FOREWORD

This book of abstracts includes all contributions of the Occupational Health scientists and practitioners coming from many countries all over the world who decided to join the 28th International Congress on Occupational Health held in Milan (Italy) from the 11th until the 16th of June 2006.

All the abstracts included were evaluated in anonymous form by a large number of colleagues in Italy and worldwide so as to guarantee scientific contents and quality of the different Congress's sessions.

Out of more than 2000 received, a total of 1346 abstracts was accepted: 636 were allocated as oral presentations in special workshops and in other 14 afternoon parallel sessions, while 710 contributions were assigned a poster presentation.

This large amount of contributions covers the manifold interests of the Occupational Health community, and emphasizes its dedication and efforts made in facing the new challenges rising in present times, in which new technologies, different types of employments and work contracts are emerging in developed countries while at the same time risks belonging to the ancient world are still at stake in developing countries and in countries under transition.

All accepted contributions are hosted in this book of abstracts, which was printed in a practical way and intended as a *vademecum* allowing participants to the Congress to keep an easy track of the scientific contents during each day.

This book, and also all the other scientific presentations related to the 28th ICOH Congress, must be attributed to the extraordinary efforts made by the *ad hoc* Scientific Committee chaired by Professor Pier Alberto Bertazzi and mostly to the tremendous dedication of Professor Angela Pesatori and Doctor Paolo Grillo, whose engagement and work on this matter started long time ago.

We also wish to thank the organizers (SPIC Congress), which followed carefully and step-by-step the printing of this book of abstracts.

Professor Vito FOÀ
President of the 28th ICOH Congress

28TH International Congress
on Occupational Health

Renewing a century of commitment to a healthy, safe and productive working life

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Oral Communications

HEALTH CARE WORKERS

KNOWLEDGE, ATTITUDE AND SAFE BEHAVIOUR OF NURSES HANDLING CYTOTOXIC ANTICANCER DRUGS IN EGE UNIVERSITY HOSPITAL

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[ID 275]

Many antineoplastic drugs are known to be carcinogenic, teratogenic and mutagenic to humans. There is thus a potential risk due to occupational exposure to cytotoxic drugs (CDs). Nurses and pharmacists are the main groups that are exposed to these drugs in the ambulatory care and hospital settings. An analytic cross sectional study was here carried out in order to evaluate the level of knowledge of nurses on the health effects and the routes of exposure
to CDs, to clarify the protective measures while handling these agents and to determine the influence of this knowledge on clinical attitudes, behaviour and actual usage of safety measures. The level of knowledge of the nurses concerning antineoplastics was not satisfactory. There is significant relationship between in service training and the level of knowledge. (X2 = 4.696, p=0.03). According to the subgroups the mean scores are as follows; mean score of antineoplastic agent knowledge is (46 +- 23), mean score of health effects is(70 +- 25), mean score of way of exposure is (73+- 26) and mean score of prevention (55 +- 18).
Findings for nurses' safety behaviour and usage of recommended health safety measures showed that, notwithstanding the rules and regulations pertaining to CDs, nurses did not comply with them fully. In service training is a very effective tool to increase the level of knowledge. This study also revealed the necessity for improvement of the working environment and the availibility of appropriate protective equipment.

ENVIRONMENTAL AND BIOLOGICAL MONITORING OF OCCUPATIONAL EXPOSURE TO SEVOFLURANE ON THE OPERATING ROOM WORKERS IN A POLYCLINIC

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[ID 290]

The occupational exposure to sevoflurane on 21 anaesthetists, 18 surgeons and 43 nurses has been evaluated in 21 operating rooms.
In 15 operating rooms sevoflurane has been used as the only anaesthetic, in the remaining ones it has been used together with nitrous oxide.
Radial dosimeters (Radiello®) have been used to measure the inhalant exposure. They have been applied to the respiratory zone of the workers for a time no less than 4 hours.
The concentrations of sevoflurane and of hexafluoroisopropanol (HFIP) have been isolated in the urine of the workers collected at the beginning (i.t.) and the end (f.t.) of their shifts.
Analysis of urinary sevoflurane (headspace/solid phase microextraction, SPME) and HFIP headspace/gastight syringe) have been carried out through a gaschromatograph linked to a mass spectrometer (GC/MS-EI) provided with an autosampler. The limits of sensibility in full scan have turned out to be equivalent to 0.01 ppm for environmental sevoflurane in a four-hour exposure time, to 0.03 µg/l for urinary sevoflurane and to 50 µg/l for HFIP.
The environmental and urinary concentrations (f.t.) of sevofluorane have turned out to be between <0,01 and 7,04 ppm (average 0.61±1.18; median 0,25 ppm) and between <0,03 e 5,12 µg/l (average 0.61±1.00; median 0.36 µg/l). The urinary HFIP concentrations (f.t.) have turned out to be between <50 e 5020 µg/l (average 374±764; median 150 µg/l).
The survey has pointed out low levels of environmental pollution due to sevoflurane. In most subjects they are lower than the NIOSH limits (95,1% < 2 ppm; 76,8% < 0,5 ppm). Furthermore, the correlations between the urinary concentrations (f.t.) of sevoflurane (CuSevo, µg/l), of HFIP (CuHFIP, µg/l) and the anaesthetic dosed in the respiratory zone (CI, ppm): CuSevo = 0.774 CI + 0.165 (n=82; r=0.887; p<0.001); log CuHFIP = 0.408 log CI + 2.471 (n=82; r=0.796; p<0,001) have turned out to be significant.

WORK RELATED FACTORS ASSOCIATED WITH ANXIETY AND DEPRESSION AMONG FAMILY PHYSICIANS IN KARACHI, PAKISTAN.

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[ID 352]

Objectives: Health care providers are considered to be at more risk for stress and other psychological problems. The objectives of this study were to assess anxiety and depression and to identify the work related factors associated with these conditions among family physicians in Karachi, Pakistan.
Methodology: A self-reported postal survey was conducted among family physicians in Karachi, the largest city of Pakistan. Socio-demographic, professional and lifestyle characters were assessed through a structured and pre-tested questionnaire. Aga Khan University Anxiety and Depression Scale (AKUADS) was used to assess anxiety and depression. Out of the 540 family physicians approached, 438 (76%) responded and 397 responses (62% males, 38% females) were found complete for analysis. Frequencies of those who scored ≥ 20 for AKUADS were calculated as positive for anxiety and depression.
Results: In all, 82% family physicians had done their basic-medical education (MBBS) for ten years or more, 51% respondents seeing hundred or more patients per week and 59% were working for more than 48 hours per week. Overall, 39% family physicians had screened positive for anxiety and depression. Work related factors that found to be significantly associated with anxiety and depression were seeing 100 or more patients per week compared to seeing less than 100 patients per week (OR=30.7, 95%CI: 2.1–6.5) and working for more than 48 hours in a week compared to those physicians who are working for 48 hours or less (OR=3.9, 95%CI: 2.5–6.2).
Conclusion: This study reveals that large number of family physicians had anxiety and depression and work related factors that were associated with theses conditions are preventable/modifiable to a larger extent. Further research and intervention studies are required to identify preventive measures in this regard and also to assess the impact of these interventions.

PREDICTORS OF EXERCISE AMONG PRACTICAL NURSES AT MAHARAJ NAKORN CHIANG MAI HOSPITAL

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[ID 394]

Although the benefits of exercise are enormous, some populations lack exercise especially among practical nurses. To promote exercise among practical nurses, essential knowledge concerning factors influencing exercise is needed. Therefore, the purpose of this study was to determine the levels of perceived self-efficacy, perceived benefits of and barriers to exercise, perceived social support, and motivation to exercise. In addition, examine the predicting ability of each of the above factors while including personal factors for exercise among practical nurses. Pender's Health Promotion Model was used as a guide for the study. Sample included 335 practical nurses from Maharaj Nakorn Chiang Mai Hospital. Research instruments included self-reported questionnaires. Data were analyzed using descriptive statistics, Pearson's product moment correlation coefficient, and stepwise multiple regression analysis. The major results demonstrated that perceived self-efficacy, perceived benefits, and motivation were at a high level. Perceived barriers and social support from family members and friends, acquaintances, or co-workers were at a low level. Average exercise or activity level for the sample was 38.47 MET x hours/week. Exercise was positively significant related to perceived self-efficacy, perceived benefits, perceived social support from family members, and motivation (r = .219, .180, .211 and .181, p < .01, respectively) and was negatively significant related to perceived barriers (r = -.215, p < .01). Perceived self-efficacy was positively statistical related to perceived social support from family members and friends, acquaintances, or co-workers (r = .214, p < .001 and r = .241, p < .001, respectively) Perceived self-efficacy, perceived social support from family members, motivation, and sex significantly contributed 15.2 percent of the variance to the prediction of exercise (p < .001) and perceived self-efficacy was the best predictor of exercise. These findings indicate that exercise promotion among practical nurses will be enhanced by incorporating perceived self-efficacy, perceived social support, and motivation.

THE CHANGING CHARACTER OF OCCUPATIONAL DISEASES AMONG HOSPITAL WORKERS

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[ID 427]

Objective: A retrospective study was performed in one of the biggest teaching hospital in France, the "Hospices Civils de Lyon", which consisted in analysing changes observed with respect to numbers and characteristics of occupational diseases among non-medical hospital workers from 1967 to 2004.
Material and Methods: Data were collected from the hospital health insurance services. For each pathology registered information regarding workers' age and sex, date of diagnosis, job title and hospital unit was analysed.
Results: compensations have been given for a total of 1,117 diseases. During the period studied, the mean number of non-medical workers was 16,000. With 84.5% of all the pathologies, women are the most concerned. They have a slightly increased risk compared to men as they represent 80.0% of the workers. Nurses and nursing auxiliary are the main professions affected. When considering all of the period, infectious diseases are prevailing with 63.1% of all the diseases registered. Most of these diseases are viral hepatitis (50.5% of all diseases and 80.0% of infectious diseases). Until 1976 viral hepatitis were the main occupational diseases indemnified. After this date their number decreased and the last cases of hepatitis B were registered in 1993. The second type of occupational diseases observed is allergic diseases (19.1%), the main aetiologies being latex (44.7%) and formaldehyde (18.1%). During the recent years the allergic diseases decreased. On the opposite, musculo-skeletal disorders are growing, the main profession concerned being technical services workers. Back pains and sciatica are also gradually increasing and affect auxiliary nurses.
Conclusion: Prevention was developed during the last decades to reduce the number of hepatitis and allergic diseases among health-care workers (hepatitis B vaccine, use of powder-free gloves). The study illustrates the efficiency of these measures. However, new diseases are coming out such as musculo-skeletal disorders and back pains.

OCCUPATIONAL HEALTH AND SAFETY ASPECTS OF RESCUE WORKERS IN TSUNAMI DISASTER IN THAILAND

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[ID 470]

The Tsunami disaster on December 26, 2004 caused many deaths and injured victims in Thailand. Following the disaster crisis, thousands of government officers, local and international volunteers came to help and support the victims. During their selflessly works, most rescue workers were prone to getting diseases and injury from their work. The aims of this study were to describe OHS situation of rescue workers during Tsunami disaster response and to explore their health effect after working.
Methods: During the disaster management, working conditions and environment at the mortuary sites and shelter sites for victims were observed and inspected. In addition, 200 professional rescue workers from two religious societies were interviewed asking about their health effect following the disaster response. The chiefs of rescue teams were also interviewed about the preparedness and management for disaster management.
Results: At the morgue, rescue workers had to collect and handle corpses and human remains. They were exposed to chemicals, heat, and shaft objects in their work. Relevant organizations were aware of these hazardous factors and tried to improve such conditions and environments. Regarding the interview of their health effect, most of them were healthy after finishing their work. Only few reported of getting some minor illnesses such as headache (29.3%) and common cold (25.2%). Almost rescue workers (90%) had been trained how to use PPE before work and 76% of them were educated how to protect themselves from getting infection from their work.
Conclusions: Rescue workers were key persons in disaster response. Their works were dangerous and they were prone to getting occupational diseases and injuries. Although the study showed their little health effect in responding to the Tsunami disaster, the preparedness and management of the teams were still very important.

PREVENTION AND MANAGEMENT OF HBV AND HCV INFECTIONS IN HEALTHCARE WORKERS: A VHPB CONSENSUS STATEMENT

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[ID 573]

At a Viral Hepatitis Prevention Board (VHPB) meeting in Rome, 2005, a consensus was reached on prevention and management of HBV and HCV infection as an occupational risk, in addition to existing guidelines for infected healthcare workers (HCWs) and (para)medical students (Gunson et al. J Clin Virol 2003; 27:213-230). The following items were considered as crucial:
- Application of universal infection control precautions – regular review of practice to ensure compliance with recommendations.
- Prevention of needlestick injuries through implementation of safer procedures and using safer devices.
- Panels must be made available at national level for counselling HBV- and HCV-infected HCWs.
- Hepatitis B vaccination of HCWs and students early on in their careers; identification of poor responders and giving appropriate advice.
- Definition of criteria for restriction of practice for HBV-infected HCWs involved in exposure-prone procedures.
- Management of HCV-infected HCWs: further discussion needed.
- Considering ethical and legal issues, including safeguarding privacy and confidentiality.
- Assessment of risk and costs before deciding on threshold values for immunity or granting or withdrawing permission to work.
- Countries should manage their own epidemiological situation, but general consensus on the need for universal hepatitis B vaccination.
- The VHPB urges countries without policies on restriction of working practices for infected HCWs to consider this situation as a matter of priority.

A preliminary survey on hepatitis B vaccination policies for HCWs was undertaken early 2005 among the 25 Member States of the European Union, and Switzerland. Results from six countries (Belgium, France, Italy, Luxembourg, the UK, Switzerland) showed variation in policies regarding (possibly mandatory) vaccination, boosters, and serological testing. All six countries vaccinate HCWs at the start of their careers or at (para)medical and/or nursing schools. A more complete survey is currently performed and its results will be presented at this congress.

FACTORS PREDICTING NURSES' CONSIDERATION OF LEAVING THEIR JOB DURING THE SARS OUTBREAK IN TAIWAN

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[ID 643]

Taiwan was affected by an outbreak of Severe Acute Respiratory Syndrome (SARS) in early 2003. We studied the factors predicting nurses' consideration of leaving their job using a questionnaire survey of 753 nurses. Nearly three quarters of participants believed they were "at great risk of

exposure to SARS", 49% felt "an increase in workload", and 32% felt that people avoided them because of their job. Seven factors were identified by principal component analysis. Approximately 8% of nurses not only considered that they should not care for SARS patients, but were looking for another job or considering resigning (categorized as "considering leaving the job"). Despite most nurses in Taiwan perceiving a great risk of exposure to SARS at work and fearing contracting this illness, only less than one tenth of nurses considered leaving their jobs. Main predictors for the nurses' consideration of leaving their job were shorter tenure, increased work stress, perceived SARS fatality, and affected social relationship.

PREDICTORS OF EXERCISE PARTICIPATION AMONG THAI FEMALE HOSPITAL NURSES

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[ID 659]

Female nurses have a greater risk of developing work-related back injury compared with other health care professionals. Few Thai nurses participate in exercise behavior and little is known about factors that influence their engagement in exercise. This study was designed to clearly ascertain the relationship among exercise participation and selected personal factors, perceived benefits of and barriers to exercise, perceived self-efficacy, perceived social support, job demands, and motivation. Social cognitive theory and the Health Promotion Model guided this cross-sectional study. Thai language translations of the Perceived Physical Ability scale, a revised Motivation for Physical Activities Measure, the Exercise Benefits/Barriers Scale, social support for exercise, psychological and physical demands scales, and the Nurses' Health Study II Activity and Inactivity Questionnaire were distributed to all Thai female nurses at Maharaj Nakorn Chiang Mai Hospital, Thailand. The number of completed questionnaires returned to the investigator were 970 (87% response rate). The results demonstrated that there was a significant relationship between exercise participation and the set of selected personal factors, perceived benefits of and barriers to exercise, perceived self-efficacy, perceived social support, and interactions (R^2 = .17, p < .0001). The addition of job demands and interactions between job demands and other predictor variables did not significantly contribute to the prediction of exercise participation after accounting for the contribution of the set of those previous variables. The addition of motivation significantly contributed to the prediction of exercise participation after accounting for the set of those previous predictor variables, t (947, .975) = 2.81, p < .01. Not all variables included in the models were significant independent predictors of exercise participation. The significant predictors found in this study are essential in planning for a population-specific intervention to facilitate increased exercise participation.

BURNOUT AND CRITICAL INCIDENTS AMONG JAPANESE NURSES

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[ID 698]

Material and methods. Nurses at the Tokyo Medical University Hospital answered a questionnaire concerning critical incidents in treatment and care of the patients. N = 696. Response rate: 96%. The questionnaire included the questions of the three scales of the Copenhagen Burnout Inventory: Personal Burnout, Work-related Burnout, and Client-related Burnout. All three scales had very satisfactory internal reliability.
Results. The nurses reported on 10 kinds of critical incidents during the last 6 months. The highest prevalences were reported in relation to: mistakes related to administrating "medication" (52%), "injections" (52%), and "lack of patients' supervision" (41%). A total of 88% of the nurses reported at least one category of incidents. We found significant positive associations between all three burnout scales and one or more of the incidents. Client-related Burnout showed significant positive associations with the following categories of incidents: "medication", "transfusions", "medical examinations", and "lack of patients' supervision". For example, the prevalence of incidents in relation to "medication" was 41%, 53%, 52%, and 62% in the four quartiles of nurses with low, rather low, rather high, and high levels of Client-related Burnout. For "lack of patients' supervision" the corresponding numbers were 29%, 38%, 45%, and 51%. For incidents related to operations/anaesthesia we unexpectedly found an inverse association with more incidents among nurses with low levels of burnout. Analyses with the two other CBI burnout scales showed a somewhat differential picture and fewer significant associations. The only type of incidents that was consistently related to all three burnout scales was "medication".
Conclusions. We found a number of clear associations between Client-related Burnout and critical incidents in care of patients. Results from this cross-sectional study need to be confirmed in longitudinal and other studies. If the associations are causal the results have important implications for the quality of treatment and care on hospitals worldwide.

MEDICAL RESIDENTS: PSYCHOSOCIAL DEMANDS AND BARRIERS AT WORK FOR HEALTHY WORK-LIFE BALANCE

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[ID 899]

Background: Medical residents combine their education to become medical specialist with full work activities and have to keep up a healthy work-life balance. The prevalence of work-related complaints is high and unnecessary drop-outs should be prevented.
Aims: To explore the least favourable psychosocial demands, and barriers in the work environment and solutions for a healthy work-life balance in Dutch medical residents.
Methods: In 2005, five group meetings were held with 29 medical residents from the pediatric resident population in one academic medical center. The focus was set by discussing two questions: what are the least favourable psychosocial demands in the educational, occupational, and personal environment that influence work-life balance negatively and what solutions are seen by them for future interventions.
Results: Least favourable aspects of work and educational environment, are: 1) too little social support from supervisors and medical staff in terms of professional feedback, appreciation and communication styles, 2) work organisation differences between wards, 3) educational forms, 4) too little time for personal growth and professional development, 5) time-constraints, 6) mental and emotional workload, 7) irregular and long working hours, 8) need for recovery and work-related fatigue. Aspects that negatively influence their work-life balance: too little (time) control to arrange child care, or social life with partner or friends sufficiently, unsafe culture to talk about children related problems, partner careers, unbalanced loyalty. Suggestions for future interventions, were: coaching the supervisors in their tasks and activities towards residents, re-organization of wards activities through which time is usable more efficiently by residents, peer-coaching by periodical group meetings for residents to exchange experiences.
Conclusion: The classic medical psychosocial work environment does not fit present ideas on how medical professionals should be educated and coached during residency. The psychosocial needs of these youngsters may start interventions that should be evaluated.

ETHICAL LOAD AS A STRESS FACTOR IN FINNISH HEALTH CARE

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[ID 995]

The rapid increase in medical knowledge and concomitant increase in specialization, as well as the rising number of old citizens with chronic diseases, increases the costs of medical services and emphasizes the need for priority-setting in health care. In the third national survey of the Finnish social and health care staff, 2870 respondents (67 % of those approached) answered a questionnaire on their working conditions and well-being. This report is based on the answers of the 1669 respondents working in health care. Their experience of stress was found to be related not only to several previously well known stress factors, but also to a factor, which may be called an "ethical work load". This was determined on the basis of the answers to four question: "How often a) are you confronted with ethical problems, b) do you deliberate on the ethically best way of acting, c) are you unsure about what is ethically the right thing to do, and

d) are you unable to act in the way you consider ethically correct due to restricted resources) with five answer alternatives for each (Cronbach alpha 0.74). The experience of stress was strongly ($p<0.001$) related to dissatisfaction with the quality of one´s own performance (risk ratio 2.8), small possibilities to affect working conditions (2.7), unclear understanding of the aims of the activities (2.2) and "ethical work load" (2.1). Due to the rapid change in health care, many organizations lack up-to-date guidelines concerning priority setting in everday work. Active development of ethical guidelines may thus be one way to decrease the experience of stress among health care work.

MUSCULOSKELETAL DISORDERS

UPPER LIMB BIOMECHANICAL OVERLOAD IN THE CLOTHING INDUSTRY

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[ID 257]

INTRODUCTION – We collected environmental and medical data in a clothing factory with the aim of evaluating the upper limb biomechanical load due to repetitive movements, force and postures.

METHODS – A total of 25 different tasks were analyzed by calculating HAL (Hand Activity Level) and PF (Peak Force) following the ACGIH method. The peak value of manual force was calculated on the basis of "Latko scale". Main physical environmental agents (climate, lighting and noise) were also investigated. The medical survey was articulated in three steps: 1) Questionnaire (given to all the 280 female workers employed in the plant), concerning personal habits, medical history and subjective evaluation of workplace; 2) Special medical examination, performed on 67 selected workers and compared with a homogenous control group of 70 employees considered at low risk of getting RSI. 3) Onsite ultrasound examination on 37 selected subjects. Current statistical tests were applied.

RESULTS. Out of 25 tasks analyzed, 8 (32%) turned out to get over TLV value, 5 (20%) settled between TLV and AL, 12 (48%) below the AL (Fig.1). Environmental investigations showed a fairly good microclimatic, acoustic and lighting asset, compared with reference standards (ISO 7730/1984, ASHRAE 55/92; UNI 10380/94; UNI 94/32 2002, ISO 90/1999).
Recovered questionnaires were 248 (88.6 %). Average age of workforce was 41 (±7.6%) and overall length of service was 23.4 years (±7.8), of which 18 (± 9.5) spent in this clothing factory. Musculoskeletal symptoms turned out to be positive for neck in 18.1% of workers, shoulders in 13.7%, wrists in 12.6%, hand fingers in 17.6% and legs in 19.5 %.
Medical examination showed positive uni/bilateral results to Finkelstein (34.3%), Tinel (40.3 %) Phalen (43.2 %) and Hawkins (28.3%) tests with a significant statistical difference ($p<0.002$) when compared to the control group. A correlation between positive outcomes of Finkelstein test and the specific sewing activity was found ($p<0.05$). The ultrasound examination of upper limb was positive for some median nerve abnormalities in 13 cases (35,1% of the examined people). Nine different shoulder abnormalities were found as well.

CONCLUSIONS. The study has highlighted that 52 % of work tasks were above the AL value with a significant higher risk for women employed in sewing activities. In these cases we suggest to introduce improvements like ergonomic changes and increasing the number of micro pauses and breaks between two successive working cycles. RSI risk increases with the length of service even though job rotation was applied. Our data suggest that clothing employees are at high risk of developing CTS and De Quervain syndrome when compared to other workers.

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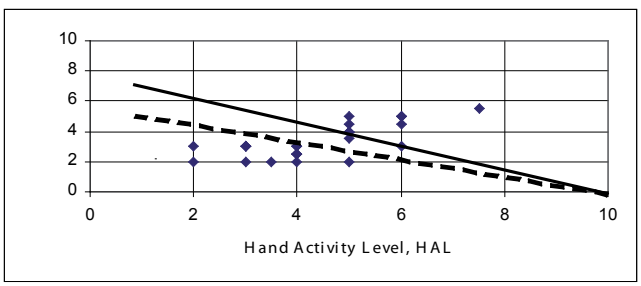

Figure 1 - Distribution of HAL values in the analyzed tasks
(Straight line indicates TLV value, dotted line, Action limit)

BULLYING IN THE WORKPLACE, STRESS AND MUSCULOSKELETAL DISORDERS AMONG TEACHERS

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[ID 313]

It is well acknowledged that bullying in the workplace causes stress, depression, mental health problems. The aim of our study was to investigate the possible effects of bullying on musculoskeletal disorders.
Methods. We performed a study among teachers in Kaunas, Lithuania in 2004. 738 teachers in 7 Kaunas secondary schools were investigated. We used the Norwegian version of the Negative Acts Questionnaire (S Einarsen) and collected the information about the diagnosed by the physicians' health outcomes during the last 6 months. Totally 470 teachers answered the questionnaire (response rate 63.7%). We used SPSS 10.0 for windows in the statistical analysis and the logistic regression in the evaluation of bullying effect on health outcomes.
Results. Our results indicated that 6.4 % of the investigated teachers experienced severe bullying in the workplace, 19.1% were victims of occasional bullying. Teachers, reporting high levels of stress, had a statistically significant 2.1-fold increase in physicians' diagnosed musculoskeletal disorders. The age-adjusted Odds ratio of occasional bullying for musculoskeletal disorders was 1.93; 945% CI 1.05-3.52.
Conclusions. Bullying in the workplace affects the health of the employees, forcing the development of psychosocial diseases (musculoskeletal disorders) and appears to be a great problem in work organization. Measures for the improvement of the psychological climate in the workplace should be implemented for health promotion strategies.

HOTEL HOUSEKEEPER INJURIES: ANALYSIS IN THE FACE OF INCOMPLETE DATA

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[ID 1408]

In 2003, 35% of the 20,750 lost time injuries or illnesses in the hotel industry in the United States were suffered by housekeepers placing them amongst the top 20 occupations for days of work lost. We have reviewed the legally required OSHA logs of 56 hotels from 20 cities throughout the United States. Between 1995 and 2004, 2,101 work related injuries and illnesses amongst housekeepers were reported. Hotel size varied from 130 to 3,000 rooms, and 1 to 33 hotels per hotel chain.
The largest categories of injuries were sprains/strains with 34%, bruises/contusions at 16%, cuts/lacerations with 12%, and soreness/pain at 10%. The highest proportion of injuries occurred in the upper extremities, and the second most common location was the trunk-back.
The injury rate varied between hotel chains from 7.8 to 18.1 injuries per room-year with a mean of 12.6, and from 4.1 in an eastern city to 26.7 at an airport in the west. Median days away from work varied between chains from 5 to 12 with a Median of 9. The US Bureau of Labor Statistics reports a median of 6 for this category of worker. Ergonomic back injury (as calculated by the authors) accounted for 16 % of all injuries in the database with a median days away from work of 12, while the BLS reports a median of 5 days for all workers with back injury.
This preliminary study confirms that housekeepers are at considerable risk of occupational injury and that the back injuries suffered are likely to be more severe than average. Further, there appears to be considerable variation in injury experience within and between differing hotel chains, suggesting that the rudimentary analysis provided by a room-year approach may be useful in identifying specific areas to emphasize for prevention with in the hotel industry.

TEN YEARS FOLLOW-UP STUDY (1995-2005) AMONG A DANISH COHORT OF FLOOR-LAYERS

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[ID 481]

The present study was performed in order to examine and compare the results from two questionnaire studies carried out in 1995 and 2005, among a cohort of floor-layers and graphic designers (controls). The aim was to illustrate the pattern of symptoms and if possible whether there had been

any change and furthermore to evaluate the degree of knee disorders and especially their reversibility. In addition the prospective of occupational and health implications were analysed.
The first questionnaire included 151 floor-layers and 388 graphic designers, the follow-up 116 and 336 respectively, all between ages 40-70 years. Employed as well as unemployed and retired were included. The participants were asked about present and previous employment, medical disorders, knee accidents and operations, participation in sports, height and weight. They were also asked if they had had musculoskeletal complaints during the last 12 months, during the past 7 days and to quantify the duration of sick leave during the last 12 months (1-7 days, 7-30 days, > 30 days).
Compared with the study from 1995 there was a similar pattern of musculoskeletal complaints with a high prevalence of knee and low back symptoms. Employed floor-layers reported more knee (OR=2,15; 95% CI=0,97-4,79) and low back (OR=2,95; 95% CI=1,01-8,57) symptoms compared with unemployed and retired floor-layers. There was a high frequency of self-reported bursitis (OR=7,32; 95% CI= 3,84-13,99). Knee complaints among the group of unemployed and retired floor-layers during the last 12 months were also significant compared with graphic designers (OR=1,74; 95% CI=1,02-2,94).
The prevalence of complaints among employed floor-layers was higher compared with unemployed and retired floor-layers, indicating a certain extent of reversibility of the complaints. On the contrary, an irreversible part cannot be excluded, because floor-layers who did not work within their trade any longer still had more complaints than graphic designers.

MUSCULOSKELETAL DISORDERS AMONG RAGPICKERS IN A SOUTHERN CITY IN BRAZIL

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[ID 243]

Ragpickers are informal workers who collect recyclable materials to earn a small wage. Their life and working conditions are extremely precarious. We examined ergonomic hazards and musculoskeletal pain among a cohort of ragpickers in Pelotas, a city in southern Brazil. Two comparison groups were available: a matched sample of non-ragpickers from the same poor neighborhoods, and a random sample of the general population of Pelotas. The cross-sectional study gathered data by interview on 990 individuals in 2004. Musculoskeletal disorders were assessed using standardized nordic questionnaire. Ragpickers reported higher prevalences for most awkward postures and ergonomic exposures compared to neighbors with other demanding manual jobs. The prevalence within the last 12 months of low back pain, lower extremity pain and upper extremity pain among ragpickers were 49.2%, 45.1% and 34.9%, respectively; levels similar to those reported by neighborhood controls. Both ragpickers and non-ragpickers reported considerably higher ergonomic exposures, and more prevalent low back pain, than the general population. While ragpickers are an unconventional and poorly studied occupation, and suffer many hazards, their ergonomic stressors appear to be comparable to those of other physically demanding manual jobs.

MUSCULO-SKELETAL DISORDERS IN CONSERVATORY CLASSICAL PIANO STUDENTS

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[ID 794]

Work-related musculoskeletal disorders (WMSDs) are not specific to any type of job and affect workers in a wide variety of occupations, usually take months or even years to develop and are a major cause of lost time from work, worker's disability and health care costs. The focus has been on back injuries and musculoskeletal disorders in offices and industries but evidence indicate that musicians are also vulnerable. Playing-related musculoskeletal disorders (PRMDs) typically affect the neck, back, upper extremities, facial musculature and often become chronic, painful, disabling health problems that may last from 2 to 5 years.
A four parts questionnaire administered to piano students of Conservatory "T. Schipa" of Lecce, southern Italy, was used to determine the prevalence of instrument-related problems. Among 121 responders, 48 (39.6%) were considered affected according to pre-established criteria. The disorders afflicted the following regions: neck (31.2%), thoracic spine (22.9%), wrist (20.8%), fore-harm and shoulder (18.7%), harm (16.6%), hand and fingers (12.5%), lumbar spine (12.5%), elbow (6.2%). Fifty percent of affected had more than one problem. Univariate analyses showed statistical differences for mean age, number of hours spent playing per week, interval without breaks, lack of sport practice and acceptability of "No pain, no gain" criteria in students with music-related pains compared with not affected pianists. No association with hand size was found in pianists with only upper limbs diseases. The multivariate analyses performed by logistic regression confirmed the independent association for the risk factors age, lack of sport practice and acceptability of "No pain, no gain" criteria. Differently from several studies older students were more frequently affected and no difference in the prevalence rate was found in females. Findings suggest a probable causal contribution of fixed postures in the development of PRMDs in pianists in addition to repetitive movements of upper limbs.

EFFECT ON THE BIOMECHANICAL LOAD OF THE NECK AND SHOULDERS OF AN INTERVENTION ON WORKING TECHNIQUE AMONG HAIRDRESSERS

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[ID 1064]

Introduction: Neck and shoulder pain has been associated to work with elevated arms without support in previous studies, and hairdressers are at risk for this kind of exposure. The purpose of this paper is to analyse the effect of an intervention on working technique to reduce biomechanical workload.
Methods: All employees in member salons of the Oslo region of the Norwegian Hairdressers Association were invited to answer a three-page questionnaire including background data and musculoskeletal complaints. A sub-sample was selected for the intervention study among the 188 responders. The inclusion criteria were right handed females between 20 and 45 years of age, with more than 30 working hours per week and not more than 2 weeks sick leave last year. Forty-nine subjects fitted to these criteria and 38 volunteered to participate. Two groups were randomly formed; both got short written and vocal information on beneficial working technique and in addition one group got a personal visit by ergotherapists with further information on the same issues. This concerned pauses, reduced work with elevated arms and use of helping devices. Eighteen subjects got only the first intervention and 20 got the additional intervention. The hairdressers were subject to measurements of muscle activity and posture/movements before the intervention and 4 weeks after the additional intervention. Electromyography of the trapezius muscles and inclinometry of the shoulder joints were performed bilaterally. Only results from the specific hairdressing tasks are presented here.
Results: There were no significant differences at baseline between the two intervention groups. There was no significant effect of the intervention on the muscle activity. However, the intervention decreased significantly the occurrence of high elevation angles for the right arm. For instance, the fraction of time with arm abducted or flexed above 90° decreased from 4.0 % to 2.5 % of the working time.

PREVALENCE AND RISK FACTORS OF WORK-RELATED MUSCULOSKELETAL DISORDERS IN CLOTHING INDUSTRY

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[ID 163]

The musculoskeletal disorders (MSDs) constitute one of the first causes of occupational diseases in Tunisia and are met in several sectors. The sector of the clothing industry appears among the most concerned. This paper attempts to determine the prevalence and the risk factors of MSDs of the back and the upper limbs in this population.
Method
The study considered a representative sample of 500 female workers taken from 30 different companies of the clothing sector in the area of Monastir. A questionnaire of 64 questions related to the general charac-

teristics of the workers, their professional seniority, their health, their working conditions and their complaints during the last 12 months on the level of the low back, the neck and the upper limbs was filled during an interview with an occupational physician. All workers contacted had accepted to respond to the questionnaire. The analysis of the data made it possible to determine the prevalence of the MSDs, a logistic regression was used to determine the risk factors. A semi quantitative analysis using video recordings was then conducted to study the body postures at the most frequent three types of activities also responsible for most of the MSDs. 30 minutes video recordings were done on a representative sample of workers and the analyses of these recordings was made after a focus on image every 15 seconds, on each image one noted the position of the neck, the wrist and the low back.
Results
The prevalence of MSDs over the last 12 months was 75.8% for the low back, 60.4% for the neck, 65.4% for the shoulders, 20.0% for the elbows and 45.2% for the wrists. The main risk factors derived from logistic regression analysis are age (OR=1.68, CI 1.21-2.33) health opinion(OR=2.6, CI 1.02-6.62), weight(OR=1.45, CI 1.16-1.80) and efforts(OR=8.14, CI 4.91-13.48). The ergonomic study showed high percentages of the time in extreme postures for the three types of activities.
Conclusion
The study confirmed a high prevalence of work related MSDs in clothes industry. This prevalence is higher than that reported in the literature for corresponding sectors. This can be explained by a greater physical load at work and at home. As this last load can be decreased in the short term, the preventive strategy must be based on ergonomic actions in the workplace.

RISK OF UPPER EXTREMITY BIOMECHANICAL OVERLOAD IN A AUTOMOTIVE FACTORY

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There are a lot of working activities that lead to pathologies produced by biomechanical overload of the upper limbs. Among these, assembly line operations performed at fixed and/or fast rythms such as those used in automobile plant, car-body, electromechanical and iron works industries etc. can be mentioned.
The objective of this study is the assessment of biomechanical overload risk on upper limbs in 13 assembly lines of an automobile factory by means of the TLV-ACGIH (HAL method). Evaluation of the exposition level to biomechanical overload on upper limbs was performed for all examined posts/functions. In particular, assessment through calculation of professional exposition level was performed by using a special method validated on an international level and acknowledged and applied also on a national level (TLV-ACGIH-HAL method). Moreover, the second evaluation of risk was performed on the basis of improvements, enabling to diminish repetitiveness and eliminate Pf.
During the first evaluation, nine assembly line presented professional exposition values above danger levels. The second evaluation revealed considerable reduction of professional exposition level; only for one line, which presented professional exposition level value superior to TLV, a level between TLV and AL was obtained. All other line values drastically diminished, placing themselves at or below the AL value.
In conclusion, risk assessment of biomechanical overload of upper limbs performed by means of the HAL method allowed to identify the greatest risk-bearing positions and consequently to back structural-organizational interventions (modification of work places, introduction of mechanically-controlled instruments, rotation among various work places) and to evaluate the reduction of professional exposition level.

A CASE OF WORK RELATED UPPER LIMB DISORDER IN AN ENGLISH TOMATO GROWING NURSERY

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Work-related upper limb disorder (WRULD) is an umbrella term for a range of disorders of the hand, arm shoulder and neck. It includes specific diagnoses eg carpal tunnel syndrome, as well as other conditions without specific symptoms or diagnoses eg repetitive strain injury. The latter are usually characterised by a non-specific diffuse forearm pain, and represent a diagnosis of exclusion that has been associated with working posture, repetitive motion, force, psychosocial factors and the working environment.
A case is described of work-related upper limb disorder in a tomato grower from Kent, England who presented to an occupational health department. The workplace was visited and assessed, whilst taking photographs and videos of the occupational health issues identified. Rapid Upper Limb Assessment (RULA) scores had been derived for the workplace activites, and these were used to assess the risk of WRULD and implement appropriate control measures. The hazards and risk assessment of the workplace are described in detail as well as the range of clinical investigations and management conducted by the specialist. The control measures implemented in the workplace are discussed.
The RULA scoring process is analysed in detail and its usefulness in assessing the risk from repetitive manual activities is demonstrated. It is compared with other tools for assessing the risk of WRULD from work activities.

SICK-LEAVE BECAUSE OF DEPRESSION AND BACK-PAIN AMONG SLOVENE WORKERS

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Introduction. Musculoskeletal diseases and mental and behavioural disturbances are among first four leading causes of sick leave in Slovenia. Several researches indicate that length of sick-leave depend on socio-economic variables like workplace, marital status, average wages. We explored the connection between other potentially relevant variables using routinely collected data regarding the workers, their physicians, and their employers to get a better background for preparing preventive programmes.
Methods. A national database, implemented in collaboration between the Institute of Public Health and the National Insurance Institute, contains information on all prescribed forms for sick leave in Slovenia. We linked this data to the database of physicians who are in charge to prescribe sick leave and the database of employers managed by National Insurance Institute. We analysed the relationship between the number of days lost because of depression or back pain and worker (gender, age), employer (number of employees) and physician characteristics (gender and age).
Results. The number of records analysed was 53,777. The average length of sick leave due to depression and back pain was 59 and 27 days, respectively. Men stay off work on average 66 days due to depression and women 56 days; no difference was observed for back pain. Young workers' absences were shorter. Mean length of sick leave for depression symptoms was 80 days in small (<5 employees) enterprises versus 54 days in larger ones; for back pain was 41 and 25 days, respectively. Female physicians prescribed less days off (57) for depression than their male colleagues (63). Young physicians approved fewer days off (51) than older doctors (61) for depression, while no difference was found with regard to back pain (27 days).
Conclusions. Our study suggests that workers' gender and age, size of enterprises and physicians' characteristics may have an important influence on sick-leave length for depression and back pain. These findings could be useful for targeting preventive programmes.

OSSIFICATION OF THE STYLOHYOID LIGAMENT: A POSSIBLE REASON FOR OCD

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[ID 1397]

Introduction:
Occupational cervicobrachial disorders (OCD) causing neck and shoulder pain are one of the major reasons for sick days and compensation claims in Germany. Besides muscular or and degenerative changes of the cervical spine, diseases of the rheumatoid sphere, infections or tumours may be possible ethiologies for the development of occupational neck pain. More than 60 years ago, it was first noted that ossification of the stylohyoid ligament can cause neck and throat pain. Although the reported incidence of radiographic stylohyoid ossification accounts for up to 28%, the relationship to OCD has yet not been investigated. Therefore the aim of our study was to compare office workers with and without OCD and to estimate the prevalence rates of stylohyoid ossification in both groups. Furthermore the impact of several important work-related and non-occupational risk factors has been analyzed.
Patients and Methods:
We enrolled 350 office workers (male 125; female 225; mean age 47±18y), working an average of 6h daily on a workstation. According to the incidence of cervicobrachial disorders (duration<1year), patients were split up into group I (no disorders; n=180) and group II (cervicobrachial disorders; n=170). All patients completed a survey about health and working conditions as well as measures on pain and function. Conventional X-rays as well as cervical MRI was performed in all patients and analyzed. Associations between incidence of stylohyoid ligament ossification and pain were determined by logistic regression analysis
Results:
The prevalence of stylohyoid ligament ossification in group I (no disorders) was significantly lower in comparison to group II ($p<0.001$). No differences according to physical workload and ergonomic problems between both groups could be detected.
Conclusion:
Ossification of the stylohyoid ligament complex might represent an important reason for occupational cervicobrachial disorders. However, larger patient numbers are needed to analyze occupational reasons for the development of this disease complex.

PHYSICAL AND PSYCHOSOCIAL RISK FACTORS AT WORK IN RELATION TO (SICKNESS ABSENCE DUE TO) MUSCULOSKELETAL SYMPTOMS; IS THERE A GENDER DIFFERENCE?

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[ID 1494]

Introduction: Many studies reported higher prevalences of (sickness absenteeism due to) musculoskeletal symptoms for women than for men. One explanation is that the same exposure to a risk factor might have a larger effect on women than on men. The objective was to determine gender differences in the relations between exposure to work-related risk factors and (sickness absenteeism due to) low back, neck, shoulder and hand-arm symptoms.
Methods: Data of a prospective cohort (SMASH) with a follow-up period of 3 years was used. Exposure to risk factors and musculoskeletal symptoms were assessed using questionnaires. Sickness absenteeism data was obtained from companies. Gender ratios were calculated to determine differences in risk. Gender ratios higher than 1.33 (women having a higher risk) or lower than 0.75 (men having a higher risk) were regarded as relevant.
Results: Multivariate GEE analyses demonstrated relevant gender ratios for many risk factors. Except for bending the wrist and bending the neck backwards (GR range 1.52-2.55), men generally had higher risks of symptoms (GR range 0.50-0.68). Women had a higher risk of sickness absence associated with work-related exposure to twisting the upper body, uncomfortable postures, twisting the wrist, bending the neck backwards, co-worker support, and supervisor support (GR range 1.66-2.63). For driving vehicles, hand-arm vibration, squeezing, working above shoulder or below knee level, reaching, twisting the neck, job demands, and skill discretion the GRs were lower than 0.75. Job satisfaction showed inconsistent results: for sickness absence due to back symptoms and absence due to neck-shoulder-hand-arm symptoms the GR was 1.78 and 0.50, respectively.
Discussion: On beforehand, it was expected that women would be more vulnerable to exposure to work-related risk factors than men. As the results show that in many cases men were more vulnerable, this study could not explain the gender difference in musculoskeletal symptoms among workers.

Table 1.Overview of relevant gender ratios (GR). GR>1.25 women having a higher risk;
GR< 0.75 men having a higher risk.

	Musculoskeletal Symptoms				Sickness absenteeism	
	Low back	Neck	Shoulder	Arm-hand	*Low back*	Neck-shoulder-arm-hand
Lifting loads >25 kg	0.67				1.30	
Working below knee level		0.72	0.63	0.68		0.66
Working above shoulder level						0.58
Hand-arm vibration						0.75
Reaching						0.58
Bending the neck backwards		1.66	0.53	0.67		0.71
Bending the neck forwards		1.99		2.00		
Twisting the neck			1.46			1.75
Bending the wrist				0.65		
Twisting the wrist						0.47
Force exertion				0.75		
Job satisfaction					1.89	0.71

Discussion: In was hypothesized that female workers would be more affected by exposure to work-related risk factors. As the results showed the opposite, this study could not explain the gender difference in musculoskeletal symptoms.

LAPTOP COMPUTER INPUTTING DEVICES: EFFECT ON UPPER TRAPEZIUS MUSCLE ACTIVITY AND PERCEIVED COMFORT

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[ID 538]

Background
There is a trend indicating that laptop personal computers are replacing desktop computers at home and in the workplace. Although previous studies have examined the effects of different types of external inputting devices, there is little evidence examining the effects of an external mouse versus integrated laptop touchpad inputting devices.
Aim
To compare Upper Trapezius (UT) muscle activity and levels of perceived comfort when using the integrated touchpad on a laptop personal computer (LPC) and a mouse inputting device.
Methods
Utilising an experimental study design, 10 participants performed a 20-minute computer task on a LPC using both the integrated touchpad and a mouse inputting device. Bilateral surface electromyography (EMG) was recorded at four time periods (5, 10, 15 and 20 minutes). All EMG data were normalised as a percentage of participants' maximal voluntary contraction (%MVC). Additionally, a 10 centimetre visual analogue scale (VAS) was used to measure perceived comfort.
Results
Mean UT muscle activity was 5.27%MVC and 8.08%MVC for the right and left sides respectively when using the mouse. When using the touchpad, the levels were 14.72%MVC and 9.59%MVC for right and left sides, representing almost a threefold increase ($p<0.05$) for the right UT when computer tasking with the integrated touchpad compared to the mouse. Left UT muscle activity levels were not significantly different ($p>0.05$) at any of the four time periods when comparing the two devices. Furthermore, subjects perceived significantly less comfort ($p=0.006$) when computer tasking with the integrated touchpad compared to the mouse, with mean VAS scores of 4.8 for the touchpad and 9.5 for the mouse (0 = discomfort, 10 = comfort).
Conclusions
The findings from this study provide evidence that computer tasking using the laptop's integrated touchpad can result in adverse increases in UT muscle activity compared to a mouse inputting device.

EPIDEMIOLOGY IN OCCUPATIONAL HEALTH

INTERNATIONAL EVALUATION OF INJURY RATES IN COAL MINING: A COMPARISON OF RISK AND COMPLIANCE BASED REGULATORY APPROACHES

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Objectives: Despite advances, coal mining remains one of the world's most dangerous professions. In the United States (U.S.), the mining industry is largely governed by a complex framework of health and safety regulations administered through a compliance-based regulatory structure. In contrast to this conventional approach, the Australian mining industry began evaluating the merits of a regulatory system predicated upon risk management and analysis in 1992, followed by its formal adoption in Queensland (QLD) in 1999 and in New South Wales (NSW) in 2002. The primary objective of this study was to determine whether implementation of the risk management approach was temporally associated with a more rapid decline in lost time injuries (LTIs).
Methods: Accident and illness surveillance databases associated with bituminous coal mining in the U.S., QLD and NSW were analyzed for the years 1996-2003. Variable definitions and data coding were harmonized between the countries. Generalized estimating equations were constructed to analyze rates of change in incident rate ratios (IRR) of LTIs among coal mines, after adjusting for confounding.
Results: From 1996-2003, LTIs per 100,000 miners declined 20% in the U.S. as compared with 78% and 52% in QLD and NSW. During the same period, the adjusted IRR for each region decreased by 11%, 72% and 44%, respectively.
Conclusions: During the study period, the rate of LTIs decreased markedly more in Australia than in the U.S. The implementation of a risk-based regulatory approach in Australia may provide one potential explanation for this differential effect.

RISK OF WORK INJURIES BY SOCIAL CLASS AND EDUCATIONAL LEVEL IN ITALY

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Higher rates of work injuries are found in less educated groups and in lower social class. The association with low education has been attributed to different mechanisms, among which employment in jobs with a higher risk of injury, unsafe work practices due to lower risk perception, or higher exposure to non-occupational risk factors. Educational level is thought to represent mainly the lifecourse availability of cultural and material resources, whereas social class would be more a descriptor of the availability of relational ones, intended here as social power, and of working conditions. Social class is based on broad categories, in which a high variability in cultural and material resources is expected. Our hypothesis is that such variability concerns also the risk of work injury, and that within each social class education is correlated with such a risk.
Objectives of this study were: 1) to estimate risks of injury by social class and educational level, controlling for each other in a logistic multivariate model, in order to disentangle their respective effect; 2) to assess if there was a significant trend in injury risk by educational level within social classes. The data derived from the 1999 National Survey of the Italian Labour Force; only employed subjects older than 14 years were included in the analysis (43,980 males and 25,636 females). Social class and educational level were both categorized in four groups.
The risk of having undergone at least one work injury in the last year was significantly higher in the working class, compared to bourgeoisie, and in the less educated compared to the highest. From multivariate models both factors remained significant, indicating that education would exert an independent effect on injury risk. Only in males, all social classes showed a significant trend in risk by education, except for the working class, where differences were smaller. At least among men, education seems able to distinguish subgroups hierarchically ordered for injury risk within social classes, and it should concur to their construction.

CARPAL TUNNEL SYNDROME: SPECIFIC ANALYSIS OF GERMAN WORK DISABILITY DATA REGARDING SINGLE OCCUPATIONS

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Problem: Age, gender, hormone balance and metabolic disorders, such as diabetes mellitus, are generally accepted as risk factors for carpal tunnel syndrome (CTS). Additionally, specific work activities are widely and controversially discussed as risk factors. Repetitive movements, forceful grip, extreme extension / flexion of the wrist or vibration are considered risk factors.
Aim of the study: A specific analysis of work disability data could provide basic information on which jobs have a higher prevalence rate than the general population. The analyses normally published by the public health insurance companies only give information about the prevalence of general work disabilities or use broad industrial classifications. The aim was to analyse the occurrence of work disability caused by CTS (G56 ICD 10) in single professions in Germany.
Method: Aggregated data of workers' work disability in 2003 were collected from four German health insurance companies including male and female employees aged between 20 and 65 years. The relative risk of the number of cases of work disability standardised by age was calculated.
Results: 18.5m employees are included in the data file. The overall number of CTS (G56 ICD 10) work disabilities was 2.8 per 1,000 male workers and 4.8 per 1,000 female workers. The number increase with age (0.8 to 5.6 per 1,000 male workers and 1.1 to 12.2 per 1,000 female workers). The age standardised relative risk ratio for men increased significantly and was greater than 2 in 10 single jobs, for example butchers (RR 2.8), half-finished product polisher (RR 1.8), and upholsterers (1.86). Among women, a higher rate of CTS was found in 23 manual and industrial jobs, for example: butchers (RR 3.1), wirepullers (2.7) and workers in the paper industry (RR 2.7).
Discussion: Work disability because of CTS is not seldom. Women are more frequently affected than men. The occurrence of CTS is clearly age related. It could be shown that workers in a number of manually demanding jobs are affected more frequently. Generally, data from health insurance companies about work disability can be used for occupational risk analyses.

WHICH VARIABLES OF A BIOMECHANICAL QUESTIONNAIRE SHOULD BE USED IN THE SURVEILLANCE OF UPPER-LIMB WORK-RELATED MUSCULOSKELETAL DISORDERS?

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Introduction. Questionnaires for assessment of biomechanical exposure are frequently used in surveillance programs, though few studies have evaluated which key questions are needed. We sought to reduce the number of items on a surveillance questionnaire by identifying which variables best summarized biomechanical exposure in a working population survey.
Methods. We used data from the French experimental network of upper-limb work-related musculoskeletal disorders (UWMSDs), in which 37 variables assessing biomechanical exposures were available. Principal Components Analysis (PCA) on covariance matrix with orthogonal rotation was performed on these variables. Variables closely associated with factors issued from PCA were selected, except those highly correlated to another variable (rho>0.70). In order to study the relevance of the method, correlations between a score based on selected variables (PCA score) and the exposure score suggested by the SALTSA group (Sluiter et al, 2001) were calculated. The associations between the PCA score and the prevalence of UWMSD were also studied.
Results. In 2002-2003, 2685 subjects were included; the questionnaire comprised 37 exposure variables (divided into four ordinal categories, according to the task frequency). According to the results of the PCA, seven easily interpretable factors were identified: the first factor could be interpreted as posture constraints, the second as repetitiveness, the third as handling heavy loads, the fourth as upper-limb biomechanical constraints, the fifth was specific for computer use, the sixth was specific for forklift operator task, and the seventh for recovery time. Twenty variables strongly correlated with the factors issued from PCA were selected. The PCA score was strongly correlated both with SALTSA score and with UWMSD prevalence ($p<0.0001$).
Discussion. Twenty variables out of 37 were efficiently selected by PCA according to their ability to summarize major biomechanical constraints in a working population. An ergonomic point of view is still needed to achieve the variable reduction.

LOW BACK PAIN DUE TO WHOLE-BODY VIBRATION IN PROFESSIONAL DRIVERS

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[ID 1100]

Introduction

Long term occupational exposure to whole-body vibration (WBV) is associated with an increased risk of Low Back Pain (LBP). The aim of this study was to investigate the prevalence of LBP in various groups of Dutch professional drivers. This cross sectional survey represents the baseline investigation of a prospective cohort study of dose-response relationships for musculoskeletal symptoms in WBV-exposed drivers recruited in a four year research project funded by the EU commission (VIBRISKS).

Subjects and Methods

The study population included 574 male professional drivers employed in agriculture, manufacturing industries, construction, community and transport. Personal, occupational and health histories were collected by means of a standardized questionnaire within the VIBRISKS project. Vibration measurements were performed on representative samples of the machines and vehicles (n=50) used by the driver groups. In accordance with the EU Directive on Physical Agents and the ISO standard 2631-1, daily vibration exposure was assessed in terms of 8-h energy-equivalent frequency weighted acceleration, A(8) in ms-2 r.m.s.

Results

The response rate was 52%. Of the professional drivers, 31.1% reported LBP in the last 7 days, and 55.5% reported LBP in the last 12 months. The average daily exposure duration was 7,9 ± 2,7 hrs per working day. Average lifetime duration of exposure to WBV was 18,0 ± 12,4 yrs. Daily vibration exposure, A (8), ranged from 0.09 to 2.43 ms-2 r.m.s. with an average of 1,25 ms-2 r.m.s.. In the professional drivers, the occurrence of 12-month LBP, high LBP intensity, and LBP disability significantly increased with increasing vibration exposure.

Conclusion

Based on preliminary results, this study confirms that professional driving in industry is associated with a high prevalence of work related LBP.

Acknowledgement

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TINNITUS IN NOISE EXPOSED WORKERS WITH AND WITHOUT HEARING LOSS

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[ID 740]

Tinnitus is a frequent consequence of acute acoustic trauma. Patients with permanent hearing impairment and noise induced hearing loss often suffers form tinnitus. However, it is unknown if long-term, non-traumatic noise exposure causes tinnitus without concomitant hearing impairment. This study investigates the relationship between noise exposure and tinnitus among workers with and without hearing loss.

We conducted a cross sectional survey of 753 workers employed at 91 workplaces analyzed by means of full work-shift noise levels, questionnaire data and bilateral pure tone audiometry. Risk of tinnitus according to current and lifelong occupational exposure to noise was analyzed by logistic regression with adjustment for noise exposure outside work, age, gender and ear disease.

We observed no association between tinnitus and the present noise level, the duration of noise exposure or the cumulative noise exposure if participants had a normal hearing. As expected, such trends were demonstrated if participants had a hearing handicap.

Based on these data, we will be cautious in ascribing tinnitus to noise exposure in our patients' workplaces if they have a normal audiogram.

IS NOISE INDUCED HEARING LOSS STILL A PROBLEM IN THE DANISH WORKFORCE?

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[ID 752]

Documentation of the extent of noise-induced hearing loss in the working population is limited. This study reports on the prevalence of noise-induced hearing loss in a population sample of workers in Denmark.

Methods

We recruited 788 workers from 11 trades with expected high noise exposure levels. For reference, financial employees and a sample of residents were investigated according to the same protocol. Full-shift A-weighted equivalent sound levels were recorded and pure tone audiometric examinations were conducted at the work sites in soundproof boots. Data were analyzed with multivariate regression techniques and adjusted for environmental noise exposure, age, sex and ear disease.

Results

An overall two-fold increased risk of hearing handicap (hearing threshold above 20 dB averaged across 2, 3 or 4 kHz for either ear) was observed in the noise exposed workers [odds ratio (OR) 1.99, 95% confidence interval (CI) 0.91-4.34]. Workers exposed for more than 20 years to an exposure level above 85 dB(A) had a three-fold increased risk. Workers starting in noisy work during the last 10-15 years or workers below 30 years of age showed no increased risk of hearing handicap.

Discussion

Noise-induced hearing loss remains prevalent in several trades, but preventive measures enforced during the past 10-15 years to reduce noise exposure may have born fruit. Systematic surveillance of noise and hearing levels in appropriate populations should still be included in an efficient hearing conservation program.

SLEEP QUALITY AND SUBJECTIVE HEALTH PARAMETERS IN FLEMISH TRUCK DRIVERS.

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[ID 592]

Objective:

To assess the sleep quality and to explore its association with (subjective) health parameters in a population of Flemish truck drivers.

Methods

In this cross-sectional study 474 drivers filled in a self-administered questionnaire that included 3 sleep questionnaires: PSQI (Pittsburgh Sleep Questionnaire), ESS (Epworth Sleeping Scale) and BQ (Berlin Questionnaire). General health was (self)rated on a 5-point scale and dichotomised in good/poor.

Results

Mean age of the drivers was 42.7±10.2 years. 75.5% had more than 10 years experience as a trucker. Their mean monthly professional driving distance was 10149±5739km.

The mean PSQI score was 5.03±2.80, mean ESS score was 6.79±4.17. The BQ indicated that 14.9% had a higher risk on sleep apnoea.

Regarding PSQI and ESS, the percentage of drivers reporting good health was significantly higher (Kruskal-Wallis test) in the first quartile (Q1) compared to the last quartile (Q4). For PSQI: 94.29% (Q1) vs 62.64% (Q4), $p<0.001$. For ESS 88.03% (Q1) vs 71.43% (Q4), $p<0.05$.

Regarding the Berlin score, the % of drivers reporting good health was significantly lower (Chi-square 36.58, $p<.001$) in the group at risk of sleep apnoea (9.6%) compared to the group not at risk (90.4%).

Sleep score result was significantly higher or worse (Mann-Whitney U, $p<0.05$) in the group that reports suffering from musculoskeletal diseases (PSQI/ESS/BQ), injury by accident (PSQI/BQ), cardiovascular diseases (ESS/BQ), respiratory diseases (PSQI/ESS/BQ), psychiatric problems (PSQI/ESS/BQ), neurological diseases (PSQI), diseases of the digestic tract (PSQI/ESS), diseases of urinary or genital organs (ESS), dermatological problems (ESS/BQ) and endocrine disorders (ESS/BQ).

Conclusion

Poor sleep quality as expressed by sleeping scales is associated with poor (self-rated) health. In evaluating and improving health of truck drivers, focus on sleeping problems should be increased. In this, PSQI, ESS and BQ can be a very helpful instrument in detecting sleep disorders.

VOICE STRESS IN WORK: SURVEY ON A TEACHER'S POOL

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[ID 258]

INTRODUCTION. The Main aim of this study was to evaluate voice stress in teaching activity.

METHODS. The medical survey was articulated in three steps: 1) VHI questionnaire (VHI= voice handicap index, modified) administration and other data about voice disturbances; 2) indirect laryngoscopy performed on 50 employees, to investigate vocal cord health status; 3) industrial hygiene assessment, with IAQ and noise measurement, to check teachers working conditions. Out of 1000 questionnaires provided, 495 (49,5 %) were recovered and compared with a homogeneous control group of 500 non professional voice users. Statistical analysis was done applying Kruskal -Wallis and Wilcoxon test ($p \leq 0.05$).

RESULTS. The analyzed pool was mainly composed by women (405 F, 81,8 % and 90 M, 18,2 %) with a average age of 49.98 (±7.6%) and using voice length of service of 24,05 years (±8,73). 39% of them were employed in nursery and primary school, 51 % in secondary school. VHI score was found to decrease for higher instruction level. Results revealed a significant correlation between VHI score and maximum and minimum time of daily voice use. With respect to control group, VHI data revealed a significant difference for all its three sections examined (functional, physical and emotional). Laryngoscopy showed clinical alterations for 29/50 (58%) teachers. Furthermore, highest score of VHI was correlated with vocal cord alterations. Industrial hygiene provided comfortable values for HR, temperature and fairly good acoustic values, compared with reference standards (ISO 7730/1984, UNI 94/32 2002, ISO 90/1999). IAQ CO_2 was greater than ASHRAE 55/92 standard for all the examined schools.

CONCLUSIONS. The survey has confirmed that all teachers are at risk of voice diseases, especially nursery and primary school teachers. Gathered results (10,64% of voice disturbances) and international literature data, show the need for specific preventive measures like a Voice Conservation Program (VCP), including the introduction of training courses about correct voice use, teaching methods and improvements of environmental conditions.

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EMERGING TRENDS OF HIV/AIDS AMONG SEAFARERS

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[ID 1732]

Background: Increase of HIV/AIDS among the world's seafarers has been observed. Majority of the world's seafarers come from the Asia-Pacific region. Seafaring countries have reported infections.

Methods: This is a review of initiatives and studies on this group. Interview of key informants from different seafaring countries complemented the study.

Results: Increasing number of seafarers from South and East Asia and Eastern Europe where HIV epidemics are emerging compounds the problem. Infection will impact on world trade and national economies because of their role. The pandemic and the country epidemic profiles will also be affected. Vulnerabilities are: mobility, sexual behaviour, knowledge of HIV and STIs, culture of penile implant, work environment, drug and alcohol use, sex work in ports, multinational crew, access to health services and the ability to pay. There is a lack of framework in dealing with the problem which results into limited initiatives at all levels. Work cycle approach can be used. Mainstreaming AIDS in the maritime industry is necessary. Examples are: workplace policy, VCT in ports, syndromic approach on ships and maritime AIDS curriculum.

Conclusion: Seafarers are at greater risk to HIV because of emerging vulnerabilities. There is an immediate need for concerted actions and initiatives using a comprehensive international framework.

THE 'HAWTHORNE EFFECT' IS A MYTH, BUT WHAT KEEPS THE STORY GOING?

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[ID 1563]

The Hawthorne studies that were conducted from 1924 to 1933 at a plant near Chicago represent a major historical event in the development of Industrial and Organisational psychology, and of social sciences in general. They consisted of a series of experiments in order to study the effects of illumination, rest breaks, length of working day and working week, wages, food, humidity and temperature on performance.

These studies have become famous because of the 'discovery' of a special effect, the 'Hawthorne effect'. Innumerable textbooks, in general psychology, in social psychology and in work and organisational psychology, characterise this effect more or less as follows: 'Regardless of the conditions, whether there were more or fewer rest periods, longer or shorter work days, each experimental period produced a higher rate of work than the one before – the women worked harder and more efficiently'(Freedman, et al., 1978, p.414).

This conclusion has become part of the accepted wisdom among social scientists and in intervention research, where the 'Hawthorne effect' is often mentioned as a possible explanation of observed changes. Accordingly, millions of students and their teachers have been scientifically raised with this story that people who are singled out for a study of any kind (may) improve their performance of behaviour not because of any specific condition being tested, but simply because of all the attention they receive.

This presentation will be based on an examination of original sources (e.g. Roethlisberger & Dickson, 1939), and numerous scientific papers on the 'Hawthorne-effect'. We will:

a) demonstrate that there is no proof of a Hawthorne effect in the original studies;

b) demonstrate that the Hawthorne myth has been debunked over and over again in scientific journals (e.g., Argyle, 1957; Carey, 1967; Parsons, 1974; Bramel & Friend, 1981; Wickstrom & Bendix, 2000; Olson et al., 2004), however, still is most persistent;

c) try to find out why this myth was created and why the myth continues.

CLINICAL EPIDEMIOLOGICAL STUDY OF EMPLOYEES EXPOSED TO PERFLUORONONANOIC ACID (PFNA).

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[ID 1933]

Introduction: Perfluorononanoic acid (PFNA) – related to other previously studied perfluorinated materials, used as a surfactant in the production of some high-performance polymers – has not been studied epidemiologically.

Methods: All 630 individuals employed at a polymer production facility using PFNA between January 1, 1989 and July 1, 2003 were included in the cohort. Data sources included medical records, work histories, and a health survey. Overall, 567 job titles were identified, and more than 4,900 job records were captured. More than 6,700 annual clinical laboratory and medical examination records were abstracted. The primary outcome variables were liver enzyme function tests and blood lipid values. PFNA blood values were available for a subset of current employees, and were used to validate exposure areas. Detailed work histories, available for all employees, provided a reasonable basis for determining exposure category.

Clinical values were evaluated by exposure level at five points in time, and annual cross-sectional analyses of liver enzymes and blood lipids were conducted across exposure groups. Longitudinal analyses, accounting for multiple measurements per person, were conducted separately for men and women, by exposure groups.

Results: Differences by exposure group for all laboratory measures, adjusted for age and body mass index, were small and not clinically significant. Although some statistically significant pair-wise comparisons were observed, these observations were not consistent between men and women, or over the five analysis windows. For the seven outcome variables (liver enzymes and blood lipids) examined in separate longitudinal models, no significant increase or decrease was observed by unit increase in cumulative exposure. For example, change in cholesterol per unit of exposure was -0.257; 95% CI -0.521 to 0.006; nor change among those with highest exposures was -2.011; 95% CI -5.066 to 1.044.
Conclusion: This is the only epidemiological study investigating the possible health effects in humans associated with exposure to PFNA. Based on clinical measures assessed over more than a decade, no adverse clinical effects were detected from occupational exposure to PFNA.

OCCUPATIONAL TOXICOLOGY AND BIOMONITORING

OCCUPATIONAL EXPOSURE TO POLYCYCLIC AROMATIC HYDROCARBONS (PAHS): HEALTH RISK ASSESSMENT FOR ASPHALTERS, COAL GASIFICATION WORKERS, INSULATION WORKERS AND CUSTOM OFFICERS

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[ID 203]

Authors presented results of long-term monitoring of exposure to polycyclic aromatic hydrocarbons (PAHs) in 328 subjects (283 men, 45 women) - 46 asphalt workers (AW), 43 coal gasification workers (GW), 18 insulation workers (IW), 44 custom officers (CO), and 177 controls (C). Subjects underwent a protocol consisting of a controlled interview with completing questionnaires (health condition, professional and family history, life style, subjective complaints), hematological and serum biochemistry examinations (26 parameters), immunological and tumor marker examinations (28 parameters) and cytogenetical analysis of lymphocytes from peripheral blood. Using long-term sampling, in workplace atmosphere the content of 16 PAHs was determined in 51 workers (active personal dosimetry) (EPA´s "Priority Pollutant List": NAP, ACY, ACE, FLE, PHE, ANT, FLU, PYR, BaA, CHR, BbF, BkF, BaP, DahA, ID, BghiP). Sum of PAHs in working environment was in the range 0.18 - 7.90 µg/m3 (AW), 0.66 - 17.08 µg/m3 (GW), 0.06 - 0.09 µg/m3 (IW) and 0.11 - 8.96 µg/m3 (CO). Biological monitoring found following mean (range) values of 1-hydroxypyrene (1-OHP) content in urine in µg/g creatinine: 1.55 (ND – 74.70) (AW), 10.66 (ND - 499.80) (GW), 0.08 (ND - 0.50) (IW), 0.56 (ND - 6.30) (CO), and 0.08 (ND - 0.30) (C). Compared with control group (C), difference at p=0.01 could be found for GW; for the IW and C, difference was found at p=0.05. Between concentrations of 1-OHP in urine and actual exposure to 16 PAHs no correlation was found in any of the assessed groups. The effect of smoker status was negligible. For mixture of PAHs, calculated occupational carcinogenic risk (of lung cancer) was as follows: for AW 3.9 - 8.5 in 100,000 workers, for GW 4.3 in 10,000 workers, for IW 8.5 in 1 million workers and for CO 7.2 - 7.5 in 1 million officers. Practical intervention measures have been implemented.

ENVIRONMENTAL CADMIUM EXPOSURE AND FOREARM BONE DENSITY

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[ID 511]

Environmental exposure to cadmium may give rise to osteomalacia combined with renal dysfunction, so called "Itai-Itai disease", which was endemic in the heavily polluted area in Japan. The main focus of this study was to investigate whether environmental exposure to cadmium is associated with low bone mass in a population living near a smelter. A total of 790 persons(302 males and 488 females), who were all over 35 years old and resided in areas near a lead, zinc and cadmium smelter and in a control area in southeast China, completed a questionnaire, and bone mineral density was measured by SPA-4 single photon absorptiometry at the radius and ulna. Cadmium content of urine was determined by graphite-furnace atomic absorption spectrophotometry as a measure if dose. The present study shows that forearm bone densities were negatively correlated with urinary cadmium excretion ($p<0.001$) and forearm bone density decreased linearly with age($p<0.001$) and urinary cadmium($p<0.01$), suggesting a dose-effect relationship between cadmium dose and bone mineral density. Based on the World Health Organization criteria, (bone mineral density<-2.5SDs below the normal young adult), the prevalence of osteoporosis in women increased from 34.0% in the control area to 51.9% in the heavily polluted area($p<0.01$) among subjects over 50 years old, and the odds ratio value was 2.09(95%CI:1.08-4.03) for the highly polluted area compared with the control area. A striking observation in the study was a marked increase of the prevalence of fracture in the cadmium-polluted area in both sexes. It was concluded that environmental exposure to cadmium is associated with an increased loss of bone mineral density in both gender, leading to osteoporosis and increased risk of fractures, especially in the elderly and in females.

EVALUATION OF DIFFERENT SAMPLING METHODS TO ASSESS AIRBORNE ENDOTOXIN EXPOSURE IN OCCUPATIONAL ENVIRONMENTS.

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[ID 771]

Inhaled endotoxins are recognized as a potent inducer of airway inflammation. Although airborne endotoxin is an occupational hazard in several productive environment, exposure assessment methods have not been adequately optimised and validated. Many studies demonstrated that different sampling methods and aerosol composition can be potentially significant factors in the determination of endotoxin activity from air samples.
In this study different sampling methods for airbone endotoxin measurement were evaluated in a wastewater treatment plant and in a waste composting plant. In each sampling site airborne endotoxins were detected using different methods (impinger method, filtration with glass fiber filter and both glass fiber filter and impinger set in series). At the same time airborne particulate matter was collected on glass fiber filter. Endotoxin was assayed with a quantitative kinetic chromogenic LAL method.
In both the examined plants the best recovery of airborne endotoxin was obtained using the filter method or with the filter associated to the impinger.
This finding suggests that probably endotoxins are mainly adsorbed to liquid or solid airborne particulate matter. The endotoxin concentrations showed a relationship with the amount of sampled particles (composting plant $r = 0.9$; wastewater treatment plant $r = 0.8$).
A great variability of airborne endotoxin concentration was found in both plants (composting plant range 16-933 EU/m3; wastewater plant range 2-194 EU/m3). This trend could be explained considering that the endotoxin release in the air is associated to the phase of the microorganism growth curve, and increases with the microorganism death. In conclusion, the ability of a sampling method to detect airborne endotoxins in working environments seems to be related to the aerosol composition in the sampling site that affects the endotoxin aerodispersion.

AN APPLICATION OF SPA INGREDIENT SOLUTION TO IMPROVE WORKERS' HYGIENIC BEHAVIOURS IN A LEAD BATTERY RECYCLING PLANT

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[ID 885]

Objectives: In Japan, people often enjoy bathing together in a big spa bath. However, workers in a lead battery recycling plant told us that they have been embarrassed having dark changes in their skin colour and consequent filthy appearance associated with their sulphur spa bathing. Learning the legendary spa story from the workers, we examined the relationship of the colour darkening to blood lead concentration (BLC). We also put the phenomenon to practical use for improving workers hygienic behaviours.
Methods: We examined hands of 119 lead-handling workers in a battery recycling plant for skin-colour darkening, visualized by wetting with 1% sodium sulphide (Na2S) solution (128 mmol/L): the Na2S test. The relationships between the Na2S test results and workers' BLC and hygiene activities were analyzed. Using the same Na2S solution, we sprayed their work uniforms, skin under cloth, freshly washed hand towels, surface of the dining tables, door knobs, and telephone receivers in their resting rooms.
Results: The Na2S test produced skin-colour darkening of the hands of 92 (77%) workers; although 88 of them had washed their hands with soap and 50 had bathed before taking the test. Na2S test was associated with not washing hands ($p = 0.009$), not bathing ($p = 0.061$), and a higher BLC ($p = 0.008$). The Na2S solution demonstrated lead contamination of almost all the objects sprayed. Observing the widespread contamination of lead by visualization, workers voluntarily discussed the way to improve the hygienic conditions and began cleaning the room.
Conclusions: The Na2S test clearly demonstrated otherwise unapparent lead contamination of the lead-workers' hands. This test would be a simple, useful method for assessing the level of workers' lead exposure over a period of time. In addition, visualizing the lead contamination could increase the workers' awareness and thus improving their hygienic behaviours.

ANALYSIS OF SOME BIOMARKERS TO EVALUATE THE OXIDATIVE STRESS POTENTIALLY INDUCED BY TOLUENE EXPOSURE

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[ID 1062]

Introduction

Oxidative stress is a condition of unbalance between the pro-oxidant status and the antioxidant protection. Toluene is known as a toxic substance able to cause clinical signs of central nervous system or hepatic and renal changes.

This study evaluates the oxidative stress induced by toluene working exposure, using specific biomarkers.

Methods

We studied the oxidative stress in 187 workers of a firm producing gummed texture exposed to toluene and in a control group of 150 workers of the same firm, not exposed to the toxic substance.

We evaluated environmental and personal exposure levels to toluene and the following oxidative stress biomarkers:

- level of plasmatic hydroperoxides ;
- amount of the total plasmatic antioxidant barrier to determine the capacity of the single patient to control the production of free radicals;
- amount of plasmatic SH groups;
- level of 8hydroxy-2deoxiguanosine, which is a biomarker of DNA damage detectable in urine
- ELISA-measured isoprostanes, producted from oxidation of arachidonic acid, which are considered a reliable marker of oxidative stress.

We also evaluated the same oxidative stress biomarkers in all the workers of the control group.

Results and discussion

The results showed a relevant exposure to toluene, even if under the T.L.V. value, in personal and environmental samples.

Biomarkers of oxidative stress were altered in 67 workers (35.8%) exposed to toluene with a statistically significant difference with the control group ($p<0,01$).

The different markers of oxidative stress didn't show a univocal behaviour in every worker, and this fact forced us to plan in our next researches a screening of the complete set of biomarkers tested in this first study, to avoid false negative results.

We think that, even if our results have to be confirmed in larger and more structured studies, the evaluation of biomarkers of oxidative stress could be a useful research field to investigate a possible precocious work damage from toxic substances.

NON-INVASIVE ASSESSMENT OF CHROMIUM EFFECTS ON RESPIRATORY TRACT IN ELECTROPLATING WORKERS

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[ID 1301]

Occupational exposure to chromium compounds, which are widely used in industry, may cause airway inflammation and bronchial asthma.

In this study we investigated pulmonary function, chromium in urine and in induced sputum, induced sputum cellularity and markers of inflammation in exhaled breath condensate (EBC) and in nasal lavage fluid of 16 electroplating workers exposed to chromium at lower concentration than current TLV and in 9 non-exposed workers.

All study participants were non smokers without active lung disease. Urinary chromium was 8,64 mg/g creat (SD 6,19).

Lung function values were normal for both groups. Chromium in induced sputum was higher in exposed workers (7.90 mg/L, SD 3.4 vs 1.78 mg/L, SD 0.25). Total leukocyte and neutrophils counts in induced sputum were not significantly higher in exposed subjects (82.98±49.00x104cell/ml vs 68.89±22.71x104cell/ml; 53.08± 34.79x104cell/ml vs 40.45±12.52x104 cell/ml).

In EBC median Nitrite concentration was significantly increased in exposed subjects (4.35 mmol/L, 5°-95° percentile:1.88-10.13 mmol/L vs 0.11 mmol/L, 5°-95° percentile: 0-0.72 mmol/L) ($p<0.001$). IL-6 and TNF-a were not detectable.

Median IL-6 concentration in nasal lavage fluid was higher in exposed workers (5.72 pg/ml, 5°-95° percentile: 0-65.25 pg/ml vs 0.28 pg/ml, 5°-95° percentile: 0-1.7 pg/ml) ($p<0.01$). No differences in Eosinophil Cationic Protein concentration were found. TNF-α was not detectable. In exposed workers urinary chromium levels where not correlated with any marker of inflammation and with chromium in induced sputum.

For the first time this study uses all this 3 non invasive methods to assess early changes in respiratory tract in workers exposed to chromium. These results are suggesting an inflammatory/irritative action of chromium on upper and lower airways which appears not correlated with chromium absorption as indicated by urinary concentration of this metal.

BIOLOGICAL MONITORING OF OCCUPATIONAL EXPOSURE TO STYRENE AND STYRENE-(7,8)-OXIDE

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[ID 1605]

This study investigated the capability of some urinary and haematic biomarkers to discriminate among different levels of occupational exposure to styrene (Sty) and styrene-(7,8)-oxide (StyOX) and evaluated the influence of smoking habit and genetic polymorphism of metabolic enzymes GSTM1 and GSTT1 on these biomarkers. With this aim, we recruited workers of the reinforced plastic industry (n=8), of the paint and dye industry (n=13), and a group of controls (n=22). Median personal exposure to airborne Sty and StyOX in the different working activities was 14.8, 3.1 and 0.3 mg/m3, and 126, 13 and <5 µg/m3, respectively, as evaluated by repeated measurements. These chemicals were strictly correlated with each other (Pearson $r = 0.826$), the ratio between Sty and StyOX being about 1000:5. Personal exposure was significantly higher in exposed workers than in controls and, among workers, in subjects of the reinforced plastic industry. Urinary biomarkers, namely unchanged styrene (StyU), mandelic acid (MA), phenylglyoxylic acid (PGA), phenylglycine (PHG), 4-vinylphenol (4-VP), and mercapturic acids (M1 and M2) were higher in end- than in pre-shift samples and significantly correlated with both airborne Sty and StyOX. The best correlations were observed between end-shift MA or MA + PGA and airborne Sty ($r = 0.890$ or 0.886, respectively). The excretion of mercapturic acids was 6-fold higher in subjects with GSTM1 active genotype in comparison with those with null genotype. Cysteinyl albumin and hemglobin adducts of StyOX could not distinguish the different exposure categories investigated. In conclusion, in both reinforced plastic and paint and dye industry there was co-exposure to airborne Sty and StyOX. Among the different biomarkers urinary MA and PGA and their sum showed the best capability to discriminate different exposures and are recommended for Sty exposure assessment starting from a level of 1 mg/m3.

COMPARATIVE EVALUATION OF URINARY MTBE AND BENZENE AS BIOMARKERS OF EXPOSURE TO URBAN TRAFFIC

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[ID 1610]

Benzene and methyl tert-butyl ether (MTBE) are found in urban environments as a consequence of autovehicular traffic; in fact both these compounds are added to fuels to increase octane ratings and/or reduce carbon monoxide emissions. Aim of the present study was to evaluate the possibility of using excretion of urinary MTBE (U-MTBE) and benzene (U-BENZ) as biomarkers of exposure to traffic. With this aim 127 Milan urban policemen, working as traffic wardens, were investigated. Spot urine samples were obtained prior to and at the end of the workshift (7.30-13.30 or 13.30-19.30), in different seasons. Analysis was performed by headspace-solid phase microextraction GC-MS. Median levels of airborne benzene was 9.6 µg/m3 (range 4.0-90.2 µg/m3). Urinary levels in the different seasons varied from 74 to 164 ng/L (50-657 ng/L) and from 85 to 277 ng/L (21-5065 ng/L) for U-MTBE and U-BENZ, respectively. U-MTBE increased of about 14% during the workshift, independently from the moment of the shift (morning or afternoon). U-BENZ increased of 27% in the afternoon, but decreased of 15% in the morning. An influence of the different

seasons was observed, with lower values in spring and higher in winter. Smoking increased the excretion of U-BENZ but not affected that of U-MTBE. The results of this study suggest that U-MTBE is a reliable marker for the assessment of exposure to urban traffic, while U-BENZ is influenced both from the moment of the day and smoking habit.

ANALYSES OF INFLAMMATION MARKERS IN EXHALED BREATH CONDENSATE IN SMOKERS AND NONSMOKERS BY LC-MS/MS

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[ID 998]

Biological effect monitoring has become important for the detection of diseases of the respiratory system in early stages. In the last decade the use of exhaled breath condensate (EBC) increased rapidly because its sampling is non-invasive. Prostaglandines, leukotrienes and 3-nitrotyrosine (3-NT) were assumed to be markers of inflammation effects. In view of the accurate determination of the basal concentrations of these markers in EBC we developed some analytical procedures using LC-MS/MS and applied them on healthy smoking and non smoking subjects.
Exhaled breath condensate was collected using the ECOSCREEN sampling system. External and online solid phase extraction were performed for clean up and preconcentration. The analytes were determined by high performance liquid chromatography and tandem masss spectrometry using electron spray ionisation and selected reaction monitoring. The procedure was applied to EBC samples of 20 healthy smokers ond non smokers.
The validation of the new LC-MS/MS procedures resulted in data of high precision (2 – 8 %) and accuracy (91 – 115 %). The limits of quantitation were found to be between 5 and 10 pg/ml. In 94 % of the EBC samples 3-NT was found to be over the limit of quantitation whereas prostaglandines and leukotrienes were generally below the quantification limits. The values of 3-NT ranged between the determination limit and 184 pg/ml. 3-NT concentrations were not significantly different in EBC of smokers and non smokers. The values were distinctly lower than in studies with the application of immunochemical analytical technique (EIA) on EBC of healthy subjects.
These new procedures for determining prostaglandines, leukotrienes and 3-nitrotyrosine in exhaled breath condensate have proved accurate and reliable. Due to the fact that prostaglandine and leukotriene concentrations were below the detection limits in real EBC samples of healthy subjects, a further improvement of sensitivity is required.

PHENOL, CATECHOL AND HYDROQUINONE IN BLOOD AMONG WORKERS EXPOSED TO BENZENE

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[ID 1249]

Background: We have developed a reliable GC/MS method of determination of benzene metabolites(phenol,catechol and hydroquinone) in blood. However, blood metabolites as biomarkers of benzene exposure have not been validated.
Aim: To validate correlations between benzene exposure and metabolites in blood among workers.
Methods: After signing consent forms, 88workers provided blood samples for phenol(PH),catechol(CAT) and hydroquinone(HQ) measurements by GC/MS. One hundred and four workers provided urine samples and sPMA were measured using ELISA kits. Twenty non-exposed workers were recruited as controls. Area and personal samples were taken from each workplace for one week to calculate daily average ,weekly average and long-term average exposure levels. Blood levels of PH,CAT and HQ and urinary sPMA were compared between controls and workers. Correlations between blood metablotes,urinary sPMA and external exposure metrics were tested.
Results: Levels of free metabolites(PH,CAT and HQ) in blood significantly increased among benzene exposed workers,0.107ug/ml,0.022ug/ml,0.427ug/ml respectively. Both free and total(free+conjugated) metabolites in blood increased with the increases of exposure. When exposure increased, proportion of PH among total amount of three metabolites decreased. Free/conjugated ratios of PH and CAT other than HQ decreased when exposure increased. Urinary sPMA level increased significantly after workshift, 9.382 umol/mol Cr vs 87.329 umol/mol Cr. Urinary PMA was significantly associated with exposure metrics.
Conclusions: Metabolites(PH,CAT and HQ) in blood might be biomarkers of benzene exposure. This study also confirmed that urinary sPMA is sensitive biomarker of benzene exposure.

BIOLOGICAL MONITORING OF LOW EXPOSURE TO POLYCYCLIC AROMATIC HYDROCARBONS

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[ID 1613]

Aim of the work was the assessment of low exposure to polycyclic aromatic hydrocarbons (PAHs) by biological monitoring. Italian asphalt workers (AW, n=100) and roadside construction workers (CW, n=47) were investigated by measurement of hydroxylated metabolites and unmetabolized PAHs in urine spot samples collected respectively after two days of vacation (baseline), before and at the end of the monitored workshift, in the second part of the workweek. Biomarkers were determined by HPLC-fluorimetry and GC-MS.
Median airborne levels during the workshift of 15 PAHs (both vapour and particulate phases), from naphthalene to indeno(1,2,3-cd)pyrene, ranged from below 0.03 to 426 ng/m3. Median excretion values of 1-hydroxypyrene (OH-Py) in baseline, before- and end-shift samples were 1.04, 1.84 and 3.16 nmol/L for AW and 1.19, 1.39 and 1.73 nmol/L for CW; lower values were found in non-smokers compared to smokers. In all subjects a weak correlation between personal exposure to the sum of airborne 15 PAHs and OH-Py was observed. Urinary naphthalene, phenanthrene, pyrene and fluorene were detected in the majority of the samples in the range below 0.01 to 2.54 nmol/L. Significant differences in the levels of the unmetabolized compounds were found between AW and CW. Moreover in AW samples the urinary excretion of most analytes increased during the work shift. The results of this study show that AW experienced a moderate occupational exposure to airborne PAHs, resulting in a significant increase of urinary biomarkers during the workday and the workweek. Both hydroxylated metabolites and unmetabolized PAHs in urine may be suggested as biomarkers of low exposure to PAHs.

A RE-APPRAISAL ON CLINICAL MANAGEMENT OF ACUTE METHANOL POISONING

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[ID 1646]

Objective: To elucidate the re-cognition on diagnosis and treatment of methanol toxicosis after summarized data of 42 poisoning cases. Methods: The data of 42 cases with methanol poison that occurred in Guangzhou, P. R. China in May 11, 2004 was summarized. The methanol concentration in wine was detected by Guangzhou Quality Supervise Control Bureau. The epidemiological information was investigated by municipal and district CDCs (Central Disease Control). The methanol concentration of blood was measured with gas chromatogram in Occupational & Environmental Hygiene Monitor Center in our hospital. The diagnosis was according to the National Occupational hygiene Criterion (GBZ53-2002) and was consisted of three stages, including observation, slight, and severe poison. The patients were cured with general therapies. Results: The methanol concentration in wine was 16% - 46%. The average age of patients (40 men and 2 women) was 46.1 year (22 – 80 year). The average consumption of the wine was 588.1ml (50 -2000 ml) per patient. The average methanol concentration in blood was 1.61 mmol/L (0.03 – 23.60 mmol/L). Among them, 17 observation cases, 9 slight toxicosis, and 16 severe toxicosis, 35 patients were cured (83.3%), 2 with blind (4.8%), 4 with neuropsychotic sequelae (9.5%). And, one was death (2.4%). Conclusion: Success of this salvage was based on the recognition of local government, the counterplan for emergency of public health events, special therapies in poison control center (PCC), and cooperation of departments and specialist groups.

PULMONARY EFFECTS OF RESPIRABLE FULLERENE(C60) BY INTRATRACHEAL INSTILLATION TO RATS

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[ID 248]

Background
Fullerene (C60) is one of the representative examples, and is a spherical aggregate of 60 carbon atoms, with a diameter of approximately 0.7 nanometers. Although C60 can be dissolved in the organic solvent at that diameter, normally it is produced in a micron-sized form. C60 is a promising material industrially, and the production increase will be expected. However, little is known about the biological effects by inhaling C60. Some studies showed the higher cytotoxicity and inflammatory effects of nanoparticles when compared at equal mass with micron-sized particles. In this study, we instilled C60 of two different sizes to the rat lung, and compared the changes of pathological features after instillation to assess the hazard of inhalable C60.
Methods. Fullerene (C60) aggregates in different diameter (0.17μm, 1.7μm) were instilled respectively to the male Wistar rats. (2mg per injection). Blood sample, and BALF (with 50 ml saline) were collected at the time point of 3, 7, and 90days after instillation. The lung tissue was evaluated at 3 and 90 days after exposure. Digital images taken of the lung sections were examined by morphometric point counting method (PCM).
Results. The WBC count in the blood was not significant among the groups, however, the number of WBC and the PMN percentage in the BALF of the 0.17μm-C60-instiiled rats were significantly higher than control within 1week after instillation. Inflammatory changes were not so obvious in the rats of 90 days after instillation. The inflammation score of C60 showed a similar pattern as TiO2 instillation during the observed period.

RECENT DEVELOPMENTS IN BIOMONITORING: GUIDANCE FOR THE INTERPRETATION OF BIOMONITORING DATA

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[ID 409]

Developments in analytical technology allow measuring increasingly lower concentrations of chemicals in tissues of adults and (unborn) children. The mere presence of these chemicals proves their absorption from the environment into the body. However, no valid interpretation of potential human health risk can be made on these biomonitoring data alone. In the past few years, several international conferences have been organised to address this problem and last year, the European Centre for Ecology and Toxicology (ECETOC) formed an expert task force to develop criteria for the consistent use of biomonitoring data, and to develop a risk-based framework and guidance on the interpretation of biomonitoring data for exposure and risk assessment purposes.
The task force considered that to use biomonitoring information for evaluation and description of health risks, information is required on four key elements:
1. a sample's analytical integrity,
2. the extent to which toxicokinetic considerations have been accounted for,
3. the relevance of the data for health effects, and
4. how the data align with other available information.

A guidance document was written that describes the level of understanding necessary for each of these elements and that identifies how the application of data varies according to the level of understanding, including the relative importance of each element. These elements were then incorporated into a framework, built upon established scientific criteria, that enables any data to be evaluated with respect to the portion of the risk assessment process in which it can be reliably applied. The resulting framework was tested with a series of case studies from published scientific literature. In addition, the report identifies a number of related issues relating to the ethics of taking samples and the communication of findings that require further discussion. In this presentation, the process and main elements of the framework will be discussed.

HEALTH SERVICES RESEARCH AND EVALUATION IN OCCUPATIONAL HEALTH

EMPLOYER INVESTMENT IN OH PROVISION IN A LIGHTLY REGULATED ENVIRONMENT: VARIATION IN OH PROVISION FOR UK UNIVERSITIES AND AN ANALYSIS OF ITS DETERMINANTS

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[ID 1878]

Introduction: There are few studies of occupational health (OH) provision across an entire employment sector. Universities have a range of, often exotic, occupational risks and other OH needs, such as fitness to practise for medical students. This survey described OH services to universities in the UK and examined the variation in OH provision. Methods: All 117 universities in the UK supplied information on type of OH provision. Detailed surveys in 2002, 2003, and 2004 requested self-completed information from each university OH service. University data came from the Higher Education Statistics Agency. Results: Half had an in-house OH service, 32% used a contractor, 9% relied on the student health service or campus general practice and 9% had ad hoc or no arrangements. 93 of the 117 (79%) universities responded to the detailed questionnaire, the response being higher from in-house services and from larger universities. The average (median) service was small, with one full time nurse, one half-day of doctor time per week and a part-time administrator. There was wide variation in clinical (doctor + nurse) staffing levels (range 0 to 8.4 full-time equivalents). In a regression analysis, number of university staff explained 34% of the variation in OH staffing. After adjusting for other factors, neither research activity score nor the presence of high OH need disciplines (eg medicine) appeared to be associated with investment in OH. OH service "advocacy" factors were associated with staffing levels, perhaps by reverse causation. Conclusions: It is unclear if the OH provision to UK universities overall is adequate for their needs. The wide variation suggests that some universities have adequate services and others do not. University employers would be likely to respond positively to guidelines based on organisational size but may need guidance on how to provide a proportionate OH response to specific OH needs.

ESTIMATING THE COSTS OF PRODUCTIVITY LOSS FROM THE COMPANY'S PERSPECTIVE: A DELPHI STUDY TO IMPROVE CURRENT METHODOLOGY

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[ID 1031]

Background: Productivity loss costs are commonly used as a primary outcome to express the benefit of occupational health interventions in economic evaluations from a company's perspective. These costs are often estimated using solely the number of sick leave days. Currently, the adequacy of such an estimation is being questioned. Also, there is speculation whether or not the methodology should differ depending on the type of work loss: presenteeism, short-term absenteeism or long-term absenteeism.
Objective: To develop a consensus-based set of items to be included in an estimation of productivity loss costs from a company's perspective.
Study design: A modified Delphi technique consisting of two written rounds and a final workshop was employed.
Methods: Item selection was based on a literature review and exploratory interviews. Fifty representatives from five different stakeholder groups were recruited to serve in the expert panel. Per item, the relevance and availability of data were rated on a 6-point and 4-point Likert scale, respectively. Data were analysed quantitatively and qualitatively. Consensus was set at 70%.
Results: The first round response rate was 72%. More than 75% of the experts had at least 10 years of experience. From the 51 items in the first round, consensus over relevance was reached on 16 items, 17 were excluded, and 18 were taken to the second round. Examples of relevant items include the duration and degree of work loss, and overtime coverage. With respect to the availability of data, the majority of items were rated as very difficult or impossible to obtain. Second round and workshop findings will be presented at the congress.
Conclusions: Preliminary findings suggest that the method for estimating productivity loss costs will differ between presenteeism, short-term absenteeism and long-term absenteeism. Furthermore, relevance can be dependent on the type of function and the sector being discussed.

OCCUPATIONAL HEALTH SERVICES IN MACEDONIA

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The process of political and economic transition has a great influence on overall changes in the occupational health services (OHS) in Macedonia. Macedonia is a small country with 279 854 employees: 40% in industry, 45% in services and 12% in agriculture. The unemployment rate is 37.2%. The purpose of the paper is to present the changes in OHS and to identify the main problems and challenges.
Descriptive statistical methods and standard indicators were used for analysis of the health care resources, utilization, morbidity and mortality data in the period of 1994-2003.
Following the break-up of Yugoslavia, the country inherited well-developed integrated OHS with 115 units, 506 health care workers and 250 physicians involved in realization of the preventive and curative activities. In 2003 there were 67 units (one unit for average 4000 workers) and 98 specialists of occupational health; more than 50% of them are redistributed in the primary health care as general practitioners. The average number of visits per worker/per year is increased from 1,5 to 2 visits (1437 – 1949/1000). The morbidity rate is increase from 646,1 to 773,8/1000. The most important characteristic of the changes is the decrease of all preventive activities including preemployment and periodical check-ups from 4,3/100 in 1994 to 2,5/100. The rate for injured persons due to work related accidents is decreased from 2,5/1000 to 0,8/1000 with very low mortality rate (0,002/1000). There aren't any official data for occupational diseases even though reporting the evidence is mandatory. There are no hospital beds for treatment or rehabilitation of occupational diseases.
The establishment of the indicators and profiles for monitoring of occupational safety and health is a prerequisite for appropriate development of the new OHS strategy in the country in accordance with EU, ILO and WHO standards.

QUALITY CONTROL IN THE FINNISH OCCUPATIONAL HEALTH SERVICES IN 2004

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[ID 419]

Background:
In Finland, occupational health units have to improve their services not only because the Occupational Health Act requires them to evaluate their quality and effectiveness but also because of increasing competition for clients in Southern Finland. The successful application of quality management to a service provides significant opportunities for improved service performance and customer satisfaction.
Aim:
To find out 1) what methods the OH units used in quality control 2) whether the OH units were aiming at Certification of services 3) what tools and methods OH units used to improve and evaluate their performance 4) how the OH units followed up the effectiveness of their work.
Material and methods:
A survey of the structure, input and outcome of Occupational Health Services (OHS) in Finland was conducted in May 2005 as part of the national follow-up system for OHS, as commissioned by the Ministry of Social Affairs and Health. A questionnaire was mailed to all known OHS units in Finland and about 72 % of 788 OH units responded.
Results:
The most generally used method of quality control of OH units was professional supplementary education (90% of 566 OH units). To improve and evaluate their performance OH units (n = 380) most generally used a client satisfaction questionnaire (60%). Some 9% (n=567) of the OH units had certificated services, and another 9% aimed to achieve certification within the next three years. Altogether 19% of 103 OH units reported that they do not follow-up their effectiveness and quality at all, whereas 28% reported to follow-up their effectiveness during workplace visits. The most important reason for not following up effectiveness was the lack of human resources.
Discussion:
There is urgent need to improve the follow-up systems in OH services, and to develop good tools for evaluating the effectiveness of services.

HEALTH CHANGE DEGREE AS AN INDEX OF IMPACT OF MEDICAL DECISIONS

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[ID 420]

Objective. Quality in health care is defined as the degree to which health services increase the likelihood of desired health outcomes. Measurement of quality is needed to certify that a structure or a professional meets established standard and to improve best practises. The study aims at analysing the impact on health of the recommended interventions following the medical decisions in occupational health practice.

Methods. 61 out of 100 cases with different medical conditions have been selected (39 cases were excluded because the disorders were considered not susceptible of improvement). The participants in the study included 14 males and 47 females working in a hospital setting. A questionnaire with two 5-point Likert scale (1 = worst health condition to 5 = best health condition) was administered to each case to investigate health conditions before and after the medical decision and the following preventive intervention. The difference between the points after and before the intervention was considered as an indicator of impact of the intervention on health status.

Results. The findings of the study show: (i) a statistically significant ($p<0.001$) increase of the rating of the Likert scale (2,4 ± 0,9 vs 3,7 ± 0,8) after the intervention; (ii) 36 workers out of 61 ($p<0.001$)improved their health conditions after the recommended intervention; (iii) nobody complained a worsening of their health conditions; (iv) 24 out of 26 cases reported an improvement of work ability.

Conclusion. Several quality factors can be assessed to evaluate occupational health practice. The indicators evaluating the outcome (such as the perceived health status as an indicator of impact) represent the more reliable measure as compared with indicators exploring characteristics of the structure (such as accessibility, continuity, equipment and professionals). This study shows that there is the need to assess the effectiveness of the different practises in occupational health and to define reference standard to be used as clinical guides.

OCCUPATIONAL HEALTH IN SERBIA - CURRENT STATUS AND CHALLENGES

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[ID 787]

Introduction: As a part of economical and political transition in Serbia that has started in 2000, necessary changes in occupational health (OH) tasks and their services are one of the objectives, although not priority.

Methods: A survey, initiated by the Ministry of Health was undertaken to establish human resources, organization, space and tasks of the occupational health services (OHS) in Serbia. Specifically constructed questionnaire was mailed to all OHS in Serbia (Total 116), and all responded to the questionnaire.

Results: Within 116 OHS, there were 446 occupational health units (10 were established by the big industries or industry branches) with 741 occupational health physicians, 314 general practitioners, 359 specialists in other medical branches (all together 1414 physicians), 86 psychologists and 1746 nurses employed. The coverage of workers (No = 1,848,531) by occupational health staff was as follows: 1 307 workers per one physician in OHS, 2 495 workers per one occupational health specialist, 1 143 per one nurse, and 21 495 per one psychologist, which met the international standards, except for psychologists. As for the main tasks performed by the OHS, the average daily number of preventive check-ups was 2.8 per one physician compared to 19.1 curative visits per one physician. Less than a half of OHS in the Serbia (48.3%) were able to report the number of high-risk workplaces, and they covered 55, 401 high-risks workplaces with 254,808 workers.

Conclusion: Relevant legislation is still in Parliament procedure (Health Care Law, Health and Safety Law, Health Insurance Law, Medical Chamber Law) and the position of OH is uncertain. In our opinion the OHS should kept being the part of national health care system and save their space, equipment and human resources. However, their main tasks should be shifted toward preventive activities in order to improve and maintain workers' health and healthy work places.

PROMOTION OF OCCUPATIONAL HEALTH RESEARCH PRIORITIES IN JAPAN: NATIONAL STRATEGY

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[ID 838]

The national conference in Japan entitled "National Conference on Promotion of Occupational Health Research Priorities (Second Conference)" has been organized by the National Institute of Industrial Health of Japan since the year 2001 in order to promote 18 priority research in occupational health, which was introduced by the Japanese Ministry of Health, Labour and Welfare in the "Conference on Occupational Health Research Strategies in the 21st Century (First Conference, 1998-2001)".

An extensive review of literatures for 721 Japanese-language original papers published in Japan classified into 18 priority research was conducted in terms of the number of the papers and the number of the first authors of all the papers. Also a questionnaire study on the 18 priority research was made to 525 members of three major academic societies on occupational health in Japan.

Results indicated that the following four research priorities were most investigated in terms of both the original papers and the researchers: Work stress and mental health (157 papers and 96 researchers), Quality of working life and health promotion, Toxicity assessment of chemicals, and Risk assessment and health effect index. On the other hand, two priorities, i.e., International standard and collaboration (2 papers and 3 researchers) and Multiple exposure to environmental factors were least investigated. It was concluded that: (1) Two research priorities, i.e., Elderly worker and Woman worker, have the highest priority for promotion of further research as they have not been fully investigated despite the fact that their research priority was among the highest as was disclosed in the First Conference, and (2) The priority for further research of International standard and collaboration and Multiple exposure to environmental factors is also high as they are least investigated so far.

RISK ASSESSMENT AND HEALTH SURVEILLANCE IN SECURITY GUARDS

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[ID 857]

Background: the security guard working sector is characterized by several health and safety risks as well as by high turnover of workers and job tasks. The literature reports scant data on risk assessment (RA) and health surveillance (HS) in this area.

Objectives: to describe occupational health and safety (OHS) interventions in a population of security guards in Northern Italy.

Methods: a OHS program has been implemented at a company of security guards since 8 years. Areas of multidisciplinary intervention were RA, HS, fitness for work (FFW) and health education (HE). Collaboration with managers, workers' representatives and safety responsibles was coordinated by the occupational physician in charge of HS. About 400 security guards were evaluated along the years, in several job tasks such as money count, valuables carrying, guard and protection, inspection and patrol, alarm surveillance, office work; many were employed on night (about 100 workers) and shift work (about 200 workers). Workforce turnover in the past years was 15-20%.

Results: according to various job tasks, RA showed risk factors such as weight lifting, upper extremities repetitive movements, whole body vibrations, noise, indoor air quality, shiftwork, long working hours, psychosocial factors, assaults, robberies, injuries. HS enabled to diagnose diseases such as hypertension (n=20), disc protrusions, herniations, spondylolisthesis, rotator cuff tears (n=20), diabetes (n=12), coronary heart diseases (n=5), hepato-nephropathies (n=5), neuro-psychological disorders (n=5). FFW was a relevant area of multidisciplinary intervention and about 35 workers had to change or adapt their job tasks because of health conditions.

HE especially addressed shiftwork, weight lifting, noise, office work, first aid. Analysis of occupational injuries was also performed to study and implement specific preventive measures. Absenteeism appeared to be contained.

Conclusions: overall, our data indicate that multidisciplinary approach to RA, HS and HE coordinated by the occupational physician is relevant for OHS of security guards.

DEVELOPMENT OF PERFORMANCE MONITORING & EVALUATION PLAN IN OCCUPATIONAL HEALTH

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[ID 1157]

Occupational health services may be described as an aggregation of specific health programmes, designed after a risk assessment, for a defined workplace.

The purpose of the presentation is to create awareness on the current developments and methods in the Monitoring and Evaluation (M&E) of health programmes. Confusions abound on the concepts and terminology frequently used in M&E of health programmes and projects thus the introduction focuses on the definitions and concepts in current usage.

The presentation attempts to demystify the M&E process by taking participants through the important logical steps in the development of M&E for a health programme. This constitutes the performance monitoring & evaluation plan which is a prerequisite for any scientific M&E.

The plan will include among others the conceptual framework, logical framework, results framework, development and selection of indicators and study designs.

It is also intended to generate interest in the need for a future skills based workshop on M&E in the context of occupational health which has been successfully run for other health programmes during the past five years.

STRUCTURE, INPUT AND OUTPUT IN OCCUPATIONAL HEALTH SERVICES (OHS) IN FINLAND IN 2004

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[ID 1238]

Introduction

This survey is a part of the national follow-up system for occupational health services (OHS) and is ordered by the Ministry of Social Affairs and Health. This is the fifth survey collected every third year in order to get overview of arrangements, recourses and output in Finnish Occupational Health Services.

Material and method

A postal questionnaire was mailed first in may to all OHS units in our register N = 784). The mailing list was based on the previous similar surveys and was updated just before this survey. To get high response rate, the extra questionnaires were sent to units who had not responded and last a telephone interview was carried out. The response rate was 94.4 %.

The questionnaire included a comprehensive selection of questions related to arrangements of OHS, employer and employee customers, personnel, their qualification, activities in OHS, cooperation and quality assessment

Result:

Altogether 783 OHS units answered. There are different possibilities to arrange OHS. 32.4 % of the OHS units were enterprises own units, 32.5 % were OHS units in municipal health care centres. And 27.9 % of the units situated in private medical centres.

Altogether 1613 occupational health physicians, 2481 nurses, 597 physiotherapists and 215 psychologists worked in the OHS.

These are preliminary results. Data analyses continues and the detailed results will be presented in the congress.

HEALTHCARE USE FOLLOWING A LONG TERM DISABILITY CLAIM IN BRITISH COLUMBIA, CANADA

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[ID 1411]

Introduction

There is growing evidence that occupational injuries influence workers' emotional and physical well being, extending beyond what is covered by the Workers' Compensation Board (WCB). This is particularly true for injured workers who require extensive time away from work or have some partial functional loss as a result of the injury. This retrospective cohort study investigates the overall and mental health care use of injured workers awarded long-term disability (LTD) benefits for a work-related injury, in British Columbia (BC), Canada.

Methods

The BC Linked Health Dataset (BCLHD) was used to examine WCB records and publicly insured health services (all visits to health care professionals and hospitals). Injured workers receiving LTD benefits in 1994 were compared to other WCB claimants who received short-term disability (STD) benefits, used health care only (HCO) or were rejected (REJ) for benefits. Since some workers had more than one claim in 1994, the injury of interest was chosen in the order of most serious claim (LTD, STD, HCO, REJ). A forth comparison group consisted of non-injured workers (NIW) in the general population.

Results

Workers receiving LTD benefits exhibited a greater increase in physician visits (↑ 2.1) for overall health care, five years after the injury, compared to the other four groups (STD ↑ 1.5, HCO ↑ 0.7, REJ ↑ 0.5,NIW ↑ 0.3). LTD workers also had a greater increase in days in hospital (↑ 0.3) five years after the injury, compared to the other four groups (STD ↑ 0.2, HCO ↑ 0.2, REJ ↑ 0.06,NIW ↑ 0.1). Mental health care use did not differ significantly among the groups. These patterns persisted when controlling for registration in the BC universal health plan and several workplace characteristics.

Conclusion

The increased overall healthcare utilization following an injury suggests the need for policy makers to focus not only on prevention but also on non-WCB funded use following a workplace injury.

UTILITARIAN STRATEGY IN OCCUPATIONAL HEALTH SERVICE - CONSENSUS OR CONFUSION?

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[ID 1644]

Occupational health services in Finland has to balance its activities between many interests. Two main stakeholders are the employer and the Social Insurance Institution of Finland who both pay the bill, fifty-fifty. Occupational health takes care of 30% of GP services in working population and therefore has remarkable impact also on public health.

Employer's interest are traditionally focused more in quality, flexibility and price of the nurse and GP services and consultations in musculoskeletal and psychosocial problems in individual employees. Social Insurance Institution and the Act on Occupational Health Services from the year 2001 focus on preventive services and promotion of work ability.

The legislative and social insurance interests can be looked at an interest of equity in line with the Rawlsian justice. Services should prevent work-related ill-health among those who are most at risk and worst-off in their health. In last twenty years the focus is shifted from occupational diseases to public health risks assessment and during the last ten years in the prevention of early retirement. Disability pension prevention refers to the interest of the national economy and competitiveness, a topic relatively far away from justice and equity.

In the cross-road of many partly contradictory interests occupational services have employed an utilitarian strategy, a strategy which aims at the maximization of the interests of all stakeholders.

In doing so it has to balance between flexible services for employees and good co-operation with the workplace foremen and managers. Utilitarian strategy is not easy to formulate or at least be understood in the same way among the customer groups and the staff of the occupational health service.

An initiative for an utilitarian strategy in occupational health services, its benefits and disadvantages are discussed more detail in the paper.

COOPERATION AND TRUST BETWEEN OCCUPATIONAL HEALTH SERVICES AND THEIR CLIENTS IN FINLAND

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[ID 1726]

Introduction: The employers are obligated by law to organize the occupational health services (OHS) for their employees in Finland. The coverage of OHS is high: 85% of the salaried employees and wage-earners are covered by OHS. High coverage tells nothing about satisfaction of the client employers and employees: are they satisfied with OHS? The objective of the study was to chart the opinions of the employers and the employees concerning their experiences of cooperation with their OHS provider. The study also investigated the difference of opinions between the client employers and the employees.

Methods: The data of the study were collected by a computer-assisted

telephone interview (CATI) in 2004 by the Finnish Institute of Occupational Health. The study was also carried out in 1998 and 2001. The survey was based on a stratified random sample from the registers of Statistics Finland. The sample of workplaces represents the entire working population. The manager, the representative of the employees and the occupational health nurse were interviewed at the workplace. The original sample in 2004 consisted of 1 000 workplaces, from which 812 managers (response rate 81%), 752 employees (response rate 93%) and 711 occupational health service personnel (response rate 88%) participated, totalling altogether almost 2 300 persons were interviewed. The questions were similar to all respondents.

Results: OHS personnel's knowledge about client workplace and workers is better according to the opinions of the employers than the employees. 81% of the employers and 73% of the employees estimated that OHS know well the health and ability to work of client employees. 81% of the employers and 72% of the employees thought that OHS know well the working conditions of the client workplace. There were more shortages of knowledge concerning the workplaces' atmosphere. 65% of the employers and 54% of the employees evaluated that OHS providers know well the atmosphere of client workplace. The client employers were more satisfied to the cooperation with their OHS provider than the client employees were: 80% of the employers and 69% of the employees estimated that there were enough collaboration in planning of OHS activities. Less satisfied the employers and the employees were with the feedback they have got from OHS: 63% of the employers and 52% of the employees evaluated that their workplace have got enough feedback from their OHS provider. 66% of the employers and 56% of the employees thought that they have got enough feasible recommendations and proposals for improvements from their OHS provider. 90% of the employers and 78% of the employees know well enough what kind of services OHS have to offer for them. There was clear difference in the trust: 94% of the client employers and 73% of the client employees estimated that trust between their workplace and their OHS provider is good.

Conclusions: According to this study, the client employers are more satisfied with their OHS provider than the client employees. Remarkable is that the employees trust to OHS less than the employers. OHS have to improve the systems for feedback, proposals for improvements and their knowledge about the client workplaces' atmosphere. Particularly attention should be paid to trust relationships to the client employees.

GUIDELINES FOR GOOD OCCUPATIONAL HEALTH PRACTICE

HEALTH SURVEILLANCE OF WORKERS WHO HAVE BEEN EXPOSED TO ASBESTOS

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[ID 62]

INTRODUCTION: The Ministry of Health and Consumer Affairs and 16 Regional Governments (of 17) of Spain have designed and agreed by consensus with major employer's organizations and Unions a National Health Surveillance Plan of asbestos-exposed workers, in order to assure appropriate, uniform and harmonized action throughout the national territory with relation to these workers.

METHODS: The Programme includes the following activities: 1) to prepare a Registry of asbestos-exposed workers; 2) to establish and facilitate access to health examinations after exposure to asbestos; 3) to apply the approved Specific Health Surveillance Protocol; 4) to establish continuation of post-exposure health surveillance; 5) to favour legal recognition of asbestos-related diseases; 6) to assign the necessary human and equipment resources; 7) to evaluate the Health Surveillance Programme.

RESULTS: Thanks to the active search of all agents involved in the Programme, a year after the Plan approval a total of 5,124 workers pertaining to 155 companies are included in the Registry of asbestos-exposed workers (the Registry of companies with asbestos risk, which is operating since 1984, contains 2,500 workers). 54% are inactive workers (retired and unemployed), whose follow-up is in charge of the National Health System, and 46% are active workers, whose follow-up is in charge of the employers. Of these, 189 (3,7%) workers have COPD (chronic obstructive pulmonary disease), 141 (2,8%) benign pleural disease, 8 (0,16%) lung cancer, and 8 mesothelioma (6 pleural and 2 peritoneal); finally, 7 workers have other cancers possibly related to asbestos (gastric, larynx and colon cancer).

CONCLUSIONS: The agreement and participation achieved regarding this Programme are allowing achieving coverage of occupational prevention policies much higher than those achieved with what a norm established, as we could see during the first year of Programme implementation in which the number of attended workers has doubled.

MANAGEMENT OF HAZARDOUS WORKERS

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[ID 279]

Prevention of occupational injury and disease has been traditionally based on identification, measurement, and control of chemical, physical, and biological risk factors. Even workers itself, if affected by transmissible or neuropsychological diseases, may be hazardous for colleagues and customers. Management of risk related to hazardous workers requires new techniques and procedures, and specific policies.

Unfortunately, there are gross discrepancies among the policies of companies on how to deal with this issue. Most employers have apparently chosen the "null" approach, leaving the burden of decision to the physician charged of medical surveillance of workers ("medico competente").

The Italian study group on Hazardous Workers (La.R.A.) is an association of physicians from different specialties, jurists, bioethicists, trade unionists, and employers, aiming at defining and implementing preventive policies on how to manage hazardous workers.

LaRA's Symposium in 2002 on infectious health care workers lead to the belief that an increased awareness and caring from involved parties is needed to put into practice the existing international or national guidelines on this argument.

Another LaRA's Symposium in 2004 on workers affected by neuropsychological diseases or addiction showed that these impaired workers are still lacking effective preventive policies in most European countries.

In the absence of mandatory rules, LaRA proposes that each employer in the Document of Risk Assessment of the Company specifically deal with the Hazardous Workers issue. Policies concerning informed consent, non compliance, confidentiality, responsibility of workers, disclosure of risk to customers, non-discrimination and counselling of workers, should be clarified. Costs and targets of the policy needs to be stated, plus the means of recovering costs to ensure viability.

The physician responsible for medical surveillance of workers should judge on a case-by-case basis the employee's ability to carry out safely the job, with reference not even to self, but also to other employees and the customers.

OFFICE ERGONOMICS: WORKSTATION ASSESSMENT AMONG COMPUTER USERS IN A NEWSPAPER INDUSTRY

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[ID 404]

A clear relationship exists between musculoskeletal disorders (MSD) and work factors. Increasingly, office ergonomics is forming an integral part of occupational health and management. Very little, however, is known about this relationship in the newspaper industry in India.

The aim of the study was to design an MSD Risk Assessment Questionnaire to determine compliance of workstation furniture and other parameters to acceptable standards.

The study was carried out on 67 workstations in the Editorial department of the English daily The Hindu, published from Chennai in the state of Tamilnadu, India. Measurements were taken on workstations, seating postures and equipment positioning. The results were then matched against set standards and compliance or non compliance to standards measured.

The study showed that over 90% of the chairs were compliant with acceptable standards for lumbar support, adjustable arm-rests, height adjustment and curved seat-pans. The workstations met standards for height and surface area, but most had retractable keyboard trays rather than on-table provision. Over 60% of the monitors showed glare from fixed overhead lights. Provision for copy holders was absent. Compliance was observed on avoidance of "waist motion", body posture in relation to feet flat on the floor, eye to monitor distance, keyboard angle, and thigh to leg angle. However, compliance was poor on arm to forearm angle, and lower spine to hip angle, which are desirable for proper body posture and wrist movement.

The study led to the formulation of recommendations for implementation, ranging from conducting awareness programmes on ergonomics and adjusting illumination to minimize glare, to the use of compliant furniture and inclusion of office ergonomics in the company's health and safety policy. The study reaffirmed the validity of the questionnaire in eliciting critical information on compliance of office ergonomics to acceptable standards.

NHS PLUS EVIDENCE-BASED GUIDELINE PROJECT

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[ID 451]

Aims

1) To develop new evidence-based guidelines to assist Occupational Health Units in raising the quality of their work
2) To review and collate existing guidelines relevant to occupational health practice in the UK and to publish on the NHS Plus website.

Method

1) A common methodology for guideline development, based on the National Institute for Clinical Evidence methodology was produced. Information regarding the project was disseminated via UK occupational health professional groups. Individuals were invited to submit proposals for development and a multidisciplinary guideline development group, comprised of representatives from major stakeholders, assessed these. The decision on whether to fund a proposal was based on the quality of the submission and the following criteria:
   a) Evidence of variation in practice which affects management or clinical outcomes
   b) Demonstration of a strong research base on which to base the evidence
   c) Potential benefit to employees/ employers sufficient to justify the resources invested in the development and implementation of the guidelines.

2) A systematic search of computer databases was undertaken and experts were consulted to identify existing guidelines relevant to occupational health.

Results

1) As of September 2005, 13 proposals for guidelines have been submitted, seven of which have been selected for funding by NHS Plus. Guidelines under development, all based on workplace management or return to work interventions include, chronic fatigue syndrome, advice on manual handling, long working hours and shift work for pregnant mothers, health screening of food handlers, latex allergy, varicella zoster, carpal tunnel syndrome, and identification of employees with alcohol problems.
2) 12 evidence and 11 consensus-based guidelines relevant to occupational health practice have been identified.

Conclusions

A programme of evidence-based guideline development has been established in the UK and existing guidelines relevant to occupational health practice are available on the NHS Plus web page, http://www.nhsplus.nhs.uk.

DEVELOPMENT OF A RISK MANAGEMENT TOOL FOR THE HAIRDRESSERS

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[ID 466]

In Australia hairdressers are small employers often with less than 5 employees. An analysis of 2000/01 workers compensation statistics showed workers compensation payments for hairdressers exceeded 1.5 million Australian Dollars. Over 50% of the injuries reported did not have a defined cause but the mechanism of injury/disease indicated that were potentially related to either the ergonomic design of salons and equipment used or to chemicals handled.

To reduce the burden on the community a project was undertaken to develop a risk assessment tool that employers of hairdressers could use to ensure that the salons met required occupational health and safety standards. To meet this aim the project had a number of objectives:

- development of a self-administered risk management tool that would encourage individual employers to consult with employees about salon risks and their management,
- development of OHS Information Package,
- raising the awareness of hairdressing and beauty therapy operators towards OHS.

This paper highlights the outcomes of the project which included the development of an interactive, flexible and easy to use risk tool which identified potential hazards and allowed the salon managers to determine the risk from hazards in their salon and select appropriate control measures.

The CD-based risk tool was mailed to 1000 hairdressers who were members of the Professional Hairdressers Association in NSW. 11 seminars were held to assist hairdressers in undertaking risk assessments but attendance at the seminars was poor. Hairdressers were surveyed and 85% of respondents indicated that the tool assisted them in undertaking risk assessments as required by NSW legislation. Although 50% indicated that they would have preferred the material in hard copy.

Some of the problems involved in developing a “one size fits all” risk assessment tool for a specialised, yet diverse SME industry group will be discussed.

OCCUPATIONAL HEALTH GUIDELINES FOR THE MANAGEMENT OF CHRONIC FATIGUE SYNDROME (CFS) AT WORK

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[ID 567]

Aims

To produce evidence-based recommendations for the management of CFS in the workplace.

Method

Key questions were based on:

a) Effective interventions to enable individuals with CFS to return or remain at work.
b) Predictive factors of relapse in terms of attendance and functioning at work.
c) Predictive factors for successful return to work.

A systematic search of the literature was undertaken using search terms that included chronic fatigue syndrome, and myalgic encephalomyelitis. Full texts were retrieved for abstracts which met the study inclusion criteria. A comprehensive literature search on CFS and work reviewing all literature up to 15/11/01 has already been published. Relevant papers from this review were retrieved. A multidisciplinary guideline development group (GDG) undertook critical appraisal of the papers using a standardised methodology. The GDG gave each paper a quality rating and assessed which papers should be included in the evidence review. Evidence tables and recommendations based on the evidence were drafted. Two external assessors reviewed the draft document to ensure that no major pieces of evidence were missing and that the recommendations were appropriate to the evidence.

Results

242 abstracts were identified and 48 full papers were retrieved, of which 23 met the inclusion criteria and were critically appraised. 10 papers were included in the evidence tables.

Cognitive behavioural therapy (CBT) and graded exercise therapy are the most effective interventions in restoring ability to work and individuals treated with CBT may have a lower risk of relapse. Concurrent depression is a predictor of poor work outcomes and should be identified and treated. There is a paucity of evidence on the optimum management of return to work, predictive factors for relapse and use of assessment tools.

Conclusions

Few papers on CFS contain work related outcomes. CBT and GET appear to be optimum treatment strategies in order to restore and maintain work.

OCCUPATIONAL HEALTH SURVEILLANCE WITH PERSONAL INFORMATION PROTECTION

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[ID 855]

Occupational health legislation in Japan requires employers to perform health surveillance among their employees and use their health information for occupational health activities. Meanwhile, Personal Information Protection Law became enforced in 2005 asking companies to protect health information. This study aimed at describing organizational reactions and professional opinions to balance the use and protection of workers’ health information.

We asked occupational health professionals to answer questionnaires at 7 cities in Japan and received 354 valid answers by August 2005.

The most frequent organizational reaction to the Law was reconsideration of contract with medical providers entrusted health surveillance (60%), followed by declaration of policy statement (58%), clarification of responsible person (52%), establishing rule (44%), deciding measures to obtain consent at health examination (45%), specification of purpose to acquire health information not required by occupational health legislations (35%), and improving privacy protection at health examination (30%). Differentiated handling of clinical information and occupational health information (9%) and establishment of confidentiality for part-time or dispatched workers (13%) have not been well treated. Split opinion among occupational health professionals was observed regarding the disclosure of workers’ health examination result to their employer. Health information most opposed to be disclosed was family history (97%), followed by body weight (87%), cholesterol (86%), and smoking status (84%).

In accordance with ICOH Code of ethics, occupational health professionals servicing to employers must always reconsider the purpose of handle workers’ health information, make an effort to conceal personal identification data and transform health information into non-sensitive information, and receive consent from the person concerned. Employer or other non-medical personnel should not directly handle the workers’ health information but ask occupational health professionals to keep and translate the information when it is necessary to use for the health protection of workers.

THE EFFECTS OF THE DUTCH NATIONAL GUIDELINE ON THE MANAGEMENT OF EMPLOYEES WITH MENTAL HEALTH PROBLEMS BY OCCUPATIONAL PHYSICIANS: RESULTS OF A RANDOMIZED CONTROLLED TRIAL

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[ID 919]

Mental health problems often lead to prolonged sick leave. In the Netherlands, mental health problems are responsible for approximately

one third of all employees disabled for over a year. Many share the view that better treatment and early intervention could prevent long lasting disability for work.
Early 2000, the Dutch Association of Occupational Physicians (NVAB) has published an authorized guideline concerning the management of employees with mental health problems by occupational physicians.
The objective of this study is to assess the effects of the guideline on return to work of employees with mental health problems. In a randomized controlled trial (RCT), subjects in the intervention group would be treated according to the guideline. The control group would receive usual care, with minimal involvement of the occupational physician and frequent referral to a psychologist.
Subjects were recruited from two Dutch police departments. One of the reasons for recruiting policemen is the high incidence of work-related mental health disorders in this population. Between January 2002 and January 2005 approximately 500 policemen were on sick leave because of mental health problems, of whom 231 agreed to participate in the RCT.
The majority of the participants (n=206) completed the baseline questionnaires and their data were used in this study. 97 policemen participated in the intervention group and 109 in the control group. In an initial analysis, no differences in the length of sick leave could be demonstrated between the two groups.
More data on return to work in relation to the the type of mental health problems, treatment and demographic factors, such as age and gender, will be available when follow-up is completed in Januari 2006.

WORKLOAD MANAGEMENT GUIDELINES TO PROMOTE BOTH WORKER HEALTH AND EFFECTIVE WORK PERFORMANCE

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[ID 1783]

Keywords: workload, management, guidelines

The maintenance of a safe system of work requires the control of psychosocial as well as physical hazards, including factors such as staffing levels, work rates and workloads. However, economic pressures can make it difficult for managers to achieve required productivity improvements while also maintaining workloads at safe levels, and excessive workloads are among the most frequently cited psychosocial hazards for full-time employees. Typical health problems in these circumstances include cumulative musculoskeletal disorders, along with various other physical and psychological manifestations of stress.
This paper critically evaluates some of the main approaches to workload management that have been developed by various professional groups. These approaches include those of: industrial engineers, whose 'work measurement' methods address performance time standards and quantitative production outputs; human factors psychologists or cognitive ergonomists, who have developed various methods for evaluating 'mental workload' with a primary focus on issues concerning system safety; physical ergonomists, whose focus is on the avoidance of injurious levels of physical task demands; and organisational psychologists, for most of whom workload is simply one of many psychosocial hazards affecting stress levels.
Drawing on these various approaches, a set of workload management guidelines are presented, organised in accord with an empirically-based, conceptual model of relationships between workload, work performance and work-related health and wellbeing (Macdonald, in press). These guidelines are described within three main categories: those affecting work and job demands, which deal with work organisation and job design; those affecting coping resources, which support and promote workers' effective coping; and those affecting individual workers' control, which are intended to optimise levels of individual decision latitude and autonomy.

QUALITY KEY - A SELF-EVALUATION TOOL FOR QUALITY ASSESSMENT OF OHS

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[ID 980]

The Act of Occupational Health Services stipulates that every provider of OHS shall have a system to evaluate effectiveness and quality of its activities. Based on survey of OHS in Finland in 2004 only 13,4 % of the OHS units informed using ISO -quality standards. However, about another 9 % of the OHS units reported being interested in sertification within the next three years. This is anticipated considering that quality and effectiveness of service is in high demand among organization customers as well as individual clients of OHS. For this purpose we have designed a new self - evaluation tool for the quality management of OHS. The content areas and the structure for the audit matrix were selected using ISO 9001 and OHSAS 18 001 standards and Quality Award (EFQM) criteria's. In the design, special attention was paid to customer requirements and planning of OHS activities together with the customers.
QUALITY KEY audit tool is composed of four content areas: 1) management and planning, 2) resource management, 3) processes, 4) evaluation and improvement, divided into 20 topics. Each topic is operationalized into a short sentence describing best practice. Example: Content area; Management and Planning, Topic; Making Contracts: 'OHS unit should make a written contract with a customer of its services based on assessment of working conditions, customer needs, and demands of laws and regulations'.
Each topic in four content areas assessed individually with a four level scale: 1) no activity, 2) activity under preparation, 3) ongoing activity 4) established and documented activity. Documented evidence of the topic areas is also asked. The audit matrix is filled in first individually. The results are then drawn together and the topics needing improvements are discussed in the OHS team, and corrective actions are agreed. The audit tool is recommend to be used at least once per year and whenever need arises.

GUIDELINE FOR HEALTHY WORK AT CALL CENTRES

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[ID 1471]

Call centres are a new but fast-growing business sector in the labour market in many parts of the world. They provide service for customers in many sectors, such as finance, insurance, telecom, travel, marketing, emergency etc. Call centre operators typically communicate with customers by phone or e-mail, seated at a computer work-station in an open office landscape.
Studies from many countries have reported occupational health hazards at call centres connected to the physical, ergonomic and psychosocial working conditions. Musculoskeletal and stress-related problems are common. So too are problems related to the eyes (vision); the ears (hearing) and the throat (voice).
Occupational health matters are seldom in focus in work-life. Some problems are characteristic for call centres and not always easy to solve. Therefore, a guideline for a healthy work environment in call centres has been developed. The guideline was developed by a joint committee of researchers, the Swedish Work Environment Authority, the trades union, the Employers Association, and representatives for the call centre industry associations. The purpose of the guideline is to provide call centre managers and staff with advice for the development of a healthy working environment. The guideline is based on the findings from national studies and labour inspections together with current knowledge of health hazards in call centres and similar situations. The guideline is available in a popular short version and a full-text version for those looking for more detailed information.
One of the central topics in the guideline is how the workplace is organised, advocating physical and mental variation, and limiting work that is closely supervised, physically or mentally restricted or monotonous and repetitive. Other topics include management, quality-control, training, check-ups of vision and hearing abilities, design of the work-stations and office space, including lighting, sound levels and the quality of air in the office.

EDUCATION AND TRAINING IN OCCUPATIONAL HEALTH

DEVELOPMENT OF A WEB-BASED TEST ENVIRONMENT USING A MAZE CONSTRUCTION WITH AN INTEGRATED TOOLBOX

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[ID 111]

Aim: to develop a web-based and multimedial test environment in a postgraduate training course of occupational medicine using an online maze structure and a toolbox to solve in an independent way the cases presented.

Methods: the test environment requirements were identified as following: online, automatically scored, branching tree structured maze and with im mediate(online)available documentation.

Results: cases were developed using a branching tree maze structure. This structure consisted of levels of multiple choice questions (MCQ) with only one correct answer which was automatically scored. Each level of MCQ's followed a short introductory text describing the problem. Feedback was given immediately and the user was guided to find the right answer. Once the correct answer was found the next level of questions with text appeared. The construction of the maze was vertical and up to six levels.

Unique for this and any other test environments was the development of an "integrated toolbox": an electronic box containing text documents, graphics, photos, hyperlinks and other multimedia. Serving as a learning support this toolbox could be consulted at any time through the maze, and instructions were available for the user as guidance to solve the maze. Most text documents were specifically designed for the case based on the most recent literature. Other documents were open source documents. The toolbox as such became a source of information through the available documentation and hyperlinks. The use of text documents made the toolbox very user friendly and compatible with most system requirements.

Conclusion: the online test environment was based on a vertical branching tree construction with automatic scoring. The development and implementation of the toolbox was unique in this setting. An online
"Admin" allows the editor to create and maintain cases without the need of ICT knowledge.

EVALUATION OF EDUCATION AND TRAINING IN OCCUPATIONAL HEALTH PSYCHOLOGY BY E-LEARNING

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[ID 250]

Occupational health psychology is a 'young' scientific discipline having emerged over the past decade (Cox, Baldursson and Rial-Gonzalez, 2000; Barling and Griffiths, 2002). An opportunity for evaluation research has been afforded by the development of a postgraduate course in occupational health psychology by e-learning as an alternative route to an existing face-to-face course. This research will identify learning points for the design, development and use of e-learning in this area of knowledge. It will provide insights into the pedagogical value of both face-to-face and online teaching methods in occupational health psychology and will inform the (re)design of further such initiatives.

This research aims at exploring two important issues in the development of e-learning for the international market in education in occupational health psychology. The first question is whether the use of e-learning technology can support education-at-a-distance in occupational health psychology producing at least a similar level of educational outcome to traditional face-to-face methods. The second question is that of evaluation of e-learning, and the use of outcome knowledge for the purpose of further development. A limited prospective study aims to answer these two questions that can be related through a comparison of learning outcomes in students attending the traditionally presented (and established) postgraduate course in occupational health psychology with those attending the new e-Learning version.

This paper reflects upon the development of the postgraduate course in occupational health psychology and discusses the first findings of this research programme. These focus on:

Findings of qualitative research based on interviews that explored the background, motivations and expectations of the first e-learning students on the course. Pre-course interviews and questionnaire data demonstrated that students' reasons for pursuing the course clustered into two primary categories: career development and personal development. Career development motivations centred on four factors:

- currently working in occupational health and wish to improve knowledge and skills
- enhancement of professional credentials
- change of career
- desire to improve employee well-being

The primary personal development motivator within this subset was the desire to pursue further academic study and, for some, the opportunity to study with internationally recognised researchers in the field of occupational health psychology acted as a motivational factor.

Course expectations divided into two family groups: issues of course structure and professional development. In terms of the former, students were keen that tutors actively stimulated, challenged and facilitated learning. Students expected and desired structured guidance from tutors rather than didactic teaching. There was recognition that at the postgraduate level the tutor may best operate as a challenger of ideas with a view to the stimulation of personal learning. Students strongly expressed expectations concerning communication needs and frequently reported previous negative experiences of study in higher education involving poor tutor feedback and responsiveness to student initiated email contact. It was emphasised that in an e-learning context effective communication would be vital.

From a professional development angle, those students who had pursued the course with a view to career change or enhancement were keen that the course met their needs in terms of providing access to research materials and equipping them with a qualification that would hold credence with potential employers.

A summary of findings of quantitative research that explored the learning outcomes of e-learning students is presented below. Module titles and mean grades are indicated; the first grade given for each module represents the mean grade obtained by the e-learning cohort for that module, the second the mean grade obtained by students pursuing the the face-to-face route to the award of MSc in Occupational Health Psychology.

Organisations, Stress and Health
66.25% 62.125%
organisational change and development
65.875 61.0
Law and occupational health
67.875 66.125
Introduction to OHP
65.375 65.5
Theories in health psychology
62.625 59.25
Professional issues in applied psychology
63.125 65.625

The data suggest that elearning is capable of facilitating learning outcomes comparable to those achieved by the traditional, classroom based face-to-face route. Implications are discussed for the development of the use of e-learning in postgraduate education in occupational health psychology.

OCCUPATIONAL HEALTH NURSING. EDUCATION AND PRACTICE IN THE EUROPEAN UNION

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[ID 333]

Information on current Education of Occupational Health Nurses (OHNs) throughout European Union (EU) countries is based mainly on anecdotal information, while past literature findings show great discrepancies among countries. The Federation of OHNs in the EU(FOHNEU) has developed and disseminated a model education curriculum – The Core Curriculum -, but its use is very limited until today.

The aim of this study was to find out the extend to which OHNs are educated and practise under statutory requirements within EU, as well as the extend to which the Core Curriculum developed by FOHNEU has been implemented so far.

A questionnaire was designed and sent out to country members of FOHNEU. The questionnaire was seeking information on education and practice, such as statutory requirements, basic qualification and education of OHNs, description of existing courses regarding level, length and content of the courses, as well as information on practice regarding content and context.
The findings revealed that six countries have included some OH teaching in undergraduate curricula, either as a separate course, or as part of public/community health nursing. Ten of the countries responded in the survey have established OHN specialisation, although courses offered vary both in length and content. Possibilities of postgraduate studies at master's or Ph.D. level exist in some countries. However, not even countries that have participated in the Core Curriculum development have implement it as such; but when analysing the content of specialist education some of the countries have included most or some of its elements. Practice however in most of the countries has similarities, which is quite surprising considering the differences in education.
In conclusion, OHN practice is wide spread in EU, but education is not yet satisfactory for the role OHNs practise. The development of postgraduate specialisation programmes based on the Core Curriculum could be proposed for improving it.

OCCUPATIONAL MEDICINE TRAINING IN THE USA: INTERNATIONAL COMPARISONS, CURRENT CHALLENGES AND RECOMMENDATIONS FOR CHANGE

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[ID 498]

AIMS: There are widespread perceptions in the USA of a crisis in occupational medicine training based upon declining numbers of qualified specialists and residency programs. The underlying causes of the current situation are explored from the perspective of a current program director.
METHODS: The training model in the USA is contrasted to that of other countries and a systematic examination is undertaken of structural problems with the administration of residency programs.
RESULTS: Programs in the USA have three unique features when compared to programs in many other countries. The most striking is a shorter length of core occupational health training - effectively one year when compared to common European Union requirements of four. Certification requirements and examinations overlap with those of two other preventive medicine specialties: aerospace medicine and general preventive medicine. Finally, there is only one certification pathway through residency training, without the additional certification mechanism available to practicing physicians in Canada, Japan, and several European countries.
There are several additional and interrelated challenges to training programs which may contribute to these trends. Because of its design, programs must be responsive to the substantial, frequently onerous, accreditation requirements of two distinct agencies. In addition, virtually all occupational health training programs are dependent, to varying degrees, upon external grant funding which further increases the administrative burden of what are generally small programs of two to three residents. There is a similar division in professional organizations, since three distinct groups can claim to represent the constituency of the occupational health training program director. The result is a loss of control over the composition of training programs by the occupational health community, a loss of training programs due to inability to meet administrative requirements, and a lack of unified representation and advocacy for training programs.
CONCLUSION: Significant and overarching reform of the existing structure is needed, and should be guided by a more in depth analysis of training programs in other countries.

OCCUPATIONAL SAFETY AND HEALTH TRAINING: AN INTERDISCIPLINARY APPROACH OF THE TECHNICIAN CERTIFICATE PROGRAM

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One of sixteen education and research centers (ERCs) in the USA, the North Carolina Occupational Safety and Health Education and Research Center (NC OSHERC) is part of The University of North Carolina at Chapel Hill. These ERCs were established by the National Institute of Safety and Health (NIOSH) to assure an ample supply of well-trained professionals in the area of occupational safety and health (OS&H). Through academic programs and continuing education, the goal of the NC OSHERC is to provide quality educational opportunities for those with the responsibility of ensuring safety and health in the workplace. Although it covers eight southeastern states in the USA, it enrolls national and international participants every year.
The mission of the NC OSHERC to prepare occupational safety and health professionals to promote and protect worker health is accomplished through the provision of high quality interdisciplinary education and training, research, and service in OS&H. One avenue of this training is through Continuing Education (CE) that addresses the needs of the non-academic practitioner who must maintain certifications and gain professional growth through education in the expanding field of OS&H. The NCOSHERC CE Program has developed three Technician Certificate Programs to meet the needs of the OS&H practitioners whose roles are evolving as the state of the business and economy changes.
In this presentation, I would be honored to share the description of the design of the Continuing Education programs and the success they have enjoyed with non-traditional students through the collaborative effort of merging university-associated and non-academic practitioners and consultants as faculty for the NC OSHERC Technician Certificate Programs.

EDUCATION AND TRAINING IN OCCUPATIONAL HEALTH

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INTRODUCTION
As a country in economic and political transition, Romania has now a great opportunity to redesign the system of occupational safety and health.
New regulations had forced the employer to ensure the preventive medical check for all employees. Occupational medicine became one of the most wanted on the job market.
An occupational physician is formed after the 6 years of medical school and 4 years of residency training.
The number of Romanian occupational health physicians in 1996 was only 240.
Some new forms of short-term training are urgently required.
OBJECTIVE
In order to increase number of OH specialists, the Romanian Society of Occupational Health decided to organize a complementary training in OH for family practitioners.
This training program had 3 objectives:
- to motivate family practitioners to learn OH information and incorporate it into their practices;
- to teach physicians how to approach OH problems in a systematic, organized manner;
- to acquaint the physicians with the principles of OH and the latest scientific data related to OHS problems;

Training contents:
The training was focused on those issues that can be used immediately in OH practice. Curriculum was composed by 6 instructional modules that incorporated 2 types of training: 6 courses of 3 days, 8 hours each during weekends, continued by practice periods. Each module was finished by an exam (questionnaire).
In order to accomplish the educational needs, teaching methods were focused on: background and definitions, hazard recognition and evaluation, legislation, ergonomics, risk assessment in the workplace, occupational diseases and work-related diseases.
CONCLUSIONS
This training program involved 1500 family physicians at national level (the training modules were organized in Bucharest and other 4 big towns).
The general practitioners will work under the supervision of an OH specialist. After 3 years of practice, they will have the right to pass the examination of OH practitioner, according to an established selection procedure.

STEPWISE ESTABLISHMENT OF OCCUPATIONAL SAFETY AND HEALTH MANAGEMENT SYSTEMS BY PRACTICE-FEEDBACK TRAINING IN SMALL-SCALE INDUSTRIES

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[ID 671]

A new training methodology based on practice feedback of trainees was developed and its efficacy was assessed. This methodology was applied to managers and workers in small-scale industries to establish occupational safety and health management systems (OSHMS).
A simple form of OSHMS, called Prime-OSH21, was applied. It comprised six steps: (1) establishing a policy, (2) setting up concise Plan-Do-Check-Act (PDCA) procedures, (3) assigning responsibilities, (4) implementation, (5) performance assessment and (6) continual improvement. Six training sessions corresponding to these steps were conducted in four separate workshops. Participants were guided to take concrete action during each practice period of two months between these workshops. The participants initially received participatory action training that focused on low-cost solutions in occupational safety, health and ergonomics. They were then requested to assess existing risks and identify and implement immediate improvements through group work involving their fellow supervisors and workers. The results of each practice period were reported back to the next workshop. By repeating these practice periods followed by workshops, the participants effectively learned concrete ways to grasp risk profiles, implement improvements involving many people and establish OSHMS in a stepwise manner.
This practice-feedback methodology has two major advantages. Firstly, the participants could learn how to assess work-related risks and plan and implement immediate improvements reducing such risks by concise PDCA procedures. Secondly, their fellow supervisors and workers could also be trained with visible effects. This methodology has proven suited for wide application in establishing OSHMS in small-scale industries.

DEVELOPMENT OF AN OCCUPATIONAL HEALTH NURSING INTERDISCIPLINARY MASTER OF PUBLIC HEALTH DEGREE VIA DISTANCE LEARNING: MEETING THE EDUCATIONAL NEEDS OF PRACTITIONERS

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[ID 799]

The Occupational Health Nursing Program has been a stable, residential program in the School of Public Health at the University of North Carolina at Chapel Hill for almost 30 years. In 1999 a distance learning education format was developed in response to a defined need by occupational health nurses desiring to obtain a master's degree but unable to leave their current positions and/or relocate. The distance education curriculum is the same as the residential instruction, which includes 39-credit-hours of coursework in the core public health sciences, occupational health sciences, and occupational health nursing.
All public health and occupational health science courses are interdisciplinary and have been developed to be delivered online, several with chat room components. Each of the two theory based occupational health nursing (OHN) didactic courses is approximately 56 content hours with embedded fieldwork. Each course is offered on-campus and content was initially spread out over a 2 ½ week period in each of two summers. Feedback from students indicated content could be offered in a more condensed timeframe including use of weekends. Consequently, both OHN courses are now attended by students for eight full consecutive days for each course. Coursework, however, extends throughout the semester for joint projects and assignment completion. Students are also required to complete a five week practicum experience which can be done at their worksite (exclusive of their current job responsibilities) or arranged for by faculty at other sites throughout the country. Program completion generally is 2 – 2 ½ years. Four students were admitted in 1999 which had quintupled over-time.
The program is accredited by both the National League for Nursing Accrediting Commission (NLNAC) and the Council on Education for Public Health (CEPH).

NET-BASED TRAINING OF WORK-RELATED MEDICINE IN LATIN AMERICA: CHANCES AND CHALLENGES OF LONG-DISTANCE TRAINING VIA THE INTERNET

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[ID 971]

It is estimated that Latin America is a region that holds a workforce of 250 million workers distributed in our developing countries. The number of accidents, diseases and deaths at the workplace has increased significantly in the past decades. Consequently, there is an increasing need to provide Occupational Health (OH) comprehensive services for preventing work-related injuries and diseases.
Latin America has several in-house OH graduate programs, and some distance education training programs. But there is still a big lack of competent OH Professionals to provide the Basic and clinical OH services, and for covering needs of the regions' workforce.
The Net-based training of Work-related Medicine (NetWoRM) is an innovative program composed of tools and procedures with an educational approach of distance learning. The countries of the EU jointly with India and Colombia designed a series of cases for teaching medical graduate and undergraduate students, in such a way that the interactive experience of solving them has become a very interesting method for teaching.
The University El Bosque trained a group of professors and OH graduate students, with which validation of the Spanish versions of the case was completed. They were used as part of the Occupational disease course delivered within the Graduate OH Program.
The overall usage of the cases became an excellent teaching tool, and at the same time provided the opportunity for exchanging clinical experiences, knowledge and technology transfer from the European and North American countries involved in the project. The adaptation to Colombia was also an interesting input for having the industrialized countries understand the cultural, economical, labour and social differences between countries/regions.
NetWoRM is a solution that provides OH professionals access to training, minimizing education costs through the usage of virtual channels, and avoiding students to travel and have higher expenses to access higher levels of education.

SHARING EVIDENCE WITH COLLEAGUES TO ENHANCE PERFORMANCE, AN EVALUATION

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[ID 1020]

Introduction

To teach occupational physicians (OPs) how to practice Evidence-based medicine (EBM), insights from Continuing Medical Education (CME) can be useful. Recent studies show that interactive, problem based, multifaceted implementation forms of CME activities can increase physicians' performance. Therefore we started an innovative project in which CME is designed to include both a regular EBM course for OPs as well as recurrent case method learning sessions. The aim is to stimulate OPs to find, share and apply best evidence in daily practice. The main question of this study is to what extent the case method learning sessions contribute to the enhancement of professional performance.

Methods

After a regular EBM course, case method learning sessions are introduced and implemented in small peer groups of 6 to 8 OPs. During the sessions, organized once every two weeks during 4 months, OPs discuss cases from their own clinical practice in a prescribed structured way. Consequently, they learn to search for, share and apply scientific evidence. The course of the recurrent case method learning sessions was measured by evaluation forms filled in by the attending OPs after every session. The perceived contribution of the sessions to the enhancement of professional performance was evaluated by interviewing OPs.

Results

The OPs evaluation of the contribution of these sessions to the enhancement of their professional performance will be the main focus of the presentation. Secondly, the course of the case method learning sessions may be an important factor for the success of the intervention. We therefore also present to what extent the sessions met our pre-defined goals.

Discussion and conclusions

This study evaluates the practice of a new form of CME directed on enhancing professional performance in the tradition of EBM and, therefore, might be beneficial to promote Evidence-based practice in occupational health.

FUNDAMENTALS IN OCCUPATIONAL HEALTH: CASE BASED MODULES ON RISK ASSESSMENT AND MANAGEMENT

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[ID 1042]

Fundamentals in Occupational Health, WHO modules in occupational health, hygiene and safety, are designed to provide education for professionals who are charged with the responsibility of protecting the health of workers, including public health officers, physicians, nurses, policy makers, labor inspectors, and worker health and safety advocates. These materials were developed to support the implementation the Forty-ninth World Health Assembly global strategy for occupational health (WHA49.12). Where relevant, the materials complement the effort of the International Programme on Chemical Safety (IPCS) Global Implementation Strategy on occupational risk management.

The materials are organized into three 16-hour, case based modules for a multidisciplinary audience, by economic sector: agriculture, manufacturing, and service. Occupational health encompasses many disciplines-- toxicology, epidemiology, industrial hygiene, and safety. It employs the methods of hazard/risk identification, characterization, and evaluation and touches on issues related to policy and ethics. We have used the “economic sector” as an organizing format; classroom exercises are built around cases related to each sector and cover each of the occupational health disciplines in one classroom. The instructor may choose to re-organize the content to fit a different student group. For example, the hygiene-related exercises may be pulled out and re-assembled to educate a group of physicians in exposure assessment.

The modules were developed by an interdisciplinary multi national team that included occupational medicine physicians, industrial hygienists and curriculum specialists. Additionally, the materials were piloted in Turkey, South Africa, and Costa Rica. The materials are also available at http://uic.edu/sph/glakes/who_modules/

WORK STRESS AND HEALTH

SALIVARY CORTISOL AS BIOMARKER OF PERCEIVED STRESS

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[ID 124]

Introduction Aims of this study were to objectify the neuroendocrine response to mental stress by mean of salivary cortisol measurements in real working conditions and to compare this response to perceived work-stress appraisal.

Methods In 50 white-collar workers (37 females and 13 males; mean age 32.03±DS 6.21 and 28.78 ±DS 8.52, respectively) saliva samplings were obtained using Salivette^{R} , taken at the time of awakening, 30, 60 minutes thereafter, at the start of work-shift and then every 3 hours. Cortisol concentration was analysed by direct radioimmunoassay (LOD=1 ng/l). The cortisol awakening response (CAR), the cortisol excretion during the working day and the endocrine response to stressfull daily events were calculated separately. The subjective perception of stress was evaluated using the Karasek Job Content Questionnaire, short version (job control 6 items, job demand 5 items). Analysis of variance with repeated measures and Pearson correlations were performed.

Results Women showed significantly larger increase of CAR compared to men, with largest difference at the third sample (+ 60 min.) ($p< 0.05$). The cortisol excretion during the working day was higher in men than in women ($p< 0.01$). Job control was inversely associated with CAR both in women and men ($r= -0.32$ and -0.37, respectively) with a statistically significant value in the first sample in men ($r= -0.73$; $p< 0.005$). Job control influenced cortisol levels over the remainder of the working day, but only in women ($r= -0.24$). Job demand was positively associated with CAR in women ($r= 0.37$), but not in men.

Conclusions Both job control and job demand show associations with neuroendocrine response with gender differences. The use of noninvasive cortisol measurements in saliva can provide a valuable tool which suited for occupational physicians in cross-sectional and longitudinal studies to explore the relationship between perceived workstress and neuroendocrine effects.

RESEARCH ON MENTAL HEALTH AND STRESS IN WORKING POPULATIONS IN CHINA

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[ID 151]

Objective: To study the current status of mental health in working populations and its influential factors.

Methods: subjects were 3615 workers from three Chinese areas. Depression symptom was measured by using the Center for Epidemiological Survey Depression Scale , the stressors, personalities, social support, coping strategies, and strains was investigated

Result: 40.2% of workers had definite depression symptoms. The male workers had the higher incidence rate of depression symptoms than female workers ($P<0.01$). The older group had the lower rates , compared with the younger group ($P<0.01$). The workers of divorce or the bereft spouse had the higher rate than the workers married and unmarried ($P<0.05$). The ones with middle school education-level had the superior rates than Masters and Doctors ($P=0.005$). The majority of the occupations studied had the rate of 30% above. The difference of the adjusted means among three groups of different depression symptoms were analyzed, the results showed the workers with definite depression symptoms had the higher scores on such factors than the other two groups as physical factors, role ambiguity, role conflict, job monotonous, mental load, responsibility for person, job future ambiguity, job hazards, type A behavior and work locus of control, social support, daily life stress, psychosomatic symptom and drug use, and had the lower scores than the other groups on the factors such as opportunity of promotion, degree of participate, autonomy, task identity, feedback, friendship opportunity, speed control, training adequacy, challenge, self-esteem and organizational commitment, coping strategies, job satisfaction($P<0.05$ or 0.01). Self-esteem, support form coworker, Intra-group conflict, role conflict, role ambiguity, rotating shift, support form family enter the regression equation($R2 >0.01$).

Conclusion: There are considerable serious mental health problem of the working populations currently in China. Stressors have effect on the mental health.

RUMINATION AND WORKERS: AN EUSTRESS OR A NEGATIVE EFFECT?

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[ID 754]

In recent years, changes in the nature of work (NCR, 1999) and in the labour market have led to the development of a new class of workers, labelled as "creative class" (Florida, 2002). Creative workers produce and exchange information and ideas. They do not carry out routine and repetitive tasks; their work tends to involve problem solving and problem setting activities. Such work is cognitively never-ending and psychologically highly motivating and tension producing, at variance with typical repetitive work which is accompanied with low motivation and boredom.

It was supposed that while the latter produces, after work, a feeling of emptiness, the former gives rise, in rest periods, to continuous mental activity related to work. Such activity is known as rumination, a term primarily used to describe unintentional preservative thoughts in the absence of obvious external cues (Martin & Tesser, 1989).

The aim of this study was to investigate whether rumination is affected by type of work (creative or routine).

There were 344 participants. They were requested to complete the JCQ (Karasek & Theorell, 1990) and rumination scale (Martin & Tesser, 1989). The ages of the participant ranged from 20 to 66 (mean: 37.4; sd: 9.78).

On the basis of the JCQ results we selected two groups of participants from the sample (creative and routine). On comparing participants' occupations in the two groups, it emerged that the "routine" group was largely composed of employees (75%) and teachers (8%), while the creative group was largely composed of architects (40%) and programmers (23%).

Analysis of the results obtained on the rumination scale (range 6-42) revealed that those with creative occupations tended to ruminate more than those with routine occupations. The average of the first group was 31.08 while the average of the second group was 14.78 (<0.001 ANOVA test).

These results suggest that creative workers tend to invest cognitively in their work though pervasive thought but this could be considered an eu-rumination. The opposite result was found for workers with routine jobs.

PSYCHOSOCIAL RISKS FACTORS AND MENTAL MORBIDITY IN A WORKING POPULATION

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[ID 207]

OBJECTIVE

To evaluate the association strength between several psychosocial risk factors (PRF) and the current mental disorders (anxiety/depression) detected in a representative sample of Colombian workers.

The psychosocial risk factors that were looked for were related to the working, the individual and the social and family conditions.

The studies on mental health and psycho-social factors consider as frequent stressors prolonged working days, the difficulties in the relationships with a superior, work instability, the lack of opportunities for professional development, work overload, the high emotional demands and the lack of social support and participation (Tudor, 2002) .

Muntaner and Eaton (1998) ; Roberts and Lee (1993); Anthony and cols. (1992); P. Garrido and cols, mentioned by Boix and cols (1998) , have reviewed different studies that show the relation of a job with the prevalence of smaller psychiatric upheavals and the consumption of psychoactive substances.

The "burnout", constitutes a type of prolonged answer to chronic emotional and interpersonal stressors at work (Maslach, 1998) , and the studies about the effects of work in the mental health of professionals of the sanitary services are abundant, (Lam, Lazarus, et al., 1999 ; Baba et al., 1999 ; Stewart et al., 2000).

Lopez and Camps (1999) , and King and Meldrum (1999) , refer the traumatic effects due to chronic stress in people affected by Mobbing. In several investigations there are also considered postraumatic stress episodes secondary to industrial accidents (Rasmussen et al., 1999 ; Asmundson et al., 1998).

METHODS
Hypothesis: People with higher levels of exposure to psychosocial risks suffer more from anxiety and/or depressive disorders or adaptive disorders with alterations of humor.
A cross sectional, case-control study was carried out in two paired samples (n= 433 workers, 212 cases and 221 controls). One was made up of workers attending health-care centers due to anxiety and depression disorders, and the other group included workers also attending those institutions, but having neither a pathology related to such a disorder nor any other stress-related disease.
The reason for choosing the controls in the same institutions was to control the selection bias. Cases and controls were paired by gender, age, economic activity and occupation. The cases and controls identification was made by means of the diagnosis elaborated by the clinician.
The instruments used were:
a) A Questionnaire to evaluate the psychosocial factors, designed and standardized by Javeriana University (Villalobos G. 1996). The Questionnaire evaluates employees' perception concerning the presence and frequency of exposure to psychosocial risk factors, and consists of 77 multiple choice items (always, often, seldom, never). Cronbach's Alpha was 0,834 (p=<0,001, n=1.891).
b) A semi-structured Interview to broaden up qualitative information on the workers' attitude towards the study, the risk factors and mental disorders history.

RESULTS
A comparative analysis (cases - controls) of the demographic and occupational variables was carried out. The association between factor and exposure was established by the odds ratio and its statistical significance (Chi square). A stratified analysis was performed for possible confusion variables not controlled by the design (i.e. the cognitive-affective moderating factors).
116 cases (54,71%) presented primary mood pathology and 96 (45,28%) adaptive disorders with mood symptoms.
Analyzing the association strength in the three main categories of psychosocial risks sources (personal, working and non working conditions), the following order was found: (1) Personality traits: OR: 6,44 (CI 3,60 – 11,63), p=0,000; (2) Non-occupational factors: OR: 3,51 (2,17 – 5,67), p=0,000; (3) Psychosocial working conditions: OR: 3,25 (1,98 – 5,34), p=0,000.
Current exposure to various PRF was explored in the two samples. It was found that anxiety/depression disorders were associated with the following sources of PRF at work: organizational characteristics (OR=2,49, IC 1,47 - 4,23), social working group (OR=2,48, IC 1,48 - 4,15), management (OR=2.28, IC 1.32 - 3.94) and seniority (OR=1.74, IC 1.14 - 2.66). All these factors were still associated after controlling non-occupational factors, and personal characteristics (demographic variables, cognitive and affective characteristics).
The main differences between the cases and controls, was the exposition – answer, which show statistically significant differences, in the relation with the coworkers (OR 3,94, Chi Square=17,365, p=0,000).

CONCLUSIONS
It was proven that the individual conditions and the non-occupational factors were more than associated than the occupational PRF. However the association between the latter and the anxiety/depression disorder persisted in an independent way, even when other associated variables were controlled. All the results were useful for proposing a national policy for evaluating and managing psychosocial factors at work and occupational stress; and to provide criteria for the study the disorders caused by stress reactions.

THE EFFECTS OF WAGE SYSTEMS ON EMPLOYEE'S BURNOUT AND PHYSICAL HEALTH COMPLAINTS BY GENDER AND GRADE OF EMPLOYMENT

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[ID 1473]

Objective: The tide of floating-wage design is rising in Taiwan, as a means to reduce costs of management. It is known that wage arrangements influence employees' attitudes to and behaviors in work. However, the health impacts on working people are usually not taken into account. In this study, we examined the relationships between wage systems and employees' burnout-related problems; and examined if these relationships vary by gender and social position.
Methods: A national survey was conducted in 2004, consisting of 8906 male and 6382 female employees aged between 25 and 65 years. Information on wage systems, work demands, job control, working hours, employment grade, work-related burnout scores (assessed by the Copenhagen Burnout Inventory, CBI), and a variety of health complaints were obtained by a self-administered questionnaire. Wage systems were classified into three types: fixed salary, performance-based salary with a based pay, and piece-r ate or time-based pay.
Results: This survey shows that beyond one-third of our study populations were with floating-wage design, including performance-based salary with a based pay and piece-rate or time-based pay. Among the three wage systems, workers with performance-based salary had longest working hours and the highest levels of work demands, job control, personal burnout, and work burnout, and also a highest prevalence of health complaints. After adjusting for age, working-hours, work demands and job control, employees who had performance-based salary, piece-rate or time-based pay reported higher burnout level than those with fixed salary. When stratified by gender and employment grade, among men, stronger relationships between elastic wage system and burnout levels were found in lower employment grades; but in women, no apparent effect modification by employment grade was found.
Conclusion: This study found that floating-wage systems were common in Taiwan and the y were associated with increased risks of burnout and health problems in working people.

REVIEW OF EPIDEMIOLOGIC RESEARCH OF WORK STRESS AND ITS HEALTH EFFECTS IN CHINA

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[ID 251]

China is a developing country with rapid transformation contributing to globalized economy, and the public have shown increasing concerns about work stress and its health effects, such as cardiovascular diseases. Thus, there is an urgent need to demonstrate the association between work stress and diseases in Chinese working population. At present, 4 instruments for measuring work stress from western societies are validated and used in China with acceptable reliability and validity, they are UK Copper's Occupational Stress Indicator (OSI), US NOISH's Generic Job Stress Questionnaire (GJSQ), US Karasek's Job Content Questionnaire (JCQ), and Germany Siegrist's Effort-Reward Imbalance (ERI) Questionnaire. However, it is crucial to develop our own measurement instrument. Until now, a number of epidemiologic studies have been reported in mainland China: 17 studies on cardiovascular diseases (10 with cross-sectional design, 6 with case-control design, and 1 with retrospective cohort design), all studies showed the positive association between work stress and increased blood pressure, hypertension, or coronary heart disease (OR 1.31-2.72); 7 studies on mental illness / self-rated health (all with cross-sectional design), the outcomes varied from mental distress, depression, fatigue to health functioning (OR 1.63-2.88); 4 studies on reproductive dysfunction in women (3 with cross-sectional design, and 1 with prospective cohort design), the risk of low birth weight or dysmenorrhea was greater among women with high work stress (OR 1.5-2.4); only 1 study with cross-sectional design on musculoskeletal disorders (OR 1.29-1.78). In addition, 10 cross-sectional studies examined the biomarkers of work stress, for example, cortisol, monamine neurotransmitters, heat shock protein, and immunoglobulin in serum or in saliva. It indicated that work stress could increase the levels of these biomarkers except decreasing immune function of human body. In future, large-scale surveys with prospective design which covers various occupations are expected.

THE RELATIONSHIP BETWEEN JOB INSECURITY, BURNOUT, WORK ENGAGEMENT, GENERAL HEALTH AND JOB SATISFACTION IN SELECTED ORGANISATIONS

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[ID 345]

The objectives of this study were to assess the relationship between job insecurity, burnout, engagement, general health and job satisfaction in selected organisations in the Vaal Triangle, South Africa. A cross sectional survey design was used. Accidental samples of workers in the selected organisations (N = 216) were taken. The Job Insecurity Questionnaire (JIQ), Maslach Burnout Inventory–General Survey (MBI-GS), Utrecht

Work Engagement Scale (UWES), General Health Questionnaire (GHQ) and Minnesota Satisfaction Questionnaire (MSQ) were administered. Exploratory factor analysis of the GHQ resulted in a four-factor model of general health. The scales demonstrated acceptable levels of internal consistencies. The results revealed practically significantly relationships between burnout, engagement, job insecurity, job satisfaction and general health. As independent variables Exhaustion and Cynicism explained 36% of the dependent variable job satisfaction and 50% of general health.

WORKPLACE STRESS AND USE OF ANTIDEPRESSANT: A PROSPECTIVE STUDY

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[ID 1589]

Many epidemiologic studies using the demand-control model have found subjects in the high strain group to be at an increased risk of mental disorders, especially depression. From a psycho-physiological point of view, exposure to high strain conditions would result in an overactivation of the hypothalamus-pituitary-adrenal cortex axis, leading to chronic stress and to subsequent emotional disorders.

Aim of this prospective study was to evaluate the risk of depression related to perceived psychosocial work environment. After factor analysis on 28 items from a modified version of the Whitehall II questionnaire completed by 4507 workers in 1999-2000, nine questions resulted as pertaining to control and four to demand. The job strain scale was built as the ratio of demand by control. Subjects were considered incident cases if they had at least two antidepressant prescriptions (according to the Regional Archive of Drug Prescriptions) in two consecutive months during 2001-2004. Data were analyzed using logistic regression, controlling for age class and stratifying by sex and occupational class (white or blue collars).

In white collars, no relationship was found between the risk of depression and exposure to demand, job control or job strain for either sex. Among blue collar workers, the risk of depression was linearly associated with demand in both sexes (p=0.04 for males; p=0.02 for females), and with job strain in women (p=0.02). For neither sex was depression associated with job control.

Study results confirm the association between mental depression and high workplace psychological demands observed in other studies, but only for blue collars; the risk of depression was not related to job control, suggesting that the excess risk observed for job strain was attributable to the influence exerted by the demand axis. Record-linkage between workers' cohorts, previously assessed for exposure to occupational risk factors, and drug prescriptions archives could be a viable method to follow-up these cohorts for certain health outcomes.

STRESSFUL LIFE EVENTS AND WORK ACCIDENTS

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[ID 521]

There have been discussions on the possibility that work accidents can be partially or totally caused by non-work phenomena. The objective of this study was to investigate the existence of non-work risk factors for work accidents, that is, to investigate an association between phenomena not directly related to work activity and work accidents.

For this we made a population based case control study, in the municipal area of Botucatu, southeast Brazil. Sample selection was made between 05/16/2002 and 10/15/2002. The cases consisted of 108 workers who had recently suffered work accidents. Each case was matched with three controls according to gender, age group, and census sector. Cases and controls answered a questionnaire on recent exposure to stressful life events.

The results showed that "to suffer environmental problems", "be an assault victim", "have little food at home" and "non-occupational fatigue" were risk factors for work accidents with estimated incidence rate ratios of 1.4 (95% confidence interval: 1.1, 1.7); 1.3 (95% CI: 1.1, 1.7); 1.3 (95% CI: 1.1, 1.6); and 1.4 (95% CI: 1.2, 1.7) respectively. Also "schooling level" was a protection factor, with estimated rate ratio of 0.9 (95% CI 0.9, 1.0).

To study non-work factors influencing the occurrence of work accidents signifies an increase in the understanding of work accidents causes, and consequently broadens the extent of preventive actions by addressing the worker in all his social dimensions to extrapolate the limits of the working day. Findings suggested non work variables participating in the origin of work accidents, increasing understanding of these phenomena and widening the perspective about new approaches in work accident prevention.

WHAT WORK-RELATED FACTORS AFFECT ON HEART RATE VARIABILITY

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[ID 1322]

Objectives: Heart rate variability (HRV) is known to related several work-related factors such as work condition including prolonged work and shift work, chemical exposure including metal fume and organic solvents, physical risk factors including noise, heat, work speed and physical exhaustion, and job stress. We conducted the study that what work-related factors can affect the autonomic nervous system by evaluating HRV.

Methods: Various workers who were exposed to chemical, physical, psycho-social risk factors were recruited. Total 114 workers from foundry, forging, machine assembly, fixing task, welding, painting jobs were attended this study from May to August 2005. We conducted work-through survey to assign each worker to several exposure categories. Several objective devices consisting exposure assessment data of chemical and physical factors, cycle ergometer and heart rate monitoring device for work energy exposure, surface EMG and electrogoniometer for muscle and joint activity, job stress questionnaire. Heart Rate Variability (SA-2000, Medicore, Korea) were recorded at morning before work and afternoon with 5 minute method after work which might represent chronic and short term effect of the exposures respectively. Time and frequency domain were analyzed.

Results: Energy expenditure during work reduced morning rMSSD, morning logHF, and afternoon logHF. Relative heart rate ratio decreased afternoon TP. High repetitive joint use lessen morning rMSSD and afternoon logHF. Cooling and cutting oil exposure reduced afternoon rMSSD. Interpersonal conflict including supervisor and coworker relationship reduced afternoon SDNN, logHF.

Conclusions: Several physical, chemical and psychosocial work-related factors were associated with HRV decrease. Dose response relationship including cumulative exposure between those factors and HRV will be analyzed. Also interaction between those factors and multivariate analysis will be conducted.

INDEPENDENT EFFECTS OF FAMILY STRESS AND WORK STRESS ON NEGATIVE EMOTIONS AMONG FEMALE WORKERS

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[ID 1376]

Objectives

We investigated whether family stress and work stress result in negative emotions independently of each other among working women in a subway company in Seoul, Korea.

Methods

A cross-sectional study was conducted on 350 women employed in The Metropolitan Subway Corporation, one of the two subway companies serving the city of Seoul, Korea. A provisional version of Job Content Questionnaire (JCQ) 2.0 was proposed by the international committee. The new version included emotional demand and family stress. Negative emotion was measured by 6 question items from CES-D. Multiple regression analysis was used for data analysis to search for factors that affect negative emotions.

Results

The workers were mainly above their 40 (44.8%), high school educated (40%), and married (88%). Job titles were varied with office workers, laundry, restaurant, and the average work tenure was 14.6 years. The mean values of the core scales were 58.3 in decision latitude and 32 in job demand. Work-family stress was higher in those married than those unmar-

ried. With multiple regression analyses, several significant independent predictors of negative emotion were identified; decision latitude, job demand, emotional demand, family stress, marriage, educaiton, and age. Work tenure was not associated. There was no interaction between family stress and work stress.
Conclusion
In the current study, family stress had a significant independent contribution to female employees' negative emotions, in addition to decision latitude and job demand. However, there was no interaction between job stress and family stress.

WORK ENVIRONMENT AND THE HEALTH STATUS OF WEAVERS. A STUDY OF HANDLOOM INDUSTRIES IN INDIA

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[ID 1718]

Participation of Indian women in economic activities is increasing in all sectors. Due to urbanization, liberalization and westernization, there is a rapid change in the family and social structure which demand women to join the work force. In the southern part of India there are communities involving in weaving. One important community among them is 'Sourashtras' (migrated from Gujarat to Tamil Nadu) who do weaving as their traditional occupation. In recent days women are forced to engage in the weaving process for many reasons like, younger generation getting into the new job market. Moreover, the handloom industry is not able to compete with the power looms. This factor along with the fall of spinning and thread industries has forced women to toil along with the older men of the family. Women have to do the major part of weaving at home (many have their looms at home) in an uncongenial atmosphere for a long duration of time in order to sustain their lives. The nature of work has a great implication on their health. The present investigation endeavors to study the health issues of the handloom weavers. The objectives of the study are:

a) to describe the work environment of the weavers.
b) to find out the health problems as the weavers report it and for which they are taking treatment.
c) to explain their response to the illness.
d) to analyze the difference between male and female weavers in terms of illness and treatment.

Methodology

The study area is Madurai District in Tamil Nadu, India. A weaver colony is the area sample in which approximately 250 households are living. The sample size is 10% of the universe selecting one adult female or male from each household. The data is collected with the help of a structured interview schedule.
The research discloses how the work as well as the work environment has a great implication on the health of the women. The constant movement of arms and legs on the loom, long hours of sitting and the dust cause many complications in them.

NOISE AND WORK

RISK MANAGEMENT OF THE EXPOSURE TO NOISE IN THE BELGIAN INDUSTRY

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[ID 80]

Aims

The aim of this study was to assess the implementation of the Belgian legislation regarding the exposure of workers to the risks of noise, which is based on the European Noise Directive 86/188/EC.

Methods

During April and May 2005 health and safety inspectors visited 136 at random chosen enterprises with noise exposure above 85 dB(A) LAeq,8h. They inspected the noise risk management using a checklist with 27 items on risk assessment and control measures.

Results

Noise risk assessment.

There was no written noise risk assessment in 39% of the enterprises and 30 % had no measurements. 45% of the measurements did not meet the requirements of the legislation and 36% were not representative for the exposure of the workers. In 29% of the enterprises the workers or their representatives were not consulted in the risk assessment and in 32% the workers were not informed about the results.

Workers exposed above LA eq,8h = 90 dB(A).

In 4% of the enterprises there is no personal protective equipment (PPE) available. In 18% the available PPE are not worn. In 25 % of the enterprises there is no proof that the used PPE give enough protection and in 26% the occupational physician is not involved in the choice of the PPE. In 16% of the enterprises the workers are not informed about the risks. 33% of the enterprises had no program to reduce the noise exposure. In 39% work areas with exposure higher than 90 dB(A) were not marked and had no delimitation or restricted access. In 97% the workers had regular health surveillance (yearly audiometric testing and general physical examination).

Conclusion.

In general, one enterprise in three has major shortcomings in the risk management of noise. Noise remains an important occupational health problem. In view of the recent European Noise Directive 2003/10/EC extra efforts are needed to assess and reduce the exposure to noise.

AIRCRAFT NOISE AND RISK OF ANNOYANCE FOR THE POPULATION LIVING NEAR MALPENSA INTERNATIONAL AIRPORT

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[ID 304]

In this study, a survey questionnaire was used to evaluate aircraft noise annoyance (ANA) in a sample of residents of Somma Lombardo, an Italian town sited in the area surrounding the Malpensa airport. The population was sampled according to exposure. Group A consisted of 1500 residents exposed to a noise level of 60,1 LvA, while Group B consisted of 1000 residents exposed to a lower noise level of 56,4 dBA Leq. Several potential correlates of ANA such as socio-demographic variables, quality of life, individual sensitivity to noise, attitude toward airport and individual coping resources were evaluated. A total of 804 subjects participated to the survey.

Univariate and multivariate analyses were performed to test inter-group differences in ANA and correlates and the association between correlates and ANA.

A proportion of 46,2% and of 19,1% resulted as “highly annoyed” in Group A and Group B respectively. No significant univariate associations were found between group membership and socio-demographic factors, individual coping resources and attitude toward airport. However, residents of Group A resulted as significantly more irritable and sensitive to noise in general (p<.001). Multivariate analysis showed that the risk for ANA was higher in Group A (O.R. 2,15) and in residents reporting higher interference due to aircraft noise on both health (O.R. 2,77) and communication (O.R. 4,62). The association between noise exposure and ANA remained significant after the inclusion of individual sensitivity to noise (O.R. 3,78). Our results pointed to the existence of a higher risk of ANA for residents of the Group A. The low response rate (32,2%) does not allow generalization of such conclusion to the population exposed to analogous aircraft noise levels. Yet, results of this study should be interpreted as a important hazard signal warranting the necessity to continue field investigations.

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SMOKING ABD HEIGHT AS RISK FACTORS OF HEARING LOSS: A FOLLOW UP STUDY OF 18-59 YEAR OLD EMPLOYEES EXPOSED AND UNEXPOSED TO NOISE.

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[ID 1081]

The present study investigated whether smoking or short stature in adulthood were independent risk factors for incidence of hearing loss.

In the Danish Work Environment Cohort Study, we reanalyzed data on prevalence of self-reported hearing loss among 7,221 employees and on 5-year incidence among 4,610 employees.

Smoking predicted hearing loss incidence (OR, males: 1.81, 95% confidence interval: 1.32-2.49; females: 1.52, CI: 1.07-2.16) and prevalence (OR, males: 1,37, CI: 1,00-1,89; females: 1.50, 0.99-2.27). Smoking did not predict incidence at noise exposure in =>½ of working hours. Very short stature predicted prevalence in the total adult population only weakly (OR, males: 1,28, CI: 0,84-1,95; females: 1,89, CI: 1,07-3,36), but strongly among employees born =<1950 (OR, males: 2,57, CI: 1,10-5,98; females: 2,79, CI: 1,02-7,66).

These prospective findings indicate that smoking is an independent risk factor for incidence of hearing loss. Very short stature predicted prevalence of hearing loss only in a sub population.

HEARING LOSS IN CLASSICAL ORCHESTRA MUSICIANS

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[ID 1095]

The purpose of this study is to analyze the data collected during the audiologic surveillance of the Teatro del Maggio Musicale Fiorentino stable Orchestra. The 113 musicians, mean age 40 years (29 ÷ 60), 85% males, were examined with tonal audiometry in silent cabin in 1999 and the tests repeated in 2005. Noise exposure was assessed in occasion of two different performances, (lyric and symphonic), with the orchestra placed on the band stand and in the “golfo mistico” respectively. The noise level assessment, confirms the literature results obtained in analogous circumstances and shows how exposure is affected by the instrumental composition of the orchestra. A high influence is due to the brass, in particular trumpets, and to percussions, with Leq over 90 dBA. The brass instruments cause high exposures to the close musicians and the levels decrease with the increase of distance nevertheless the Leq is still over 85 dBA. Hearing loss is mainly linked to the duration of work, there are no meaningful differences among the different classes of age, except for the oldest class. Hearing loss is frequent among percussionists, an important prevalence of left monolateral deficit in the group of arc musicians can be referred to the vicinity of the instrument to the ear. The results of the hearing surveillance program highlights it’s importance even if planned just for suitability suggestions. Appropriate health information is an important factor in risk control and damage management for musicians. According to the available data it doesn’t appear the possibility of a damage evolution, either in the short or in a long term such as compromising the musical activity. Nevertheless this data can be useful to organize a more adequate system, in order to plan different positioning for the orchestra, searching for a good compromise with artistic requirements. Personal protection for single musicians could be also suggested.

THE CAUSES OF ONE-SIDED HEARING LOSS IN TRUCK DRIVERS

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[ID 1234]

Introduction

It has been observed that hearing loss in truck drivers is largest in left ears. Occupational health professionals attribute this one-sided hearing loss to the higher noise levels due to the open window. Noise measurements in truck cabins indicate that the noise levels are above no-risk levels when

the left window is open. There are only a few studies with low quality research designs and small numbers of truck drivers to support the notion of one-sided hearing loss. Therefore, we wanted to find out if in truck drivers hearing loss is more often left-sided than right-sided compared to construction workers.
Methods
Both truck drivers and construction workers have periodical health examinations in which standardised audiometry is performed. From the files of an occupational health service we drew a random sample of truck drivers (N=55) that we matched for sex, age and number of years on the job with a sample of construction workers (N=55). We used a difference of 10dB to indicate a worse hearing ear. Thus all cases were indicated as having a left or right worst hearing ear.
Results
In truck drivers 16.4% had worst hearing left ears compared to 12.4% of construction workers. This was not a statistically significant result.
Conclusion
Based on our sample, we conclude that there is no indication that higher left-sided noise exposure causes more left-sided hearing loss in truck drivers.

EFFECTS OF OCCUPATIONAL NOISE EXPOSURE ON AMBULATORY CARDIOVASCULAR PARAMETERS

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[ID 139]

Objective: This study aims to investigate the effects of occupational noise exposure on ambulatory cardiovascular parameters for automobile manufacturing workers.
Method: We recruited 20 volunteers in an automobile manufacturing company as the study subjects. Participants were classified to the high-exposure group and the low-exposure group based on environmental-noise measurement at their workplace. We used the Logging Noise Dose Meter (Type 4443) to determine each subject's noise exposure during his working and off-duty periods. Each participant carried a DynaPulse 5000A to measure his ambulatory cardiovascular parameters during 24 hours simultaneously. Some confounders associated with subjects' cardiovascular parameters were collected by using self-administered questionnaire and their health checkup results. Linear mixed-effects regression model were used to analyze the data by controlling related confounders.
Result: The occupational noise levels of the high-exposure workers with 85 ± 8 dBA were significantly higher than those of the low-exposure workers with 59 ± 4 dBA ($p<0.05$). For the transient effects, we found high-exposure workers had the significant increase of left ventricular ejection time with 0.0018 second per 1-dBA increase during the working time. Their left ventricular contractility had the significant decrease of 0.17 L/sec per 1-dBA increase in occupational noise exposure and had the same effect at a 2-hour lag time during work. The systemic vascular compliance of high-exposure group had the significant increase of 0.1 ml/L/mmHg per 1-dBA increase in occupational noise exposure at a 2-hour lag time. For the sustained effects, the high-exposure group had the lower left ventricular contractility (-1.2 L/sec, $p<0.05$), higher stroke volume index (+4.7 ml/B/m^2, $p<0.05$), higher systemic vascular resistance (+2.9 ml/L/min, $p<0.05$), and greater brachial artery diameter (+0.2 mm, $p<0.05$) than the low-exposure group during the sleep time, respectively.
Conclusion: Occupational noise exposure had both transient and sustained effects on automobile workers' cardiovascular parameters.

CONTRIBUTION OF THE HEARING AIDS IN MITIGATING PROFESSIONAL DEAFNESS

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[ID 161]

By its general distribution and its aggressiveness, noise constitutes a real scourge for Man despite the medical techniques development and the implementation of the protection means.
It has long been believed that no medical device can be applied to professional deafness. However, the progress which the hearing aids and the technological development have reached made it possible to design increasingly efficient apparatuses.
We have carried out an exhaustive retrospective study of professional deafness declared cases recognized and compensated by the IPP attribution medical commission AT/MP of Central Tunisia during a 6 year period (April – 1998 to April - 2004).
The objective is:
- to analyze the socio-professional and clinical characteristics of the patients,
- to assess the contribution of the hearing aid on the social, family and professional life by comparing two cohorts of patients one with and one without prothesis.
- to suggest some recommendations for a better employees financial support in order to help them in their treatment procedure.

During the study period, 157 patients were compensated for professional deafness. A male prevalence was noted (153 men, sex ratio = 38.3). The average age is 50.6 years. The most affected professional sectors are the car industries (36.9 %), textiles (30.6 %) and metallurgy (12.1 %). The average deficiency rate which exceeds the 50dB concerns 70 % of the right ear cases 65 % of the the left ear ones.
Some effects of the noise and deafness on work were reported: tiredness (82.6 %), relational difficulties (58.23 %) and attention disorders (33.3 %). Regarding the social and family aspects, the relational difficulties were mentioned (84 %), as well as irritability (79,6 %) and loneliness (57,6 %).
The analytical study of the contribution of the hearing aid in the two groups of patients with aid (N = 55) and without aid (N = 102)confirmed the improvement at the neuropsychic level (irritability and anxiety) and at the family and social level (relational and behavioral difficulty, irritability and aggressiveness).
We insist on the improvement of the treatment of the professional deafness victims by ensuring a fast financing of the hearing aids which must involve the maximum number of the affected persons.

HEARING LOSS IN WORKERS EXPOSED TO DIFFERENT TYPE OF NOISE, ORGANIC SOLVENTS AND HAND-ARM VIBRATION

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[ID 931]

The severity of occupational noise-induced hearing loss could be significantly influenced by the co-exposure to vibration and chemicals i.e. organic solvents. It depends not only on the equivalent sound pressure level, but also on the type of exposure (continuous noise vs. impulse noise).
The aim of the study was to evaluate hearing impairment in four groups of subjects: 427 dockyard workers co-exposed to steady-state noise (at the equivalent level 95.5 ± 1.8 dBA) and organic solvent mixture; 161 dockyard workers co-exposed to impulse noise (at the equivalent level 92.5 ± 3.3 dBA) and vibration; 86 glass factory workers exposed to continuous steady-state noise-only (at the equivalent level 90.8 ± 4.4 dBA); and 204 control subjects exposed neither to noise nor to solvents or vibration. Gender and age were account as confounding factors for all statistical analyses.
Audiometric results revealed the poorest hearing thresholds in the group exposed to impulse noise and vibration, lesser degree of hearing loss was seen in the group exposed to continuous noise and organic solvent mixture. The group exposed to continuous noise-only revealed relatively little hearing impairment. The results indicate that noise characteristics and co-exposure to noise and vibration or chemicals should be taken into account in evaluation of occupational hearing loss.

SMOKING AND OCCUPATIONAL NOISE EXPOSURE AS A RISK FACTOR FOR PREVALENCE OF HEARING LOSS. A QUESTIONAIRE STUDY OF 827 MILITARY EMPLOYEES IN DENMARK AGED 19-59 YEARS EXPOSED AND UNEXPOSED TO NOISE

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[ID 1085]

Previous reports analyzing an association between smoking and hearing do not agree; some found an association, other studies failed to do so. An explanation could be that smoking and occupational noise interact. This study investigates if smoking in adulthood is an independent risk factor for hearing loss and if smoking interacts with occupational noise exposure.
A questionnaire was handed out among staff in the army, the air force and the navy – 966 were returned – 851 were males. Among the males, 827 people were 19-59 years (mean 41.2) with sufficient information on age, head injuries, noise and smoking. 308 people were not exposed to occupational noise, aged 20-59 years (mean 42.7). Prevalence of hearing loss was estimated in multiple regression analyses where age, occupational noise (above 80dB), smoking and previous head injury were independent variables.
Among all males, occupational noise (OR: 2.80, CI: 1.71-4.60) and participation in hunting (OR, 1.93, CI: 1.18-3.13), but not heavy smoking (OR: 1.25, CI: 0.77-2.02), was associated to prevalence of hearing loss. Among males not exposed to occupational noise, heavy smoking (OR: 2.63, CI: 1.02-6.74) was associated to prevalence of hearing loss.
These findings indicate that smoking is an independent risk factor for prevalence of hearing loss – but only among people with limited exposure to occupational noise. This indicates an interaction between smoking and noise exposure at a level where saturation of the noise-induced hearing loss has not been reached.

ASSESSMENT OF ACOUSTIC ABILITY IN GROUND HANDLING PERSONNEL OF FLIGHT COMPANIES

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[ID 738]

Exposure to noise induces hearing loss depending on intensity and duration. Ground-handling personnel of flight companies are exposed to different noise levels without always using hearing protection.
In the present study 223 employees – all men working in the airports for over 3 years -, 181 from the Athens airport and 42 from Thessalonica were examined by audiometry. Additional data for length of employment, prior exposure to occupational or other noise, hearing protection, were collected by a questionnaire. Mean noise exposure was calculated by noise dosimeters. Measurements were performed during days with an estimated year average planned air flights in each airport. In total, there were performed 12 measurements in Athens and 3 in Thessalonica. The calculated mean noise exposure in Athens was 82dBA and in Thessalonica 79dBA.
Bilateral hearing loss over 25dBA in 4000Hz, as well as losses in other frequencies, was attributed apriori to occupational noise exposure. In data analysis hearing loss was treated as a dependent variable, while age, length of employment in the airport, hearing protection, and airport in which they were employed, were treated as independent ones.
Employees with prior employment in noisy environments or noise exposure from other sources were excluded from analysis, resulting in a final sample of 150. Findings showed that 12% of employees from the Athens airport and 3% from Thessalonica suffered hearing loss. The proportion of employees with hearing loss among those who were not using protection was 22% to 3% in those who used. Length of employment was related to the presence of hearing loss significantly ($p<0.1$). Age was not found to relate to the problem, but this finding could be due to low age distribution.
In conclusion, ground-handling staff who are exposed to medium level of occupational noise, in combination with short exposure to high levels of noise, is possible to present with hearing loss.

COMBINED EFFECT OF NOISE AND ORGANIC SOLVENTS ON HEARING THRESHOLD

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[ID 309]

The effects of organic solvents at high concentration on hearing impairment had been reported. This study was aimed at evaluating the hearing loss in 40 workers with exposed to styrene at low concentration (0.01-63.6 ppm) and noise (80.2-87.9 dB(A)) in septic tank plants (combined group). These workers were compared with 299 workers exposed to noise only (81.4-87.9 dB(A)) in bathroom products plants (noise group) and with 24 office workers who were not exposed to either noise or styrene (control group). We conducted interviews to obtain personal information, medical history, working conditions and subjective symptoms. Hearing threshold of subjects were evaluated by using audiometer. Styrene concentration and noise level in working environment were also measured. Results showed that hearing threshold at 4 kHz and 8 kHz in combined group and noise group were significantly higher than that in control group. The prevalence of hearing loss (hearing threshold > 35 dB) at 1, 2, and 4 kHz in noise group was higher than that in combined group and control group, while the prevalence of hearing loss at 8 kHz in combined group was higher than that in noise group and control group. The results indicated that styrene exposure at low concentration increases the risk of hearing loss, especially at high frequencies. The ototoxic effects should be considered when the health effects of exposed workers are monitored.

OCCUPATIONAL CANCER EPIDEMIOLOGY

CANCER MORTALITY RISK IN TWO COHORTS OF BIOLOGY RESEARCH WORKERS IN FRANCE

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Background: All causes and cancer mortality of biological research laboratories workers of the French Atomic Energy Commission (CEA) and the National Institute for Health and Medical Research (INSERM) were investigated. Two cohorts: bioCEA (N=3509) and bioINSERM (N=4966) were followed respectively from 1968 to 1994 and from 1980 to 1993.
Methods: The mortality of each cohort was compared with that of the French population by computation of the Standardized Mortality Ratio (SMR) with their 90% Confidence Interval, [90%CI]. Trend and heterogeneity tests were computed in order to study SMRs variation by job characteristics. In the bioCEA cohort individual dosimetry data being available a trend test was also computed according to ionizing radiation cumulative dose.
Results: The SMRs were significantly below 1 in both cohorts for all causes mortality (bioCEA : SMR=0,52 [0,46-0,59], bioINSERM : SMR=0,56 [0,46-0,67]) and for all cancers mortality (bioCEA : SMR=0,66 [0,54-0,80], bioINSERM : SMR=0,55 [0,39-0,75]). When considering all specific cancer sites only SMRs for breast cancer in bioCEA (n=8, SMR=1.30 [0.64-2.34]) and for colon cancer in bioINSERM (n=4, SMR=1.41 [0.48-3.23]) were greater than 1, but not statistically significant. A positive trend was observed between employment duration and all-cause SMRs and between ionizing radiation cumulative doses and all-cancer SMRs in bioCEA. In bioINSERM, no trend between employment duration and SMRs was observed.
Conclusion: There is no evidence of any overall increased risk of mortality in biological research laboratory workers. But as duration of employment and ionizing radiation exposure are associated with an increase of mortality, we suggest to continue the follow-up for a longer period in order to verify on a larger scale any relation to a specific exposure.

RADIATION AND NON RADIATION RISK FACTORS EFFECT ON THE LARGE INTESTINE CANCER MORBIDITY AMONG MAYAK NUCLEAR WORKERS

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The large intestine cancer is polyetiological and widely distributed oncological disease. The aim of the present retrospective nested case-control study appears to be a quantitative estimation of radiation (total chronic external exposure to gamma-rays and internal exposure to α-rays due to inhalation of 239Pu) and non radiation risk factor (digestive system diseases, cigarette and alcohol consumption) contribution to large intestine cancer morbidity among Mayak nuclear workers.
The case group included 244 incidences of large intestine cancer (morphologicaly confirmed) diagnosed among Mayak nuclear workers since 1963 to 2004; 33% of incidences were rectum tumors, 12% were rectosigmoid tumors, 23% were sigmoid colon tumors, 7% - caecum tumors and in 25 % of incidences the colon was affected. The control group consisted of 488 Mayak nuclear workers who had no malignant neoplasms. The control group included workers from the same Mayak PA plants as the case group and was matched by sex, year of birth (± 5 years), year of starting work at the Mayak PA (± 2 years).
Total external gamma doses varied from 0 to 7.3 Gy (the mean dose was 0.7), 239Pu incorporation also varied from 0 to 21.5 kBk: (the mean – 0.57 kBk). During the other work before the Mayak employment 5.1% of individuals were occupationally exposed to chemical agents, 58% were smokers; 10.4% of individual abused alcohol.
We calculated adjusted odds ratio (OR) with 95% confidence intervals (95% CI) using multifactor logistic regression; we also estimated the attributable fraction. Preliminary analysis results testify to the significant influence of total external gamma-irradiation in dose more then 3.0 Gy (OR=3.3; 95% CI: 1.3 – 8.3), intestinal polyposis (OR=4.2; 95% CI: 1.8 – 10.1), smoking (OR=1.9; 95% CI: 1.4 – 2.6) on large intestine cancer. Chronic colitis (OR=1.5; 95% CI: 0.96 – 2.3), and chemical agent (OR=1.9; 95% CI: 0.96 – 3.8) effects were near to be significant. The estimation of the attributable fraction indicated that non-radiation factors contributed essentially to large intestine cancer morbidity.

CANCER MORTALITY AMONG MEN OCCUPATIONALLY EXPOSED TO DICHLORODIPHENYLTRICHLOROETHANE

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[ID 1579]

Object. Several studies have evaluated cancer risk associated with occupational and environmental exposure to dichloro-diphenyl-trichloroethane (DDT). Results are mixed. To further inquire into human carcinogenicity of DDT, we conducted a mortality follow-up study of 4,552 male workers, exposed to DDT during anti-malarial operations in Sardinia, Italy conducted in 1946-50. Methods. Detailed information on DDT use during the operations provided the opportunity to develop individual estimates of average and cumulative exposure. Mortality of the cohort was compared to that of the Sardinian population. Overall mortality in the cohort was about as expected, but there was a deficit for death from cardiovascular disease and a slight excess for non-malignant respiratory diseases. For internal comparisons, we used Poisson regression analysis to calculate relative risks (RR) of selected malignant and non malignant diseases with the unexposed sub-cohort as the reference. Results. Cancer mortality was decreased among DDT exposed workers, mainly due to a reduction in lung cancer deaths. Birth outside from the study area was a strong predictor of mortality from leukemia. Mortality from stomach cancer increased up to 2-fold in the highest quartile of cumulative exposure (RR = 2.0, 95% C.I. 0.9, 4.4), but no exposure-response trend was observed. Risks of liver cancer, pancreatic cancer, and leukemia were not elevated among DDT exposed workers. No effect of latency on risk estimates was observed over the 45 years of follow-up and within selected time windows. Adjusting risks by possible exposure to chlordane in the second part of the anti-malarial operations did not change the results. Conclusion. We found little evidence for a link between occupational exposure to DDT and mortality from any of the cancers previously suggested to be associated.

OCCUPATIONAL EXPOSURES AND RISK OF BREAST CANCER. A POPULATION BASED CASE-CONTROL STUDY IN POLAND

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Background: Epidemiologic data on the role of occupational exposures in breast carcinogenesis are unavailable or limited for most of the chemical substances that have been shown to induce mammary tumors in rodents. We used data from a population-based case-control study to examine potential associations between breast cancer and selected occupational exposures.
Methods: Our case-control study included 2386 cytologically or histologically confirmed incident breast cancer cases diagnosed over the period January 2000 to January 2003 in Warsaw and Lodz (the two largest cities in Poland), and 2502 controls from the general population matched to the cases on city of residence and age. Detailed lifetime occupational histories, as well as information on other potential breast cancer risk factors, were obtained through personal interviews. Potential occupational exposures to cytostatic drugs, ethylene oxide, and formaldehyde were evaluated by trained industrial hygienists using information from work histories. Analyses considered exposure status (ever, never) as well as duration, intensity, frequency, probability, latency, and cumulative exposures. Conditional logistic regression analyses calculated odds ratios (OR) associated with the various exposure measures after control for potential confounders.
Results: We did not find an increased risk of breast cancer associated with potential exposures to the analyzed occupational hazards. The ORs for ever exposure to cytostatic drugs, ethylene oxide and formaldehyde were 0.4, 0.9, and 0.9, respectively. There was no evidence of a potentially causal relationship when more detailed exposures measures were considered.

Conclusions: The results of the present study do not provide evidence that occupational exposure to cytostatic drugs, ethylene oxide or formaldehyde increases breast cancer risk.

LUNG CANCER MORTALITY AND CARBON BLACK EXPOSURE – A NESTED CASE CONTROL STUDY AT A GERMAN CARBON BLACK PRODUCTION PLANT

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[ID 906]

A cohort study on 1528 male German carbon black workers which where followed from 1976 to 1998 revealed an elevated SMR for lung cancer without showing an association with carbon black exposure. In order to further explore the causes for excess lung cancer mortality a nested case-control study was conducted.
Two controls per case - matched on year of birth - were obtained through risk-set sampling. Each subject's cumulative carbon black exposure was determined. Data on smoking, duration of employment in different departments, contact to feedstock and asbestos exposure during the carbon black job, jobs prior to the carbon black job, times of POW after WWII, and participation in WWII as German soldier were collected. Conditional logistic regression for lung cancer mortality depending on cumulative carbon black exposure - without and with a 10 year lag - and adjusting for age at hire and the other collected data was conducted. All models were also fitted only for subjects belonging to an inception cohort comprising only subjects hiring after 1st Jan 1960.
The analysis for 50 lung cancer cases and their controls indicated no association of carbon black exposure with lung cancer mortality (OR<1). Contact to feedstock, exposure to asbestos, working in the lamp or gas black department, and prior exposures showed some association with the lung cancer mortality. A positive association was also observed for age at hire, which persisted after restriction to the inception cohort.
Carbon black exposure was not linked to an increased lung cancer risk. Hints at positive associations with asbestos exposure, feedstock contact and duration of work in specific departments are inconclusive due to small numbers. An age at hire related selection effect may be present. A major weakness of this study is its limited power. An extended analysis based on a longer follow-up is indicated.

LUNG CANCER MORTALITY AND CARBON BLACK EXPOSURE – COX REGRESSION ANALYSIS OF A COHORT FROM A GERMAN CARBON BLACK PRODUCTION PLANT

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[ID 933]

A first SMR analysis for a lung cancer mortality cohort study comprising 1528 German male carbon black workers followed from 1976 – 1998 yielded an elevated SMR of approx. two. The present study provides for an internal analysis of lung cancer mortality applying Cox models.
Cumulative carbon black exposure was determined on the basis of semi-quantitative retrospective exposure estimates. The last known smoking status was determined from medical files. Cox-models across age for lung cancer mortality with time-dependent covariates cumulative carbon black exposure, mean carbon black exposure, and duration of exposure in different departments adjusting for calendar time, a time-independent smoking indicator, and age at hire were fitted. Analysis was performed for the full cohort and restricted to an inception cohort of subjects hiring at the plant after Jan 1st 1960. Analyses with lags up to 20 years was also conducted.
A total of 50 lung cancer deaths occurred in the full cohort, 40 deaths of these came from the inception cohort (N=1271). No positive association was found with cumulative carbon black exposure (full cohort: relative risk= 0.521; p=0.16) or with other carbon black exposure indices. Some models indicated an increasing risk with duration of work in the lamp black department (inception cohort: relative risk=1,79; p=0.039), and also age at hire and date of birth.
Despite extensive analyses we found no hint that carbon black exposure is a human lung carcinogen. The lamp black result, if no artefact, may point at historical exposures to gaseous PAHs. The adverse effects associated with age at hire and date of birth may go back to selection effects. This study's major limitation is its limited power due to the small number of lung cancer deaths. Extension of follow-up is indicated. Furthermore, smoking adjustment may be insufficient and indepth time-dependent modelling of improved information could help.

INCREASED MORTALITY RATIO OF KIDNEY CANCER IN CHINESE HERBALISTS

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[ID 830]

-Background-
Chinese herb Aristolochia fangchi that contained Aristolochic acid (AA) was proved to be a strong carcinogen to upper urinary tract and will result in renal failure. Many traditional Chinese herbs contained Aristolochic acid and the herbalists were somewhat exposed to these herbs during processing. This drew our attention to monitor the cancer risk in this occupation.
-Methods-
A retrospective cohort study was conducted to evaluate the cancer mortality of Chinese herbalists. The cohort consisted of 3,088 males and 3,460 females who manufactured Chinese hers from 1985 through 2000. The NIOSH life table analysis system (LTAS) was used to generate person-year-at-risk, observed and expected deaths, and the standardized mortality ratios (SMR) for each cause. Demographic and work history files were acquired from the Bureau of Labor Insurance. Considering about a short latency for urothelial cancer when exposed to Aristolochic acid, five year lag period was set.
-Results-
A total of 26,208 person-years in male and 29,657 in female were included. Though the SMR for all cancer mortality was relative low (0.91; 95% CI, 0.72 to 1.03), the SMR for kidney cancer was significantly elevated with 5.83 (95% CI, 1.21 to 17.01) in female and 2.51 (95% CI, 0.30 to 9.08) in male. In female, the SMR for kidney diseases were also elevated with 2.84 (95% CI, 0.07 to 15.79) for acute glomerulonephritis, nephritic syndrome, and acute renal failure was and 1.79 (95% CI, 0.58 to 4.19) for chronic and unspecific nephritis, renal failure, and renal sclerosis.
-Conclusions-
We found mortality from kidney cancer was increased in Chinese herbalists of Taiwan. Also the increased SMR of acute and chronic kidney diseases made us take notice of the possible exposure to AA-contained herbs at work. A thorough and in depth study to determine the route of AA exposure and detect Ochratoxin A, a possible contaminant of moldy herbs that was proved to be toxic and carcinogenic to kidney, is recommended.

RENAL CELL CANCER AMONG VITAMIN MANUFACTURING WORKERS

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[ID 1765]

In December 2002, the French Ministries of Labour and Health were informed of a high number of renal cancer cases in a plant located in the region of Auvergne. This plant is specialized in the chemical synthesis of vitamins. This alert prompted us to investigate workers' renal cancer risk at this plant.

Between 1994 and 2002, 10 cases of renal cell carcinomas (RCC) were observed among male workers. Nine of them were detected by the annual abdominal ultrasonography exam scheduled by the occupational health service. Nearly 400 substances have been present in this plant. One of them, an intermediate chemical produced in the course of vitamin A synthesis, "Chloracetal C5" (C5H13ClO2), has been assumed to be related to the occurrence of RCC by some toxicologists.
Firstly, two types of verification were conducted:
- Review of tumour slides histologically confirmed the diagnosis for all cases.
- A standardized incidence ratio (SIR) of RCC in men was calculated for the period between 1994 and 2002 using the national incidence rates estimated from the data of French cancer registries. We observed a significant SIR of 13.1. Secondly, two types of epidemiological study were planned: a retrospective cohort mortality study and a nested case control study.
A retrospective cohort mortality study was carried out with all 2,545 subjects who had worked at the plant for more than 6 months since 1960. The 1968-1999 standardized mortality ratios (SMRs) for all causes [SMR=0.89, 95% confidence interval (CI) = 0.80-0.99] and for all cancers [SMR=0.89, 95% CI = 0.73-1.07] in men were not greater than expected. Similar results were observed in women. Analyses of mortality for specific tumours are ongoing.
For the case-control study, we have sought RCC cases among current and retired employees who had not been reported. A total of 20 cases have been included in the study.

LIFE EXPECTANCY LOST ASSESMENT IN FERROUS METALLURGY WORKERS

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[ID 856]
Number of workers who work at harmful working conditions increases in Russia every year. It can lead to intensification of occupational factors influence on life length. In cohort prospective epidemiological study with observation period of 20 years (1975-1995) was assessment of the years of life expectancy lost (YLELs) in ferrous metallurgy workers due to influence of occupational factors in Nizhniy Tagil city of Sverdlovsk region (Ural). Overall value of person-years observation was 100246.The population of Sverdlov region was used as reference group. Assessment of YLELs was performed on the basis of comparison of mortality tables data for population and for two hypothetical mortality tables, one being constructed for population of the region with exclusion of studied cause of death and another one with exclusion of studied cause of death but corrected on mortality RR for metallurgy workers. In occupations of metallurgy working environment of which are characterized by intensive heating, dusts and hard physical work, mortality due to ischemic heart disease and hypertension was SMR = 1,54 (95% CI 1,1 – 1,8), due to cancer of trachea, bronchia and lung SMR = 1,4 (95% CI 1,1– 1,9). Mean values of YLELs for an 20 years-old worker in "hot" occupations of the factory as compared with male population of Sverdlovsk region were 1.2 years from ischemic heart disease and hypertension and about ½ year because of fatalities due to malignant neoplasm of respiratory organs. In coke and chemical department with presence of 3,4-benz(a)pyren in concentrations up to 20-25 OEL mortality rate due to malignant neoplasm was SMR = 2,3 (95% CI 1,7-3,1) with leading localization - cancer of trachea, bronchia and lungs - SMR = 3,8 (95% CI 2,6-5,3) for a worker mean values of YLELs because of high risk of death due to malignant neoplasm were 5 years. Damage due to occupational hazards according to YLELs estimates depends on mortality RR as well as on prevalence of mortality cause studied and mean age of its onset.

DOSE-RESPONSE RELATIONSHIP BETWEEN COOKING FUMES EXPOSURES AND LUNG CANCER AMONG CHINESE NON-SMOKING WOMEN

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Background: The high incidence of lung cancer among Chinese females, despite a low smoking prevalence, remains poorly explained. Cooking fume exposure during frying could be an important risk factor.
Methods: We carried out a population based case-control study in Hong Kong. Cases were Chinese female non-smokers with newly diagnosed primary lung cancer. Controls were female non-smokers randomly sampled from the community, frequency matched by age groups. Face to face interviews were conducted using a standardised questionnaire. The "total cooking dish-years", categorized by increments of 50, was used as a surrogate of cooking fumes exposure. Multiple unconditional logistic regression was used to estimate the odds ratios (ORs) for different levels of exposure after adjusting for various potential confounding factors.
Results: We interviewed 212 cases and 292 controls. The ORs of lung cancer across increasing levels of cooking dish-years were 1.00, 1.18, 1.89, 2.21 and 5.37. After adjusting for age and other potential confounding factors, the increasing trend of ORs with increasing exposure categories became clearer, being 1.00, 1.39, 2.49, 3.05 and 6.25 respectively. The OR of lung cancer was highest for deep-frying (2.36 per 10 dish-years), follow by that of frying (1.31), and stir-frying had the lowest OR (1.08) among the 3 methods.
Conclusions: Exposure to cooking fumes could increase the risk of lung cancer among non-smoking Chinese women in a dose-response manner. Modification of the conventional Chinese cooking methods is recommended.

OCCUPATIONAL RISKS FOR LUNG CANCER IN THE POPULATION-BASED CASE-CONTROL STUDY "ENVIRONMENTAL AND GENETIC LUNG CANCER ETIOLOGY" (EAGLE) STUDY

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A population-based case-control study sponsored by the NCI has been conducted in Lombardy, Northern Italy, in collaboration with the University of Milan and 14 hospitals. Over 2,000 lung cancer cases, diagnosed in April 2002-February 2005, and 2,000 randomly selected population controls (frequency-matched to cases by area, gender, age) were enrolled. Participation rates were 85% (cases) and 72% (controls). The subjects consented to conduct a computer-assisted personal interview (CAPI), and to fill-in a self-administered questionnaire; biospecimens were collected from all participants and pathological material (tissue blocks and slides as well as fresh frozen tissue in a subset of surgical cases) from cases. Data cleaning is in progress. We performed analyses of occupational lung cancer occupations on 3,972 subjects with CAPI: 1962 confirmed lung cancer cases (1,556 males, 406 females); 2,008 controls (1,554/454). Jobs were coded according to standard classifications and then classified as known (List A) or suspected (List B) to entail exposure to lung carcinogens. We used logistic regression to compute odds ratios (ORs) and 95% confidence intervals (95%CI), adjusted for area, age, consumption of other types of tobacco, number of jobs held; cigarette smoking was modeled using different covariates: ever smoker status; years since quitting; cumulative pack-years, treated in different ways (continuous without or with quadratic/cubic components, categorical). Among males, 156 cases (10%) and 98 controls (8.1%) reported having worked in List A jobs: the ORs ranged from 1.3 (0.94-1.8) to 1.4 (1.0-1.9), depending on how pack-years were considered; the excess was manly due to jobs in nonferrous metal basic industries (51 cases, 31 controls; ORs 1.5 to 1.7). Risk for List B jobs was not increased. In conclusion, among men, we found a 30-40% elevated lung cancer risk for occupations with a known carcinogenic potential; the corresponding population attributable fraction was around 2.5% (95%CI 0-4.8%).

META-ANALYSIS OF MORTALITY AMONG WORKERS IN THE SYNTHETIC RUBBER PRODUCING INDUSTRY

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INTRODUCTION: Rubber manufacturing involves many difference processes, products and chemicals. A systematic review and meta-analyses of cohort studies of workers in the rubber producing industry has been carried out.

METHODS: Computerized searches were carried out of Medline, Toxfile, Cancerlit, EMBASE, CA Search, BIOSIS previews, SciSearch, Pascal, National Technical Information Service from inception until December 2003. Reference lists of identified articles were inspected for further relevant articles. Studies were assessed for the methodological quality using a modified version of the Newcastle-Ottawa scale. Meta-analyses were undertaken, using random effect models, on the log Standardised Mortality Ratio (SMR) scale. Subgroup analyses of workers in tyre and other rubber manufacturing were carried out. Heterogeneity and publication bias were explored.

RESULTS: 35 references reported information on 29 different cohorts. The meta-SMR for all cause mortality was 0.86 (95% CI 0.82 - 0.91) (28 cohorts), and for all malignant neoplasms was 0.94 (0.89 - 1.01) (27 cohorts). Heterogeneity was observed for these and the majority of disease specific outcomes. Statistically significant excesses were observed for leukaemia (meta-SMR 1.21 (1.03 - 1.43)) (16 cohorts) and diabetes (meta-SMR 1.36 (1.17 - 1.59)) (5 cohorts). Excess mortality from leukaemia was not observed for employees working exclusively in the tyre-producing sub-sector (meta-SMR 1.03 (0.76 - 1.41)) (6 cohorts), nor for workers in the manufacture of both tyre and other rubber products (meta-SMR 1.03 (0.75 – 1.41)) (6 cohorts). However, a significant excess was found for those working exclusively in non-tyre manufacturing (butadiene-styrene or Pliofilm) (meta-SMR 1.70 (1.1.4-2.54)) (4 cohorts).

CONCLUSIONS: Previous (non-systematic) reviews highlighted excess risks from lung, bladder and stomach cancers. This was not substantiated in this meta-analysis. There was a lack of specific exposure data in the papers. However, exposure to benzene and 1,3-butadiene used in rubber film manufacture has been shown in both laboratory and human studies to be causally related to excess leukaemia risk.

CARDIOVASCULAR DISEASE IN OCCUPATIONAL HEALTH

CARDIOPULMONARY DISORDERS DUE TO EXPOSURE OF PARTICULATE MATTER IN NORMAL AND HYPERTENSIVE STATE

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Earlier it was thought that particulate matter (PM) exposure in occupational environment could damage the target organ lung and produce pulmonary fibrosis and lung cancer. The recent epidemiological studies have indicated more death from cardiovascular diseases during high exposure of PM. Thus industrial workers have double burden of PM exposure, as an occupational environment exposure and second as general environmental exposure. The present study was designed to evaluate the adverse health effect of PM >10 collected from high pollution zones of Lucknow City on healthy and hypertensive rats. The hypertensive rat model was produced by i.p. treatment with monocrotaline (MCT) (60 Mg / Kg). Thirty-two adult rats were grouped in four groups: Group I – control; Group II – MCT treatment group; Group III – PM (5 mg) exposure Group IV – MCT + PM. After 12 days, MCT treatment rats were exposed intratrcheally to PM.
Changes in electrocardiogram (ECG), increase in heart rate and decrease in blood pressure were observed in group II and group III which were further decreased in group IV after 7 days of the post exposure of PM clearly indicating about toxic potential of PM on cardiovascular system. The relative weight of lung was increased in-group III and weight of trachebronchial lymph nodes were increased in-group II, III and IV. Alveolar Macrophages (AM) showed hyperchromatic cytoplasm with micronuclei in-group II, distended cytoplasm along with peripherally placed nucleus and micronuclei in group III and clusters of markedly atypical cells with hyperchromatic nuclei in-group IV. Morphometric analysis of AM showed decrease in percent nucleus area and increase in percent cytoplasm area, an early sign of damage on nucleus in-group II, III and IV. The result of experiment showed that heavy exposure of particulate matter has potential to affect on cardiopulmonary system of healthy and hypertensive rats.

JOB INSECURITY AND INCREASED RISKS OF STROKE IN JAPANESE MEN: A PROSPECTIVE FINDING FROM THE JSTRESS STUDY

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[ID 496]

Purpose: The aim of the study is to clarify the prospective relationship between job insecurity and risk of stroke among employed men in Japan
Methods: The Japan Work Stress and Health Cohort Study (JSTRESS) is a multi-site prospective cohort study. The baseline surveys were conducted in five companies between 1996 and 1998 and 25,104 questionnaires were returned (response rate, 85%). The following analysis was limited to 19,033 men. We further excluded those (n=847) who had coronary heart disease or stroke at baseline and those (n=2,952) who had a missing response to relevant variables. A total of remaining 14,387 men (with average age 40 years old) were followed up until March 2003. The follow-up period was 5.2 years on average, ranging 0-7 years. Job strain and job insecurity were measured using the Job Content Questionnaire (JCQ) scales and job future ambiguity and employment opportunity (perceived employability) were measured by the US NIOSH generic job stress questionnaire; and the subjects were classified into tertiles based on each score. Incidence of stroke and CHD was monitored and reported by occupational physicians.
Results: Thirty-one new cases of stroke were observed during the follow-up (incidence, 0.42/1000 person-years). Men with moderate and high levels of job insecurity had greater risk of stroke (hazard ratio, 3.54 [95%CI, 0.79-15.72] and 6.86 [95%CI, 1.52-30.89], respectively) after controlling for age, education, marital status, occupation, smoking, drinking, physical activity, obesity, and hypertension at baseline. Job strain did not significantly predict the incidence of stroke. Job future ambiguity and future employment opportunity were weakly associated with incidence of stroke, although not significant.
Conclusion: Job insecurity was associated with increased risk of stroke. Threats to job loss which were measured by the JCQ job insecurity scale may be a stronger predictor of stroke, rather than future ambiguity or perceived employability.

JOB STRESSORS AND CARDIOVASCULAR DISEASE IN THE FRAMINGHAM OFFSPRING STUDY

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[ID 820]

An association between job strain and cardiovascular disease (CVD) has been observed in a majority of the studies that have tested these associations. However, a recent analysis of data from the Framingham Offspring Study found no association between job strain and mortality or incident coronary heart disease (CHD) in either men or women over 10-years of follow-up. Contrary to expectations, women with active (high demand-high control) jobs had a 2.8-fold increased risk of CHD compared to women with job strain.
We will present data from 2,678 working men and women participating in the Framingham Offspring Study, third examination cycle (1984–1987).
Cross-sectional associations between job characteristics and cardiovascular risk factors (systolic blood pressure (SBP), cigarette smoking and leisure-time physical activity) will be estimated using multiple linear regression, adjusted for age, body mass index (BMI), alcohol use, and level of education.
Second, relative risks of mortality, CVD, CHD, myocardial infarction, and angina pectoris at 5-year and 10-year follow-up in relation to specific job characteristics, will be estimated using Cox proportional hazards regression analysis, adjusted for age, BMI, marital status, total/HDL, glucose levels, alcohol use, SBP, smoking status, level of education, and level of physical activity. All analyses will be conducted by gender and within strata of SES.
Preliminary analyses indicate that the association between job strain and SBP is slightly greater among men with lower occupational status (2.46 mm Hg, p=.10). vs. men with higher status (-0.57 mm Hg, p=.68). Among women, the association between job strain and SBP is also slightly greater among those with lower occupational status (2.69 mm Hg, p=.028) vs. women with higher occupational status (-0.75 mm Hg, p=.64).
The preliminary findings for SBP are consistent with other studies that have found stronger associations between job strain and cardiovascular risk among lower SES groups.

RISK OF FIRST MAJOR CORONARY EVENTS AMONG OCCUPATIONAL AND EDUCATIONAL SOCIAL CLASSES. 12-YEAR FOLLOW-UP OF THE MONICA BRIANZA AND PAMELA COHORTS.

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[ID 989]

The aim is to assess occupational (OC) and educational (ED) class differences in incidence of coronary (CHD) events in northern Italian cohorts.
Methods. In a prospective cohort study, 2,245 25-64 year old employed men, CHD-free at baseline were recruited from four population-based cohorts (MONICA Brianza surveys and the PAMELA Study) from 1986 to

1994, and followed-up until the end of 2002 to ascertain first major coronary event, fatal or non fatal (MONICA validated). At baseline systolic blood pressure, current cigarette smoking, total and HDL cholesterol, hypertension drug treatment, diabetes mellitus and BMI were investigated according to the standardised MONICA protocol. Four OC classes were derived from the Erikson, Golthorpe and Portocarero scheme, using information on job position. ED classes were obtained from years of schooling adjusted by age. Age-adjusted and multi-factor-adjusted hazard ratios (HRs) and 95%CI were calculated from Cox proportional hazards models, with non-manual workers and the highest ED categories as reference levels.
Results. In 12-year median follow-up, 108 first CHD events occurred (incidence rate 4.1 per 1000 person-years). Age-adjusted HR for OC follows a "U-shape" distribution, with higher risks for administrators and professionals, manual workers and self-employed; the overall effect is borderline significant (p=0.08). An inverse linear gradient (p=0.07) was found for ED. Multivariate adjustment for major coronaric risk factors reduces the risk excess in the lower SES classes only. In a model with both OC and ED, the association between CHD risk and each of the two SES indices still remain.
Conclusion. The higher risk of coronary diseases among lower SES classes is confirmed, in this low incidence population. This excess is mostly explained by major CHD risk factors, though the increased risk of CHD among administrators and professionals is not modified. Further research is needed to assess the contribution of other, in particular work-related, risk factors.

MAINTENANCE AT WORK AFTER ISCHEMIC HEART DISEASE: A PILOT STUDY IN THE ELECTRICITY AND GAS INDUSTRY

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[ID 1108]

Most studies on return to work after ischemic heart disease [IHD] in France originate from cardiovascular rehabilitation centers and study small numbers. The existence of an IHD registry within a large nationwide power company (EDF-GDF) allowed to perform a large size study on maintenance at work.
We considered the 623 male employees (aged 31 to 62 years) included in the registry who presented a non-fatal initial clinical form of IHD between 1993 and 1997. Medical variables such as diagnosis (angina pectoris or myocardial infarction), diagnostic and prognostic tests, and treatments were recorded in the registry. These employees were followed up during 5 years after their first cardiac event. We studied:
- Sick-leaves, which were systematically recorded with their medical cause in the epidemiological database of the company health insurance department, with a special focus on IHD relapses,
- Modifications of the occupational status (retirement or death), which were available from the companies' files.

We used censored data methods (Kaplan-Meier curves and Cox models).
After the initial sick-leave, 94% of the employees resumed work. Five years later, 55% were still at work. The most frequent way of leaving work was retiring. Leaving work was influenced by age, but also by educational level at the time of hiring (greater risk for low levels: RR=2.05 [1.26-1.33]) and by work grade (greater risk for high levels: RR=1.85 [1.39-2.43]). It is noteworthy that in EDF-GDF, 80% of the white collars have a low initial educational level. Maintenance at work was better when job accommodations were implemented.
During the five years following their initial episode of IHD, 35% of the employees took at least one sick-leave for IHD relapse. The mortality rate in the five years amongst employees returned to work was 3%.
This long-term study is the first one to study maintenance at work after IHD from enterprise-collected data and shows rather good results of occupational management.

JOB STRESSORS AND AMBULATORY BLOOD PRESSURE AMONG HEALTH CARE WORKERS

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[ID 821]

Ambulatory blood pressure (AmBP) monitoring is a more reliable and valid measure of true BP and a better predictor of target organ damage and cardiovascular disease than is casual clinic BP. However, AmBP monitors are expensive and discomfort may be experienced when wearing a monitor throughout a work shift or 24-hour period. Data are presented from an on-going research program at the Mount Sinai School of Medicine in New York City and the University of California at Irvine. All participants had casual (office) BP readings taken, and wore an AmBP monitor and a wrist BP monitor for a work shift, with readings taken every 30 minutes.
"Occult" (hidden) work-related hypertension, defined as normal casual clinic BP (<85 mm Hg diastolic), no prior diagnosis of hypertension, and elevated BP (85+ mm Hg diastolic) while working, was observed in 9.4% of 128 female hospital workers with complete BP data.
58% of the female hospital workers reported "job strain-1977" (based on 1977 national U.S. averages for job demands and job decision latitude), 49.4% reported "job strain-2002" (based on 2002 national averages), 56.9% reported effort-reward imbalance >1 (ERI), and 19.9% worked evening, night or rotating shifts.
Preliminary analyses indicate higher AmBP among participants reporting "job strain-1977" (4.7 mm Hg systolic (p=.09), 4.0 mm Hg diastolic (p=.03)), ERI (2.9 mm Hg systolic (p=.36), 3.9 mm Hg diastolic (p=.06)), non-day shift (5.0 mm Hg systolic (p=.23), 4.0 mm Hg diastolic (p=.14)), and having only secondary education (13.0 mm Hg systolic (p=.02), 9.1 mm Hg diastolic (p=.01)), controlling for age, race and body mass index. However, slightly lower AmBP was observed among participants reporting "job strain-2002".
These findings emphasize the importance of workplace BP screening, since individuals with occult hypertension need counseling or treatment for elevated BP, but often do not receive it because their office BP appears normal. In addition, the findings suggest the importance of measuring work stressors and intervening to reduce them to reduce the prevalence of hypertension.

EFFECT OF ON-THE TRACK ACCIDENT EXPERIENCE ON HEART RATE VARIABILITY AMONG SUBWAY DRIVERS.

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[ID 1297]

Overview
This study was designed to determine the effects of "On-the Track Accident" experiences (OTA) on the heart rate variability (HRV) of drivers after adjusting for several relating variables, including irregular duty schedules and psychological symptoms.
Methods
Among the subway drivers in one city of Korea, 18 drivers from a OTA experienced group (EG) and 31 drivers from a OTA unexperienced group (NEG) were surveyed from July to August 2005. The psychological status of drivers were checked by the State-trait Anxiety Inventory and the Center for Epidemiologic Studies Depression Scale. Heart rate variability (SA-2000, Medicore, Korea) was recoded twice a day (at 9AM and 5PM) over five to six consecutive days to include diurnal rhythm and various shift patterns. Irregular shift work schedules were divided into morning, afternoon, night, daybreak, and rest duty. Repeated measure ANOVA (RMA) analyses using SAS Window version 9.0 were conducted.
Results
There were no stastically significant differences between groups in age, body mass index, frequency of exercise, education, tenure, disease (hypertension, diabetes, hyperlipidemia), alcohol drinking patterns and smoking habits. Heart rate variability was related with OTA experience and shift work in 1-way RMA. Statistically significant differences between the two groups were found for SDNN (32.24±2.70, 41.58±2.05, p=0.0082), Rmssd (22.52±2.89, 33.57±2.20, p=0.044), log (Tp) (6.56±0.14, 7.00±0.11, p=0.0150), log (Lf) (5.30±0.18, 5.81±0.14 p=0.0316), log (Hf) (4.63±0.18, 5.24±0.14, p=0.0103) according to the EG and the NEG, respectively. Also, the EG's had a decreased heart rate variability when compared to the NEG's in 2-way RMA, even when adjusting for shift work, diseases and psychological symptoms. EG's had higher psychological symptom prevalence than NEG's, which was not statistically significant.

Conclusions
OTA experience decreased heart rate variability. The memory of accidents could act as a stressor and have a cumulative effect. A decrease in heart rate variability became known to the single most common risk factor for many chronic diseases, especially chronic heart disease. Because the health of subway drivers is important not only for personal well-being but also for public safety, a more active stress intervention program for OTA experienced drivers is urgently required.

CARDIOPATHIC PATIENTS' FITNESS TO WORK

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[ID 926]

The reduction in lethal coronary events has led to an increase in cardiopathic patients who may expect a long working life. Classically, the cardiologists approach tends to be oriented more towards patient follow-up and nursing with the aim of reinstatement into the original social context more than a specific evaluation of the question of the patient re-entering the working world. Therefore, a standardized methodology for the assessment of cardiopathic patients was proposed by our institute to this aim, in 1992.
The patients were assigned to one of four categories depending on a cardiological score which was given on the basis of case history data together with the results of specific tests. These tests included: ergometric test, echocardiography and dynamic Holter ECG. Each category contains corresponding limitations forming the judgement of fitness for a determined task involving energy consumption, shift work, production rate, professional driving, thermal discomfort or tasks to be carried out above ground level and/or under unstable equilibrium conditions.
This study has been carried out in order to verify the efficacy of the assessment made as to the patients' fitness levels, from a work load point of view. All patients were visited and "graded" at the Outpatient's Department of Occupational Medicine at the C.T.O. Hospital Turin Italy, between 1993 and 2004.
Fifty eight ischaemic patients were studied. At the end of the first visit a cardiologic score was given to every worker (Class 1 to 4: C1- 8 subjects; C2- 37 subjects; C3- 13 subjects; C4- 0 subject), and the consequent fitness limits were expressed. Only 8 workers were judged unfit to the current task. Every patient was then followed-up. In 10 cases the score changed (worse for 7 workers, better for 3). No worker needed a further change in task.
The constant task role of the workers after the first examination supports the level of efficacy for the judgement made according to the methodology set up by our department. Further progress is necessary along these lines in order to verify the possibility of loosening the restrictions imposed on these subjects in the work place.

ON THE ASSOCIATION BETWEEN SOCIO-OCCUPATIONAL CLASSES AND THE INCIDENCE OF MAJOR CARDIOVASCULAR EVENTS: WHICH CONTRIBUTION FROM THE METABOLIC SYNDROME?

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[ID 1003]

Aims: Estimate metabolic syndrome (MS) contribution in the assessment of the association between socio-occupational (SO) classes and the incidence of circulatory events (CEV) in three northern Italian cohorts.
Methods. In a prospective fixed-cohort study 2,252 men 25-74 year old, free from CHD or stroke events at baseline, recruited from 1990 to 1994 in two MONICA Brianza surveys and the PAMELA study were followed up until the end of 2002 to ascertain the first occurrence of CEV: fatal or non fatal coronary events or ischaemic strokes (MONICA validated), coronary revascularizations or carotid endarterectomies. Risk factors (RF) were investigated at baseline according to the standardized MONICA protocol. NCEP ATP III criteria were used for MS definition. Based on the last or current job position information, six SO classes were derived according to Erikson, Golthorpe and Portocarero scheme. Cox proportional hazards models were used to estimate age-, period-, MS- and RFs-adjusted hazard ratios (HRs) and 95%IC.
Results. Low overall MS prevalence was estimated (13.7%), with no statistically significant differences among SO classes. Breaking down MS into its RF components revealed different mean values only for waist circumference (p=0.04) and systolic blood pressure (p=0.02). In 11-year median follow-up 151 first circulatory events occurred, corresponding to an overall incidence rates of 6.43 per 1000 person-year. Considering routine non manual workers as reference level, higher age- and period-adjusted CEV risks were found for low administrators and professionals, skilled manual and self-employed. MS was positively associated with the incidence of CEV (HR=1.84; 1.28-2.64), but its inclusion could not explain the risk excesses identified among SO classes. Further adjustment for current cigarette smoking, anti-hypertensive treatment and total cholesterol did not modify substantially the gradient detected.
Conclusion. In the investigated low incidence CEV population, risk differences among SO classes could not be explained by MS and traditional risk factors.

DIAGNOSTIC PROCEDURES AND SURVEILLANCE SYSTEMS

THE YIELD OF PRE-EMPLOYMENT MEDICAL EVALUATION BY 3 DIFFERENT METHODES

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[ID 232]

Objective: Increasing effort is being made to prevent sickness absence and to increase worker efficiency. One of the leading means to reach these goals is the pre-employment medical assessment. Pre-employment medical assessment of white-collar workers is costly, thus the importance of cost-effective evaluation of this assessment. Our study addressed the question of whether filling an occupational health questionnaire is an equally valid preplacement assessment as previously employed protocols, which included a physical examination and laboratory workup performed for each applicant.

Methods: We performed a retrospective study comparing three populations of job applicants. Population A - applicants who were each examined by an occupational physician. Population B - applicants who were examined by a GP and their medical records were further evaluated by an occupational physician. Population C – each applicant filled an occupational health questionnaire, which was evaluated by an occupational physician.

Results: The study produced 1940 pre-employment assessments divided into groups A (618) B (256) C (1066). A total of 41 (2.1%) applicants were restricted. The restriction rate for the above protocols was 2.1%, 1.2% and 2.3% respectively (P=NS). The lowest restriction rate (1.4%) was found among applicants 29 year-old and younger, and the highest (3.6%) for applicants over 50 year-old (P=NS). The most frequent restriction medical diagnoses were transient ischemic attack or stroke (20%), musculoskeletal disorders (15%) and cardiovascular diseases (12%).

Conclusions: The restriction rate achieved by medical examination, either done by an occupational physician (method A) or by a family physician (method B) is much the same as in self questionnaire (method C). We recommend the use of a self-administered questionnaire followed by a consideration of an occupational physician as best method of pre-employment evaluation, in terms of cost-effectiveness, for non-hazardous occupations.

REQUEST OF INHABILITY PENSION. A HELP FOR ORGANIZATION OF HEALTH SURVEILLANCE

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[ID 305]

In order to increase the knowledge on health status changes in workers employed in different activities, by common consent with regional sector of National Insurance Institute, the clinical histories of 5538 workers, white collars blue collars and rural workers, that in five year period, 1998-2002, submitted an application for disability allowance or pension to National Insurance Fund, have been collected.

Firstly, the prevalence of respiratory cardiovascular and muscle skeletal chronic degenerative diseases has been computed; subsequently, data, adjusted by age life style and occupational categories, have been analysed.

The prevalence of respiratory and cardiovascular diseases was significantly higher in rural workers compared to blue and white collars (p<0,01), while no significant differences between all occupational categories for musculoskeletal disorders were found. Among cardiovascular diseases, a higher prevalence of hypertensive cardiopathy was found in blue collars compared to white collars (p<0,01), while the prevalence of myocardial infarction was higher in rural workers compared to the other categories (p<0,05). The prevalence of cancer was scattered distributed in the different occupational categories and in the different age cluster.

Data adjusted by age showed that rural workers were younger than workers of the other categories, which requested the disability allowance for respiratory or cardiovascular diseases (P<0,01). Moreover, the white collars were older than the other workers, when submitted the pension request (p<0,01).

In conclusion, our findings showed that the mean age and the reasons of the requests for a disability allowance or pension were significantly different among occupational categories. These results suggest that an accurate analysis of disability requests could be a profitable help in the organization of health surveillance of under estimated occupational categories.

OCCUPATIONALLY CAUSED COPD - ASSESSING THE EVIDENCE FOR COMPENSATION

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[ID 1310]

INTRODUCTION: Chronic Obstructive Pulmonary Disease (COPD, including chronic bronchitis and emphysema (CBE), caused by exposure to coal dust is a compensatable disease in several countries, including the UK. Excess COPD has been identified in a wide-range of other industries associated with exposure to fumes, chemical substances and dusts. This paper evaluates the strength of the evidence for extending compensation.

METHODS: The available body of knowledge on the causes of CBE and COPD is vast. However, evaluation of the literature for compensation purposes (rather than the more conventional aetiological overview) requires particular focus on key issues: the ability to provide a workable diagnosis of the disease; estimation of the magnitude of the risk relating to occupational circumstances; assessment of the exposures necessary for development and severity of the disease.

RESULTS: The evidence does not indicate excess risk for surface workers at underground mines or workers at open cast mines, although specific jobs e.g. drilling warrant monitoring. Agricultural workers can be exposed to a variety of gases and organic dusts. CBE is clearly elevated, particularly for pig farmers and exposure to endotoxins, with an increased annual decline in lung function. Similarly, cotton textile workers are exposed to a mixture of substances affecting development of atopy, byssinosis and CBE, and across-shift and long-term decline in lung function. Atopy also has an important role in the development of COPD in flour mill workers and bakers, with those sensitised to bakery allergens having a greater lung function decline than non-sensitised individuals. Welding processes involve a range of potential chemical, physical and radiation hazards. The average reduction in FEV1 associated with welding fumes is similar to that associated with smoking.

CONCLUSIONS: Challenges in assessing the evidence for compensation include: variation in diagnostic methods; concurrent exposure to cigarette smoke (direct or second-hand) and multiple work-place irritants; healthy worker selection/survivor effects; poor exposure definition. Occupations of particular concern are: farming, flour mill work and baking; cotton textile work; welding.

WORK-RELATED DISEASES IN THE NORWEGIAN PETROLEUM INDUSTRY (1992-2003)

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[ID 401]

Introduction: Since 1992 Norwegian physicians from the petroleum industry have reported work-related diseases to the Petroleum Safety Authority (PSA) in Norway. As a part of Norwegian legislation, all cases of suspected work-related diseases should be reported. One purpose is to get information about unhealthy work places to be able to improve them. The aim of this study was to analyse reported work-related diseases from 1992 to 2003 to find the main diseases. Methods: Descriptive analyses were based on the register of work-related diseases from the PSA and employee statistics from Statistics Norway. Results: During the period 1995-2003 a total of 6725 new cases of work-related diseases were reported to the PSA. Work-related musculoskeletal disorders (WMSD) accounted for 47 % of the cases during the period; followed by hearing loss (25%) and skin diseases (15%). Respiratory diseases accounted for 2 % and mental problems for 1% of the cases. Irrespective of diagnosis, the largest number of work-related diseases was found among maintenance workers. The incidence of reported work-related diseases was 3.8 in 1992, but from 1995 the average annual incidence was 11.6 per 1000 employees. The number of reported cases differed a lot between companies and within one company from year to year, indicating underreporting of work-related diseases. The highest reported number of WMSD was found among cater-

ing assistants. Most frequent reported exposures among workers with WMSD were heavy load and repetitive work. The largest reported number of hearing loss was found among mechanics. Skin diseases were most often found among roughnecks, with mineral oil as the most frequent exposure. Conclusions: WMSD, hearing loss and skin diseases were the main diagnoses reported. Despite underreporting, this register might be useful to make strategies to prevent work-related diseases. However, continuous improvement of the register is necessary, both of reporting routines and kind of information included.

ESTABLISHING AN EVIDENCE-BASED LIST OF RECOGNIZED WORK-RELATED DISORDERS

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[ID 833]

Background
Many countries have a prescribed list of work-related diseases that automatically qualify for compensation payment. Virtually all are based on the ILO's List Of Occupational Diseases, which has been amended several times. In New Zealand, the equivalent list is Schedule 2 of the IPRC Act. Recent reviews and research have raised concerns that Schedule 2 is too restrictive. The aim of the project was to provide background information and recommendations to support a review of Schedule 2.
Methods
The project involved a detailed assessment of disorders where the causal link between exposure and development of the disorder is well established, and estimation of the prevalence of such disorders/diseases in the community. Three criteria were developed to guide the final recommendations on which disorders should and should not be included in the Schedule.
Findings
The current version of Schedule 2 does not include many of the categories listed in the ILO List, which itself excludes many disorders that can definitely arise due to occupational exposures. For inclusion in Schedule 2, it is important that: there is strong evidence (consistent evidence in good quality studies published in peer-reviewed literature) of a causal link between the occupational exposure and the disorder; that there are clear and repeatable criteria for diagnosing the disorder; and that the disorder comprises a considerable proportion (with the definition of "considerable" varying between disorders, but usually comprising at least 10% of cases) of the cases of that disorder in the overall population or an identifiable subset of the population. The structure of Schedule 2 (or its equivalent in other countries) is best based on a combination of specific disorder-exposure combinations, unless the number of potential exposures linked to a particular disorder, or the number of disorders linked to a particular exposure, make it impractical to list them all.
Conclusions
The revised version of Schedule 2 should provide more evidence-based and practical coverage of work-related disorders.

THE ROLE OF THE OCCUPATIONAL PHYSICIAN IN SYSTEMATIC SEARCH AND AETIOLOGICAL DIAGNOSIS OF LUNG CANCER

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[ID 869]

Background: about 15% of lung cancers (LC) might be attributable to occupation according to epidemiological estimates. However, on a clinical practice basis, percentage of LC for which an aetiological role of the occupational exposure is recognized is lower than expected.
Objectives: to address the role of the Occupational Physician (OP) in systematic search of LC and in aetiological diagnosis; to illustrate the consequences of such activities.
Methods: the search was carried out since 1998 at a university hospital in Brescia, northern Italy, a highly industrialized area with many workers potentially exposed to occupational lung carcinogens. Through short occupational history forms, physicians of various departments refer incident LC to the OP. When occupational exposure to lung carcinogens is assumed, OP carries out a formal evaluation at the occupational clinic and sends clinical reports to notifying physicians, containing aetiological diagnosis and indications for medico-legal obligations.
Results: before 1998, few cases were referred to the OP and even less were compensated. The search has yielded 1502 LC; after screening, full occupational health evaluation was performed in 693 LC cases: occupational etiology was recognized in 182 (26%). Risk factors were silica, asbestos, polycyclic aromatic hydrocarbons, job tasks such as truck driving, painting, road paving; many workers were exposed to multiple carcinogens. 48 cases were compensated, many others are under litigation.
Conclusions: systematic search of LC cases enabled to:
- reach aetiological diagnosis and reduce gap between expected LC and those reported and compensated;
- inform health authorities and undertake preventive actions in workplaces;
- detect sentinel events;
- provide epidemiological data at the local community;
- promote cooperation among health professionals (oncologists, surgeons, pneumologists, general practitioners, plant OP);
- increase teaching opportunities especially for medical students, Occupational Health residents;
- provide counselling and professional expert opinions for individual subjects, trade unions, employers, law courts.

THE ASSESSMENT OF WORKABILITY BY INSURANCE PHYSICIANS

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[ID 914]

Long-term work disability is an expanding social problem and therefore the assessment of work disability should be precisely performed. In the disability determination process, physicians determine the functional abilities of a claimant; when functional abilities do not match required work demands, work disability exists. At the moment, the professional basis for the physicians' judgments about workability is unclear, because no generally accepted instruments to assess workability are available. In the Netherlands, the specialists in workability assessment are insurance physicians (IPs) who receive four years of training in assessing workability. To assess the professional basis of an IP's workability assessments, a qualitative interview by telephone was conducted on a random sample of 60 IPs. Information on three types of diseases was gathered: musculoskeletal, psychiatric and a category of other diseases. Questions regarding the different aspects determining an employee's workability, regarding the importance of these aspects for workability and regarding the prognosis for five days, three months or five years of workability were asked. The answers were categorized according to the six ICF components: disease/disorder, functions and structures, activities, participation, environmental factors and personal factors.
In determining workability, a wide range of aspects were used. In the case of musculoskeletal diseases, the IPs predominantly considered the "function and structures" component important. In case of psychiatric and other diseases, however, the "participation factor" component was mostly considered important. Regarding the three types of diseases, aspects relating to the "environmental factor" and "personal factor" components were mentioned as important by less than 25 % of the IPs. In assessing the short-term and long-term prognosis of workability, the "disease or disorder" component was primarily used. Based on the evidence in the literature, it can be argued that "environmental factors" and "personal factors" should play a more important role in workability assessments of IPs.

DEVELOPMENT AND VALIDATION OF QUALITY INDICATORS FOR NATIONAL REGISTRATION SYSTEMS OF OCCUPATIONAL DISEASES

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[ID 750]

Introduction
The aim of this study is to develop a tool for evaluation of national registration systems of occupational diseases with respect to their ability to provide essential information for preventive policy. The specific questions in this article are: 1. Which indicators determine the quality of national registration systems of occupational diseases with respect to their ability to provide essential information for preventive policy? 2. Which criteria do these indicators have to meet to provide good quality information?

Methods
We answered the research question in a three step method. First we did a literature search to define which output can be considered as essential for preventive policy. Second with the aid of the quality model of Donabedian and on the basis of the literature search we developed a set of quality indicators with their criteria to describe and evaluate national registration systems of occupational diseases. Finally we tested the content validity of this tool and made adjustments in a Delphi study. We asked 25 experts from all EU countries to participate in the study. Criteria for selection of experts were publications in the field of registration of occupational diseases or a position in national or international bodies concerning occupational diseases.
Results
In the literature we found that two different types of information output are essential information for preventive policy: alert and monitor information. We defined a set of indicators with their criteria to determine the quality of the alert function of a national registration system and also a set of indicators with their criteria to determine the monitor function. Sixteen of the 25 experts responded in the Delphi method to validate the evaluation tool. As a result of the Delphi-study we made adjustments in the tool.
Conclusions
We have developed a valid tool for evaluation of national registration systems of occupational diseases with respect to their ability to provide essential information for preventive policy. We can use this tool to evaluate and compare national registration systems of occupational diseases of the 25 EU-countries in a following study.

THE REPORTING SYSTEM OF OCCUPATIONAL DISEASES AND INJURIES IN TAIWAN: A 10-YEAR REVIEW
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The Department of Health of Taiwan established a reporting system of occupational diseases and injuries in June 1995. The goal of the system is to promote the health and safety of workers through the collaborations among (particularly the occupational medicine specialists), industrial hygienists, health-care facilities, and governmental health and labor affairs agencies. The reportable conditions cover all the suspected occupational diseases and certain occupational injuries, which include injuries to the eye, chemical burns, moderate to server burns, and all the occupational injuries that lead to absence from work for more than one week. The Department of Health of Taiwan had operated the system using its own staff till 1998, and then the work was contracted out to the Taiwan Environmental and Occupational Medicine Association since 1999. A web-based reporting mechanism was established in 2000, but the system continues to accept hard copy reports. By the end of June 2005, a total of 15193 cases were reported by physicians from all over Taiwan, at the rate of about 126 cases per month. The types of occupational diseases most frequently reported were decompression illness, pneumoconiosis, noise induced hearing loss, carpal tunnel syndromes, and skin diseases." In the recent years, the number of reports on carpal tunnel syndromes increased, while those on the decompression illness and pneumoconiosis decreased. The proportion of reports filed through the web-based mechanism soon exceeded that of those filed using hard copies on year after the construction of the homepage. Therefore, web-based reporting systems of diseases are feasible, and many physicians are willing to report cases through such a system.

INTERNATIONAL COMPARISON OF RECOGNITION OF OCCUPATIONAL DISEASES
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[ID 1278]
Occupational diseases (ODs) attract the attention of many interest groups. All of the parties concerned – be it labour unions, workers or employees, consumer rights groups, insurance industry, public policy experts, politicians, or medical doctors agree that victims of occupational diseases should receive just and fair compensation for their health condition. However, after analysing more than 10 different occupational diseases insurance models across the world, we conclude that in addition to the already known difficulties in defining, preventing and diagnosing occupational diseases, differences of opinion also exist among all parties concerned on the means of designing appropriate compensating mechanisms. This means for instance that in some countries the amount of economic benefits for a victim of an occupational disease is calculated from the moment he or she had the first symptom related to the diagnosed occupational disease, whereas in other countries the amount is calculated from the moment an occupational disease is legally confirmed. In our analysis we found six different alternatives for compensating occupational diseases, as well as different definitions, and multiple ways of financing occupational diseases insurance.
ODs are posing an ever-increasing challenge to occupational safety and health –OSH- as well as to workers' compensation systems –WCS- (occupational accidents and occupational diseases insurance). Current trends in ODs make more evident the need to review how ODs are prevent and insured and to discuss whether the current mechanisms are appropriate for dealing with the challenges we are now experiencing: Long latency crossed with new scenarios where "non-traditional" occupational hazards might assume increased importance (e.g. ergonomic or psychological occupational hazards) and where new occupational diseases can arise, flexibility in the job market, changes in the work environment, just to mention some. Nowadays, that the intersection between OSH with WCS is getting closer and even more necessary, there is a need to come together in order to better tackle the ongoing challenges.
Our aim is not to define the optimal model of compensating and financing occupational diseases, but to present and discuss, in addition to our findings, our proposed classification model, where we established two major groups of ODs: ODs with easy/clear attribution and ODs with complex attribution. This proposal can be considered as a step towards a sustainable and future oriented approach to guarantee a fair compensation for the victims of ODs, while providing a sustainable long-term system.

IMPROVING OCCUPATIONAL HEALTH AT "ZINCOR", A ZINC REFINERY IN SOUTH AFRICA, THROUGH THE INTEGRATION OF OCCUPATIONAL MEDICINE AND OCCUPATIONAL HYGIENE.
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Aim
Occupational medicine and occupational (industrial) hygiene are two disciplines that complement each other and have long been considered to be a unit under the umbrella of "Occupational Health". Worldwide very little has been done towards real integration. Integration at Zincor occurred due to a business improvement process which resulted in the integration of occupational medicine and occupational hygiene into one functional "Occupational Health" team.
Method
The Zincor occupational health team works together in identifying the occupational health risks through the process of an occupational health risk assessment. The identified hazard is then managed by ensuring that the appropriate medical surveillance (including biological monitoring and biological effect monitoring) and occupational hygiene monitoring takes place. The occupational health results are compared to both the individual worker and the homogenous exposure group. Results are recorded and reported. Controls are then recommended and implemented.
Results
Integration has resulted in producing an effective occupational health unit that is able to identify deviations and address them as soon as possible. The occupational health results allow for controls to be applied that are specific and focused on the problems/trends that are developing. (Specific examples will be highlighted in the paper). As root causes have been identified, controls are more effective and appropriate. The root causes, including how to mitigate and manage them, are better understood by both the worker and the occupational health team.
Conclusion
Long gone is the time where occupational health and occupational hygiene are practised separately in "silos". The burden of disease cannot be allowed to continue and therefore all possible avenues should be investigated in order to decrease this burden. The integration of occupational medicine and occupational hygiene into one comprehensive "occupational health programme" is one method that can be used. The benefits of such an action in the workplace should result in occupational health surveillance and occupational hygiene monitoring which is appropriate and focused.

CT SCAN SCREENING FOR EARLY LUNG CANCER DETECTION IN NUCLEAR WEAPONS WORKERS

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[ID 1454]

Background: Low dose helical CT scanning identifies early stage lung malignancies, an important advance for workers exposed to lung carcinogens. CT scanning also detects a large proportion of lung nodules of uncertain diagnostic and prognostic significance (i.e. – indeterminate nodules). These nodules may provoke anxiety, require costly follow-up, and are frequently viewed as a major disadvantage of CT screening for lung cancer.
Methods: We CT scanned for lung cancer 4,401 nuclear weapons workers at intermediate risk of lung cancer. They underwent initial low dose CT scan, interval CT scans at 3, 6, and 12 months for indeterminate lung nodules (e.g. – defined as non-calcified nodules that were not immediately suspicious for lung cancer) and 18 month full chest low dose incidence CT scan.
Results: We detected 33 lung cancers, 80% of which were detected at an ealry stage. We achieved > 98% 12 month follow-up of 807 participants with indeterminate nodules or with suspicious nodules. Only 3 of 764 (0.39%) people with indeterminate nodules were identified as having lung cancer during the subsequent 12 months. Work-up of the three malignant nodules was triggered by growth observed on the 3 or 6 month follow-up CT scan. All three lung cancers were Stage I at the time of diagnosis.
Conclusions: Low dose CT scanning detects early lung cancer at potenially curable stage. The probability that indeterminate nodules are malignant is low. A single interval CT scan at 6 months can be offered with limited risk and cost and will successfully detect lung cancers at an early stage. Occupational cohorts are feasible, motivated, and efficient groups for application of CT scanning to detect early stage lung cancer.

PREVENTION OF OCCUPATIONAL DISEASES AND INJURIES: THE MODEL AND THE EXPERIENCE OF THE REGION OF LOMBARDY (ITALY)

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[ID 2265]

The Region of Lombardy (Italy) has prepared and developed an action plan on occupational health and safety for the triennium 2004-2006. The plan is addressed at well identified priority areas: building construction, agriculture, health care structures, construction of high speed railways and activities done in the highness with use of ropes. Also emerging occupational risks, such as occupational carcinogens and mental stress, have been addressed. In a Regional situation characterized by 687.909 enterprises, with 3.612.891 employees, the medium yearly incidence of occupational accidents is in the order of 160,000. Out of them, 3,000 cases are characterized by permanent inability of the worker, and 85-100 are fatalities (The Regional Registry of Occupational Fatal Accidents). These are the reason why occupational accidents have been addressed by specific planned actions, with a particular attention for sectors, such as building constructions and agriculture, where the incidence is higher.
As for the specific activities, the project on constructions is based on interventions on the single settlements, with a particular attention for the risk of falls, together with educational and training activities and inspections. In the project addressed at agriculture, data collection on occupational accidents, realization of training activities, and publication of guidelines are being carried out. In the health care sector priority has been given to muscolo-skeletal and infectious diseases, mainly through interventions addressed at the improvement of the prevention systems of the health care structures.
As for neoplasm prevention, most of the activities are addressed at the reduction of occupational exposure to carcinogens and at epidemiological data collection.
The innovative characteristic of the experience carried out is the holistic approach, where collected data and informations (registries, monitoring activities) are the basis for the definition either of preventive interventions, addressed at risk removal or mitigation, or specific training activities and guideline publication. A further specificity is represented by the generalization of the activities in the whole territory of our Region, with the involvement of trade unions, employers associations and other stakeholders.

CHILD LABOUR

WORKING CHILDREN'S PERCETION OF CHILD LABOUR

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[ID 132]

Introduction

Child labour continues to pose a challenge to public health authorities. Several perspectives of the problem have been presented by child health authorities and international agencies. Few studies have focused on children's perspectives.

Objective

This study sought to determine working children's perceptions of child labour, its benefits and disadvantages, and the working child's perception of himself and his future aspirations.

Methods

A cross sectional study was carried out among working children in a large market in Ibadan, Nigeria. Questionnaires were administered to all consenting children seen working in the market during the period of the study.

Results

Two hundred and twenty five children aged 8 – 17 years were interviewed. Forty six percent were currently in school and 52% were out of school. Forty six percent thought that children should not work. Seventy-nine percent of children would rather go to school or learn a trade. Benefits of working reported were source of income, 36%, helping parents, 23% and training to be responsible adults, 17%. Bad company, ill health and road traffic accidents were perceived ill effect of child labour.

Career aspirations were low with only 20% aspiring towards professional or office jobs.

Twenty five percent of children thought that child labour was a sign of deprivation. The perception of child labour as a sign of deprivation was more prevalent among those who were out of school, those with only primary school education, those who had worked for more than 6 months and those whose earnings were small.

Conclusion

Child labour is forced on a large proportion of working children. Many of these children would much rather go to school or learn a trade. Low career aspirations guarantee that child labour and poverty become a vicious cycle in such families.

EPIDEMIOLOGICAL STUDY ON CHILD LABOUR IN ALGERIA

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C.H.U BAB EL OUED - ALGER - Algeria

[ID 328]

Although child labour is not considered of great concern or being of significant importance in Algeria, an epidemiological descriptive study on this subject has been achieved in order to:

- determine the nature and real extent of the problem;
- Identify its roots;
- Depict the social characteristics of young workers, their feelings towards labour and their working conditions;
- Formulate some recommendations aiming to fight against child labour and exploitation.

The results of this study have shown that :

- 5% of the children's population under study – aged between 5 to 18 years – are constrained to work.
- This percentage falls to 1.8% for the 5 to 14 years old population;
- Children are constrained to labour mainly because of poverty (44.7%), social difficulties (9.1%) and precocious exclusion from school (3.9%).
- Poverty is very often the major cause in rural areas (52,1%) and especially for young female workers (58.2%).
- 15.4% of the young workers have lost their father and/or mother;
- Parents' level of education is low or they are illiterate (61.6%).
- Both boys (66.1%) and girls (33.9%) are concerned, the labour being much harder and occurring precociously for the girls in rural areas compared to urban cities.
- 36.5% of the children work in the commerce, in handicraft (19.6%), in various services (14.3%), in agriculture (3.4%), in the field of transports (2.4%), and in construction industry (2.1%).

Child labour is quite a new phenomena in Algeria. It has not yet attained alarming levels but should be considered as a serious threat for the country. This phenomena needs to be tackled and as a conclusion, we recommend the creation of a national child labour observatory, the strengthening of the actual legislation and systematic controls by the labour inspection in addition to the prevention of precocious educational failures.

EXPOSURE TO COMBUSTION PRODUCTS AND RESPIRATORY SYMPTOMS AMONG INFORMAL WORKING CHILDREN AT THE CITY DUMP "LA CHURECA" IN MANAGUA, NICARAGUA.

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[ID 690]

Aims: To study respiratory symptoms and lung function in children working informally at a city waste disposal site ("dump"), in relation to their work tasks and exposure levels. The waste is burned at multiple sites creating a permanent haze.

Methods: A cross-sectional study was performed including 103 working children age 6-16 (out of 117 invited), and 103 referent children (150 invited) not working there from a nearby reference area with similar socioeconomic conditions. The examination included: work history, respiratory symptoms (ISAAC-questionnaire), spirometry (Polgar and Promadhat 1971 reference values), weight and height. Nutritional status was evaluated with NutStat, EpiInfo 2002. Exposure was monitored with passive samplers for nitrogen dioxide (NO2), and with an aerosol monitor (TSI Sidepak) for particulate matter (PM2..5; N=30)

Results: The NO2 levels at the dump ranged from 100 to 500µg/m3. The average level of PM2..5 was 700µg/m3 at the dump, compared to 75µg/m3 in the reference area (US EPA standard (24h): 65µg/m3).

Ever getting a physician's diagnosis of asthma was equally common in both groups (26%). However, the 12 month prevalence of wheeze was higher in the exposed group than in the referent group (39% vs 19%; OR=2.6, 95% CI=1.4-4.9), as was wheezing after exercise (34% vs 15%; OR=3.0; 95% CI=1.5-6.0). High proportions of FEV1 below expected values were found, especially among the exposed children. The same applied for FVC. Malnutrition was common in both groups, but more so in the exposed one. The lung volumes were associated with the nutritional status.

Conclusions: The concentrations of particulate matter were very high at the dump. The asthma prevalence was fairly high in both groups and similar to that reported from ISAAC-studies in Costa Rica. However, wheezing was more common in the exposed group, as was having a lower than expected FEV1. Associations with exposure category among the working children are presently evaluated.

EXPOSURE TO PERSISTENT AND SEMIPERSISTENT ORGANOHALOGENS IN CHILDREN WORKING IN A WASTE DISPOSAL SITE IN MANAGUA, NICARAGUA

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[ID 733]

More than 1000 persons, of which over 50% are under age 18, work at the municipal domestic and industrial waste disposal site in Managua. A thick cloud of smoke covers the area as the waste is openly burned. The area is located at the shore of Lake Managua. Hitherto only few assessments of emerging as well as classical persistent organohalogen pollutants from the Southern hemisphere have been reported, and never from such areas. We have assessed such exposure, using pooled serum samples from groups of children aged 11-16 working and sometimes also living in the area. Referents sharing the same underprivileged socioeconomic conditions were also investigated.

Results and comments: Serum levels of several organochlorine pesticides, pentachlorphenol (PCP), polychlorinated biphenyls (PCBs) and polybrominated diphenyl ethers (PBDEs) were determined. The DDT-metabolite p,p´-DDE was the most abundant compound observed. Clear gradients for several of the compounds were observed, working children having the highest levels. In general, the levels observed were higher than reported in children from developed countries. The level of PBDEs in children work-

ing and living at the waste disposal site was among the highest ever reported in humans.

Table: Description of pools, and concentrations of selected organohalogens in serum (ng/g lipid weight)

Pools	N	Consumption of fish from Lake Managua (meals/ month)	p, p´-DDE	PCP	sum PCB	sumPBDE
Work and live at waste disposal site	11	2 (0-8)	1600	1200	540	440
Work at waste disposal site, live nearby	23	2 (0-8)	1200	510	530	69
Live nearby	16	2 (2-8)	990	480	390	40
Live nearby	10	0	1000	350	230	31
Live far from dump	10	0	990	380	160	32

N= number of subjects
[1] median (range),
[2] sum of CB105, 118, 128, 138, 153, 180, 183, and 187
[3] sum of BDE 28,47,66,85, 99,100,153,154, and 209

Conclusions: Our observations indicate that the waste disposal site is a source of occupational and environmental exposure to organohalogen compounds. Monitoring of organohalogen exposure in developing countries is needed to give guidance for actions to control the human exposure. Especially, risk assessment with regard to reproductive outcome is relevant.

WORK RELATED INJURIES IN CHILDREN WORKING AT A WASTE DISPOSAL SITE IN NICARAGUA, AND IN REFERENTS

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[ID 1463]

Objectives:
To investigate the occurrence and pattern of injuries among children working at a waste disposal site in Managua, Nicaragua, and in referents from a nearby residential area with similar poor socioeconomic conditions.
Methods:
Children aged 6-15 years, working on average since 3 years at the waste disposal site (n=102), and referents (n=101) were interviewed. Only injuries occurring during the last 12 months and causing at least one day of absence from work or from school are reported here. The risk of having an injury, as well as the incidence rates of work and non-work related injuries were estimated using logistic regression and Poisson regression, respectively. Classes of work related injuries (injuries typology) were identified by applying a two-step cluster analysis.
Results:
66 child workers and 20 referents reported at least one injury during the last 12 months (odds ratio 7.4; 95% CI 3.9 to 14). In total, 110 and 22 injuries, respectively, were reported. Among the child workers, most of the injuries occurred at the waste disposal site (n= 79; incidence rate of work related injuries 2.2 per 1000 person-days). The most common class of work related injuries included open wounds, which affected feet or lower extremities, and caused between 4 and 13 days lost (n= 27; 34%). Also, fractures or dislocations which affected lower or upper extremities, and caused from 1 week up to 2 months of lost work (n=9;11%) were observed. Moreover, seven (9 %) of the work related injuries resulted in persisting functional impairment or pain, i.e. approximately 0.07 per working year.
Conclusion:
The risk of having a work related injury in these child workers is high, with direct impact on the child's present and future health status, school attendance and on family income. Still our study most likely underestimates the true risk, as only presently active child workers were included.

CHILD LABOUR AND WORK ACCIDENTS IN RIBEIRÃO PRETO-SP, BRAZIL

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[ID 804]

Nowadays, children and adolescents are one of the most affected population segments affected by continued social, economic and cultural problems in Brazil. Income concentration, informal work, low wages, the lack of a universal and high-quality public education network, unemployment and impaired family structures directly affect children and adolescents' lives, obliging them to take part in the labor market early to help their parents with expenses. Although child work is illegal, children and adolescents work and are victims of Occupational Accidents (OA). This study aimed to identify the type of work they perform, which body parts are affected in AO and whether the compulsory notification document CAT is issued. We used a protocol to review the records of young people attended at an occupational health service in a large city in the interior of São Paulo, Brazil, during one year. The obtained information was coded according to the International Classification of Diseases - CID 10 (1993). During the research period, 1,589 child and adolescent accident victims were attended. 64.3% were boys, 75% were 17 years old, 12.4% were bakery auxiliaries. 51.8% of OA affected lower limbs and 12.5% the head. CAT was not issued in 62.5% of cases. These figures can be improved by education, social programs and aid to families in need.

GENDER DIVISION OF WORK AMONG CHILDREN OF TOBACCO CULTIVATION FAMILIES IN SOUTH LEBANON

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[ID 1103]

Background: More than 25,000 children support their families in cultivating tobacco in Lebanon. This includes planting seeds, uprooting and transplanting seedlings, harvesting leaves, and threading and drying leaves. Their role differs by age and gender. This study aims at documenting the involvement of children of families of tobacco cultivation in different tobacco-related work activities and at identifying gender differences in work involvement and reported health complaints.
Methodology: 136 boys and girls 13-17 years old from families working in tobacco farming in Nabatiyeh (South Lebanon) were interviewed at schools in spring 2005. Children were asked about their involvement in tobacco-related activities and housework during the last season, and about acute and chronic health problems.
Findings: 13% of the boys reported spraying insecticides but none of the girls. Both groups were heavily and equally involved in threading tobacco leaves (88%) and harvesting (50%). More boys than girls were involved in the remaining activities (33-69% vs. 8-49%). Differences were statistically significant. In contrast, girls were statistically significantly more involved than males in household activities (2.2 vs. 1.0 h/day).
Threading tobacco leaves using steelheads and weeding were associated with the highest proportion of health complaints (52.9% and 12.5%, respectively). Threading was mainly associated with injuries (predominantly cuts), while weeding was associated with musculoskeletal problems. Girls reported more acute and chronic health complaints than boys.
Conclusions: The study points to a high involvement of children in tobacco farming with their families. Although boys are more involved in tobacco-related activities, girls are carrying the extra burden of housework. Girls could be relieving their mothers from several household responsibilities allowing them to attend more to tobacco farming. Injuries and musculoskeletal complaints top the frequent reporting of health complaints, especially among girls. This calls for gender-sensitive intervention programs, best if guided by more in-depth qualitative studies.

HAZARDOUS CHILD LABOR LIST: CONSIDERATIONS ABOUT ITS DEFINITION AND REVIEW

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[ID 1347]

ILO Convention 182 on the Worst Forms of Child Labor, adopted in 1999, calls on each ratifying nation to take immediate and urgent action to eliminate hazardous child labor (HCL). The Convention requires each ratifying nation to specify in national law or regulation which types of child labor are considered to be hazardous and to periodically re-examine and revise this list as necessary.

There has been much controversy about which criteria should be used to define HCL and about the specific jobs that should be included on the HCL list. A serious underlying problem is that the list is dichotomous – a job is declared to be either hazardous or not, and there is no possibility for gradation of the severity of hazard. In reality, however, the impact of work on health results from a complex mix of hazards and host factors which could interact with each other and have multiple effects on health. Moreover, the illness and injury suffered by workers can vary from subclinical manifestations, to acute or chronic morbidities or even death, and these effects are often difficult to measure. Thus, it is a challenge to summarize the impact of work on health in a single dichotomous indicator.

A further problem is that most of the existent HCL lists mix economic activities, tasks and occupational hazards.

To define hazardous child labor and to establish priorities for action it is important to evaluate the occupational exposure, the probability that the exposure will cause health problems, the severity of health problems that could be caused, the vulnerability of the particular children at risk of exposure, as well as the number of exposed children.

A matrix presenting in each line economic activities, tasks, hazards and effects on health correspondent to each other, seem to be very useful for advocacy and action and a more rational way to comply with Convention 182.

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SLEEP DISTURBANCES AMONG TEEN WORKERS FROM A PUBLIC SCHOOL OF SÃO PAULO, BRAZIL.

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[ID 1766]

Introduction: According to IBGE (Statistics and Geography Brazilian Institute) in 2002 33 million (18%) of the Brazilian population were adolescents, and 32% of them, reported were at work. The adolescence is a period of important physiological and psychosocial development. It is a transition from childhood to adulthood characterized by vulnerability and intense changes including puberty, lifestyles, entering labor market, etc.

Objective: To evaluate variables associated to sleep disturbances reported by working teens, attending evening classes of a public school in São Paulo, Brazil.

Method: The research was conducted among 491 high school students aged 14 to 21 years. Seventy-four percent reported work and 26% were non-workers. A comprehensive questionnaire about living and working conditions, health symptoms including sleep disturbances (BRAZ et al., 1987) were answered by all students. Association among variables was initially tested using Pearson Chi-Square test followed by multiple logistic regression. A 5% level of significance was used in all analysis.

Results: Out of 68 adolescents who reported sleep disturbances (sleep walking, grinding one's teeth, headaches, sleep apnea, cramps and other symptoms), 55 (80.9%) were working. The results of multivariate logistic analysis showed adjusted odds ratio of 3.79 for females (1.85 – 7.76), 4.19 for those who smoked before sleeping (1.80 – 9.74), 4.01 for those who felt weakness (1.74 – 9.27), 3.59 for those who suffered work injuries (1.72 - 7.48). Age and drinking habits were kept in the model for better adjustment (Goodness-of-fit test: p=0.993).

Conclusions: The high prevalence of sleep disturbances were reported in working teens. Some variables (demographics, life style, working and health conditions) showed associated with sleep disturbances. The significant number of teens entering labor market should require attention by health and education authorities, as well as policy government guidelines to protect teen's health.

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OCCUPATIONAL HEALTH AND DEVELOPMENT

THE CONSEQUENCES OF A MAJOR ACCIDENT ON FISHERMEN WORKING CONDITIONS

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[ID 1470]

This paper presents an analysis of the consequences of a major accident, an oil spillage, which occurred in Guanabara Bay, Rio de Janeiro, Brazil in the year 2000. The accident created conflicts between different groups involved and affected. The study is focusing on the consequences of the accident seen from the fishermen's perspective. Frame analysis was applied to foster the understanding of their point of view.First analysed were the effects of oil spillage on the surrounding environment. Secondly, a frame analysis was carried out among the fishermen in order to understand how the accident affected their working conditions and employment. The results answer the following questions: How the accident affected the fishermen working life? Could the accident have been handled in a different way, by the company and authorities? Could the consequences of the accident have been minimized? Did the fishermen receive adequate compensation? How do they perceive the risk of a new accident? Case study was used as a research strategy. The data collected from reading material, interviews and intentional survey, focusing on the fisher communities. The study is part of an ongoing broader research project. The application of Frame Analysis as a tool for environmental conflict resolution is part of the project. Why does Frame Analysis help in conflict resolution? Frame analysis helps us to understand others view. We use frame to help us to make sense of the world around us, to make sense of the complex reality, abounded by complex and often divergent information about our social world. The way we frame a situation will define which aspects of it we select or ignore for attention. We applied frame analysis to understand the consequences of the accident seen from the fishermen's perspective.

A NATIONAL INSTITUTE REFLECTING SOCIETAL CHANGE

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[ID 1661]

In 1966 the Swedish National Institute of Occupational Medicine was created. Up to now the Institute has undergone three major reorganisations, in 1972, 1987 and 1995. Linked to the reorganisations, the Institute´s name and mandate has changed:

1966 National Institute of Occupational Medicine
1972 Research Department of the National Board of Occupational Safety and Health
1977 Swedish Centre for Working Life
1987 National Institute of Occupational Health
1993 Swedish Institute for Work Life Research
1995 National Institute for Working Life

The organisational changes will be described and analysed, considering the internal and external driving forces for change and drafting some possible future developments.

OCCUPATIONAL HEALTH IN MEXICO

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[ID 1700]

Context: The Mexican Institute of Social Security (IMSS) provides healthcare services to 40% of the entire population of Mexico (>100 million inhabitants), the Social and Security Services for State Workers Institute (ISSSSTE), to 5.9%, other institutions, 2.1%, and the private healthcare system provides 1.1% of healthcare services. The Mexican Federal Work Law and the Mexican Federal Regulations for Safety, Hygiene, and the Work Environment establish the bases for providing Occupational Health (OH) services.

Educative and Research Resources in OH and Its Practice:

There are two residency programs in Occupational Medicine, while Safety and Industrial Hygiene provides two undergraduate programs, one specialty program, and eight Masters Degree programs. In the area of Occupational Nursing, there are two specialty courses and one course in ergonomy. There is no national agenda in OH research. The participation of OH professionals in environmental health problems has not been important. OH professionals work in private enterprises and social security institutions; there are few OH professionals working in educational institutions and government agencies and the independent consultancy market is closed. OH services are focused on diminishing absenteeism and the occupational-related insurance risk, as well as on medical care for damages to health and the compensation of these.

OH Statistics: IMSS-affiliated workers during 2004 comprised 12,297,653, and were employed by 804,389 enterprises, of which 0.9% corresponded to large enterprises that employ 41.6% of workers, 10.6% were small businesses that employed 24.3% workers, and 1.5% were medium businesses that employed 14.1% of workers; finally, 87% corresponded to microenterprises, which employed 20% of workers. During the past 20 years, the annual work accident rate fell from 7.23 to 2.3%, the mortality rate decreased from 1.68/ to 0.9/10,000 workers and the occupational disease rate rose from 0.6 to 1.0 per 1,000 workers. In 8 years, the occupational accident-associated lethality rate has increased from 29.9 to 37.8/10,000 workers. The main occupational diseases comprise hearing loss, chemical bronchitis, and pneumoconiosis. The invalidity rate has dropped from 4.2 to 1.2/1,000 insured workers. The principal invalidating diseases include degenerative articular disease, diabetes-related complications, and cancer.

Conclusions: OH policies and practice in Mexico should be brought up to an adequate level with regard to the national reality for confronting future challenges and to improve professional quality and competitiveness.

TRENDS AND DIFFERENTIALS OF MORTALITY RESULTING FROM WORK ACCIDENTS AND WORK-RELATED ILLNESSES ACCORDING TO THE OFFICIAL REGISTERS IN BRAZIL

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[ID 1712]

Strategically, the present work comprises two related aspects of a question: a critical appraisal of the official statistics of mortality from work accidents and work-related illnesses, and the arrangement of some proposals orientated to an intervention for the general improvement of data registration records and information diffusion for this matter of great concern. In the first place, it aims to analyze the available figures as well as the variability in the profiles of death at work from the nineties to the beginning of the this century according to the main federal administrative reports that cover the whole relation correspondent to health, labor and social security in Brazil, such as the death certificates of the mortality of the Mortality Information Systems from Health Ministry, employment and unemployment balance of the Annual Relation of Social Information from Ministry of Labor and Employment , and finally the records of occupational accident cases in the National Institute for Social Security from Ministry of Security and Social Assistance. Thereafter, discussions are made to focus not only some difficulties in qualifying round fatal occupational accidents among the set of external causes of mortality in the country but also on the understanding of the limits associated to the acquirement of improved profiles of them at least under two conditions: the first one is in terms of demographic and epidemiological characterization; the second one is comparatively related to the different modalities that compound the broader scenario of work accidents in national scale according to the three class categorization of the accident developed by the INSS: typical work accidents, transport to and from work accidents and work related illnesses. That way some aspects related to not measuring mortality resulting from accidents in the informal labor market are critically considered as well as some hypothesis to overcome this serious obstacle to get better statistics. Besides the difficulty resulting from the absence of a better grade of coverage and an availability of a structured and uninterrupted data base, an approach including some realistic proposals are managed in order do put on the way alternatives to improve both effective identification and new characterization of mortality from workplace in all.

EVOLUTION OF WORKPLACE ACCIDENTS ON THE CONSTRUCTION INDUSTRY IN BRAZIL DURING 1997-2003

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[ID 1740]

The present work analyses the trends and differentials of workplace ac-

cidents on the construction industry in Brazil, between 1997 and 2003, privileging in this case, a critic and comparative analysis of social statistics available at the Ministry of Welfare State and Ministry of Labor and Employment, which, basically, reports to the formal labor market. In another hand, intend to assess the evolution of general conditions on health and safety at work places on this activity branch, in a way to contextualize the dynamics of workplace accidents which the subject assume. Thus, we seek to identify and measure occurrences of workplace accidents through a research of different kind of national data's available, nevertheless, allowing a geographic and subjected approaches of the labor accidental reality, which could compare different data base, an at the same time, specifying different aspects about the evolution and situation linked with the profiles of regional accidents, especially related to the five Brazilian macro regions, looking forward the main occurrences on different economic groups of activity including it's respective classes. According to the variables selected, it's intended describe demographically and epidemiologically the varying profiles of the population which has suffered an occupational accident. Otherwise, measurement of differentials about workplace accident results – i.e., temporary incapacity, death and disability, previdenciary cost and benefits, period moved away, accident description, age and sex composition, educational characteristics, occupation and income of workers. Thereafter, discussions are made to focus some difficulties in understanding of the limits associated to the acquirement of improved profiles of them comparatively related to the different modalities that compound the broader scenario of work accidents by size of enterprises in national scale according to the class categorization and main consequence of the accident developed by the National Institute for Social Security: typical work accidents, transport to and from work accidents, work related illnesses, and fatal occupational accidents. In particular, what is searched here it's not just qualify the fatalities identified as workplace accidents, but comparatively, discuss the limits needed to make a better realistic quantification and characterization in demographic and epidemiologic terms. At last, even keeping the construction industry particularities in focus, this work shows a concrete analysis followed by propositions of intervention to achieve a better workplace accidents statistics in Brazil.

INFORMATION SYSTEMS: A KEY RISK MANAGEMENT FACTOR FOR A WORKERS' COMPENSATION ADMINISTRATOR

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[ID 800]

SUMMARY

In a globalized world, a company's competitiveness and productivity are factors determine its success. One aspect that must be borne in mind is being aware of and controlling the risks to which workers are exposed on a daily basis.

METHODOLOGY

SURATEP´s information system, has been specially designed to handle Companies information and their workers, thanks to the interaction that exists between the different applications, the online availability and the handling of a single database.

The cycle of a Workers' Compensation Administrator begins when the company becomes a client and its corporate information and a more detailed information regarding its workers is duly registered. This will be the starting point for the handling of all the client´s information as well as for the corresponding profiling of such in different areas.

Then, the Service Management service allows us to control activities scheduled, cost of services and special control strategies that the Company has in place. In the event that a worker suffers an accident, it will be reported to the toll-free Lifesaver Line, where the claim is recorded for subsequent consultation, grading and handling by the doctor. With this claim system, all types of follow-ups can be carried out with regard to how the patient is responding. If the worker should die or acquire a disability, with the labor medicine and economic benefit systems the worker is guaranteed a rating corresponding to "loss of work capacity", in accordance with the injury as well as the payment of the benefits.

CONCLUSIONS

This topic has enormous importance for the Congress, given the fact that the on-line availability of company information is fundamental to:

- o Be able to advise client companies and provide a better quality of life to the working population.
- o Enhancing statistical control, providing more focused cost control and supervisory strategies that can be invested in more investigation.

RISKS AND ACCIDENTS – FROM SIMPLE TO HIGHLY COMPLEX PRODUCTION PROCESSES

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[ID 1469]

An analysis of the risks and accidents produced by activities applying different levels of technology is presented. A wide range of activities, going from very low level of technology till activities depending of very high level of technology is analysed.Activities that require very low level of technology such as craft mining and fishing, small scale agriculture, and cattle breading is the beginning. The analysis continues to activities that involve the use of more technology such as butchery, and construction industry. The next step includes food and automobile industries, which employ assembly lines and continuous production process. They are analysed in relation to the risks and accidents they produce. They require a medium level of technology. Next to be analysed are the activities requiring knowledge-based work and the employment of high level of technology, such as chemical industries. New dimensions are aggregated in the production of risks. Not just factors such as materials, processes and work organization characterise such industries, but also unexpected interactions between these factors contributing to increased risks. The corresponding accidents may develop into major accidents with large impacts, affecting worker, society and the environment.Finally, activities that require intensive knowledge-based work in continuous processes with tightly coupled system, such as nuclear plants and petrochemical industry, are analysed. Uncertainties related to unknown aspects of these complex industrial activities contribute to increased risks.

While local risk management may control the risks produced during the activities employing low and medium level of technology, the activities employing high level of technology require considerations not only by local management but also by the surrounding community and other interest groups involved. The safety of activities involving high level of technology should also be a concern for policymakers.

OCCUPATIONAL HEALTH IN PAKISTAN

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[ID 181]

Pakistan is a developing country with a resident population of 152 million and a total civilian labor workforce of 45.2 million while employed population is 41.7 million. Most of the workers are engaged in the agricultural, manufacturing, services, construction, and commerce sectors. Mining and quarrying activities are relatively less. In 2004, the infant mortality rate was 72.4 per 1,000 live births and life expectancy at birth was 63 years. Thirty percent of the population lives below the poverty line. The overall literacy rate is 51.6%.

In 2003, the reported occupational injuries were as follow: agriculture & forestry (43%), manufacturing (14%) and construction (10%). Actual statistics must be manifold higher, as we lack a properly managed reporting and notification system. No data of occupational diseases was available. The main law governing occupational health and safety is the Factories Act 1934. It does not cover agricultural and construction sectors, which constitute more than half of the total workforce. The labor laws are implemented by the Ministry of Labor and Manpower. Workman compensation authorities are functioning inadequately.

Education and training in occupational health is neglected in Pakistan. Few hours of formal instruction given to undergraduates, and no institute offers any post-graduate diploma or degree in occupational medicine. The number of doctors having a postgraduate qualification in this field of occupational medicine is extremely low.

Big organizations provide medical treatment only to regular, full-time employees while casual, part time laborers are given insufficient medical coverage. Government and allied agencies should take steps to protect and promote the health of workers. Besides tackling current issues, they must anticipate and address future problems as well. Healthcare professionals have to be given opportunities for higher education in the field of occupational medicine. Finally labor legislation must be constantly updated and properly implemented.

ASPECTS FROM NATIONAL STRATEGIES FOR OCCUPATIONAL HEALTH

RAPAS L.
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[ID 1334]

Occupational health is in a process of dynamic changes in all the countries and although the impact of the membership of the European Union is clearly an important influence on this process of change, it is important to acknowledge that there are real differences in health and safety provision between countries. Harmonization does not mean that all workers in Europe are currently experiencing the same standards of health and safety at their workplaces or that infrastructures for health and safety are equally developed in all countries.

The board of competent authorities establishes the necessity the community occupational health must be revitalized in order to enlarge the occupational medicine approaches.

The attention is focused on:

*training new professionals
*new research fields
*new bounds between health, safety and environment at work
*adapting the communication system
*improve the information network
*community health programs

The recent changes in legislative framework, the market mechanism, the employers and employees increasing interest for health link with new governmental policy concerning insurance for accidents and occupational diseases will determine improvement of occupational health approach.

Our models:

public OH providers are organised like a network at national level;

private OH providers cover about 40 % of small and medium business and they action in local, regional and even national area. Some of large companies have developing OH in house company service.

OH providers for social sector focus their action on early ill-health retirement assessment and surveillance employees with disabilities.

OH works as agent of changes and need new tools. This represents a major challenge for the legislators, the social partners, the regulatory agencies and the specialists, but one which must be confronted if system for promoting the well-being of people at work in Europe are to keep up with the rapidly changing nature of the risks that they face.

MACEDONIAN EXPERIENCE OF THE ROLE OF NATIONAL STRATEGY FOR HEALTH AND SAFETY AT WORK IN THE DEVELOPMENT OF OCCUPATIONAL HEALTH POLICY, SYSTEM AND SERVICES

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[ID 1025]

National Strategy for health and safety at work has got a crucial role in the process of development of occupational health policy, legislation, system and services concerning occupational health in our country. New political and socioeconomic conditions, decreased life standard, high rate of unemployment, older technologies and new occupational risks demand different approaches and principles of management of occupational health and safety (OH&S) and require new legislation as well as establishment of modern OH services. National Strategy, promoted on National Conference on occupational Health, (Skopje 2005), supported by WHO EURO, represents the Macedonian designation for EU integration in the field of OH&S and provides directions for concrete activities and measures at national, local and enterprise level. Basis for action are comprised in actual situational analysis, with all critical points in the ongoing OH reforms in Macedonia. The Strategy leading principles and main concept are based on WHO, ILO and EU documents and recommendations. Strategic goals focussed on primary prevention, with multidisciplinary, multisectoral and multilevel approach are the core of the OH&S national policy and system. Strategy, based on Action Plan as an operative document should be implemented trough the stakeholders' partnership, new mechanisms for efficient social dialogue, tripartite system, voluntary initiatives, agreements and strengthening governmental stewardship function. The proposed activities relying on social dialogue and stakeholders' involvement should be coordinated by the Governmental Intersectoral committee of OH&S. Institute of Occupational Health, WHO Collaborating Centre should undertake OH actions at national level. Strategically, OH development in the country has to be incorporated in the new model of OH services. The implementation of National Strategy requires development of international cooperation, collaboration at regional and sub regional levels as well as WHO support to build the national capacity for quality improvement of health and safety at work.

RELOCATING STONE CRUSHING INDUSTRY: IMPACT ON ENVIRONMENT AND HEALTH – A SURVEY OF VILLAGE SITES

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[ID 1237]

To save the residents of the adverse health hazards of stone dust, acting on a Public Interest Litigation, Supreme Court of India ordered the closure of all the mechanical stone crushers operating in the Capital city f India, Delhi, in early nineties. Thus around 250 crushing units of village Lal Kuan were relocated to village Pali, around 25 km from Delhi.

The after effects of this reshuffle could be seen both at the vacated as well as at the relocated site. A survey of both the villages (Lal Kuan and Pali) was done to assess the impact on environment, occupation, and villagers as well as on the workers of the crushing units.

The workers at the old site (Lal Kuan) never got rehabilitated, nor provided with any alternative occupations. Hundreds of them die every year from silicosis, silicotuberculosis and related respiratory diseases. The abandoned mines sites have not been rehabilitated with plantation as per the laid down procedures till now.

Establishment of new livelihood opportunities for the villagers of Pali made them sell their farmlands, livestock and other means of traditional earning resources. Majority started operating trucks/dumper bought on loan to transport the raw and finished materials of the crushing industry.

Approximately 20,000 migrated workers had established slums in the vicinity of crushing zone where they are living without any electricity, potable water, sanitation facilities and other very basic amenities of life. They and their families are constantly being exposed to silica and majority has symptoms of respiratory diseases.

Relocation of industry without thorough assessment of the effects and shortsightedness of the Judiciary has failed to protect the environment, occupation and health of the workers in particular and general public at large.

SAFETY, HEALTH AND ENVIRONMENT (SHE) PROMOTION IN THE FACULTY OF MEDICINE, KHON KAEN UNIVERSITY, THAILAND

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[ID 1421]

Introduction: The Project SHE is in accordance with the Faculty of Medicine's mission to maintain healthy personnel and students and to provide a safe working environment and quality management. There have been no regulations of SHE in any universities in THAILAND. Therefore, Faculty of Medicine together with the university hospital was the first medical school in Thailand where the SHE promotion was established.

Objective: To establish safety, health and environment committee in the medical school and university hospital.

Methodology: The committee was set up initially in a very difficult stage because only a few people understood about how importance of SHE promotion provided in the university setting. However, we had made the efforts to establish the committee in order to endorse the policy and to monitor the SHE activities. The committees included eight subcommittees as follows.

1. Physical Strengthening and Rehabilitation Board
2. Occupational Health and Safety at Workplace Board and secretary.
3. Hazardous and Toxic Substances Control Board

4. Chemical Therapy Control Board
5. Radioactive Waste Control Board
6. Infectious Disease Hospital Control Board
7. Administrative Board for Environmental Development and Fire and Accident Prevention
8. Administrative Board for fire and accident prevention at the Faculty of Medicine

The processes of setting up SHE have currently found to be recognized by both faculty administrations and members. Moreover, this faculty has been the benchmarks for SHE policies of other medical school and other university hospitals in THAILAND. Learning organization and knowledge management is the most important factor for this success.

INFORMATION SECURITY FOR OCCUPATIONAL HEALTH AND SAFETY PROFESSIONALS

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[ID 1422]

The use of computers and computer networks has penetrated virtually all regions of modern-day life. The health field is no exception either, where the development of sophisticated databases tracking the various data of workers provided a premium example of the benefits of modern technology. The reliability and quick access to the necessary information makes the job of health and safety professionals much easier, and in an area, where efficiency directly translates to the quality of services and the health of individual worker and worker group, the impact of high technology is irrefutable. The application of information technology in the occupational health and safety field includes access to networked information systems (such as employee health record databases, medical research databases, worldwide surveillance of infectious diseases), deployment of electronic documents (such as equipment manuals, protocols and internal memos), and the development of web-based learning tools (such as interactive multimedia health and safety education).

However, these great advancements also open the door to certain great risks. Concerns of information security are no longer limited to national intelligence agencies and gigantic corporations. Occupational health and safety professionals bear a great responsibility in adequately protecting the confidentiality and integrity of sensitive information on workers. This presentation will provide an introduction to information security for the occupational health and safety workforce, and discuss the currently existing major vulnerabilities presented by everyday messaging and other Internet-based systems, as well as the available countermeasures. The clear understanding of the nature of present threats will empower health professionals at the worksites to successfully fight against the dangers future technology will bring about.

QUALITY OF LIFE AMONG LAOTIAN MIGRANT WORKERS WITHIN THE THAI-LAO BORDER AREA

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[ID 229]

This qualitative research constitutes a preliminary phase of Action Research that aimed to explore the quality of life of Laotian migrant workers within the Thai-Lao border area. Seventy Laotian migrant workers employed in the Nong Khai and Mukdaharn provinces of Northeastern Thailand voluntarily participated in this study. Data were collected using in-depth interviews, participant observation, field notes, and meetings; and were analyzed through qualitative content analysis. The study's results revealed that some migrant workers were pleased that they had jobs and could earn money for their families. However, despite this fact, a number of workers were distraught with worry for their families in Laos and experienced loneliness due to their separation from their families. Most workers were satisfied with their jobs, although a few remained worried about illness resulting from their work. Concerning self-care, most migrant workers refrained from exercise and nutritious diets. Most male workers consumed alcohol and smoked. No female workers had ever received a breast examination and Pap smear. A number of migrants worked in hazardous environments without practicing proper work safety techniques. They also worked with poor posture and some were at risk for contracting sexual transmitted diseases. Several individuals lived in unhygienic and congested areas devoid of basic necessaries like sanitation and drainage. Some of them were verbally abused and insulted by their employers and communities. Most lacked opportunities to receive information about their health and rights to work in Thailand. A few of migrant workers were not registered as nationals of Thailand or Laos. Some of them did not have work permits and were employed and paid illegally. A number of workers were able to access health care services provided by health welfare; however some of their children were unable to receive the same benefits because the welfare covered only the migrant workers.

HEALTH CARE WORKERS

NEEDLESTICK INJURIES AMONG HEALTH CARE WORKERS - EFFECTIVENESS AND ECONOMIC IMPLICATIONS OF SAFETY-ENGINEERED MEDICAL DEVICES. A QUALITY-BASED CRITICAL REVIEW OF THE LITERATURE.

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[ID 1098]

Injuries from needle sticks and sharp instruments (NSI) can pose a serious risk for health care workers because of the potential for infection by blood-borne pathogens like hepatitis B and C virus, and HIV. Growing awareness of the HIV epidemic starting in the 1980s resulted in the development of NSI prevention strategies, which since the 1990s have focused on safety-engineered devices. The objective of this study was to critically review and summarize the published literature evaluating the effectiveness of safer devices and their cost effectiveness. A comprehensive search of the literature on NSI in Medline and a multi-stage selection process identified 61 publications on intervention as appropriate for inclusion in the Quality Based Critical Review (QBCR). Interventions were evaluated and rated according to quality indicators which addressed such characteristics as clarity of writing, intervention design characteristics, and statistical rigor. In spite of large differences in methodological quality, the majority of intervention evaluations showed that engineering controls, especially the introduction of safety-engineered devices, were effective in reducing the number of reported NSI. The relative improvements in NSI rates varied considerably by type of intervention, though differences in study units (denominators) precluded direct comparisons within and across intervention types. Based on a small number of cost-benefit analyses, it appears that it is difficult for a hospital to reach the break-even point in most intervention scenarios. However, the studies that included economic data were methodologically inconsistent and in most, both the costs of NSI and the costs associated with the introduction of safety-engineered devices were underestimated due to ignoring indirect costs. Therefore no firm conclusions or clear cost estimates can be derived. Furthermore, societal as well as intangible costs and benefits should be considered in an overall cost-benefit analysis.

NEEDLESTICK INJURIES AMONG MEDICAL STUDENTS IN GERMANY

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[ID 1382]

Sharp injuries are the dominant risk factor for transmission of blood borne infections among health care workers. The aim of this study was to determine the prevalence of needlestick injuries in medical students and to detect high risk periods during medical training.
Immunization status against hepatitis B, number of needlestick injuries, situations in which they occurred and knowledge about emergency measures were assessed via questionnaire. 780 fourth and fifth year medical students (response 74%) of four German universities participated in the study.
The lifetime prevalence of needlestick injuries was 35%. They mainly occurred during clinical electives (60%) and 28% were related to health care jobs. Situations with a high risk of needlestick injuries were taking blood from patients (31%) and assisting in the operating room (27%). Nine percent of all medical students were not immunized against hepatitis B. HBs-antigen-tests were only performed in 68% of vaccinated students.
In conclusion, needlestick injuries occur frequently among medical students in Germany. This important risk of preventable infections should be addressed by occupational health professionals with preventive measures.

WORKING CONDITIONS AND WORK FAMILY CONFLICT IN GERMAN HOSPITAL DOCTORS

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[ID 1393]

Actually, working conditions in German hospitals are subject to major changes due to the adoption of a new hospital financing system (based on diagnosis-related groups, DRG). In addition, an increasing number of hospitals is closed down or is no longer operated in the public sector but by private companies. Against this background of changing working conditions, psychosocial factors at work as well as work organisation were assessed in German hospital doctors.
Together, 960 physicians were asked to participate in the survey. A standardised questionnaire was used, built on the German version of the Copenhagen Psychosocial Questionnaire (COPSOQ) as main instrument. In this questionnaire, a “work family conflict scale” (WFC) was included and adopted to serve as a “work privacy conflict scale” thus addressing subjects without children or partner, too. By means of bi- and multivariate analyses, predictors for a high score in the WFC scale were described. In addition, all data were compared to the information gathered in the German COPSOQ validation study.
A total of 296 questionnaires were returned (31%). Significant correlations between single COPSOQ scales and the results of the WFC scale were described for “quantitative demands”, “role-conflict”, “influence at work”, “sense of community”, “possibilities for development”, “social relations”, and “quality of leadership”. In the multivariate analysis, the two scales “quantitative demands” and “sense of community” resulted as predictors for work privacy / familiy conflict. In addition, single items describing the work organisation resulted as predictors (e.g. conditions of changes of the duty roster).
As several demands seem to be inherent to the doctors´ work and can´t be changed at short notice, more emphasis should be put on improving basic conditions of the hospital work (e.g. duty roster, holiday plan, working time).

QUANTIFICATION OF PSYCHOSOCIAL AND ORGANISATIONAL WORK FACTORS (POWF): SPECIAL INSTRUMENTS FOR HEALTH CARE WORKERS EPIDEMIOLOGY.

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[ID 1522]

Objective: To develop instruments to make quantitative estimates of POWF among nurses
Methods: The characterization of POWF affecting nurses, was first conducted with psychologists, ergonomists, and occupational physicians. Then, two operators made a systematic review of the international literature addressing relationships between POWF and issues related to nurses’health, with a special concern on the validation data of the instruments assessing POWF (93 references included). One of the questionnaires was selected, for its strong external validity, and complementary items, defined by our multidisciplinary staff, were added. The construct validity and the reliability of this expanded questionnaire were tested on a population of 410 nurses. External measurements of POWF are also developed.
Results: The structure of the “expanded NWI-R” questionnaire (36 items) is validated by a factorial analysis, conducted separately on two half samples (split-half method). This analysis points out 8 dimensions, with Cronbach alpha from 0.61 to 0.87, explaining 53% of the total variance: “nurses-physicians relationsphips”, “nurse manager leadership style”, “team work”, “Workload”, “frequency of work interruptions”, “organisational dysfunctions indicators”, “support from administration”, “sharing same values”. The one month reproducibility is satisfactory. Two instruments were also designed to make external measurements of POWF: on-site observation with a view to drawing up a grid to quantify organisational dysfunctions, and external activity indicators supplied by the nurse manager. Both were tested in situ (feasibility study).
Discussion-perspectives: These 3 instruments will be used in a national multicentric cohort involving 7 large French hospitals (beginning January 2006). The impact of POWF on health, focusing on blood pressure and mental health, will be measured. The originality of the methodology used is to assess POWF not only on a subjective basis (autoquestionnaires) but also on external data, to prevent “negative affectivity” bias.

WORK-RELATED FACTORS INFLUENCING NURSES' LEAVING THEIR ORGANIZATION

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[ID 1787]

There are signs of shortage of nurses in some health care sectors and areas in Finland. Leaving the organization may be the first step of leaving the nursing profession altogether. The decision to leave is a result of several underlying causes. The aim of this study was to identify the work-related factors associated with leaving the organization. The study is a part of the European 'Nurses early exit study' (www.next-study.net). The material consists of a survey of 3 626 Finnish nurses (response rate 77 %).

Of the nurses, 130 left their organization of their own free will during the follow-up year. Those who left were younger, had higher professional training, were more often temporarily hired, had worked a shorter time for their employer, and more often reported experience of burnout than those who did not leave. Weak commitment to the institution (OR 2.6; 95 % C.I. 1.8-3.7), poor promotion prospects (OR 3.2; 95 % C.I. 2.1-4.8) and working in an organization where nurses participated in tasks not directly related to patient care (OR 2.0; 95 % C.I. 1.3-3.0) were factors independently associated with the leaving. In addition, weak commitment to the nursing profession, poor possibilities for development, dissatisfaction with the way one's abilities were put to use, experience of harassment/discrimination and experience of work-family conflict were also related to the leaving. The associations were not explained by age, occupational training, working contract or organizational tenure.

To ensure the availability and quality of health care services in the future, the field must be attractive to young people. Equally important is to actively support the work ability and motivation of those presently working in the field. The health care institutions are thus confronted with the challenge to take care of the working conditions of nurses.

INTERVENTIONS TO PROMOTE THE WEARING OF HEARING PROTECTION

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[ID 1032]

Background: noise induced hearing loss can only be prevented by lowering noise exposure levels. In case the source of the noise can not be eliminated workers have to rely on hearing protective equipment. Therefore, interventions to promote the wearing of hearing protection are important.

Objectives: to summarise the evidence on the effectiveness of interventions to enhance the wearing of hearing protection among workers exposed to noise.

Search strategy: electronic databases, such as MEDLINE, EMBASE, and Cochrane Library were searched with synonyms for hearing protection devices. References of the identified relevant studies were scrutinized for additional citations and specialists in the area and authors of included trials were contacted for unpublished data.

Selection criteria: studies were included if they had a randomised design, if they were among noise exposed workers or pupils, if there was some kind of intervention to promote the wearing of hearing protection, if the outcome measured was an equivalent of the amount of use of hearing protection.

Main results: two studies were found. Lusk 2003; Lusk 2004 examined the effect of two different interventions following each other in time in the same group of workers. A personalised intervention lasting 30 minutes was not more effective than a video providing general information among workers of which around 80% already used hearing protection. Sending a reminder at the home address after this intervention after 30, 90 or 30 and 90 days did not change this percentage either. Knoblock 1998 evaluated the effect of a four year school based hearing loss prevention programme among pupils working at their parents farms (N=753) in a cluster randomised controlled trial. The intervention group was twice as more likely to wear some kind of hearing protection than the control group that got a minimal intervention only, without allowing for the cluster effect. All results are based on self reported use of hearing protection.

Reviewers' conclusions: there is limited evidence that personalised interventions are equaly effective to general interventions in workers, of which 80% already uses hearing protection. Long lasting school based interventions may increase the use of hearing protection substantially .These results are based on single studies only. Better interventions to enhance the use of hearing protection need to be developed and evaluated in order to contribute to the prevention of noise induced hearing loss among workers.

EFFORT-REWARD IMBALANCE AND OVERCOMMITMENT AMONG SICK LISTED HEALTH CARE WORKERS WITH MENTAL HEALTH PROBLEMS

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[ID 1294]

Background: about one third of all employees on long-term sick leave in Sweden have diagnoses indicating stress related mental health problems.

Aim: the aim was to study if people on sick leave due to mental health problems perceive their work situation differently from employees on sick leave due to other disorders, and from employees not on sick leave, respectively.

Method: questionnaires were mailed to all employees (n= 10 886) and all employees on long-term (>3 months) sick leave (n= 430) in a Swedish county council (response rates 79% and 74%, respectively). The questionnaire included Siegrist´s 23-question Effort Reward Imbalance model. Sick listed workers were classified into two groups: those reporting mental health problems (n=70) and those reporting other problems (n=85).

Results: in logistic regression models including age, profession, effort-reward imbalance and overcomittment, employees on sick leave with mental health problems had an increased risk of an Effort Reward Imbalance compared to employees on sick leave with other problems (OR = 2.0), and to employees not on sick leave (OR = 1.6). Also, overcomittment to work was strongly associated with sick leave due to mental health problems compared to employees on sick leave due to other problems (OR= 7.1), and compared to those at work (OR= 12.6).

Conclusion: when compared to employees on sick leave due to other problems, and those at work, employees on long-term sick leave due to mental health problems perceive a higher effort – reward imbalance at the workplace, irrespective of degree of commitment. In addition, they have a very high degree of commitment at work, which may in itself increase their vulnerability for stressful conditions. Implications for work organization and leadership behaviour will be discussed in relation to possibilities for return-to-work.

PARTICIPATORY TEAMS IN THE INTERVENTION STUDY "HEALTHY WORK-PLACES IN THE HOSPITAL SECTOR"

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[ID 1701]

Introduction

In order to provide practical tools for the improvement of working condition at Danish hospitals, a governmental research program was initiated in 2002. As part of this program, the present intervention study was initiated in the psychiatric and orthopaedic ward at a Copenhagen University hospital. Previous studies have shown that the concept of local participatory teams has been a successful workplace intervention.

Objective

1) Evaluation of the establishment and functions of local participatory teams (to plan, initiate and implement intervention activities) 2) to decrease the prevalence of musculoskeletal complaints among the hospital staff 3) to increase the hospital staff ´s ability to cope with violence

Methods: working environment problems were assessed in a validated questionnaire-based survey focusing on musculoskeletal- and psychosocial problems. Based on the survey, a controlled trial was conducted by assigning sub-units in the wards to either intervention or control groups. A follow-up questionnaire was applied after the intervention period.

Participatory teams were established in the 3 intervention sub-units.

The teams´ major assignment was to decide 1) the appropriate intervention activities 2) how to initiate and implement the activities.

The research- group supported the teams by clarifying the relevant activities and assisting with practical issues.

Results/Conclusion: low back prevalence decreased with 24% and sick-absence due to low-back pain decreased with 33 %. No significant changes were found in the psycho-social dimensions. However concerning ability to cope with workplace violence the intervention groups reported to be better prepared due to the training they had received as one of the intervention activities compared with the control groups.

To our knowledge this workplace intervention study using participatory teams as intervention method is the first to show significant positive health effects among hospital staff.

MUSCULOSKELETAL DISORDERS

PATTERN OF DENTAL WORK TASK HISTORY AND FINGER OSTEOARTHRITIS

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[ID 705]

Mechanical load has been proposed as a risk factor of hand osteoarthritis. Dentists produce high manual forces at work. We studied whether the pattern of dental work tasks was associated with finger osteoarthritis. Radiographs of both hands of 291 middle-aged female dentists were examined for the presence of osteoarthritis. Each finger joint was graded (0=no OA, …, 4=severe OA) separately, by using reference images.. Finger OA was defined to be present if there was a radiograph reading of grade 2 - 4 in any finger. OA in at least one joint of the thumb, index and middle fingers was compared to OA in at least one joint of the ring and little fingers. OA was defined to be symmetrical if the same joint was affected in both hands. Patterns of dental work tasks during work history were empirically defined using cluster analysis. Three patterns emerged reflecting high (33% of the dentists), moderate (22% of the dentists) and mild (45% of the dentists) task variation. Age, specialization, years in clinical work, various activities requiring hand use, family history of Heberden's nodes, body mass index, and smoking were accounted for in logistic regression analyses. The dentists with a history of low and moderate task variation had an increased risk of osteoarthritis in the thumb, index, and middle fingers in the right hand (OR 2.84, 95% CI 1.04-7.85 and OR 3.05, 95% CI 1.00-9.34, respectively) and in the left hand (OR 2.57, 95% CI 1.09-6.05 and OR 2.54, 95% CI 0.96-6.74, respectively) compared with dentists with high variation. Age, family history of Heberden's nodes, and high BMI were also associated with OA. The pattern of dental work task history seems to affect the localization of osteoarthritis in the fingers.

A MULTI-TIERED APPROACH TO DEVELOPING ERGONOMIC/ ADAPTIVE SOLUTIONS FOR SONOGRAPHERS

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[ID 1721]

Background: Musculoskeletal disorders (MSDs) are increasing around the world among health care workers who routinely perform sonograms. In the United States and United Kingdom, sonograms are performed by sonographer/technicians. In other parts of Europe, sonograms are performed by physicians, also known as sonologists. In the United States alone, over twenty billion dollars is spent each year on MSDs for sonographers in direct costs. It is estimated that 80% of sonographers perform their job with some amount of pain usually beginning within five years of entering the profession. Furthermore, research shows that one in five will eventually experience a career-ending injury. **Interventions:** Awkward postures assumed by sonographers as a result of scanning include rotating/bending the trunk and neck and elevating the scanning arm. They also elevate their keying arm due to the elevated height of keyboards and computer equipment, sometimes for long periods of time due to lengthy procedures. For this project, interventions that were implemented include better positioning of the patient, repositioning the sonographer for better posture while using the equipment, positioning the scanning arm on an external support, and alternating between right and left hand scanning. Some clinics have begun using specialty exam tables and chairs, which offer better access to patients and better work postures for sonographers. Specialty chairs are also used with success in our clinics. **Evaluation and Outcome:** In evaluating our injury data, it was determined that these interventions alone were not enough to prevent injuries. Consequently, a sonographers' ergonomics committee was formed with sonographers from various specialities to help identify additional solutions or interventions. To date, the committee has identified several engineering interventions as well as administrative interventions to reduce risk of injury. These interventions will be discussed as well as the outcome of use and how well they actually reduce risk.

INTEGRATED ASSESSMENT FOR MANUAL HANDLING ACTIVITIES AMONG NURSES: A NEW METHOD

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[ID 1445]

INTRODUCTION

The musculoskeletal disorders include conditions affecting muscles, nerves, tendons, joints: job tasks, such as patient handling, can lead to or exacerbate these conditions.

While attempts to quantify allowable levels of weight for lifting have been made, designations based on static loads using non-representative study populations cannot be generalized to the nursing workforce.

Manual handling is each activity requiring the use of force by a person to lift, lower, push, pull, carry, move, hold or restrain a person or object.

The EPM (Movement and Posture Ergonomy) Research Unit from Milano stated a method to evaluate risk from lifting among nurses, validated in Italy: it does not evaluate all the activities of manual handling.

The aim of this study was to provide a method to assess the global risk of manual handling among nurses.

METHODS

We enrolled in our study 18 units from four departments of L'Aquila Hospital (Italy) and we evaluated the activities of manual handling performed by nursing staff (actions on patients and objects). We faced the results with gold standard such as MAPO, NIOSH and Snook and Ciriello Methods, to identify four different risk levels. We integrated this conclusions with results of physical examinations among nurses to assess agreement between pathological conditions affecting for example back and spine and job task.

RESULTS AND CONCLUSIONS

We have a quantitative index which resume all the risk factors we considered, including factors from NIOSH, MAPO and Snook and Ciriello's index: we divided the operative units among three groups, according to different level of manual handling risk. This survey is continuing, to obtain a complete quantitative risk evaluation for manual handling among nurses, to individuate real needs in work environment and to address any improvement for sanitary monitoring.

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FUNCTIONAL, MORPHOLOGICAL, AND PSYCHOSOCIAL CORRELATES OF RECURRENT LOW BACK PAIN IN NURSES COMPARED TO FEMALE ADMINISTRATIVE PERSONAL

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[ID 1687]

Introduction: Work-related recurrent low back pain is a prevalent condition and its diagnosis strongly depends on the expression of pain and functional disturbance by the patients themselves. This paper evaluates if morphological findings, functional capacities, clinical signs, or subjective symptoms are significantly correlated with recurrent low back pain and if there are significant differences between occupational groups having predominantly sitting postures and those involving active movements and lifting.

Methods: 112 female subjects (> 45 years, nurses and administrative personal, with and without recurrent low back pain) were examined. A comprehensive evaluation included six areas of interest (workplace factors, clinical examination, functional tests, MRI findings, psychosocial fac-

tors, questionnaire results on pain and disability). Canonical discriminant analysis was applied to identify correlates of occupational group and/or recurrent low back pain.
Results: Questionnaire data on work exposure and several psychosocial factors clearly differed between nurses and administrative personal, but not between cases with low back pain and controls. The clinical evaluation revealed significant differences between low back cases and controls in nurses but not in administrative personal. MRI findings neither differed between cases and controls, nor between the two professional groups. Functional tests did not differ between low back cases and controls in nurses but clearly separated cases and controls in administrative personal.
Conclusion: Neither MRI, nor clinical examination nor functional tests significantly helped to separate between cases with recurrent low back pain and controls. On the other hand, in low back cases results from functional tests significantly differed between nurses and administrative personal, which indicates that occupational factors must be taken into account for the interpretation of symptoms and functional changes in recurrent low back pain.

UPPER EXTREMITY DISORDERS - EXPOSURE ASSESSMENT IN REPETITIVE TASKS

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[ID 778]

Introduction
In recent years the German statutory accident insurance has observed elevated sickness levels in industry sectors that are related to repetitive occupational tasks. The main types of disorders found are musculoskeletal disorders, and particularly those affecting the upper limb and the spine. The assessment of risk factors involved in repetitive activities (e.g. frequency of action, exertion, posture, lack of recovery) is complicated by the number of parameters that need consideration. In order to find preventive measures the German statutory accident insurance started a study on exposure assessment of musculoskeletal workload factors in repetitive occupational tasks.
Methods
The field study was conducted at several sewing and garment making jobs as well as in dental technician laboratories. Body postures and movements (including the upper limb) were recorded with the CUELA system, a person-centred measuring system consisting of sensors that are attached to the subject's clothes. In addition, electromyographic recordings (EMG) of upper arm muscles and heart rate measurements were made. The work situation was also documented on video and later synchronised to the measurement data.
For risk assessment frequency distributions of single risk factors were made and several evaluation schemes from the literature (e. g. Kilbom, OCRA, RULA) were applied to the data sets.
Results
The CUELA system is well suited for recording and documentation of workload factors in repetitive occupational tasks. With the help of the CUELA software multiple evaluations with different evaluation schemes are possible for each data set. In some cases the risk assessment results vary for the same workplace depending on the applied evaluation scheme.
Conclusions
Preventive measures can be evaluated with the described assessment method for repetitive work tasks. Existing evaluation schemes can be improved in order to obtain consistent risk assessment results.

CRITERIA FOR DETERMINING THE WORK-RELATEDNESS OF NON-SPECIFIC LOW-BACK PAIN

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[ID 816]

Introduction
The prevalence of non-specific low-back pain (LBP) in workers is high, especially in physically demanding jobs. In order to prevent LBP, it is important to know which work-related factors play a role in the onset of these complaints.
Purpose
The purpose of this project was:
1) to develop a decision model to estimate the level of work-relatedness for LBP in an individual worker, taking into account the personal exposure profile to established risk factors for LBP;
2) to include the opinions of national and international experts in order to raise support for broader implementation of the decision model; and
3) to develop an instrument with criteria for the application of the decision model in practice.

The decision model
The decision model is based on a systematic review of the literature, on a meta-analysis and on national and international workshop meetings. The model assumes an a priori probability for the occurrence of non-specific LBP in the absence of exposure to work-related risk factors. Exposure to the work-related risk factors leads to an increase in the probability that non-specific LBP will occur. The magnitude of the increase depends on the number of risk factors involved, and the intensity and duration of exposure during the working day. The a priori probability of non-specific LBP was calculated in the meta-analysis from epidemiological data on the prevalence of non-specific LBP in a population without any relevant occupational exposure. Since the a priori probability is known to be age-related, it was calculated for three age-groups (< 35 yr, 35-45 yr, > 45 yr.). In these groups the values found were 22%, 30%, and 34% respectively. Only the risk factors with a statistically significant pooled odds ratio in the meta-analysis ($p<0.05$) were included in the model. These were manual material handling (OR 1.51), frequent bending and twisting of the trunk (OR 1.68) and whole body vibration (OR 1.30). The pooled odds ratio of the psychosocial risk factor job dissatisfaction was also significant (OR 1.30). However, in the international workshop meeting it was decided not to include this factor in the model because most researchers consulted agreed that it is too difficult to separate the individual component of job dissatisfaction from the work-related component. The model is presented as a practical instrument consisting of a score table from which the probability of work-relatedness can be read off for a given exposure.
Application
The practical instrument was tested in practice by 9 occupational physicians and 1 insurance physician using in total 38 cases. The evaluation did not result in any alterations to the practical instrument. All physicians expressed that they would continue to use the instrument. The instrument enables them to assess in a more objective manner the work-relatedness of LBP. Besides, the calculated probability of work-relatedness provides information that can be used to support both the professional assessment of the work situation in terms of risk for LBP and proposals for improvement in the interests of workers at risk. Finally, it might improve the quality of notification of LBP as an occupational disorder.

POPULATION ATTRIBUTABLE RISK FOR UPPER EXTREMITY MUSCULOSKELETAL DISORDERS: CONTRIBUTIONS OF WORK EXPOSURES AND PERSONAL RISK FACTORS

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[ID 1087]

While multiple risk factors have been demonstrated for upper extremity musculoskeletal disorders (UEMSD), few studies in working populations have simultaneously measured the effects work-related physical risk factors such as exposure to forceful, repetitive movements and personal risk factors such as age, gender, body mass index, and co-morbid diseases. To estimate the population attributable risks (PAR) of UEMSD due to workplace physical exposures and personal risk factors, we examined a representative cross section of 2658 French workers, who underwent a standardized physical examination and a questionnaire on symptoms, medical history, and physical exposures. Case definitions were based on the SALTSA international consensus criteria. Using Cox regression models

with a constant time of follow-up and robust variance, we calculated prevalence ratios for three MSD outcomes: all upper limb disorders, rotator cuff syndrome, and carpal tunnel syndrome. All analyses were conducted separately for men and women. Our final model included age, obesity, diabetes, and work-related exposures defined according to the SALTSA criteria. 11% of men and 15% of women met our clinical criteria as cases of upper limb disorders. The most common diagnoses were rotator cuff syndrome (prevalence in men 6.8% and in women 8.9%) and carpal tunnel syndrome (men 2.3% and women 4.0%). For cases of UEMSD, we found that the PAR for workplace physical exposures was 31% of for men and 33% for women. The PARs for personal risk factors were 66% and 68%. Age was the primary contributor among personal factors; the effects of obesity and diabetes were modest. In this representative cross section of the general working population, we found that a substantial fraction of prevalent rotator cuff syndrome, CTS, and other UEMSD were associated with work exposures independent of personal risk factors. Preventive strategies for UEMSD should recognize the multifactorial nature of risk and focus on modifiable risk factors.

PREDICTIVE FACTORS FOR LOW BACK PAIN AND ASSOCIATED SICK LEAVE IN A COHORT OF YOUNG WORKERS

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In the working population low back pain is the most frequent disorder of the musculoskeletal system and a major reason for sick leave and permanent work inability.

The BelCoBack Study, Belgian Cohort Back Study, was designed as a three-year prospective study to identify risk factors for low back disorders in occupational settings. To minimise dropout, we included only workers with a tenured position or equivalent. Furthermore, to reduce the influence of age and of prior episodes of LBP, participants had to be no older than 30 years at the time of intake and to have been free of episodes of LBP of seven or more consecutive days during the twelve months before intake in the study.

After one year of follow-up, 12.6% (95%CI: 10.1-15.0) of the workers had developed LBP lasting seven or more consecutive days. In agreement with literature, physical work factors were found predictive for low back complaints: about two-fold elevated risks were observed for awkward working postures and inability to change posture regularly. In addition to physical work factors, we also found an effect of psychological characteristics: workers that reported high fear for pain, physical activity or injury showed an almost two-fold increased risk of LBP. In the last two decades, pain-related fear has emerged as an important predictor of chronic LBP and disability. Our study, however, is the first that showed a relationship between misconceptions about LBP in pain-free workers and the development of LBP.

Back-related sick leave was reported by 5.9% (95%CI: 4.1-7.6) of the workers. These workers accounted for a substantial amount of all the sick leave days. Contrary to our expectations, back-related sick leave was not predicted by physical workload or by pain-related fear; the strongest risk factor for back-related sick leave turned out to be a lack of professional challenges.

UPPER LIMB WORK-RELATED DISORDERS: ANALYSIS OF AN HOSPITAL BASED CASE STUDY

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[ID 873]

Objective: The biomechanical overload of the upper-limb due to repetitive movements alone or in combination with other risk factors such as force, posture and hand transmitted vibration, is typically represented in different kind of manual work. This overriding risk for workers' health has attracted a growing interest in the past twenty years from academic and regulatory institutions. Biomechanical overload can cause an heterogeneous group of upper-limb musculoskeletal disorder, which is known as "Work-related Musculo-Skeletal Disorders (WMSDs). The goal of this work was to describe the cases of suspected WMSDs observed at Institute of Occupational Health, University of Brescia over the last two decades.

Methods: Using the computerized database of our Clinic, individual information were collected on age, sex, life style, source of referring request, work sector and specific job task, pathological and work history, clinical diagnosis. Information were collected and classified in a specific dataset.

Results: The case list includes about 780 subjects, 53% women and 47% men whose mean age is 45 and 47 years respectively, observed in the period from 1987 to 2004. Patients were referred by family physicians (66%), employers (29%), the Local Public Health Department (3%), and the National Work Compensation Institute (INAIL) (2%). Requests for evaluation included the identification of etiological diagnosis and work-relatedness (80%), and specific job fitness evaluation (20%). Work sectors most frequently affected were the textile (16%), construction (10%), cleaning (8%), metal mechanical (6%), health care (4%) assembly (3%), food preparation (3%). Illnesses were diagnosed as work-related in 61% of the cases. The results of this survey showed a significant overall evident increase of the annual average of WMSDs from 2 in 1987, to 64 in 2004. A significant increase was especially observed from 1999 to 2004.

Conclusion: The findings of this study indicate an increasing demand for clinical assessment of subjects affected by work related musculoskeletal disorders of the upper limb. Therefore, it is important that a standardized clinical diagnostic procedure is applied, together with an accurate evaluation of the biomechanical risk. Textile, construction industries and cleaning jobs seem mostly affected in this area and the preventive intervention should focus on these sectors.

DIAGNOSTIC PROCEDURES AND SURVEILLANCE SYSTEM

FOLLOW-UP STUDY OF HEMATOLOGICAL EFFECT IN ETHYLENE GLYCOL MONOETHYL ETHER ACETATE-EXPOSED SILK-SCREENING WORKERS

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[ID 1027]

Ethylene glycol ethers (including ethylene glycol ether esters) are a group of solvents widely used in coatings and in many other industries. The objective of this study is to evaluate the intervention program of wearing rubber gloves and to follow-up the haematological effect in the ethylene glycol monoethyl ether acetate (EGEEA, 2-EEAc) exposed workers of a silk-screening factory. The longitudinal study recruited 40 high exposure workers (exposed group) and 47 low exposure workers (comparison group) from the silk-screening factory. Three haematological parameters were measured during health examination from 1998 to 2003. Information of personal characteristics and working habits was obtained by structured questionnaire. There was no difference in personal characteristics and habits between exposed and comparison groups, except for gender and education levels. More female workers involved in the manual printing resulted in high exposure to 2-EEAc. Stratification by gender and adjusted for age, BMI, and education level was performed in the analysis. The haemoglobin and haematocrit in the female high 2-EEAc exposure workers were significantly lower than those of female comparison workers in 1998 cross-sectional survey. No difference was found for male workers. The haemoglobin, haematocrit, and RBC count in the study population had a significant dose-response relation with air 2-EEAc levels in 1998. There was no difference between the female high 2-EEAc exposure workers and female comparison workers for haemoglobin and haematocrit in 2000 and 2003. In the longitudinal study, an increasing trend on the haemoglobin, haematocrit, and RBC count was found for female high 2-EEAc exposure workers from 1998 to 2003, yet the trend is not significant for male workers. Adjusted for age, sex, BMI, and education level by GEE model, the increasing gradients for haemoglobin, haematocrit, and RBC count were 1.55 g/dl, 4.39 % and 0.55 x10 6/ul, respectively, which were significantly higher in the EEAc exposed workers across these 3 checkups than in the comparison workers. The intervention program was effective to avoid directly dermal exposure of 2-EEAc by wearing rubber gloves.

DOCUMENTATION FOR THE POSSIBLE ASSOCIATION BETWEEN COMPUTER WORK AND CARPAL TUNNEL SYNDROME

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[ID 1091]

Aim and methods. In Denmark occupational injuries and diseases are compensated through the Workers Compensation Act administered by the National Board of Industrial Injuries (NBII). In the legal sense, occupational diseases are diseases which are brought about by specific influence to which certain groups of people, through their work or working conditions are more exposed than persons not having such work. NBII compiles a list of such diseases which is revised regularly. To ensure proper documentation for causality NBII, as a new initiative, formulated a list of topics to be reviewed scientifically, among others the scientific evidence for an association between computer work and carpal tunnel syndrome. To meet the requirements The Danish Association of Occupational Medicine appointed a scientific committee consisting of trained researchers within epidemiology. The Committee called for applications from Danish and Nordic researchers to perform the reviews. A first draft document was reviewed by two independent international reviewers, discussed by the scientific committee together with the reviewers and the author and then revised. The final document was sent to NBII.
Results and conclusions. The review revealed 5 epidemiological studies with a focus on computer work and CTS. 3 studies were longitudinal, 1 was a case-referent study and one was cross sectional. 2 of the longitudinal studies indicated an exposure-response relationship but both studies had limitations in either diagnostic approach, exposure assessment or power. The third longitudinal study had too many unclear aspects to contribute to the evaluation. The case-referent study was well conducted but had too little power. In the cross sectional study no statistical testing was performed. Also epidemiological studies (longitudinal only) of repetitive industrial work and CTS were reviewed but results pointed in different directions. In conclusion, there was insufficient evidence that computer work (mouse and keyboard) causes CTS.

DIFFERENT PATTERNS FOR WORK RELATED MENTAL ILL HEALTH REPORTED BY PSYCHIATRISTS AND BY OCCUPATIONAL PHYSICIANS

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[ID 1675]

Aims:
To examine differences in mental ill-health reporting by occupational physicians and psychiatrists in two occupational health reporting schemes, and to determine whether there are systematic differences in diagnostic preferences between them.

Background:
Reports from occupational physicians participating in the Occupational Physicians Reporting Activity (OPRA) between 1996 and 2002 showed an increasing annual case numbers for mental ill-health, and in 2003 the number of mental ill-health cases reported exceeded musculoskeletal disorders which had previously been the commonest reported category.

Method:
Cases of mental ill-health were reported by 1230 occupational physicians in OPRA and psychiatrists in the Surveillance of Occupational Stress & Mental Illness (SOSMI) in 2002, and by 1079 reporters from the same specialties in 2003. Reporting patterns were analysed within major psychological diagnostic categories including 'stress' and 'anxiety/depression'. A subset of 100 case summaries have been collated from reporting physicians, blinded as to source and original diagnosis, randomised, and sent for 10 diagnostic categorisations per case, from a pool of 125 occupational physicians and 125 psychiatrists.

Results:
In 2002, proportions of case returns in the 'stress' diagnostic category were much greater for occupational physicians (39.6%) than psychiatrists (8.1%), while 'anxiety / depression' cases showed a higher proportion for psychiatrists (66.1%) than occupational physicians (54.2%), with similar results in 2003. The initial phase produced an excellent case summary return rate of 75.8%. Preliminary analysis of the categorisation comparisons (67.6% return rate to date) showed good agreement with the original diagnosis for 'anxiety / depression', poorer agreement for 'stress', and differences between clinical specialists when categorising disease.

Conclusion:
Patterns of reporting that vary between clinical specialties may be caused by differences in the 'case mixes' seen, by reporting artifacts, or because occupational physicians and psychiatrists have different diagnostic preferences based on their specialist training and experience.

THE ROLE OF LIVER FUNCTION TESTS IN THE MEDICAL SURVEILLANCE OF WORKERS EXPOSED TO VINYL CHLORIDE MONOMER

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[ID 1784]

Background: High Vinyl chloride (VC) occupational exposures have been documented to induce an increased incidence of liver angiosarcoma and periportal fibrosis. The health surveillance of VCM/PVC workers has been traditionally based on a periodical medical examination including a battery of blood liver-function tests.

Aim: To assess the role of liver function tests (LFTs) in health surveillance of vinyl chloride workers and their relation with current/past occupational exposure to vinyl chloride monomer (VCM).

Materials and methods
A group of 757 workers employed in the production of VCM/polyvinylchloride (PVC) underwent a medical examination including the execution

of liver function tests and liver ultrasonography. Cumulative and maximum VCM exposures were calculated. History of viral hepatitis and alcohol intake were collected. The association between abnormal LFTs and a group of possible determinants (VCM cumulative and maximum exposure, BMI, age, history of viral hepatitis, alcohol and triglyceride levels) was assessed by regression analysis. The synergistic effect between VCM and a history of hepatitis was also analysed, together with the possible association between VCM exposure and AST/ALT ratio > 1. Abnormal LFTs were also assessed in relation to the diagnosis provided by liver ultrasonography.
Results: The group showed the following abnormal serum parameters: total cholesterol (27.3%), triglycerides (12.2%), total bilirubin (9.1%), GGT (9.0%), ALT (8.2%), AST/ALT ratio > 1 (28.1%). Abnormal LFTs were not associated with current or past VCM exposure. High ALT resulted positively associated with BMI; AST with alcohol intake; GGT with alcohol intake and triglycerides. No synergistic effect between exposure to VCM and a history of hepatitis was observed. AST/ALT ratio> 1 did not result associated with VCM exposure. The prevalence of abnormal LFTs was higher in subjects diagnosed with liver steatosis (ALT) or periportal fibrosis (GGT), but not in case of pure hepatomegaly, as documented by ultrasonography.
Conclusions: VCM-induced liver damage is not detected by liver function assessment. Instead, LFTs reveal alterations due to non-occupational factors, such as dietary and/or metabolic disfunctions. LFTs are however necessary to detect liver damage that would make appropriate to recommend a precautionary avoidance of occupational exposure to VCM. They are also useful for medical counselling and health promotion purposes.

ANALISIS OF THE SERUM MYOCARDIAL ENZYMES IN ACUTE POISONING PATIENTS

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[ID 1864]

Acute poisoning caused by various factors could all result in different degree of myocardial damage. We analyzed the serum myocardial enzymes of 143 patients, which include 35 acute carbon monoxide poisoning, 29 acute organophosphorous pesticide poisoning, 30 acute fluoroacetamide poisoning, 43 acute diazepam poisoning, 6 acute poisonous fungus poisoning, to explore different poison do different degree of harm to the cardiac muscle. Myocardial enzymes were consist of AST、LDH、CK、CK-MB and α-HBDH. The results showed that the acute carbon monoxide poisoning patients' serum AST、LDH、CK、CK-MB and α-HBDH activities were all higher than matched controls' significantly($P<0.01$). Among them, especially the CK and CK-MB changed markedly, this showed that the more aggravating the poison degree is, the more higher the enzyme activities will be, meanwhile the damage to the cardiac muscle will be more serous; Acute organophosphorous pesticide poisoning patients' serum CK、CK-MB and α-HBDH activities were all higher than matched controls' remarkably ($P<0.01$), α-HBDH had the higher positive rate, and sensitive to organophosphorous pesticide poisoning, it is helpful to inspect the course of poisoning diseases; Fluoroacetamide poisoning could affect the heart, resulting in myocardial enzymes go up, it had very remarkable difference compared to matched controls'; The acute diazepam poisoning patients' serum AST、LDH、CK、CK-MB and α-HBDH activities were all higher than matched controls' remarkably ($P<0.01$), especially the CK、CK-MB and AST, going up obviously and damage the cardiac muscle more serous; Among the 6 fungus poisoning patients, their 5 kinds of myocardial enzymes were all higher than matched controls' 3 to 15 times remarkably, positive rate was 100%. Among the 5 kinds of poisoning patients, their serum cardiac muscle enzymes were all going up to different degree, all damage the cardiac muscle more or less after poisoned. It is suggest that at course of emergency treatment, the change of serum myocardial enzymes should be inspected in order to get favorable treatment result and prognosis.

NEUROTOXICOLOGY AND PSYCHOPHYSIOLOGY (I)

IMPACT OF MILITARY OCCUPATION ON THE INCIDENCE AND RECURRENCE OF SEIZURES IN YOUNG ARMY RECRUITS

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[ID 201]

Objectives: To determine the relative risk of developing or having recurrent seizures, among young adults in different medical categories of disease and in 3 kinds of occupations in the army, throughout 30 months of military service.

Design: Historical prospective study.

Setting: The Medical and occupational history of army recruits was noted during the 30-month period after their induction into the IDF.

Subjects: More than 300,000 young adults serving 3 years of obligatory service in the Israel Defense Forces (IDF) over a period of 10 years.

Intervention: In case of changes in the medical status subjects were evaluated again by a trained neurologist. The duty status of the soldiers in combat units (CU), maintenance units (MU) and clerical tasks (CT) was related to their morbidity.

Main outcome measures: The medical status and the occupation at the end of the follow up period.

Results: Higher risk for new onset seizures was found only among CU compare to CT (RR=1.35). The more severe the category of epilepsy was found at recruitment, the greater was the RR for worsening of seizures status. The rate of recurrent seizures in epileptic patients was much the same in different occupations.

Conclusion: The low rate of reseizures in patients 6 years free of symptoms with normal EEG enable us to recommend occupying them in almost all kinds of works, except vocational driving.

THE NEUROBEHAVIORAL EFFECTS OF OCCUPATIONAL EXPOSURE TO ORGANIC SOLVENTS AMONG PRINTING WORKERS

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[ID 468]

Objectives

This study attempted to reveal the neurobehavioral effects of exposure to low level mixed organic solvents using the World Health Organization Neurobehavioral Core Test Battery (WHO-NCTB).

Methods

Workers in the printing workshops were classified as the exposed group and the reference group was the workers working in the binding division of the same factories. All subjects answered a questionnaire and underwent the WHO-NCTB.

Exposure assessment was conducted using U.S. National Institute for Occupational Safety and Health (NIOSH) standard sampling and analysis methods. Toluene, n-hexane, and total hydrocarbon were analyzed in 89 area samples collected by active samplers and 71 personal samples collected by passive monitor. About half of the subjects provided urine samples for testing hippuric acid and 2,5-hexanedione.

The NCTB scores were compared between the exposed group and the reference group by analysis of covariance after adjustment for the confounding factors. The dose response relationship between the neurobehavioral test scores and the exposure intensity was analyzed by multiple regression after adjusting for confounding factors.

Results

216 male subjects were included in the study. The concentrations of toluene and n-hexane in the printing workshop were higher than those in the binding division, but did not exceed the Occupational Exposure Limits (OELs) used in Hong Kong.

The mean standard scores of the Digit Symbol and the Pursuit Aiming (correct dots) tests in the exposed group were 47.5 and 47.1, respectively, while the corresponding figures in the reference group were 52.6 and 52.4. Differences between the two groups were statistically significant. Multiple regression analysis showed negative associations between psychomotor test scores and levels of solvents exposure.

Conclusion

Printing workers exposed to organic solvents at levels below the prevailing OELs were found to have neurobehavioral deficits, mainly psychomotor dysfunction. Dose-response relationships were present between these neurobehavioral effects and the exposure parameters.

A SURVEY OF NEURO-BEHAVIORAL DISORDERS FROM SOLVENT EXPOSURE AMONG MACHINISTS IN AN AEROPLANE REPAIRING COMPANY

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[ID 469]

Aims: Machinists, who take care and repair of aeroplane, are one of the high risk groups for solvent exposure. The aims of the study were to identify the prevalence of neuro-behavioral disorders among machinists who were exposed to solvents in their work and to study the relationship of the illness and risk factors, e.g. type of chemicals, duration of exposure, etc..

Methods: The cross-sectional survey was conducted among 847 machinists during their annual check up. The tools included general and health information questionnaire, Swedish questionnaire 16 (Q16), Thai Mental State Examination (TMSE), physical examination, and urine collection of biomarker testing for solvent exposure.

Results: 117 workers (13.8%) were expected of having neuro-behavioral abnormality. Their age ranged between 27-57 years old (Mean=41.9), Most of them (16.2%) worked in aeroplane body metal repairing. The high frequent of symptoms reported by workers included blurred vision (75%), and feeling exhaustion (74%). Seventy-eight persons had positive results in Swedish Q16 test. In addition, 41 workers had positive results in TMSE. The most common domain which workers got abnormal results included recall (59.8%), language (47.9%), and calculation (41%). Only 0.14% of workers had positive results from all tests including higher biomarker level than normal standard. Regarding the relationship between cases and risk factors such as age of workers, duration of exposure, and types of chemicals, there were no statistical significance.

Conclusions: Machinists in aeroplane repairing industries were high risk groups for having neuro-behavioral disorder from solvent exposure. Although other high risk factors could not be identified in the study, preventive and control measures, especially high level of solvent exposure in the working environment, should be implemented.

ADVERSE EFFECTS OF EXPOSURE TO 1-BROMOPROPANE ON CENTRAL NERVOUS SYSTEM AND PERIPHERAL NERVE IN HUMAN

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[ID 491]

Introduction: 1-Bromopropane (1-BP) is introduced as an alternative for ozone-depleting solvents. Recently new severe intoxication cases were reported in Utah, following cases in New Jersey and North Carolina, US. The present study investigated the workers in the factory producing 1-BP to clarify the effect of 1-BP exposure on the workers.

Subjects and Methods: Forty workers engaged in 1-BP production and forty age- and sex- matched non-exposed workers were examined with electrophysiological examination of lower limbs and WHO neurobehavior core test battery as well as blood laboratory test. The individual exposure levels were also estimated with passive sampler tubes. Obtained data were analyzed with paired t-test between the exposure group and the control. Signed informed consent was obtained from each worker for all examinations according to the declaration of Helsinki.

Results: The time weighted average of exposure levels in workers were 15.3 ± 16.2 (Mean±SD), 73.7 (Max) and 0.65 (Min) ppm. Exposure group showed elongation in distal latency (DL) and reduction in motor nerve conduction velocity (MCV) in lower limb compared to the control. The exposure group showed lower score in Tension and Fatigue in profile of mood status and Benton test than the control. In the laboratory tests, exposure group showed increase in total protein, GOT, LDH, TSH, FSH and

ferritin and decrease in creatinine, Fe, VB1 and estradiol.
Conclusion: Increase in distal latency and total protein and decrease in MCV were also found in our previous animal study. Benton test showed inferior cognitive function, which accords with the recent severe cases in Salt Lake City. The present study not only confirmed that exposure to 1-BP elongated DL in humans, which was shown by our previous investigation, but also newly showed decrease in MCV as well as increase in total protein in human.

NEUROTOXIC SYMPTOMS AMONG DENTAL ASSISTANTS

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[ID 880]

Introduction: One of the main work tasks for dental assistants is to help the dentist in preparation of filling material of teeth. Amalgam was the filling material mostly used in Norway before 1980. It has now declined to about 5% of all fillings in 2005. Amalgam is an alloy of silver, copper, tin and mercury. Metallic mercury is known to be neurotoxic, shown in studies of workers engaged in production using mercury, as well as in mercury and gold mining. Few studies have been published of dental assistants. The aim of this study was to compare the occurrence of neurotoxic symptoms among dental assistants likely to be exposed to mercury in dental fillings, compared to similar health personell with no mercury exposure. Material and methods: All dental assistants borne before 1970 and after 1935 registered in a Dental assistant association in a county of Norway were invited to participate, as well as a similar number of randomly selected assistant nurses from another association in the same age group. The participants answered a self-administered, mailed questionnaire, with questions about demographic variables, life-style, musculoskeletal symptoms and neurotoxic symptoms (Euroquest). The response rate was 68% for dental assistants and 87% for the assistant nurses. Results: The dental assistants reported significant higher occurrence of neurotoxic symptoms, such as memory disturbance, tremor, anxiety and depression. Adjusting for age, education level and lifestyle factors by logistic regression did not materially change the results. Conclusion: The relation between the higher occurrence of neurotoxic symptoms among the dental assistants and their exposure to mercury ought to be studied further.

OCCUPATIONAL EXPOSURE TO WELDING FUME AND ALTERATION OF SERUM METALS AND PROLACTIN

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[ID 1215]

We evaluate the alteration of serum metals in shipyard welders exposed to welding fume and the relationship with airborne exposure level and serum prolactin (PRL). Cross-sectional study was conducted on 140 welders, aged 46.1±5.0 years old, who have been working for 17.4 years (range: 2 to 35 years) in twelve shipyards. One hundred office workers, who were not exposed to neurotoxic chemicals and of comparable age, composed the control group. We analyzed serum concentrations of manganese (BMn), iron (BIFe), calcium (BCA), lead (BPb), cooper (BCu), aluminum (BAl), zinc (BZn), and prolactin (PRL). We measured present airborne metals including Mn (AMn), iron (AFe), lead (APb), cooper (ACu), aluminum (AAl), zinc (AZn), and total welding fume. Cumulative exposed index (CEI) of airborne Mn was calculated. CEI and geometric mean of recent Mn of welders were 1.4 ± 1.2 mg/m^3•year (range: 0.1-4.4), 0.4 ± 3.84 mg/m^3 (range: 0 - 3.8) respectively.
BMn, BPb, BCu, BAL were significantly higher in welders (1.57 µg/dl, 3.31 µg/dl, 92.0 µg/dl, and 0.68 µg/dl respectively) than controls (1.14 µg/dl, 2.91 µg/dl, 89.5 µg/dl, and 0.57 µg/dl respectively). BCA was lower in welders (9.22 µg/dl) compare to control (9.33 µg/dl). AFe, ACu, and AAl inversely correlated with BCA. The relationship between PRL and BFe was significant negatively. BMn and BZn increased significantly along with mean concentration of previous Mn. But with CEI of Mn, only BZn showed positive relationship. These findings suggest that occupational exposure to welding fumes among welders disturbs the homeostasis of serum metals and prolactin.

RELATIONSHIP BETWEEN PHYSICOCHEMICAL PARAMETERS AND THE IN VITRO TOXICITY OF CARBON NANOTUBES, METAL OXIDES AND QUANTUM DOT NANOPARTICLES IN HUMAN EPITHELIAL CELL ASSAY A549

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[ID 1346]

Some studies indicate that the particle induced inflammation and cytotoxicity of insoluble particles is controlled mainly by the specific particle surface area. However, the toxicity of particles also depends on other parameters, e.g., surface properties, solubility and metal toxicity. For the same compound, thermodynamic properties may result in different polymorphs (atomic structures) at various particle sizes. For example, the thermodynamic stable TiO_2 structure varies from rutile (tetragonal), to brookite (orthorhombic) to anatase (tetragonal) at increasing surface area. Because different polymorphs have different surface structures and surface reactivities, the biological reactivity of compounds such as TiO_2 may vary, not only as function of surface area, but also as function differences in the atomic structure of the material analyzed. However, if the main parameters that control the particle toxicity, can be identified, this may be a very efficient way to perform preliminary risk evaluation of new particles. Especially in evaluating the new particles produced in the growing nanoparticle production. In this study, we investigate whether the combination of surface area and surface reactivity measures correlate with the variation in toxicity (in vitro) of several nanoparticles, including two TiO_2 and ZrO_2 nanoparticle series with different polymorphs and specific BET surface areas ranging from 1.2 to 236 m^3/g and mean XRD crystallite sizes between 5.3 and 77.5 nm. The tests of inflammatory potential, cytotoxicity and DNA-damage were conducted in human epithelial cell assay A549 at 24-h exposure to 0, 0.01, 0.02. 0.04, 0.08, 0.16 and 0.32 mg material/ml at 37°C. So far the results have shown that nanoparticulate TiO_2 was more cytotoxic than nanoparticulate ZrO_2 and that the toxic potential of the same compounds/polymorphs form individual trend-lines with increasing toxicity at decreasing crystal size or increasing BET surface area. Some of the nanoparticles may have inhibitory effects on interleukine secretion. Further studies includes test of DNA-damage and relevant measures for surface reactivity.

ESTABLISHING A LOCAL REFERENCE STANDARD FOR NEUROBEHAVIOURAL TEST PERFORMANCE

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Introduction: neurobehavioural tests are used in the evaluation of workers with work-related neurobehavioural dysfunction and identification of workers with exposure to neurotoxic hazards, such as solvents like toluene and carbon disulphide, and heavy metals.
Objective: to establish a local reference standard for some neurobehavioral tests.
Materials and Methods: a battery of five tests was identified to assess the various aspects of neurobehavioural performance. The battery includes tests of simple reaction time, finger tapping, digit span memory, symbol digit matching and the Santa Ana manual dexterity test, for assessing concentration and attention, motor skills and strength, short-term memory, visuomotor coordination and manual dexterity. 107 male Chinese workers, unexposed to neurotoxic hazards, from two shipyards were given questionnaires and administered the battery of tests. Workers with a history of alcoholism, epilepsy, psychiatric disorder, previous neurological diseases, head injury, or diabetes mellitus were excluded.
Results: the symbol digit matching test was significantly affected by the worker's age and educational level, with the younger and better educated workers performing better than the older and less educated ones. For the Santa Ana manual dexterity test for both hands, age was a significant factor, with younger workers performing better than older ones. The tests of simple reaction time, finger tapping, digit span, and the Santa Ana manual dexterity for dominant and non-dominant hands were not significantly affected by age and educational levels of the workers.
Conclusion: the results would serve as reference values for the evaluation of local Chinese male workers from different age and educational groups with work-related neurobehavioural dysfunction and may be used as a package or selectively.

WORK DISABILITY AND REHABILITATION

EVALUATION OF THE PROGRAM THEORY OF A COLLABORATIVE REHABILITATION PROGRAM

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Introduction: In most publications on low back pain rehabilitation program, the program's underlying theory is not described by the authors. Consequently, the exact mechanisms of action by which these programs intend to increase the probability of return to work remain unknown. This lack of knowledge jeopardises the implementation of effective programs by health professionals and firms managers.
Objective: The objective of this study was to test the program theory of a collaborative rehabilitation program previously developed (Durand et al, 2004).
Method: The program theory was tested using a multiple-case study design. Twenty workers who completed the rehabilitation program participated in the study. Valid and reliable indicators concerning the worker, the work environment and the interaction between the worker and his environment were chosen and assessed at the beginning and the end of the program. Also, semi-structured interviews were held with the workers and clinician. Data was analysed using a mixed approach (qualitative and quantitative analyses).
Results: Results indicated that regular return to work after a long period of absence due to musculoskeletal disorders was associated with an increase of the workers' competent work behaviours. Also, structured support given to the worker and his workplace throughout the work rehabilitation process was an important component of the program. Besides, results showed that work exposition was intimately related with collaboration between stakeholders and, in particular, the importance of providing a single message to the injured worker.
Conclusion: The development and evaluation of program impact theory can help program designers, practitioners and researchers make wiser decisions about the program, improve their practice, make relevant recommendations about the program, and very importantly, make changes and reproduce the program elsewhere.

THE QUEBEC NETWORK FOR WORK REHABILITATION: RESULTS OF A PILOT STUDY AND ONE AND THREE YEARS FOLLOW-UP

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Background: In 2000, the Québec workers' compensation board (WCB) funded the creation of a provincial public work rehabilitation consortium. This consortium, known as the Réseau en réadaptation au travail du Québec (RRTQ), consisted of a partnership of 11 work rehabilitation institutions in the province of Québec. The aim of the RRTQ was to develop and implement evidence-based prevention and work rehabilitation programs. It also aimed to foster the development and update of new knowledge and practices in work rehabilitation through research and training.
Methods: A thirty-month pilot study was held in four rehabilitation institutions disseminated throughout the province of Québec to implement an evidence-based program in work rehabilitation. Each team received theoretical and practical training on the program and on the latest evidence in work rehabilitation. Training was reinforced with visits by the director, training seminars, and a skill-upgrading workshop that brought together stakeholders from each institution. All workers participating in the rehabilitation program had a follow-up at one and three years after the program to collect data on their work and health status.
Results and conclusion: The program implementation progressed well within the rehabilitation institutions. Interdisciplinary work rehabilitation teams were put in place, as planned, and expertise was developed and shared. As of December, 2003, 437 workers had been assessed by RRTQ teams and 259 had participated in the rehabilitation program. For these workers, who had a mean of 6 months of absence from work, the rate of return to pre-injury work was 63%. The follow-up is underway and results will be presented at the congress. While this pilot implementation was generally successful, significant opposition to the mandated nature of the referral process arose among WCB front line practitioners. Funding for the network was not renewed, highlighting the crucial importance of involving all stakeholders throughout the knowledge translation process.

WHAT CAN BE LEARNED FROM THE LITERATURE ON SOCIAL REPRESENTATIONS TO UNDERSTAND WORKERS' MOTIVATION DURING WORK REHABILITATION.

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Work is a central aspect of the adult life and creates a sense of social conformity. Therefore, a disruption in the working role may have considerable repercussions. Every year many workers are excluded from work because of work disability due to a musculoskeletal disorder (MSD). Factors associated with the development and the persistence of work disability can be related to the worker, the work environment, the compensation policies, the health care system and the insurance system. Concerning the workers their conception/representation of their disability is associated with coping behaviours. A representation is a complex and organised entity including information, opinions, attitudes and beliefs on a particular subject. Representations have been studied in anthropology, sociology and psychology since the sixties, but often in a compartmentalized way. These are one important key for understanding what motivates the worker during the rehabilitation and the return to work. To build upon disciplinary knowledge and better understand the workers' motivations, the objectives of this study where 1) to document existing models and conceptual framework on representations, 2) to establish a transdisciplinary link among findings and 3) to document the theoretical applicability in work rehabilitation for MSD. Methods: Electronic literature search (French, English) from 1960 to 2005, in medical, paramedical and social science databases (MedLINE, PsychINFO, CINAHL, etc.) with predetermined key words. References list where also consulted. After screening abstract based on a set of criteria, content analysis was performed on retained articles. Results: Models found in sociology and anthropology are mainly descriptive and performed in a medical context, and rarely in an occupational health. However, these models could add to psychosocial models that are more dynamic and oriented toward understanding the reasons behind specific behaviours. Spin-off: bridging the gap between these disciplines will help achieve a new level of knowledge in understanding workers' motivations.

INJURED WORKERS' EXPERIENCE OF VOCATIONAL REHABILITATION AND RETURN TO WORK

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This paper will present an analysis of data obtained in the course of a qualitative study conducted in Québec. 85 injured workers were interviewed about their experience as workers' compensation claimants and the interviews focussed on the positive and negative effects of the process on their health. Many workers spoke of the return to work process, in the context of early return to work programmes, or after return to work when the injury was healed, but also with regard to the process in which employment is deemed suitable after return to pre-injury employment was considered to be impossible. Some of the experiences in rehabilitation programmes was considered favourable to recovery and the prevention of handicap, but many workers were highly critical of their experience with vocational retraining and return to either pre-injury employment or employment deemed «suitable».

The study permitted a better understanding of the issues which give rise to conflict between the worker, the employer and the compensation board. Varying perceptions of the meaning of «rehabilitation» lead to misunderstandings that may develop into poisoned relationships and hostility.
A brief presentation of the legislative framework governing vocational rehabilitation of injured workers in Quebec will be followed by a presentation of the results of our study with regard to specific aspects of vocational rehabilitation. The workers' perception of the role of the workers' compensation board staff, the employer, former colleagues, vocational retraining centres and doctors will be examined, as well as the perception workers had of their own behaviour in the return to work process. Conclusions drawn form the study will permit a better understanding of obstacles to successful return to work.

REDUCTION OF MUSCULOSKELETAL SICKNESS ABSENCE: A 3 YEAR INTERVENTION STUDY

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[ID 341]

The purpose of this 3 year (2001-4) prospective intervention study was to reduce musculoskeletal related sickness absence and associated costs at 3 companies producing fiber glass products, concrete bathroom units and windows. A self-administered questionnaire was sent to all employees at the start and conclusion of the study. Response rate was 68 % (273) including 15% immigrants at the 1st study while 58% (255) with 19% immigrants responded in the follow-up study. The intervention team included a nurse, a physical therapist and an occupational physician. The intervention encompassed 3 levels: organisation, workplace and worker. Interventions included language courses for immigrants, workplace adjustments and individual training programs. Statistical analyses, including Students T-Test and chi2, were performed using SPSS 7.5 and limited to the cohort who had participated in both questionnaire studies (N=103). Of the 70 workers who received a personal training program, 75% reported symptom reduction. Reported pain in the 3 previous months from low back (LBP) (37 to 29%), shoulder/neck (39 to 34%) and arm (31 to 27%) was significantly reduced (P<0.001). Reported sick leave in the 3 previous months fell from 5.8 to 1.9% for shoulder/neck and 2 to 1% for arm. Reported sick leave was reduced among immigrants: from 20 to 7% for LBP and 17 to 11% for shoulder/neck (P<0.001). VAS scale (0-10) showed musculoskeletal pain reducuction only in the immigrant group: 2.85 to 1.09 (P<0.05). Average reported number of pain days in the previous 3 months was reduced in the immigrant group (LBP 17 to 2, shoulder/neck 18 to 3 and arm 16 to 4). In the 3 year study period annual average registered sick leave fell from 6.27 to 4.79% and annual direct related costs were reduced from 8,562 to 6,190 Danish Crowns per worker. Thus the interventions successfully reduced sick leave.

DEVELOPMENT OF GOOD PRACTICE MSD REHABILITATION AND CASE MANAGEMENT PROGRAMMES

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[ID 786]

Musculoskeletal Disorders (MSDs) are the most significant occupational ill health issue in the UK, with over 1.1 million people affected (HSE, 2004). They cost business and society over £6 billion per year (HSE, 1995/6). The UK Health and Safety Executive (HSE) commissioned this 18 month study to identify appropriate models of active case management and rehabilitation for those with MSDs, which showed significant cost benefits, such that these models could be proposed as making good business sense.
Active case management and rehabilitation for MSDs is a relatively new approach in the UK; as such, a number of different models are emerging of appropriate methods for successfully managing those with these problems. This study sought to identify the good practice principles that should be applied when developing and implementing such models. Evidence of good practice internationally was obtained from an extensive literature review. Data on the approaches, motivators and obstacles to these programmes in the UK were obtained through a series of focus group discussions, a questionnaire for professionals, a questionnaire for sufferers, and obtaining more detailed information from 25 organisations of the implementation and effectiveness of these programmes.
Key components of these programmes were identified based on this evidence. These include: commitment of senior managers to the programmes; clearly defined roles and responsibilities; appropriate competency of staff involved; competent assessment of needs; coordinated healthcare provision; all professionals involved having a consistent approach; agreement of goals with the individual; timely access to appropriate treatment; regular contact with those absent; clear vocational focus, with appropriate workplace / work task changes; addressing the psychosocial obstacles to return to work; monitoring and review of individual during rehabilitation phase; and knowing when to stop.
Feedback on these key components of models was obtained from professionals, in order to allow development of the model programmes.

EFFECTIVENESS AND IMPLEMENTATION OF A PARTICIPATORY ERGONOMICS PROGRAM FOR WORKERS ON SICKLEAVE DUE TO LOW BACK PAIN: A RANDOMIZED CONTROLLED TRIAL

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[ID 785]

Background: Ergonomic interventions are widely advocated for return-to-work after low back pain (LBP), but the effectiveness of these interventions has not been established.
Purpose: To evaluate the implementation and effectiveness of ergonomic interventions based on methods used in participatory ergonomics (PE).
Methods: A population based randomized controlled trial with workers (n=196) sicklisted 2 to 6 weeks due to non specific LBP. Participants were randomized to the PE-intervention (n=96) or usual care (n=100). The PE-program consists of a workplace assessment, ergonomic interventions and case management involving all stakeholders. Main outcome measures were time until full return-to-work, functional status (RDQ) and pain intensity (10-point scale), assessed before randomisation, and at 12, 26 and 52 weeks after first day of sickleave. In addition, a process and qualitative analysis of the implementation of the program was conducted (n=35 workers).
Results: The median time to full return-to-work for workers with the PE-intervention was 77 days vs. 104 days for workers without this intervention (p=0.018). PE-intervention was effective on return-to-work rate (HR = 1.7 [95% CI 1.2 to 2.3]; p=0.003). Workers with a PE-intervention improved more on functional status and pain intensity than workers without this intervention, but this was not statistically significant. Ergonomic solutions were targeted more at work design and organisation of work (58.9%) than at workplace and equipment design (38.9%). Almost half (48.9%) of the ergonomic solutions were completely or partially implemented within three months after the first day of sickleave. Most workers were satisfied about the PE-program (median score 7.8 on a 10-point scale). Main obstacles to implementation according to the ergonomists were technical or organizational difficulties (50.0%) and physical disabilities of the worker (44.8%).
Conclusions: The PE-intervention had a positive effect on return-to-work of workers sicklisted due to subacute low back pain. The compliance, acceptance and satisfaction related to the PE-program were good.

SHIFTWORK, NIGHTWORK AND FLEXIBLE WORKING HOURS

ADAPTATION TO NIGHT WORK - ACCELERATED BY MODERATE BRIGHT LIGHT

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[ID 356]

Introduction. The ability to cope with shift work is related to the diurnal type and morning types are regarded as unable to adapt to night work.
Hypothesis. As the direction and the extent of light-induced phase shifts depend on the time between the midpoint of light exposure and the cross-over point of the phase-response curve morning types adapt as well as evening types if light is presented accordingly.
Methods & Materials. Eight healthy young men each (19-34 yrs) with equally varying morningness were allocated to a Control Group and two groups treated with bright light (L1, L2). They performed 3 consecutive day shifts and after a free weekend 3 consecutive night shifts. Both shift periods were followed by a constant routine (CRD, CRN, bed rest, isocaloric diet, 30 lux, 20 °C). The shifts of the circadian systems were quantified by means of melatonin and cortisol profiles (CRN – CRD) as determined from hourly taken saliva samples. The control group worked exclusively in 150 lux. The treated groups were exposed each night to a 4-hours light pulse (1 500 lux), that started in the first night in L1 soon after the expected melatonin onset, in L2 with shift onset and 1 hour later in both consecutive nights.
Results. The hormonal profiles were delayed by 3 hours in the Control Group and by 6 hours in both treated groups. The temporal parameters of both profiles were considerably less dissociated after light exposure but the duration of the cortisol quiescent period decreased with increasing morningness.
Conclusion. Though the overall delay of the circadian rhythm did not vary with morningness, morning types seem to be, due to the shortening of their cortisol quiescent period, endogenously disadvantaged. This shortening might indicate an increased risk to develop cardiovascular problems in the long run.

NUMBER OF WORKING NIGHTS AND HEALTH AMONG BRAZILIAN NURSES

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In Brazil, many hospitals adopt 12-h night shifts followed by 60 h off. The relatively small number of working nights at a given hospital is often associated to a high rate of moonlighting both at day- and nighttime. We tested the hypothesis that the total number of working nights is a relevant factor in the association between nightwork and health.
A cross-sectional study was carried out by means of a comprehensive questionnaire completed by 600 nurses and nursing assistants (mostly females) involved in patient care at a general hospital. The Brazilian version of the Finnish questionnaire for work ability index was used to assess the number of reported diseases. The studied group was classified into: those who have never worked at night, ex-night workers, those who currently work up to 5 nights/fortnight, and those who currently work at least 6 nights/fortnight. The analysis of diseases considered those with no disease, those that reported 1-2 diseases, and those reporting 3 or more diseases. Multinomial logistic regression was used to evaluate the association between nightwork and the number of diseases. After adjusting for socio-demographic variables (age, education degree, marital status, income, race/ethnicity, gender) and the total number of worked hours/week, working at least 6 nights/fortnight increased the odds of reporting three diseases or more by OR=6.09 (95% CI = 2.09-17.77) and working up to 5 nights increased the respective odds by OR=2.13 (95% CI = 1.09-4.16), both compared to workers who have never worked at night. No significant association was observed as to the ex-night work group.
Results confirm the association between nightwork and poor health, which is particularly relevant to those working several nights, who are likely to be the ones engaged on a second job. The effect seems to be related to current nightwork, as judged by results concerning ex-nightworkers.

RELATIONSHIP BETWEEN CONTIONUS NIGHT WORK AND CARDIOVASCULAR AND METABOLIC RISK FACTORS : A RETROSCPETCIVE LONGITUDINAL STUDY ON HANDSWEEPERS AND DRIVERS OF MOTORSWEEPERS

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There is wide consensus that shift work, including night work, could have a wide range of cardiovascular and metabolic effects. Less data is available about the association between continuous night work and health effects. We explored the relationship between continuous night work and cardiovascular and metabolic risk factors in a retrospective longitudinal study of workers employed in four plants of municipal enterprise put in charge of street cleaning and domestic waste collection in Milan, Italy. From the personnel files we selected all subjects who have been ever working in night shifts as hand sweepers, drivers of motorsweepers, and drivers of delivery tricar in the period 1976-2005 and with at least two medical examinations. As a referent group we selected subjects ever working in the same jobs but in day shifts. Most of the workers spent their careers, first in day shifts and then in night shifts. From the medical surveillance files we abstracted the following information: lifestyle habits (smoking, alcohol consumption), body mass index, glycemia, serum lipids, hepatic enzymes, blood pressure and ECG recordings, and selected drugs. Data abstraction was completed for three out of the four plants: we identified 505 workers (almost all males) who have been examined on average 4 times (min 2, max 13), for a total of over 2,000 medical examinations: 172 had always worked in day shift, 12 always in night shift, and 321 in both. We used generalized estimating equations (GEE) models to analyse the relationship between night work and health effects while accounting for within-subject correlations and adjusting for study period, age, plant, and job. We found that night workers smoked more and had significantly higher BMI (+1 Kg/m2), cholesterol (+15 mg/100 mL), and triglycerides (+34 mg/100 mL). We noted a lowering of blood lipids, blood arterial pressure in the last five years: this may suggest the efficacy of preventive interventions introduced at the time.

NIGHT-WORK : PROFESSIONAL BIOGRAPHY AND HEALTH

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[ID 1540]

This study was mandated by the Swiss State Secretariat for Economic Affairs (seco) in order to identify if permanent night-work has negative effects on health and if the impact is greater than for a rotating shift system.
In order to control the well-know “healthy shift-worker effect” – according to which negative effects of shift- and night-work on health are more likely to be found in former shift- and night-workers than current workers –, this quantitative retrospective study, conducted by Computer Assisted Telephone Interviewing (CATI), evaluates the present health status (physical, functional and mental) and reconstructs the professional biographies of a sample of 1015 current and former workers engaged in (or having engaged in) different types of working schedules (day, shift, permanent night-work), in 63 Swiss enterprises from 5 economic sectors (manufacturing, health services, bakeries, distribution, printing) during a specific period in the past (3 to 10 years ago).
The analyses showed that, independent of working schedules, the sample is characterised by lower socio-economic status and poorer health than the overall Swiss population. Secondly, current permanent night-workers at the time of the study report, on average, being in better health than workers engaged in other types of schedules, reflecting the “healthy shift-worker effect”. In contrast, former permanent night-workers and workers that have mainly performed permanent night-work during their professional lives declare poorer health status than the whole analysed sample.

Workers having practiced mainly 3x8 or 2x12 rotating work schedules demonstrate the same health problems to those that practiced mainly permanent night-work, but in smaller proportions. Finally, reports of poor working conditions correlate to health problems. It should thus be concluded that permanent night-work poses a problem which must be viewed as an element of the global relationship between working conditions, way of life and health.

THE EFFECT OF SHIFT WORK ON THE SLEEP DISTURBANCE IN SUBWAY DRIVERS

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[ID 1280]

Objective: The purpose of this study is to investigation the physiological effect of shift work and the experience in on-track accidents.
Methods: Among the subway drivers in one city of Korea, eighteen which has experienced (Experienced group; EG) and thirty-one which has not experienced on-track accidents (non-Experienced group; NEG) were selected. General characteristics, job stress and psychological health status were questioned. Job stress was evaluated by KSOS (Korean standardized occupational stress questionnaire) and psychological status was by STAI (Spielberger et al, 1970) and CES-D (National Institute of Mental Health, 1970). Sleep diary was recorded during 6days (282 sleeps) for quality/quantity of sleep (time to take sleep, frequency of awakening in sleep, sleep quality, degree of clearness in driving and psychological/physical fatigue at end of drive and hours of sleep), and type of shift was recorded. Salivary cortisols were collected 5 times in a day during 5-6 days (1,170 samples) and analyzed with HS Cortisol Enzyme Immunoassay kit. Repeated measure ANOVA (RMA) analysis was conducted.
Results: Mean age was 35.6(±5.3) years and all of subjects were male. Type of shift was related to degree of time to take sleep ($p=0.005$), clearness in driving ($p<0.001$), psychological/physical fatigue ($p<0.001$). Frequency of awakening in sleep was related to experience of on-track accident ($p=0.014$). Salivary cortisol concentration was related with diurnal rhythm and higher in experienced group than non-experienced group ($p=0.002$).
Conclusion: Shift work in working irregularly and experience of on-track accidents will induce physiological response (sleep and cortisol disruption) to subway drivers.
key work: shift, drivers, physiological effect

LIFELONG WORKING TIME ARRANGEMENTS: CHANCES AND RISKS FOR COMPANIES AND EMPLOYEES

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[ID 1748]

The demografic change and the EU-policies for the realisation of equal opportunities will be a new challenge for European companies: The work contents and working conditions have to be critically checked referring to the increasing diversity in the companies and the requirement to extend the working life. As the qualified labour supply will become rare, a self-critical review of the meaning of attractiveness of the company regarding the labour market is of crucial importance.
Lifelong working time arrangements in combination with measures like sensitisation of management, labour organisation, human resources development, ergonomic workplace design and health promotion are key factors for the resolution of the above-named problems. Such a combination facilitates the consideration of individual necessities and the preferences of any age- and employee-group. The results will be an optimal use of resources and an increase of productivity and job satisfaction.
Up to now there are no controlled longitudinal studies which analyse systematically the specific effects of different arrangements. Furthermore there is neither research regarding the relevant aspects of company-related and individual effects as a whole nor research on their interdependency.
However, as the level of autonomy of the employees regarding their working time is a contribution factor of success, it is necessary to operationalise adequately the range of variation of influence and to detect models of working time with different specifications of autonomy. Furthermore an enormous resource of formation lies in the consideration of time during the whole range of lifelong working time. The analysis of effects of working time models on employees includes the assessment of work-related and life style-related impairments in the different ranges of life.
Within the scope of a German research project the effects of different lifelong working time arrangements regarding different ages are analysed in six companies from four industrial sectors. First results of this research project will be presented.

WORK ABILITY, HEALTH AND WELL BEING OF AGING WORKERS

LOW WORK ABILITY IN ITALIAN NURSES: THINKING OF CHANGING OR EXIT FROM THE WORKPLACE? EFFECTS OF AGE-RELATED OPPORTUNITIES

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[ID 354]

Qualified nurses report many work-related problems, which threat their health and work ability. In 2003, a sample of 5504 Italian registered nurses participated to the Nurses' Early Exit Study (NEXT). In 2004, 3329 also participated to the follow-up phase (attrition rate = 35%). The aim of the present analysis was to investigate perceived work ability as a predictor of different types of quitting thoughts or actual exit from the workplace. Several multiple logistic regression analyses were performed controlling for indicators of work-related well-being and socio-demographic characteristics. Also perceived availability of nursing posts in the regional area was controlled for in the analyses. Results of the follow-up study showed that within nurses aged under 45 the Work Ability Index (WAI) was a significant predictor of different quitting thoughts (ORs ranged from 3.05 to 6.67) but not of actual exit from the workplace. At contrary, among the older nurses (>45), only actual exit was predicted by lower WAI scores, besides the perception of large availability of free nursing posts in the region.
Among nurses aged <45 having a low perceived work ability is associated to higher desire to undertake further education and/or to change the workplace or the profession. Despite earlier literature demonstrated that thinking of quitting well predicts actual leaving, in the Italian context few people have the real opportunity to realize the desired change. Yet, younger nurses who actually exited perceived high availability of nursing posts and/or the opportunity to get closer to their birth location. Instead, older nurses (>45) showing low perceived work ability have an higher risk of actually leaving their current job or the profession, since they are approaching pension or they feel confident they will find a self-employed job after retirement.
Thus, in the relationship between low perceived work ability and actual or intended exit, a significant part is explained by age itself but also by the age-related differences in occupational and life opportunities.

PERCEIVED WORK WELL-BEING AND CERTIFIED SICKNESS ABSENCE AMONG EMPLOYEES OF DIFFERENT AGES IN AFOOD FACTORY

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[ID 767]

The food industry has in average one of the highest numbers of sickness absence in the industry mainly due to the high work load and some special features. The purpose of the study was to elaborate the relations between perceived work well-being (perceived health, work ability, mental stress and work satisfaction) and sickness absence in a cross-sectional sample of workers in a food factory aged between 19 and 66 years. Questionnaire (n=827) and certified sickness absence data were collected. The workers were away from work due to sickness in average 19 days in the year 2003 (5.4 %/person years). Women had statistically significant more long sickness absence spells (OR 1.43) than men. Younger employees had more short sickness spells (OR 2.62) than older. Employees with a poor perceived health and poor work ability had more sickness absence days per year (OR 1.63 and 1.99) and a higher percentage of sickness absence per person years (OR 1.56 and 2.03) than those with a good or excellent health and work ability. In addition those employees with poor work ability had more long sickness spells (OR 1.84) than those with an excellent work ability. Perceived mental stress and work satisfaction were statistically not significant associated to sickness absence. It was concluded that sickness absence was more related to individual perceived poor health and work ability than perceived work related psycho-social factors. Number of sickness days was related to neither gender nor age, but the number of long spells was more common among women than among men and short spells more common among the younger than the older.

FUTURE EXCELLENT OR POOR WORK ABILITY? A 4-YEAR FOLLOW-UP OF FIVE INSTRUMENTS FOR SELF-ASSESSMENT, AND SICKLEAVE AS OUTCOME MEASURE FOR WORK ABILITY.

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[ID 1012]

Objectives: Self-rated health is among the most frequently assessed health perceptions in population studies. Several instruments have been used. This study aimed at exploring the qualities of five instruments to predict future excellent and poor work ability defined by the individual's degree of sickness absence during follow-up.
Methods: 2252 employees (84% response rate) in three Swedish municipalities filled in a baseline questionnaire and were followed for four years by means of their sick leave records. Five health oriented instruments for self-assessment were used as potential predictors of future work ability, two single-question instruments: "Global health", and "Work ability in 2 years" and three multi-question instruments: "SF-36 General Health", "Work Ability Index" (WAI), and "Health for Working". Outcome measures: 1. No sick leave at all = excellent work ability, 2. One or more spells of sick leave ≥28 days = poor work ability. Predictive values and Cox proportional hazard ratios (HR), adjusted for age, gender and work type, were calculated for all and stratified on gender.
Results: 4-year prevalence of excellent work ability: women 18%, men 32%; and poor work ability: women 28%, men 18%. The positive predictive values were somewhat higher for poor (md: 0.42) than for excellent work ability (md: 0.28), while negative predictive values were very similar (md: 0.79 and 0.82). The instruments showed no statistical difference in predicting future work ability, but WAI had a tendency to the overall best prediction, HR 2.55, 95% CI 2.13-3.06 for poor and HR 1.52, 95% CI 1.37-1.69 for excellent work ability. For men, however, "Health for Working" predicted poor work ability better, HR 5.81 95% CI 3.50-9.64, and significantly higher than WAI for women, HR 2.39, 95% CI 1.97-2.90.
Conclusion: All instruments predicted future work ability, somewhat better for poor than for excellent work ability, multi-item instrument somewhat better than single-item instruments.

THE RISK MANAGEMENT PYRAMID

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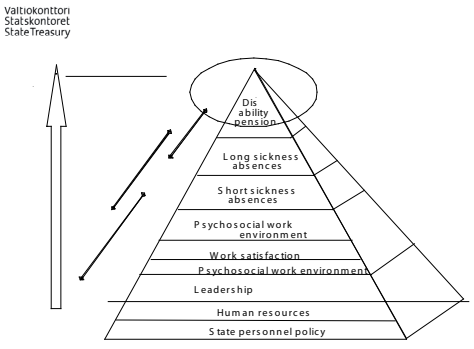
[ID 1440]

State employees constitute about 6% of the workforce in Finland. The natural drain of personnel to pensions is fast because of the age profile. Surprisingly enough in spite of this the number of applications for disability pensions has decreased, 15 % of applications are rejected and the number of cases of successful vocational rehabilitation is increasing.
One division of the State Treasury is the insurance division, which handles pensions, accidents, vocational rehabilitation and well-being at work for state bureaus and institutions. Our vision is to make difficult issues easy for our clients – effectively. With this goal in mind we have developed this visual model of risk assessment.
The risk pyramid has three sides representing work-ability, -safety and -health promotion. Risk model is of great assistance in planning appropriate, comprehensive work safety, OHS and well being programs. The most prevalent diagnoses of disability pensions were in 2004 mental illnesses (40%) and musculoskeletal diseases (25%).



We are studying systematically from databases the causalities between the pyramid levels, the size of the effect and the strength of evidence. The effect of leadership on sick leaves and disability pensions seems to

be moderate It seems that work health promotion is effective in the long run only if its practiced continuously. It also seems evident that symptomatic employees should participate in early vocationally oriented rehabilitation programmes. Those employees with chronic diseases seem to need both vocational and medical rehabilitation planning. We emphasize that a work disabled patient should never be left without support. The follow up should be continued until he or she has returned to work successfully. The planning of rehabilitation should begin within half a year of the onset of long sick leave.
Multiprofessional collaboration is important between management, employees, liaisons in the workplace, comprehensive OHS, insurance institutions, health care and rehabilitation.

WORK ABILITY INDEX: ASSOCIATED FACTORS AMONG HEALTH CARE WORKERS OF SÃO PAULO, BRAZIL

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[ID 1717]

Introduction: There is an increasing aging of the working population all over the world,
and important changes in dependency ratio (Ilmarinen, 1999; WHO, 1993). Aging workers should be applied in developing countries to workers younger than 45 years old (Ilmarinen, 1997). Maintaining Work Ability is a multifactorial challenge (WHO, 1993). Usual stressors at hospitals are: exposure to environmental stressors, bad postures, excessive workload, repetitive work, emotional stressors, shift/nightwork, two jobs.
Objective: Aim of this study was to evaluate variables associated with work ability, well-being and health of healthcare shiftworkers.
Methodology: this is a cross-sectional study. Data collection took place in 2004 and 2005, at an University Hospital, in São Paulo, Brazil. Consent forms were signed by 696 participants who worked 6 or 9-hour fixed days and 12-hour nights. A comprehensive questionnaire included demographic data, living and working conditions, mental and physical health and early aging. An adapted Portuguese version of the Work Ability Index- WAI (Tuomi et al, 1991; Fischer et al, 1997) was used. Hierarchical multiple logistic regressions were used to evaluate factors associated to inadequate (moderate and poor) WAI.
Results and discussion: Mean age was 34.9 (SD 10.4 years). Factors associated with inadequate WAI are: obesity (OR= 2.7 p= 0.001), be a family breadwinner (OR= 2.2, p=0.001), raising kids (OR= 1.5, p= 0.06), thermal discomfort at work (OR= 1.6 p=0.06), verbal abuse (OR 2.14, p=0.03), sleep problems (OR=1.7, p=0.018), fatigue (medium score OR= 3.8, p=0.000; high score OR=13.4, p=0.000). Age (40 years and +) was a protection factor (OR= 0.58, p=0.04). Control variables were: work schedules, number of jobs, JCQ demand/control scores. These results indicate nursing is a profession usually associated with bad working conditions, including negative psychosocial factors leading to health problems. Intervention measures, such as nutritional education and exercise practice are necessary to prevent a decrease in work ability, even in this quite young working population.
Acknowledgements: Fogarty Foundation, Mount Sinai School of Medicine; PIBIC- CNPq; CAPES.

KAIKU-PROGRAMME, PROMOTING OCCUPATIONAL WELL BEING AMONG GOVERNMENT EMPLOYEES IN FINLAND

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[ID 1458]

The workforce in Finland is ageing rapidly. Within the governmental sector 30% of the present workforce will reach the official retirement age of 63 years before 2011, among them 80% of management.
The Kaiku Programme was launched late in 2002 to promote improved working conditions and occupation well-being (OWB) among civil servants. The overall objective is to include OWB as a living part of management and working cultures. It aims at developing leadership skills, management of change and competences as well as communication and interaction of the heterogeneous working force. Emphasis is on the needs of aging employees, but specific issues concerning younger generations are not forgotten. In several studies competence, support from the leader and ability to participate in decisions related to one's own work are cornerstones of OWB together with experiences of being appreciated and fairly treated.
Kaiku has trained 200 leaders in issues related to OWS. Their task is to work for the improvement of OWS within their own departments and ensure that these issues are taken into consideration in annual BSC and financial agreements between the department and ministry. 100 additional experts will be trained before July 2007.
Kaiku offers consultancy and open training for different departments around Finland. It allocates money to departmental OWB promoting projects (2.5 M€ to 170 different projects). In addition Kaiku has an extensive website with information on key areas of OWB and issues a magazine 4-5/year.
Results are encouraging. According to a recent study the State employees are more often very satisfied with their work than private and municipal employees. They also feel they have better chances to influence their own work. There was also less exhaustion. Considering ongoing extensive reorganisation programmes ongoing, this can be seen as a very satisfying result.

OVERWEIGHT AND OBESITY AND THEIR ASSOCIATION WITH WORK ABILITY AMONG NURSING PERSONNEL FROM A PUBLIC HOSPITAL IN RIO DE JANEIRO, BRAZIL

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[ID 227]

Background: The problem of overweight and obesity are one of the major immediate and long-term health issues in modern society, including possible impacts on the ability to work.
Objective: To analyze the association between Body Mass Index (BMI) and the work ability index (WAI) among nursing personnel from a public hospital in Rio de Janeiro, Brazil.
Methods: Cross-sectional study based on questionnaire completed by 511 female healthcare workers involved in patient care at the hospital. Obesity (BMI>=30.0) and overweight (BMI=25 to 29.9) were calculated on the basis of self-reported weight and height. The WAI - which reveals how well a worker is able to perform his or her work - was evaluated by means of the Brazilian version of the Finnish questionnaire; the median value was used as the cut-off for high/low ability. Logistic regression was used to examine the association between dichotomized WAI and independent variables.
Results: The prevalence of overweight and obesity were 37.2% and 19.3%, respectively. The prevalence among nurses were 33.8% and 13.2%, among nursing assistants were 41.6 and 14.2%, and among nursing aides were 30.5% and 33.8% (p<0.001). Low WAI was observed in 74.4% of obese workers, in 52.3% of overweight workers, and in 43.6% of workers with low/normal BMI. After adjusting for socio-demographic variables (age, education degree, marital status, race/ethnicity, income and parents' education) and health behaviors (physical activities, smoking and alcohol consumption) overweight increased the odds of low WAI by OR=2.5 (95% CI =1.40-4.68) and obesity increased the odds by OR=3.2 (95% CI=1.76-5.83), compared to workers with low/normal BMI.
Conclusions: Results provide evidence for the association between body weight excess and outcomes related to occupational health and work ability. Programs of food education and availability of physical exercise in work settings could reduce morbidity and improve the quality of life among nursing personnel.

VIOLENCE AND HARASSMENT IN WORKPLACES

HOSPITAL RECORDS OF ACCIDENTS RELATED TO VIOLENCE: THE PSYCHIATRIC WARD

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[ID 1004]

Introduction

In examining the hospital records of accidents of a public hospital during the period 1999-2003, we found that the most affected departments were the Emergency Room and the Psychiatric Ward. The majority of these accidents involved violence towards health care workers (HCWs) (in particular nurses) from patients or their relatives. To further explore the phenomenon, we undertook a study of work-related violence in the psychiatric ward of large Roman hospital where all episodes of violence have been recorded by the nurses in the clinical charts of the patients.

Methods

We analysed 2400 clinical records of the psychiatric unit for the period 2002-2005, where violence towards health care workers was reported. For each episode we coded the gender, professional and other characteristics of the victim, the work shift, the type of violence (physical or verbal) and the severity of the consequences of the aggression during the study period.

Results

The Psychiatric ward admits 600 patients per year, the majority of whom are women hospitalized for suicide attempt. Episodes of violence and health consequences to nurses were recorded daily. Two third of the injuries detected are due to physical violence and occurred mostly while constraining the patient. The official hospital records comprise only 5 % of these aggressions, since most of the injuries caused by the violent patients do not lead to sick leave for the personnel affected. Violent episodes occur more frequently in the night shift, and by male patients. The hospital does not provide any training on how to handle violence, and there is no attempt to reduce the risk and protect HCWs by rotation, or other organizational measures. The results also indicate that the hospital does not apply the European Directives on the psychological and social risk at work, and that the HCWs are not reimbursed for the loss of personal property or other damage due to patient violence.

DIAGNOSIS OPPORTUNITY OF BEHAVIOURAL DISEASES IN DIFFERENT WORK ACTIVITIES

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[ID 1118]

The attention paid by the scientific community to the phenomenon of mobbing allowed to attribute some behavioural disorders, previously considered correlated to individual factors, to occupational environment.

Aim of this study was to analyse the prevalence of different psychological diagnosis among a sample of 137 workers, 96 men and 41 women, affected by working behavioural disorders.

In the whole group, the prevalence of the behavioural disorders was: 11% post-traumatic stress disorder (PTSD), 29.9% depressive reaction (DR), 13.4% anxiety disorder (AD), 42.5% anxious-depressive syndrome (ADS), 1.6% factitious disorder (FD), 1.6% other. The ADS prevalence was higher in the industrial (54.3%) than in tertiary sector (38%) while PTSD and DR were higher in tertiary (13% vs. 5.7% and 33.7% vs. 20% respectively). In the tertiary services sector, women showed a higher prevalence of ADS than men (43.2% vs. 34.5%), while DR prevalence was higher in men (38.2% vs. 27%).

The PTSD diagnosis has come out after 1998, including a pattern of symptoms previously associated with diagnosis of other behavioural disorders. This finding was more evident in the tertiary sector (20.7% vs. 8.7% in the industrial sector), because of the greater account to harassment at work. Moreover, the mobbing determining factors are easily evaluated in the tertiary sector because are clearly listed in the "Italian Consensus Document". By contrary, in the industrial sector the difficulty in the analysis of risk factors and the poor number of reports by workers underestimate the PTSD prevalence, in spite of a high prevalence of ADS (47.8%), that shows the dangerous effects of work on behaviour. These findings suggest that, after the adjustment of diagnostic criteria to industrial work, some cases of psychological disorders (in particular ADS) could be attributed to the effect of harassment at work.

RACIAL AND ETHNIC DISCRIMINATION IN THE WORKPLACE: THE PERCEIVED IMPACT ON HEALTH AND SAFETY

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[ID 1161]

Racial/ethnic discrimination is an important feature of life for minority population groups in the United States. A national study conducted by Kessler et al. (1999) in which researchers attempted to gauge the extent to which people of color experience discrimination, found that 60.9% of minority respondents reported having experienced at least one of nine types of discrimination on a day-to-day basis. Frequencies ranged from a high of 48.2% for being treated as if inferior to 23.5% for being threatened or harassed.

The workplace is no exception where racial/ethnic discrimination is concerned (e.g., Baldi & McBrier, 1997). In 2002, 35.4% of all charge filings with the U.S. Equal Employment Opportunity Commission alleged race discrimination.

Few studies have investigated the link between workplace discrimination per se and health and safety outcomes minority workers. Consequently, the primary goal of this qualitative research study was to begin to understand the forms and types of racial/ethnic discrimination experienced by U.S. minority group members in the workplace and to investigate the perceived impact on health and safety.

A community-based focus group study was conducted. Study participants were adult males and females employed across a range of blue and white collar occupations and industries. Sixteen focus groups, each comprised of 7-9 participants of the same race and/or ethnicity, were conducted (N=112). Blacks/African Americans, Hispanics, Asians, Native Americans and White Americans participated in the study.

Initial analyses of data indicate that minority focus group respondents reported experiencing both interpersonal and institutional forms of racial/ethnic discrimination at work and linked these experiences to a variety of physical (e.g., stomachache, headache) and psychological complaints (e.g., depression, anxiety), to negative affectivity (e.g., anger), and to health-compromising behaviors (e.g., smoking, alcohol use). This presentation will discuss these findings in greater detail.

AGGRESSIONS AT WORK PLACES AGAINST HEALTH WORKERS : STUDY OF 107 CASES.

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[ID 1255]

Aim of the study:

Violence at work place is an universal issue. The objectives of this study achieved among health workers are to estimate the frequency of aggressions against the hospital staff; to describe the characteristics of the aggrieved persons and, to analyse the circumstances as well as the consequences of aggressions.

Methods and materials

It is a 13 year - retrospective study showing the declared aggressions reported by the personnel of both hospitals of Sfax (Tunisia).

Results:

One hundred and seven aggressions cases represent 4,1 % of the totality of the declared working accidents.

Unlike men women are hardly aggrieved with respectively slightly higher frequency of 5.2 % and 4.7 %. The aggrieved persons are 39.4 years of age.

Nurses and hand workers are the most concerned subjects with a total of aggressions of 6.4 %.

The majority of aggressions are likely to be found in psychiatric clinic (46%).

generating scratches, bruises and haematomas.

The psychological impact is shown in 47.3 % of cases. The aggressions have generate 1876 days of sick leave.

Discussion:

Compared to the other studies, the study of aggressions against the hospital stuff remains limited in our country, because of the missed declaration.

In this study as well as in the literature, the psychiatric clinic staff personnel are likely to be the first population at risk of aggression, which consequently, should be at the top of the preventive list.
Conclusion
Security will be guaranteed only with a strategy having as objectives the denunciation of violence, the integration of its prevention in the working organization and finally to envisage the establishment of norms aiming at assuring the security of the health workers.

MULTIFORMITY OF NEGATIVE ACTS IN BULLYING AT WORK: AN IMPORTANT VARIABLE TO CONSIDER

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[ID 1520]

In the international literature, several studies of workplace bullying show a correlation between this situation and its health consequences. The relationship between the presence of workplace bullying behaviour and the sickness absenteeism rate has been considered as well but the results show a weak correlation.
This study aims to further investigate this relationship, test the hypothesis that the variety and number of bullying behaviours might influence the sickness absenteeism rate and evaluate whether a correlation might be established between this parameter and the number of different negative acts.
A sample of 243 subjects suffering a bullying situation have completed a self administered questionnaire exploring the different attacks and threats most frequently used against the person or his professional career.
Results show a sickness absenteeism mean value of 62.9 days/year (s.d. 67.8) and a mean value of different negative acts of 11.06 (s.d. 5.8).
The victims who have suffered a higher number of negative acts have a greater absenteeism rate and a statistical correlation (correlation coefficient 0.199; $p<0.01$) is observed between the sick leave rate and the amount of different types of bullying behaviours. No significant correlation (correlation coefficient 0.51; $p>0.05$) is found between the bullying duration and the sick leave rate.
Results suggest that the multiplicity of the negative actions strengthens the subjects awareness of suffering a bullying situation and might results in an increased health risk. The authors discuss the opportunity that the number and typology of negative acts be considered a parameter of health risk besides the frequency and the duration of bullying.

IS KIDNAPPING AN OCCUPATIONAL INJURY?

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[ID 1275]

Since the devastating attack on the World Trade Center, the subject of terrorism has taken on an entirely new dimension for the occupational safety and health sector, as well as for the workers' compensation insurance (industrial injuries scheme) around the world.
Billion-dollar losses are no longer the sole preserve of natural catastrophes; we now have to contend with man-made risks capable of inflicting damage on a similar scale.
The threat of terrorism has also brought about a fundamental change in safety at work and even more in workers' compensation insurance.
Different arrangements can be made in order to prevent workplace violence, as well as to help individuals to overcome the burden of an injury or disease arising out from an act of violence. However, the question is up to what extent acts of terrorism can be considered occupational risks and where to draw the line between social violence and terrorism, or safety and security, just to mention some.
The presentation will reflect on social violence, terrorism, OSH measures and insurance of occupational risks, taking kidnapping as the starting point for the discussion.
Aims
- To bring awareness of this emerging risk.
- To open scenarios where OSH and insurance can share experiences to better understand the dimension of this risk.

PSYCHOLOGICAL RESPONSES TO PHYSICAL VIOLENCE AT WORK: CLINICAL INTERVIEWS WITH 22 BANK EMPLOYEES VICTIMS OF ROBBERY

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[ID 1544]

The psychological effects reported by workers victims of physical aggression are variable, from mild and short-lasting symptoms of psychological distress to the development of psychiatric disease.
The aim of this study is to highlight, with clinical interviews, the reactions and the subjective feelings following hold-ups in bank employees.
Subjects and Methods
22 victims of at least one robbery were recruited for the study. The clinical interviews were conducted by psychologists and focused on: the description of robberies; the physical damage reported; the number of robberies during the entire working history, the emotions and feelings during and after the event; the impairment of workability.
Results
7 subjects were victims of one robbery while most subjects experienced 2 to 6 events throughout their working lives.
All subjects were threatened by criminals with pistols or knives and 20 subjects interacted with delinquents. 2 subjects reported physical damage and/or were confronted with the injury of others. 1 subject was kidnapped for 24 hours; another one was confronted with the killing of gangsters by police.
The terms more frequently utilized by victims to describe their feelings during the robberies were "ice", "motionlessness", "rage", "terror", "panic", "coldness". Some of them developed panic attacks with tremors and tachycardia when the robbers escaped.
Most subjects felt psychological distress of different severity during the periods following the event: from fear of new robberies to impairment of their workability because of concentration problems, panic attacks and depressive reactions requiring medical consultation. 3 subjects had to make use of sick leave because of symptoms, and 1 subject had to change his job. 8 subjects reported a deterioration of work environment after robberies.
Conclusions
The clinical interviews reveal some form of distress and psychological suffering after robberies in nearly all subjects. Some subjects reported lack of support by their work environments.
These data seem to confirm the importance of robbery as a potential risk for workers' health and suggest that further studies are needed to devise strategies of secondary prevention.

WORK-RELATED VIOLENCE AND THREATS AND THE RISK OF DEPRESSION AND STRESS DISORDERS

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[ID 600]

Context:
A number of cross-sectional, self-report studies, mostly of human service professions, report an association between high prevalence of work-related violence and threats and complaints of metal health problems. Little is known about the causal relation between these exposures and clinically diagnosed psychiatric disorders across occupations.
Objective:
To examine the risk of depression and stress-related disorders as a function of occupational exposure to violence and threats.
Design:
Population-based nested case-control study.
Setting:
All gainfully employed Danes.
Cases and controls:

14,166 hospital in- and out-patients, aged 18-65, treated for affective or stress-related disorders during 1995-1998 selected from The Danish Psychiatric Central Research Register and 58,060 controls matched for age, gender and time, drawn from Statistics Denmark's Integrated Database for Labour Market Research.
Main outcome measure:
Clinical psychiatric diagnosis (WHO ICD-10) of affective (F30-39) or stress-related (F40-48) disorders compared with controls by the occupation held the year before treatment. Occupation was used as a proxy measure for actual exposure.
Results:
Potential exposure to occupational violence is associated with significantly increased risks of both disorders in either sex (women: depression RR 1.45 CI 1.27-1.65, stress RR 1.32 CI 1.19-1.46; men: depression RR 1.48 CI 1.18-1.86, stress RR 1.55 CI 1.29-1.84). Work-related threats are associated with increase in the risk of depression in women (RR 1.48 CI 1.23-1.79) and the risk of stress-related disorders in men (RR 1.59 CI 1.32-1.91). Risks rose with increasing prevalence of violence and threats. The results remain significant and only slightly attenuated after controlling for extent of professional contact with people other than colleagues.
Conclusions:
Employment in occupations with a high prevalence of threats and violence is a risk factor for psychiatrically diagnosed depression and stress-related disorders in both sexes. These findings have important implications for health and safety at work polices.

EVIDENCE-BASED OCCUPATIONAL HEALTH PRACTICE

WORKPLACE INTERVENTIONS FOR PEOPLE WITH COMMON MENTAL HEALTH PROBLEMS: A SYSTEMATIC REVIEW OF THE LITERATURE

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AIMS
To review the literature on mental health and employment in order to identify evidence-based interventions that supports the effective management of common mental health problems (CMHP) at work.
The main questions were:
a) What is the evidence for the effectiveness of preventative programmes at work?
b) For employees at risk, what interventions enable them to stay at work?
c) What interventions are most effective for enabling employees with CMHP to return to work?

METHOD
A systematic search of the literature was undertaken using a defined search strategy. The research working group (RWG) reviewed abstracts and full papers were retrieved for abstracts which met the inclusion criteria. The RWG undertook a critical appraisal of the papers using the SIGN methodology and assessed which papers should be included in the evidence review. Evidence tables and recommendations based on the evidence were drafted. Two external assessors reviewed final draft document to ensure that no major pieces of evidence were missing.

RESULTS
Over 15000 references were identified, of which 114 abstracts were relevant to the key questions. 85 full papers were retrieved and a further 26 follow-on studies were appraised. 40 papers met the criteria for inclusion into the evidence tables.
The main results were:
a) Multimodal approaches are more effective than single methods in preventing individuals from developing CMHP.
b) For employees identified as at risk of developing CMHP, individual rather than organisational approaches are a more effective at keeping individuals at work
c) Brief individual therapy, especially cognitive behavioural therapy is the most effective intervention in enabling an individual to return to work.

CONCLUSIONS
The evidence base is heterogeneous, but multi-modal interventions aimed at the individual are promising and methods of delivery should be further tested.

EVIDENCE FOR THE EFFECTIVENESS OF INTERVENTIONS FOR TREATING DYSPHONIA

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Background
Functional dysphonia, a voice disturbance in the absence of structural or neurological laryngeal pathology is a common complaint with professional voice users like teachers and call-centre workers. It is unclear what the exact causes are although it has been strongly linked to vocational load or environmental and personal risk factors. Possible ways of treating functional dysphonia thereby include: optimizing vocal hygiene, voice production and improving breath support or changing the environment through amplification or acoustical improvements.
Objectives
To compare, via Cochrane systematic literature review, the effectiveness of various interventions with one another and with no intervention for treating dysphonia.
Methods
We will conduct a Cochrane systematic literature review of original research articles about interventions aiming to treat dysphonia. We will develop a systematic search strategy for identifying randomised controlled intervention studies in relevant databases. Two authors will then independently determine study inclusion, extract data and assess study quality. Where data can be pooled, a meta-analysis will be performed. Otherwise a qualitative synthesis will be employed using levels of evidence.
Results
Based on at least one randomised and another controlled clinical trial we can say that voice therapy - offered either individually or in groups - for patients suffering from mild, non-organic dysphonia can produce clinically meaningful improvements in voice quality without apparent changes in laryngeal status. Some of the attained positive results can be sustained at least up to a year.
Conclusions
Professional voice users can achieve reductions in dysphonia from well planned interventions. Current evidence is however anecdotal or based on a few individual studies. There are as yet, no evidence-based guidelines on the best ways to treat functional dysphonia that is not associated with any relevant upper aerodigestive tract malignancy. This systematic literature review aims to provide the basis for such guidelines in what is sure to be an increasingly important occupational problem in the future.

CAN USE OF EBM IN DAILY PRACTICE OF OCCUPATIONAL HEALTH PHYSICIANS BE STIMULATED?

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[ID 866]

Context: A substantial part of daily routine in occupational health practice in the Netherlands is involvement in advising patients and their supervisors in relation to sickness absence management. Applying evidence in the decision making process of occupational physicians is not a regular part of this process.
Objective:
To enhance the use of EBM in daily practice by occupational health physicians
Design:
A cluster randomized controlled trial
Setting:
9 Occupational Health Services in the Netherlands
Participants:
123 Occupational health physicians
Intervention:
54 OPs randomized to the intervention group will receive a three half daily course in EBM. This is followed by recurrent case method learning sessions in small groups in which the steps of EBM are a regular part during a four months period. The OPs will perform regular search exercises to develop and increase their skills. Quality of sickness absent management in its context based on evidence is part of the training program.
Main outcome measure:
Sickness absence management based on evidence.
Results:
Improvement of behaviour underpinning advices and care by evidence from guidelines or literature

DEVELOPMENT AND VALIDATION OF A SCREENING INSTRUMENT FOR EMPLOYEES AT HIGH RISK FOR LONG-TERM SICKNESS ABSENCE

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Reduction of sickness absence and work disability is given high priority in the Netherlands by both employers and employees' organizations and the government. So far, treatment success and rehabilitation of employees on sick leave are rather limited. Therefore, a preventive approach aimed at early treatment of employees before sickness absence occurs, may be more effective. A prerequisite for such a preventive strategy is the capa-

bility to identify employees at high risk for long-term sickness absence before absenteeism actually occurs.
The purpose of our study was to develop a screening instrument aimed at identifying employees at high risk for long-term sickness absence.
The screening questionnaire, the so-called Balance Meter, was developed through analyses of questionnaire data (May 1998) and sickness absence data (July - December 1998) of the Maastricht Cohort Study (n=12,140), by using a cascade approach. The Balance Meter captures 39 multiple-choice questions regarding demographics, work environment, private situation, (mental) health status, and sickness absence history. Using a predefined algorithm, the response items are weighted and summed up to calculate a total score for predicting sickness absence. Both sensitivity and specificity of the Balance Meter are 75% for predicting long-term sickness absence (> 28 calendar days) during two to eight months after completion of the questionnaire.
The internal validation process was based on questionnaire and sickness absence data of the Maastricht Cohort Study in the period of May till December 1999 and revealed a good predictive value of the Balance Meter for future sickness absence in men (OR 16.0; CI 10.2-25.1) and women (OR 7.7; CI 4.5-13.2). The Balance Meter was also externally validated in a study among 4,987 ABN AMRO employees. Over an 11-month follow-up period, statistically significant differences were found in absence frequency and duration of employees scoring above the predefined cut-off score as compared to those scoring below the cut-off point.
It is concluded that the Balance Meter is capable of predicting future sickness absence, and as such may be considered a valuable screening instrument.

THE ERLANGEN MODEL OF WORKPLACE HEALTH PROMOTION - INITIATION OF A SUSTAINABLE CONSTITUTIONAL CORPORATE CULTURE

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Workplace health promotion (WHP) involves rules of conduct and ambience. A constitutional corporate culture was established to create and cultivate discrete sustainable institutions for prevention. Developed measures and programs were evaluated project-related. A cross-section study of n=1602 employees (54.3% female, age 16-63) out of six business companies in public services (PS), service providing (SP), crafts-enterprise (CE) and technology (T) was performed by standardized questionnaire. Project management, controlling and evaluation were served by the results. Emphasis was paid on behaviour patterns in “exercise”, “recreation” and “nutrition” as well as on “motivation”, “expectations”, “wishes” and “employee’s engagement”. By standardized interview the company management (CM) and involved staff members were asked for their motivation, expectations, goals and engagement.
50% of PS-, SP- and T –employees (CE: 34%) were set of changing attitude in exercising behaviour. 75 % of SP-employees outranked changes in nutrition and recreation more than exercise in contrast to CE-employees (34%). Basic desires in exercise were fitness-training, swimming and callisthenics. Nutritional consulting for weight reduction and cookery courses was required. Time- and mental pressure was reported by CE-employees. Requests for recreation were undifferentiated but generally designated. Employee’s engagement to sacrifice spare time was limited. Exercise- and other fees should be paid by employer. In majority, employee’s motivation was the expectation on “positive teamwork-effects”, “well-being” and “health”. CM-interview results agreed concerning goals of preventive measures (teamwork, manpower-preservation, upgrading the company’s outward appearance) but not as cost reduction instrument. Rating effects on employee’s illness status diverged between “essential” and “inaccessible”. CM-estimations to establish a constitutional corporate culture ranked between one to five years, some expected a decline in employee’s illness after one year.
A sustainable constitutional corporate culture in companies can be achieved by elements of “exercise”, “recreation” and “nutrition”. Attending evaluation processes feed back and optimize WHP results and help to avoid aberrations. Upcoming WHP programs should contribute mental health aspects.

APPLYING EVIDENCE-BASED MEDICAL DISPUTE RESOLUTION IN PRACTICE

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Health and medical knowledge are essential to the resolution of disputes in law and administrative applications (such as workers’ compensation) and provide essential input into public policy decisions (such as occupational health standards). There are few socially agreed-upon rules for the application of this knowledge except in the law. The legal system lacks the capacity to evaluate the validity of knowledge as evidence and therefore relies heavily on expert opinion. A similar problem once existed for the clinical practice of medicine but has been largely resolved through reliance on an approach called critical appraisal, which has established norms for the acceptance of evidence in clinical practice. We have been engaged in a project to develop a framework for applying the knowledge of health and medicine similar to the concept of critical appraisal but conducted within the dominant framework of dispute resolution in our society: the law. One critical issue is how to apply scientific evidence when the standard is “more likely than not” rather than scientific certainty. Another is how the generalizations drawn from epidemiology and population-based sciences are interpreted and individualized, as they must be, for the case at hand. A related issue is how risk is interpreted for an individual after the fact, when conventional probability treats risk before the fact and conventional biostatistics applies primarily to a population. We call this emerging approach “evidence-based medical dispute resolution”.

EVIDENCE ON HEALTH EFFECTS ASSOCIATED TO SEDENTARY WORK

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Objectives: Occupational health surveillance needs an evidence-based approach to identify all possible health effects related to risk factors. As part of a broader project, the objective of this present work is to identify and summarise recent published scientific evidence on health problems related to sedentary work as a contribution to evidence-based occupational health surveillance protocols.
Methods: The most prevalent occupational risk factors were selected according to the latest Spanish Survey on Work Conditions and included a list of physical, chemical, biological, ergonomic and psychosocial risk factors. Key words for each factor were selected through expert consultation and, when appropriate, electronic searches were carried out accordingly for each available databases. These searches were combined with a common strategy to identify observational and experimental studies, and reviews and metaanalyses in occupational health. Critical appraisal of each eligible study was carried out and identified health effects were classified according to the degree of evidence on their association with the risk factor and the magnitude of this association.
Results: Twenty-seven studies have been identified up to now on sedentary work, of which 11 have been excluded for various reasons. The quality was high for nine of the 16 included studies and intermediate for seven. There were eight case-control designs, eight cohorts, one review and one metaanalysis. Exposure to sedentary work was measured through the occupational title (n=11), interview and/or questionnaire (n=4) and quite differently accross studies. A moderate degree of evidence and of low magnitude was observed for breast and endometric cancer. The evidence was inconsistent for the rest of identified health outcomes, such as other cancers and musculoskeletal disorders.
Conclusions: This review suggests that other health effects than those traditionally known are associated to sedentary work.

OCCUPATIONAL CANCER AND CARCINOGENESIS

EXPOSURE TO SOLVENTS AND RISK OF HEMATOLYMPHOPOIETIC MALIGNANCIES: EVIDENCE FROM THE "ITALIAN CASE-CONTROL STUDY ON HEMATHOLYMPHOPOIETIC MALIGNANCIES.

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[ID 1685]

We have conducted a population-based case-control study in Italy. The study covered 11 Italian areas (Varese, Forlì, Siena, Latina, Ragusa, Imperia, Florence, Novara, Vercelli, and Verona provinces plus the city of Turin). All newly diagnosed cases of Non-Hodgkin's Lymphomas (NHL), Hodgkin's disease, all leukaemia types and Multiple Myeloma (MM) which occurred in males and females aged 20 to 74 years in the 1991-1993 period, were identified. The control group was formed by a random sample of the general population resident in each of the areas under study, stratified by sex and five-year age groups. Cases and controls were asked to participate in a person-to-person interview. 2,737 cases and 1,779 controls agreed and gave a complete interview on education, life-style factors, occupational history, medical history, specific medications, and family history. Concerning occupations, subjects were interviewed with job-specific questionnaires (about 50 for specific industrial and agricultural activities. Questionnaires of all interviewed people in 8 areas (2,428 cases and 1,530 controls) were evaluated by expert industrial hygienists who, blind to disease status, recorded their judgment on probability of exposure and intensity of exposure for a list of groups of chemicals and individual chemicals. For categorical models reported here, exposure was categorized as never, low or medium/high. For those in the medium-high level of exposure there was an increased risk of NHL (combined with Chronic Lymphocytic Leukemia [CLL] because of substantial biological similarities between the two diseases) for exposure to toluene (OR 1.8, 95% CI 1.1-2.8), xylene (OR 1.7, 95% CI 1.0-2.6) and benzene (OR 1.6, 95% CI 1.0-2.4). There was a high degree of correlation among benzene, xylene and toluene exposure, so that disentangling the role played by each exposure separately was not possible. Subjects exposed to all three aromatic hydrocarbons (benzene, toluene and xylene, medium/high intensity compared to none) had an OR of 2.2 (95% CI 1.1-4.5). Concerning all leukaemia types (ICD IX 204-208), we found a slight increased risk for exposure to benzene in medium/high category (OR=1.4, 95% CI 0.8-2.4). When we look at the specific subtypes of leukemia we found no association between exposure to any chemical classes or specific solvent and myeloid leukemia (ICD XI 205) in the medium/ high intensity levels and an increased risk for Lymphatic Leukemia (ICD IX 204), in particular for CLL, for exposure to benzene, toluene and xylene. Those exposed to benzene at medium /high level were at risk also for MM (OR 2.1, 95% CI 1.0-4.2). Our results support the hypothesis that solvent exposure may be a risk factor for hematolymphopoietic malignancies

CANCER RISKS IN A HISTORICAL UK COHORT OF BENZENE-EXPOSED WORKERS

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[ID 52]

A cohort of 5514 workers who had been occupationally exposed to benzene in 1966/67 or earlier had been assembled by the former Factory Inspectorate and the Medical Research Council from details provided by 233 employers in England and Wales. The cohort was followed up for mortality (1968-2002) and cancer registrations (1971-2001). National mortality rates and cancer registration rates were used to calculate standardised mortality ratios (SMRs) and standardised registration ratios (SRRs). Mortality was close to expectation for all causes (Obs 2430, 95%CI 97 to 105, SMR 101) and significantly elevated for cancer of the lip (Obs 2, SMR 974, 95% CI 118 to 3519), lung cancer (Obs 294, SMR 121, 95% CI 107 to 135), secondary and unspecified cancers (Obs 68, SMR 140, 95% CI 109 to 178), acute non-lymphocytic leukaemia (ANLL)(Obs 14, SMR 183, 5% CI 100 to 307), and all neoplasms (Obs 761, SMR 109, 95% CI 101 to 117). Significant deficits were shown for three non-malignant categories (mental disorders: Obs 8, SMR 50, 95% CI 21 to 98; diseases of the digestive system: Obs 51, SMR 76, 95% CI 56 to 100; accidents: Obs 23, SMR 55, 95% CI 35 to 82). SMRs for other leukaemia, lymphomas and multiple myeloma were close to or below expectation. There was some evidence of under-ascertainment of cancer registrations, although significantly elevated SRRs were shown for lung cancer (Obs 293, SRR 119, 95% CI 106 to 134) and cancer of the pleura (mesothelioma) (Obs 15, SRR 237, 95% CI 133 to 391). Many study subjects would have been exposed to carcinogens other than benzene (eg asbestos, rubber industry fumes, foundry fumes, polycyclic aromatic hydrocarbons) and the excesses of lung cancer and mesothelioma are likely to reflect exposures to these other carcinogens. The carcinogenic effects of benzene exposure on the lymphohaematopoietic system were limited to ANLL, and appear to be small in absolute terms.

CHANGES IN METHYLATION PATTERNS IN SUBJECTS EXPOSED TO LOW-DOSE BENZENE

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[ID 2263]

High-dose exposure to benzene, an ubiquitous environmental pollutant, is associated with
increased risk of acute myeloid leukemia (AML) in exposed subjects, but mechanisms of leukomogenesis and risks associated with lower exposures are largely unknown.
Since AML is accompanied by profound epigenetic alterations, to assess if benzene exposure could lead to a genome-wide hypomethylation and to a hypermethylation or hypomethylation of specific genes, we tested the degree of methylation of five sequences (Alu, LINE, MAGE, p15, H19) in DNA obtained from whole blood sample of a subgroup of the Italian population (Milan area, Italy), composed by 77 gasoline station attendants (median exposure 61 µg/m3), 77 traffic police officers (median exposure 22 µg/m3) and 57 referents (median exposure 6 µg/m3). These subjects are well-characterized in terms of individual airborne exposure, urinary biomarkers (t,t-muconic acid, S-phenylmercapturic acid, urinary benzene), genetic polymorphisms, DNA-SSB, blood cell count and questionnaire data (demographics, education, tobacco smoke, alcohol, leisure time activity, personal medical history, residence, work history). DNA methylation was investigated by means of PCR amplification and pyrosequencing on bisulfite-treated DNA. Alu and LINE-1 repetitive elements were used to estimate global DNA methylation. Hypomethylation of MAGE and hypermethylation of p15 were tested. H19 allele-specific methylation was determined as a marker of Loss of Imprinting (LOI).
A significant reduction in global methylation measured in Alu (-9.95%, p=0.027) and LINE-1 (-23.28% p<0.01) was observed for a 10-log units increase in airborne benzene exposure. Airborne benzene was associated with hypermethylation in p15 (+3.54%; p=0.018) and hypomethylation in MAGE (-4.85%; p=0.049), while H19 methylation was not significantly different in the three groups.
Our findings suggest that low-dose benzene induces in healthy subjects epigenetic alterations that are qualitatively similar to those found in malignant cells and need to be further evaluated.

CAUSE-SPECIFIC MORTALITY OF A COHORT OF RUBBER MIXERS

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[ID 988]

Introduction: amines (beta-naphthylamine, nitrosamines), solvents, dusts (e.g. talc, carbon black, asbestos) have been described as determinants of high incidence of tumors (mainly bladder, larynx, lung cancer and leukaemia) in rubber workers. Rubber mixing is among the jobs with the highest levels of exposure to this wide range of substances. In the area of Torino the rubber manufacturing industry (mostly rubber tire industry) has represented for many years one of the main industrial activities. Methods: The study population consisted of 1,777 male workers employed in "rubber mixing", hired between 1923 and 1978. Vital status was ascertained by means of mailing follow-up. Standardized Mortality Ratios were computed using the manual workers population of Torino as a reference, in order to reduce the healthy worker effect and the confounding from social class, since no information was available on subjects' lifestyle habits. Observation period went from 1/1/1971 to 31/12/1995. 1,277 rubber

mixers still alive at 1971 were included in analysis. Cause of death was retrieved for 259 of 277 subjects (93.5%). Results: overall mortality was significantly increased (SMR=136; 90%C.I. 123-151). Mortality from all neoplasms (103 obs.; SMR=133; 90%C.I. 112-156) and leukaemia (9 obs.; SMR=414; 90%C.I. 217-725) was significantly higher than expected, whereas non-significant excess mortality was observed for lung (29 obs.; SMR=112), larynx (5 obs.; SMR=180), liver (8 obs.; SMR=175), prostate (6 obs; SMR=217), stomach (10 obs.; SMR=150) and bladder cancers (5 obs.; SMR=138). Cancer mortality was higher among workers employed more than 10 years. Among non malignant diseases, a statistically significant increased mortality from cerebrovascular diseases was found (28 obs.; SMR=178; 90%C.I. 127-245); the number of deaths from ischemic heart diseases (36 obs.; SMR=113) and cirrhosis (18 obs.; SMR=134) was larger than the expected, although not significantly. Conclusions: excesses of cancer of lung, larynx, bladder, stomach and leukaemias are in agreement with previous studies. The choice of a reference population composed of urban manual workers, who belong to the same socioeconomic class of the cohort, reduces the probability that the observed excesses are attributable to confounding by lifestyle habits.

EXPOSURE TO BENZENE AND RISK OF BREAST CANCER AMONG SHOE FACTORY WORKERS IN ITALY

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[ID 1536]

Background: Little is known about the role of environmental factors in the induction of breast cancer. Some studies suggested a possible role of organic solvents and specifically of benzene.
Objectives: To analyse the risk of breast cancer among women under the hypothesis that low exposures to benzene could be a risk factor for solid cancer with a latency period longer than for leukemia in a cohort of women exposed to benzene in a shoe-factory in Florence, Italy.
Methods: The whole cohort consisted of 1002 women at work on January 1, 1950 followed up 1950 to 2002 for mortality and 1985-2000 for incidence. Standardised Mortality Ratios were calculated for a sub-cohort of 797 women - for whom cumulative exposure (CE) to benzene was estimated - based on mortality rates of Tuscany. Standardised Incidence Ratios were calculated for 735 women out of 797 - alive on 1985 (first year of availability of incidence data provided by the Tuscan Cancer Registry.
Results: Sixteen deaths for breast cancer occurred in the whole cohort; 13 were the breast cancer deaths in the 797 women sub-cohort. The SMR was equal to 59 (95% CI: 19-181) for less than 30 years of latency and 151 (95% CI: 79-290) for 30 or more years of latency. No differences were observed among women with different classes of CE exposure. In the sub-cohort of 735 women, 24 cases of breast cancer occurred. The SIR was equal to 133 (95% CI: 72-247) for a latency period less then 30 years and 105 (95% CI: 62-177) for a latency period equal or greater than 30 years. The SIR was equal to 201 (95% CI: 28-1430) in the >40 ppm-years and less than 30 year latency period category.
Conclusion: There is some suggestion of elevated incident breast cancer risk in the highest exposure group, but small numbers limit confidence in this finding.

THE RISK OF CANCER AMONG OFFSHORE WORKERS IN NORWEGIAN UPSTREAM PETROLEUM INDUSTRY

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[ID 1019]

Introduction: Benzene and polycyclic aromatic hydrocarbons are known carcinogenic substances. Offshore workers, who have participated in exploration and production of gas and oil on the Norwegian continental shelf for the last 35 years, have been exposed to these substances in varying degree. We wanted to estimate the differences in incidence of all cancer types and length of survival in these workers compared to the general working population in Norway.
Methods: A historical cohort will be established using the Registry of Employers and Employees, which includes information on all Norwegian employers and their employees. The cohort will include all workers with the Norwegian continental shelf as their workplace at any time in the period from 1980 and up to 2004, approximately 70,000 individuals. A reference population of 400,000 workers will be drawn from the general working population from the same register. Up to 6 reference workers will be linked to each offshore worker at time of this workers first engagement offshore, matched on sex, age and municipality. The total cohort will be linked to the Norwegian Cancer Registry for the same period for registration of all cancer types, and to the Registry of Causes of Mortality for the analysis of differences in length of survival or remission after the date of diagnosis.
Results: Incidence ratios, using Poisson regression, and survival ratios, using the Cox's proportional hazard regression model, will be presented for main cancer types between groups of offshore workers and the general working population.
Conclusion: The results will enable us to evaluate whether workers in upstream petroleum industry in Norway have been exposed to carcinogenic substances to such a degree that they have had an increased frequency of cancers. The size of the study will permit an evaluation of a possible increased risk also for workers with relatively low exposure.

CANCER RISK ASSESSMENT IN WORKERS EXPOSED TO DICHLOROBENZIDINE

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[ID 1448]

Introduction: Dichlorobenzidine (DCB) is classified as a probable human carcinogen. In a French facility producing DCB and a dye (Yellow 12) synthesized from DCB, we observed through the last 10 years several cases of bladder cancer, and frequent significant contamination of workers with DCB, with urinary levels above 300 ppb. The aims of this study were to assess current exposure to DCB and to screen for bladder lesions with new screening tests.
Material and Methods: all the 61 workers exposed to DCB were included. Two series of urine samples were taken: firstly in usual professional working activity, secondly just after a one month period of holidays (non-exposure). The contamination of workers was evaluated with the Ames test (strains TA 98, 100) and with measurement of urinary levels of DCB. Simultaneously, workers had to answer a questionnaire concerning the working conditions (including the use of PPE). Detection of bladder tumors was performed with an original approach combining urinary cytology and fluorescence immunocytochemistry using monoclonal antibodies (19A211, M344 and LDQ10).
Results: exposure assessment and research for bladder lesions were fully performed for respectively 48 and 47 workers. The mean length of employment was 12,5 years. 7 workers had a positive answer to the Ames test, and 4 of them displayed a positive trend between the non-exposed and the exposed periods. DCB was detected in 4 urine samples. Analysis of the questionnaire revealed a real need for improvement of industrial hygiene (lack of hand washing, smoking on the workplace). No bladder tumor was found and urinary cytology and immunocytochemistry dysplayed concordant results.
Discussion-conclusion: DCB exposures in this facility appeared to be low, yet with the need of some improvement. Despite high exposure to DCB in the past, no bladder tumor was found, even with a combination of two screening tests known to have a better sensitivity that urinary cytology alone.

REPRODUCTIVE HAZARDS IN THE WORKPLACE

REPRODUCTIVE ENDOCRINE STUDY IN THE FEMALE WORKERS OF LIQUID CRYSTAL DISPLAY MANUFACTURING

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[ID 414]

Introduction: In our previous study, we found that female workers in module area had a higher risk of shorter menstrual length than the other areas. The possible explanation for this result was potential multiple chemicals including ethanol, acetone, toluene, xylene, benzene, and styrene affecting female reproductive endocrine. The objective of this cross-sectional study was to assess the potential reproductive endocrine effects of occupational exposures in the liquid crystal display (LCD) manufacturing. Methods: The study population consisted of 96 female employees working at array, panel, or module processes at a LCD plant of Taiwan. Each subject completed the questionnaire and collected urine samples daily after waking for at least one complete menstrual cycle with daily diary between December 2003 and January 2004. We measured daily urine follicular stimulating hormone (FSH), estrone conjugates (E1C), and pregnanediol-3-glucuronide (PdG) by ELISA. Finally, we used linear mixed models to estimate coefficients and to control age, body mass index, and psychiatric stress. Results: We found that the female workers in the module group had a significant increase of FSH (0.08 mIU/mg Cr, $p < 0.05$) and E1C (2.38 ng/mg Cr, $p < 0.01$) in the early follicular phase compared with those in panel group. Conclusions: It can be inferred that multiple chemical exposures may diminish ovarian oocyte reserve or induced ovarian failure. Consequently, shortening follicular phase leads to shortening menstrual cycle. It is collaborate with the finding of our previous study.

OCCUPATIONAL EXPOSURE TO CHLORDECONE AND MALE FERTILITY IN BANANA PLANTATION WORKERS IN GUADELOUPE (FRENCH WEST INDIES)

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Chlordecone is a synthetic chlorinated pesticide that was used in the USA to control insects in non-fruit citrus trees, tobacco and ornamental shrubs until it was banned in 1978. However, it was used until 1993 in the French West Indies in banana plantations for the control of banana root borer. Chlordecone is highly persistent and because of its lipophilicity it is bioaccumulated through environmental (food chain) or occupational exposures. Toxicological studies have shown that chlordecone interferes with reproduction, including male fertility and it is clearly identified as an endocrine disruptor. Our study aimed to determine the current level of contamination in banana workers in Guadeloupe and to investigate its relationship with fertility. We carried out a cross-sectional study to assess semen quality and concentrations of chlordecone in the blood of 100 workers regularly followed by occupational physicians. Of the subjects, 43 were professional pesticide applicators and 57 worked in non-agricultural sectors and had never applied pesticides in any circumstances. Gas chromatography coupled to an electron capture detection was used to measure chlordecone in serum. Semen analyses were carried out according to WHO recommendations. The mean level of chlordecone was significantly different in workers not applying pesticides than in those applying pesticides (5.9 ng/ml, range 1.5 to 24, compared to 15.4 ng/ml, range 1.5 to 105, respectively, $p = 0.002$). Among pesticide applicators, there was a significant correlation between the number of years of pesticide application and chlordecone levels ($R = 0.23$, $p = 0.02$). However, most seminal characteristics (sperm concentration, output, motility and morphology) showed no significant correlation with chlordecone levels in blood or with the number of years of pesticide application. Our results show high levels of body contamination by chlordecone in Guadeloupean male workers population. However, current exposure levels are not associated with a significant effect on seminal quality.

MATERNAL OCCUPATIONAL RISK FACTORS AND PERINATAL MORTALITY IN PENINSULAR MALAYSIA, 2002

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A study to determine the extent of perinatal deaths and to investigate associated maternal occupational risk factors was initiated in Peninsular Malaysia.

A one-year community-based cross-sectional descriptive study was initially conducted. This was followed by a case-control study in the State of Selangor, one of 12 states in Peninsular Malaysia. Mothers experiencing perinatal death (stillbirth or infant death within a week of life) were identified through a national reporting system and interviewed to obtain information on the mothers' occupation and their perception of workplace exposures to hazardous materials and risk factors. A total of 2,819 perinatal death forms were received for the one-year study period and 30.3% of these were among working mothers. The most frequently reported workplace risk factor was prolonged standing (> 3 hours) during the work day (39.3%).

The study of 78 cases (working mothers with perinatal death) and 78 controls (working mothers with livebirth baby not resulting in early neonatal death) showed significant differences for: a) having a husband who is a smoker, b) giving birth prematurely during the most recent pregnancy, c) delivering a low birth weight baby of < 2,500 grams, and d) prolonged standing of > 3 hours during the work day. However, the variables that remained significant after logistic regression analysis are premature delivery (OR 4.4, 95% CI 1.3-14.7.0, $p = 0.02$), low birth weight baby of (OR 3.6, 95% CI 1.2-10.1, $p = 0.02$) and prolonged standing (OR 3.5, 95% CI 1.5 – 8.3, $p = 0.01$). Two of these factors related to the pregnancy state, while the third factor (prolonged standing) is an occupational risk factor that can be reduced through preventive measures at the workplace.

OCCUPATIONAL ACTIVITY AND PREGNANCY OUTCOME. A SYSTEMATIC REVIEW OF THE LITERATURE

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Background and aims

EU legislation requires assessment and minimisation of occupational risks to pregnant workers. We conducted a systematic literature review to assess whether working hours, shift work, standing, and physically demanding work affect the risks of pre-term delivery, low birth weight (LBW) and pre-eclampsia.

Methods

We searched all papers with an English abstract published in the Medline and Embase databases during 1966 - February 2005 using appropriate MESH and keyword terms. Following a consensual review of abstracts by two of us, relevant papers were retrieved and their bibliography searched for extra material. We assessed the methodological quality and design of each relevant study, and abstracted and summarised risk estimates.

Results

Our search identified 47 observational studies (30 on prematurity, 31 on LBW and 9 on pre-eclampsia). The exposure most consistently associated with preterm delivery was standing at work, but the strength of evidence was limited. Studies used different exposure definitions and assessment methods and risks were only slightly raised. Heavy lifting, shift work and long working hours were sometimes associated with prematurity, but not significantly. Two ad hoc scores (cumulative physical activity and perceived fatigue) proved difficult to interpret. For LBW, some studies used only a

continuous outcome measure and did not consider the clinical importance of reduced weight within a normal range; others did not adjust for gestational age. After excluding this second group, increased risks were reported in most studies of shift work and standing, but effects tended not to be significant. Regarding pre-eclampsia, no evidence was found of a significant relation with working hours, shift work or standing.
Discussion
Although some positive associations were found, the evidence linking physically demanding activities to preterm delivery, LBW and pre-eclampsia remains inconclusive. Studies often proved hard to compare or had methodological weaknesses, suggesting a need for more targeted research.

MAGNETIC FIELDS EMITTED BY INDUSTRIAL SEWING MACHINES AND SPONTANEOUS ABORTION

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[ID 913]

The objective of this study was to determine whether magnetic fields (MF) emitted by industrial sewing machines is related to spontaneous abortion (SA). The information about outcomes of pregnancies, workload and type of sewing machines used during this time was defined on the basis of the questionnaire completed by seamstresses employed in 9 sewing rooms. Machine characteristics in respect of magnetic fields emission were performed on the basis of measurement MF at the knee level of seamstress. These measurements allow classifying sewing machines into two groups: those with lower (0.2 – 4.0 A/m) and higher (9.0 – 16.0 A/m) MF emissions.
Among 2807 women who participated in the study (79.3% of the employed in these plants) 4236 pregnancies were identified. Because the outcome of previous pregnancies have influence on the outcome of the next pregnancies we decided to restrict the main analysis to 2084 first pregnancies in women working before end/or during pregnancy in sewing rooms. Among 300 women, who continued work with sewing machines during pregnancy, 38 (12.67%) experienced a spontaneous abortion, 2 (0.67%) ectopic pregnancy and 5 (1.67%) stillbirths.
The relation between MF emitted by sewing machines and SA was determined according to the case-control model: the cases – 38 SA and controls – 255 live births. During pregnancy 258 women used sewing machines with low and 35 with high MF emission. In the first group the mean age at the point of the study were 40.9±7.4 years and during first pregnancy 22.4±2.0 years, in the second group – 35.8±8.5 and 22.3±2.1 respectively. The number of spontaneous abortion in the first group was 20 (7.75%) and in the second group – 18 (51.4%). The crude odds ratio (OR) for spontaneous abortion among women who had used sewing machines with a higher MF emission was 12.60 (95% CI: 5.62 – 28.27) as compared with women using sewing machines with lower emission. Adjustment for statistically significant confounders (workload >700 kcal/shift, piecework, years between point of the study and first pregnancy) decreased the OR for spontaneous abortion related to high MF exposure, but it was still very high (OR = 7.91; 95% CI: 3.03 – 20.64).
The results suggest important negative influence MF emitted by some of sewing machines on the course of pregnancy, but they should be interpreted with caution due to the method used in obtaining the data on pregnancy outcomes.

THE RISK OF REDUCED FERTILITY AND FOETAL DEATH AMONG FEMALE GREENHOUSE WORKERS.

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[ID 1776]

The aim of the study was to evaluate the effect of exposure to pesticides on fertility and pregnancy outcome among female greenhouse workers.
Reproductive history, time to pregnancy, pregnancy outcome and information on occupational exposures prior and during each pregnancy were obtained from the women workers of 34 greenhouse flower growing enterprises. The data were collected retrospectively by questionnaire from women aged between 20-49 with at least one pregnancy and working in greenhouses for at least three months between 1990-1999.
Time to pregnancy was based on data provided by 565 women (response rate 78.8%), reporting 713 pregnancies. The study of spontaneous abortion was based on 846 pregnancies.
After adjustment for confounding variables(women's age, parity, smoking, coffee, alcohol and tea consumption, hypertension, work and age of the partner), the hazard ratio for reduced fecundability among the exposed was not statistically significantly (OR 0.96, 95% CI 0.81-1.13) . A significant reduction in fecundability was observed for age and low parity of the women and with the daily consumption of one or more drinks of alcoholic beverages or tea. The incidence of spontaneous abortion was 12.6% among the exposed pregnancies (n=334) , and 9.2% among the non exposed (n=512), with an adjusted OR of 1.4 (95% CI 0.8-2.3). Classifying pregnancies according to degree of exposure (measured by to the time elapsing between application of pesticides and re-entry in the greenhouse), there was increased risk of spontaneous abortion among women with the highest exposure (OR 4.2, 95% CI 1.9-9.2).
We found no evidence that work in greenhouses prior to and during pregnancy is associated with reduced fertility. The risk for spontaneous abortion is higher among pregnant women who re-enter the greenhouse within 24 hours of pesticide application.

EFFECT OF OCCUPATIONAL SAFETY MEASURES ON THE MICRONUCLEUS FREQUENCY IN SEMICONDUCTOR PERSONNEL

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[ID 1211]

Semiconductor workers are potentially exposed to complex mixtures of waste products originating from the plasma etching process. Little is known about the toxicological consequences of exposure to these residues, but there is some indication for an elevated risk of spontaneous abortion in semiconductor personnel. The objective of the present study was to investigate whether semiconductor workers show an increased genotoxic risk as compared to unexposed controls. The micronucleus test on isolated lymphocytes was used for the detection of genotoxic effects. Two series of monitoring have been performed in order to assess the effect of implemented protection measures. We found a significantly increased micronucleus frequency in exposed individuals as compared to controls. Interestingly, the second survey 12 years after implementation of protection measures did not reveal any differences in the micronucleus frequency between exposed individuals and controls. This points to the significance of adequate safety measures to protect against chromosomal damage in semiconductor personnel. We recommend the micronucleus tests as a useful tool for the early detection of health risk due to exposure to complex mixtures of chemicals.

SMALL SCALE ENTERPRISE AND INFORMAL SECTOR

FIELD SURVEY ON USE OF ORGANIC SOLVENTS IN INDUSTRIES OF VARIOUS SIZES

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[ID 1686]

Objective: The intention of this study was to examine, in relation to the size of enterprise, 1) common types of solvents and 2) the relative risk of high solvent exposure by types of work.
Methods: Following grid sampling strategy, air samples were collected in 1016 solvent workplaces in 156 enterprises of various sizes, and analyzed for concentrations of 47 legally designated organic solvents. The GM values of the concentrations (after application of additiveness formula) in each workplace were taken as the representative value. Solvent works were classified into 11 categories according to the regulatory ordinance.
Results: Toluene was the most often detected solvent (i.e., 42% of the 1016 workplaces). By types of solvent work, toluene was most common in printing (64%), painting (79%), and adhesive spreading work (86%), whereas isopropyl alcohol was the leading solvent in cases of surface coating (52%) and cleaning work (46%). Use of methanol was also high (36% of all cases). Thus, compared with the results of a survey in 1996, a shift from toluene to alcohol was evident. There was a reverse enterprise size-dependency in solvent concentrations in air, being 5 times higher in enterprises with <50 employees as compared with the level in enterprises with ⩾501 employees. Among solvent workplaces, concentrations tended to be high in printing workplaces especially in small enterprises, whereas the levels were substantially lower in testing and research laboratories irrespective of enterprise size.
Conclusions: Solvent exposure was about 5-times higher in small enterprises as compared with the levels in large enterprises. There was a gradual shift in solvent use from toluene to other solvents, typically alcohols such as isopropyl alcohol and methanol. By types of work, solvent vapor levels were relatively high in printing workplaces and low in testing and research laboratories.

A WISE APPROACH FOR DEALING WITH STRESS, VIOLENCE, HARASSMENT, LONG WORKING HOURS AND SHIFT WORK IN SMALL ENTERPRISES

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[ID 772]

The Work Improvement in Small Enterprises (WISE) training program was developed by the ILO to promote improvement in working conditions in the types of enterprises that are least susceptible to action by labour inspectorates and trade unions, i.e. small enterprises. It has been used worldwide for nearly two decades and translated into Bahasa Indonesia, Bahasa Malaysia, Thai, Lao, Khmer, Chinese, Bangla, Vietnamese, Mongolian, Serbian, French, and Spanish. WISE approaches the issue of working conditions from the point of view of employers, emphasising the business benefits that can be derived from better workplace conditions. The current WISE programme has a strong focus on the physical work environment and ergonomic issues.
This presentation describes new ILO training materials designed to assist small enterprise employers in implementing practical, simple and low-cost measures to address emerging occupational health problems related to stress, violence, harassment, long working hours and shift work. These are areas where improvements on the ground could begin to tackle gender gaps at work as well. The presentation will discuss the WISE approach to these issues, which have been developed based on past experiences with WISE, and summarize the findings from pilot training programs that are currently being conducted in many countries in Asia, Africa, and South America.

STUDIES IN SMALL ENTERPRISES AND THE INFORMAL SECTOR IN AUSTRALIA

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[ID 1680]

The National Institute of Occupational Health and Safety was the main scientific body dealing with OHS issues in Australia. Based on the statistics of notified occupational health problems in small enterprises and the informal sector we received regularly, we decided to explore some of the major problems identified and which warranted deeper investigation. One problem related to indoor air quality in small workplaces. We took a sample of a total of 857 workers in several workplaces, and found that up to 38 per cent complained of symptoms related to ventilation. Physical, chemical and biological parameters were tested. The parameters most closely related to the workers' symptoms were dustiness, draftiness and temperature imbalance. Another sector of increasing concern were health personnel in small establishments exposed to ergonomic and chemical factors, particularly to glutaraldehyde and latex. In our study of 154 such workers, we found 85 per cent complained of adverse effects from glutaraldehyde, but in most such cases there were no objective signs to support the diagnosis. We confirmed a few cases of frank inorganic metal poisoning (particularly lead and mercury), organic solvent poisoning and pesticide poisoning (particularly organophosphates and pyrethroids). However, we also observed an increasing number of cases diagnosed as Multiple Chemical Sensitivities. We studied 45 such cases, and found that they originated from a large range of manufacturing and service industries.
The paper concludes with recommendations on the formulation of national codes of practice to prevent such hazards.

BIOHAZARDS: A GROWING CHALLENGE FOR WORKPLACE EXPOSURE ASSESSMENT

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[ID 368]

Airborne microbiological agents are involved in a number of significant occupational diseases. Exposure to these bioaerosols is predominantly in rural, low paid occupations mostly in developing countries and involves agents of infectious and respiratory illness.
With the revolution in biotechnologies in the past two decades and the recent focus on potential agents of bio terrorism, however, there is a renewed view that most working environments can be potentially at risk from biohazards.
In risk management terms, the assessment and control of biohazards pose a unique challenge to OHS professionals. With tens of thousands of chemically different agents involved, and often growing and multiplying at rapid rates, a multitude of sampling and analytical methods are used.
Interpretation of bioaerosol sampling data is another key problem. Although some approaches have been taken to set specific exposure standards (for example by ACGIH, 1989, Dutch ECOS 1997), results are interpreted subjectively and lack validated exposure assessment criteria. Sampling methods and exposure standards or guidelines for biohazards are therefore not well-established in the field of occupational hygiene, as their counterparts in physical and chemical hazards.
This paper will highlight the challenges faced in biohazard assessments in the workplace by reviewing current sampling methodology for bioaerosols and various international attempts at establishing exposure assessment guidelines.
The problem in the occupational health & safety context will be illustrated with an outline of the risk management framework for biohazards in Australian OHS legislation. Case studies will be provided to demonstrate its application.
Emerging issues of occupational exposures involving microbiological hazards such as SARS and potential bio terrorism agents have given an impetus for attention on biohazards. Recommendations will be made for initiatives from occupational health professionals, regulatory agencies, unions and employers to protect workers from risks related to exposures from biohazards at work. .
(The views expressed in this abstract are those of the authors and do not necessarily reflect those of their affiliated organisations)

DEVELOPING A PARADIAM FOR ASSESSING ERGONOMIC HAZARDS FOR SMALL AND MEDIUM WORKPLACES IN INDIA

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[ID 17]

The guidelines for assessment of ergonomic hazards at workplaces are relatively new and are based on databases largely generated in developed country settings. Few efforts have been made to assess the applicability of these guidelines in developing countries. Differences in hazard profiles, co-exposures to chemical, biological and other physical hazards and ambient exposures are just a few factors, an understanding of which will greatly improve generation of process specific guidelines. Further, ergonomic hazards can originate not only from the poor design of the workstation but also due to the improper selection of the worker to carry out the specific job (the individual's physiological suitability for the job). Thus it becomes necessary to consider simultaneously the workload and the work capacity to assess hazards at any workstation.

We present results of our attempts to inter-relate the workload and work capacity for a series of processes in small and medium scale enterprises(SMEs) from the tanning, textile and automotive sectors in Southern India. This information along with baseline work environment profiles is used to generate a framework for design of specific interventions of other chemical and physical hazards at these worksites.

INDOOR AIR QUALITY

EVALUATION OF THE AIR QUALITY IN OPERATING BLOCKS OF THE UNIVERSITY HOSPITAL

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[ID 182]

Introduction
Hospital air environment is particularly rich in highly resistant bacteria and it is therefore a major source of nosocomial infections.
Objectives
The aim of our study was to evaluate microbiological, particle, physical air quality, bacteriological quality of surfaces and the efficacy of air treatment modalities in operating rooms.
Methods
Microbiological air control was performed by a bio-collector using a direct impaction technique. Sampling method and culture medium were recommended by the nosocomial infections coordinating centre of the France (C. CLIN). Surfaces bacteriological control was performed using qualitative swab sampling. Particle counting was made using an optic particle sensor.
Results
The study showed a high level of colonies forming units m3 ranging between 9 an 100 which was higher than the recommended AFNOR norms (French Normalisation Association). Bacterial flora was polymorph however negative coagulase staphylococcus was predominant (65 %). Penicillium was the most frequent isolated mould (41 %). Surfaces bacteriological control was positive 37 % of cases. Air particle analysis showed that the majority of operating rooms were not conforming to the recommended levels (operating site infection level 7).
Air physical analysis, temperature and hygrometric levels were within the recommended norms however pressure gradients were in depression. The hourly air renewal rate was very low (0 – 8.8 v/h).
Discussion and conclusion
These results could be explained by the air treatment quality. Indeed the centralized air treatment tends to be abandoned in high infection risk areas. Besides, some nursing stuff practices should be changed.
A supervision protocol of air quality in operating rooms must be implemented for a better control of airborne infection risk.

SICK BUILDING SYNDROME AND INDOOR AIR QUALITY IN JAPAN

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[ID 494]

[BACKGROUND] The similar Sick Building Syndrome (SBS) has been reported with increasing frequency in airtight new houses in Japan, that is, Sick House Syndrome (SHS). [METHODS] We conducted the questionnaire survey of the family and measuring indoor air quality in each house concerning SHS. In 2003, we sent the questionnaire to about 1000 new houses, built from 1996 to 2002 which were independently owned houses in Fukushima city, northeast part of Japan. The response rate was 47%. In 2004, we measured the indoor air quality (45 volatile organic compounds, fungus, mite and so on) in the 68 houses, surveyed in 2003. [RESULTS & CONCLUSSION]Popular indoor ventilation methods were to open the window, and then to use vitiation system in each room. Ventilation systems were located mainly in the kitchen and bathroom. Frequent symptoms of the families were nasal obstruction, eye strain, breathlessness, skin eczema, skin itching, weariness, languidness, abdominal symptoms, allergic reaction, asthma. Mean concentrations of formaldehyde, acetaldehyde and acetone were respectively 39.9(SD;14.8), 32.0(22.2), and 61.0(57.7)μg/m3. Mean concentration of cladosprium which was popular in door air, was 303.2 (SD;266.0)CFU/m3. Common sources of these contaminations include renovation and remodeling material such as paints, insulation material, and volatile organic compounds such as formaldehyde and microbes such as fungus, mite. Ventilation device must be set up in new houses in building law from 2003 in Japan. Measurements of air contamination are needed to follow up.

CHARACTERISTICS ON PM10 AND PM2.5 MONITORED IN INTERIOR AND PLATFORM OF SUBWAY TRAIN IN KOREA

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[ID 675]

This study was performed to investigate the concentration of PM10 and PM2.5 inside trains and platforms on subway lines 1, 2, 4 and 5 in Seoul, KOREA. PM10, PM2.5, and carbon dioxide were monitored using a Portable Aerosol Spectrometer in the afternoons (between 13:00 and 16:00). The concentrations of PM10 and PM2.5 inside trains were significantly higher than those measured on platforms and in ambient air reported by the Korea Environmental Protection Agency (EPA). This study found that PM10 levels inside subway lines 1, 2 and 4 exceeded the Korea indoor air quality standard (IAQ) of 150 $\mu g/m^3$. The average percentage that exceeded the PM10 standard was 83.3 % on line 1, 37.9 % on line 2 and 63.1 % on line 4, respectively. PM2.5 concentration ranged from 77.7 $\mu g/m^3$ to 158.2 $\mu g/m^3$, which were found to be much higher than the ambient air PM2.5 standard promulgated by United States Environmental Protection Agency (US-EPA) (24 hours arithmetic mean: 65 $\mu g/m^3$). The reason for interior PM10 and PM2.5 being higher than those on platforms is due to subway trains in Korea not having mechanical ventilation systems to supply fresh air inside the train. The percentage of PM2.5 in PM10 was 86.2 % on platforms, 81.7 % inside trains, 80.2 % underground and 90.2 % at ground track. These results indicated that fine particles (PM2.5) accounted for most of PM10 and polluted subway air. Further study is required to examine whether differences of the ratio in PM2.5 to PM10 among several subway characteristics is significant.

REACTIVE CHEMISTRY AND ITS HEALTH IMPLICATION IN THE OFFICE ENVIRONMENT

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[ID 951]

Sensory irritation in eyes and upper airways are common symptoms reported in office environments. It has been suggested that ozone and certain common alkenes (terpenes) in indoor air form unstable species which could be responsible for the observed sensory irritation – presented as the "reactive chemistry" hypothesis. This hypothesis has been evaluated by measure of the sensory irritation of terpene oxidation products in a mouse bioassay and a human eye exposure model. The paper summarizes the knowledge about reactive chemistry and its possible implication on sensory irritation in the office environment.
The results from the mouse bioassay, which estimates airway irritation from reduction in the respiratory rate, suggested that R-limonene/ozone (LO), -pinene/ozone (PO), and isoprene/ozone (IO) reaction mixtures generate sensory irritants of known and unknown structures. The sensory irritation effect is significantly higher than that exhibited by the reaction products and residual concentration of the reactants. The identified sensory irritants inter alia include formaldehyde, methacrolein, methyl vinylketone, and formic and acetic acid. New research, however, has demonstrated that a number of labile species are not sampled by traditional techniques.
In human exposure studies, male subjects have been exposed in one eye for 20 min with LO and IO reaction mixtures, the nitrate radical, methacrolein, and residual reactants. The eye blink frequencies of the subjects were recorded as a measure of trigeminal stimulation of the eye. Mean blink frequencies increased significantly only during exposure to LO reaction mixtures and methacrolein compared with that of clean air; the findings coincided with qualitative reporting of weak eye irritation symptoms. The blink frequency showed a decreasing trend by increase of the relative humidity from 20% to 50% for LO reaction mixtures. A similar significant effect was observed in the mouse bioassay in which sensory irritation was highest at low relative humidity for both LO and IO reaction mixtures. The observed effects may be ascribed to the formation of less irritation species, a more stable mucous membrane, a more stable eye tear film or a combination.
The above findings substantiate the hypothesis that gaseous terpene-ozone reaction mixtures cause trigeminal stimulation and possibly eye irritation at ozone and limonene concentrations that are close to high-end values in indoor settings at typical air exchange rates. Exposure duration and low relative humidity appear to be important factors in development of sensory irritation in the office environment.

EVALUATION OF HEALTH AND COMFORT IN OFFICE BUILDINGS (EU HOPE PROJECT): ANALYSIS OF ITALIAN RESULTS

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[ID 1737]

The EU project HOPE (Health Optimisation Protocol for Energy-efficient buildings) aimed at characterising building performance in both energy efficiency and occupant health and comfort. A total of seventy one office buildings have been evaluated at European level. This paper presents detailed results obtained from the Italian office building sample (4 office buildings located in Milan).

Building health classification was based on a two-stage approach. First, a qualitative evaluation was made based on building characteristics collected by checklists and during visual inspections of the buildings; this evaluation was integrated with the results of the questionnaires compiled by the occupants of the building. The second step consisted of instrumental measurements of hazards evaluated as present or possibly present on the first phase. Combining the results the buildings were classified into three categories: 1 - Healthy building; 2 - Uncertainly healthy building; 3 – Unhealthy building.

Although the investigated Italian office buildings were built or converted and retrofitted recently, taking care of health and comfort issues, all the buildings resulted in a final classification as "unhealthy buildings". The main problems found were: non complete smoking policy, high levels of radon, particulate matter, carcinogenic VOCs, CO and NOx, and possible presence of biological pollutants. In all buildings the most frequent symptoms reported by occupants at the questionnaire were lethargy (42,9%), headache (29,3%) and dry eyes (28,7%). The environmental measurements performed in two of these buildings led to the final classification and in general showed a good agreement with phase 1 assessment, indicating the effectiveness of phase 1 procedures in selecting measurement plans and assessing health and comfort hazards in buildings.

INDOOR ENVIRONMENTAL QUALITY IN A 'LOW ALLERGEN' SCHOOL AND THREE STANDARD PRIMARY SCHOOLS IN WESTERN AUSTRALIA

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[ID 1935]

Indoor air quality has been associated with respiratory symptoms in children in various settings. In general children spend most of their time indoors in homes but attendance at school also involves a considerable periods of time indoors. The purpose of this study was to investigate indoor environmental quality in classrooms in a 'low allergen' school and three standard primary schools in Western Australia.

Dust allergens, air pollutants and physical parameters were monitored in the four schools at four times (summer school term, autumn holiday, winter school term and winter holiday) in 2002. The levels of particulate matter (PM10) and volatile organic compounds were similar between the four primary schools. Although slightly decreased levels of dust mite and cat allergens were observed in the 'low allergen' school, the reductions were not statistically significant and the allergen levels in all schools were much lower than the recommended sensitizing thresholds. However, significantly lower relative humidity and formaldehyde level during summer-term were recorded in the 'low allergen' school.

In conclusion, the preliminary evidence suggested that the 'low allergen' school did not significantly improve the indoor environmental quality in classrooms.

ASSESSMENT OF PERSONAL PM EXPOSURE IN THE PM-CARE PROJECT

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[ID 1880]

Aim: to investigate associations between seasonal and individual activity-related variations in urban-air particulate exposure and some clinical parameters, measured continuously and at end 24h sessions in 79 non-smoking elderly subjects, grouped into three panels according to their clinical history.

Methods: Individual exposures to ultrafine (UFP: <0,1µm), fine (0,1-2,5µm) and coarse (>2,5µm) PM fractions were measured during subjects habitual activities in Summer 2005 with selective monitoring devices mounted onto a trolley (25kg; 0,12m3) carried by subjects during indoor and outdoor displacements.

Results: Preliminary results (33 of 79 subjects) showed that daily average mass particulate concentration (PM10) was 39 µg/ m3 (range: 15-68 µg/ m3); 73 % (58-85%) of the mass was below 2.5µm; 62% (44-79%) was below 1µm and 55% (39-73%) was below 0.5µm in diameter. Average total number concentration was about 17.000 #/cm3. Significant increases UFP levels were associated with "flame-cooking" activities and subjects outdoor displacements and consistent with increases in carbon monoxide levels. Estimated UFP peak exposures depended on the examined averaging period, ranging from 100.000 #/ cm3 for 1/2h ("flame-cooking") up to 500.000 #/cm3 for <2min ("promenade in urban area"). The CO average concentration was 0,61 mg/ m3, with time averaged maximum ranging from 10 mg/ m3 at 1/2h ("flame-cooking") to 35 mg/ m3 at <2min ("promenade in urban area"). Outdoor displacements always determined particle loads one to two orders of magnitude higher than those observed during "home at rest" activities.

Conclusions: Although preliminary, the data examined so far provided a detailed and reliable picture of PM exposures experienced by subjects living in urban areas. This type of investigations enable detailed environmental characterization of common activities associated with peak urban particle personal exposures and offer a valuable support to the PM-CARE project, aimed at investigating the pathogenetic mechanisms of cardio-respiratory effects produced by changes in personal PM exposure.

INDOOR AIR QUALITY AND CHILDREN'S HEALTH IN ULAANBAATAR (MONGOLIA)

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[ID 1934]

Indoor air quality is receiving increased attention in developed and developing countries. In some developing countries, such as Mongolia, there is concern about exposure to air pollution from the use of biomass fuels for cooking and heating inside dwellings. The capital city of Mongolia, Ulaanbaatar, has experienced a recent period of urbanization and population growth, which has resulted in an increase in pressure on the environment. The people of Ulaanbaatar typically live in one of three types of dwelling: the traditional Mongolian gher, houses or apartments. Ventilation in all of these types of dwelling is generally extremely poor over winter months. The purpose of this study was to determine the prevalence of respiratory symptoms and levels of indoor air contamination related to products of combustion.

A sample of five hundred children 2 to 8 years of age were surveyed in districts of Ulaanbaatar. The sample had approximately equal numbers of males and females by age and by type of house. A questionnaire covering demographic and domestic environment factors as well as the prevalence of respiratory symptoms in children was administered as an interview. Indoor air quality was monitored for indicators of products of combustion (SO2, CO and particulate matter)

The results indicated that 19% of children had bronchitis, 1.4% had asthma and 78% had other types of respiratory symptoms. Levels of CO and particulate matter were significantly higher in gers and houses than apartments. The average level of particulate matter was substantially higher than accepted standards in all types of dwellings.

The study has shown that children in Ulaanbaatar can be exposed to high levels of pollutants in their domestic environments and that bronchitis and respiratory symptoms are health issues of concern in Ulaanbaatar.

OCCUPATIONAL HEALTH FOR HEALTH CARE WORKERS

LEADERSHIP AND STRESS IN PUBLIC HUMAN SERVICE ORGANISATIONS: ACTING SHOCK ABSORBER AND SUSTAINING OWN INTEGRITY.

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[ID 1439]

Leaders are essential in reducing stress in the work place. Despite the acknowledged key-role of leaders for psychosocial work environment, only a limited amount of studies focus on how leaders can decrease work-related stress among subordinates and among themselves. In human service organisations, leaders are often under high pressure and dealing with the indistinctness of the role. AIM: The aim of this qualitative study was to gain deeper knowledge about leader's perceptions and strategies in dealing with their own and subordinates stress in human service organisations. METHOD: In-depth interviews were made with clinical leaders from hospitals and leaders from regional social insurance offices (n=21) and analysed in line with grounded theory method. RESULTS: The leaders handled workplace stress by acting shock absorber (core-category). In order to balance experienced demands and workplace stress, they used strategies characterised as to lead in continuous change whilst maintaining trustworthiness. Structuring and stabilising strategies were qualitatively related to leading in continuous change. To maintain trustworthiness, communicating and filtering as well as supporting and encouraging strategies were used. To manage own stress, they tried to sustaining their own integrity (core-category) by either identifying with or distancing from the leader role. CONCLUSION: Some of the strategies may be counterproductive, in terms of efficiency of production, organisational decision-making as well as stress prevention. Supporting structures and improved communication about every-day dilemmas seam from this qualitative study needed to decrease stress among leaders in human service organisations.

MULTIDIMENSIONAL COMPUTER BASED QUESTIONING SYSTEM FOR THE OCCUPATIONAL MEDICINE

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[ID 1692]

Goal: The main goal of our study was to implement an electronic questioning system which can be used in the occupational medicine, simpler enough to be operated by the patient, but powerful enough to gather an large amount of data in a very standardized matter.

Method: We started by observing the anamnesis process, performed by the physician and studied a large collection of standardized medical questionnaires. From this data we extracted an standardized algorithm for the anamnesis and the different question and answer types which are used in this process. The algorithm was implemented in a software

Results: The anamnesis process is a very dynamic process, where the course of the questioning is tightly bond to the answers the physician receives. This is why the software possesses very powerful and diverse loop question types.

The software must also give the possibility to easily make changes to the questionnaire in a matter that would not affect the existing data. At the work anamnesis we implemented the ISCO-88 standard. We created therefore a special structure, where the patients inputs a text value which is compared in a local database for a match. This gives the questioning a high standardization and makes it easy to port to other languages.

From the ergonomics point of view we made it as easy as possible for the patient. Some key features are: touch screen input, speech assisted questioning, magnifying of text and buttons.

Discussion: The new questioning system, offers new perspectives in effective large data collection, which makes paper and pen questioning practically obsolete. The improved ergonomics makes the software easy to use and intuitive, which is a key feature when we are questioning people which have little knowledge of computer.

WORK-RELATED ACCIDENTS IN THE ITALIAN HEALTHCARE SECTOR: A MULTICENTRIC STUDY (2000-2004) FROM AIRESPSA*

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[ID 559]

Work related accidents (WRA) recorded in the period 2000-2004 by the Protective and Preventive Services of 15 Italian healthcare centres were reviewed. WRA were included regardless they resulted in an interruption of work or not. In the study period 13,230 WRA have been reported by 139,425 employed persons. The most frequent WRA were exposures to biological agents through injuries or mucocutaneous contaminations (37.5%), traumatisms (31%), including slips, trips, falls, falling objects, sharps, and road traffic accidents (14%), including commuting accidents between home and the workplace. Musculoskeletal disorders (i.e. poor working postures, heavy loads) accounted for 8% of cases, and violence from other persons for 2.5%. Overall, the WRA incidence was 9.5 per 100 persons in employment, varying between centres from 5 to 12; a significant decrease was observed from 2000 to 2004 (incidence 10.6, 9.9, 10.0, 9.4, and 8.7 in the five years, respectively; p<001); this finding appears to be due almost exclusively to a decreasing incidence of exposures to biological agents (from 4.22 to 3.34); the incidence of other causes did not vary significantly. Data on days' absence from work were available in 90% of WRA for a total of 140,066 days, almost exclusively due to accident other than exposure to biological agents; no significant variation in the study period was observed (mean 12.5 days). The wide heterogeneity of causes of WRA and different rates between and within enrolled centres is consistent with the complexity of hazards and risks that characterize the health care sector. Although limitation due to the retrospective design of the studyand potential reporting bias, exposures to biological agents continue to be the most frequent WRA although other causes of WRA account for the majority of days lost from work. Protective and Preventive Services should be implemented to manage further efforts toward a safer healthcare work environment.

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HOME HEALTHCARE: SAFETY AND HEALTH IN THE WORK-HOME ENVIRONMENT

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[ID 648]

The U.S. home healthcare industry has expanded rapidly during the past decade. Nonetheless, most information about healthcare providers' occupational exposures originates from hospitals. This paper describes the findings of qualitative research conducted as part of larger project, funded by the U.S. National Institute for Occupational Safety and Health, on preventing blood exposures and sharps injuries among home healthcare providers. The purpose is to characterize the work experience of home healthcare providers and the full range of their safety and health exposures.

Five focus groups and ten in-depth interviews were conducted among home healthcare providers at two large home healthcare agencies and two labor unions representing healthcare workers. Focus group participants were female nurses or health aides with home healthcare experience. Interviews were conducted with agency managers and union leaders.

This research was initially planned to identify questions for a survey on

occupational risk factors in home healthcare. However from these focus groups and interviews, a much fuller understanding of the nature of home healthcare work emerged, providing a valuable context for the study questions and their future interpretation. Examples of hazards included: unsanitary and unpredictable conditions, time pressures to maintain high productivity levels, animal attacks, mentally unstable and violent patients and family members, guns in homes, and illegal drug activity in neighborhoods. Blood exposures and sharps injury risks were particularly associated with care of diabetic and cancer patients, lack of proper workstations, the lack of, or poorly designed medical safety devices, and unsafe sharps disposal containers. Despite these hazards, most participants found their work profoundly meaningful, citing rewarding relationships with patients and their families, independent work organization (compared to hospitals), and regular confirmation that they make positive impacts in people's lives. Health and safety interventions should be aimed at reducing harmful exposures while preserving or enhancing the meaningful job aspects.

BACK PAIN IN NURSES - RESULTS OF A FIFTEEN YEAR LONGITUDINAL STUDY IN GERMANY

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[ID 757]

The aims of the study were to assess the development of low back pain (LBP) incidence/prevalence during the first years of occupation in the nursing profession and to identify individual and work related factors correlated to development, persistence and chronification of LBP.
The study was started between 1989 and 1992 in various nursing classes. The target was a thirteen to fifteen year follow up including up to sixteen yearly panels. Data are collected using a semi-standardised questionnaire on socio-demographic data, back pain symptoms, physical/psychosocial working environment and the impact of various LBP-symptoms(Lumbago, Lumbago sciatica/sciatica).
The results refer to 372 probands who have taken part in at least nine of the investigations. Over time 1-year prevalence of LBP is steadily growing from 14% to more than 30% in the first years and than remaining at about 30-40%. Cumulated life time prevalence of LBP is growing from one third to more than 80% in the course of the study. Looking at the more severe symptom "lumbago sciatica / sciatica" 1-year prevalence increases from 2-3% to more than 10%. Cumulated lifetime prevalence is growing from 7% to more than 35%. Corresponding, percentage of medical and non-medical treatment are increasing: both from about 20% at the start of the study to more than 70%. Lifetime prevalence of sick-leave absence due to LBP is increasing from 11% to more than 50%. And: subjective causal attribution of LBP to work load is growing quickly in the first three working years from about one third to two thirds and remaining later at this percentage.
It can be concluded that LBP is one of the most important problems of occupational health in the nursing professions emerging immediately at the beginning of work. Medical, non-medical and behavioural treatment as well as ergonomic measures should be used to avoid LBP-episodes and the development of spine disorders.
Acknowledgement: The financial support of the "Berufsgenossenschaft fuer Gesundheitsdienst und Wohlfahrtspflege" (BGW) is gratefully acknowledged.

IMPROVING THE EFFECTIVENESS OF THE PREPLACEMENT MEDICAL EVALUATION AT LARGE MEDICAL CENTERS

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[ID 834]

During the decade after the Americans with Disabilities Act (ADA) became law in 1992, occupational health practitioners responded to employer directives to minimize costs while still conforming to the requirements of the ADA. Preplacement examinations became nurse-conducted screenings involving no physical examination but referral to a physician when certain criteria were met during the nurse screening. However, the literature since 1992 is virtually silent about the effectiveness of this major transition in the practice of occupational medicine.
As a continuous improvement project, a mixed professional task force at Mayo Clinic in Rochester, Minnesota, directed a staged progression from a full general medical examination to a nurse-based functional assessment over a 3-year period. After switching to a revolutionary function-based questionnaire, the outcome for 170 exams over a 2-month period was compared to the outcome for 258 exams during the same period during the previous year with no significant difference found. In fact, the new process disqualified 3 applicants who might otherwise have been hired with the traditional medical format. For the same cohort, physician conclusions before and after the physical examination were identical in all but one case, making the physical examination irrelevant in almost every case.
In January 2005 all routine preplacement medical evaluations became nurse-conducted functional assessments with immediate physician back-up when nurses identified possible disqualifying characteristics based on a pre-established protocol. This change has resulted in faster response time to Human Resources, significant savings in cost, more clarity in the purpose of the preplacement evaluation and no complaints from examinees.

THE EFFECT OF EMOTION ON THE HEALTH OF PUBLIC AND PRIVATE METROPOLITAN HOSPITAL NURSES: AN EXPLORATORY STUDY.

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[ID 1436]

Emotion work is characterised by the expression of emotions within a caring relationship that is not performed in exchange for salary, and which may be performed voluntarily. Many individuals perform multiple roles involving the performance of emotion work in their daily lives. Emotional labour on the other hand, is usually performed as a job requirement and directly benefits organisations. Although links have been made between components of emotion labour and burnout and job satisfaction respectively, few studies have examined the effect of emotion work on employee health. Two studies were conducted using both public (N= 238) and private metropolitan hospital nurses (data are currently being collected from the second sample) and compared levels of emotion labour, emotion work, work-family spillover, burnout and other measures of well being. A hierarchical regression indicated that for public hospital nurses, emotion labour was related to burnout, stress and job satisfaction, and that the positive component of emotion work was a significant predictor for job satisfaction, though neither emotion labour nor emotion work were related to organisational (affective) commitment. Negative work-family interference was also a significant predictor for all dependent variables except affective commitment. Comparisons of these results with those from private hospital nurse data will be discussed, along with the results of a thematic analysis of the experiences of public and private metropolitan hospital nurses. It is suggested that future research examine in greater depth the role of emotion work in increasing job satisfaction for nurses, as well as the mediating role of work-family interference on employee health.

SOCIAL SUPPORT AND PERCEPTION OF WORK'S USEFULNESS AND STABILITY ARE DETERMINANTS OF PSYCHOLOGICAL WELL-BEING IN HEALTH CARE WORKERS

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[ID 348]

Objective. Stress, particularly work stress, has aroused growing interest in recent years and socio-cultural factors appear to increase perceived isk from stress in workers in South Europe. This study aims at (i) investigating the stress-related factors in a hospital setting, (ii) identifying indicators useful for the measurement of the work-life of health care workers (HCW).
Methods. 332 HCW (nurses and ancillary, doctors, technical and administrative staff of medicine, surgery, services, emergency-urgency areas) consecutively examined during the periodic health surveillance participated in the study. An anonymous self-administered validated questionnaire was administered. The questionnaire included 47 items aiming at investigating (i) the socio-cultural aspects of work, (ii) the impact between the work-load and the individual characteristics, (iii) the different aspects of the work-related stress. In particular, the following aspects were investigated: autonomy, rewards, work variety, equity, social support, material conditions, work-load, physical effort, work satisfaction.
Results. Although the number of employees experiencing psychological

problems related to occupational stress is rapidly increasing in more developed countries, this study shows that the examined HCW have a good perception of their work. Most workers (89,3%) consider at least acceptable the overall working conditions. Most workers (i) do not consider to be at risk for unemployment (93%), (ii) regard as useful their job (69%), (iii) are satisfied at work in the last 20 days (66%). The critical aspects are a limited possibility of professional development, lack of rewards and work overload.
Conclusion. Although not much real scientific evidence is available on the effectiveness of stress management, the commitment of the organization and the involvement of both workers and management are crucial for recognizing the problem and for the success of stress management activities.

EVALUATION OF KNOWLEDGE AND ATTITUDES ON THE OCCUPATIONAL BLOOD EXPOSURE BEFORE AND AFTER A TRAINING ACTION IN A HOSPITAL OF MONASTIR CITY

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[ID 183]

Introduction
Occupational blood exposure was a daily reality in hospital departments. Prevention of these accidents was based on universal precautions respect, care coordination, specific and adapted training of the exposed ancillary medical staffs.
Objectives
The aim of our study was to evaluate knowledge, practices and attitudes on the occupational blood exposure before and after a training action in a hospital of Monastir city.
Methods
The study group was consists of 100 ancillary medical staffs having received training on the occupational blood exposure. The knowledge's level of preventive measures was estimated with two established scores (theoric score: SCORT) and the practices at risk (risk score: SCORR).
Results
The global knowledge's level on the risk of three haematogenous viruses is considered inadequate in 24 % of cases. A significant acquisition of new knowledge was noted after the training and the SCORT score increase from 15 to 26. However this acquisition was not maintained after three months. Incorrect behaviors declined, and the score of risk was considered weak after the training. Indeed 46 % of the nursing don't recapping any more needles (22 % before the forming), 90 % use containers and 54 % wash themselves and disinfect hands after stain with the blood (22 %). Besides 34 % of the study group continue to adopt behaviour at risk.
Conclusion
The results of our study showed a! better sensitization of the nursing and we recommend the follow-up of these training actions to prevent more occupational blood exposure.

PRELIMINARY STUDY ON THE IMPLEMENTATION OF HEALTH POLICIES AND REGULATIONS FOR MEDICAL STAFF AT SOME HEALTH CARE FACILITIES

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[ID 1512]

A cross sectional study being carried in 1494 medical staffs at 79 health care facilities in 3 cities/provinces in Vietnam aimed at investigating the implementation of existing health policies and regulations for medical staff in health care facilities and recommendation of intervention measures.
The study results showed that 83.7% of staff received different kinds of allowances in health sector including allowance for working in hazardous and dangerous environment (39%), responsibility allowance (36%), mobility allowances (10%), being on duty allowance (on duty for 24 hours) (8.4%) and other allowances such as surgerical, specific occupation, prevention of epidemic diseases, duty allowance (0.8-2.3%). Almost all of investigated medical staff had pre-employment health checked up (88.6%)and periodic health checked up (91%). There were one third of staff did not attend any training course on OSH. 38.7% of staff were detected occupational diseases. The detected occupational diseases were occupational tuberculosis (50%), occupational hepatitis B/C (30.5%), occupational diseases due to radiation (16.1%) and occupational HIV/AIDS (1.8%). Majority of medical staff who were detected as suffering from occupational diseases did not receive compensation (96.4%). Among staff getting injured at work, there were 16.7% of staff receiving compensation. 29.7% of total number of investigated staffs were under convalesce, in which half of staff received allowances and 45.8% went on holiday. Almost allowances and compensations received by medical staff were inappropriate and irrational according to investigated staff' opinions (83.3-95.2%).
Authors suggested that further study should be carried on implementation of health policies and regulations in different health care facilities and based on these results the new health policies and regulations should be developed for medical staff to be more appropriate to the current economic and social conditions in our country.

MUSCULOSKELETAL DISORDERS IN COMPUTER OPERATORS

MUSCULOSKELETAL DISORDERS OF THE NECK AND UPPER EXTREMITY IN COMPUTER WORKERS – A CAUSAL RELATIONSHIP?

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[ID 1060]

By invitation of the Danish Society for Occupational and Environmental Medicine a systematic critical literature review was performed on the relationship between computer work and musculoskeletal disorders with physical findings in the neck and upper extremities (except carpal tunnel syndrome (CTS)). The documentation in the scientific literature turned out to be sparse. A comprehensive search in several databases gave only 13 studies (17 articles) fulfilling the inclusion criteria, seven having a prospective study design (10 articles), five having a cross-sectional design (6 articles) and one case-control study. The included studies had data on the relationship between computer work (computer work per se, keyboard use and/or mouse use) and tension neck syndrome (neck pain with physical findings), shoulder tendinitis (rotator cuff syndrome), epicondylitis of the elbow (medial or lateral), radial nerve compression / pronator teres syndrome and forearm, wrist and hand disorders. A schematic scoring of the scientific quality of the included articles by an established quality assessment list showed that the articles to a varying degree satisfied the scoring items. The included studies that provided risk estimates (or data for establishing such risk estimates) for the studied relationship, was subjected to a qualitative detailed quality assessment as well. Our final conclusions were mainly based on the latter studies of good quality. However, some attention was also given to relevant findings in studies lacking the clinical examination of the cases, and in studies of possible pathophysiological mechanisms. Mostly the sparse scientific literature was insufficient with respect to concluding on a possible causal relationship. However, a few relationships were concluded on the lowest level of possible causal relationship (with bias and confounding not unlikely to explain associations), mainly in the forearm, wrist and hand region.

ANXIETY, MUSCULOSKELETAL AND VISUAL DISORDERS IN VIDEO DISPLAY TERMINAL WORKERS.

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[ID 1564]

We studied musculoskeletal and visual disorders and levels of anxiety in 190 VDT operators, subdivided into two groups (A and B) on the basis of tasks performed and average hours/week spent at VDT (25 vs. 36), and 190 controls not assigned to VDT, in order to evaluate if they could be influenced by organizational and intrinsically working factors. Ocular and musculoskeletal subjective symptoms and objective findings were assessed for all subjects, and the STAI test was administered. For VDT operators of the two groups, the relationship between ocular and musculoskeletal symptoms and findings, working life (p=0.0001) and number of hours spent at VDT (symptoms p=0.001 and p=0.0001; findings p=0.002 and p=0.007), was significant. Group B VDT operators showed significantly higher S-anxiety levels vs. those in Group A and controls (p=0.001); T-anxiety was significantly higher in Group B and controls vs. Group A (p=0.001 and p=0.03). Our results confirm the literature data about musculoskeletal and visual disorders and, as for anxiety, seem to denote a higher relevance of factors related to labour organization vs. VDT use by itself.

A RANDOMIZED CONTROLLED TRIAL OF ERGONOMIC INTERVENTIONS AMONG COMPUTER OPERATORS

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[ID 575]

Introduction

Customer service work at computers is associated with elevated rates of upper body musculoskeletal disorders and pain. The purpose of this study was to determine whether two simple workstation interventions would reduce the incidence of upper body musculoskeletal disorders and pain severity among computer users.

Methods

This was a one year, randomized controlled intervention trial among 182 customer service operators at 2 call centers of a large HMO. Participants were randomized to receive (1) ergonomics training only, (2) training plus a trackball, (3) training plus a forearm support, or (4) training plus a trackball and forearm support. Outcome measures were weekly pain severity scores and diagnosis of incident musculoskeletal disorder in the upper extremities based on physical examination performed by a physician blinded to intervention. Analyses using Cox proportional hazard models and linear regression models were adjusted for demographic factors, baseline pain levels, and psychosocial job factors.

Results

Post-intervention, 63 participants were diagnosed with one or more musculoskeletal disorders. Adjusted hazard rate ratios show a protective effect of the armboard for neck-shoulder disorders (HR = 0.49, 95% C.I. = 0.24 to 0.97). The armboard also significantly reduced neck/shoulder pain (p=0.01) and right hand/wrist/forearm pain (p=0.002) in comparison to the control group. The effect of the trackball was mixed. A return-on-investment model predicted a full return of armboard costs within 10.6 months.

Conclusions

Providing a large forearm support combined with ergonomic training is an effective intervention to prevent upper body musculoskeletal disorders and reduce upper body pain associated with computer work.

CLINICAL CRITERIA FOR CASE DEFINITIONS IN THE NECK AND UPPER EXTREMITIES IN STUDIES OF COMPUTER USERS

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[ID 694]

Objectives: Self-reported trouble in the neck, shoulder and forearm has shown a higher prevalence among office workers than diagnoses from clinical examinations, though many clinical signs have been reported. Thus, classical diagnostic criteria (ICD-code) may not suffice, and which calls for supplementary objective criteria. The aim of this study was to systematize clinical signs and symptoms among computer users, both in a group with self-reported neck/shoulder trouble (NS-cases) and in a group without such trouble (NS-controls). **Methods:** The data are extracted from three studies representing 211 workers (NEW: 42cases/61controls, SPA: 44cases/25controls, and RAMIN: 35cases/7controls). Questionnaire-defined NS-cases included those responding more than 30 days of trouble within the last 12 months in the NS-region, and NS-controls included those responding less than 8 days of such trouble, and with a maximum of three regions with more than 30 days of trouble in both groups. The clinical examination included questions and specific tests with computerized criteria resulting in various diagnoses (Ohlsson et al. Ergonomics 37:891-897, 1994, Juul-Kristensen et al. Eur J Appl Physiol 2005). **Results:** Trapezius myalgia (43%), tension neck syndrome (23%) and cervicalgia (12%) were the most frequent diagnoses among NS-cases. Having one or several of the diagnoses located in the neck/shoulder constituted 58% of the subjects that reported trouble. In contrast, among NS-controls trapezius myalgia was found in only 4%, and in total only 5% of the NS-controls were found to have a diagnosis. **Conclusions:** Among workers subjectively reporting neck/shoulder trouble for more than 30 days during the last year 58% had one or more clinical diagnoses, while this was the case for only 5% among those reporting such trouble for less than 8 days. Thus subjective complaints were of such intensity that their origin could be objectively identified in the neck/shoulder tissues with high sensitivity and specificity.

RISK FACTORS RELATED TO FEMALE TECHNICAL SCHOOL STUDENTS REPORTING MODERATE/SEVERE NECK, SHOULDER AND UPPER BACK PAIN IN A PROSPECTIVE FIELD STUDY

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[ID 1272]

Introduction: Pain in the neck and shoulder region is common, especially in females, and is more frequent in occupational groups exposed to static work postures, such as hairdressers. Musculoskeletal pain states are also a problem in a young age and even before entering working life. Increased attention has been paid to whether the foundation for future pain and occupational injuries is created already in the youth. The aim of this analysis was to investigate the development of pain reports in young females over a 3-year period at the start of their professional career.
Methods: 265 female technical school students (hairdresser-, and art/media design students) were followed every third month in their last year of technical school and through their two years of apprenticeship, giving a total of 12 questionnaires during the 3-year period. Data on risk factors were obtained at baseline and successively. The subjects were in all questionnaires asked to report neck, shoulder and upper back pain the previous four weeks. On the basis of their pain report they were dichotomized into two groups: no/little pain or moderate/severe pain.
Results: The data showed a high prevalence of moderate/severe pain report at baseline (36%), which after half a year decreased to a "steady state" at 5-10%. Data from the two first years showed no significant association between physical activity level during leisure time and moderate/severe pain. The moderate/severe pain group had over 3 times higher risk of reporting high stress level at school (OR: 3,5, 95% CI 1.3-9). Data from the last four questionnaires have not been analysed at the time of submitting this abstract, but will be presented in more detail at the conference. This also concerns risk factors for pain, as work with lifted arms without support.

INCIDENCE OF SELF-REPORTED REDUCED PRODUCTIVITY DUE TO MUSCULOSKELETAL SYMPTOMS: ASSOCIATION WITH WORKPLACE AND INDIVIDUAL FACTORS AMONG COMPUTER USERS

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[ID 1316]

The aim of the present study was to assess the incidence and identify possible risk factors for reduced productivity due to musculoskeletal symptoms among computer users.
Design. A cohort study with a baseline questionnaire and monthly follow ups during 10 months
Methods. The study base consisted of 1283 computer users, 636 men and 896 women. Ergonomists observed workstation characteristics before entering the cohort. Cases were defined as subjects reporting reduced productivity or reported being on sickleave due to symptoms in any of the body regions asked about, > 3 days during the preceding month and. Incident cases were examined by a physician.
Results. The incidence of reduced productivity due to musculoskeletal symptoms was 0.92 per 100 person months for neck symptoms, 0.48 for back symptoms, 0.40 for shoulder and 0.54 for forearm/hand symptoms. Women had approximately two times the incidence of reduced productivity due to symptoms in the neck, shoulder and in the forearm/hand than men. There was no difference in gender for the incidence of reduced productivity due to back symptoms. Working overtime and job demands were risk factors for reduced productivity due to neck and back symptoms. Physical exercise fewer than 8 times the last month was a risk factor for reduced productivity due to neck, shoulder and forearm/hand symptoms. Computer mouse use for more than 0.5 hours/day was a risk factor for reduced productivity due to shoulder and forearm/hand symptoms. "Muscle disorder" or "unclear" were the "diagnoses" for 58-84% of reduced productivity cases.
Conclusions. Risk factors for reduced productivity due to musculoskeletal symptoms included life style factors such as overweight and low physical exercise, occupational factors such as overtime, job demands and computer mouse operating time. Thus both life style factors and occupational factors should be targeted to prevent reduced productivity.

EPIDEMIOLOGY IN OCCUPATIONAL HEALTH

OCCUPATIONAL RHINITIS WITHIN THE EUROPEAN COMMUNITY RESPIRATORY HEALTH SURVEY

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Background: The prevalence of occupational rhinitis is high and appears to be increasing. Even though it might not have the same impact as occupational asthma, occupational rhinitis does cause morbidity and is associated with decreased work productivity. However, population-based prospective data are scarce. We studied the association between occupational exposures to asthmagens and rhinitis prospectively within an international population-based cohort study.
Methods: Longitudinal data were used from 24 centres of the European Community Respiratory Health Survey II including data for 7,713 participants followed in most centres from 1992 to 2001. We examined new onset allergic rhinitis during follow-up based on baseline and follow-up interview information. Full occupational history during follow-up was obtained. Occupational exposures were assessed on the basis of an asthma-specific job exposure matrix (JEM) including high molecular weight agents (e.g. latex), and other asthmagens. We used generalized estimating equations adjusting for sex, age, education, smoking, parental allergy, and country.
Results: Risk for rhinitis was not associated with exposure to high molecular weight agents (RR=1.04, 95%CI 0.9-1.2), low molecular weight agents (RR=1.07, CI 0.9-1.3) and other asthma related exposures. Increased risks were only found in subgroups including exposure to irritant peaks in women (OR 3.1; 95% CI 1.1-8.5) but not in men (RR=0.8, CI 0,5-1,1). Age, family history of allergic diseases and high educational level (RR=1.3, CI 1.2-1.5) were significant risk factors of allergic rhinitis. In contrast, the risk of both smokers and ex-smokers was significantly decreased. With respect to the different countries, risks were lowest for Spain and highest for the UK and the USA. Similar results were found when using other statistical approaches such as logistic regression and survival analyses.
Conclusion: In this population-based cohort study workplace exposures associated with occupational asthma were not clearly related to new-onset allergic rhinitis.

WELDING EXPOSURES AT WORK, RESPIRATORY SYMPTOMS AND LUNG FUNCTION

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In a prospective general population study we investigated if welding at work increases the risk of asthma and other respiratory symptoms. In the follow-up of the European Community Respiratory Health Survey (ECHRS) 375 individuals from 22 centres carried out welding in their jobs. Details of welding activities including tasks and duration, welding methods and materials and respiratory protection were obtained in a face-to-face interview. Cumulative exposures to welding fume during the follow-up period was assessed using an external exposure database.
The individuals could be grouped in 17 occupational categories according to ISCO codes. Only 7% were welders and flame cutters, while 20% were building workers, 17% mechanics and fitters and 12% plant and machine operators. Sixty-two% performed welding < 1 hour/day and only 15% performed welding >4 hours/day. Welding at work, independent of duration or assigned exposure did not increase the prevalence or incidence of asthma nor did it result in a decline in FEV1 compared to a reference group not welding. There was a small increase in incidence of wheeze (RR 1.5; 1.0-2.2) in workers doing welding, which was not related to duration. Individuals welding in stainless steel ≥ 1 day/week showed an increased prevalence of asthma symptoms (RR 2.8; 0.9-9.1) and a significant increase in cough or phlegm (RR 2.9; 1.3-6.4). The number of subjects highly exposed to welding fumes was small, which limits the power of the study.

REDUCING HEALTHY WORKER SURVIVOR BIAS BY RESTRICTING COHORT DEFINITION IN A STUDY OF LUNG CANCER AND SILICA

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Introduction: Previous studies of lung cancer and silica among Vermont granite workers suggested an increasing exposure-response relationship, although relative risk declined at the highest exposures. In the present analysis, we explored healthy worker survivor effect (HWSE) by defining 'prevalent' and 'incident hires as a function of date of hire and start of follow-up. Methods: The original cohort included workers who participated in an industry-wide medical surveillance program between 1950 and 1982. Job histories were linked to silica dust measurements and cumulative exposures were generated. Using proportional hazards, silica exposure was modeled as a linear term, categorical variable, and with penalized splines, controlling for age and calendar year. We compared results between the original (both prevalent and incident hires) and the subset of incident hires. To examine the sensitivity of the analysis, we further redefined the cohort by varying the date of hire criterion and compared exposure-response models based on penalized splines. Results: When restricted to incident hires, there was a 74% reduction in the number of cases (original cohort n=213, incident hires sub-cohort n=56) and a dramatic decrease in the exposure range (maximum mg-yr/m3: original cohort=48.2, incident hires sub-cohort=2.1). Using a linear term for silica exposure, the mortality rate ratio (MRR) for the original cohort was null (MRR=1.0 (95% confidence interval (CI): 0.9, 1.0)), compared to 1.6 in the incident hires sub-cohort (95% CI 0.8, 3.2). In the categorical analysis of the original cohort, the exposure-response decreased in the highest category. For incident hires, the exposure range was truncated but the pattern of increasing mortality rate extended to higher categories. Using penalized splines, the magnitude of the association increased as the proportion of prevalent hires decreased. Conclusions: Although loss in power and restricted exposure range may be of concern, decreasing the relative proportion of prevalent to incident hires will reduce HWSE in occupational cohort studies.

SILICA AND LUNG CANCER MORTALITY RATIO AMONG BANOVIĆI COAL MINING WORKERS

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[ID 204]

BACKGROUND: Silica in coal- mine dust was classified as a human lung carcinogen type 1.
OBJECTIVE: The aim of the study was to investigate the mortality ratio of lung cancer between all mortality causes among coal- mine workers and to examine the association between lung cancer mortality ratio and occupational lung cancer risks in coal-miners, the time weighted average for SiO2 concentration and duration time of work experience in coal- mining. We analysed all causes of mortality occurrences among all male workers of Banovići municipal (Northeast part of Bosnia and Herzegovina, total of 32 140 residences) during the follow- up period from 1988 to 1997.
SUBJECTS AND METHODS: The differences of causes of mortality occurrence have been observed between 1688 coal- mining workers who employed in Banovići former coal- mining areas (exposed to silica group) and 5561 non-coal- mining workers (the all other male Banovići municipal workers, non- exposed to silica, control group). All examiners were male and aged from 35-69 years. The level of concentration of free silica (SiO2) in coal- mine dust was estimated by standard method (type CMP-3 capture). A registry of lung cancers was set of on clinical regional basis and

a registry of mortality pattern on Public Health Institution of BiH. The time weighted average (TWA) for SiO2 in coal mining area was 6.74±9.2 mg/m3. Cox's hazard model was applied to determine the lung cancer risk ratio (RR) and 95% confidence interval (CI). In these analyses smoking habit, smoking habit, duration time of work experience in coal mining, were included as independent variables and bases for subgroups.
RESULTS: A total of 536 males Banovići workers had died during follow-up period (346 of 536 coal- mine workers and 190 of 536 workers of control group). A significant excess of general mortality risk was shown for coal-mine workers in relationship to control group (RR= 6.03; CI: 1, 23-52, 4). A total of 114 males workers had died in cases lung cancer during examination period (87 coal- mine workers and only 27 non-coal mining workers). A significant excess of lung cancer was found for coal-mine workers in relationship to control group (RR= 10, 62; CI: 1, 97-70, 25). The incidence for all causes of death and all malignant neoplasm in coal-miner workers also increase with the length of experience in coal mining. Analysis of the results for all mortality causes between died workers showed that coal miners had high risks ratios for lung cancer (RR = 1, 77; CI: 0, 8-4, 1), other lung diseases (RR= 1, 14; CI: 0, 3-2, 66), and for all other mortality causes and accidents (RR=1, 92; CI: 0, 85-4, 5), though these ratios were statistically significant. There were no significantly correlation between the incidence of lung cancer mortality and levels of exposure to free silica in dust compared by specific workplace exposure (r=0.375; P >0.05) and smoking (r= 0.585; P >0.05). A significantly correlations were recognised between duration time of work in coal- mining and incidence of lung cancer (r= 0,205; P<0,001).
CONCLUSION: The Banovići coal-miners had the highest RR for lung cancer associated by years of work experiences in coal- mining. Silica was possible main carcinogen, but level of exposure to silica was not too important factor for lung cancer.

LUNG CANCER MORTALITY AND CARBON BLACK EXPOSURE – UNCERTAINTIES OF SMR ANALYSES IN A COHORT STUDY AT A GERMAN CARBON BLACK PRODUCING PLANT

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[ID 936]
This study is a sensitivity analysis of the lung cancer SMR statistic obtained from a cohort study of 1522 male German carbon black workers who were followed from 1976 to 1998. The sensitivity analysis considers findings from a nested case-control study for lung cancer mortality in this cohort.
We used the results of the nested case-control study, to adjust the lung cancer SMR for individual smoking habits and known lung carcinogen exposures, potentially received prior to subjects' hire at the carbon black plant. In addition, sensitivity of applied reference rates was explored. We applied national German reference rates, North Rhine-Westphalia state rates, and – with limitations – also local rates from the greater city in the vicinity of the carbon black plant.
Based on 47 lung cancer deaths in the cohort between 1976 and 1998, the SMR was 1.52 (local), 1.61 (state), or 2.08 (national rates). All SMRs were statistically significant elevated on a 5%-level. The findings of the nested case-control study suggested the consideration of correction factors for prior exposures (f-corr=0.75) and smoking habits (f-corr=0.7). Application of these factors reduced the lung cancer SMR to 1.14 (local), 1.21 (state), 1.14 (national), with only the SMR based on the national rates close to statistical significance (p=0.05).
Lung cancer SMRs (0.95-CI) ranged from 1.14 (0.83; 1.52) to 2.08 (1.53; 2.77) in this sensitivity analysis. Historical exposures to known lung carcinogens, e.g. smoking, may well have a strong influence on the SMR estimate. The choice of reference rates has some impact on the SMR and which one is most suitable and thus requires careful consideration and justification. This study demonstrates that in general, we consider SMRs to be only weak measures of causal associations and we believe they should be complemented by appropriate internal modelling of exposure effects whenever possible.

AIRBORNE EXPOSURE, BIOLOGICAL MONITORING AND LUNG FUNCTION BEFORE AND AFTER THE INTRODUCTION OF A SMOKING BAN

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Exposure to environmental tobacco smoke is associated with a range of health effects. A total smoking ban was introduced in the Norwegian hospitality industry on 1 June, 2004. Air quality was studied in 13 restaurants and bars, and urinary cotinine levels and lung function in 93 subjects from these establishments were measured before the smoking ban. The same establishments and subjects were re-examined after the smoking ban. The arithmetic mean (AM) concentration of nicotine and total dust in air declined from 28.3 µg/m3 and 262 µg/m3 respectively, to 0.6 µg/m3 and 77 µg/m3. The post-shift geometric mean (GM) U-Cotinine concentration declined from 9.5 µg/g creatinine (cr) to 1.4 µg/g cr (p<0.001) in non-smokers. The U-Cotinine levels were also reduced in the smokers. The cross-shift AM reduction in forced vital capacity was 81 mL before the smoking ban and 52 mL (p=0.24) after the smoking ban, whereas the AM cross-shift reduction in forced expired volume in one second was 89 mL before the ban and 46 mL (p=0.09) after the ban. The reduction in forced mid-expiratory flow rate (FEF25-75%) changed significantly from 199 mL/s before the ban to 64 mL/s (p=0.01). This difference was most pronounced among the non-smokers and subjects having a history of asthma. The introduction of smoke free bars and restaurants in Norway resulted in substantially lower airborne contamination and lower U-Cotinine levels of non-smokers as well as smokers. This first study of cross-shift changes before and after implementation of a smoking ban in restaurants and bars showed a larger decline in lung function parameters across shift before the smoking ban was introduced as compared to after the ban. This was most pronounced among non-smokers, but also among subjects with asthma in their medical history.

PREVALENCE OF HEALTH PROBLEMS IN SMALL ESTABLISHMENTS COMPARED TO LARGE ESTABLISHMENTS

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Backgrounds: Because of shortages of fund, equipment, and manpower, it is difficult for small establishments to take adequate health measures.
Objective: To compare prevalence of health problems in small (less than 50 employees) and large (more than 1000 employees) establishments in Japan.
Methods: A health examination database, including 150 thousands health examinees in the 2004 fiscal year, was obtained from a Japanese health-care foundation. Age- and sex-specific prevalence rates of health problems were estimated in the groups of 232 small establishments (n=2375) and 51 large establishments (n=18553) respectively. Health problems were: obesity (BMI ≥25), hypertension (blood pressure ≥140/90 mmHg), hypercholesterolemia (serum cholesterol ≥220 mg/dl), hypertriglyceridemia (triglyceride ≥150 mg/dl), hyperglycemia (fasting blood glucose ≥110 mg/dl or HbA1c ≥5.9 %), hyperuricemia (uric acid ≥7.0 mg/dl), fatty liver (ALT ≥40 IU/l and ALT>AST), alcoholic liver (γGTP ≥60 IU/l), anemia (hemoglobin ≥13.0 mg/dl, men; ≥11.0 mg/dl, women), metabolic syndrome (the 2005 Japanese joint committee criteria modified), and smoking. Standardized prevalence ratios (SPRs) with 95% confidence intervals (CIs) were calculated by the indirect standardization method, dividing the total number of observed cases by the total number of expected cases based on the prevalence rates in the large establishment group as standard.
Results: For men, significant high SPR was found in obesity 1.13 (95%CI 1.03-2.04), hypercholesterolemia 1.15 (95%CI 1.03-1.27), hypertriglyceridemia 1.40 (95%CI 1.24-1.57), and smoking 1.12 (95%CI 1.04-1.21). Not significant but high SPR was found in hyperglycemia 1.31 (95%CI 0.98-1.73), hyperuricemia 1.24 (95%CI 0.99-1.53), and fatty liver 1.17 (95%CI 0.98-1.38). Meanwhile significant low SPR was found in hypertension 0.85 (95%CI 0.73-0.99). For women, there was no health problem with significant high or low SPR.
Conclusion: Health problems are more frequently observed among employees in small establishments compared to large establishments. It is necessary to stimulate public support systems and facilitate health care activities in small establishments.

PREDICTORS OF SICKNESS ABSENCE: META-ANALYSIS OF OBSERVATIONAL STUDIES

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[ID 406]

Objective To explore predictive factors for sickness absence due to psychosocial health complaints
Design Meta-analysis
Data sources Observational studies published up to June 2005 (identified through Medline, Psychinfo and Embase) that studied predictive factors for sickness absence
Review methods Eligible for inclusion were prospective studies that examined potentially predictive factors, such as sociodemographic factors, health, mental health, psychosocial work factors, personal factors and organizational factors, on sickness absence due to psychosocial health complaints; and studies that provided sufficient information to estimate summary odds ratios or summary correlations on the association
Results 39 studies were included. Correlations on sociodemographic and psychosocial work factors were primarily negative; correlations on health, mental health, personal and organizational factors were mainly positive. Significant fully adjusted summary odds ratios for both absence duration ≤ 3 days and absence duration > 3 days were found for being unmarried 1.28 (1.14 to 1.44) and 1.37 (1.15 to 1.64) respectively, experiencing psychosomatic complaints 1.43 (1.08 to 1.90) and 1.79 (1.54 to 2.07), using medication 1.44 (1.32 to 1.58) and 3.13 (1.71 to 5.72), having a burnout 1.28 (1.23 to 1.34) and 2.34 (1.59 to 3.45), suffering from psychological problems 1.27 (1.23 to 1.31) and 1.97 (1.37 to 2.85), having high job control 0.79 (0.72 to 0.88) and 0.78 (0.75 to 0.82), enjoying high decision latitude 0.81 (0.77 to 0.87) and 0.82 (0.79 to 0.87) and experiencing a great deal of fairness, 0.84 (0.75 to 0.94) and 0.77 (0.69 to 0.85).
Conclusions Contrary to expected heterogeneity, predictors of sickness absence can be identified in a rather homogeneous manner. The results of this meta-analysis provide imperative leads to public health interventions, directed at these predictors, to successfully improve psychosocial health and to reduce both absence frequency and absence duration ≤ 3 days and > 3 days.

MUTUAL AND SEPARATE DETERMINANTS PROMOTING EXCELLENT WORK ABILITY OR PREVENTING LONG-TERM SICK LEAVE

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[ID 999]

Objectives: Health has been described as a continuum between the two poles of excellent health and ill health. Research has so far focused on the negative pole, leaving knowledge about the positive pole vague. With a main focus on working life, we wanted to identify determinants promoting excellent work ability and determinants preventing poor work ability.
Methods: 5638 (73%) employees in the public sector in Sweden answered a questionnaire both at baseline and at follow-up 18 months later. The employees were divided into three groups based on sick leave at follow-up: excellent work ability (13%), poor work ability (15%), and a middle group (72%). Self-reported socio-demographic data, life-style data, and working life exposures at baseline were fitted into logistic regression models to determine what factors, if any, promoted excellent work ability or protected against poor work ability.
Results: Some determinants were mutual, but more than half of the determinants in the final model were associated solely with promoting excellent work ability or preventing poor work ability, thus creating different patterns of associations. Promotion of excellent work ability seemed more dependent on physical factors, clear work tasks, and positive feedback, while prevention of poor work ability seemed more dependent on job security and psychosocial factors.
Conclusion: This explorative longitudinal study showed slightly different patterns of determinants promoting excellent work ability and preventing poor work ability. As most of the identified determinants are amenable to influence, our results open up the possibility of interventions for promoting excellent work ability and preventing poor work ability.

RISK FACTORS OF SICK LEAVE DUE TO NECK OR BACK PAIN AMONG A WORKING POPULATION. A PROSPECTIVE STUDY WITH AN 18-MONTH AND A THREE-YEAR FOLLOW-UP

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[ID 674]

Background
Low back and neck pain have a high prevalence and incidence in adult populations, and social expenditures due to these ailments are huge. In a recent systematic review it was called for well-designed prospective studies concerning factors related to sick leave.
Objectives
To identify predictors/risk factors of sick leave due to neck or back pain.
Method
A prospective study was performed. The baseline measurement was administered in 2000 and the follow-up measurements were accomplished 18 months and three years thereafter. The study population comprised 2233 employees. The baseline measurement comprised physical and psychosocial work factors, perceived health, pain characteristics, lifestyle and demographic factors. The response rate at the both follow-ups was 73%. Logistic regression was employed to analyze the data. The dependent (outcome) variable was sick-listing or no sick-listing.
Results
After 18 months, pain-related sick leave was predicted by aspects of job demands, less control of work pace, few positive challenges at work, information about quality of work being given sometimes or often, higher support in private life regarding work problems, intrinsic work motives, limited role functioning, earlier sick leave (all causes except neck/back pain) and earlier episodes of back pain. After three years, being a blue-collar worker, several earlier episodes of neck pain, lower physical functioning, seldom or never feeling recovered when about to start work and job insecurity were identified as predictors.
Conclusion
At the 18-month follow-up factors related to the psychosocial work environment were predictive of pain-related sick leave together with a smaller number of health- and pain-related characteristics. At the three-year follow-up, the health- and pain-related variables were predominant. Measures to enhance employees' control at work and job security in combination with secondary prevention of neck or back pain may be instrumental in reducing sick leave due to these complaints.

BIAS FROM DIFFERENTIAL REPORTING IN A CASE-CONTROL STUDY

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[ID 1033]

Material and methods: Consecutive cases of AML and MDS (N=251) were prospectively included 2000-2002, together with frequency-matched (age, sex; N=126) population and hospital (melanoma; N=186) controls. The participation rates were 66%, 52% and 87%, respectively. The medical and occupational history, leisure-time activities (specified and "other"), tobacco, and alcohol consumption were obtained from face to face interviews conducted by occupational health nurses. The closest first-grade relative was interviewed if the index person was deceased. Differential detail in the information was evaluated by comparing the number of reported jobs (> 6 months) and "other" leisure-time activities between the three groups. The effect on a hypothetical "true" odds ratio (OR) of 1.5 for any occupational exposure to organic solvents was evaluated assuming that the probability of such exposure was 0.20 in the controls, and 0.03 for each reported job.
Result: Direct interviews with the study subject were performed for 178 cases (71%), 124 population controls (98%), and 178 hospital controls (99%). The number of reported jobs was higher for those interviews than those performed with next–of-kin, for both cases (mean 4.0 vs. 3.5; Mann-Whitney U-test: p=0.047) and controls (mean 4.3 vs. 2.5; p=0.096). Thus, the number of reported jobs was overall higher among the controls (p=0.03; t-test). Moreover, among the directly interviewed study subjects the population referents tended to report more jobs than the hospi-

tal controls (means 4.7 vs. 4.0; p=0.08). The same was found for reporting "other" leisure-time activity (67% vs. 51%; p=0.007). The overall effect from the differential reporting between cases and controls on the OR was 9% (OR=1.36).
Conclusions: Less detail in the interviews with the cases, due to high fatality rates, biased the OR towards the null. Furthermore, contrary to our expectations of more thorough recall for those with serious disease (cases and hospital controls), more jobs were reported by the population controls. Their participation rate was lower, and the included subjects may on average have had a higher dedication. Analysis of differential detail in reporting is useful for evaluation of potential information bias, especially since the direction of the bias may be contra-intuitive.

FEASIBILITY STUDY INTO THE ESTABLISHMENT OF A RETROSPECTIVE COHORT STUDY OF WORKERS IN THE BRITISH SEMICONDUCTOR INDUSTRY

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[ID 1023]

Background: A study of cancer in one UK semiconductor manufacturing plant found some excess of lung and stomach cancer among women, and of brain cancer among men but, because of small numbers in the study, the results are difficult to interpret. Workers in the industry are potentially exposed to agents including compounds of antimony, arsenic and chromium, solvents and etching fluids, although exposures in the industry are generally well controlled. There is therefore an interest in the feasibility of studying a larger cohort, across the UK semiconductor industry.
Aims: This study set out to establish the availability of:
- sufficient data to allow identification of a historical cohort;
- good descriptions of past jobs and working conditions;
- other important data such as smoking habits; and whether;
- taking these factors into account, a study would be feasible and sufficiently powerful.

Methods: An epidemiologist and an occupational hygienist visited eight of the largest and longest-established plants. The plants were located throughout the UK and four had been in operation since the 1980s or earlier. Information was collected about the nature and extent of employment and other records held for individuals. Knowledgeable staff were interviewed about plant history and hygiene monitoring practices. Similar information was sought by questionnaire from smaller companies.
Results and Conclusions: Given suitable access to company records, it would be feasible to amass a cohort of 12,000 workers. This would allow comparison of cancer incidence with external reference rates and between workers involved or not involved directly in wafer fabrication. There was some incompleteness in the identification of former workers, primarily among those who had worked in the industry in its early days. Data on smoking habits are available for only part of the cohort.
Statistical power calculations show that a cohort study should have around 80% power to detect an two-fold relative risk of lung cancer in fabrication workers, but relatively poor statistical power to detect excesses in rarer causes.

OCCUPATIONAL STATUS, JOB STRAIN, AND HIGH-SENSITIVITY C-REACTIVE PROTEIN IN JAPANESE FEMALE AND MALE WORKERS: JMS COHORT STUDY

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[ID 897]

Recently, several studies have drawn attention to elevated levels of C-reactive protein (CRP), a sensitive marker of inflammation, as a CVD risk factor.
The aim of the study was to explore the association between occupational status, job strain, and high-sensitivity CRP levels in a Japanese working population.
Of the Jichi Medical School Cohort study database, a multi-center study designed to explore cardiovascular risk factors of Japanese population, 1878 female and 1703 male workers aged 65 and under for whom a CRP measure was available, were subjected to this analysis. CRP levels were measured using nephelometry. Sociodemographic and behavioral variables were obtained by a standardized questionnaire to consider possible confounders. Serum lipid profiles and fibrinogen were also taken into account. Results showed that both women and men in a managerial level had significantly higher CRP levels (age adjusted geometric mean = 109.1 mg/dl and 144.7 mg/dl, for women and men respectively) than did their counterparts in the general level (91.7 mg/dl and 123.8 mg/dl, p= 0.023 and p = 0.041, respectively). An interaction effect of occupational status and job strain level was found in women. Among women with low and middle job strain levels, those in a managerial level showed a higher CRP level than those in a general level, whereas, among women with a high job strain level, women in a general level showed a higher CRP level than those in a managerial level (p = 0.010). After hypothesized CRP correlates had been adjusted for, associations between occupational status and CRP were reduced, however, an interaction effect of occupational status and job strain level remained in women (p = 0.011).
Japanese workers in a managerial level showed higher CRP levels. However, job strain as a psychological factor may differentiate associations between occupational status and inflammation markers in Japanese working women.

TOXICOLOGY OF METALS

DIRECT EFFECT OF COCL2 AND NICL2 ON CITRATE UPTAKE BY THE RAT RENAL BRUSH BORDER MEMBRANE

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[ID 40]

Co and Ni are essential but relatively rare elements. In the mammalian membrane, these metals are transported by the same carrier proteins. The aim of this study was to investigate the direct effects of CoCl2 and NiCl2 on citrate uptake by rat renal brush border membrane vesicles (BBMV). BBMV were prepared by the divalent cation precipitation methods, and citrate uptake was measured by the Millipore rapid membrane filtration technique.

The time course of citrate uptake during 120-min of incubation with 1 mM CoCl2 and NiCl2 showed a rapid significant inhibition at the early phase and a slight recover at the late phase. Incubation for 1 min of BBMV with 1, 5 and 25 mM CoCl2 and NiCl2, respectively, significantly inhibited citrate uptake in a concentration-dependent manner compared with that of 0 mM.

Co and Ni are located in Group 8th of the periodic table as Fe. In the late phase, these metals might be removed from the BBMV. As a result, citrate uptake indicate a slight recover. We discuss these findings from the pint of view that Co and Ni are located in Group 8th of the periodic table and may replace iron.

ARSENIC AND HUMAN HEALTH EFFECTS MITIGATION: PREVENTION BY DIETARY MODIFICATION WITH FUNCTIONAL FOOD-JAGGERY

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[ID 185]

The most essential component of life water, contaminated with arsenic is global human health hazard. Arsenic is widely distributed in nature and released into the work–environment through industrial processes and agriculture usage. Ingestion of inorganic arsenic leads in inflammatory, neoplastic and degenerative changes of skin, respiratory, nervous, cardiovascular and reproductive system. There is no effective remedial action for chronic arsenic intoxication. Industrial workers and labours belong to low socioeconomic status malnourishment is responsible for the enhancement of the disease conditions. The present research work aimed on mitigation of the disorders of the ingestion of arsenic by dietary modulations. Four groups of mice which were treated as follows: Group-I control; Group-II mice treated with Arsenic as arsenic trioxide (12.9 mg /kg body weight SC) on day 1, 7, 14, 21, and 28 to induce the arsenic toxicity. Group-III mice were exposed with arsenic and Jaggery (250 mg / mice/ oral gavages, daily). The mice of Group - IV treated with Jaggery alone.

The arsenic treatment appeared to have significant effects on body weight, relative organ weight and on hematological parameters; all these parameters of the preventive group (Group-III) were near normal to the control (Group-I). Morphological alteration of alveolar macrophages derived from bronchoalveolar lavage fluid (BALF) shows decreased percent cytoplasm area and increased percent nucleus area initiating to apoptosis in Group-II and simultaneous administration of Jaggery enhances the modulating capacity and macrophages appears near normal (Group-III). Adrenal and peripheral lymph nodes (PLN) showed dilated cortical region and necrosis in arsenic treated group, while combined-administration of arsenic with Jaggery reduced dilation and degeneration of cells in adrenal and PLN.

Our experiment demonstrated that functional food - Jaggery has an efficient preventive dietary supplements and could be helpful for human population exposed to arsenic contaminated drinking water.

ESTIMATION OF BIOLOGICAL EXPOSURE LIMIT (BEL) USING BENCHMARK DOSE (BMD)

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[ID 330]

Based on two sets of data from occupational epidemiology, Benchmark dose (BMD) was applied to estimate biological exposure limit (BEL). Cadmium exposed workers were selected from a cadmium smelting and a zinc products factory and control group was selected from doctors or nurses and staff from shops living in local area; Urinary cadmium (UCd) was used as exposure biomarker and urinary β2-microgloburin (B2M), N-Acety1-β-D-glucosaminidase (NAG) and albumin (ALB) were used as effect biomarkers. All urine parameters were adjusted by urinary creatinine. Software of BMDS (Version 1.3.2, EPA.U.S) was used to calculate BMD. Calculated abnormal prevalence was based on the upper limit of 95% of effect biomarkers in control group; There are significant dose response relationship between the prevalence of effect biomarkers(UB2M,UNAG and UALB) and exposure biomarker (UCd); BEL was 5μg/g creatinine for UB2M as effect biomarker, It consists with the recommendation of WHO; BEL was 3μg/g creatinine for UNAG as effect biomarker; BEL can be estimated by using the method of BMD; the more sensitive biomarker would used, the more occupational population would protected. The application of BMD in estimating biological exposure limit (BEL) is proper. UNAG is suggested as more sensitive biomarker to be used to estimate BEL for cadmium exposure.

PLASMA METALLOTHIONEIN ANTIBODY AND RENAL DYSFUNCTION IN CHINESE CADMIUM EXPOSED WORKERS

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[ID 339]

It has been reported that metallothionein antibody is present in the circulations of healthy subjects and in patients suffering from atopic dermatitis. The aim of this study was to investigate whether cadmium-induced renal dysfunction is related to the presence of the plasma metallothionein antibody (MT Ab) in workers exposed to cadmium occupationally. We used enzyme-linked immunosorbent assay (ELISA) techniques to determine the levels of plasma metallothionein antibody in workers in China who had been exposed occupationally to cadmium; from these measurements we determined their degrees of exposure and risk assessments. We demonstrate that there is a significantly increased prevalence of renal dysfunction—existing in a dose-dependant relationship—with respect to the level of urinary cadmium. We found no significant correlations between the levels of MT Ab and the external or internal exposure doses of cadmium ($P > 0.05$), but the levels of MT Ab did correlate positively with two biomarkers of renal dysfunction—urinary 2-microglobulin (UB2M; $r = 0.302$, $P < 0.001$) and -D-glucosaminidase (UNAG; $r = 0.218$, P N-acetyl- < 0.05)—in cadmium-exposed workers. Workers having high levels of MT Ab are more susceptible to cadmium-induced tubular nephrotoxicity than are those possessing low levels of MT Ab. The value of the odds ratio (OR) was 4.2; the 95%-confidence intervals were 1.2–14.5 ($P < 0.05$). This study suggests that subjects having higher MT Ab levels more readily develop cadmium-induced renal dysfunction. Thus, the levels of plasma MT Ab can be used as a biomarker of a subject's susceptibility to renal dysfunction as a result of occupational exposure to cadmium.

NEW BIOMARKERS OF CADMIUM EXPOSURE, EFFECT AND SUSCEPTIBILITY

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[ID 359]

Metal toxicology is confronted with new challenges to meet requirements from advanced technologies in search for new materials and processes, Further development of biomarkers are needed. In cadmium (Cd) exposure both surrogate and direct biomarkers are used. Environmental exposure to Cd is mainly from food and smoking. Exposure in the work environment is mainly via air and dust. There is gastrointestinal or pulmonary absorption. The distribution depends on chemical species. Cd is mainly transported as metallothionein (MT) in blood and it accumulates in kidneys where renal tubular damage occurs. Biomarkers of Cd exposure are Cd in blood and urine. MT, N-Acetyl-beta-D-glucosaminidase (NAG) activity (NAG- A and –B). proteins, calcium and magnesium in urine are biomarkers of adverse effects.

Ethical issues to be addressed in biological monitoring are how information about DNA from subjects can be used against or for the subject.

Our recent studies in both environmentally and work related exposure employed metallothionein gene expression (MT-GE) in peripheral blood lymphocytes (PBLs) as a biomarker. Basal and induced MT mRNA expression levels in PBLs were shown to be related to Cd exposure. Induced MT-GE was shown to be inversely related to the urinary excretion of NAG, an indicator of early renal tubular damage. MT-GE in PBL:s can thus be used as a biomarker of susceptibility to renal Cd toxicity. Induced MT- mRNA levels in PBLs are likely to reflect renal MT induction ability, thus providing an index of susceptibility to the adverse effect of Cd. This biomarker should be investigated for its possible usefulness in workers exposed to other metals.

This is an example of how advances in molecular epidemiology may increase delineation of human health risks from environmental metal exposure. Reference values for this new biomarker and for other biomarkers of Cd exposure, effects and susceptibility needs to be established

NEW ALAD POLYMORPHISM MIGHT INFLUENCE HUMAN SUSCEPTIBILITY TO RENAL TOXICITY OF LEAD

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[ID 412]

Hypothesis: Newly identified polymorphisms in ALAD may affect human susceptibility to lead effects on the kidney.

Objective: To examine if other Single Nucleotide Polymorphism (SNPs) at ALAD gene loci other than Msp SNP in exon 4 could modify the relationship between blood lead and renal function parameters.

Method: This is a cross-sectional study on a sample of 275 volunteers occupationally exposed to lead in Vietnam. All subjects had measurement of Blood lead (PbB) , Urinary Retinal Binding Protein (URBP), Urinary α1-microglobulin (Uα1m), Urinary β2-microglobulin (Uβ2m), Urinary N-acetyl-beta-D-glucosaminidase (NAG), urinaryamino levulinic acid (ALAU), Serum α1-microglobulin (Sα1m), Serum β2-microglobulin (Sβ2 m) and Urinary Albumin (Ualb). The 6 SNPs studied were Msp & Rsa in Exon 4, Rsa39488 in Exon 5, HpyIV & HpyCH4 in intron 6, Sau3A in intron 12. General linear model (GLM) and multiple regression analysis with interaction of PbB*SNPs were applied to check possible modifying effect of the SNPs on the association of renal parameters and blood lead adjusting for potential confounders like age, gender, Body Mass Index (BMI), and exposure duration.

Result: Among the 6 SNPs studied, HpyCH4 was found to be associated with certain renal parameter. Workers with HpyCH4 1-1 homozygote were more susceptible to effects of lead on Uα1m, Uβ2m, URBP, Ualb compared to workers with HpyCH4 1-2 heterozygote.

Conclusion: HpyCH4 SNP in intron 6 has shown significant effect on lead toxicity to kidney with wild type allele being more susceptible than variant. The particular mechanism has yet to be investigated.

CADMIUM INDUCED KIDNEY DYSFUNCTION IN HUMANS-DOSE-RESPONSE RELATIONSHIPS AND BENCHMARK DOSE ESTIMATES FROM AN EPIDEMIOLOGICAL STUDY IN CHINA

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[ID 432]

Tubular kidney dysfunction is the critical effect of long term occupational or environmental cadmium exposure in humans. In a population group of 790 persons exposed to cadmium in the general environment in China, we have studied urinary excretion of biomarkers of kidney dysfunction of tubular type: N-acetyl B-D-glucosaminidase (NAG), its isoformB (NAGB), Beta-2-microglobulin (B2M), retinol binding protein(RBP) and albumin (ALB) in relation to a biomarker of exposure and dose, namely levels of urinary cadmium (UCd). We found statistically significant relationships between levels of UCd and the prevalence of hyper NAGB-uria, hyper NAGuria, hyperB2Muria, hyperRBPuria and hyperALBuria. By the Benchmark Dose procedure, we calculated the lower confidence level of the Benchmark dose (LBMD) of UCd for the renal effect biomarkers. LBMD-05 for NAGBuria in females was 3.7 ug/g crea and for other biomarkers higher values were found, the highest for ALBuria with LBMD-05 = 12.2 ug/g crea. The lowest critical level of CdU for 5 percent response rate of renal dysfunction thus appears to be between 3-4 ug/g crea. CdU should be kept below this level, preferably below 2.5 ug/g crea in order to prevent renal tubular damage.

PULMONARY TOXICITY OF INDIUM COMPOUNDS, INDIUM-TIN OXIDE, INDIUM OXIDE AND INDIUM HYDROXIDE, INSTILLED INTRATRACHEALLY IN RAT.

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[ID 478]

Due to the increasing industrial use of indium compounds, occupational exposure to indium particles has been attracted much attention. Recently, the first case of interstitial pneumonia consistent with occupational exposure to indium-tin oxide (ITO) was reported. Therefore, the pulmonary toxic effect of ITO, In2O3 and indium hydroxide (In(OH)3) was evaluated on male Wistar rats. Each 10mg In/kg of indium compounds was instilled into the trachea of rats, 5 times for two weeks. Over a 3 month after the last instillation, these animals were autopsied serially and pulmonary toxicity was evaluated in all the groups, except in the In(OH)3 group. Because of systemic toxicity, In(OH)3 -treated rats were evaluated for the period of 4 week after the last instillation. During the experimental period, body weight gain was significantly suppressed in the In(OH)3 group, but not in both ITO and In2O3 groups, compared to the control group. A significant increase in relative lung weights was observed in all the indium-treated rats, especially those in the In(OH)3 group. Foci of slight to severe inflammatory lesions were present in all the indium-treated groups. These lesions deteriorated among all indium- treated rats during examination period, especially in the In(OH)3 - treated rats. Extensive interstitial pneumonia with squamous cell metaplasia was observed in the In(OH)3 - treated rats, but not in the ITO- or In2O3 -treated rats.

The present study clearly demonstrated that ITO, In2O3 and In(OH)3 caused pulmonary damages when instilled intratracheally into rats. Although same dose as indium was given in this study, it seems that In(OH)3 has greater systemic and pulmonary toxic effects than do other two indium compounds.

REPRODUCTIVE TOXICITY OF LOW-LEVEL LEAD EXPOSURE IN MEN

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[ID 1036]

Parameters of semen quality (including sperm concentration, motility, morphology and seminal plasma indicators of secretory function of prostate and seminal vesicles), sex hormones in serum (FSH, LH, prolactin, testosterone and estradiol), and biomarkers of lead, cadmium, copper, zinc, and selenium were measured in 240 Croatian men aged 19-52 years. The subjects had no occupational exposure to metals and no other known factors suspected of influencing male reproductive function or metal metabolism. After adjusting for potentially confounding variables (age, smoking, alcohol, blood cadmium and serum copper, zinc, and selenium) by multiple re-

gression, an increase in blood lead (BPb) was significantly associated with decreasing percentage of morphologically subnormal sperm ($P < 10^{-5}$), increasing percentages of pathologic ($P < 0.003$) and overly wide ($P < 10^{-5}$) sperm, increasing serum levels of LH ($P < 0.02$), testosterone ($P < 0.003$), and estradiol ($P < 0.006$) and decreasing serum prolactin ($P < 0.03$). In the multiple regression model where δ-aminolevulinic acid dehydratase (ALAD) activity in blood was included instead of BPb, a decrease in ALAD activity was significantly associated with decreasing percentage of morphologically subnormal sperm ($P < 0.003$), increasing percentages of pathologic ($P < 0.03$) and overly wide ($P < 0.0004$) sperm, decreasing seminal plasma zinc ($P < 0.04$), decreasing serum prolactin ($P < 0.02$) and increasing serum testosterone ($P < 0.02$). The median and range values of BPb and ALAD in the 240 subjects were 49 (11-149) µg/L and 57.1 (22.8-97.1) European units, respectively. The results indicate that even low-level environmental lead exposure, that is common for the general populations worldwide, can significantly affect reproductive function in men. An independent contribution of age, smoking, alcohol, or blood cadmium, serum copper, zinc, and selenium levels (although all were within the range of so-called normal values) to changes in certain reproductive parameters was also observed.

RECURRENT LARYNGEAL NERVE NEUROPATHY SECONDARY TO OCCUPATIONAL LEAD POISONING

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[ID 1041]

Occupational lead exposure constitutes another large group of person at risk. Lack of personal protective equipments and ignorance regarding the deleterious effects of this heavy metal continues to be the major factors that predispose them to its toxic effects. Chronic lead poisoning has toxic effects on multiple organ systems, particularly the hematologic and neurologic systems of all ages. However ,recurrent laryngeal nerve involvement is commonly seen in horses but not in humans. We report a case of a 29-year-old male, a metal grinder for about a year and a half. He sought consult because of voice stuttering, incomprehensibility, feeling of choking and swelling of the right arm noticed within six months in his job. Consult with a neurologist and cardiologist was done and ruled out any primary neurologic or cardiovascular problem. EMG-NCV showed evidenced of nerve entrapment consistent with carpal tunnel syndrome. Blood lead level was 29 ug/dl. A direct nasopharyngolaryngoscopy revealed generalized weakness of the oropharyngeal area with weakness of velopharyngeal function. There is also weakness on abduction of left vocal cord compared with the right. Chelation was done using DMSA 100 mg/cap at 30 mg/kg for the first three days in three divided doses and 20 mg/kg in three divided doses for 16 days. A repeat blood lead analysis 2 weeks after treatment showed 2 ug/dL. There was also a significant change in his voice and resolution of other symptoms. This report showed that lead poisoning could manifest as voice problem and should be considered as a differential diagnosis.

APOPTOSIS INDUCED BY LOW DOSE OF CHROMIUM IS NOT DEPENDENT ON CASPASE 3 ACTIVATION

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[ID 1315]

Hexavalent chromium compounds are well documented human carcinogens. In vitro experiments show Cr (VI) induces cell death by apoptosis through activation of p53 protein. This study evaluated Cr (VI)-induced apoptosis in a human bronchial epithelial cell line (BEAS-2B) and in a lymphoblastic leukemia cell line (MOLT-4).
Cultured cells were treated with either 0 – 0.5 – 3 – 6 - 9 or 200 mM Cr (VI) for 4, 12 or 24 hours. To evaluate caspase involvement in Cr (VI)-induced apoptosis, cells were treated with 6 mM Cr (VI) and either caspase-3 inhibitor, caspase-8 inhibitor or caspase-9 inhibitor for 24 hours.
Cell-pellets were resuspended in hypotonic fluorochrome solution. The PI fluorescence of individual nuclei was measured using a FACScan flow cytometer.
To study p53 expression, MOLT-4 cells were treated for 1 – 2 – 3 – 4 – 6 - 12 and 24 hours with 3 mM Cr(VI), and for 4 -12 and 24 h with 0.5 mM Cr(VI). BEAS-2B was treated with 0.5 and 3 mM Cr (VI) for 4, 12 and 24 hours.
Aliquots corresponding to a protein content of 40 mg were electrophoresed, electroblotted and probed with anti-p53 Ab-6. The secondary antibody was detected using enhanced chemiluminescence, followed by autoradiography.
Cr (VI) caused dose- and time-dependent increases in the apoptosis rate in both cell lines. Western blotting showed increased p53 protein expression in MOLT-4 cells, but not in BEAS-2B cells, after exposure to 0.5 and 3 mM hexavalent chromium for 12 hours and 4 hours respectively.
Apoptotic cell death induced by Cr (VI) was not decreased with caspase-3, 8 and 9 inhibitors.
These preliminary results provide evidence of Cr (VI)-induced apoptosis which deserves further investigation in occupationally exposed workers.

CHANGES IN TUBULAR DYSFUNCTION MARKER LEVELS IN PARALLEL WITH LEVELS OF COPPER ETC.,SEPARATELY FROM THAT OF CADMIUM

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[ID 1669]

Objective: This study was initiated to investigate what extent the elevation in urinary α_1- and β_2-microglobulins (α_1-MG and β_2-MG, respectively) is specific to Cd nephrotoxicity.
Methods: 1000 adult women in 11 prefectures all over Japan offered morning spot urine samples with written informed consent. The samples were analyzed for 8 elements (Ca, Cd, Co, Cu, Mg, Mn, Ni and Zn), α_1-MG, β_2-MG, creatinine (CR) and specific gravity (SG). The levels of 8 elements and 2 MGs were expressed after correction for CR or SG (1.016). Age, CR and SG distributed normally, and 2 MGs and 8 elements distributed log-normally. Total cases were classified into four groups (250 cases/group) for each element from lowest to highest (Groups A to D)
Results: α_1-MG and β_2-MG increased as a function of Ca, Cd, Cu, Mn and Ni when corrected for CR, and it was Cd and Cu after SG correction. Prevalence of α_1-MG-uria (cut-off value; 6.5 mg/g cr or l) and β_2-MG-uria (cut-off value; 400 µg/g cr or l) was elevated with increasing Ca, Cd, Cu and Mg when corrected for CR, but only with Ca, Cd and Cu when corrected for SG. Multiple regression analysis of 353 cases of 50-59 year-old women with the 8 element levels as independent variables and one of the two MGs as a dependent variable showed that Cu was the most influential element followed by Cd or Zn.
Conclusions: Urinary levels of α_1-MG and β_2-MG correlated not only with Cd levels but with the levels of other elements, especially Cu. The observation suggests that sub-clinical elevation inα_1-MG and β_2-MG is not always attributable to Cd nephro-toxicity, and that consideration of other factors such as Cu, Ca and Zn is necessary.

STUDY ON EARLY RENAL INJURY IN THE WORKERS OCCUPATIONALLY EXPOSED TO LEAD

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[ID 1865]

Lead is a sort of heavy metal poison and mostly could be excreted through the kidney when it enters blood. To study early renal injury in the workers occupationally exposed to lead (Pb), the blood lead (PbB) were measured by graphite furnace atomic absorption spectroscopy, the levels of urinary total protein (TP), microalbumin (mALB), β2-microglodulin (β2-MG) , immunoglobulin G (IgG) and the activities of urinary N-acetyl-beta-D-glucosaminidase (NAG), -GT) , lactate dehydrogenase (LDH), alkaline□-glutamyl transferase (□ phosphatase (ALP) were determined in 598 workers from one smelt factory in Shenyang . Based on their the levels of PbB, the workers were divided into three mol/L, the absorbed group□groups: the exposed group PbB levels were less than1.9 mol/L□mol/L, less than or equal to 2.9□PbB levels were more than or equal to1.9 mol/L . The results showed□and the poisoned group PbB levels were more than 2.9 that the contents of urinary β2-MG (109.3±19.8, 153.3±10.3, 172.2±18.6µg/gCr), mALB (5.8±1.9, 6.1±3.8, 8.1±4.2 mg/gCr) and the activities NAG (10.3±1.8, -GT (51.2±11.9, 62.1±13.8, 88.1±14.2 U /gCr) in□15.3±1.3, 17.2±1.6 U /gCr), three groups were significantly higher than those in controls (88.6±11.2µg/gCr, 0.01□.The levels□0.05□P□4.8±2.1 mg/gCr, 8.2±1.6 U /gCr, 41.3±12.1 U /gCr) □P were increased gradually with the contents of blood Pb. Our findings indicated that the renal functions of the workers occupationally exposed to lead had been mol/L , the renal□damaged in a certain degree, and when PbB levels more than 2.9 -GT could be sensitive□injury was more extensive; The urinaryβ2-MG, mALB, NAG, index for monitoring early renal injury, suggesting that these measurements could be as biomarkers to Pb occupational exposure.

PESTICIDE EXPOSURE AND HEALTH EFFECTS

EPIDEMIOLOGICAL EVIDENCE AND STRATEGIES FOR PREVENTION OF PESTICIDE-RELATED ADVERSE HEALTH EFFECTS IN AGRICULTURAL WORKERS: THE PARAQUAT EXAMPLE

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[ID 1734]

Prevention of adverse health effects from pesticide exposure requires a thorough understanding of the circumstances in which these effects arise. Although there are a large number of studies, surveys and case reports in the literature, their value is often limited because of insufficient information to confirm the nature of the effect, the circumstances of intoxication, the causing agent, the toxic dose, the levels in the body tissues, etc. Due to its particular toxicity and mode of action, the number of papers published on paraquat is much greater than that of other compounds. We have evaluated these data to see what general conclusions for preventative strategies can be derived from the literature on paraquat-related health effects in exposed workers.

Epidemiology of acute paraquat poisoning. Toxicity of paraquat is due to its oxidising action to cells and tissues. Irrespectively of the routes of absorption, the critical systemic toxicity of paraquat in mammalians, including humans, consists of a pulmonary fibrosis. Paraquat also induces irritative changes to ocular and gastrointestinal mucosae and to skin by direct contact.

Despite the large number of papers and reports are available on acute paraquat poisoning, the quality of information available in many studies is rather limited and their conclusions are not supported by robust scientific evidence, the major limitations being the lack of confirmation of the causal nature of the health effect and/or uncertainty on the actual exposure circumstances.

Acute poisoning cases by paraquat with severe lung lesions and lethal outcome have been observed to occur after oral intake, mostly from intentional self harm. Accidental cases by ingestion appear to have declined in incidence over recent time.

Effects from skin contamination are usually of a localised, irritant nature. However, there are a small number of reports of acute, systemic poisoning cases that have mostly concerned paraquat users affected with skin lesions, using poor work practices and faulty equipment; these cases resulted from prolonged skin contact or extensive accidental contamination of the skin and garments not properly removed or treated under correct conditions of use.

Acute exposure through breathing in concentrated spray mist may produce local irritation of the upper respiratory tract but does not cause serious systemic poisoning.

Prevention strategies. The key elements for preventing adverse health effects from paraquat exposure are equally applicable to pesticides in general and include: development of safe formulations, adequate procedures for storage and use (including both mixing-loading and application), safe disposal of unused compounds and containers, provision of adequate spraying equipment and its proper maintenance, effective personal protection, adequate hygienic practices at work, proper instruction, training and certification of application personnel, restriction of use to *bona fide* agricultural users, health surveillance of users, epidemiological surveillance of poisoning and other adverse health effects (a set of tools for incident investigation and analysis having been developed by international organisations).

PESTICIDES AND RESPIRATORY SYMPTOMS AMONG FARMERS

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[ID 209]

Background: Despite the intensive use of pesticides in agriculture there are few studies evaluating the impact of this exposure on respiratory problems.

Objectives: To quantify the prevalence of respiratory symptoms among farmers and to evaluate the relationship between occupational use of pesticides and the prevalence of respiratory symptoms.

Methodology: A cross-sectional study was conducted among farmers from two counties of Serra Gaucha, in Brazil. Frequency and type of chemical exposure and pesticide poisoning were recorded. An adaptation of a questionnaire developed by the American Thoracic Society (ATS) was used for the assessment of respiratory symptoms. Multivariate logistic regression analysis was carried out.

Results: The study interviewed 1,379 farmers in 471 farms. Prevalence of asthma symptoms was 12% and of chronic respiratory disease symptoms was 22%. Highest odds ratio (OR) for asthma symptoms (OR 1.51; 95% confidence interval [CI] 1.07-2.14) and chronic respiratory disease symptoms (OR 1.34; CI 1.00-1.81) was found on women. Logistic regression analysis identified associations between many forms of exposure to pesticides and an increase in respiratory symptoms. Pesticide poisoning occurrence was associated with higher prevalence of asthma symptoms (OR 1.54; CI 1.04-2.58) and chronic respiratory disease symptoms (OR 1.57; CI 1.08-2.28).

Conclusion: In spite of causality limitations, the results provide evidence that farming exposure to pesticides is associated with higher prevalence of respiratory symptoms, especially when the exposure is above two days per month.

AN UPDATE ON PESTICIDE POISONING SURVEILANCE IN THE UNITED STATES - THE SENSOR-PESTICIDES PROGRAM

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[ID 433]

It is important to conduct public health surveillance on pesticides in order to identify any adverse effects on humans that pesticides may be producing. Data gathered through surveillance efforts can guide prevention activities, including regulatory, enforcement, consultative, and/or educational interventions. It has been argued that pesticide poisoning, along with heavy metal poisoning, is a useful sentinel to trigger action against environmental toxins. Recognizing the importance of pesticide poisoning surveillance, the National Institute for Occupational Safety and Health (NIOSH) provides funding and technical support to state health departments through the Sentinel Event Notification System for Occupational Risk (SENSOR)-Pesticides program. The SENSOR-pesticides program is also partially funded by the EPA. Health departments in nine states (Arizona, California, Florida, Louisiana, Michigan, New York, Oregon, Texas, and Washington State) participate in the program. Case reports are obtained from many different sources. Between 1998-2002, the three leading report sources were other government agencies (e.g. the state department of agriculture, state department of industrial relations, and county health departments)(36%), workers' compensation (25%), and poison control centers (24%). Health care professionals provided a much smaller proportion of reports (4%). All cases conform to a standardized case definition. Detailed information on each case is collected by the state agencies in a standardized manner, using standardized variables and a severity index. Between 1998 and 2002, a total 2,721 cases of acute occupational pesticide-related illness were identified by the SENSOR-pesticides program. In addition to assessing magnitude and identifying risk factors, the SENSOR-pesticides program has identified many emerging pesticide problems. The latest information on the magnitude of pesticide poisoning in the US, risk factors for these illnesses, and a summary of recently identified emerging problems will be provided.

ENDOSULFAN EXPOSURE AND NEUROBEHAVIOURAL DEVELOPMENT IN SCHOOL CHILDREN

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[ID 846]

The detrimental effects of various pesticides including endosulfan on neurobehavioural development have been shown in animals. The present study aimed to compare the prevalence of learning disability, IQ performance and abnormal behavior among 619 school children belonging to a village which was exposed to endosulfan through aerial spray for about 2 decades (study group) and 416 school children from control village (reference group). The study parameters included evaluation of the learning disability as reported by the class teacher and the results of annual school

examinations, IQ evaluation by "Draw A Man Test" and behavioural abnormality in the class as reported by the class teacher. Exposure assessment to endosulfan was evaluated through the endosulfan levels in serum in a select subpopulation (study group n= 164; reference group n = 83). The results of the study showed that the mean +/- SEM serum endosulfan (total) levels in study and reference group were 9.8 +/- 1.0 and 1.2 +/- 0.14 ppb respectively and these differences were statistically significant (p <0.01). The prevalence of learning disability in study and reference group was 10.6% and 2.6% respectively with RR = 4.03 (2.16 – 7.54). Prevalence of retention in the same class was 20.4% and 13.5% respectively with RR 1.51 (1.13 - 2.02). The difference in both these parameters were statistically significant (p < 0.01). The prevalences of low IQ and behavioral abnormalities (aggression, arrogance and restlessness) were significantly higher in the study group (P < 0.01). The study results indicate a possible link between neurobehavioral abnormalities and exposure to endosulfan through aerial spray. The study has limitations inherent in cross sectional studies, non response for blood examination and possibility of observer's bias.

ADVERSE HEALTH EFFECTS ASSOCIATED WITH CHRONIC LOW LEVEL EXPOSURES TO ORGANOPHOSPHATE PESTICIDES

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[ID 1722]

Aims

To determine whether chronic low level occupational exposures of people who were farmers in the 1970s contributed to neuropsychiatric morbidity.

Method

The Survey of Health in Agricultural Work (SHAW) project consists of a staged epidemiologic and clinical study. In the first stage, a historically prospective cohort of more than 19,000 farmers in the 1970s was established through various sources, such as the National Farmers' Union and various livestock associations. Farmers were then sent a questionnaire asking about their health and work history (including working with sheep or cattle and the use of pesticide concentrates for the treatment of pests). Potential cases, in particular of neuropathic disease, Parkinson's disease, depression were identified using published tools, or 'a priori' algorithms based on the questions used for screening purposes.

Results

So far, information on 32% of the cohort has been obtained, 38% have not responded and 30% no longer live at the original address. Analysis of the first 1070 questionnaires indicated that 54% of the farmers were still working full-or part time and 41 % had retired or were semi-retired. 97% of the farmers had had livestock and 50% both cattle and sheep. 80% of the farmers reported that they had dipped sheep. Furthermore, over 70% reported that they had handled concentrate for the treatment of pests on sheep.

Working with sheep per se was not associated with any outcome of interest but handling of the concentrate for treatment of pests on sheep was associated with neurolopathic (OR 1.99; 95%CI 1.14-3.47) and Parkinson's disease (OR 2.12; 95%CI 1.21-3.73). This association persisted even after exclusion of those subjects who gave a past history consistent with acute organophosphate poisoning.

Conclusions

Vhronic low level exposure to organophosphate concentrate may have caused neurological ill-health amongst farmers. Further investigation is in progress

CANCER RISKS AMONG SWEDISH PESTICIDE APPLICATORS

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[ID 1874]

In Sweden, licensed pesticide applicators is the most appropriate occupational group for studying effects of pesticides on cancer. The aim of this retrospective cohort study was to explore cancer risk among licensed pesticide applicators in comparison with the general population.

Since 1965 it has been mandatory to have a license for handling the most acutely toxic pesticides. It was therefore possible to create a unique cohort of all pesticide applicators with licenses issued between 1965 and 2003 by the Swedish Board of Agriculture. Date of death was derived from the Cause of Death Register in case a person was deceased. The cohort was followed-up in the Cancer Registry from date of license until death or December 31, 2003. This cohort comprises 65,056 persons who contributed with 988,384 person-years in the study. The expected number of incident cases was calculated on the basis of annual cancer incidence data for the whole country.

Totally 5698 cancer cases were observed as compared to 5622 expected, SIR (Standardized Incidence Ratio)=1.01 (95 % confidence interval: 0.99-1.04). Increased risks were observed for lip cancer SIR=2.30 (1.82-2.86), prostate cancer SIR=1.17 (1.11-1.23), testicular cancer SIR=1.86 (1.51-2.27), tumors in the nervous system SIR=1.23 (1.06-1.40), thyroid cancer SIR=1.96 (1.47-2.55), Hodgkin's disease SIR=1.89 (1.42-2.48), malignant non-Hodgkin lymphomas SIR=1.27 (1.11-1.43) and lymphatic leukemia SIR=1.36 (1.10-1.66). Lower than expected risks were found for cancer in the tongue SIR=0.54 (0.28-0.90), esophagus cancer SIR=0.54 (0.38-0.75), pancreatic cancer SIR=0.75 (0.58-0.91), trachea cancer SIR=0.71 (0.50-0.98) and lung cancer SIR=0.53 (0.47-0.60).

Pesticides produce both short- and long-term effects on human health. The long-term effects of pesticides include cancer risks and disruption of the body's reproductive, immune, endocrine, and nervous system. The cancers affected are non-Hodgkin's lymphoma, soft-tissue sarcoma, prostate, leukemia, pancreas, lung, breast, skin and ovary cancer. The results in this study support some of those earlier findings.

FARMER'S RISK-TAKING BEHAVIOUR WITH REGARDS TO USING PESTICIDES IN SPAIN: A SOCIOLOGICAL APPROACH

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[ID 819]

Background: According to specialized literature, Spanish farmers take a lot of risks in their daily practices using pesticides. A theoretical frame based on the relevance of psychosocial and institutional variables has been used here to analyse these farmer's risk-taking behaviours.

Aims: The main aim of this paper is to understand why farmers take risks when working with pesticides, in order to propose measures to improve safety in their work.

Materials and methods: We analysed the national and international literature concerning pesticide use, and we carried out qualitative research based on in-depth interviews and two samples: one composed of 30 farmers and the second of 18 institutional expert advisers to farmers in the use of pesticides. The data analysis followed the grounded theory proceedings.

Conclusions: Farmers talk about their various intoxication symptoms as something 'normal' within their pesticide work. Furthermore, they recognize they do not wear the necessary individual protection. This means that they know they should take more precautionary measures, although they do not always do it. They say that safety rules concerning pesticides are almost impossible to observe in their daily work, but at the same time they think the rules are correct, and they take full responsibility for the consequences associated with breaking them. This contradiction could be explained by looking at the dominant agricultural pattern imposed by companies and state agencies, which generate strong dependency relations with the farmers. This may also explain why, in spite of health repercussions associated with pesticide use, there is not a clear opposition to pesticides amongst the farmers. In short, if we want to decrease farmers' risk-taking behaviour, we must know that it is not enough to just give more information to the farmers; it is also necessary to increase the farmers' autonomy in their work.

ACUTE AGRICULTURAL PESTICIDE-RELATED ILLNESSES IN ITALY, 2004

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[ID 1059]

Italy is ranked second in Europe and sixth worldwide with regard to the use of pesticides in agriculture (1). In this country farmers and agricultural

workers are about 4.1 milions (2). Being aware of the large amount of pesticides used and the high number of people employed in agriculture, the Italian National Institute of Health has recently implemented a surveillance system for acute pesticide related illnesses, based on the national Poison Control Centers (PCCs) contribution.
In 2004, five PCCs collaborated to the surveillance system and notified a total of 1051 cases of unintentional exposure to agricultural pesticides. Among them, 388 met the criteria to be considered pesticide related illnesses and fell into the following classification categories: definite = 65 (17%), probable = 102 (26%), possible = 121 (31%), suspicious = 100 (26%). Severity was low in 79% (n=307) of the illnesses, moderate in 20% (n=79) and high in two. Most of the cases were adults (n=354, 94%) and males (n=297, 77%). Exposure occurred at work for about 50% of the illnesses and nearly one forth of them were exposed to two or more pesticides, totalling 500 identified exposures. The classes of agents most frequently reported were insecticides (n=261, 53%), and among them organophosphates (n=112, 25%), and fungicides (n=125, 25%). The top six pesticides associated with health effects were methomyl (n=54), glyphosate (n=34), dimethoate (n=30), copper sulphate (n=58) and copper oxychloride (n=22). A total of 64% of the cases were exposed between May and September. The Italian Regions with the higher number of illnesses were Sicily (n=81), Campania (n=55), Apulia (n=32) and Calabria (n=29).
The data here presented provide an initial support to focus the attention on emerging problems, mainly related to specific chemicals currently used in Italy, and to identify Italian geographic areas where local surveillance and intervention programs should be implemented.
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2. ISTAT. Principali risultati del 5° Censimento Generale dell' Agricoltura. Anno 2000.
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REPRODUCTIVE HEALTH IN GREENHOUSE WORKERS

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[ID 1530]

Background: Greenhouse workers (GW) are exposed to environmental contaminants, such as pesticides, that may cause known effects in terms of acute poisoning, but also long-term effects, which are less frequently investigated. This study investigated the association between occupational exposure to pesticides in GW and reduced female fertility.
Materials and methods: The analysis is based on a retrospective cohort of 200 women who have been working for at least two years in greenhouses located in the province of Latina, Latium. Information on health status, lifestyle, work activity, reproductive history and other characteristics (age, smoking, alcohol abuse, drugs exposure) were collected using a structured questionnaire. Exposure to pesticides was classified according to work tasks and level of exposure. The fertility was measured in terms of time to pregnancy (TTP), that is the number of non-contraceptive cycles that it takes a couple to conceive. A comparison group of 200 women was selected among the employees of the public administration in the same province. The difference of the average TTP between exposed and non exposed group was analysed by using the t of student test. Cox' proportional hazard model was used to compare the TTP between the two groups after correction for confounding factors, such as age, paternal and maternal smoking, previous pregnancies.
Preliminary results: In the exposure group the average TTP was 12.4 months (± 2.5), among the non exposed the average TTP was 5.9 months (± 2.2). The difference among exposed and exposed was thus 6.5 months ($p<0,05$). The comparison of the distribution of TTP in the two groups showed a hazard ratio of 1.44 (C.I. 95%: 1.05 – 1.97).
Conclusions: The findings suggest that female workers in flower greenhouses may have reduced fertility and that exposure to pesticides may be part of the causal chain. After adjusting for confounding factors the excess of risk among exposure group was confirmed. The issue under investigation is complex: it is not only the health status that is involved in the reproductive health but also the emotional status, other than conditions of susceptibility due to congenital or acquired factors. Occupational exposure is a condition to be investigated In the field of the studies on fertility, keeping in mind that other factors may influence the outcome measure.

COMPARATIVE EVALUATION OF CHOLINESTERASE LEVELS IN BANANA PLANTATION WORKERS IN CHANGUINOLA DISTRICT 2002 TO 2004

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[ID 85]

Banana Plantations workers in Bocas de Toro have been complaining of different health effects induced by organophosphates such as mild poisonings, skin and respiratory allergies, cancers and birth deformities.Aims:1. Compare AchE base line activity level of the general working population of the district with the AchE activity level of organophosphate handlers.2. Compare Ache activity levels in the organophosphates handlers population, before and after the new work patterns introduced at the end of year 2003.Materials and Methods: This is a prospective study of the level of AchE activity of all new unexposed banana workers 1132 at the moment, and of 671 of the 1000 organophosphates handlers, data corresponds to results from the years 2002 to 2004. Results: Serum AchE activity levels followed a normal distribution in the non exposed population with an average of 7480 UI. Only 7.7% (88 new workers) presented a serum cholinesterase level equal or below 5499 UI.The average serum AchE activity level in the organophosphate handlers was 5295 UI.The AchE activity base line in the exposed workers after the new work methods were introduced did not show change in the average level of activity, but the number of workers with levels below 5499 UI went from 46% (137 of 299 organophosphate handler) to 54% (200 of 372 organophosphate handlers)Conclusions:1.- That laborers enter into the banana plantation work force with a normal AchE base line level of 7500UI.2.- Exposed workers, even with the use of protective equipment present biological effects that have to be taken in account for personnel rotation and other means of protection.3.- Data indicates that the new work patterns implemented at end of year 2003 reduces the individual baseline of AchE activity level in the workers and need to be reviewed

PERSONAL PROTECTIVE EQUIPMENTS IN PESTICIDE RISK ASSESSMENT: ESTIMATED VERSUS REAL EXPOSURE PROTECTION.

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[ID 1761]

In operator risk assessment for plant protection product registration in Europe, information from toxicity studies is combined with data on operator and worker exposure. If exposure data are lacking or insufficient, operator exposure is estimated using predictive models. Presently, four models are available in Europe: the German model, the UK Predictive Operator Exposure Model (POEM), the Dutch model and EUROPOEM. All the models calculate exposure during mixing/loading and application of pesticides and/or re-entry in a pesticide treated crop as mg active substance per day. The use of personal protective equipment represents an option to reduce predicted operator and worker exposure. Depending on the type of PPE envisaged, standard coefficients are applied in the models which reduce predicted exposure up to 99%, based on the body area considered.
A survey on the recently published literature has been conducted to assess whether these default values are up to date or may under- or overestimate actual exposure levels. Preliminary results show a great variability of existing PPEs and respective levels of protection afforded. This paper discusses some relevant examples.
In conclusion, concern arises on the gap between estimated and real protection obtained with PPE in the various exposure scenarios

OCCUPATIONAL HEALTH NURSING

INTERNATIONAL COLLABORATIVE RESEARCH: INTER-COUNTRY OCCUPATIONAL HEALTH NURSING PRACTICE SIMILARITIES AND DIFFERENCES

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[ID 634]

The occupational health nursing (OHN) specialty is well established in a few developed countries such as the U.S. However, it is not a well defined nursing field in many countries. Assumptions are that roles and task performance among OHNs in various countries would differ. The purpose of this presentation is to compare and contrast OHN roles and functions identified through role delineation surveys conducted in Japan, Korea, and the U.S. All three studies used the American Board for Occupational Health Nurses, Inc.'s (ABOHN's) 1999 Job Analysis Survey. The survey instrument was modified for the Japanese and Korean studies to manage certain items (e.g., geographical locations, ethnicity, regulatory standards) that were non-relevant to their situations.

The data were analyzed with eligible responses from 245 OHNs in Japan, 351 in Korea, and 661 in the U.S. All three studies' participants were predominantly women. Mean age and years of OHN experience revealed Korean OHNs were the youngest and had the least work experience. The percentage of BSN graduates was lowest in Japan (6%), compared to Korea (35%) and the US (34%). A higher proportion of U.S nurses (65%) worked in companies with over 1000 employees than did Japanese (44%) and Korean (40%) OHNs.

In all three countries, the most common OHN role was clinician. For US nurses, the manager role (23%) was higher than for Japanese (8%) and Korean (3%) nurses. The ten most and least frequently performed tasks differed among the three countries' OHNs. During the presentation, the implication of these findings and the need for additional similar research will be discussed.

This is part of a multinational comparative study and it is the first attempt to develop OHN roles at the international level. Currently, this practice analysis study is being replicated in Thailand and will be performed in Brazil in 2006.

AAOHN ADOPTS POLICY GOVERNANCE: KEYS TO SUCCESS

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[ID 664]

The American Association of Occupational Health Nurses (AAOHN) adopted a new governance model, policy governance, and implemented it in 2003. The decision was made after two years of study, self-evaluation, and SWOT (Strengths, Weaknesses, Opportunities, Threats) analysis. Policy Governance, developed by Dr. John Carver in the late 1970s, enables the Board of Directors to focus on high level issues, delegate with clarity, evaluate the accomplishments of the organization, and lead the association. Emphasis is placed on values, vision, strategic leadership, and empowerment of both the Board of Directors and the staff.

An overview of policy governance will be presented using a decision-making framework. Assessment—Board identified need for a change based on need for efficiency in process and elimination of duplicity. Planning—Policy Governance was identified as preferred choice after study of other governance models. Policies were established in four areas: Governance Process, Board-CEO Linkage, Executive Limitations, and ENDs (Outcomes). Bylaws changes were initiated. Implementation—Model was implemented with support of the Board and Staff. Values were established. ENDs were development. Materials for meetings are prepared to guide discussion and debate including the issue, background, and action required. Evaluation—Evaluation is both internal (Board of Directors) and external (outcomes); each will be discussed.

This new governance has contributed to stronger links with membership and improved accountability. It also has created a more cohesive Board of Directors evidence by evaluations. While Policy Governance may not fit for every organization, AAOHN has benefited from this change. Lessons learned will be discussed.

JOB SATISFACTION AND INTENT TO LEAVE NURSING ACCORDING TO GENDER AMONG HEALTH CARE WORKERS IN 8 EUROPEAN COUNTRIES

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[ID 1884]

Objectives: Family barriers for both men and women pursuing careers in nursing need to be addressed if the current nursing shortage is to be solved. NEXT data allowed us to study associations of gender, family status, age, place of birth, work-family imbalance with occupational position as indicator of career development.

Methods: We conducted the analysis on 32 489 European nurses: 4070 head nurses, 4921 specialised nurses and 23497 registered nurses. Considered factors were included in a multivariate analysis.

Results: The occupational level varied according to gender ($p<.001$). In most countries, males were more represented in the highest positions. More male nurses were born in another country ($p<.01$), while more female nurses worked part-time ($p<.001$). Yet, differences varied across countries. Multivariate analysis shows that male nurses more often obtained promotion (OR=1.27; 95%CI=1.16-1.38). Promotion was frequently attained at the expense of family life. Nurses who became specialised or head nurses more often lived alone compared to those living not alone (OR=1.17; 95%CI=1.06-1.29), more frequently came from another region or outside the country (OR=1.48; 95%CI=1.40-1.57 and OR=1.24; 95%CI=1.09-1.42 respectively), worked longer weeks (OR=1.19; 95%CI=1.12-1.26) and had low family conflicting work (OR=1.35; 95%CI=1.25-1.44). As expected, promotion was linked with higher age.

Conclusions: In general, opportunities for career development are addressed mainly focusing on gender inequalities. These are usually related to the women's need of seeking positions with less responsibility to better match with family obligations. Yet, this study shows that among nurses, irrespective of gender and age, not having family constraints improves possibilities for career advancement. Considering that nowadays managerial posts for nurses are scarce, competition favours those who sacrifice themselves to the higher extent or are more supported in family care.

YOUNG WORKERS AS A CHALLENGE FOR OCCUPATIONAL HEALTH CARE

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[ID 1236]

The aim of this project is to develop a group model to promote work ability and healthy lifestyle of young workers. Our previous research project showed that active coping with stress, optimism, social support and healthy lifestyle are associated with good work ability. These themes are included in this planned group model to be used by occupational or student health care personnel. The most important target of this group model is to improve the participants' skills to solve problems. The background theory in the development work has been constructivism.

The group model consists of three group sessions, 1,5 hours each, with a one week interval. Tools used in this group model consist of a dice game, workbook for a participant and material for a group leader. The aims of the group sessions are: 1) to motivate the participants to consider their habits and factors associated with their work ability 2) to learn to receive and give social support in solving problems 3) to construct optimistic visions of the future.

The group model has been developed in collaboration with multidisciplinary personnel from FIOH and occupational and student health care. The group model will be evaluated in twelve pilot groups, each having eight participants aged under 30 years. Participants and group leaders will evaluate the group model and tools. Additional, the change in coping skills and subjective well-being of the participants will be evaluated using

a questionnaires. Pilot groups will be performed during the autumn 2005. Group model will be ready for used in spring 2006 when a training process for personnel of occupational and student health care will be arranged.

EVALUATION AND RESEARCH ACTIVITIES AND SUPPORT NEEDS AMONG JAPANESE OCCUPATIONAL HEALTH NURSES

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[ID 1370]

Introduction and Objectives

The Bureau of Occupational Health Nursing aims to contribute to quality improvement and assurance of OHN practices through providing various types of supporting activities, such as continuous educations and public relations. As one of those activities, we conducted the questionnaire survey on evaluation and research activities by OHNs. The objectives of this study are: 1) To investigate the present implementation rates of evaluation and research activities, 2) To elucidate the related factors to implementation rates of those activities, and 3) To clarify the support needs for promoting those activities among OHNs.

Subjects and Methods

Questionnaires were distributed to 838 members of the Bureau. As for the evaluation and research activities, several areas of them were listed by the OHN researchers and practitioners. Implementation rate, importance recognition, and skill possession for those activities in each area were inquired in four levels of Likert scale. Whether they had supportive environments, such as education opportunities, was also asked respectively. Multivariate regression analyses were conducted. Dependent variable was total score of evaluation/research activities and independent variables were supportive environments, etc.

Results and Discussion

Evaluation activities were wholly recognized important, while implementation and skill possession for evaluation activities were concomitantly varied among the areas. Implementation rates of research activities were also varied in proportion to the skill possession rates. As the related factors to evaluation and research implementation, superior's understanding, connection with regional universities, and utilization of references were revealed to be independent predictors among supportive environments. As for skills, joining in the study circles was also significantly related. These results indicated that establishment of the support network seems to be necessary and effective to promote these evaluation and research activities. Assistance to those networking initiatives will be one of our important contributions for further progresses in OHN practices.

THE ASSESSMENT OF TH HEALTH CARE UNIT IN FACTORIES: A CASE STUDY OF THE TEXTILE INDUSTRY IN BANGKOK

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[ID 360]

The workers of the textile industry are an at risk group for occupational heath diseases. Health care units in factories have been established to provide health services to employees in the workplace. In this study, a qualitative design was used to explore multiple dimensions of the current situation of the health care unit in 4 textile factories with different types of nurses as related to structure, practice process, and outputs. The theoretical notion of the standard of the nursing unit was employed to examine the systematic organization in the health care unit. The data were collected from workers, nurses, and managers and were analyzed by using the content analysis induction technique.

Results show that the studied factories did not have an employee health care policy. The location of the health care unit was not suitable. There was no philosophy, objectives or budget planning of health care units. The ratio of nurses to employees was not in accordance with the legal requirement. The health services mostly emphasized primary medical care, without the provision of active health services. Instrument and medical supplies were enough for the services provided. There was no documentation regarding inspection of the quality of nursing service and activities. Although workers and nurses recognized the importance and advantages of the nursing health care unit, some factory's owner or managers' vision and mission still neglected employee's health promotion, protection. Two problems relating to the unit was a lack of nurses because they did not want to work full-time in the factory and a lack of budget and academic support from the government. The study indicated that nurses who work in a factory should develop their knowledge about occupational health and the necessary standard of nursing units required and budget and support for service development should be improved.

OCCUPATIONAL HEALTH NURSES' TRAINING NEEDS IN EUROPE

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[ID 883]

Introduction: Needs assessment is the first and primary step before setting up any training project. An evaluation of Occupational health Physicians needs in Europe was done in the year 2000. However, there is no such work found in scientific litterature revue for Occupational Health Nurses. The objective of this study is to identify European Occupational Health Nurses competencies needed in practice.

Method: the study concerns Occupational Health Nurses in Europe. An Occupational Health physician, member of EASOM (European Association of Schools of Medicine) has been selected for each country. Each Physican chooses 6 nurses having qualified occupational health training and 6 without specific training but practicing in occupational health field. A questionnaire containing two parts is sent to both groups of nurses : The first part concerns general information identification, appointments and training. The second part deals with open questions regarding competencies and necessary training classifying priority of needs.

Results: out of 25 european countries, 8 have been selected (Occupational Health Nurses' presence, and qualifed training available). Competencies identified following hierarchy of needs will be reported.

Conclusion: An Occupational Health Nurses' training needs assessment would help to prioritise needs and eventually to set up a common training model at european level.

DEALING WITH PROBLEMS IN THE NURSING WORK ENVIRONMENT IN EUROPEAN COUNTRIES – RESULTS FROM THE NEXT-STUDY

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[ID 1270]

Introduction: Good team problem solving (PS) is relevant for the workers´ psychological health. Three different ways of PS are distinguished: a) discussion, b) using authority, and c) postponing (not solving). In this contribution, prevalence and consequences of PS are examined among nurses in 8 European countries (BE, FIN, FR, D, IT, NL, POL, SLK)

Methods: The NEXT–Study (www.next-study.net) is investigating working conditions of nurses. This analysis is based on the NEXT-follow up questionnaire assessments in 2003/4 among 23,515 nurses, and was limited to registered nurses in hospitals (n=12,908).

Results: 16.0% of all nurses reported rare 'PS with discussions', 20.5% frequent 'authoritarian PS' and 24.1% frequent 'postponing'. Nurses in NL reported the most and those in POL and especially SLK the least participative PS strategies. Younger nurses (<30 years) reported a higher proportion of non-discussing PS style (sig. in IT, SLK, ANOVA p<.01). No gender differences were found. Ward sisters had a distinctly more positive perception of the PS styles.

All three PS styles were associated with 'job dissatisfaction' (total sample: Pearson corr. between -.19 and .23), with the 'intention to leave the institution' (esp. 'postponing': r=.19), with the 'intention to leave nursing completely' (esp. 'postponing': r=.17), with 'burnout' (especially 'authoritarian decisions', r=.17, all: p<.001). Such associations were clearly highest in DE and lowest in PL. 'Authoritarian' PS style was more positively perceived in BE, FIN, FR and NL and negatively in SLK and especially D. In FR and POL 'postponing' seemed to be the most disliked PS style.

Conclusions: The results reflect different work cultures. The main finding is that the prevalence of a non participatory leadership style is not automatically associated with the degree of negative attitudinal consequences (e.g. DE had a lower prevalence of non participatory PS style but if so, it had more sever consequences, in POL the opposite was observed). Our find-

ings may contribute to the discussion about the role of leadership styles and their consequences in nursing. This debate will be a central for future action to make nursing a (more) attractive profession to the young people.

FACTORS LINKED WITH VIOLENT EVENTS IN HEALTH CARE– RESULTS FROM THE NEXT STUDY

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Introduction: Healthcare workers (HCWs) employed in hospitals were found to be at high risk for violence. Previous research found nursing aids to be at higher risk for workplace violence than registered nurses, especially in psychiatric, geriatric and intensive care. Further research is needed to confirm that improved communication may enhance team-building and help preventing violent episodes. This study aims to identify potential risk factors for violence, in order to provide suggestions for intervention.
Methods: We analysed data of the PRESST-NEXT study, selecting only HCWs working in hospitals in 10 European countries (N=23163). Multivariate analysis was conducted using HCW's declaration of violent episodes as outcome (risk category: occurrence of one or more violent episodes per month). All risk factors found significant in previous univariate analyses were included in the multivariate model, together with confounders such as age and gender.
Results: Nursing aids showed significantly higher risk of being exposed to one or more violent episodes per month (OR = 1,38) compared to head nurses, while the most relevant factor was working in psychiatric care (OR= 5,91) compared to medicine unit, followed by working in geriatric and intensive care units (OR = 1,50 and OR = 1,21 respectively). Frequently interrupted HCWs exhibited a significant OR of 1.84. Other predictors concerned with insufficient team work (uncertainty regarding treatment, harassment, dissatisfaction with handover shifts, not knowing what ought to be told to patient) showed significant adjusted ORs close to 1.30 each. Moreover, HCWs working only night shifts or alternating shifts declared significantly more violent events than those working day shifts (OR = 1,83 and OR = 1,70 respectively).
Conclusions: These results supported that insufficient team work may lead to higher risk for violence episodes at work, especially in units with more demanding patients. Safety training devoted to multidisciplinary personnel may improve team work.

EMPLOYEES' SATISFACTION WITH OCCUPATIONAL HEALTH NURSING SERVICES IN WORK LOCATIONS , RAYONG PROVINCE

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[ID 672]

Services quality is an important indicator in the evaluation of services outcome. This cross-sectional survey research was conducted to evaluate the satisfaction level of employees with occupational health nursing services in particular work location, and to analyze the relationship between factors related to personal information, factors related to workplaces,and5dimensions of satisfaction(i.e. tangible, reliability, responsiveness, assurance, and empathy). The population sample used in this research comprised 439 employees from different organization in Rayong province with not less than 50 employees. Data collection was done through a questionnaire by quota sampling. The collected data were statistically analyze on frequency distribution, percentage ,mean, and standard deviation. Correlation analysis used in this research was Chi-square test and Pearson's Product Moment Correlation Coefficient.
The results showed that theses employees had a moderate level of satisfaction with the occupational health nursing services. Reliability of the services was shown at a high level; whereas the tangible , responsiveness, assurance, and empathy were at moderate levels. In addition, it was found that job characteristics, job position ,type of workplace ,and time management were significantly related to the satisfaction of employees with the occupational health nursing services (p-value < 0.05).
This research suggests that the needs of employees related to occupational health nursing services in workplace should be analyze in order to develop an appropriate health nursing service management system according to the needs of employees. Additionally, health service providers should be well trained and clearly understand their roles as service providers in order to develop their personal characteristics ,capability and knowledge, which could eventually lead the health nursing service system in the workplace to the highest standard and quality.

A REVIEW OF OCCUPATIONAL HEALTH NURSING RESEARCH IN THAILAND

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[ID 1309]

This study aimed to describe the occupational health nursing research conducted in Thailand in terms of design, theoretical framework, occupation studies, sample size, studied variables, and intervention. The design was an analytic review of 15-year nursing research conducted in 1990-2004. Studies relevant to occupational health nursing were located from Thai nursing research database and were systematically reviewed.
Results showed that most studies were descriptive (80.3%). Of 61 studies, 9 (14.8%) used quasi-experimental design. A few studies used mixed methods of quantitative and qualitative approach. Industrial workers and nurses were occupation frequently studied. In regard to sample size, 23.0% had sample of 200-300. Most reviewed studies focused on exploring factors related to health status or health behaviors of workers. While most of the articles did not describe the theoretical framework used., the Health Belief Model was most frequently reported (40%) among those indicated the theoretical framework used.
Findings indicated that occupational health nursing research in Thailand addresses needs of diverse occupation groups. Future research needs to include more intervention studies and studies addressing occupational service development for informal workers.

BURNOUT SYNDROME AMONG NURSES FROM DIFFERENT DEPARTMENTS

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[ID 700]

Introduction: The burnout syndrome as a psychological syndrome provoked by prolonged exposure to occupational stress is often recognized among health care workers.
The aim of the paper is to evaluate whether there is a difference between the stressful factors on which the nurses from various departments are being exposed. And, whether dissimilarity exists in the prevalence of the burnout syndrome and its components: Emotional exhaustion (EE), Depersonalization (DP) and Personal accomplishment (PA).
Methods: The survey was performed on 92 nurses from 5 different departments: internal medicine $n_1 = 24$, surgery $n_2 = 21$, dialysis $n_3 = 23$, phthiziology, $n_4 = 9$ and emergency services $n_5 = 15$.
Two types of questionnaires were filled out: questionnaire used for the most common stressful factors at the work place and Maslach Burnout Inventory – MBI Human services survey, for quantitative estimation of the three burnout syndrome components. The data obtained were statistically processed by Student's t-test.
Results: High level of EE was found in 62,5% of the nurses from the internal medicine department and 60,9% of the dialyses nurses. The average values with high level of EE among nurses from the internal medicine ($\overline{X}_1 = 30,5 \pm 11,5$) and dialyses nurses ($\overline{X}_3 = 38,8 \pm 7,9$) were significantly higher ($p < 0,01$) compared with the other groups, except with the phthiziology nurses which showed medium level of EE ($\overline{X}_4 = 24,6 \pm 10,6$). The average values with medium level of reduction of PA among surgical nurses ($\overline{X}_2 = 36,6 \pm 8,1$) were significantly higher ($p < 0,05$) compared with some of the other groups.
Conclusion: Fully developed burnout syndrome can not be registered, but depending on the stressful factors and the exposure duration for nurses from different departments, emotional exhaustion and reduction of personal accomplishment is being manifested.

AGING AND WORK

"WITH WRINKLED SKIN AND WORN-OUT SHOES" ELDERLY WORKERS' LABOR AND SUBSISTENCE IN MEXICO'S SHOE AND TANNING INDUSTRIES

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[ID 317]

Background: Today, social conditions for the elderly are largely defined by their relationship to work. The phrase "Old Age" has social connotations linking it to an identity characterized by deteriorated abilities, redundancy and obsolescence in productive sectors, resulting in lowered expectations and a lower quality of life.
Objective: To explore the meanings that work holds for the elderly and the subsistence strategies they develop.
Methods: The study included 25 men and 10 women, ranging in age from 50 to 89, all living in León, Guanajuato, Mexico and employed –or once employed– in the shoe and tanning industries. Data was obtained through deep interviews lasting 2 or 3 sessions, including clinical histories.
Results and discussion: Of these subjects, 23 men and 9 women were still employed, despite chronic illness(es) that affect 17 of them (8 muscular-skeletal, 6 cardiovascular, 5 diabetes, including 2 blind individuals). Only 31% had welfare or medical benefits: on average a monthly pension of $1,500 pesos ($109 USD). All expressed that working was the best way to earn a living, as it brings self-esteem and social recognition. Half of the people worked in leather-shoe manufacturing, mainly in jobs reserved for the more defenseless, or "old folks": as shoe polishers, janitors, night watchmen, garbage collectors and cleaning women; those who had disabling illnesses but no social benefits survived by begging.
The system of labor relations as a means of gaining social recognition and power, the remuneration system, wage levels, functional abilities, gender and health are some of the factors that help explain the variety of configurations that characterize these elderly workers' survival strategies.

THE HEALTH AND SOCIAL PROBLEMS AMONG ELDERLY WORKERS

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[ID 503]

Workforce is getting older due to aging of the population. As well as occupation, aging itself causes many health problems. Aim of this study was to ascertain health and social problems present among elderly workers of a factory constructed to produce ammunitions of all forms for both defense industry and civil affairs. The study was performed on 284 (N=299) male employees (≥45 years of old) by interviews, physical examinations and some laboratory investigations.
Age range of the workers in our study was 47,03 ± 1,69 (Min; 45 – Max; 53) years with median and mode of being 47 and 45 years respectively. They had started working generally at young ages (13,26 ± 5,28) as unpaid family workers in agriculture (%46,1). For only 38,4% of the workers, this factory had been the first plant to work. They generally had started as industrial workers (75,7%). The mean of the "beginning to work age as paid workers" was greater (20,17 ± 3,78) than the mean of the "beginning to work age in that factory" (24,00 ± 4,89).
Some of the common health problems among them were as shown on the Table. They had 34 different disorders. Most of them had visual impairment (71,2%) and 38,7 % of them had hearing loss. Among the workers, 4/5th had some kinds of health problems and 3/5th had chronic or progressive diseases. Common health problems were kidney stone (18,7%), disk hernia (18,0%), hypertension (18,0%) and diabetes mellitus (8,5%). However, chronic obstructive lung disease (2,5%), chronic bronchitis (1,1%), bronchial asthma (0,7%) and dermatitis (12,7%) were stated to be seldom. One third of the workers had experienced at least one serious occupational accident (1/4th within 3, 1/2th within 7, 3/4th within 14 years of working).
Table-1 Age Groups & Common Health Problems in Elderly Workers
Health Problems Age Groups (n) p
45-47 (175) 48+ (109)
Visual Impairment 112 93 0,001
Myopia 18 9
Hypermetropia 73 67
Myopia & Hypermetropia 21 17
Hearing Loss 73 37 >0,05
Kidney Stone 42 11 0,003
Disc Hernia 35 16 >0,05
Hypertension 30 21 >0,05
Dermatological Problems* 36 9 0,006
Diabetes Mellitus 16 8 >0,05
* Allergic& Irritative skin diseases
Medication and polypharmacy rates were 21,5% (62,3% analgesics) and 11,2%, hospitalization and operation rates were 42,6% and 25,0% respectively. Reasons for operations were as follows; inguinal hernia (14,1%), occupational accidents (14,0%), disk hernia (7,0%), cataract (7,0%) kidney stone (7,0%).
Interestingly workers having any of the health problems were decreasing (x2=23,53, p=0,009) but those having serious health problems were increasing in number (x2=14,545, p=0,012) in relation to increase in their age. Although the health problems seemed to have no effect on their distribution within the plant, (x2=4,246, p=0,120), elderly workers suffering from serious health problems were usually shifted to work in management offices (x2=7,188, p=0,027).

THE HEALTH PROMOTION MODEL AS ASSESSED BY AGING WORKERS

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[ID 535]

This study describes quantitatively the importance of individual, workplace, and occupational health promoting factors, the impact of health promotion, and the contributions of the other co-partners promoting the health of aging workers. These form the foundation for a model of health promotion.
A pre-tested questionnaire with structured questions were devised to form the basis of qualitative data and sent to 150 aging workers (individuals over 45 years of age), of whom 93 (62%) returned it. Statistical analyses were performed using frequencies and means.
Over 90% of respondents stated that health habits, individual arrangements at the workplace, a good workplace spirit, health checks, counselling, and access to nursing care were important issues in health promotion. Better health (99%), work satisfaction (95%), and motivation of employees (96%) were the experienced impacts of health promotion activities. Aging workers stated that health and safety organisation (94%) and rehabilitation institutes (93%) were the most important co-partners.
This study confirms extremely high importance of different health promotion factors, their impacts and some co-partners. It is important that except aging workers, but also other co-partners support their work ability effectively and systematically to allow these workers to stay employed until the normal retirement age. Management have to take a positive attitude toward these workers and participate more effectively in their health promotion. Occupational health professionals play a key role in training workers and management to undertake the required measures.

AGING AND LABOUR MARKET PROSPECTS IN GREAT BRITAIN AND ITS REGIONS

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Labour market prospects depend on the interaction between demography and participation on the supply-side and on trends in the level and nature of labour demand and on government interventions. This paper examines the current labour market position of older workers in Great Britain and, in the light of this, hypothesises the possible effects of workforce aging on the labour market at a number of spatial levels. The paper includes a study of Cornwall, an area in the South West region of England which has an age profile skewed more markedly towards the older age groups than the British average.
The methods adopted are: a detailed analysis of labour market data for Great Britain and its regions, particularly the data provided by the Office for National Statistics (ONS) Labour Force Survey (Autumn 2004); a review of the literature on older workers and the labour market in Britain; and a case-study of Cornwall.
The results of the analysis of the ONS Labour Force Survey data, combined with evidence from the literature review, enable an identification to be made of the probable effects of workforce aging upon the labour market in Great Britain with the effects exhibiting regional variations. Prospects include the likelihood that: whilst the recent recovery in em-

ployment of older workers in Britain may continue, many of the jobs for them may be part-time jobs; the aging of the workforce may bring with it a higher rate of self-employment but also greater numbers of older workers being unemployed long-term; the polarisation between professional and manual workers may widen; in some localities, as the ethnic minority population ages, there will be larger numbers experiencing current problems of social exclusion and poverty.
The case-study of Cornwall extends the analysis to the sub-regional level and suggests that policy interventions need a more local orientation.

OLDER WORKERS IN THE U.S.: NATIONAL DATA REGARDING WORKING CONDITIONS AND HEALTH

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[ID 1372]

AIMS. This study addressed three basic questions: How do the working conditions of older workers differ from those of younger workers? How does the health of workers vary by age? Are older workers more susceptible to the effects of job stress?
METHODS. Data came from the 2002 General Social Survey which provides a representative sample of the U.S. adult population. In 2002, a 76-item quality of worklife module was completed by 1,777 respondents, with 309 individuals (or 17.3%) 55 years or older. Three additional age groups were formed: 18-34, 35-44, and 45-54. Descriptive analyses compared the four age groups in terms of working conditions and health. Logistic regression, controlling for gender and race, determined if the association between job stress and health was stronger for older workers, suggesting increased susceptibility.
RESULTS. Older workers (55 years+) were more likely to be part-time employees, independent contractors, or work mainly at home. They were less likely to be in jobs requiring mandatory overtime. Results for health measures were mixed, with older workers reporting poorer general health than younger workers. However, older workers were less likely to be injured, experience poor mental health, or report high levels of job stress. No consistent pattern emerged for back or arm pain. Logistic regression found that job stress predicted virtually all of the selected health measures. However, with the exception of being injured at work and experiencing poor mental health, the adjusted odds ratios for older workers were not larger than those for younger workers.
CONCLUSIONS. Older workers in the U.S. are more likely to experience certain types of working conditions. However, this does not necessarily translate into poorer health. In addition, older workers do not display a consistent pattern of higher associations between job stress and adverse health consequences, compared to younger workers.

GENDER AND WORK ABILITY AMONG PUBLIC WORKERS

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[ID 153]

Studies carried out in Brazil showed work ability (WAI) and gender is associated: females had decreased their ability before men in relation to age. The objective of this study was to assess demographic and lifestyles characteristics, working conditions and work ability among public workers looking at gender as a mediator factor. A cross-sectional study was carried out in a public health institution in Santa Rita do Passa Quatro, São Paulo State, Brazil. A comprehensive questionnaire including individual, lifestyles and work characteristics, as well as the work ability index (Tuomi et al, 1997) were answered by the studied population. Six hundred fifty one participants agreed to answer the questionnaire and were included in the study. This totalized 89.4% of the total population working in the institution. Females were 63.7% of all participants and the mean age was 43.1 for them and 49.0 for men.
Descriptive analysis showed that women were younger than men ($p<0.0077$), had more years of education, predominantly mixed physical and mental work demands, were shorter time on the job and spent longer weekly time in household activities compared to their males colleagues ($p<0.0001$). More women than men were overweight and obese. Work ability index items showed differences in relation to mental work demands, work impairment, and mental resources ($p<0.05$): women were worse than men. The following reported diseases were more frequent among women than men: disorders of the lower back, rheumatoid arthritis, chronic sinusitis, slight mental disorder or problem, urinary tract infection, allergic rash and obesity ($p<0.05$).
A multiple logistic regression was carried out to identify variables associated to females. They were: type of work demands, the daily working time, a single job, no smoking habits and presence of the following reported diagnosed diseases (neck pain, rheumatoid arthritis and chronic sinusitis).
1 FAPESP provided financial support to this research (grantee 04/07243-7)
2 Scientific initiation grant CNPq, PIBIC-UFSCar.

INFLUENCE ON THE WORK ABILITY IMPROVEMENT IN AGING AUTOMOBILE WORKER FOUND AFTER THE TWO-YEAR FOLLOW UP STUDY

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[ID 264]

Objectives This study examined the influence of job stress, social support and lifestyles on the improvement of work ability index in the aging automobile worker.
Methods The study population was composed of 2247 automobile industry employees. Baseline data were collected from the self-completed questionnaires about job stress, social support, lifestyles such as daily exercises, alcohol and cigarette intake. At the moment, perceived work ability also assessed at 2003 and 2004 by the questionnaires. The examinees were divided in two groups at the age of 45. Both groups were examined for the influence of job-stress, social support and lifestyles on the work ability using multiple regression analysis and compared contributing factors of the elderly group with that of the younger group.
Results As a favorable lifestyles, daily exercises significantly affected those at any age. But the control of BMI was accepted more by the elderly group. Both of the groups correlated with the proper workload and the feeling of the job matching. The elderly group was more affected by environmental stress, but the younger group was by conflicts between the sections and insufficient performance in spite of their knowledge or skill. Support from their superiors, colleagues or family were also correlated to their work ability.
Conclusions The findings suggested that daily exercises, proper workload, job matching and social support significantly correlated with the improvement of the work ability. Especially, for the elderly workers, the weight control and intensive care of the environmental stress may be helpful to keep up their work ability.

QUALITY OF LIFE IN RETIREMENT AMONG U.S. WOMEN KNOWN AS THE GOVERNMENT GIRLS OF WORLD WAR II

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[ID 1075]

During the years surrounding WW II, many young American women began working for the U.S. federal government to replace the men who served in the military. Although most of these women worked in low- to mid-level clerical positions, others became highly educated and advanced to high-level government employment. These women were called “government girls” and assumed positions of power and authority unusual for U.S. women in the 1940’s and later years. The requirements of their work demanded heavy time commitments; however, these commitments also limited the women’s ability to fulfill normative gender roles, including establishment of traditional social arrangements, such as marriage and having children. We present a qualitative study of 10 of those women age 75 and older. We examined how gender roles and commitment to their work affect quality of life during retirement. Quality of life issues of special interest include late-life loneliness, propensity for institutionalization, abandonment, self-neglect, morbidity, and mortality. Data collection began in 2004. The data are collected in personal face-to-face interviews lasting about 90 minutes. We believe that our study is replicable and applicable to similar older women workers in other countries. Our research topic and methods offer a unique opportunity to conduct collaborative studies on other populations of retired female workers in late life, workers we believe were and are early leaders of women’s movements in other parts of the world.

WORK STRESS IN VARIOUS OCCUPATIONS

MENTAL WORKLOAD AND STRESS AMONG UNIVERSITY LECTURERS: BUILDING INTERVENTION STRATEGIES ON LOCAL ENVIRONMENTAL RESOURCES

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[ID 1335]

Although many workers in heavy-duty industries seem to suffer more from stress, lecturers in tertiary institutions especially in developing nations have been observed to be stress prone due to high-level and intensive cognitive tasks. These activities are seemingly invisible but highly demanding, as compared to physical and psychomotor tasks. The objective of this study was to examine the extent to which lecturers are subjected to stress as a result of cognitive workload, and the strategies employed as coping mechanisms. A total of 78 lecturers (n = 61 males, 17 females) were randomly selected from a state university to participate in the study. A set of self-administered questionnaire was used as instrument with a response rate of 70.90 % and descriptive statistics was used to analyse data. Results showed that lecturers suffer from physical, mental and behavioural deviations as a result of their cognitive activities. Activities of Lecturers did not carry the same weight and spread, and account for different mental health experiences and impact. In terms of symptoms experienced, analysis showed no significant difference between the females and males. Lecturers employed both proactive and reactive measures as coping strategies and although some are regressive, they constitute a framework for the development of local management strategies through cognitive coping and environmental modification.

SOCIAL DETERMINANTS OF JOB STRAIN IN MUNICIPALITY WORKERS

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[ID 38]

Background: Job strain has been defined as the combination of job demands and job control. High job demands combined with low control results in high job strain. Job strain has been shown to be related to a number of health outcomes such as coronary heart disease, musculoskeletal disease and mental health problems including depression and anxiety. Social conditions that might have influence on job strain have been less examined.
Methods: The aim of this study was to evaluate the effects of social factors on job strain in municipality workers in Izmir, Turkey. Objective and subjective job insecurity, perception of inequity in the workplace, life course social class transition and socio-demographic variables were independent variables. Job strain was defined as the ratio between the job demands and job control. The median value of this ratio was accepted as the cut-off value for high strain level.
The study was conducted at the Garbage Collection Department in Izmir Municipality, Turkey. There were 486 eligible workers and 463 of these completed the study 95.3%). Chi square and logistic regression were used for the statistical analyses.
Results: Men with low income (p=0.005), perceived inequity (p=0.022), old age p=0.011), having worked for more than 20 years (p=0.005), being of agricultural origin (p<0.001), being garbage collector (p<0.001), and permanently contracted (p=0.002) reported significantly higher job strain. Education level (p=0.328), insecurity perception (p=0.624) and perceived hazardous workplace (p=0.122) did not significantly affect job strain.
Age adjusted models were constructed and being collector (OR=3.9; GA: 2.0-7.6), being of agricultural origin (OR=1.7; GA: 1.1-2.8), and perceiving inequality in the workplace (OR=1.5; GA: 1.0-2.3) were significantly were associated with high job strain scores.
Conclusion: Job strain might be affected by or associated with social class differences. Perceived inequities in the workplace are also associated with job strain.

PSYCHOPHYSIOLOGICAL STRESS AND AEROBIC FITNESS OF TEACHERS

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[ID 334]

Stress, overall fatigue and burn-out are common work-related health problems of workers in the European Union. Their frequency is the highest in occupations with heavy workload and low job control such in teachers. Their work is stressful and mental ill-health is an ordinary reason for premature retirement among teachers.
The aim of this study was to investigate the effects of aerobic fitness on psychophysiological work-related stress of teachers.
The subjects were experienced healthy teachers. The mean age of the female (n=17) and male (n=9) subjects was 50 (range 35-61) years and 47 (range 33-62) years, respectively. Heart rate (HR), systolic blood pressure (SBP), diastolic blood pressure (DBP), electromyography (EMG), perceived stress based on the visual analogue scale (VAS) and the excretion of catecholamine and cortisol were measured during habitual school days. Individual characteristics and aerobic fitness according to the maximal oxygen consumption (VO2max) were assessed in the laboratory.
.....VO2max and body mass index (BMI) had a significant effect on HR (p=0.007 and p=0.064, respectively). VO2max also effected on the static level of EMG (p=0.028) and VAS (p=0.042). There was no predictive power of VO2max on SBP, DBP, catecholamine and cortisol. VO2max and the individual characteristics (BMI, work experience, gender) predicted for the variation of HR, the static level of EMG and VAS by 39%, 37% and 33%, respectively.
.....A good VO2max seemed to alleviate HR, muscle tension and perceived stress of teachers in their work. Proactive individual strategies including physical activity may be important for coping psychophysiological work-related stress. Besides individual measures stress at work can be reduced with ergonomics and adequate curricula.

WELL-BEING AND STRESS AMONG LEADERS AND EMPLOYEES – DO THE LEADERS HAVE MORE STRESS THAN THE EMPLOYEES? - RESULTS FROM THE IPAW STUDY.

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[ID 1715]

Purpose: The aim of this article is to present the findings on whether leaders' perceived stress are exceeding the perceived stress among employees.
Population and methods: The Intervention Project on Absence and Well-being (IPAW) is a five-year intervention study of the psychosocial work environment. It is conducted by NIOH, Denmark in cooperation with various workplaces, the Occupational Health Services and work environment professionals. The data collection method in this article is based on 37 workplaces and 1100 respondents included in the IPAW study.
Findings: Looking at the descriptive analyses based on the mean score for all leaders and employees included in the analysis, employees tend to experience more stress (behavioural, somatic, emotional and cognitive) than leaders, and they tend to evaluate management quality more critical than the leaders evaluate the management quality of their superiors. In their coping with stress, the leaders tend to use individual coping whereas the employees use emotional and communicational coping to a higher extend than the leaders. The level of proactive coping is about the same for the two groups.
The analysis also shows that leaders perceive their influence at work, degree of freedom at work, possibilities for development, meaning of work, job satisfaction, general health, vitality and mental health higher than the employees. The leaders are working 7 h. longer a week than the employees. There is no significant difference between the leaders' and employees' perception of leadership support received.
Conclusion: Overall the figures show that the leaders have a more positive perception of their work environment, report less stress and at the same time work longer hours than the employees. These results contradict the lay perception of leaders being under higher pressure and feeling more stress than employees.

MANAGERS' WORK CONDITIONS AND SELF-REPORTED HEALTH

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[ID 1460]

INTRODUCTION

From many points of view managers are a privileged group in working life. It is assumed that they have a high degree of psychological demands in combination with high decision latitude. Many researchers assume that managers' circumstances at work have a direct influence on their subordinates' health. Hence, increased knowledge about the managers' situation could lead to improving the situation of the employees. However, little research has focused on the work conditions of managers themselves. The aim of this study was to describe such work conditions and the health status of managers in two paper mills.

METHOD

In 2003, a questionnaire was sent to 182 managers, actively working in two paper mills in Sweden. The questionnaire was comprised of items from the demand-control model, social support and self reported health status.

RESULTS

In all, 146 persons (80 %) participated in the study. The analyses were performed for women and men together in two age groups (<=50 and >50 years). Sixty per cent of the younger managers and 42 per cent of the older reported high psychological demands. The corresponding percentages for decision latitude were 60 and 62, respectively. Managers in the younger age group experienced less emotional support from their subordinates than their older counterparts, 52 and 64 per cent, respectively. About 80 per cent in both age groups reported feeling recovered when they start working a new day/shift. As for self-reported health, almost 25 per cent of the younger managers reported less than good health, while the corresponding percentage for the older was 10 per cent. The difference was significant.

CONCLUSION

The results indicate that younger managers have poorer work conditions and health status than older ones. This could be due to factors like higher self-demand for success and making a career among the younger or to healthy worker effect among the older.

PSYCHOPHYSIOLOGICAL RESPONSES OF YOUNGER AND OLDER FEMALE TEACHERS DURING THE PERIODS OF PERCEIVED HIGH AND LOW WORK STRESS

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[ID 299]

The aims of the study was to examine psychophysiological stress responses of teachers during the work periods of perceived low and high stress, and to examine determinants for their physiological responses during the work period of perceived high stress. The participants were younger (mean age 31 years, n = 14) and older (mean age 54 years, n = 14) female teachers, and 30 female teachers with the mean age of 42 years.

Heart rate (HR), systolic blood pressure (SBP), diastolic blood pressure (DBP), psychosomatic symptoms, waist-hip ratio (WHR), lipoprotein cholesterol levels and the rate of morning cortisol were measured during the work periods of perceived low and high tress.

In the younger participants, HR, cortisol rate and psychosomatic symptoms were significantly higher during the perceived high stress period than during the low one. The older participants had no significant differences in HR, SBP, DBP and cortisol rate during the work periods of perceived low and high stress. The increased rate of cortisol (β = 0.41, p = 0.027) predicted a greater number of psychosomatic symptoms at work (r^2 = 0.14, p = 0.027). Triglycerides (β = 0.52, p = 0.004) and DBP (β = 0.32, p = 0.061) predicted 40% of the total variation of cortisol rate (p = 0.001). LDL cholesterol (β = 0.67, p = 0.006), age (β = 0.55, p = 0.002) and cortisol rate (β = 0.42, p = 0.008) predicted 46% of the total variation of DBP at work (p = 0.001). WHR was the significant determinant for HDL cholestrol (β = -0.73, p = 0.001), and predicted 41% of its total variation (p = 0.001).

The results suggest that insufficient body stress response in ageing teachers should be taken into the consideration during the work period of perceived high stress. Positive associations between cortisol rate, DBP, LDL cholesterol and triglycerides during the work period of perceived high stress may lead to increased risk of ill-health.

PSYCHOSOCIAL WORKING CONDITIONS AND MENTAL HEALTH PROBLEMS AMONG CLEANERS

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[ID 1274]

To examine psychosocial and organisational work conditions among female cleaners and the relation to mental health.

Methods

Questionnaires were sent to 661 cleaners in 7 cleaning institutions in 7 different cities in Norway. The response rate was 64%, out of which 374 were women. Mean age 42.7 years. Twenty-six questions were used to assess psychosocial work environment over the three last months. In addition three questions about work organisation were provided. To assess mental health we used the Hopkins Symptoms Checklist (HSCL-25).

Results

Mean seniority in cleaning was 10.8 years. Factor analysis defined four dimensions of psychosocial work environment: leadership, co-workers, time pressure/control and information/knowledge. There were 17.5 % with a HSCL-25 1.75, with a mean of 2.16 compared to 1.41 for the whole group. Poor leadership (OR=3.6; CI 1.2-10.6), poor satisfaction with co-workers (OR=2.3; CI 1.1-4.8), meeting colleagues as seldom as once a week/month (OR=2.4; CI 1.2-5.1), and not Norwegian origin (OR=3.0; CI 1.4-6.4) were significantly related to the mental health.

Conclusions

Mental health problems are frequent among female cleaners. Our results indicate that leadership, collaboration with co-workers and ethnicity are significantly associated with mental health.

CREATING AN ENGAGED WORKFORCE THROUGH EFFECTIVE LEADERSHIP

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[ID 1507]

It is not the intent of this presentation to be prescriptive about responding to health and wellness issues, such as stress, in the workplace; there is already a large body of literature in that regard. Rather, this presentation will examine the findings of a study that show the type of leadership exhibited by an organization can be a key predictor of psychosomatic strains. The presentation will outline descriptive aspects of effective leadership as it relates to (a) creating an engaged workplace, one that produces a more spirited, and independent, self-reliant, health conscious workforce, and (b) improving sustainable productivity. Both function as the foundation for a better work life.

Many definitions have been proposed for what leadership is and how individuals can become effective leaders. In our changing workplace a leader's effectiveness is often gauged by the financial performance of their company. The link between perceived effectiveness and financial performance leads many executives to focus solely on the bottom line. This management style is proving to be counter-productive as it is shown that employees who perceive their leaders to focus exclusively on financial performance also report high levels psychosomatic strains.

"How do we maintain and nurture healthy employees and achieve improved sustainable productivity in an often turbulent and quickly changing workplace?" The answer lies within the workplace itself. Healthy employees and sustainable productivity must relate harmoniously in the workplace. This harmonious relationship resonates with leadership. Workplace leaders must go beyond "empowering" and "enabling" employees. There must be a healthy work environment that encourages the development of employees who are capable of moving confidently and competently from one team or unit to another; who are efficient at utilizing their skills and abilities; and who are effective at seeking out continuous learning opportunities and applying that knowledge and understanding to a given task.

EMPLOYEE-PERCEIVED LEADERSHIP BEHAVIOUR AND EFFORT-REWARD IMBALANCE & OVERCOMMITTMENT

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[ID 990]

Background
In Sweden long term sick leaves due to stressrelated mental adjustment disorders have increased during the last years. During the same period extensive reorganizations and downsizing have changed work roles. In particular leadership roles have become more complex in flatter and more flexible organizations.
Aim
The aim was to study how employee-perceived leadership behaviour was associated with experience of effort, reward, and overcommittment among employees in the health care sector.
Material and methods
A questionnaire was mailed to all employees in a Swedish county council (response rate 79%). The questionnaire included Siegrist´s 23-item effort-reward imbalance (ERI) questionnaire, and 10 questions about leadership behaviour (goal clarity, utilization of competence, easy to approach, openmindedness, providing information, etc). People on sick-leave, part time employees and managers were excluded in the analysis, leaving a population of 5130. 81% were females and 19% were males. In a logistic regression analysis (adjusted for age, work time location, department and profession) the associations between employee-perceived leadership behaviour and effort, reward, overcommittment and the effort-reward imbalance were explored.
Results
Employee-perceived leadership behaviour was associated with effort-reward imbalance Ors ranging from 2.3 to 8.9 (p<.001) for the various leadership items. Both effort and in particular the reward dimensions showed strong and systematic associations with leadership. Also, employee-perceived leadership behaviour was associated with overcommittment, Ors ranging from 1.7 to 2.8 (p<.001), worse leadership was related to increasing degrees of overcommittment.
Conclusions
Leadership behaviour was associated with perceived stress among employees, as measured by the ERI scale. While it was expected that the reward dimension was strongly associated with employee-perceived leadership behaviour, somewhat surprisingly overcommittment was also associated with employee-perceived leadership behaviour. Unclear leadership may force employees to higher commitment in health care work.

SUICIDE IN JAPAN: EFFECTS OF URBANIZATION, ECONOMIC DEVELOPMENT, AND MIGRATION OF WORKERS

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[ID 828]

Suicide in workers, especially in the middle-aged, is recently increasing in Japan. In the year 2004, a total of 121 cases were claimed as Labour Accident in all Japan with 45 cases legally compensated by the Government.
Relationships between male or female age-adjusted and age-specific suicide mortality and 22 social life indicators for all 46 Japanese prefectures in 1970, 1975, 1980, 1985 and 1990 were investigated by multiple regression analysis after classification of the social life indicators by factor analysis. During this period, Japan experienced high economic growth after the Second World War, serious economic crisis (the so-called oil crisis) in 1973, the second economic crisis (the secondary oil crisis) in 1980-1983, and economic prosperity (the bubble economy) in 1986-1990.
In all the five years, male age-adjusted suicide mortality was significantly related inversely to the indicator of urban residence (urbanization factor). In 1970 and 1975, male suicide mortality in the young, middle-aged, and elderly were significantly related positively to the indicators of young and old populations, low income, and rural residence, respectively. In 1980, 1985 and 1990, male suicide mortality was significantly related positively to the indicators of population decrease by migration of workers.
It is suggested that (1) urbanization was a major determinant to prevent male suicide mortality during the past 20 years (1970-1990); (2) young and old populations, low income, and rural residence specifically affected suicide mortality in young, middle-aged, and elderly men, respectively; (3) decrease of population by migration of workers became another important factor for the male mortality during these 10 years (1980-1990); and (4) female suicide mortality was less vulnerable to those social life factors for these 20 years than the male mortality.

OCCUPATION, WORK CONDITIONS AND MENTAL HEALTH: A LONGITUDINAL ANALYSIS OF PSYCHOLOGICAL DISTRESS EXPERIENCES IN THE CANADIAN WORKFORCE

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[ID 801]

This study analyses the relationship between occupation, work organisation conditions and the experience of psychological distress within a model encompassing the stress promoted by constraints-resources embedded in macrosocial structures (occupational structure), structures of daily life (workplace, family, social networks outside the workplace) and agent personality (demography, physical health, psychological traits, life habits, stressful childhood events). Longitudinal data were derived from Statistics Canada's National Population Health Survey and comprised 6,359 workers nested in 471 occupations, followed four times between 1994-1995 and 2000-2001. Discrete time survival multilevel regressions were conducted on first and repeated episodes of psychological distress. Results showed that 42.9% of workers had reported one episode of psychological distress and 18.7% had done so more than once. Data supported the model and challenged the results of previous studies. The individual's position in the occupational structure plays a limited role when the structures of daily life and agent personality are accounted for. In the workplace, job insecurity and social support are important determinants, but greater decision authority increases the risk of psychological distress and psychological demands have no specific impact. Family structure, social network outside the workplace and agent personality also contribute to psychological distress but they do not moderate the influence of the workplace. The results of this study suggests expanding approaches in occupational mental health in order to avoid coming to erroneous conclusions about the relationship between work and mental health.

DO GENDER AND EMPLOYMENT STATUS INCREASE THE RISK OF LABOR INTENSITY?

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[ID 653]

Purpose: Due to economic crisis, most of Korean workers have suffered from abrupt layoff, contingent work, subcontract, increasing work hours, and changes of work organization. This study aimed to examine the association of gender difference and employment status (regular vs. irregular) with labor intensity.
Methods: A structured-questionnaire was used to assess the demographics, work environment, and labor intensity. A total of 18,798 workers from the three nationwide representative areas of the country were surveyed. Logistic regression analysis was performed to estimate the relationship gender difference and employment status with labor intensity. Labor intensity was analyzed into three dimensions, absolute labor intensity, relative labor intensity and flexibility.
Results: The results showed that irregular workers had a tendency to be shorter tenure, lower incomes, working in small-sized company, and involving in shiftwork. They have more experienced work instability and downsizing than regular workers. Females were more associated with lower income, long work hours, downsizing and unemployment than males. In logistic regression analysis income (OR=0.6), company size (OR=1.5), and shiftwork (OR=1.2) were significantly increased the risk of absolute labor intensity for male regular workers. Workers in small-sized company (OR=2.6) was associated with an increased risk of absolute labor intensity for female regular workers. Middle-level income (OR=1.3), large-sized company (OR=1.4) were associated with increasing of relative labor intensity in regular male workers. And in female regular workers, middle-sized company (100-300 person) (OR=1.5), 1-5 years tenure (OR=1.9), over 10 years tenure (OR=2.8) and shifwork (OR=0.7) showed positive relationships to flexibility. In female irregular workers, lower income (OR=2.9) was associated with flexibility.
Conclusions: General working conditions of regular workers are better than irregular ones. Although labor intensity, as a whole, has been increasing independent of employment status and gender, some changes of labor intensity were found in gender and employment status.

COGNITIVE PERFORMANCE VARIABILITY UNDER DIVERSE INTENSITY AND TEMPORAL DEMANDS

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[ID 1639]

Background: The development of modern technology has changed the nature of human work from being mostly manual skills to being mostly knowledge intensive functions (i.e., cognitive tasks). This state of affairs has consequences for both system design and reliability analysis. In system design, for instance, conventional ergonomic aspects must be replaced by cognitive ergonomics. Similarly, in risk assessment and reliability analysis, first generation Human Reliability Analysis (HRA) must be replaced by a second generation, context-dependent cognitive reliability analysis.
Purpose: to quantitatively investigate variability of cognitive performance due to the different temporal demand and task difficulty.
Methods and Materials: 14 undergraduate students were recruited to type randomly appearing meaningless words (in Romans alphabet) with a different intensity and temporal demands. Along with performing the task, some various quantitative performance-related measures were automatically measured by the designed task in which it had different characteristics based on the conditions of the experiment. Furthermore, during complement of the task, some psycho-physiological indices, such as EEG, ECG, and EOG were taken, as a complementary study, in order to precisely insight into cognitive system variability of the subjects in each condition. Nasa TLX questionnaire was also utilized to subjectively evaluate of workload.
Results: Multiple analysis of variance (MANOVA) of performance-related data including trial number, response time, and typing time were statistically significant (F=45.5, 7.4, 47.8; *p<0.001*) under time pressure. Concerning the effect of task difficulty on cognitive performance measures, trial number, response time, and typing time, all related measures were significantly different using same analysis method. (F= 815, 40.3, 184.3; *p<0.001*).
Likewise, in respect of the psycho-physiological indices, under different conditions of the task implementation, was revealed a various level of attention, relaxation, heart rate variability, and eye blink (using data related to the interpretation of EEG, ECG, and EOG) which all of them were statistically also significant.
Conclusion: our designed simple typing task was a useful way of quantitatively analyzing the variability of cognitive performance, in the different level of intensity and temporal demand of the experiment. In addition, instrumental survey also was a complementary study of representing those variabilities to some extent.

OCCUPATIONAL STRESSES OF WOMEN IN FISH PROCESSING ACTIVITIES

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[ID 90]

In India,a large number of women (approx. 3 million) engaged in fish processing activities and are subjected to inclement working condition. One hundred and eighty five women workers were examined to identify their work-related hazards and stresses. To analyse work in the fish processing activities, a multi-method ergonomics checklist was introduced, including assessment of health complaints, MSD, skin symptoms and temperatures (Tsk) of hand and fingers. The principal component analysis yielded three components of stressors related to work environment, methods of work and the psychosocial variables, that explained 80.4% of the total variance. Component 1 (15 items) described the work environment stressors, such as cold, wet, greasy and slippery work premises, congested work area, lack of personal protective wears, irregular work hours, etc. The cold injuries — blanching of fingers, hand numbness, Raynaud's phenomena of palm area, might be attributed to the stressors of Component 1 that explained 32.5% of the total variance. The Tsk of hand areas during work was as low as 20.7 ± 1.9°C, i.e., 8°C less than the pre-exposure values. The drop in Tsk during work were significant (p<0.001), compared to pre-exposure Tsk. Component 2 (13 items) described the stressors of the methods of work, such as unsafe hand tools, and work postures. About 67% of the workers complained of pain and discomfort in body parts. The highest prevalence of discomfort localized in the lower back, followed by knees, upper back and other areas, that explained the stressors grouped under Component 2. The principal component 3 (9 items) — the psychosocial variables (supervisory pressure, changing job assignments, personal job characteristics) explained about 22.8% of the total variance. The stronger components being the work environment and the methods of work, with summated loading of 57.6% of the total variance, the analysis focuses on the associated job design issues.

PHYSICAL HAZARD AT WORK

SOLAR UV RADIATION EXPOSURE IN A POPULATION OF TUSCANY VINEYARD WORKERS

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[ID 1227]

In the framework of an epidemiological study regarding the correlation between sunlight exposure and skin pathologies, the solar UV radiation exposure was quantified in a population of outdoor workers, such as vinegrowers in Tuscany.
The possibility of using polysulphone film personal dosemeters to quantify the subjects UVB exposure has been evaluated. The polysulphone response is similar to the CIE erythemal response curve. Due to UVB radiation exposure, the polysulphone film dosemeters photodegrade with a measurable absorbance change. The absorbance variation after the dosemeter exposure to UV radiation has been correlated to the UVB effective dose. The polysulphone dosimetric technique has been systematically compared to a dosimetric method based on electronic dosimeters. The method will be used to quantify the personal exposure of workers whose exposure conditions are characterized by high variability. Environmental measurements have been also performed by means of a broad band radiometer sensitive in the UVB spectral range.
In order to assess the variability of solar UV personal exposure three experiments were carried out on vineyard workers at the rural site of S. Felice (SI) in Tuscany, (Lat.43.3°N, Long.11.3°E, altitude 300m). Dosimetric evaluations have been performed in April, at the beginning of working season, in July, during the period in which the sun irradiance reaches its maximum level, and in October 2005, at the end of the outdoor working season. These periods were selected on the basis of different working postures during different activities. Each volunteer wore two PS dosimeters: one on the arm and the other on the back. In addition pre and post exposure measures of skin reflectance parameters and skin temperature of volunteers were taken by means of colorimetric techniques.
Dosimetric data have been correlated to surface skin temperature and skin pigmentation before and after exposure. High exposure levels were found during the summer period.

HEAT ILLNESS IN UNDERGROUND MINING

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[ID 33]

Heat stroke, heat exhaustion, heat cramps and miliaria rubra can occur in underground mining. Heat stroke is life-threatening and characterised by disturbances of the central nervous system and multi-organ tissue damage. It is rare in mining if appropriate control measures are instituted. Heat exhaustion is primarily due to hypohydration following prolonged sweating in hot conditions. Symptoms include fatigue, headaches, dizziness, nausea, vomiting, shortness of breath, or brief syncope. Confusion, ataxia, prolonged unconsciousness or convulsions are strongly suggestive of heat stroke. The dehydration of heat exhaustion results in increased serum osmolality, urea and creatinine. Neutrophil leukocytosis, type A lactic acidosis and mild rises in AST, LDH and CK also occur. Heat cramps are painful involuntary contractions of skeletal muscle, usually affecting the limbs, typically lasting a few minutes. Heat cramps tend to occur in heat exhaustion when hypohydration becomes marked. Miliaria rubra is a non-follicular erythematous papular rash caused by extravasation of sweat into the skin, as a result of obstruction of the sweat glands. It occurs after prolonged sweating in hot environments. Secondary infection is common. It can take three to four weeks of sedentary duties in a cool environment to resolve. Heat illness would be unlikely in underground mining if the thermal environment was sufficiently well controlled by ventilation and refrigeration. However this is often not practicable. Where engineering controls alone cannot provide sufficient control of risk, the residual risk can be assessed using an appropriate heat stress index. While procedural controls may further reduce the residual risk, they are less reliable than engineering controls and cases of heat illness may still occur. Procedural controls include application of heat stress limits, education, hydration, self-pacing, early symptom reporting, medical advice, acclimatisation procedures, air conditioned accommodation, support to achieve a healthy body mass index, and an effective emergency response capacity.

THE EFFICACY OF HEAD WASH USING WATER IN HEAT-EXPOSED ERGONOMIC EXERCISE

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[ID 168]

According to the World Health Organization, in some of the least developed countries up to 80% of the workforce is employed in primary production under heavy physical work combined very often with heat stress. In consideration of the impact and feasibility of intervention measures in such countries, we designed an intervention-control study based on non-refrigerated water usage, agreeing with the observation of the regular behavior of sportsman and agriculture workers.
The sample was composed of 12 fit young Japanese male individuals between 19 and 26 years old. Each individual participated in one day of control measures and one day of intervention. The rectal, esophageal, skin and auditory canal temperatures, as well as heart rate were monitored constantly under a protocol of ergometric exercise. Estabilometry and visual reaction time tests were performed before and after every resting period. A subjective questionnaire was also applied. The intervention consisted of pouring 2 liters of 23ºC water over the head of each individual for one minute, after every 20 minutes of physical effort in a climatic chamber with a temperature of 35ºC and 60% humidity.
A significant improvement in subjective concentration capacity and subjective fatigue was observed ($p<0,008$), and skin temperature and auditory canal temperatures presented amelioration tendencies, although no other significant correlation for the analyzed parameters was found. The results indicate that this method could be used as a comfort measure. Further investigation regarding variances in the time length of water pouring should be considered.

PREVENTION OF VIBRATION RELATED DISORDERS - FIFTEEN YEARS OF EXPERIENCE IN CAR MECHANIC/REPAIR SHOPS

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[ID 997]

Although Hand-arm-vibration syndrome (HAVS) has been known for a long time, there was a lack of regulation for medical examination until the directive 2002/44/EC of the European Parliament and the Council was implemented 2005.
Car mechanics, lorry mechanics, car paint workers and car-body workers in car mechanic-repairshop using pneumatic hand tools, experienced an increasing numbers of neurological symptoms.
Hence, at the Runstone Occupational Health and Safety Center in Malmö, Sweden, we developed 1986 a model for prevention of HAVS.
The main part of the model consisted of:
· Periodical medical examination (1) incl. tactilogram (2).
· Measurements of hand-transmitted vibration from pneumatic tools (3).
· Training and education of workers and supervisors
· Evaluation and improvement of working conditions
· Advice when purchasing new pneumatic tools
The model showed to be in the line with the EU-directiv 2002/44/EC.
In the calender period 1990 – 2005, three thousand tactilogram were performed for 1200 subjects. The vibrotactile perception threshold was measured at seven frequencies (8-500 Hz), and if the integrated area was <0,8 compared to a superimposed age matched reference, the sensibility index (SI) was regarded as pathological.
The examinations showed 50 % pathological tactilograms(2) in 1990 and 24 % in 2000.
The prevalence of pathological SI has decreased in all groups, except for the car mechanics using impact wrenches.
The work continues according to the model; medical examination, survey of the tools condition, information on work routines and individual protection, has made an impact on the prevention of HAVS.

REDUCITION OF WHOLE-BODY VIBRATION EXPOSED TO FORKLIFT OPERATORS AND THE IMPROVEMENT OF HEALTH COMPLAINTS

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Seventeen years' follow-up study on low back pain of the freight-container tractor drivers and its association with the reduction of whole-body vibration exposure and other ergonomic improvement

Our study in 1983 revealed that the vibration of the drivers seat on the freight-container tractors mainly used in dockyards area was dominant in the back-to-chest directions (X-axis) under the actual working situation, the allowable exposure time was considerably shorter than that of the heavy duty truck and the low back pain (LBP) by medical check-up among the 231 drivers was due to the long working hours and the ergonomically unsound tractor design as well as the vibration. The typical measure was the introduction of the tractor equipped with the air-suspension system instead of the leaf-spring-suspension system. We conducted similar study in 1992. The comparison of the newest model with the leaf-spring-suspension system to the old one produced by the same motor company revealed the X-axis of the vibration level decreased as much as 4 to 9 dB, changed the dominant direction of the vibration level from X-axis to Z-axis and resulted in reducing the whole-body vibration exposure. The questionnaire study on the 267 drivers showed the improvement in the ergonomic evaluation of the tractors and the less complaint of LBP. The drivers on the air-suspension system less complained LBP than those on the leaf-spring-suspension system. Since then the development and spread of the air-suspension system and the ergonomic improvement has been reportedly more remarkable.

The objective of the study in 2000 was to confirm such improvement and its effect on LBP as well as other health condition of the drivers.

The subjects of the questionnaire study were the sampled 89 freight-container tractor drivers participated in the preceding studies mentioned above. The questionnaire consisted of 153 ergonomic check items as similar as the preceding studies and 79 health conditions as same as in the nearest preceding occupational health questionnaire study on the Japan working population conducted by the Ministry of Labor every fifth year. The present study compared the health conditions between the drivers and working population through age matching. The portable measuring system developed by us evaluates the whole-body vibration exposure of the drivers on the several freight-container tractors during the actual working condition according to ISO 2631-1982 to compare the magnitude of whole-body vibration evaluated in the preceding studies.

The valid respondents were 82 with average age of 46.9. The sixty three among them had driven the tractors equipped with the air-suspension system and were subsequent subject to be analyzed. They show the significant higher prevalence of the 16 health conditions such as fatigue, palpitation, diarrhea, cough, throat pain, blurred eyesight, insomnia although without no difference about LBP. 46.3% of the drivers complained LBP in the past few months, however there is no statistics in the questionnaire study by the Ministry of Labor mentioned above. The drivers with such LBP were engaged in significantly longer service years and more often connected the chassis to the tractor. There is no difference of age, height, weight, BMI, sleeping hours, workday, overtime work, driving distance a month and driving years of air-suspended tractors. The 8 ergonomic unsoud conditions show the significant decrease of complaining rates in comparison of the study in 1992 ($p < 0.05$) that included no items about the whole-body vibration exposure. The levels of whole-body vibration were around 06.m/s2 for vertical direction and do not show the significant decrease from the level in 1992.

In conclusion it is difficult to find clear improvement of the freight-container tractors. This study still suggests the necessity of the further improvement of the working conditions of the drivers about whole-vibration as well as ergonomics for the drivers' health.

Reference

Nishiyama K., Taoda K., Kitahara T. A decade of improvement in whole-body vibration and low-back pain for freight container tractor drivers. Journal of Sound And Vibration, 215(4), 635-642, 1998

COMBINED VIBRATION EXPOSURE AND POSTURE ASSESSMENT IN U.S. RAILROAD LOCOMOTIVE OPERATORS

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U.S. locomotive operators are exposed to whole-body vibration (WBV) and have a high prevalence of neck and lower back disorders. Postural seating conditions are important co-factors in an overall WBV risk assessment. The goal of this study was the combined assessment of the operators' posture during routine measurement of WBV exposure. In this pilot field study the seating posture of locomotive operators were studied utilizing a novel measurement system (CUELA = computer-assisted recording and long-term analysis of musculoskeletal loading). The CUELA is a personal monitoring device utilizing advanced sensor-technology worn over normal work clothing and during routine work tasks. Data synchronization of video recordings and vibration measurements enable body posture analysis during special vibration events. This study focused further on the feasibility of routine measurements under difficult field conditions. Seat designs in locomotives range from traditional round stools without back or arm support to seats with adjustable back and arm support, and simple spring/damper mechanism. WBV data was collected according to ISO 2631 guidelines on a total of 55 locomotives. The result of WBV ranges were for basic x-y-z axis vibration (m/s2): 0.05 - 0.72, 0.05 - 0.71, 0.09 - 0.5, respectively; vector sum: 0.13 - 1.44; Crest factors: 6.6 – 67.2; MTVV/ aw: 2.1 – 26.16; and VDV/ aw T1/4: 1/44 - 4.27. Operators spend typically long hours inside the locomotive cab (10-12 hours/day) primarily seated. Effective vibration dampening of seats appeared to be highly variable and mostly insufficient. Yard switching compared to long haul service requires more frequent changes of the body posture and resulted in awkward spinal postures, which the CUELA system is able to monitor without interfering with the normal operators tasks. CUELA measurements showed postures with lateral flexed spine postures of up to 20 % of the working time during yard switching tasks. Combined instrumentations and methods appear to result in an improved overall risk assessment.

HAND-ARM VIBRATION: NON CONTACT MEASUREMENT OF THE HAND-SKIN TEMPERATURE

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The hand-arm vibration syndrome is an occupational disease provoked by a prolonged use of vibrating hand-held tools. Vibrations generated by these tools are transmitted from handle to the hand and to arm of the subject using the tool. Prolonged and/or intensive exposure of these tools represent an effective risk for the subject who, in most of the cases, is a worker. The most typical pathological effect caused by hand-arm vibration is the Raynaud's phenomenon of vibration-induced white finger (VWF). VWF is the result of impaired circulation poor blood supply in the fingers, caused by the prolonged use of vibrating tools and may appear after only several months or may appear after tens of years.

In this study a novel measurement technique, based on infrared thermography, has been used to asses the variation of the temperature of the hand-skin when the subject is undertaking a known grip on a cylindrical handle (40 mm of diameter) and is exposed to controlled acceleration.

The experimental procedure carried out by the authors implies the measurement of the hand and finger skin temperature without contact by means of an IR camera that assures the necessary spatial resolution and a sufficient thermal sensitivity (0.08 °C @ 30 °C). Moreover the push force, grip force and acceleration generated on the handle are simultaneously measured before, during and after the vibration exposure.

Tests conditions are: vibration spectra of the signal to the handle: 20-80 Hz; vibration amplitude (rms): 6 m/s2; subject tested: 5 healthy male.

Measurements of different hand skin temperature variations respect to the basal value will be reported; effect of different push force will be presented; effect of different duration of the exposure on the temperature will be also described.

Results show a maximum reduction of temperature after the vibration exposure of 1.90 °K and a minimum of 0.71 °K, with an average reduction over all the tests of 1.27 °K. Respect to these reduction an average increase of temperature of 2.20 °K (max: 3.96 °K and 0.45 °K min) is measured 100 s after the conclusion of the exposure (the subjects are requested to maintain the hand grip).

ELECTRICAL INJURY: LONG-TERM AND DELAYED EFFECTS

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[ID 1226]

Aim

To demonstrate the diversity of long term and delayed sequelae related to electrical injuries (EI).

Background

Clinical manifestations after EI range from transient unpleasant sensations to massive tissue damage or death. Between these extremities patients evaluated in occupational medicine present a diversity of physical and neuropsychological symptoms – often causing considerably functional impairment. Occasionally symptoms have either been overlooked as sequelae of EI or patients have been through an odyssé of evaluations in different medical diciplins without any causality has been indicated. Roughly symptoms can be divided into regional physical symptoms (e.g. pain, tingling, and numbness), general physical sensations (e.g. fatigable, exhaustion, gereral pain) and neuropsychological symptoms (e.g. memory impairment, reduced concentration, insomnia, irritability, PTSD).

Method

Clinical case descriptions. Review of the literature.

Case report

In March 2000 a 56-year-old man sustained a high voltage EI when testing oil pipelines with 30.000 volt. He became shortly inconscious, had involuntary urination and was reddish on back of both feet in his safety shoes. He went home but had difficulties sleeping because of severe general pain. He sought medical attention the next day and was monitored for a few hours without cardiac rythm disturbances. After a few weeks he gave up working because of muscle pain, tingling in arms and legs and exhaustion. During the next 3½ years symptoms progressed (severe memory impairment, pain, physical weakness, increased emotional sensitivity, headache, impotence) and he had repeated neurological, reumatological, neurophysiological and psychological examinations. Objective findings: musculoskeletal tenderness, sensoric polyneuropati in both arms and legs, muscle atrofi, progressive cognitive dysfunctions.

Literature and discussion

Musculoskeletal pain and peripheral nerve injury is a common described clinical manifestation of electrical injury. Still the pathophysiology of late electrical injury sequelae is poorly understood.

Progressive neuropsychological manifestations of EI have been demonstrated in later studies.

Complications are most common in high voltage injuries.

SIMPLE AND EFFECTIVE MEANS TO REDUCE PHYSICAL HAZARDS IN A LARGE REFINERY COMPLEX.

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[ID 1867]

Objectives: Among various occupational health (OH) hazards inherent in any industry, physical hazards like Noise, Heat stress & dust exposure in work environment are very common & frequently encountered. Identification of hazards by shop floor workers themselves is the most effective way to tackle them, as elimination at root source is the most cost-effective solution.

Methods: A multidisciplinary team consisting of occupational health physician, safety manager, production engineer, maintenance engineer and mechanical technical expert, lead by plant manager were constituted to make aware all workers about OH hazards, ways to identify them and mean to control them or reduce exposure of them. Tool box talks, brain storming, walk through surveys, industrial hygiene survey, interaction of team members with shop floor workers, class room training etc. were applied to bring awareness about and identification of OH hazards.

Results: Amongst various physical hazards, noise, dust and heat stress were found most common and prevailing across various plants. Various engineering solutions have helped in either eliminating or reducing many of the hazards altogether. Where ever that was not possible, reducing the exposure time or preventing self by use of proper PPEs is implemented. Most of the solutions came from workers themselves.

Conclusions:

Awareness about the OH hazards in working environment is one of the best strategies for subsequent reduction of exposures. This not only helps in prevention of OH hazards and attitudinal change, but also results in a better productivity and profitability.

The paper describes in detail a methodology adopted to achieve the same in various plants in Reliance Industries Limited, Jamnagar, India.

MEASUREMENT OF FEED AND GRIP FORCES :TESTS WITH PAVEMENT BREAKERS ACCORDING TO ISO 8662:5

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[ID 791]

The ISO 8662:5 standard specifies a laboratory method for the measurement of the vibrations at the handle of pavement breakers and hammers. Such kind of tests allows to compare different tools under repeatable conditions. According to the standard, in order to improve the repeatability, 3 skilled operators are required to perform 5 tests of at least 8 s. Acceptance of the data is subjected by the use of a coefficient of variation.

Never the less ,large dispersion of data among different operators and low repeatability of the tests among different laboratories are caused by measuring techniques (see ISO 8662:5).

Two influencing inputs significantly act during the tests: the feed and grip forces exerted during the tests. The standard itself reports this as an important limitation: "… Not only the feed force but also the grip force on the handle have a considerable influence on the vibration level (…). At present it is not possible to measure the grip force using simple means" (from ISO 8662-6).

In this work, we propose the use of a matrix of pressure sensors (composed by 156 sensors) to be wrapped on the handle and used to measure the feed and grip forces exerted during a typical ISO 8662:5 test. Tests have been carried out on a hydraulic impact hammer (LH21, Lifton, DK) mounted on a steel ball energy absorber (ISO 8662-5). An accelerometer and a proper mechanical filter has been placed on the handle. Five male subjects (BMI 24.33 ±3.19 kg/m2, age 38.6 ±10.2 yr) have been used during the tests. Feed force measured during tests has been compared with the feed force measured by a scale, according with the ISO 8662:5.

Results show how the low grip (mean 12.61 N) and low feed force (mean. 49.58 N) operating conditions are related to the lowest level of acceleration (mean: 12.69 m/s2; SD 5.71), while the highest accelerations (mean: 39.9 m/s2; SD 20.05) are measured while the tool is operated with high feed (mean: 112.32 N) and high grip forces (mean: 126.44N). ANOVA tests show that feed force is significantly correlated ($p < 0.01$) to acceleration for 3 over 5 subjects. Tests carried out using one hand showed significant correlation ($p < 0.001$) for all the subjects.

EDUCATION AND TRAINING IN OCCUPATIONAL HEALTH

KNOWLEDGE VS. INFORMATION - A DISCUSSION OF ADAPTING HEALTH AND SAFETY COMMUNICATION AND TRAINING TO CULTURE

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[ID 1204]

The best communication may depend upon recognizing how knowledge differs from information. Often, when there is a problem in health and safety communication or training, the first reaction is to add more information. However, the solution may not lie in the amount of information, or even in the quality of information. Instead, the solution may lie in a different arena-knowledge. Information-or fact-is primarily intellect-driven. Information is helpful, but it is not where we live, where we reside. Total communication involves more than the intellect. As a species, we reside in our knowledge-knowledge of who we are, what we know to be true, our relationship to ourselves, our family, our culture. This knowledge is intrinsic, experienced, and often non-verbal. And it is the knowledge of our culture, our worldview, our reality-that informs our decisions, including our health and safety decisions. Information may mean nothing without first addressing the knowledge of the worker. That knowledge is the "glue" that allows the factual information to "stick." During this presentation, a dialogue will be offered, posing the question, "By addressing the knowledge of each culture, can we adapt information / training / communication from one culture to another?" Examples from health communicators' experience in addressing knowledge and culture will be invited and explored.

LARGE SCALE PROGRAM FOR CONTINUOUS EDUCATION ON WORKERS' HEALTH BASED ON DISTANCE LEARNING STRATEGIES: A BRAZILIAN EXPERIENCE OF MINISTRY OF HEALTH AND OSWALDO CRUZ FOUNDATION

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[ID 1183]

The implementation of an Integral Workers' Health Care Net inside Brazilian National Health System, which assists an estimated population of 85 million workers, constitutes now a great challenge, especially regarding the preparation of public health care professionals, considering Brazil's continental dimension and huge regional diversity.
Difficulties are particularly considerable in Amazon Legal Region, for its size and lack of Health Services' tradition in dealing with this kind of issues. In order to face the challenge of preparing around 5,000 professionals in two years, a habilitation program is being implemented, adopting the strategy of long distance learning, in a partnership among the Ministry of Health, the State and County Regional Health Departments and the National School of Public Health from Oswaldo Cruz Foundation
The program of the course, in constructivist basis, was build upon the basic skills defined as the ones required for professional practice which include: a) study of work and its effects on environment and health; b) integrated health care and vigilance on individual and collective levels; c) epidemiologic skills (identify and modify work-health-disease profiles); d) formulation and implementation of health policies and occupational health management; e) educational activities and continuous professional improvement; f) production and propagation of technical and scientific knowledge, establishment of protocols and procedural norms.

REALITY VIDEO - WHEN THE HONESTY OF THE MOMENT CAN MEAN MORE EFFECTIVE HEALTH AND SAFETY COMMUNICATION

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[ID 1201]

The increasing acceptance of reality video in many cultures offers an opportunity for occupational health and safety communication. The gift of this style is that it presents the honesty of the moment. Within a health and safety context, audiences view this raw and unrefined format as intimate and candid. By showing people and real life as they are, a level of trust is established. This trust is essential for health and safety communication. These qualities will be illustrated and discussed through reality video clips from Los Alamos National Laboratory. On-camera workers tell their stories in their own way. Workplace events are recreated from the workers' point of view. For the health and safety communicator and trainer, reality video offers the additional opportunity of quick response to events, such as recent accidents and lessons learned. These health and safety videos can be easily shot onsite while only using hand-held cameras and available light. The editing style can be simple, even rough. Therefore, a short reality video can be developed in less time and for less money than a more complicated video. Ultimately, these low-budget, quickly produced videos that have the workers' trust can enhance occupational health and safety communication and training.

ERGOPHTHALMOLOGY AND VISUAL ERGONOMICS: CURRICULUM FOR OCCUPATIONAL PHYSICIANS

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Mismatch of ergophthalmological requirements and visual conditions at work are responsible for visual complaints and a reduced manpower. "Visually healthy" are rarely a problem to occupational health. However, it must be considered that the ageing working population and the continuously increasing visual demands will create important problems.
Ergophthalmology / visual ergonomics is one among many other topics in the education of occupational physicians. Considering the proportion of visual tasks in today's work, ergophthalmology has received little attention. As a consequence, in practice occupational physicians ask a specialist such as an ophthalmologist to optimise workplaces with highly demanding visual tasks. Such specialists however, not necessarily are aware of particular requirements or methods common to occupational health.
It is desirable to give more importance to ergophthalmology / visual ergonomics in education of the occupational physician in order to enable an efficient optimisation of visual conditions at work, which are fit to individual needs.
Following curriculum "Ergophthalmology for occupational physicians" is suggested:

1. Measurement and evaluation of visual performance:
   Vision, vision when dazzled, contrast vision, adaptation, colour vision, refraction and accommodation (accommodation width and pathodynamics), binocular vision, processing of visual information, validity and reliability of measurement techniques and parameters.
2. Evaluation of visual demands, visual ergonomics:
   Statics and dynamics of directions of gaze, visual distances, nature and size of objects, light and lighting (qualities of light, colour temperature, lighting strength, light density, shadow formation), contrasts, size of symbols, characters and details, methods of assessing the workplace and work demands, cognitive costs.
3. Visual aids:
   Theoretical understanding of spectacles, contact lenses, work spectacles, status post lens implantation and refractive corneal surgery, magnifying glasses, binoculars.
4. Special topics:
   Circadian variation and stress reactions of the organ of sight and of older workers, asthenopic complaints, vision and the spine, VDU tests for VDU workers.

RISKTRAINER, A TRAINING METHOD FOR FACILITATING PARTICIPATORY RISK MANAGEMENT IN COMPANIES

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Background: Studies have shown the effectiveness of participatory risk management (PRM). Unfortunately, communication problems, lack of trust in prevention advisors and line managers, and the feeling that workers' specific knowledge about their working conditions are insufficiently taken into account, constitute major barriers to implement PRM.. So, we developed a training method called TOXTRAINER focused on the chemical industry. Its aim is to provide prevention advisors the necessary skills to facilitate PRM in their company during a two-day workshop. Unfortunately, most prevention advisors who attended the workshops, were working mainly in big companies.
Objective: Pursuing the same objectives, RISKTRAINER aims at reaching a maximum of companies using new information and communication technologies.
Method: RISKTRAINER provides prevention advisors a structured method to facilitate PRM and means to improve their pedagogical skills. RISKTRAINER is a training in three stages. The first stage consists of an e-learning course pursuing two aims: increasing participants' awareness about both the benefits of PRM and the pedagogical skills needed for facilitating it. Stage two consists of a one day workshop for groups of 10-12 participants, allowing participants to gain the needed skills through role-playing, to make themselves familiar with the structured method proposed by RISKTRAINER and to train their pedagogical skills. Stage three consists of a half-day session allowing participants to exchange their experiences about their practice. Six groups will be trained during the first semester of 2006 to test the RISKTRAINER approach in order to improve it through a qualitative analysis.
Conclusion: Once RISKTRAINER improved, a set of questions impossible to enclose in experimental phase will be investigated: Will be RISKTRAINER version as effective as TOXTRAINER two-day workshops? How many prevention advisors doing RISKTRAINER stage one will choose to attend the one-day workshop? Etc. A further evaluation will be carried on to go deeply into these questions.

IMPLEMENTATION AND EVALUATION OF AN EDUCATIONAL PROGRAM ON PATIENT HANDLING

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An educational program was implemented at a large hospital among nursing personnel, within the framework of a multidisciplinary intervention on low back pain (LBP).
The program was directed to 140 nurses and aides, to improve knowledge on prevention of LBP and patient handling techniques. After 2-hour theoretical class, participants were divided into groups of 20 for 3-hour practical training. Effectiveness was evaluated by questionnaire and direct observation, before program and 2-6-months after its completion. Questionnaire scores significantly improved both at 2-6-months, as compared to baseline. Handling techniques were judged as good-excellent. Age, education, job task, length of exposure had no relevance on results. A questionnaire survey on LBP showed that 80 participants were symptomatic; after a few months use of handling devices, 62 workers out of 80 improved their symptoms.
A "train the trainer" educational program was carried out on 52 nurses. The program consisted of 4-hour theoretical class, 4-hour lesson on communication techniques and 4-hour practical training. Effectiveness was tested by questionnaire and direct observation of both practical lessons and technique evaluation. The evaluating team included occupational physicians, physiotherapists, trained nurses. Such program showed, for the great majority of participants: good knowledge on LBP prevention; good-excellent learning on communication skills and on patient handling techniques with and without devices; fair-good level in capability of evaluating patient handling techniques performed by colleagues. The trainers are now transferring their skills to other nurses and aides in their wards.
This study showed that education was effective in increasing knowledge on prevention of LBP and improving patient handling techniques, as well as subjective health status in trained nurses.
Trainer-nurses could be the proper choice to improve handling techniques in each ward and could act as a tool to implement future ergonomic programs.

AN ALTERNATIVE MEANS OF SPECIALIZING IN OCCUPATIONAL HEALTH IN FINLAND AN EVALUATION OF THE RESULTS

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In order to specialize in occupational health in Finland, a physician must work 6-12 months in the Finnish Institute of Occupational Health (FIOH), in addition to receiving basic training and working in a hospital and in occupational health units. Because more occupational health specialists are needed than can be trained in this manner, an alternative was devised to compensate for the 6 months in the FIOH.
The physicians in training spend one day every week in the Tampere Regional Institute of Occupational Health over a period of 10 months while continuing with their normal jobs. During half of their training, these physicians work in the clinic of occupational medicine, and during the other half they participate in modules pertaining to core topics in occupational health (e.g., occupational hygiene, risk assessment in the workplace, economics and occupational health legislation, work organization psychology, toxicology, ergonomics, and ethics in occupational medicine).
Six trained physicians evaluated every module according to the importance and implementation of the topic. Before their 10 months of training, the physicians were asked to describe how they handled 1) a typical workplace visit and 2) a case of suspected occupational asthma. The same questions were repeated after the training. The answers were evaluated with a phenomenographic method. The physicians' ability to assess workplace risks increased during the training, although the assessment of chemical risks was still somewhat troublesome. Half of the physicians were skilled in diagnosing occupational asthma before their training, and after the training their skills were generally also evaluated as good.
Finally, the physicians were asked what issues were the most important for them during their training. Managing a patient with an occupational disease was given priority. Familiarizing themselves with the functioning of FIOH and being trained to assess workplace risks systematically were also considered important.

CITATION CLASSICS IN OCCUPATIONAL MEDICINE JOURNALS

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[ID 632]

Introduction. The number of citation an article receives after its publication reflects its impact on the scientific community, but also the impact of the authors, of a specific institution or even of a country in the field studied. Garfield in 1987 listed the "top 100" best-cited articles ever published in JAMA and named them "Citation classics". A systematic analysis of top-cited articles in the field of occupational medicine is not yet available. The purpose of this study was therefore to assess whether or not citation classics exists in occupational medicine and to assess the characteristics, such as ranking, year of publication, publishing journal, type of article, institution of origin, country, state, topic of the most frequently cited articles published in the majors occupational medicine journals.
Material and methods. The five major journals in occupational medicine. The most frequently cited articles published in these journals were identified using the database of the Science Citation Index Expanded (SCI-EXPANDED, 1945 to present). The data were obtained by searching one year and one journal for at a time. All the articles cited more than 100 times were collected and analysed.
Results - Discussion. Among the 15 553 articles published by the journals studied since 1949, only 85 articles had been cited more than 100 times. The oldest was published in 1950 and the latest in 1997. England contributed for 28% of those citation classics and USA or Sweden for 19%. One

article had been cited 979 times, and 3 more than 300 times. Fundamental toxicology or toxicokinetics were the most represented topics (21% of articles) followed by musculoskeletal disorders (11,5%) and cancer (15,9%). Since the 80th, USA and Scandinavia have taken the leadership on the publication of citation classics' papers. Nevertheless, the spreading of literature published in occupational medicine literature remains low.

DAY LABORER LEARNING: ANALYSIS OF WORKER CENTERS' FOCUS GROUPS

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[ID 642]

Day laborers are workers who look for work on a daily basis and work for contractors or temporary labor agencies for one day or for short periods of time. These vulnerable workers experience many abuses from employers and confront the challenges of not speaking English and fear of deportation if they contact the government to enforce their labor rights at work if they are violated. In Chicago, day laborers have organized worker centers to establish fair employment practices, experience employment they control, mutual support, organizing, direct action and training. One important principle of workers centers is peer leadership development and governance. Occupational health learning and services may also be an aspect of worker centers.

Leslie Nickels, MEd., is the principle investigator in NIOSH National Occupational Research Agenda research on special populations at risk, focusing her inquiry on 4 Chicago-based worker centers and the role that they may play in supporting day laborer occupational health. As part of the inquiry, a series of focus groups of worker center staff and worker directors were conducted in 2005. Joseph Zanoni, MILR and Leslie Nickels will present the preliminary findings of the focus group analysis. We seek to understand how day laborers learn about occupational health at the workers centers, present models of day laborer learning styles and propose implications for occupational health curriculum including suggested topic, materials and methods.

FROM OCCUPATIONAL HEALTH TO INTEGRATED HEALTH MANAGEMENT

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[ID 1443]

New health challenges have emerged at the workplace alongside changes in the working environment, demographic trends and globalization. Occupational injuries and the physical work environment have become lesser challenges compared to the rapidly increasing work-related mental disorders and unhealthy lifestyles. This has created the demand for a new set of skills for occupational health professionals which academic training has not adequately prepared them for to date. Employers are demanding more stringent accountability and cost-benefit from their health services which often lie beyond the traditional field of occupational health. Often, occupational health professionals are asked to design, implement and evaulate health management programs without the necessary background and skills leading to stressful situations and unsuccessful programs.

This presentation will highlight an intensive training program which is intended to ease the transition for occupational health professionals and provide trainees with a base set of skills for integrated health management. The interdisciplinary program was initially crafted at the International Institute for Health Promotion (IIHP) at American University in Washington, DC and has been modified according to input from health professionals from many different countries. The curriculum includes the following modules:

· health and productivity management
· behavior change theories and practices
· psychosocial factors and the new working environment
· health risks and lifestyles,
· assessment tools and evaluation methods.

In addition, the training program takes a global perspective and places emphasis on cultural issues at the workplace.

The overarching training objective is to build capacity for occupational health professionals, thereby developing and preparing the workforce in the field for the new challenges which lie ahead.

AN INVESTIGATION BY AGENT BIO 07: BIOLOGICAL RISKS AT WORK

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[ID 1048]

As biological risks are very often forgotten during risk assessment in a company, INRS has decided to raise awareness of everyone involved in biological risks assessment by producing a film of 13 minutes with animation combining 2D illustrations and 3D characters and settings.

James BIO 07 is the main character of this film. He is a biological agent but also a secret agent. So that his boss can take the necessary preventive measures against biological risk, and make sure they are known, he has been entrusted with a mission of the utmost importance - he has to investigate the biological risks faced by humans at the workplace. James has to carry out four successive missions separated by a countdown (James has 24 hours to complete each mission) :

· Summarize the relationships between biological agents and human beings (module 1 - biological agents),
· Find out how some biological agents are transmitted to workers (module 2 - the transmission chain),
· Study the situations in which workers can be exposed to pathogenic agents (module 3 - exposure situations),
· Find out how to prevent contamination risks (module 4 - prevention).

At the end of the investigation, James' report is clear. Occupational biological risks are likely to be found when an epidemiological chain can be identified at the workplace: a reservoir from which agents can escape through exit doors, and then travel to entrance doors of the human body. How to prevent biological risks appears to be obvious: to prevent the risk of contamination, you need to break the chain of transmission.

This film has been produced for a very large target audience: all sectors, for operators and management at all levels. It is also suitable for students in vocational and technical training.

WORK AND VISION

INDOOR MICROBIAL POLLUTION AND OPHTHALMIC INFECTIONS: IS THERE ANY OCCUPATIONAL RISK?

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[ID 1096]

The ocular surface can be defined as a functional unit aimed at ensuring the optical characteristic of the eye together with protection against mechanical, chemical and biological agents.
Its components are eye lids, lacrimal film, conjunctiva and cornea, which directly interact with the surrounding environment.
Indeed, bacteria, fungi, and viruses are often found in indoor working areas and according to the numerous S.B.S. investigations reported in the literature, it is well known they have a role in the development of certain respiratory and skin diseases of the occupants.
The origins of microbial contamination in indoor environments are usually outdoor air (bacteria and fungal spores) and humans. They are sustained or worsened by poor maintenance of air conditioners, fan coils and humidifier systems, as well as by carpets and office equipment, including keyboards and computer mice.
The ocular conjunctiva and cornea, due to their external position, can be easily contaminated by microrganisms present on periocular tissues and fingers.
In everyday clinical practice infective diseases of the ocular surface (conjunctivitis, cheratitis, dacriocystitis, etc.) are quite common, but it can be argued that, unless detailed and targeted ophthalmic examinations are carried out, their origin could be misinterpreted or ignored.
In fact Aspergillus sp., Staphylococcus aureus, Pseudomonas Stuzeri and Aeruginosa and Candida albicans have been isolated on VDU work stations.
Some of these microorganisms are the most frequent aetiological cause of bacterial and fungal keratitis, both in contact lenses wearers and in no contact lenses wearers.
In contact lenses wearers the incidence of ulcerative keratitis is estimated as follow:
. 4,1 cases every 10.000 soft contact lenses wearers;
. 210,9 cases every 10.000 daily soft contact lenses wearers;
. 2,0 cases in rigid contact lenses wearers;
. 4,0 cases in gas permeable contact lenses wearers.
The possible effects of these interactions on the worker's wellbeing, as well as the possible development of ophthalmic work-related diseases, disorders and disturbances is discussed.

OBSERVATION DISTANCE AND TASK DURATION OBJECTIVE EVALUATION: AN INFRARED-ULTRASOUND EQUIPMENT

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[ID 1116]

Modern work activities often require an intense and prolonged visual effort on near objects, which is frequently associated to an accommodation and binocularity overloading asthenopia.
An objective quantification of observation distance and task duration can be useful for the interpretation of the still controversial aetiology of occupational asthenopia in both office and industrial contexts.
Based on our previous laboratory and on-site experience, we developed and built some equipment composed of:

1. up to five IR system of illuminators (gated with a 40 KHz modulation), each of one "marks off" a different observation area (channel);
2. a 40 KHz US transmitters paired to each channel, in order to quantify, by the "time to flying", the observation distance;
3. a control unit which in order, scans all the IR illuminators and US transmitters, defines the repetition rate of measurements, takes the time (distance) measurements and records the results (distance and observation area) on non volatile memories (EEPROM). At the end of the recording session, the system downloads all the EEPROM data by means of a USB interface to a PC, for data processing and graphs generation;
4. a sort of "google" equipped with a approximately 10° viewing angle IR sensor, and approximately 100° viewing angle US receiving transducer.

Due to adopted scan system, when the IR sensor receives the IR signal on a specific time window (gate), it sends the information on the observed area and at the same time triggers the distance measurement on the same "channel"; the latter is achieved by measuring the "flying time" of a "8 US pulses train" which is activated, in turn, at the end of the "time window".
The distance measurements accuracy is ± 0,5 cm with a frequency of 3,33 measurements per second (300ms period). Specific software running on Windows 9x or Xp allows the data downloading and a preliminary immediate elaboration of the data transferred to the computer (area of gaze, viewing distance, accommodation and convergence load, etc.) as well as all graph elaboration.

REDUCED PERCEPTION OF DEPTH DUE TO THE FRAME OF THE STEREOSCOPIC DISPLAY

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[ID 1084]

Stereoscopic displays become more and more popular, as for instance in medical imagery, tele surgery or in applications of virtual and augmented reality. Stereoscopic displays have been shown to be an important cause for asthenopic complaints due to conflicting visual information as for instance mismatch between the demands of accommodation and vergence.
. In a pilot study we demonstrated that conflicting visual information also appears for objects presented close to the frame of a stereoscopic display. Such objects appear to be clamped in depth to the depth of the frame. The strength of the spatial distortion depends on the position of the object within the display, the shape and the colour of the object.
In order to compensate for the distortion of perception of depth, it is necessary to know the magnitude of the effect as function of the factors mentioned above.
By means of a psychophysical experiment we assessed the magnitude of distortion as function of the factors 1) distance of the object from the frame, 2) size of the object and 3) colour of the object. Vision of subjects participating at the experiment was best corrected using subjective refraction based on binocular fine tuning. Binocular vision was tested using the Lang and the TNO random-dot stereo test as well as a stereo test used in the Titmus T2a screener. Colour vision was assessed using the Nagel anomaloscope.
As our results show, required surplus disparity for full compensation of the distortion is high. Fusional limits of the observer will not allow to compensate for the distortion. Other solutions are suggested for circumvent the effect of clamping of depth and therefore reducing visual load when using stereoscopic displays.

CONSISTENCY AND TEST-RETEST RELIABILITY OF AN EYE COMPLAINTS QUESTIONNAIRE

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[ID 1365]

Background: Prevalence of eye problems associated with VDU use range from 25 to 93 %.
Aim: To examine clinimetric properties of an eye complaints questionnaire (ECQ). Internal consistency, and test-retest reliability over one working day, between two consecutive days and over a one-week time period were examined.
Methods: The 10 items came from existing questionnaires. A total of 96 workers (70% female) performing > 4 hours of VDU work a day participated. Mean age was 36.4 years (SD=10.1). The ECQ was administered on 4 occasions: (T1) at morning 15 minutes into the working day, (T2) 15 minutes before ending the T1 working day, (T3) at morning 15 minutes into the working day one week from T1, and (T4) 15 minutes before the end of this working day. Answering categories were: not at all, hardly, a bit, somewhat, rather, considerable and very.
Analysis: Internal consistency was determined on T2 and a Cronbach's alpha of >0.70 and <0.90 was considered acceptable. Items were omitted in case alpha improved by 0.03. Total scale scores were calculated and ranged from 0-100%. Stability over time was determined by the intraclass correlation coefficient (two-way random model, average measures) between ECQ scores on T1 and T2, T1 and T3 and T2 and T4. An ICC of > 0.80 was considered as good.
Results: Internal consistency on T2 was good with a Cronbach's alpha of 0.80. Stability over time between T1 and T3 was good (ICC= 0.87, 95% CI=[0.81-0.92]). The ICC between T2 and T4 was moderate 0.78, 95% CI =[0.66-0.85]. The ICC between T1 and T2 was low (0.68, 95% CI= [0.38-0.82]).

Conclusions: This questionnaire has potential for the measurement of eye complaints in an office population. Based on a low ICC between the morning and afternoon measurement and a moderate ICC on the afternoon measurments, timing of the measurements seems of great importance.

BLUE LIGHT EXPOSURE: RISK ASSESSMENT EVALUATION IN THE RETAIL SECTOR

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Occupational exposure to "blue light" (wavelength between 380 and 520 nm) is a hazard for the visual apparatus. Both in animals and humans permanent damage to the retina pigmented epithelium (RPE) is reported in literature, according to wavelength, radiance, W/(m2·sr), and exposure duration.
Indeed, it should be noted that the real amount of blue light absorbed by the operator, i.e. the amount which actually enters the pupil and reaches the retina, is affected by many variables, like pupil size, optical media transparencies, task-related head position, lamps location, job displacements within the ambient, etc.). All these changeable circumstances make the worker's occupational visual field outline, which is essential for a reliable risk assessment, complex and difficult.
We carried out an investigation in 8 work sites of the retail sector (department stores), where halide lamps (power ranging from 50 to 150 watts) are used. Due to the high luminance (up to 500,000 cd/m2) and the amount of "blue light" emitted by some of these lamps, exposure levels exceeding the TLV proposed by ICNIRP and ACGIH were theoretically possible.
Measurements were made placing the sensor of the spectroradiometer at eye level (nasion) of each worker. Readings were taken at the imaginary intersection points of 10° angles on the horizontal plane (from 0° to 180° to the left and right of the observer) and at 5° on the vertical plane (from 90° to 110°).
Exposure values were calculated referring to 95 readings mean.
The results show that at least for two models of halide lamps the 100 W/(m2 sr) TLV has been exceeded reaching levels of exposure of 560 W/(m2 sr) and of 1400 W/(m2 sr).
If the analysed task sequence is representative of the average working shift (which needs many further on sites inspections to be confirmed), according to current TLV these lamps should be visible, i.e. included into the occupational visual field of the exposed workers, for not more than 30 and 12 minutes per day, respectively.

OCCUPATIONAL BLUE LIGHT EXPOSURE AND AGE RELATED MACULAR DEGENERATION

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[ID 1119]

Normal exposure to sunlight does not result in damage to the visual mechanism because of the autonomic reflexes of the visual system. Also the anatomy of the eyeball, including the osteo-cutaneous orbital ridges, eyelashes and eyelids, all help reduce exposure of the visual mechanism to excessive levels of optical radiation.
However, literature on incoherent optical radiation effects on human and animals, has long drawn the attention of researchers to the problem of "blue-light hazard". This definition derives from its wavelength which is situated in the region of the violet-blue band, ranging between 380 and 520 nm., with the most harmful effects around 441/442 nm. The retina is the most susceptible part of the eye to this type of light emission, in particular the macular area.
In western countries age related macular degeneration is the principal cause of severe loss of central vision among adults aged 65 years or over. The role played by blue light exposure, particularly occupational exposure, is still unclear.
The purpose of this paper is to review the potential harmful effects of occupational exposure to "blue light" with specific reference to workers belonging to commerce and advertising/live entertainment sectors.
Attention is paid to the suitability and applicability in the workplace of current international legislation on blue light hazard. Indeed, there is a need to develop a better understanding of the cumulative effects of long-term occupational exposure, and whether such exposure can possibly lead to retinal lesions, in particular macular lesions. It also discusses the need to develop a wider comprehension of whether conditions of hyper-susceptibility or pathologic pre-disposition or both exist, that require specific procedures for a job fit evaluation. Finally, criteria for a more detailed and targeted health surveillance are proposed.

HUMAN EYE BLINK FREQUENCY AND OCULAR EXPOSED AREA DURING VDU WORK WITH LOW AND HIGH MONITOR POSITION.

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[ID 1689]

A number of studies have investigated the optimal monitor position during work with VDU. Still, contradictory recommendations with regard to ergonomic factors exist regarding prevention of visual versus musculoskeletal discomfort. Low monitor position has been recommended for visual comfort while a higher position is recommended for neck comfort. The aim of our study was to measure the ocular exposed area and the eye blink frequency during two different monitor positions.
Ten healthy subjects (5 males, 5 females) completed 2 x 10 min computer mouse work in a 23˚C temperature and 30-35% relative humidity controlled simulated office environment with two monitor positions: high (the monitors' upper edge in the same height as the subjects' eyes) and low (lowered by 25˚ and tilted until perpendicular to gaze angle). Blink frequency was sampled by electrooculogram. Ocular area was measured manually from video recordings.
The effect of lowering the gaze angle by 25˚ decreased the mean blink frequency by 20% ($p< 0.036$) from 5.0 blinks/min to 4.0 blinks/min. Similarly the mean ocular area was decreased by 8% during the low monitor placement compared to the high. However, no individual correlation between the ocular area and the blink frequency was detected, which may indicate that a small ocular area not necessarily imply a lower blink frequency. It is possible that a correlation between the blink frequency and the ocular area may occur if the change in monitor position and thereby gaze angle and ocular area was larger and if the computer mouse work was performed for longer duration.
In conclusion: Low monitor position resulted in a decreased ocular area and also in decreased blink frequency.

THE MODERN OFFICE ENVIRONMENT DESSICATES THE EYES?

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[ID 953]

Eye irritation is a common complaint in the modern office environment. The causes are partly still unknown, but high periocular relative humidity appears to protect the precorneal tear film against desiccation and sensory irritants, and reduces the development of eye irritation related symptoms. This is particularly relevant for intensive computer work, where the precorneal tear film is altered resulting in eye dryness, in addition to enhanced susceptibility towards sensory irritants. The workplace, work schedule, including breaks should be planned in such a way to maintain a normal eye blink frequency to minimise alterations of the precorneal tear film. The consequence is that the impact of the relative humidity should not be underestimated for eye irritation related symptoms. The beneficial effect of multiple short breaks on the precorneal tear film should be considered acceptable, in addition to longer breaks and low gaze, in particular during visual demanding work, where the precorneal tear film is altered. Such breaks appear also to be beneficial for the performance.

CHEMICAL AND BIOLOGICAL EXPOSURE-RELATED EYE INJURIES AMONG WORKERS TREATED IN U.S. EMERGENCY DEPARTMENTS

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[ID 1171]

Objective: To characterize occupational eye injuries resulting from chemical and biological exposures.
Methods: The National Electronic Injury Surveillance System (NEISS), a probability sample of U.S. hospital emergency departments (ED), provided estimates of work-related eye injuries treated in an ED.
Results: In 1998-2003, there was an annual average of 253,000 ED-treated workplace eye injuries (range of 222,000-297,000) with an average rate of 19 injuries/10,000 FTE (range of 17-22) among U.S. civilian workers. Eye injuries represent about 7% of all injuries. Contact with an object, such as particles, dust, pieces of metal, building materials, parts, and tools, was the leading eye injury event (69%) followed by an eye exposure to a harmful substance or environment (27%). Fifteen percent of all eye injuries involved a chemical or chemical product as the source of the injury and 3% involved a body fluid. On average the eye was the body part affected in 38% of the cases with a chemical source and in 46% of the cases with a body fluid source.
Conclusions: Eye injuries represent a relatively small proportion of occupational injuries treated in U.S. hospital EDs. However, if a chemical or biological exposure is involved it affects the eye in about 1/3 to 1/2 of the cases compared to other body parts. These types of exposures have an increased potential for affecting both eyes and/or resulting in significant vision loss compared to the common occurrence of a foreign body in the eye. Prevention efforts focused on these types of exposure incidents may significantly reduce vision loss and potentially serious infectious illnesses resulting from mucous membrane exposures through the eye.

OCULAR SURFACE AND GASEOUS CHEMICAL AGENTS IN OFFICES

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[ID 1626]

Office workers frequently report occupational asthenopia (also called “eye irritation”, “ocular discomfort”), which in some cases is related to Indoor Air Quality problems. In fact it should be noted that the ocular surface, i.e. eye lids, lacrimal film, conjunctiva and cornea, is a delicate functional entity which can easily be altered by environmental gaseous chemical agents, leading to the development of short and sometimes long term effects.
The literature suggests that these disturbances may be partly attributable to: gaseous emissions, especially formaldehyde, VOCs, Nox, O3, etc. possibly originating from new interior furnishing and equipment; airborne particles from carpets, ceiling insulation, laser printer, photocopiers, air conditioning systems, moquettes; irritants from environmental tobacco smoke and combustion products from interior or exterior sources.
Our research, which is still in progress, has two aims. The first is to review and systematize the literature on this topic; the second is to make a list of the most active gaseous substances, to improve our understanding of how they interact with the ocular surface. Preliminary evidences are (i) that lacrimation, caustication, solvent and surfactant action, are among the principal mechanisms of action of these chemicals; (ii) that several other aspects are involved in developing disturbances and alterations, but are generally omitted or underevaluated. These are: lacrimal film type and state, task related visual effort, lighting and microclimate. Indeed, their synergistic effect should be kept in mind when investigating the possible consequences of ocular surface exposure to gaseous chemicals.

ASSESSMENT OF THE LIGHTING ENVIRONMENT IN CALL CENTRES: THE NEED FOR

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[ID 1919]

Staff in call centres are involved in a range of visually demanding tasks. Following concerns about visual disturbances and lighting arrangements in a financial call centre, a series of measurements of illuminance and luminance were undertaken.
Illuminances were generally in excess of recommended maintenance illuminance levels for screen based tasks with reference material of average detail. Luminances were highly variable and dependent on natural lighting conditions, including skylights. Most glare situations observed were associated with high luminance contrast ratios. Glare could be exacerbated by the use of dark screen backgrounds and seasonal sun positions. The roof skylights were in the visual field of the employees is some instances and more over head in the kinetic visual field in other cases.
Glare arising from skylights and open or partially open venetian blinds would appear to be likely to lead to visual discomfort, affecting productivity and may be associated with adverse health symptoms such as eye irritation or headaches.
The use of illuminance as a single measure of the adequacy of lighting is inappropriate for risk assessment purposes. Systematic photometry, involving detailed measurement of luminance within the occupational visual field, is recommended

EFFECTS OF POLYPHENOL ON VISUAL FATIGUE OF ELDERLY PERSON BY VDT WORK

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[ID 689]

In this paper, an experimental approach is used to examine the effect of the polyphenol on the recovery of the visual function from visual fatigue caused by working at a VDT of elderly person. 60 office workers from 25 to 60 years old include the elderly persons are selected as the subjects who are without impairment of visual function. The subjects of the experiment are asked to perform simple calculations as representative work at a VDT. They works for a total of 120 minutes (60 minutes for each session), with a 15-minute break between, during which time cloth pads moistened with a polyphenol solution are applied to the eyes, as well as at the end of the second session. The aim of the study is to explore the effect of the polyphenol on the process of recovery from visual fatigue. There are three kinds of parameters that used for evaluating the effect of the polyphenol. The first is the questionnaire for subjective feelings of fatigue as subjective evaluation. The second is the binocular visual functions such as the near-point distance of accommodation, positive and negative accommodation times. The calculation work efficiency is measured as a behavioural variable in the third parameter. In the conclusion of this experiment, it is verified that the effect of the polyphenol on the recovery of the eyes from lowered binocular visual function can be demonstrated statistically. In addition, it is seen that the polyphenol prevent the decrease in working efficiency of VDT work.

LOW VISION AND COMPUTER USE AT WORK

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[ID 1629]

INPS (National Institute for Social Security) is one of the biggest public welfare departments in Italy. It has over 35000 staff and the main work instrument is VDU.
In Italy, blind or partially sighted people are employed by law 113/1985. INPS employs 116 blind operators and 149 operators affected by “hypovision” (visus below 3/10 and visual field lower than 60%). The latter are operators suffering from hereditary retinal dystrophies, keratoconus, severe nystagmus, etc. In these kind of operators two aspects are essential to enable them to carry out their tasks efficiently and without feeling uneasy: screen and keyboard must provide adequate dimensions of icons and print/text, paper document must be magnified, workstation lighting conditions must be particularly flexible.
In this regard INPS carried out a study on 10 hypovision operators in order to evaluate the adequacy and effectiveness of a new VDU workstation equipped with: a 20” LCD screen, screen magnification software for VDU images, a CCD camera connected to the VDU for paper document magnification.
Each subject underwent a four-hour session, working on a routine set of administrative procedures, working with two different interfaces (50%

each): GUI i.e. a visual computer environment that represents programs, files, and options with graphical images, such as icons, menus, and dialog boxes, and CUI (a user interface that displays only text characters).
The workstation was located in a traditional office where natural light is well controlled and artificial lighting, both general and localized, could be easily adjusted in agreement with the subject's visual features.
Results show that the new VDU workstation is effective and subjects felt considerably better while carrying out their duties. Two aspects, which are generally underestimated in this context, have been evaluated as important by the subjects: high flexibility of the localized lighting and, in subjects with severe hypovision, the availability of GUI.

SPECIALISED CONSULTATION AND A NEW PROFESSIONAL REALISTIC COLOUR VISION TEST FOR YOUNG PEOPLE CAREER GUIDANCE PRESENTING COLOUR VISION DEFECTS.

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[ID 1261]

Introduction : nine per cent of the men and 0,5% of the women present a colour vision defect. For certain trades and in particular in the electricity and electrical engineering sectors, a good chromatic discrimination is necessary. The traditional ophthalmologic diagnostic tests are insufficient to evaluate the professional capacity. We set up a standard specific approach for the assistance to the career guidance of these young people.
Objectives: to determine the degree and the type of colour vision defect, to test the young persons in real situation of work for better evaluating their capacities of deficit compensation
Methods : The standard approach includes a medical interrogation , an evaluation of the professional wishes of the young person who passes an ophthalmologic series of tests in particular the Fansworth panel D-15 test and the 15 Hue Lanthony desaturated test in order to detect abnormal trichromates. Thereafter, the young person is subjected to a realistic professional test of wiring, developed in the department and standardised using a reference group. This test comprises two tests of connection (association name of colour- cables and pairing cable-cable) for 3 categories of cables (building electricity, industrial electricity, telephony).
Results: Since the installation of this consultation, more than 600 young people presenting colour vision defect were tested. An evaluation of the career guidance decision taken was made as well as a study of the becoming of a sample of these young people. These studies made it possible to validate our approach and to redefine the limits of the error count acceptable to the professional realistic test.
Conclusion: this standard step including a professional realistic test made it possible to better test the capacities of compensation of colour vision defects in young people in order to improve their career guidance.

ACCIDENT PREVENTION

SURVEY OF HEALTH AND WORKING CONDITIONS OF SHIP RECYCLING WORKERS IN CHITTAGONG, BANGLADESH

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[ID 39]

Introduction:
Ship recycling in Chittagong, Bangladesh is the biggest in the world & provides 90% of the needed iron for the country. The industry is labour-intensive and risky. It is under international scrutiny because of appalling labour conditions and environmental pollution. This survey was conducted in 2005 to provide objective data for further actions.

Methods:
Semi-structured interview questionnaires for owners and management (17 yards), supervisors (60) and workers (85) were used. Another survey method was used to estimate the number of workers.

Results:
There are around 16,000 employees directly engaged in 26 active yards. None are females. Six of the 85 workers interviewed are between 15-17. 82% of workers are between 25-39. 67% of workers come from outside the district. 59% are illiterate and 41% have below primary education. 61% of workers receive US$1.5 to 2.3, 17% above $2.3 and 20% less than $1.5 per day. A few government agencies are involved in ensuring safety of workers. Most workers are aware of the hazards of their work. 41% are aware of fire dangers. Few companies have trained workers. Use of personal protective equipment is virtually non-existent. Only cutters and fitters use PPE. About 25 % of workers live in cramped sheds provided by yards with inadequate toilet facilities and unsafe water. 100 workers have access to one tube well and 48 workers to one latrine. Workers have limited access to health services. They are not assured of compensation for injury, disability or fatality.

Conclusion:
There is lack of appropriate safety training, guidance and monitoring of safety measures by authorities. Low awareness and poor knowledge of risks involved contribute to reluctance of applying safety measures. There is also a dearth of information, inadequate modern equipment and technology, and less interaction between industry, government and international organizations, which lead to the problems.

COMMON PITFALLS WHEN USING BEHAVIOR BASED SAFETY MANAGEMENT

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[ID 53]

The Behavior Based Safety (BBS)is a technology for reducing occupational accidents and improving the general safety of industrial organizations. It has demonstrated a high efficacy in the major applications around the world. Despite the above, an elevated number of its unsuccessful cases and the origins of its critics come from deficiencies in the application of the technology and the ignorance of its basic principles.
Based on the experience of applying (or helping to) this technology in several organizations, it is the objective of this paper to describe the more common pitfalls when suing BBS like:
- Consider the technology as a “universal panacea”
- Not to integrate it with the existing General Safety System
- Use as a repressive instrument
- Poor support and leadership from all the management structure
- Insufficient use of generated data
- Using generic description of behaviors
- Poor use of reinforcing
- Poor participation
- Insufficient continue training

Following these descriptions, it is also the paper’s intention to explain the general principles of this technology for assuring its success when it is implemented.

THE INTEGRATION OF OCCUPATIONAL HEALTH & SAFETY, PSYCHOSOCIAL ENVIRONMENT, AND PERSONAL HEALTH FACTORS INTO A COMPREHENSIVE ORGANIZATIONAL FRAMEWORK

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[ID 177]

To be successful within a competitive global economy many organizations are
re-structuring their business models and workplace environment to nurture and support higher levels of performance. Initiatives within safety, health, environment and quality programs have all traditionally contributed towards providing an organizational environment to further improve efficiencies, productivity, workplace morale, and the occupational health and safety of workers. The integration of safety, occupational health, and environment strategies into overall organizational business strategies represents a best practice of high performing organizations (Abromeit & Sassano, 2002). Furthermore, research evidence suggests that the traditional health and safety intervention approaches through purely physical and biomechanical means may be limited in effectiveness without the consideration of psychosocial and personal health perspectives. Psychosocial influences such as the organizational of work, managing practices, high demand with low control workplace situations are observed as having direct health harms and costs that are borne not only by individual employees and employers, but also by families and society at large (Shain 1999). The organization of work has further evidence in affecting worker health through a variety of pathways, such as stress related illnesses, cardiovascular disease, musculoskeletal disorders, and psychosocial disorders (Landsbergis 2003). (Burton 2002) indicates that ensuring a healthy psychosocial environment requires addressing the leadership style and management practices of organizations. The conference Board of Canada (2000) recommends an “Integrated Approach to Workplace Occupational Health”, by integrating the following workplace interventions to improve worker health. For Example: (a) Physical Work Environment,
(b) Health Practices, and (c) Social Environment and Personal Resources. It is further suggested that there needs to exist a strong collaboration of an integrated policy formation within the disciplines of occupational health and safety, health promotion, human resource management, and operations management. It is becoming apparent that employers, employees, governments and occupational health and safety professionals can no longer limit their health and safety intervention strategies solely from a physical and / or biomechanical perspective.
Upon approval by the ICOH review committee, the IAPA proposes to organize a session at the ICOH 2006 conference in Milan that will discuss the evidence and application of this integrated framework through recognized international speakers.

EFFECTS OF A FARM SAFETY PROMOTION PROGRAM

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[ID 389]

The purpose of this intervention follow-up study was to evaluate to what extent an injury prevention program succeeded in improving farm safety attitudes and behavior as well as reducing accidents. The intervention program was carried out including 11 different activities. Activities were directed toward farmers, their families and employees. The program consisted of interactive, target-group oriented, multifaceted interventions. The activities included meetings in experience-groups, educational meetings, courses for 13-17 year old part-time assistants, activity-days, a card-game for children, educational activities at the farming exhibitions, and series of articles in a farm newspaper. A cohort of all farmers in Vejle County completed a questionnaire about accidents and safety attitudes and behavior at baseline (1999) and at follow-up (2002). Respondence rates were 84% and 67% respectively. The final cohort consisted of 1855 male farmers having responded both times. Everyday farm situations were selected and used as indicators for changes in attitudes and behavior. Number and types of accidents were recorded. The statistical methods used were chi-2-statistics, McNemars change test and multiple logistic regression. For most of the main intervention themes, safety attitudes and behavior were improved. However, changes were minor. Farmers had become better to bind loose tractor wheels, to tie ladders, to lockup pesticides, and

to use personal safety equipment. A 17% decrease in accidents was seen (p=0.10). Accidents decreased among children, spouses and farmers, but not among employees. After the intervention the farmers significantly increased self-awareness concerning their own role in accidents. However, 11% of the farmers still thought that some persons are particularly accident-prone. The positive changes were significantly correlated to level of participation in the activities. This program of interactive, target-group oriented, multifaceted interventions improved farmers´ safety attitudes and behavior as well as reduced accidents to some degree.

THE OPHTHALMOLOGICAL EXAMINATION FOR THE BUS DRIVING LICENCE IN ITALY: A POTENTIAL RISK FOR SAFETY AT WORK AND FOR GENERAL POPULATION

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[ID 443]

Introduction

The Italian law prescribes that ophthalmological examination for obtaining bus driving licence doesn't go under the responsibility of the occupational health doctor.

This examination is regularly carried out by other medical doctors from public health service, using usually few tests, with a variable periodicity, usually every five years.

Methods

To evaluate the efficacy of Italian ophthalmological health control for bus drivers we analysed the ophthalmological status in 249 bus drivers from 13 different companies.

Every bus driver was visited by a specialized ophthalmologist who carried out a thorough ocular examination.

Among all the valued elements we particularly considered:

- natural and best corrected visus at near and at far;
- actual visual correction at near and at far;
- ocular motility and stereopsy;
- possible presence of ocular asthenopia related to the work;
- ocular colour screening capability.

Results

The results of ophthalmological examinations showed that among drivers already working:

- 48 (19,3%) had a not well corrected visus at far (an error of +/- 0,75 dioptres minimum);
- Among 127 drivers older than 45, 52 (41,0%) had a not well corrected visus at near (an error of +/- 0,50 dioptres minimun);
- 35 (14,1%) had an unbalanced ocular motility;
- 21 (8,43%) had relevant alterations in colour screening capability.

Discussion

The results showed that a relevant part of the bus drivers evaluated, who had regularly obtained and confirmed their driving license, had relevant not corrected alteration of one important ophthalmological parameter at least.

This fact can alterate their correct driving capability and especially their reaction time in case of danger. This is a risk for their safety during work and consequently for the passengers' and general population's safety.

We consequently think Italian actual procedure for attainment and maintenance of bus driving license is insufficient and has to be improved.

ESTIMATION OF LIFE EXPECTANCY LOST DUE TO PERMANENT OCCUPATIONAL DISABILITY

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[ID 463]

We assessed the life expectancy lost resulting from cases of permanent disability by different events of occupational injuries during 1986-2000 in Taiwan. Databases of occupational permanent disability during 1986-2000 were retrieved from the Bureau of Labor Insurance, which were linked with the database of the national death registry to construct the survival function. Then, a Monte Carlo simulation method was used to extrapolate the survivors up to 600 months to derive the life expectancy for different injury cases with permanent disability (n=81,249). The result indicated that different events of injury showed variations of YPLL (years of potential life lost) ranged from 13.6 years to 7.4 years per case. The overall YPLL of permanent occupational disability is almost the same as that of occupational mortality, with a ratio of 1.04:1. The mortality rate for those who survive the acute care phase but suffer permanent disability is higher than that of general population with the same age-gender profile. We concluded that permanent disability resulting from occupational injuries has a significant impact on society. Our estimations can provide an empirical basis for both health policy decisions and improvements in the equity and efficiency of the workers compensation system in Taiwan.

FALLS FROM HEIGHT PREVENTION CAMPAIGN

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[ID 818]

1. Introduction

Falls from height are the most common cause of fatal injury worldwide. An average of 14% of all mortal work related accidents during ------ in SURATEP were due to falls from height in all industry sectors although differences in the level of incidence vary considerably

The most frequently asked question is how could they have been avoided? Which factors contribute to the unsafe act? By performing an analysis on cases known it could be seen that several of the workers involved in an accident had been properly trained, however they had performed unsafe acts, which produced irreversible injuries and/or death in many cases.

2. Objectives

To develop a safety campaign oriented towards reinforcing key concepts of the risk intervention strategy for falls from height.

3. Methodology

The campaign was directed towards: Directives, Occupational Health & Safety Staff, and workers from warehouses and other exposed workers.

An analysis of causes was performed in the cases from the last two years . Evidence showed that many of the workers involved that had received training on safety procedures for work in height occasionally omitted the use of EPP and/or performed unsafe acts.

The campaign was oriented towards detecting the "Truth moments" prior to the accident. The following was observed:

o The worker requests the work permit and goes to the warehouse to get the PPE.
o The worker begins to execute the job in the desired location.
o The supervisor visits the worker at the job location.

For these three "Moments" the following reinforcements were designed:

o Information posters for the storage of PPE in warehouses.
o A foldable guide, which the worker can review before beginning the job in the desired location.
o Rot folio with information so that the supervisor can review safety procedures with the worker at any time.
o Internet presentation which contains a questionnaire in order to build consciousness and provide general information on the different aspects of prevention of falls from height

4. Conclusions

Risk intervention must be carried out using structured strategies based on proven risk management models and using the adequate tools for the needs of each company and economic activity.

The success of a campaign is based on its design and the analysis of the problem, which requires addressing a well-structured intervention model.

The preliminary analysis concluded that the worker requires more information on risks and permanent reinforcement on the adoption of safe work procedures and of the consequences of these in order to raise the risk consciousness level.

THE COST-EFFECTIVENESS OF SYSTEMATIC OCCUPATIONAL HEALTH AND SAFETY MANAGEMENT

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[ID 942]

During the last decade Australia has seen business engage in widespread cost-cutting of occupational health services. Many businesses that at the beginning of the 1990s maintained their own occupational health service began the new millennium outsourcing these services on an adhoc basis. This trend has continued despite the fact that work related musculoskel-

etal disorders (WRMSD) remain a significant cost to business, reflected in high insurance premiums.
When questioned business spokepeople comment that occupational health services do not contribute the "bottomline". That is occupational health services are seen as a business expense, a net cost.
To challenge this view it will be necessary to demonstrate the value of occupational health management services to business. This in turn will require new tools for occupational health professionals. Tools that capture not just the costs of occupational health services and their benefit to workers but capture too any benefits that relate to the business as a whole, to the "bottomline".
In 2004 Oxenburgh et al were able to show a positive cost-benefit to a business of rehabilitating a single worker with a WRMSD through the use of the Productivity Assessment Tool devised by Oxenburgh.
This paper uses a case study approach to apply the Productivity Assessment Tool to calculate the cost-benefit of occupational health services. Individual components of occupational health systems are also analysed to establish which components contribute the most to the cost effectiveness of the whole system.
Australia has also seen a trend towards hire of casual labour for individual jobs. In this situation workers are covered against injury by their employer, termed a labour-hire company; but work under the occupational health and safety system provided by their host employer. Thus their risk of injury is controlled by the host employer. The case of one such labour-hire company which moved against the trends to establish a comprehensive occupational health management system is explored.

ZERO TRAFFIC ACCIDENTS MODEL

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[ID 1167]

Introduction:
Traffic accidents are harmful to a company's progress and a country's economy as well as the quality of life of its citizens due to the death or injury of the economically active population. The consequences in terms of victims, handicapped, assistance costs and expenses in general, represent at least 1 % of the GNP (Gross National Product) of any country.
"Traffic accidents can be measured in terms of anguish, physical pain and Gross national product".
SURATEP, convinced that these accidents are avoidable, offers a prevention and guidance model in order to take measures, which are efficient in terms of cost/benefit.
METHODOLOGY:
This intervention proposal is based on the PDCA cycle (Plan, Do, Check, Act) Continuous improvement method. This method is made up of four components:
· Plan: Performing an administrative diagnostic and risk evaluation. Characterizing accidents. Cost Analysis. Creating traffic accident prevention policies. Creating an action plan.
· Implementation: Training and developing skills in people (leadership training for drivers). Adjusting the selection and training process for drivers and contractors. Defining traffic safety standards. Performing maintenance on vehicles. Observing general behavior and evaluating performance.
· Evaluation and verification: To evaluate the accomplishment of goals and to attend accidents (before, during, after). To adjust the action plan.
· Revision done by management: To review indicators and improve the process. To visit the work sites. To generate commitment to continuous improvement.
Results:
Among the results we expect:
The reduction of traffic accidents, sequels and death.
The Reduction of days lost due to traffic accidents and the replacement of personnel.
The Improvement of the quality of life.
The Establishment of a safety culture and health and safety promotion in companies and citizens.
The Reduction of operation costs and the improvement of competitivity in the global market, among other things.

NEEDLESTICK-PREVENTION DEVICES IN THE ITALIAN HEALTH CARE SETTING: THE SIROH EXPERIENCE

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[ID 1258]

Needlestick-prevention devices (NPD) were recently introduced on a wider scale in Europe and data are still scarce. Thirty-five SIROH hospitals were asked to provide the following information: NPD adoption, year of introduction, involved units, replacement of conventional devices (CD), users training. The number of devices used annually (NPD and CD, by type of device), was used as denominator to calculate needlestick rates.
Twenty-one of 25 hospitals adopted NPD from 2001-2002 onwards. Of 17 providing complete data, 12 implemented > 2 NPD, most frequently IV catheter, vacuum-tube phlebotomy needle (VTPN) and lancet (8 each), followed by blood gas syringe and butterfly-type needle (3 each). One third of NPD were adopted in specific units only (infectious diseases, emergency department, home care) based on a cost-risk assessment. In 64% of cases CD were completely replaced by NPD. Intensive theoretical and practical training was carried out in all hospitals before implementation, in small groups (10-12 workers); every NPD injury was investigated, and training was repeated generally after 6-12 months.
The number of injuries in these 17 hospitals showed a decrease after NPD implementation, mainly regarding hollow-bore needle injuries. Data on >1,500,000 NPD were collected. NPD-specific injury rates were significantly lower than the corresponding CD rates, but both showed a downward trend after NPD introduction. IV catheter CD rates were 19.2/100,000 in 2002, 15.1 in 2003 and 14.2 in 2004; corresponding NPD rates were 3.6, 1.9 and 1.4 (8 hospitals). A similar trend was observed for VTPN butterfly-type. Of note, a slight upward trend was observed in the first hospital to introduce NPD (2000) in 2003-2004.
Though potential reporting bias should be considered, these results highlight the combined impact of education and NPD implementation in decreasing needlestick rates, and the need to reinforce correct use and activation of NPD through repeated training, also considering the high turnover of nursing staff in Italy.
*Other authors: Picelli G, Aiello A, Piccini G, Pan A, Crotti MT, Micheloni G, Cardinale F, Perosino M, Cinti G, Torri P, Liboni D, Zanardo E, Raineri G, Bisco A, Zanon A, Ascani A, Rellecati P - Ministero della Salute-AIDS Project and Ricerca Corrente IRCCS

STATE POLITICAL ECONOMY AND OCCUPATIONAL FATALITY RATES IN THE UNITED STATES

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[ID 1441]

Occupational injury rates vary between countries and among subareas within them. Differences in regional economies explain some of this variation, but the effects of other attributes of geopolitical areas are largely unknown. We investigated the extent to which the political economy of US states and the relative power of labor predict rates of fatal occupational injury, hypothesizing that injuries are more frequent in states where the balance of power favors capital over labor and government. States were ranked according to six variables ("right to work" laws limiting union organizing; union membership rates; grievance rates for unfair labor practices; government debt; unemployment, and social welfare payments) and dichotomized to identify the10 states least favorable to labor by each measure. Region was also coded to identify states located in the south. Data on fatal occupational injuries were obtained from the NTOF system of the

National Institute for Occupational Safety and Health, and population data were obtained from the census. Poisson regression was used to estimate the relative change in the rate of injury associated with each of the state-level predictors. We report results for the year 1995, the most recent for which data were available. In models controlling for industry, right to work laws (RR 1.2, 95% CI 1.1-11.4), high grievance rates (RR 1.5, 95% CI 1.4-19.5), high unemployment (RR 1.1, 95% CI 1.0-8.8), low social welfare payments (RR 1.1, 95% CI 1.0-8.4)and the southern region (RR 1.3, 95% CI 1.3-13.2) were associated with higher occupational injury rates. After controlling for these factors, low union membership (RR 0.8, 95% CI 0.8-5.5) and high government debt (RR 0.7, 95% CI 0.6-4.2) were associated with lower injury rates. The effects of state policy and the relative power of labor on occupational injury rates merit further investigation using data for longer time periods.

OCCUPATIONAL INJURY AND DISEASES AMONG HEALTH CARE WORKERS OF A LARGE ORGANISATION IN SOUTH AFRICA

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[ID 1923]

Background: Work related injury and disease among health care personnel are of growing concern worldwide. Most injuries in the workplace are preventable and injury surveillance data should be used to identify priorities for intervention. Occupational injury and disease data collected over the last four years in a large health organisation comprising nearly 4000 personnel within laboratory services and institutes of communicable disease and occupational health have been analysed by category of worker, location and type of incident.
Results: Over 200 injuries and diseases on duty were reported annually during the four years reviewed. The overall annual injury rate of about 60 per 1000 employees or 6 per 200 000 person hours is consistent with international rates for health care workers. The top three types of injuries reported are cuts, eye and body splashes, and needle stick injuries, followed by falls/strains, crushes/blunt objects and traffic accidents. Laboratory personnel have the highest risk of injury. Occupationally acquired tuberculosis is reported by approximately 4 per 1000 employees annually.
Discussion and Conclusion: The previous surveillance system indicated only overall organisational performance. The introduction of detailed analysis per organisational region and personnel category has identified organisational and job category priorities for comprehensive systems and training programmes. Surveillance of injury and disease at work is a useful tool for intervention because it provides information on differing performance and priorities within a complex organisation.

IMPROVEMENT IN OCCUPATIONAL SAFETY AND HEALTH PERFORMANCE - INTERVENTION EFFECTIVENESS - CASE STUDY

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[ID 202]

Introduction : Occupational injuries represent a serious health concern for workers throughout the world. Indian Railways is the world's largest railway system under single management with about 1.55 million employees at various location including workshops. Apparently chances of injuries are more in the railway workshops as the workers here are associated with manual work as well as working with various types of power driven and automatic machines and different chemicals. On this issue, a study has been undertaken in one of the workshops of Indian Railways since January, 1996.
Aims and objectives: The aims and objectives of the three phases of this study were: (i) to ascertain the intensity of occupational injury and its probable causes, (ii) intervention (iii) assessment of improvements and further planning
Materials and method: Reports of accident investigation and data on the reportable injury on duty cases during 1991-1995 were collected and analyzed. Shop floors of various workplaces were inspected. Root cause analyses were done. Various aspects like knowledge, attitude and work-practice of the workers and the supervisors towards safety were studied. Different intervention methods during 1996 –2000 are noted. Data on injuries were again collected during 2000 – 2004 to assess the improvement, if any.
Discussion and results: Initial data showed Average Incidence Rate of reportable injuries was about 28 but the average mandays loss was alarming (47 days). Considering the other losses also and identifying the lack of proper occupational safety and health measures as the most important causal factor, OSH measures were improved during 1996-2000, which results in remarkable reduction of Average Incidence Rate to 15 and average mandays loss to 24 days.
Conclusion : Improvement of workplaces and promotion of OSH helped to improve safety and productivity and reduce injuries. Further improvement is expected if OSH performance is sustained and continued.

ALLERGOLOGY AND IMMUNOTOXICOLOGY

OCCUPATIONAL ALLERGY IN HEALTH CARE WORKERS

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[ID 273]

Background: Health care workers are usually exposed to severaloccupational hazards.
Objectives: The aim of this study was to determine the prevalence of contact sensitization to occupational haptens and latex hypersensitivity among health care workers at the University General Hospital in Uruguay.
Methods: 1025 health care workers were asked to fill a questionnaire that covered demographics, job category, occupational and domestic exposures, latex glove use and allergic and atopic symptoms. Patch testing with the International Standard Series as well as the European Series for rubber, antimicrobials, and antiseptics, and/or prick testing with commercial latex and latex glove extract, latex glove use test and latex specific IgE testing was performed in 644 workers.
Results: ·32% of the subjects reported dermatitis symptoms, 24% reported rhinitis, 11% urticaria-like rashes and 8% asthmatic symptoms. Contact dermatitis (past or present) occurred in 61% of the tested subjects. The most common allergens were nickel, thiuram mix, cobalt chloride, fragrance mix and balsam of Peru. 18.5% of workers reported symptoms when using latex gloves and contact urticaria to latex was present in 6.7 % of the subjects. Sensitization to latex was correlated with the presence of atopy and use of latex gloves for several hours a day.
Conclusions: Contact dermatitis and natural rubber latex hypersensitivity are significant occupational problem among health care workers. The need is stressed for appropriate preventive measures to prevent the onset of contact dermatitis and every effort should be made to minimize and regulate latex exposure.

CYTOTOXIC ACTIVITY, ANXIETY AND OCCUPATIONAL STRESS OF WOMEN WORKING IN A UNIVERSITY

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[ID 764]

The study investigates the effects of stress and anxiety on the immune response of 58 women with different working activities in a university. The first group(A), with mean age 28 years, was composed of young doctors and post-graduated students without a stable employment. The mean age of the other 4 groups was 44 years: group B worked in libraries, C in offices in contact with students, D in offices as secretaries, and E in a museum (referent group). The occupational stress was monitored by a test with 10 items of the American Institute of Stress; temporary (state) anxiety was determined by STAI I, and trate anxiety (as tendency of the personality) by STAI II. Blood samples were collected for determining cytotoxic activity (vs human erythroleukemia cells) and lymphocyte subsets CD45+, CD45+-CD3+, CD45+-CD3+-CD4+, CD45+-CD3+-CD8+,CD45+-CD3--CD8+, CD3+-CD16+-56+ and CD3+-CD19+.
The group A (young women without a stable employment) showed low job stress and blood NK activity significantly reduced ($p<0.01$). The group C (employees in contact with students) showed significantly higher score of occupational stress ($p<0.05$) and STAI I slightly elevated.
STAI I of all the women was significantly correlated with both STAI II ($p<0.001$) and occupational stress ($p<0.05$). Moreover, STAI I was positively correlated with the NK CD3+-CD16+-56+ lymphocytes and negatively with T CD45+-CD3+ lymphocytes ($p<0.01$). Cytotoxic activity/ml of blood and cytotoxic activity/CD45+-CD16+-56+ lymphocytes were both negatively correlated with STAI II ($p<0.001$); however, STAI I was negatively correlated only with cytotoxic activity/CD45+-CD16+-56+ lymphocytes.
The results of this study show that temporary state anxiety (STAI I) mobilizes NK cells with reduced cytotoxic activity. Moreover, stress slightly increases state (temporary) anxiety without altering trate anxiety (linked to the personality); it may be also suggested that employment instability may be related with low blood cytotoxic activity and high trate anxiety.

ALTERATIONS OF FAS AND FAS-RELATED MOLECULES IN PATIENTS WITH SILICOSIS

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[ID 2266]

Silicosis patients suffer not only from respiratory disorders but also from autoimmune diseases. To clarify the mechanisms involved in the dysregulation of autoimmunity found in silicosis patients, we have been focusing on Fas and Fas-related molecules in the Fas-mediated apoptotic pathway, since Fas is one of the most important molecules regulating autoimmunity involving T cells. Our findings showed that silicosis patients exhibited elevated serum soluble Fas levels, an increased relative expression of the soluble fas and dcr3 genes in peripheral blood mononuclear cells, high levels if other variant messages of the fas transcript, relatively decreased expression of several physiological inhibitors (survivin and toso), and dominancy of lower membrane Fas expressers in lymphocytes, which transcribe soluble fas dominantly, in comparison with healthy donors. These findings are consistent with known features regarding immunological factors such as serum immunogulobulin G levels and the titer of anti-nuclear autoantibodies in silicosis. In addition, anti-caspase 8 autoantibody and anti-Fas autoantibody were detected in serum from silicosis patients, and a functional assay showed that anti-Fas antibody stimulated Fas-mediated apoptosis. We hypothesize that there are two subpopulations of silicosis lymphocytes. One is a long-term fraction that includes self-recognizing clones showing lower levels of membrane Fas and inhibition of Fas/Fas ligand binding in extracellular spaces. The other is a fraction that exhibits apoptosis caused by silica/silicates, is recruited from bone marrow, shows higher levels of membrane Fas, and is sensitive to anti-Fas autoantibody. Further investigation should be performed to confirm the effects of silica/silicates on the human immune system

A CRITERIA DOCUMENT FOR FUNGAL SPORES

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[ID 720]

Introduction: Fungal spores are ubiquitous in the environment and healthy people are well adapted to cope with inhaled spores. However, in workplaces where mouldy materials are handled exposure levels are much higher than outdoor levels. Attacks of toxic alveolitis are relatively common in such occupations, which occur after episodes with high exposures. In common indoor environments symptoms as Sick Building Syndrome are ascribed to fungi although exposure levels are much lower. The Nordic Expert Group for Criteria Documentation of Health Risk from Chemicals therefore initiated a review of the scientific evidence for health effects of exposure to fungal spores in working populations.
Methods: A literature search of in vitro, in vivo, clinical, and epidemiological studies of fungal spores was conducted and further references were obtained from reviewed papers.
Results: The role of specific fungi in hypersensitivity pneumonitis has been clearly demonstrated by provocation testing of individuals from many occupations. In vitro and in vivo studies have also demonstrated differences between fungal species. In epidemiological studies exposure-response associations have been observed with many different respiratory outcomes and lowest observed effect levels ranging from 105 to109 spores/m3. In most of these studies fungal spores are only one of several possible causal agents and spores from different species were not identified. In experimental studies non-allergic responses dominated but allergic responses were also observed, mainly to viable spores and hyphae. In epidemiological studies mainly non-allergic outcomes have been studied. Few epidemiological studies of common indoor environments have been found but most did not find associations with respiratory outcomes. This is in agreement with a challenge study of individuals with building related disease where a not observed effect level of to104 spores/m3 was found.
Conclusions: The review will be completed at the time of the conference and the final conclusions will be presented.

DOES BIOLOGICAL PEST CONTROL POSE A RISK TO HUMAN HEALTH?

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[ID 922]

In recent years different biological methods of pest control in greenhouses including bacteria or fungi acting as insecticides or predatory animals, mites, bugs, nematodes, and insects have been introduced. These "green" methods have been approved for organic cultures and are therefore widespread.

To investigate the impact on the exposed workers a series of investigations were initiated, especially concerning inflammatory respiratory diseases. Solitary cases of allergic disorders caused by mites have been documented.

The study was a three-year follow up of workers in 31 Danish ornament flower enterprises. 579 persons participated covering 1054 person-years with annual examinations of symptoms, prick test, lung function, bronchial reactivity as well as blood tests for allergy (IgE and histamine release test) towards a series of microbiological pesticides (Bacillus thuringiensis, Verticillium lecanii, and Trichoderma harzianii), mites (Amblyseius cucumeris, Phytoseiulus persimilis, and Hypoaspis miles), and the predatory wasp (Aphidius colemanii). In the cohort the percentage of persons exposed to the different agents varied between 18 and 73% while between 2 and 11% handled them regularly.

The prevalences of positive IgE against the agents were 38% for Bacillus thuringiensis, 27% for Verticillium lecanii, and 3.8% for Trichoderma harzianii, 5.6% for Amblyseius cucumeris, 2.6% for Phytoseiulus persimilis, 2.9% for Hypoaspis miles, and 4.1% for Aphidius colemani. The observed sensitizations did not significantly correlate to the exposure estimates; in particular, no increased prevalence was seen in the persons with the highest exposure.

The prevalence of asthma was 6.6% but no consistent relations between the prevalence of symptoms, IgEs, and the exposure estimates were seen. The rates of symptoms decreased slightly during follow up and preliminary analyses of the incidence rates did not show clear cut effects, either.

The use of biological pest control poses some potential health risks but on a population scale the effects on occupationally exposed persons seem to be limited.

INTRA- AND EXTRACELLULAR CHEMILUMINECENCE ACTIVITY IN PERIPHERAL NEUTROPHILS FROM WORKERS EXPOSED TO LOW FREQUENCY ELECTROMAGNETIC FIELDS.

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[ID 1168]

Free radicals have been reported to have a role in interaction of extremely low frequency electromagnetic fields (ELF) with biological systems. Neutrophils (PMNs) are, in vivo, the main source of free radicals and other reactive oxygen species (ROS) and are a useful model to study cell activation and to evaluate the interference of electromagnetic fields with signaling pathways. The aim of this study was to evaluate the effects of chronic, occupational ELF exposure, on compartmental PMN release of ROS by means of intra- and extracellular chemiluminescence (CL) assays. These were performed on peripheral isolated PMNs, both resting and stimulated with phorbol myristate acetate (PMA) or zymosan osponized with autologous serum (OZA). Luminol-amplified CL is related to myeloperoxidase-H2O2 system. The detection protocol for extracellular CL response uses azide, a low molecular weight myeloperoxidase inhibitor, which accesses intracellular compartments, and an azide-insensitive peroxidase (horseradish peroxidase, HRP), which cannot gain access to intracellular compartments. Azide inhibits myeloperoxidase and total CL, but HRP regenerates extracellular response. The method for intracellular CL response evaluation uses superoxide dismutase and catalase. In presence of these molecules, the extracellular O2- and H2O2 are scavenged, thus allowing measurement of intracellular response alone. Total basal CL was higher in exposed subjects than in controls. Compartmental studies showed that the basal intracellular CL emission increased in ELF-exposed subjects, whereas the extracellular one did not differ, when compared with controls. PMA and OZA activated PMNs emitted total CL significantly lower in ELF-exposed subjects. PMA- and OZA-stimulated intracellular CL did not show differences between the two groups of subjects. On the contrary, extracellular emission from PMA- and OZA-stimulated isolated PMNs was lower in ELF-exposed subjects. Finally, we cannot characterize the mechanism of interaction between ELF and PMNs by this experimental model, however compartmental measurements allow us to better describe the activity of ELF-exposed subject phagocytes.

COMPARATION OF THE EFFECTS OF 30 METAL SALTS ON LYMPHOCYTE PROLIFERATION AND CYTOKINE RELEASE

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[ID 781]

Purpose of this study was to compare the "in vitro" immune response of human peripheral blood mononuclear cells (PBMC) to different doses of 30 selected metal compounds.

Spontaneous and phytohemagglutinin (PHA) proliferation of human PBMC and release of TNF-alfa, IFN-gamma, IL-2, and IL-5 from peripheral blood mononuclear cells (PBMC) were determined at concentration ranging from 10-4 M to 10-9 M.

INIBITORY EFFECTS. The inhibitory effects of the Pt group (Pt, Pd, Rh) elements on the spontaneous and PHA stimulated immune response were in the following order: ammonium hexachloro-Pd(IV)- or -Pt(IV) compounds > ammonium tetrachloro-Pd(II)- or Pt(II) compounds > Na2Pt(IV)I6 and CisPt > Pd(II) or Pt(II) chloride compounds. Hexachloro-Rh(IV) and RhCl3 exerted a similar action.

The inhibitory effect of As salts on the spontaneous and PHA stimulated immune response were in the following order: momo-methyl-arsinous acic (MMAsIII) > sodium arsenite (As(III)) > tetraphenyl arsonium chloride (As(V)) > sodium arsenate (As(V)) > potassium- and sodium-esa-fluorum arsenate (As(V)) > dimethyl arsinic acid (DMAsV), while monomethyl-arsonic-acid (MMAsV) and arsenobetaine did not exert effects.

Ti oxalate(more than titanocene and Ti ascorbate), K2TeO3(IV) (more than K2TeO4 (VI)), Ni sulphate, Cd sulphate and sodium metavanadate significanly inhibited the PHA stimulated immune response, while Ti dioxide did not exert immune effects.

STIMULATORY EFFECTS. 10-4 M and 10-5 M Zn sulphate and 10-5 M Se sulphate as well as 10-7 M and/or 10-8 sodium metavanadate, MMAsIII, sodium arsenite (As(III)) and DMAs(V) exerted a stimulatory effect on the PHA stimulated response. These metals, with the exception of Zn sulphate, showed an immune response with the phenomenon of "hormesis" (inhibitory at low doses and stimulatory at high dose). The stimulatory effect may be linked either to useful effects (e.g. to the essentiality of the element) or to a toxic action.

DEVELOPMENT OF A MURINE MODEL TO TEST FOR RESPIRATORY SENSITIZATION POTENTIALS OF CHEMICAL ALLERGENS.RESPIRATORY AND IMMUNOLOGICAL CHANGES.

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[ID 332]

Occupational asthma caused by low molecular weight chemicals is an increasing problem. There is no good model for predicting their potential to cause asthma. Based on the local lymph node assay procudere we attempt to develope model for testing potentials of chemicals to cause respiratory sensitizations. Our previous studies have shown clear evidence that dermal application of toluene-2,4-diisocyanate (TDI), a known respiratory sensitizer, followed by intranasal instillation, in mice can cause: 1)Early ventilatory changes (<1h), 2)airway hyperreactivity (AHR), 3)airway inflam-

mation. Here we present farther analyses of respiratory and immunological changes using a modifications of protocol that in general is composed of two dermal applications and intranasal challenge. Our studies further confirm clear respiratory changes in mice exposed to TDI. These changes are more evident after multiple intranasal instillations. Also evident are immunological changes in respect to IgE serum levels and auricular lymph node lymphocyte subpopulations. However, there is no clear development of the T cell response toward Th2 cytokine production even using multiple TDI challanges that cause increased eosinophil influx into the lungs and much higher then after 1 intranasal challange serum IgE levels. Our model can be useful in assessing potentials of chemicals to cause respiratory changes.During its development we do not have evidence that respiratory changes can be related to clear cut development of Th2 profile of cytokines in local lymph nodes thus, other markers need to be looked for to determine early changes leading to respiratory sensitization.

DOES THE USE OF BIOFUELS AFFECT THE PREVALENCE OF RESPIRATORY SYMPTOMS AMONG DANISH HEAT- AND POWER PLAN WORKERS?

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[ID 1731]

Background: In Denmark, the use of biofuels is increasing.
In an ongoing study among Danish heat- and power plant workers the relation between biomaterial and respiratory impairment is investigated.
Aim: To explore the prevalence of asthma and respiratory symptoms and to estimate concentrations of moulds, endotoxin, and dust among employees on 11 conventional plants, 42 plants using wood chips, and 30 plants using straw.
Methods: Respiratory symptoms were revealed by questionnaire among 138 workers using wood chips (chip workers), 94 using straw (straw workers), and 107 workers using conventional fuel (control workers). For straw workers and controls, inhalable dust for gravimetric analysis, moulds (cfu) and endotoxin analysis (n=160) was sampled using GSP samplers. For chip workers and controls (n=118), moulds (cfu) were measured using a biap-slitsampler. For chip workers and controls, personal total dust measurements, (n=64) were performed with Millipore cassettes.
Results: No difference between gender (96% male) smoking (36%) and age (mean 47 year) was seen in the 3 groups.
The prevalence of toxic alveolitis symptoms, nasal symptoms, and coughing were equal in the 3 groups. Among non-smokers, the prevalence of asthma symptoms was increased for straw workers (14%) compared to control workers (3%), where for smokers no differences were found. Mould concentrations were higher in wood chip plants (median 643 cfu/m3, range 77-> 9450) compared to conventional plants (median 217 cfu/m3, range 57->9450), and in straw plants (median 4477 cfu/m3, range 78-83787) compared to conventional plants (median 113 cfu/m3, range 0-713).The endotoxin level was substantial higher for straw workers (median 129 EU/m3, range 7-8002) compared to control workers (median 8 EU/m3, range 0 – 126).
No difference in total dust (median 0.11mg/m3, range 0.01-1.44) and inhalable dust levels (median 0.35mg/m3, range 0.01-9.39) was found.
Conclusion: The prevalence of asthma symptoms was increased among non-smoking straw workers. No significant differences in prevalence of other respiratory symptoms were observed. Exposure to bioaerosols was substantially increased in plants using biofuels.

BRONCHIAL HYPERRESPONSIVENESS IN EXPOSED AND UNEXPOSED WORKERS

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[ID 780]

Aim of the study. To evaluate the prevalence and severity of bronchial hyperresponsiveness (BHR), as well as its relation to atopy and daily smoking in exposed and unexposed workers. Methods. We performed a cross-sectional study including 255 subjects (115 males and 140 females, aged 21-56), 192 “dusty occupation” workers (67 textile workers, 63 herbal tea processors, and 62 cleaners) and 63 unexposed controls (office workers). Evaluation of exposed and unexposed workers included completion of a questionnaire, skin prick tests to common aeroallergens, spirometry, and histamine challenge. Results. The highest BHR prevalence was found in textile workers, followed by herbal tea processors, cleaners, and office workers (20.9%, 19.2%, 16.7%, and 12.8%, respectively). The highest prevalence of severe to moderate BHR (PC20 < 1 mg/ml) and mild BHR (PC20 = 1 - 4 mg/ml) was detected in textile workers (4.4% and 7.4%, respectively), while the highest frequency of borderline BHR (PC20 > 4 mg/ml) was found in cleaners (9.6%). The highest BHR severity was detected in textile workers (mean PC20 = 3.91 ± 2.88 mg/ml) and the lowest one in office workers (mean PC20 = 5.75 ± 2.49 mg/ml). We found significant association between BHR and atopy in textile workers ($P < 0.01$), herbal tea processors ($P < 0.01$), and cleaners ($P < 0.05$), while in office workers the same relation just missed significance ($P = 0.07$). Association between BHR and daily smoking was significant in exposed workers ($P < 0.05$). Conclusion. We observed higher BHR prevalence and severity in exposed workers, particularly in atopics and daily smokers.

UMBILICAL CORD HAEMATOPOIETIC STEM CELL MODEL AS POTENTIAL HUMAN TRANSFORMATION ASSAY FOR IMMUNOTOXICITY AND CARCINOGENESIS OF METAL COMPOUNDS

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[ID 884]

Mounting awareness of the inherent toxicity of many metal compounds, together with their widespread environmental incidence, have raised increasing concerns relating to plausible human health hazards, in particular immunetoxicity and cancer risks. The attention of many international agencies and organizations is focused on the environmental chemicals still not fully understood in term of toxicity and carcinogenicity potential. Despite sound progress in the comprehension of carcinogenic and immunotoxic mechanisms, firm insight of metal toxic activity is still limited, mainly due to the fact that:

- human epidemiological studies most often do not allow for unequivocal conclusions regarding carcinogenicity;
- results from animal in vitro and in vivo bioassays remain flawed by the inconvenience of species-to-species extrapolation;
- in vitro genotoxicity tests generally exhibit excellent predictivity for DNA-reactive chemical carcinogens, but generally fail to identify non-genotoxic carcinogens.

Accordingly, new in vitro models for carcinogenicity, based on human cells, have to be developed in order to better understand the mechanisms of cell transformation and carcinogenesis induced by metal compounds.
Increasing evidence has been gathered showing that many tumors contain cells with characteristics of stem cells and the expression of stem-cell markers could indicate that the cell of origin in most cancers is in a non-differentiated state, i.e. a toti-potent or multi-potent, stem cell lineage. Moreover, it has been demonstrated that human haematopoietic CD34+ progenitor cells are highly sensitive to cytogenetic damage. Therefore, Stem Cells can be utilized as a sensitive and specific model for the study of carcinogenic potential of environmental hazards including metal compounds.
Our experiences on metal immunotoxicity, performed on PBMCs, evidenced, among critical points, the need of an experimental model, more adherent to the natural exposure, in order to better extrapolate results from in-vitro to in-vivo. The application of an assays based on differentiating stem cells is offering interesting results.

ASBESTOS AND DISEASES

ANALYSIS OF TIME-DEPENDENT VARIABLES IN A COHORT OF ASBESTOS WORKERS: RISK OF PLEURAL AND LUNG CANCERS FOR LONG LATENCY PERIODS

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[ID 1122]

Asbestos is a well recognized carcinogen. Although both duration of exposure and time since first exposure (latency) are associated with increased risk for several tumour types, only a few studies have estimated the risk after very long latency periods. In this study we have analysed a cohort of 3434 asbestos cement workers, formerly employed at the "Eternit" plant in Casale Monferrato (NW-Italy). The plant started operations in 1912 and is therefore informative in this respect. The cohort includes workers active in the plant on 1st January 1950 or hired between 1950-1984. We analysed variations of risk for asbestos-related neoplasms according to 1) time since first exposure, 2) duration of exposure, and 3) time since last exposure . Cause specific mortality was calculated for the cohort using Standardized Mortality Ratios (SMR), based on regional mortality rates. We used Poisson regression (age adjusted) to make internal comparisons within the males in the cohort (2657 subjects). The highest SMRs for lung and pleural cancer were observed in the classes of latency "30-39 years" and "40-49 years", respectively. SMRs decreased for longer periods of latency. The risk of death because of a pleural malignancy decreased with time since last of exposure. Consistent results are obtained with Poisson regression analysis. We also used linear splines, with a unique knot at category "30-39 years" for lung cancer and "40-49 years" for pleural cancer, to investigate the changes of trend. In both instances the test for change of trend were highly significant (p< 0.002). The results suggested that risk of developing pleural or lung cancer, rather than showing indefinite increase, may start to decrease when a long time has elapsed after first exposure. Should this be the case, the number of lung and pleural cancers caused by asbestos exposure predicted by currently used models could be overestimated.

Table 1 – Poisson regression. Men Rate Ratios (RR) adjusted by age and calendar period. Mortality for pleura, lung and peritoneum cancer.

		Pleura		Lung		Peritoneum	
		RR	CI 95%	RR	CI 95%	RR	CI 95%
Duration of employment							
	<1 year	0.41	0.09-1.80	0.54	0.24-1.20	0	-
	1-4 years	0.71	0.30-1.65	0.51	0.30-0.88	0.18	0.02-1.47
	5-9 years	1.07	0.52-2.19	0.76	0.49-1.19	0.68	0.20-2.26
	10-19 years	1	-	1	-	1	
	20-29 years	1.92	1.11-3.30	1.09	0.80-1.48	1.24	0.52-2.91
	30 years or more	1.79	0.88-3.63	0.78	0.50-1.21	3.34	1.36-8.20
Time since first exposure							
	<10 years	0.06	0.01-0.50	0.10	0.02-0.46	-	-
	10-19 years	0.14	0.04-0.42	0.39	0.20-0.74	-	-
	20-29 years	0.43	0.22-0.82	0.80	0.52-1.24	0.14	0.04-0.48
	30-39 years	0.56	0.33-0.93	1.32	0.93-1.88	0.54	0.24-1.19
	40-49 years	1	-	1	-	1	-
	50 years or more	0.40	0.16-0.99	0.74	0.43-1.27	1.30	0.46-3.66
Time since last exposure							
	< 2 years	3.84	1.70-8.67	1.49	0.85-2.60	3.77	1.13-12.61
	2-9 years	1.62	0.93-2.83	1.02	0.72-1.45	1.03	0.40-2.65
	10-19 years	1	-	1	-	1	-
	20-29 years	0.83	0.47-1.48	0.87	0.61-1.24	0.55	0.19-1.55
	30-39 years	0.64	0.28-1.45	0.84	0.50-1.39	1.21	0.43-3.44
	40 years or more	0.41	0.05-3.07	0.43	0.10-1.77	1.10	0.14-8.75

WHAT SIZE ASBESTOS FIBERS ARE MOST IMPORTANT FOR PREDICTING HUMAN RISK OF LUNG CANCER AND ASBESTOSIS?

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[ID 1716]

key words: asbestos, lung cancer, asbestosis

Background: Epidemiologic analyses and risk assessments for asbestos have been based on defining asbestos as those fibers having a minimum length of 5 micrometers, and a 3:1 aspect ratio. This definition was never based on biologic reasoning, but rather on the limitations of the phase contract microscopy (PCM) counting method. It has been argued based on toxicological evidence that long fibers (e.g. > than 20) carry the greatest risk for lung cancer, and in the U.S. there has been a proposal to revised the current risk assessment model to give greater weight for long fibers.
Methods: The NIOSH cohort of textile workers exposed to chrysotile asbestos was updated for vital status through 2001. Filter cassettes from the original survey of the facility were re-analyzed using transmission electron microscopy (TEM). The bivariate (width and length) distribution of fiber counts were counted for samples representative of key jobs and operations in the factory. This information was used to adjust the original job exposure matrix to predict exposures for different combinations of fiber length and diameter. Life-table analyses, and Cox proportionate hazard modeling using a log-linear link were conducted to determine which combinations of size are the most predictive of the risk of lung cancer and asbestosis. Surface area was also examined as an alternative measure to fiber count.
Results: As in previous analysis, a large increase in lung cancer (SMR=1.98, 95%CI=1.68 – 2.24) and pneumoconiosis (SMR=4.81, 95%CI=3.84–5.94) mortality, which increased with exposure, was observed in this cohort. Using the traditional definition of an asbestos fiber being > 5 micrometers (mm) the slope was reduced and the goodness of fit was increased when TEM fiber estimates (β=0.05, χ2=29.5) were used rather than PCM (β=0.11, χ2=24.8). Analysis indicate that lung cancer is most strongly predicted by long (> 40 mm), and then fibers (< 0.3 mm). Thin fibers (< 0.3 mm), and all fiber lengths including very short fibers (<1.5 mm) are highly predictive of asbestosis. Using surface area did not improve the fit of the models to the data relative to using fiber counts.

THE RISK OF PLEURAL MESOTHELIOMA: A FRENCH POPULATION-BASED CASE-CONTROL STUDY (1998-2002)

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Introduction: In industrialised countries, asbestos has been widely used for decades and occupational exposure to asbestos has been identified as the most important risk factor for pleural mesothelioma. The aims of this study are to analyse the risk of mesothelioma according to occupations and industries, to estimate the attributable risk to asbestos exposure, and to research other factors (synthetic fibres, ionizing radiations, SV40 virus, previous diseases). Only results on occupational exposure are presented in this report. **Methods:** A population-based case-control study was conducted between 1998 and 2002 in 19 French districts, within the National mesothelioma surveillance program (covering 25% of the French population). This report is based on 467 cases histologically confirmed (80% males, 41-93 years old) and 868 controls matched for sex, age and district. Data were collected by trained interviewers with a standardised questionnaire, and lifetime occupational exposure was assessed by experts. Logistic regression was used to estimate odds ratios (OR) and 95% confidence intervals (CIs). **Results:** Among men, the highest risks were observed for the occupations of plumbers, pipe-fitters, sheet-metal workers, and for the industries of ship repair, asbestos products, metal products, and construction. A significant dose-response relationship was found between cumulative occupational asbestos exposure and pleural mesothelioma, even for the lowest exposure category >0-0.07 fibres/ml-years (OR 2.8, 95% CI 1.7-4.7). The attributable risk for occupational asbestos exposure was 83.5% (95% CI 77.2-89.8%) for men and 41.9%

(95% CI 29.8-54.0%) for women. **Conclusion:** This report enabled us to classify occupations and industries according to the risk of pleural mesothelioma; it provides guidance for preventive actions among specific groups of workers, and allows a continuous evaluation of their efficiency. The analyses are ongoing with a focus on non-occupational exposed subjects to asbestos (women in particular).

PLEURAL MESOTHELIOMA MORTALITY IN ITALY. PREDICTIONS BY AN AGE-PERIOD-COHORT MODEL AND BY THE ASBESTOS CONSUMPTION

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[ID 609]

Italy was the second main asbestos producing country in Europe, after the Soviet Union, until the end of 1980s and raw asbestos importations were relevant until 1992. More than 3,700,000 tons of raw asbestos have been producted between 1945 and 1992; the consumption peak has been reached in the period 1976-1979 (more than 160,000 tons/year). The Italian pattern of asbestos consumption shows a mean delay of about ten years with respect to those experienced by the USA, Australia, the UK and the Nordic countries. Measures aimed to reduce the exposure were introduced in the mid-1970 only in some workplace; in 1986 limitations to the use of crocidolite were promulgated and in 1992 asbestos was definitively banned.

We have used primary pleural cancer mortality figures (1970-1999) to predict mortality from mesothelioma in Italy in the next 30 years by age-cohort-period models and by a model based on asbestos consumption figures taking into account in the analysis the pleural cancer/mesothelioma ratio and mesothelioma misdiagnosis in the past.

Estimated risks of birth cohorts born after 1945 decrease less quickly in Italy than in other western countries. The findings provide a peak with about 800 mesothelioma males annual deaths in the period 2012-2024. The concordance between age-cohort models findings and asbestos consumption models findings appears to be significant. Decrease of deaths currently observed in some western countries (United States and nordic countries) is not in act in Italy in accordance with the extent and the delay of the national asbestos consumption curve.

The legacy of massive asbestos use in Italy is particurarly severe for the consequences of occupational exposures in the past and for the possible current presence of asbestos in the workplaces and in the environment.

NON-OCCUPATIONAL CAUSES OF MESOTHELIOMA?

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[ID 426]

Malignant mesothelioma (MM) is associated with asbestos exposure. Recent
evidence has however linked disease risk also to infection with simian virus 40 (SV40), a possible contaminant of polio vaccine during 1956-63. The aim of the study was to investigate risk of MM associated with the presence of pre-diagnostic SV40 antibodies and DNA fragments.

Eighty MM cases who had donated blood to the Janus serum bank 0.4-30 years prior to diagnosis were identified by linkage to the Norwegian Cancer Registry, and 239 age and gender matched controls were selected from the study base. Data on occupation were
obtained from national censuses. Glutathion-S-Transferase (GST) capture ELISA combined with Luminex was used to detect antibodies to the major capsid protein VP1, and to the large T antigen of primate polyomaviruses SV40, BKV and JCV. Viral DNA fragments were analyzed by PCR designed to recognize the Enhancer and Tag C-terminus of SV40. Conditional logistic regression analysis was used.

High correlations between SV40 Tag, BKV and JCV indicated cross-reactivity. Risk of MM was 50 % higher in the group testing positive for SV40 VP1 (OR 1.5, 95% CI.0.89-2.53) compared to the group with negative test. DNA fragments of SV40 were not detected in the sera.

No evidence of an association between SV40 and risk of MM was seen in this study using pre-diagnostic sera. The high level of correlation between SV40 Tag, JCV and BKV may indicate that no SV40 antibody is present.

A SERUM TUMOR MARKER FOR THE DIAGNOSIS OF MESOTHELIOMA: MESOTHELIN-FAMILY PROTEINS

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[ID 1097]

Backgroud: In spite of the ban on asbestos established by the Italian law in 1992 asbestos-related mesothelioma incidence is still increasing because of the diffuse exposure in previous years, the absence of a threshold, and the long latency period.

Identification of a serum tumor marker would facilitate early diagnosis and early therapeutic intervention, and could be useful for monitoring responses to treatment. Much more controversial is its possible use in screening at-risk individuals.

We are conducting a study aiming at evaluating, in terms of efficiency and feasibility, the use of soluble mesothelin-related proteins (SMR) for the identification of at-risk population, for early diagnosis of mesothelioma and for the follow-up of affected patients. For this purpose, we design a cross-sectional study for the measurement of SMR in 30 subjects with mesothelioma, 30 with asbestosis, 30 with lung cancer, 50 with asbestos-related pleural plaques, 100 subjects never exposed to asbestos without pulmonary or pleural disease.

The measurement is performed using the Mesomark™ ELISA test by Robinson BWS and colleagues.

The recruitment is still on-going. We present the preliminary results up to october 2005.

Materials and methods: We assayed serum concentrations of soluble mesothelin-related proteins using a double determinant (sandwich) ELISA in a blinded study of serum samples from 15 patients with histologically proven mesothelioma; 135 matched healthy controls, 26 of whom had been exposed to asbestos; 27 patients with other malignant lung diseases; 33 patients with asbestosis and 33 patients with pleural plaques.

We compared the means of SMR concentrations by group of diagnosis with one-way Anova. The distribution of SMR concentrations was highly positively skewed and the data were thus log-transformed before analysis.

Results: Subjects with mesothelioma showed increased level of SMR in comparison with all groups investigated with a mean of 4.62 (sd 6.36). SMR concentrations in the serum of 33 patients with asbestosis was 0.94 (sd 0.48), followed by SMR levels in subjects with lung cancer (mean 0.89, sd 0.51); pleural plaques (mean 0.88, sd 0.34); non-exposed healthy controls (mean 0.79, sd 0.44). The differences between mesothelioma patients and others groups were statistically significant, even if the sample size was small. However there was no statistically significant difference among asbestos-exposed subjects and the reference group. In the regression model, taking into account sex and age, only the diagnosis of mesothelioma appeared to influence the SMR levels.

Discussion and conclusion: Preliminary results appear to confirm previous experiences for the use of SMR as a marker for diagnosis of malignant mesothelioma.

ASSESSMENT OF COSTS DUE TO ASBESTOS-RELATED DISEASES IN GERMANY (1999-2002)

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[ID 431]

Introduction:

Asbestos-related diseases (asbestosis, cancer of the larynx or lungs, mesothelioma) have a great economic impact, which has not been exactly described so far. In this study an assessment of direct and indirect costs of asbestos-related diseases has been performed.

Material and Methods:

Analysis of official publications of the Federal Ministry of Work and Federation of the Institutions for Statutory Accident Insurance and

Prevention from the years 1999 – 2004 [1-4].
Results:
Direct costs:
Total direct costs of recognised occupational diseases (n=13.930) and of claimed cases with asbestos exposure, but not being occupational diseases (6% of all claims for mesothelioma [n=123], 21% of lung/larynx cancer [n=1.671], 23% of asbestosis [n=1.500]) are summarized to 1.42 billions € from 1999 to 2002 (health care, rehabilitation, pensions: 1.38 billion €, administration: 0.012 billion €, prevention: 0,028 billion € including the Central Registry for Asbestos Exposed Workers: 0.02 billion €).
Indirect costs:
About 9.220 patients were calculated to be younger than 65 years. Productivity loss is assessed from 0.6 up to 0.9 billion € for mesothelioma and lung/larynx cancer only (n=4.147 persons). For asbestosis 0.7 to 1.1 billion € are assessed imprecise, because of no exactly known data of the time gap between the manifestation of disease and cessation of work because of it.
Discussion:
Total costs assessment ranges from 0.5 to 0.9 billions € /year. Uncertainty results predominantly from under-claiming and - more important - from calculation of indirect costs. Because of a constant increasing incidence of asbestos-related diseases we expect costs of 5.0 to 9.0 billions € for the next ten years.
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[4] Bundesminister für Arbeit: Unfallverhütungsbericht. Berlin (yearly)

PREVALENCE OF RADIOGRAPHIC ASBESTOS-RELATED DISEASES AMONG CONSTRUCTION WORKERS IN FUKUI, JAPAN
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Introduction
Asbestos exposure among construction workers has been occupational risk for developing asbestos-related pulmonary diseases. We aimed to assess prevalence of radiographic asbestos-related pulmonary diseases among construction workers in Fukui, Japan.
Subjects and Methods
A medical screening program using chest radiograph was done during 6 to 10 September 2004, and over 600 male subjects participated in it. Most of them were self-employed homebuilders who usually build wooden houses. Chest radiograph was taken by high-kilovoltage technique using a mobile chest radiograph bus. Chest radiograph was assessed by occupational physician for assessment of asbestos-related pulmonary diseases using ILO 2000 Classification of Radiograph of Pneumoconioses. One of the readers was US NIOSH B-reader.
Results
Construction workers who participated in the medical check-up counted 639 during 6 to 10 September 2004. Mean age of the participants were 51.9 year-old with standard deviation of 14.3 years. Among 639 workers, five (0.78%) subjects were classified as ILO category 1/0 or higher profusion, and 49 (7.67%) subjects had either pleural plaque or diffuse pleural thickening. Among these radiographic asbestosis, at least 2 of them were CT proven asbestosis. The prevalence of small opacity profusion category 1 or more was higher in the individuals with self-reported exposure to asbestos than those without it, but the prevalence of pleural abnormalities did not differ in these two groups.
Conclusion
Prevalence of radiographic asbestosis among male construction workers in Fukui, Japan was 0.78%, whereas prevalence of radiographic pleural plaque was 7.67%. We are following up whole of the workers' union member for long period to evaluate risk of malignant and non-malignant asbestos-related diseases.

REVISED ATS CRITERIA FOR DIAGNOSIS OF ASBESTOS-RELATED NONMALIGNANT DISEASE
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[ID 1546]
In 1986, the American Thoracic Society (ATS) published an authoritative set of criteria for the diagnosis of asbestos-related diseases other than cancer. In 2000, the ATS undertook to revise the criteria. These were published in the American Journal of Respiratory and Critical Care Medicine in September 2004 (170:691-715). Nonmalignant asbestos-related diseases include asbestosis, pleural thickening and its consequences, and chronic airway obstruction, which, although of small degree, may contribute to the outcome in persons with low lung function. The guidelines require that three general criteria be satisfied to make the diagnosis and require functional assessment as an integral part of the evaluation once the diagnosis is made. The criteria (and the means by which they may be satisfied) are: 1) Evidence of structural pathology consistent with an asbestos-related disease (imaging, pathology), 2) Evidence of causation by asbestos (occupational and environmental history, markers of exposure such as pleural plaques, identification or recovery of asbestos bodies), 3) Exclusion of alternative plausible causes for the findings. The revised guidelines differ from the 1986 criteria in placing more emphasis on the three primary criteria and on structural rather than functional changes, mandating functional impairment but removing it from the diagnostic criteria, updating the provisions for imaging technology, incorporating bronchoalveolar lavage as an option, and proposing guidelines for managing patients once the diagnosis is made. The 2004 criteria represent an incremental medical and scientific advance building on the firm foundation of the 1986 criteria.

NATIONAL INDICATORS FOR ASSESSING THE ASBESTOS SITUATION
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Background: National asbestos indicators may assist countries to monitor progress towards effective control and ultimate ban of asbestos. Objective: To develop national indicators for the asbestos situation of populations and apply actual data for several countries of different periods. Methods: The indicators attempt to describe the macro situation regarding asbestos by different aspects: consumption, administrative measures, disease status, and compensation. Examples of indicators for consumption are, per capita volume of current and cumulative consumption (kg/capita for most recent year and kg/capita for cumulative period), and characterization of direction of trend (increase/stable/decrease). Examples of indicators for administrative measures are occupational exposure limits (OEL) in terms of designated level (f/ml) and their known status in the literature. The status of ban on asbestos and ratification status of relevant ILO Conventions (C.139, C.162, P.155) also comprise indicators of this category. Indicators of disease status focus on availability of statistics and their numeric status on the key asbestos diseases, i.e., asbestosis, lung cancer and mesothelioma. Indicators of compensation focus on its known status in the literature. Results and Discussion: Actual macro data applied to indicators allow comparison across countries and monitoring of progress over a period within the same country. Non-availability of data for developing countries hinders the exercise but identifies areas where efforts are needed. Indicators may motivate countries lagging behind in control and ultimate ban of asbestos through the numeric and comparative expression of the national situation.

QUANTITATIVE ASSESSMENT OF THE RISK OF LUNG CANCER AND PLEURAL MESOTHELIOMA AMONG AUTOMOBILE MECHANICS IN FRANCE
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[ID 1764]
Key words : Asbestos; Risk assessment; Automobile mechanics
Objective: A quantitative estimation of the risk of lung cancer and pleural mesothelioma among automobile mechanics exposed to dust released from automobile asbestos-containing parts was performed on behalf of the French Ministry of Labour.
Methods: The population of automobile mechanics in France, according to profession and industrial sectors codes, was estimated from the data

of the 1999 census. Risks were computed for a total male population of 242,360 automobile mechanics aged from 16 to 60 year. Exposure to asbestos among these workers comes from maintenance tasks involving asbestos-containing parts produced before 1997 (date of the asbestos ban in France). Airborne asbestos concentration data available from the literature were highly variable. No data reporting the distribution of time spent for such tasks over a typical week of work were available. Therefore, different weekly exposure profiles were simulated, based on data from the 1994 French SUMER survey describing occupational exposures from a representative sample of French workers. Risk models were those used for assessing asbestos health effects by most national and international agencies. Exposure scenarios mixed different levels of exposure, periods of time, proportions of exposed workers and dates of the "natural" disappearance of the automobile fleet built before asbestos was banned in brakes and others parts.
Results: The most realistic scenario hypothesizes that all automobile mechanics were exposed to asbestos, that the exposure levels ranged from 0.06 and 0.25 fibers/liter per week for the period before 1997, and between 0.01 and 0.06 fibers/liter per week afterwards until 2010. According to this scenario, the number of lifelong cancer deaths (lung and pleura) induced by asbestos exposure in the population of mechanics active in 2003 was estimated to 604 cases due to exposure experienced before 2003 and 42 additional cases due to exposure experienced from 2003 to 2010 (based on the French death registry mortality rates, 13 486 lung cancer deaths were expected in this population).
Conclusion: Most asbestos attributable pleura and lung cancer deaths that will occur (after 2003) in this population were "unavoidable" due to previous exposure, nevertheless 42 could be prevented if asbestos was removed from existing automobiles at this moment.

QUANTIFICATION OF ASBESTOS AND OTHER MINERAL PHASE BURDEN IN NECROSCOPIC HUMAN LUNG TISSUES WITH A NEW METHOD

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Background: A large amount of studies on asbestos exposure reconstruction have been so far conducted digesting the lung tissues with appropriate reagents, separating the powder from the digestion liquid by filtration and analysing the residue by optical or electron microscopy. This analytical approach has good sensitivity but is not yet well standardized, the investigated portion is not representative of the bulk sample, the results are often characterized by lack of reproducibility and repeatability. Moreover, the numeric quantification of asbestos requires a time-consuming particle by particle analysis.
Aim: to develop a new method for the complete quantitative characterization of asbestos and other mineral phases in human lung tissue.
Methods: The new method is based on sodium hypochlorite digestion, separation and XRPD analysis. The XRPD approach needs moderate lung tissue amounts (at least 20 g of wet tissue), but allows to conduct a complete quantitative characterization of each crystalline phase in the sample giving bulk-representative results with good reproducibility, accuracy and precision. The detection limit of conventional XRPD was considerably improved by a novel instrumental setting and weight concentrations can be obtained, giving additional information to numeric ones, preferable in clinical and pathogenetic studies but probably not for the exposure reconstruction.
Results: Among the analysed autoptic lung tissues, ten samples belonged to subjects occupationally exposed to asbestos and six were collected from urban area controls. Asbestos phases were detected in none of controls and in 5 of 10 occupationally exposed subjects (those with highest exposure history) indicating that this method is suitable for the reconstruction of medium and high asbestos exposures. It has been furthermore confirmed the mineral association found in previous studies: mainly composed by quartz, talc, clay minerals, micas, Fe-Al-Ti oxides and bio-minerals such Ca-phosphates, carbonates and oxalates.

MALIGNANT PLEURAL MESOTHELIOMA AND USE OF RECYCLED JUTE SACKS

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We describe a case of mesothelioma in a woman worker employed in a factory making rice starch. The combination of the histological and immuno-histochemical characteristics (the epitheliode shape, positive calretinin and vimentin results, and negative CEA) and clinical findings (metastatic lesions of the skin and lymphonodes at the site of pleural drainage), led to a definite diagnosis of pleural mesothelioma. The evaluation of the job history and of any possible non-occupational exposure to asbestos was based on interviews to relatives and workmates. For approximately 40 years, the woman had worked in the storehouse of a factory which produced rice starch, and her job involved retrieving the jute sacks in which the rice was transported. Some of these sacks had "Asbestos" written on the outside, which meant that these were recycled sacks which had contained asbestos and were then used again for something else. The woman's job consisted of putting the empty sacks into a special machine which shook them so as to clean out the dust and left-over rice; then they were washed and the broken sections repaired. Analysis of job history was considered consistent with the diagnosis of occupational disease. Similar cases, with the risks deriving from contact with recycled sacks containing asbestos, has already been hypothesised in cases of mesothelioma in textile industry workers and in employees in commercial sectors.
This case provides further confirmation of the risk of pleural neoplasm deriving from the re-use of contaminated jute sacks, inasmuch as this practice can bring workers into contact with a significant level of asbestos fibre. It also makes us aware of the importance of careful history-taking when assessing specific aspects of a patient's work history, especially in generic occupations such as that of storesmen employed in work situations in which there was apparently no contact with asbestos.

MUSCULOSKELETAL DISORDES: CLINICAL ASPECTS

CLINICAL FINDINGS AT THE KNEE JOINT IN THE CONSTRUCTION INDUSTRY

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[ID 338]

Problem: It is well known from the construction industry that high stresses can be caused by kneeling and squatting, carrying loads over uneven surfaces, ladders and by jumps and falls.
Objective: The connection between professional activity and the stresses caused, together with individual disposition, the incidence of gonarthrosis is to be assessed on of the data from the occupational medical care.
Method: The data of the Occupational Health Service (AMD) from 1991 to 1999 (n=95,199 men) and a special investigation of the pain topography (4,640 employees - from the years 1996 to 1997) have been assessed for the current investigation.
Results: Depending on age, 7 to 27% of male construction workers suffer from knee complaints. The risk is increased for tilers (OR = 1.60; CI 1.09-2.37), installers (OR = 1.45; 1,35 – 1,56) and roofing workers (OR = 1.36 / 1,17 – 1,58). Painful movement restrictions, crepitations and patella compression pains were recorded as functionally restricting in 4.9 %. Forced positions (OR = 1.65 / 1.51-1.80) and hand-arm vibration (OR = 2.72 / 2.42 – 3.05) lead to increased risks. The highest OR reaches 1.91 for tilers, 1.56 for room fitters, and 1.30 for installers.
Overweight workers (BMI >25.0) show an OR of 1.18 (1.08 - 1.30), slightly obese 1.52 (1.35 - 1.71), medium obese 1.61 (1.28 - 2.03) and heavily obese workers 1.67 (0.99 - 2.81).
Conclusions: An increased risk of work-related damage to the knee joint seems plausible for construction work. The majority of the cases were in workers with long-term enforced kneeling or squatting positions and hand arm vibration. Overweight also represents a major independent risk factor for gonarthrosis in construction workers.

PREVALENCE OF PERISCAPULAR PAIN WITH TENDERNESS AND ANALYSES OF ASSOCIATED FACTORS

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[ID 792]

Periscapular pain is common, however, epidemiological studies are rare. Almost no studies have evaluated associated factors, let alone risk factors. Most studies have not separated shoulder pain from periscapular pain. Terms used for this condition are disparate helping to add confusion.
Baseline data from a large, multicenter, prospective cohort study were analyzed (n=920, 2 US States, 15 diverse employers). All subjects completed laptop administered questionnaires, structured interviews and two standardized physical examinations that included palpation of 6 periscapular tender points (upper trapezius, levator scapulae, rhomboid major) selected from those used by ARA for fibromyalgia. The case definition for this study was acknowledgement of “pain” on palpating at least 2 of 6 periscapular tender points with 4kg of force in addition to pain complaints in the month prior to enrollment in a periscapular or neck region other than merely the glenohumeral shoulder joint.
Prevalence of neck pain was 41.3%, with right and left periscapular pain was 27.5% and 26.9% respectively. The prevalence of having multiple tender points was 32.7% and a prevalence rate of muscle tension syndrome was 26.5%.
Multivariate factors included female gender, OR=3.36 (95% C.I., 2.20-5.14) and diabetes mellitus OR=2.54 (1.30-4.98). Age and BMI were not statistically associated. Job satisfaction was strongly associated: very satisfied OR=1.0, satisfied, OR=1.81 (1.15-2.85), neither, OR=2.31 (1.35-3.94), dissatisfied OR=3.67 (1.76-7.67) and very dissatisfied OR=11.90 (1.19-119.3). Frequency of reporting family problems bothering or irritating was much less associated, with always OR=1.88 (0.94-3.75). Job physical factors as measured by a preliminary Strain Index Score were not statistically significant.
Job satisfaction appears to be strongly related to this condition. Family problems are much less strongly associated. These findings are not dissimilar to prior reports on back pain, but are in sharp contrast with data from our study on carpal tunnel syndrome, suggesting markedly different disease mechanisms.

THE ROLE OF PHYSICAL EXAMINATION IN STUDIES OF MUSCULOSKELETAL DISORDERS: HOW ARE WE DOING?

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[ID 927]

Introduction: Physical examination is a basic diagnostic tool in clinical practice, but the role of physical examinations in epidemiological studies of musculoskeltal disorders is still questionable. The aim is to present data on pain and physical findings from the elbow region in an epidemiological study in order to discuss the role of diagnostic criteria in epidemiological studies of epicondylitis.
Method: From a large cohort of computer workers a subgroup of 1.369 participants, who reported at least moderate pain in the neck and upper extremities were invited to attend a standardized physical examination. Two independent clinical examinations were performed, one blinded and one not blinded for the medical history. Information concerning musculoskeletal symptoms was obtained by a baseline questionnaire and a similar schedule completed on the day of the examination.
Results: 242 participants reported at least moderate pain in the elbow and thereby met our criteria for being an elbow case. Among the 1369 participants the prevalence of at least mild palpation tenderness and indirect tenderness at the lateral epicondyle was 5.8%. The occurrence of physical findings increased markedly by level of pain score. Only about one half with physical findings fulfilled our pain criterion for having lateral epicondylitis. A large part with physical findings reported no pain at all in the elbow in any of the two questionnaires, 28% and 23%, respectively.
Inter-examiner reliability between blinded and not blinded examination was found to be low (kappa value (0.33-0.37).
Conclusion: Very few with at least moderate pain in the elbow region met common specific criteria for lateral epicondylitis. The occurrence of clinical findings increased markedly by level of pain score. Physical signs were commonly found in subjects with no pain complaints. No further impact was achieved if the clinical examination was not blinded to the medical history.

CURRENT ISSUES IN CASE DEFINITIONS FOR COMMON MUSCULOSKELETAL DISORDERS AMONG WORKERS IN CLINICAL PRACTICE AND RESEARCH

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[ID 1321]

There are no scientific consensus criteria for most ICD-10 (International Classification of Disease) musculoskeletal related diagnoses to be considered in workers. When looking for criteria for different musculoskeletal diagnoses one could to some extent consider the proposed criteria for surveillance and epidemiological studies. If the different musculoskeletal symptoms and signs do not completely comply with criteria for a disease we recommended to choose an ICD label that focus on the symptoms rather than the pathology. An example for non-specific neck-shoulder pain is to use the label “cervicobrachial syndrome“ M53.1 (ICD-10).
In the history of work-related musculoskeletal disorders we have used concepts that have hampered the development of valid case definition. Examples of such terms were RSI (repetitive strain disorders), CTD (cumulative trauma disorders) and OCD (occupational cervicobrachial disorders). The use or rather misuse of these terms has decreased. The main problem with these terms was that they implied a pathophysiology that could often not be proven. Besides health status, function is a parameter

to consider in case definitions especially in randomized controlled trials. The perceived disability may differ from the functional loss. There is still a debate over whether occupational risk factors do result in pathological changes in contrast to produce symptoms from pathological changes. Thus for the purpose of evaluation of work-relatedness it may also be of interest to have case-definitions based on pathological changes only.
For economical reasons case-definitions may be based on performance for example productivity during work. Valid measures of work-related utility and function may result in economic reports that includes workers quality of life as well as costs including productivity.

META-ANALYSIS OF LOW BACK PAIN STUDIES: A PROPOSAL FOR CLASSIFYING OUTCOME DEFINITIONS

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[ID 1371]

Introduction: Meta-analyses of low back pain (LBP) studies require combining data with different outcome definitions. Diverse definitions have led to different associations with potential risk factors. In the absence of a uniform definition of LBP, we undertook a Delphi consensus process to identify potentially combinable sets of outcome definitions.
Methods: We used prior work on classifying musculoskeletal disorders to develop a theoretical framework and conceptualized LBP as being measured by four outcome types: pathology, symptoms, functional limitations, and participation. We identified 55 studies with 132 outcome definitions in a preliminary literature review and created an e-mail survey in which the outcomes were grouped into initial sets within the four outcome types. In the first Delphi round experts independently rated how much they agreed that each outcome definition belonged in its assigned set using a 7-point scale. Between rounds the survey results were synthesized and outcome sets were revised based on the experts' comments. In each subsequent round experts were asked to re-rate the outcomes considering the previous rounds' responses.
Results: The initial survey included 14 outcome sets: 2 pathology, 8 symptoms, 2 functional limitations, 2 participation. After the first round there was consensus for 80% of the outcomes. Suggestions were made to drop outcomes and to split and rename outcome sets. The ratings for the second round increased by an average of 0.4 on a 7-point scale. During each round the level of agreement increased until the experts had reached consensus on 97% of the outcomes. The final survey included 21 outcomes sets (3 pathology, 13 symptoms, 2 functional limitations, 2 participation).
Conclusions: To identify homogeneous sets of outcome definitions that can potentially be combined in a meta-analysis in a research area with no uniform outcome definition a Delphi consensus process can be successfully undertaken.

CHRONIC EPICONDYLITIS: BONE SCAN, FUNCTION, WORKING ABILITY AND WORKLOAD.

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[ID 449]

Objectives. To quantitate bone metabolism in chronic epicondylitis, and compare results with clinical, pain, working ability and occupational workload measures.
Methods. Bone scans were imaged after an intravenous injection of 550 MBq of 99mTc hydroxymethane disphosphonate in 59 patients (19 males, 40 females, mean age 41 years) with chronic epicondylitis. The scans were printed on X-ray films, and evaluated using X-Rite 331 B W Transmission Densitometer. The maximal uptake of each epicondylus and the mean value of adjacent humerus were calculated and values (DM) were compared with clinical, pain, muscle strength, working ability and workload measures of patients.
Results. The DM values of involved epicondyles were 25 % (p=0.0001) and 21 % (p=0.006) higher than the opposite hand's corresponding and the same hand's healthy epicondyles, respectively. The values of males were 15 % higher than those of females. Patients unable to work had 15 % (p=0.09) lower DM values than the patients able to work. In logistic regression analysis working inability was explained in 32 % by pain under strain (p=0.001), in decrease of grip strength (p= 0.015) and pain threshold (p= 0.021). High DM category was associated with bigger grip strength (r= 0.32, p=0.01) and higher workload (r=0.42, p=0.043).
Conclusions. Increased bone scan uptake quantitated with densitometer in chronic epicondylitis is associated with better muscle function, better working ability and higher workload. The finding may be associated with overuse injury or regenerative process. Although bone scan is rarely used in the evaluation of epicondylitis it may be useful in prognostic examination of chronic cases.

VIBROTACTILE SENSE IN PATIENTS WITH DIFFERENT UPPER LIMB DISORDERS COMPARED WITH A CONTROL GROUP

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[ID 1592]

Background: Upper limb disorders (ULDs) are common as are the difficulties with regard to their specific diagnoses. According to diagnostic consensus criteria, specific diagnoses include neuropathy as well as muscular and connective tissue disorders (MCD). There is a need for valid objective diagnostic tools to reveal underlying mechanisms for specific diagnoses.
Objective: To investigate possible differences in vibration perception threshold (VPT) and tolerance to supra threshold stimulation (STS) between controls and specific diagnostic ULD patient groups with uni- and bi-lateral neuropathy and/or MCD.
Methods: In 161 ULD patients and 40 controls, the VPT of the median, ulnar, and radial nerves innervating the hand was examined by vibrometry using the method of limit. The tolerance to STS of the anterior forearm was tested in 128 of the patients and all controls.
Results: ULD patients in all diagnostic groups had significantly higher VPT ($p<0.05$) in all nerves in limbs with and without diagnoses compared with controls. Only patient groups defined with neuropathy demonstrated significant higher VPT in the limb with diagnoses compared to contra lateral without. The highest VPTs were found in the patient group with unilateral neuropathy & MCD, and for the radial nerve, VPT was significantly higher than for patients with unilateral MCD alone. These findings were confirmed by almost similar findings in STS responses.
Conclusions: ULD patients generally demonstrated increased VPT compared with controls, indicating a neurogenous component independent of specific ULD diagnose. Contra lateral significant findings in limbs without diagnoses compared with controls indicate a central neurogenous affection. Significant higher VPT values in limbs with neuropathy diagnoses compared to limbs without and not in MCD alone, may indicate peripheral sensibilization or nerve affection only in the group with a specific diagnosis of neuropathy. These findings underline the importance of specific diagnoses among ULD patients.

SOMATISATION AND ARM PAIN: A PROSPECTIVE COHORT STUDY

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[ID 1904]

Aims:
Somatisation (a tendency to feel distressed by somatic symptoms) may be a risk factor for disabling arm pain, although information on this is limited. To quantify its effects, we conducted a cohort study in working-aged patients chosen at random from the age-sex registers of five general practices in the west of England
Method:
At baseline, subjects were asked about their mental health, their work activities, and about arm pain in the past year. Those who agreed to be re-contacted (75% of respondents) were sent a follow-up questionnaire at 12 months about arm pain during the past 4 weeks - including pain lasting >14 days, causing disability, or treated with a prescription medicine. Associations with incident or persistent arm pain were explored using logistic regression.
Results:
1,202 subjects completed the second questionnaire (response rate 75%).

Over follow-up 21% of the 593 who were initially pain-free reported new arm pain, while 53% of the 609 who had arm pain initially also had symptoms at the second inquiry. Somatisation was associated with all subcategories of outcome, but particularly with persistent arm pain and with incident or persistent arm pain requiring medication. The odds of having arm pain treated by a prescribed medicine at follow-up were raised over five-fold in the worst vs. the best third of somatisation score. Among those in work, associations with physical work activities (such as typing and repetitive movements) were much weaker than for somatisation.
Conclusion:
Somatisation is a risk factor for incident and persistent arm pain. It deserves more attention as a potential confounder or effect modifier in occupational studies of musculoskeletal pain.

REPRODUCIBILITY OF AN FUNCTIONAL CAPACITY EVALUATION METHOD IN SUBJECTS WITH AND WITHOUT MUSCULOSKELETAL COMPLAINTS

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[ID 841]

Background: The Ergo-Kit® (EK®) is an Functional Capacity Evaluation (FCE) method reporting the functional physical capacity of people with or without musculoskeletal complaints, through standardized tests that reflect work-related activities. The reproducibility of the isometric and dynamic EK® lifting tests has not been assessed so far.
Objective: The reproducibility (i.e. reliability and agreement) of five EK® lifting tests in subjects with and without musculoskeletal complaints was evaluated.
Method: One group of twenty-seven subjects without musculoskeletal complaints (15 males and 12 females; mean age of 40 years old) and one group of twenty-four subjects with CLBP (10 males and 14 females, mean age of 49 years old) participated.
A within-subjects design with repeated measures was used in both subjects' groups. The group of subjects without musculoskeletal complaints was assessed on the isometric and dynamic EK® lifting tests at three times (T1, T2 and T3) by two different raters (R1 and R2) with a time interval of 4 days. The group of subjects with CLBP was assessed on the isometric and dynamic EK® lifting tests at two times (T1 and T2) by two different raters (R1 and R2) with a time interval of 3 days. Intraclass Correlation Coefficient (ICC), 95% Confidence Interval (CI) and Standard Error of Measurement (SEM) were used to express reliability and agreement.
Results: The reliability (intra- and interrater reliability) of the isometric and dynamic EK® lifting was evaluated as high (ICC means or lower bounds 95%CI range from 0.84 to 0.97) in both subjects' groups. Agreement between the raters was considered good for all five EK® lifting tests (low variation between raters and SEM ranging from 1.9 to 8.6 kg) in subjects with CLBP.
Conclusion: The reproducibility between raters of the isometric and dynamic EK® lifting tests is good in subjects with and without musculoskeletal complaints.

MUSCULOSKELETAL DISORDERS AND REHABILITATION

PREDICTORS OF CEASING EMPLOYMENT DUE TO MUSCULOSKELETAL PAIN: A TWO YEAR FOLLOW-UP AMONG 4009 WORKERS.

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[ID 877]

Objective:
To identify risk factors of ceasing employment in a cohort of Danish employees.
Methods: two year follow up in a cohort of 39 workplaces within production and service sector with 5611 employees, who were invited to participate. 4009 (71.1%) responded to a baseline questionnaire on individual demographic factors (sex, age, education), health related factors (body mass index, pain in body regions past 12 months, chronic diseases, somatic symptoms, fear avoidance, pain amplification), work type (academic/administrative, skilled, unskilled), physical work factors (repetition, lifting, pushing, sitting) and psychosocial (control, social support, quality of leadership). 3279 (88.2%) filled in a follow-up questionnaire two years from baseline, indicating termination of job since inclusion. Endpoint was ceasing of employment due to musculoskeletal (MSD) pain. Relative risk (odds ratio (OR with 95% confidence intervals(CI)) was calculated by logistic regression analysis. The predictive factors were analysed univariately, in blocks as indicated above, and significant factors at 0.10 were included in a final model.
Results: 102 employees had ceased due to MSD pain. Both individual, psychosocial and physical work place factors were positively associated to ceasing employment due to MSD pain. Sex and age was not related to the outcome. On multiple adjustments three factors remained significant: 7-9 years school education (OR 2.6; CI 1.2-5.5), regional pain in one region (3.5; 1.9-6.4), in two regions (6.1; 3.3-11.4), in three to four regions (7.0; 3.5-14.0), fear avoidance medium (2.3; 1.0-4.9), high 2.2; 1.0-4.9). Having an unskilled job was highly associated to ceasing employment (OR 5.9; 2.5-14.5).
Conclusion: in this study short school education, regional body pain, fear avoidance and unskilled work was highly predictive of ceasing employment due do MSD.

DEVELOPMENT OF A JOB DTABASE FOR CONTROL OF WORK RELATED MUSCULOSKELETAL DISORDERS

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[ID 1073]

This presentation describes the development of computerized database of job information for control of exposures to risk factors of work-related musculoskeletal disorders, WMSDs. Microsoft Excel® was used to develop the ergonomic database because it is widely available and it did not require purchasing or installation of new software. Job departments, sections and titles were obtained from an existing company database at four to six month intervals and included in one work sheet and formed the primary search key and menu for the ergonomic database. Job descriptions were obtained either from the company job database or from job surveys. Ergonomic exposures were assessed via a plant wide survey using ACGIH TLV® for Hand Activity Level and a company ergonomic checklist. Other ergonomic assessment tools could easily be utilized. Digital video recordings of each job were linked to the jobs. A graphical user interface, GUI, was created for users to select and view the job description, video and ergonomic assessment for a given job and given time. Fields were added for users to record their comments and progress with job improvements. Software was developed to compare job descriptions from different times so that job changes could be identified and evaluated. A report generator was added to copy information from the database to the word document. The database was implemented and evaluated at a large US automobile assembly plant. Users reported significant time savings using the database. They particularly appreciated the video recordings and the ability to record and retrieve job information electronically. Previously they spent a large amount of time traveling to the plant to find the jobs of interest and recording job information on paper. Finally the ergonomic job assessments could be plotted to assess the overall worker ergonomic exposures. These studies provide a foundation for future ergonomic studies.

EVIDENCE BASED INFORMATION AND WORK PLACE SCREENING FOR PHYSICAL WORKLOADS AS PAIN RELATED DISABILITY INTERVENTIONS – A RANDOMIZED STUDY

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[ID 1138]

Objective:
A: To evaluate whether evidence based information on common pain problems alone or in combinations with work place screening for physical workloads could reduce pain related disability problems.
B: To examine the impact of physical and psychosocial workloads, fear avoidance beliefs, current pain reporting and other factors on absence taking due to musculoskeletal pain problems.
Methods: in a cohort of 4009 employees, participants were allocated to one of two interventions groups or to a control group by block randomization at work place level. During 18 months absence spells were systematically obtained from each company. All participants with sickness absence were contacted by mail and asked to inform the specific cause and duration of each absence spell by questionnaire. We analyzed the risk for sickness absence, with duration of at least 7 days, using Cox's proportional hazard models. Participants contributed risk time until first event, work termination or end of the study period which ever came first.
Results: among 3552 participants, followed for 3 to 18 months, 214 experienced sickness absence due to pain problems. None of the two interventions reduced absence rates. Risk increased according to pain intensity (adjusted RR= 3.1, 95% CI: 2.0-4.9 and 4.2, 95% CI: 2.5-7.0) for moderate and severe pain reporting at baseline respectively, female gender (RR= 1.7, 95% CI : 1.2-2.5), lack of vocational education (RR=1.9, 95% CI: 1.0-3.51) and having an ongoing workers compensation claim (RR=2.0, 95% CI: 1.1-3.6). Physical and psychosocial workloads, higher degrees of fear avoidance beliefs, age, and numbers of other nonspecific somatic symptoms did not predict pain related absence taking.
Conclusions: previously reported advantageous effect on pain related disability problems, using evidenced based information in unselected populations, could not be corroborated in this study. Absence taking in this population was most strongly related to level of pain at baseline.

CASE-CONTROL STUDY PREDICTING RESOLUTION OF SYMPTOMS AMONG AUTO ASSEMBLY WORKERS WITH CARPAL TUNNEL SYNDROME

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[ID 26]

Carpal tunnel syndrome (CTS) associated with work activity is common with a prevalence of 5-10% in many industrial settings. The influence of treatment, ergonomic factors, medical history, psychosocial variables and aging on the improvement of symptoms has not been well defined. This study followed a cohort of 34 workers with symptomatic CTS for an average of 13 months. Improvement was defined as either complete resolution of symptoms or improvement on a visual analog scale of 2 point with the final rating being under 4. The predictive factors for improvement included younger age, lower body mass index, absence of a history of upper extremity tendonitis and lower hand/wrist discomfort rating at baseline. Ergonomic, psychosocial and electrophysiologic measures were not predictive. The models had high sensitivity and specificity. Treatment effects could not be evaluated due to incomplete data available. Older, obese workers with a history of an upper extremity tendonitis are less likely to have improvement in the CTS over time.

A SYSTEMATIC REVIEW OF THE RELATION BETWEEN PHYSICAL CAPACITY AND FUTURE LOW BACK AND NECK/SHOULDER PAIN

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[ID 1501]

Objective: in this systematic review, the evidence of performance in tests of muscle strength, muscle endurance, or spinal mobility was investigated as predictors of future work-related low back or neck/shoulder pain.

Methods: abstracts found by electronic databases were checked on several inclusion criteria. Two reviewers separately evaluated the quality of the studies. Based on the quality and the consistency of the results of the included studies, three levels of evidence were constructed.
Results: the results of 26 prospective cohort studies were summarized, of which 24 reported on the longitudinal relationship between physical capacity measures and the risk of low back pain and only three studies reported on the longitudinal relationship between physical capacity measures and the risk of neck/shoulder pain. We found strong evidence that there is no relationship between trunk muscle endurance and the risk of low back pain. Furthermore, due to inconsistent results in multiple studies, we found inconclusive evidence for a relationship between trunk muscle strength, or mobility of the lumbar spine and the risk of low back pain. Finally, due to a limited number of studies, we found inconclusive evidence for a relationship between physical capacity measures and the risk of neck/shoulder pain.
Conclusion: there is no relationship between trunk muscle endurance and low back pain, but it is unclear if there is a relationship between trunk muscle strength or mobility of the lumbar spine and low back pain. In addition, it is unclear if there is a relationship between physical capacity measures and neck/shoulder pain.

RESULTS OF AN INTENSIVE REHABILITATION PROGRAM FOR WORKERS WITH CHRONIC LOW BACK PAIN

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[ID 1679]

Since 2002, the STM, the largest occupational health service in Luxembourg, has started an intensive rehabilitation program for workers with low back pain, called “Live and work with your back. The program is partially sponsored by the FSE (Fonds Social Européen).
The aim is to reduce lost days after a back pain episode and to prevent permanent disability.

1. Methods:

The program is based on the following principles:
- participation of a voluntary basis
- agreement with the company of the worker
- multidisciplinary approach (occupational health, ergonomics, physical therapy and psychology)

The program “live and work with your back” involves 4 components:
- back school including anatomy and physiology of the spine, learning of back protection principles
- physical reconditioning : aerobic fitness, muscular strength and joint flexibility
- pain and stress management including relaxation techniques
- work place ergonomic analysis and identification of biomechanical risk factors in order to suggest improvements of the working conditions

It is organised for groups with maximum 10 workers, who participate to 10 sessions over 5 successive weeks.
Afterwards they are invited to 3 follow-up sessions after 6, 12 and 24 months.

2. Results:

The short term results of 80 participants, assessed by comparing the individual parameters at the beginning and at the end of a session. This isn’t a study with a control group but only a comparison of the participants at the beginning and at the end..
For this evaluation we are using the following tools:

	Beginning	End	p
Pain level at the moment of the interview (measures on an visual analogue scale in mm)	57,87 (29,67)	44,86 (28,97)	P<0,0001
Pain level at the beginning of day during the 3 last days (measures on an visual analogue scale in mm)	45,66 (28,60)	39,45 (28,40)	P<0,05
Pain level at the end of day during the 3 last days (measures on an visual analogue scale in mm)	39,86 (26,47)	28,55 (25,71)	P<0,0001
Eifel score	40,65 (21,19)	30,74 (19,94)	P<0,0001
Dallas (Q 8-10)	52,86 (20,41)	41,77 (23,40)	P<0,0001
Dallas (Q 11-13)	41,54 (21,87)	33,39 (23,40)	P<0,001
Dallas (Q 14-16)	31,80 (23,76)	25,05 (20,7)	P<0,001
Fingertip to ground	15,35 (14,83)	8,25 (13,53)	P<0,0001
Muscular force (Test de la chaise in sec)	68,42 (45,59)	168,66 (149,38)	P<0,0001

At the refresher session, they are invited to complete a questionnaire including the lost work days during the 6 months, the number of days they had suffered of low pain and the necessity of a light duty job.30 During the 6 months after the training, only 10% had an absence from work with a maximum of 5 days.

THE EFFECTIVENESS OF A RETURN-TO-WORK TREATMENT PROGRAM FOR SICK-LISTED PATIENTS WITH CHRONIC NON-SPECIFIC MUSCULOSKELETAL COMPLAINTS IN THE UPPER EXTREMITY

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[ID 306]

Musculoskeletal complaints in the upper extremity are frequently reported in office workers and may result in sick leave. High quality evidence on effective return-to-work treatment in patients with non-specific upper extremity musculoskeletal complaints is still lacking. This study aims at determining the effectiveness of a multidisciplinary treatment on individual and societal levels in sick-listed patients with chronic non-specific upper extremity musculoskeletal complaints.
Office workers, who were suffering from chronic non-specific complaints and sick-listed for at least 4 weeks, were included. Thirty-eight subjects were randomly allocated to multidisciplinary treatment (intervention) or to usual care provided by occupational health services. The intervention consisted of psychological and physical sessions provided by four (para-) medical disciplines. The effectiveness on individual level was measured by intensity of complaints and the effectiveness on societal level was expressed as percentage return-to-work. Furthermore, the treatment’s process is evaluated. Measurements were performed at baseline, after two, six and twelve months. Student’s t-tests were used to determine the effectiveness on the short-term (after 2 months), mixed model analyses to determine the long-term effectiveness.
The intervention achieves its aims on the short term: physical disabilities (p=0.010), kinesiophobia (p=0.000) and physical functioning (p=0.018) improved significantly more as compared to usual care. These effects are lasting 12 months after baseline. In addition, the treatment was significantly more effective in reducing the severity of complaints and equally effective compared to usual care in terms of return-to-work on both the short- and the long-term; After 2 months the mean percentage of return-to-work in the intervention group was 40% vs. 38% in the usual care group whereas after 12 months the percentages were 86% vs. 73%. It is concluded that multidisciplinary treatment affects individuals positively and is perceived effectively, but shows no significant difference in effectiveness on the societal level as compared to usual care.

RECOVERY PATTERN OF NECK AND SHOULDER PAIN AMONG SEWING MACHINE OPERATORS

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[ID 576]

BACKGROUND. Few studies to date have addressed recovery from work-related musculoskeletal pain. The aim of this study was to explore factors that may affect or modify recovery from a neck/shoulder disorder.
METHODS. This 4-month prospective cohort study followed 129 sewing machine operators who reported a neck/shoulder pain at baseline before adopting ergonomic interventions. Musculoskeletal pain data was gathered in a standardized interview at baseline and during the follow-up period. Recovery pattern was evaluated using a proportional pain score (PS) of baseline pain in percentile as a continuous measurement of severity by multiplying pain frequency and pain intensity to generate a pain score, and dividing the score at each survey by the baseline score for each individual. Linear mixed models were used to examine the association between individual characteristics and work-related ergonomic and psychosocial factors on overall reduction of pain from baseline to four months and average reduction rate of pain per month.
RESULTS. The mean PS reduction was 9.2% per month. One unit baseline pain score increase is associated with increasing of PS reduction rate of 0.3% per month. Both total rest period of 35-50 minutes and more than 55 minutes were associated with faster recovery rate compared to less than 35 minutes (with PS reduction rate of 32.8 and 30.2 % more per month respectively). In contrast, subjects aged 50 years and above were

associated with slower recovery rate compared to those less than 30 (with 31.4% less per moth on PS reduction rate).
CONCLUSION. These results suggest that baseline musculoskeletal pain is positively associated with pain recovery rate. Individual and ergonomic factors, but not psychosocial factors, were associated with pain recovery. This result suggests that assessments of intervention effectiveness may need to consider effects of both individual and work-related factors as well as baseline musculoskeletal pain.

THE EFFECT OF A STRETCHING PROGRAM TO CONTROL WORK-RELATED UPPER EXTREMETY PAIN: AN INTERVENTION STUDY.

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[ID 616]

Introduction: Neck and upper limb complaints is common among industrial workers with repetitive and strenuous work; to reduce and prevent this a stretching program were evaluated.
Methods: The study was realised among 87 female workers, 55 blue-collar workers (intervention group) and 32 workers with less job strain(controls), in a plant producing rubber products for sea rescue purposes. The intervention consisted in stretching exercises during the working hours, in a six months period. The Nordic questionnaire on physical complaints and a questionnaire on psychosocial issues were used. All participants recieved an examination of the neck and upper extremities with pressure algometrics to evalutate soreness, isometric measurements of muscular strength and sensibility evaluated by vibratory threshold. Scales with scores between 0-9 were used to caracterice the complaints. Data were analysed with SPSS ver.10.0, relevant confoundercontrol were performed and recognized statistical methods used.
Results: More complaints of pain/soreness in the elbow and hand region and sensibility disturbances in the upper extremities were seen in the blue collar workers. After intervention pain/soreness and sensibility improvements were found in all regions in the intervention group. Pressure algometrics revealed higher pain/soreness around the elbow and greater muscular strenght in the blue collar workers. No difference in vibration threshold were seen, although subjects with complaints had a higher threshold than those without. After intervention no improvements were seen in relation to pain/soreness in a logistic regression analysis, but in a non-parametric test, where each individual were her own control and data were not digotomized, significant improvements were seen in musculus trapezius/supraspinatus/infraspinatus, plexus brachialis, nervus medianus and epicondylus lateralis.
Conclusion: Stretching exersises performed during work seems to have a positive influence on pain/soreness in the upper extremity among workers with repetitive and strenuous work. More studies are needed to confirm these findings.

A PREFERRED ORIENTATION OF A CYLINDRICAL HAND DYNAMOMETER FOR MEASURING GRIP FORCE

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[ID 1319]

Hand grip strength has been measured with a cylindrical dynamometer in which two halves of a split cylinder are separated with a force gauge[1]. Grip force is a set of force vectors around the object surface and is not uniformly distributed. Therefore, grip force measurement with a cylindrical dynamometer, “one-axial grip force,” differs by its orientation relative to the hand[2]. This study examines the effect of a cylindrical dynamometer’s orientation on grip force measurement, and suggests a “preferred” orientation.
While subjects exerted their maximum grip strength on a cylinder in a power grip, normal forces were recorded by an XSENSOR pressure mat that was wrapping the cylinder surface. Three females and three male subjects participated in the experiment. Their hand lengths, L, correspond to 23-83 percentiles[3]. Three handle diameters were tested: D = 51, 76, 89mm. Eight orientations were considered as a potential preferred orientation: the thumb’s tip, IP and MCP, the hypothenar area and the middle finger’s MCP, PIP, DIP and tip (Figure 1). These orientations provide a clear landmark for investigators in the field, and their proportional positions in relation to the hand are consistent regardless of hand/handle sizes. One-axial grip forces were calculated as a sum of the cosine of normal forces ($\Sigma Fn_i \cos\theta$) for each orientation, and normalized to each subject’s maximum. The proper orientation should result in the least scattered regression (highest SSR/SSY) between the normalized one-axial grip force and D/L. One-axial grip forces varied up to 66% depending on the orientation. Normalized grip forces were highest for the middle finger’s PIP and MCP orientations and the hypothenar orientation. The middle finger’s MCP orientation had the highest SSR/SSY, 0.6 (
Figure 2), and can therefore be regarded as the preferred orientation. A further validation with the use of a cylindrical dynamometer is in progress.

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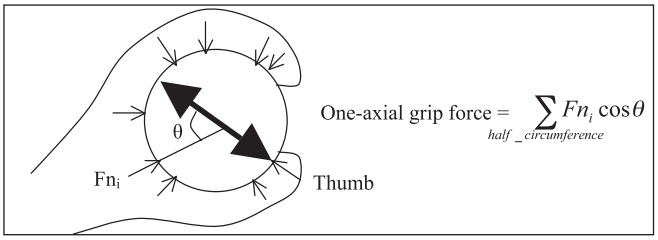

Figure 1 One-axial grip force at a given orientation of the cylindrical hand dynamometer. The thick arrow represents the direction along which the normal force vectors are projected. Hence, the thick arrow in this figure represents the thumb tip orientation.

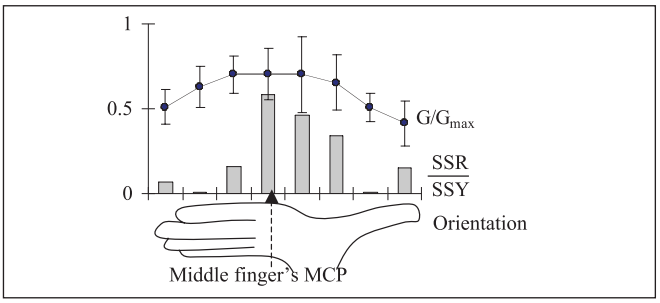

Figure 2 Normalized one-axial grip force (G/G_{max}) and SSR/SSY (SSR: regression sum of squares, SSY: total sum of squares) as a function of the cylindrical dynamometer orientation: The middle finger’s MCP orientation yields the highest SSR/SSY.

EPIDEMIOLOGY IN OCCUPATIONAL HEALTH

OCCUPATION AND BLADDER CANCER: RESULTS OF A HOSPITAL-BASED CASE-CONTROL STUDY IN NORTHERN ITALY

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[ID 893]

BACKGROUND: 5-10% bladder cancer (BC) cases can be attributed to occupation; certain aromatic amines (AA) and PAHs are bladder carcinogens.
OBJECTIVE: to investigate occupational risk factors for BC among men resident in Brescia, a highly industrialized province in Northern Italy, with many metalmechanical industries.
METHODS: a hospital based case-control study was conducted between 1992 and 2000. 297 incident histologically confirmed BC cases were frequency-matched on age, period and hospital admission with 302 controls with urological non neoplastic diseases. Detailed information on environmental and occupational BC risk factors were collected by direct interview; occupational exposure to PAHs and AA was blindly coded following international criteria. Odds ratios and 95% confidence intervals were calculated from unconditional logistic, adjusted for age, education, smoking, coffee, alcohol drinking.
RESULTS: increased risks were observed for industries, such as "manufacture of machinery-equipment" (OR 1.70; CI 0.99-2.93), "manufacture of fabricated metal products" (OR 1.86; CI 1.13-3.06) (the latter, with significant trend for duration) and occupations like "machine-tool setters-operators" (OR 4.45; CI 1.08-18.36), "lathe operator" with duration of employment >10 years (OR 3.89; CI 1.07-14.17), "spray-painter" (OR 11.31; CI 1.34-95.25, based on 10 cases and 1 control). Non-significantly increased OR were observed for painters (OR 1.71; CI 0.68-4.25), farm workers (OR 1.84; CI 0.80-4.26), metal processers (OR 1.38; CI 0.79-2.41), "textile, wearing apparel, leather industry" with duration of employment >10 years (OR 2.52; CI 0.87-7.50). 33.3% cases and 31.8% controls had occupational exposure to PAHs, 7,4% cases and 4,6% controls to AA. No significant excess was observed for PAHs exposure according to reliability, level, frequency, mode, calendar, duration. AA exposure for >30 years and medium-high frequency showed borderline significant increased risk.
DISCUSSION: the overall findings are consistent with previous litterature. In our study-population, metal industry appears to play a relevant role in BC risk.

THE RISK OF BREAST CANCER IN RELATION TO HEALTH HABITS, OCCUPATIONAL EXPOSURE AND BIOMARKERS

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[ID 1254]

World as well as Israeli breast cancer (BC) burden has grown steadily over time resulted in speculation about whether environmental exposures are important risk factors for the developing of BC. Chemical carcinogens presumably cause cancer by producing genetic or epigenetic damage. Two classes of genes that play a central role in the carcinogenesis process are oncogenes and tumor suppressor genes.
The aim of this case control study was to investigate the relation between the risk of BC, and occupations, exposures and biomarkers namely p53, p21 and c-erbB_2 proteins in primary BC tumors, while adjusting for the main known risk factors such as diet, smoking, family history of BC, and exposure to female reproductive hormones (both endogenous and exogenous).
The study population included 326 BC patients (cases) and 413 healthy women (controls). We used telephone interview to collect occupational, exposure, medical, health habits, reproductive and hormonal histories. Immunohistochemical staining was used to detect the biological markers in breast cancer sections.
Results: Working in textile and clothing, [adjusted OR (95% CI)] [1.8 (1.1-3.0)], and in various industries [4.3(2.0-9.3)], exposure to ionizing radiation [5.3(2.4-14.1)], as well as age and having a family history of BC significantly ($p<0.05$) increased the risk of BC. Administrative works, [0.6(0.4-0.9)], the number of full term births, adherence to high fiber [0.5(0.2-0.9)], low salt [0.6(0.3-0.9)] and low fat diets [0.4(0.3-0.6)] are significantly ($p<0.05$) protective factors for developing BC.
Elevation of p53, c-erbB_2, and p21 proteins expression (positive cases) were found in 25.%, 73.5% and 33.3% of the cases respectively. Of the c-erbB_2 positive cases, significantly more breast cancer patients were exposed to hazardous substances at work. We did not find a relationship between p53, p21, and c-erbB_2 and specific occupations or exposures.
Conclusion: Our study supports the assumption that occupational exposure may contribute to the etiology of BC.

M_3 RECEPTOR GENE EXPRESSION IN PERIPHERAL BLOOD LYMPHOCYTE FROM WORKERS EXPOSED TO DIMETHOATE

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[ID 1129]

M_3 gene expression in peripheral blood lymphocyte of workers exposed to dimethoate (one of the most common organophosphorus pesticide used) was studied and its role in the toxic effects of Ops was explored. The lymphocytes in peripheral blood from 33 workers exposed to dimethoate and 15 control people were isolated and treated with saline and dimethoate in vitro, respectively. RT-PCR technique was used in determine M_3 gene expression. Basal and inducible gene expression levels were measured. There were no significant difference of basal gene expression level between the exposed group and control group, (1.49±0.20) versus (1.49±0.45); while the inducible gene expression level was significantly higher in exposure group to the control group, (1.92±1.07) versus (1.22±0.19). No difference was found between male and female people in both exposed and control group. The inducible gene expression level was higher in the operators than in the packers, which maybe attribute to the difference of exposure time. The inducible M_3 gene expression level showed a gradient increment with the elongation of the working age: <5yr(1.69±0.95), 5~25yr (1.91±1.03), >25yr (2.09±1.25). These indicated that after long-term exposure to OPs, the basal M_3 receptor gene expression level in the exposed workers did not show any difference with the control group, but the inducible gene expression level (treated with OPs in vitro) would increase and the level was related to the degree of OPs exposure.

GENE-ENVIRONMENT INTERACTIONS IN PARKINSON'S DISEASE: RESULTS FROM THE EUROPEAN STUDY GEOPARKINSON.

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[ID 1484]

With the exception of rare autosomal dominant or recessive subsets, and October 2004 on 959 cases of parkinsonism (767 of which affected by PD), and 1989 controls, comparable for age and sex distributions, were recruited. Individual information about socio-demographic status, voluptuary habits and past environmental-occupational exposures (organic solvents, pesticides, metals) was collected using a structured questionnaire. Genetic polymorphisms of proteins involved either in xenobiotic metabolism (*CYP1B1*, *CYP2D6*, *GSTM1*, *GSTT1*, *GSTP1*, *GSTM3*, *PON*, *EPHX1*, *NQO1*, *SOD2*, *NAT2*) or in dopaminergic transmission (DAT1, MAO-A, MAO-B, DRD2) were characterized on DNA isolated from peripheral blood samples. Logistic regression was used to investigate either association of risk factors to the disease and gene-environment interactions. Smoking habits was negatively associated to PD (OR 0.51, 95% CI 0.43-0.61), whereas cranial traumas with loss of conscience (OR 2.54, 95%CI 1.81-3.57), first degree familial positive history (OR4.83, 95% CI 3.42-6.83) and pesticide exposure (OR 1.41, 95%CI 1.07-1.87) were significant risk factors, thus confirming previous studies. Significant interactions were apparent between smoking habits and either *GSTM1pos* (OR=0.43, 95%CI 0.34-0.55) or *GSTP1BC* genotypes (OR=0.21, 95%CI 0.08-0.54), and between pesticide exposure and either *PON-1 QR-RR* (OR=1.82, 95%CI 1.01-3.26) or *MAO-B AG-GG* (OR=5.57, 95%CI 2.06-15.07) status, the latter being limited to females. If confirmed, such biologically plausible interactions could be useful not only for the development of novel therapeutic strategies but also from a preventive point of view.
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PATERNAL OCCUPATIONAL EXPOSURES AND BIRTH DEFECTS IN CHILDREN

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[ID 99]

Objective. Assessment of occupational exposure of parents as a risk factor of congenital malformation in children.

Methods. Case-control study was carried out in Moscow during eight years follow-up period. Cases: 550 newborns with congenital malformations, which died during perinatal period (stillbirth and death during the first week of life). 1778 controls were randomly selected out of healthy newborns born at the same time. Parents in the both groups were mail interviewed concerning parents occupational history (place of employment before pregnancy, occupation, data of beginning of work and dismissal, presence of occupational hazards and existing compensations thereof), demographic and social data, life style (including smoking habits and alcohol consumption), medical history of the family. Stratification analysis for unmatched series helped to control confounding factors.

Results. At least one of the parents was occupational exposed in 165 cases and 295 controls. Odds ratio (OR) for congenital malformations was 2.15 (95%CI 1.7-2.7). OR was higher if mother was exposed to occupational risk factors. When mother or father was exposed to chemical hazards (pesticides, organic solvents, aerosols of non-ferrous metals, formaldehyde resigns, anesthetics, pharmaceuticals etc.), OR for congenital malformations in newborns was 2.4 95%CI 1.8-3.3 (mothers) and 1.5 95%CI 1.1-2.1 (fathers); for radiofrequency band EMFs 11.5 95%CI 2.7-48.0 (mothers) and 2.5 95%CI 1.5-4.4 (fathers); for ionizing radiation 2.7 95%CI 1.1-6.3 (fathers), for heating microclimate due to high temperature radiation emission 6.5 95%CI 1.4-30.6 (mothers) and 2.6 95%CI 1.1-6.5 (fathers); for biological factors - medical personal of infectious hospitals (viruses and bacterial infections) 8.1 95%CI 1.8-36.4 (mothers).

Conclusion. The data obtained correspond with the results of other epidemiological and experimental studies. However, supplemental investigations for “occupational exposure of parents - malformation in children” are still necessary.

PRECONCEPTIONAL EXPOSURE TO SOLVENTS ASSOCIATED WITH INCREASED RISK OF CANCER IN THE OFFSPRING

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[ID 435]

Background: Many organic solvents are considered probable carcinogens. There is limited evidence on the hypothesis that maternal occupational exposure near the conception increases the risk of cancer in the offspring.

Methods: In a retrospective cohort study, 103,934 children born by female workers in Taiwan were evaluated for any increase of cancer mortality associated with ever worked in a former electronic factory potentially exposed to organic solvents. The study period was from 1978 to 2001, and causes of death were identified in the Taiwan national death registry. Through Poisson regression modeling, we compared the mortality of cancer and congenital malformations among children with mothers probably exposed and unexposed to chlorinated hydrocarbons.

Results: After adjustment for calendar year and maternal age, an increased association was found between probable preconceptional exposure to chlorinated solvents of children and cancer mortality [rate ratio (RR) = 1.89; 95% confidence interval (CI), 1.11-3.23]. The rate ratio of leukemia and non-Hodgkin’s lymphoma was also increased to 2.17 (CI: 0.95-4.93). Findings remained similar when restricted to the analysis of first parity children. However, such associations were not detected in congenital malformations.

Conclusions: Our findings suggested that preconceptional exposure to organic solvents might be associated with an increased risk of cancer mortality, especially for leukemia and non-Hodgkin’s lymphoma.

PARENTAL EXPOSURE TO PESTICIDES IN THE AGRICULTURAL POPULATION OF COSTA RICA AND RISK OF LEUKEMIA IN THE OFFSPRING

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[ID 1360]

A Costa Rican case-control study explores childhood leukemia and parents´ occupational pesticide exposure during pregnancy and early childhood. Incident cases during 1995-2000 were identified from the National Tumor Registry (N= 300), with 579 population controls. Parental questionnaires addressed occupational activities and pesticide exposure. An exposure model was constructed for 26 prioritized pesticides and 5 time windows from the year before conception until first year of life inclusive for 876 mothers and 762 fathers. For insecticides unspecified, elevated odds ratios (OR) from logistic models were found for all parents pooled during III trimester of pregnancy (OR 2.1; 95% confidence interval 1.2-4.0) and for mothers anytime (2.9; 1.0-8.2), during 1 year before conception (4.5; 1.2-17.5); and III trimester (3.4; 1.0-11.6). An OR 6.2 (1.2-32.8) was found for foxim, an organophosphate insecticide, for fathers of acute lymphocytic leukemia (ALL) cases during first year of life of the case. For fungicides, excesses were seen for all parents anytime (1.8; 1.1-2.8), and for mothers (3.8; 1.0-15.5) and fathers (1.8; 1.1-2.8) separately, and an exposure-response for benomyl for fathers of ALL during the first year of life. For herbicides, the excesses were for all parents during II trimester (1.5; 1.0-2.4), and for mothers during II (4.5; 1.2-17.5) and III (13.5; 1.7-110.6) trimesters. The herbicide picloram was associated with an OR 8.8 (1.3-57.4) for fathers during I trimester, and paraquat for mothers of ALL during II trimester (8.8; 1.0-80.2). The results suggest that parental exposure to certain pesticides may increase risk of leukemia in the offspring.

EFFECTS OF EXPERIENCES EARLY IN LIFE ON PSYCHIATRIC SICKNESS ABSENCE IN YOUNG ADULTHOOD: A LIFE COURSE APPROACH

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[ID 624]

Introduction: Life course studies indicate that social factors early in life may influence adult health, and our aim was to assess if this applies to psychiatric sickness absence in young adults as well.

Methods: We established a cohort of all live born subjects in Norway, 1967-76. Information on index subjects and their parents were retrieved in several national registers: Medical Birth Registry of Norway, National Insurance Administration, Statistics Norway, and Central Population Register. The main study determinants were parental characteristics during the index person’s childhood and adolescence: educational attainment, family structure, disability pension, and income. Study outcome was the first long-term (>15 days) medically certified spell of psychiatric sickness absence during 2000-03. We computed adjusted hazard ratios and corresponding 95% confidence intervals for each gender separately in Cox regression. Analysis was restricted to 165 419 women and 212 937 men who had finished their education, did not receive disability pension, had income above the level entitling compensation, and were not absent from work due to sickness on January 1, 2000. Results: 61% of the women and 25% of the men had at least one absence spell 2000-03. The four-year risk of a first absence with psychiatric diagnosis was 8.4% in women and 3.8% in men. Psychiatric sickness absence was associated with some parental characteristics: educational attainment in a dose dependent fashion, maternal or paternal disability, and parental marital status at index person age 16. There were no apparent associations with parental vital status and parental income. Associations were generally stronger for men than for women.

Conclusions: Parental factors in childhood are associated with psychiatric sickness absence among young adults. This effect is likely to act through several mechanisms. Considering life course events may add to our understanding of psychiatric sickness absence.

LIFE COURSE DETERMINANTS FOR EARLY DISABILITY PENSION

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Background: Many countries experience an increase in disability pension (DP). A special concern has been people who are granted a DP during the first years after entering working life. We wanted to examine determinants for such early disability pension with a life course approach.
Material and methods: Through linkage between several national registers containing personal information from birth into adult age we established a longitudinal, population-based cohort. Study participants were all subjects born in Norway in the period 1967-1976, as registered by the Medical Birth Registry of Norway, who were national residents at age 17. The main independent variables were different early factors: perinatal and childhood health and some social and health related parental characteristics. We also considered educational achievement. The study outcome was granting a DP. Follow-up started when subjects were first registered with a personal income above the level entitling compensation and lasted until the end of 2003. Thus, subjects who were granted a DP before ever having income were not included. 598 837 persons were included in the study. Adjusted hazard ratios were computed using Cox regression analyses.
Results: 10 670 persons (1.8 %) were granted a DP. 60 % of the DPs were due to psychiatric and musculoskeletal disorders. The risk for DP for subjects with low education (11 years or less) was 4.5 %, whereas the risk for subjects having received benefit during childhood because of chronic disease was 10.5 %. Persons with both childhood disease benefit and low education had a 19.9 % DP risk. Subjects with disabled parents also had excess risk for own DP (3.7 %).
Conclusions: DP in young adults is associated with several early life factors. Considering life course events may add to our understanding of DP.

POOR SELF-RATED HEALTH IN ADOLESCENCE AND DISABILITY PENSION 30 YEARS LATER

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[ID 1681]

Background
Known risk factors for disability pension are age, health and prior labour market position. We have previously demonstrated that among young men poor self-rated health (SRH) predicts future mortality risks, and that this relation can be explained by early indications of poor mental health. The present purpose was to investigate whether SRH in adolescence is related to disability pension (DP) in middle age, and also to study potential confounding from lifestyle factors and mental health indicators in adolescence and occupational class in adulthood.
Methods
Data on SRH – very good (reference category), rather good, neither good nor bad, rather poor/very poor – and potential explanatory factors (BMI>25, smoking, risky alcohol consumption, low emotional control, medication for nervous problems and psychiatric diagnosis) was collected among 49 323 men, born in 1949-51, at conscription for compulsory military training in 1969/70. Data on adult occupational class was obtained from the 1990 census. Data on DP during the years 1999-2001 was obtained from national registers. The analyses were based upon those 42 184 conscripts with information on all background variables, who were still alive in 1999 and not granted a DP before this year.
Results
Poor SRH in adolescence was associated with increased relative risk of disability pension during the years of 1999-2001. The relative risk of DP increased with poorer SRH (RR=1.2, 1.8, and 3.0 respectively compared with the reference group). Approximately 50 % of the increased relative risk was explained by differential occurrence of poor mental health in adolescence, while control for differences concerning lifestyle factors in adolescence and occupational class in adulthood had almost no effect.
Conclusion
Poor self-rated health reported in adolescence is a predictor of disability pension 30 years later. Indications of poor mental health in adolescence contributed to explain this relation. The relation did not seem to be mediated by occupational class in adult life.

NEUROTOXICOLOGY AND PSYCHOPHYSIOLOGY (II)

SELF-REPORTED SYMPTOMS IN WORKERS WITH PAST EXPOSURE TO SOLVENT-BASED GLUES – AN 18-YEAR FOLLOW-UP STUDY

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[ID 1703]

Alterations in psychiatric symptoms following exposure to organic solvents have been frequently reported in cross-sectional studies, whereas far less is known on long-lasting alteration after cessation of exposure. The aim of the present study was to examine to what extent exposure to organic solvents during the working life affects general well-being in the long term, and to explore the relationship between symptoms and cognitive functioning.

In this 18-year follow-up study, symptom prevalence and level of spare time activities were studied in 41 floor layers with previous heavy exposure to solvent-based glues and 40 unexposed referents using the same scales as in the initial study. These include a general health questionnaire, a symptom rating scale, the Q16 symptom questionnaire, and a questionnaire for spare time activities. Recently published data on cognitive functioning of the participants at follow-up were available.

Results

Neuropsychiatric symptoms were more frequent among the floor layers than among their unexposed referents at follow-up. Over-time comparisons revealed increased complaints of depressive mood and abnormal fatigue in the most exposed individuals. Memory difficulties, although more frequent among floor layers than among referents, had decreased in floor layers while increased in referents. Floor layers also reported some negative effects on intimate relations and activity level. Neuropsychiatric symptoms were related to poorer performance chiefly in episodic memory tasks and tests of complex attention, more seldom in tests of perceptual speed and occasionally in visuospatial tasks.

Discussion and Conclusions

The findings of long-lasting, partly deteriorating and exposure-related neuropsychiatric complaints as well as some negative effects on intimate relations and activity level indicate that general well-being later in life has been affected in these previously heavily solvent-exposed workers. In contrast to most previous studies, we found frequent associations between symptom prevalence and cognitive functioning.

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POLYNEUROPATHY AND 2,5-HEXANDIONE IN RELATION TO OCCUPATIONAL EXPOSURE.

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[ID 1475]

Introduction: The hydrocarbon solvent n-hexane is well known to cause polyneuropathy and its neurotoxicity is linked to the metabolite 2,5-hexanedione (2,5-HD). Increased urinary concentrations of 2,5-HD are shown in workers occupationally exposed to n-hexane or methylbutyl ketone. However, low urinary concentrations of 2,5 HD have also been detected in the general population possibly caused by lipid peroxidation within the body or microexposure to n-hexane in the environment. Therefore, we found it interesting to compare the excretion of 2,5-HD in cases with cryptogenic polyneuropathy and in randomly selected subjects from the general population.

Methods: All 164 cases of cryptogenic polyneuropathy included in a former case-referent study and 300 randomly selected subjects, out of the 604 referents were invited. Exposure information had earlier been collected by postal questionnaires. Finally, morning urine samples were collected from 114 cases of polyneuropathy and 227 referents. All urine samples were analysed at the laboratory of Medicina del Lavoro in Perugia, Italy.

Results: Only seven subjects (4 cases and 3 referents) had ever been occupationally exposed to n-hexane or methylbutyl ketone. In the multiple linear regression model only male gender and case status were significantly associated with urinary 2,5-HD. Ever exposure to various chemicals or to vibrations at work or during leisure time, along with non-Scandinavian origin showed no significance. Furthermore, differences in mean values of 2,5-HD in urine between cases and referents were compared for several various occupational exposures. Only for occupational exposure to anaesthetic gas and hydraulic oil significant differences were shown.

Conclusion: An increased excretion in urine of the metabolite 2,5-HD might be associated with clinically diagnosed polyneuropathy. However, that finding could not be explained by any reported occupational exposure. Our results have to be further investigated but perhaps mainly not from the occupational viewpoint.

VISUAL SEARCH AND EYE MOVEMENTS IN INVESTIGATING THE VISUAL AND ATTENTIONAL DEFICITS IN PATIENTS WITH CHRONIC SOLVENT ENCEPHALOPATHY

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[ID 954]

Various aspects of visual perception may deteriorate due to chronic solvent exposure. Modern measurement techniques such as eye movement recordings combined to tasks which require dynamic information processing and visual attention can help to further characterise the effects of solvent exposure on different levels of visual processing, and to help in developing more sensitive screening tests. We measured eye movements and visual search performance in a group of patients with chronic solvent encephalopathy (CSE), and age- and education matched control subjects. The task was to search for and identify a target letter among numerals presented in rectangular stimulus matrices of different sizes. The spatial area that could be processed during a single eye fixation, as well as parameters related to oculomotor functioning and visual search strategy were estimated from eye movement data. The visual search times of the CSE patients were clearly longer, and they needed considerably more eye fixations than healthy controls to find the target. Therefore, their reduced performance in visual search seems to be related to the reduction in the capacity of spatial attention (perceptual span). For most of the patients visual acuity, contrast sensitivity, and the oculomotor properties of saccadic eye movements were within normal limits. The results suggest that motor slowness or low-level visual factors do not explain the poor performance of CSE patients in visual search tasks. The results are also discussed with respect to the effects of education, and performance in a widely used neurobehavioral Trail Making test, which uses similar stimuli and also requires visual search.

EFFECT OF OCCUPATIONAL EXPOSURE TO STYRENE ON VISUAL CONTRAST SENSITIVITY

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[ID 1677]

Several studies have shown that styrene has ophthalmotoxic properties. Visual contrast sensitivity (CS) loss has been observed among workers exposed to organic solvent mixtures and styrene. Little attention has been paid to the relation between biological exposure index and CS loss. The present study aimed to (1) assess the relationship between urinary metabolites and CS loss and (2) examine visual function in relation to cumulative styrene exposure. CS was measured for 165 male workers exposed to styrene in four fiberglass and reinforced plastics factories (length of exposure>3 years) and 125 male non-exposed workers and college students using the Vistech MCT 8000 chart. All subjects were asked to complete questionnaire in which the items concerned their work history, occupational exposure or non-occupational solvent

exposure, lifestyle habits, drug use and anamnesis. The personal styrene exposure in the air and end shift urinary mandelic acid (MA) and phenylglyoxylic acid (PGA) were measured, and the individual cumulative exposure index (CEI) was calculated. The results showed a significant reduction in CS at in styrene-exposed workers compared to the controls ($p<0.001$), after adjusting age, alcohol and smoking consumption. There was a significant effect of urinary MA+PGA level, with workers in high and medium concentration (>=200mg/g creatinine) group compared to low concentration group and controls at different spatial frequencies. With respect to CEI, there was a significant reduction in CS in 12 cycles per degree in high group workers than those in low group. The results suggest that urinary MA plus PGA less than 400 mg/g creatinine in long term exposure to styrene might lead to CS loss and CS loss might appear with increase of CEI.

EVOLUTION AND FUTURE CHALLENGES OF NEUROBEHAVIORAL TOXICOLOGY IN HAZARD IDENTIFICATION AND RISK ASSESSMENT

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Objectives. Neurobehavioral toxicology is aimed to assess preclinical changes of the Central Nervous System due to exposure to neurotoxic agents. Starting from an historical reconstruction of the previous work, this review was aimed to identify the current trends and the most important needs and challenges to be addressed in this discipline, considering the rapid changes of exposures and scenarios occurring in the general environment and in the occupational settings.
Methods. Published literature from the early 1970s was analyzed using MEDLINE resources through PUBMED and OVID systems, and the proceedings from the series of International Ssymposia organized by the ICOH Scientific Committee on Neurotoxicology and Psychophysiology.
Results. The total number of studies using neurobehavioral methods is constantly increasing, including occupational, environmental and pediatric exposure. Starting from a few articles in the early 1970's (although the number is underestimated since not all the articles of those years are indexed in MEDLINE) they reached about 183 in 2004. Regulatory agencies adopt scientific data obtained through neurobehavioral assessment. Three major areas of future challenges were identified: a) specific technical issues regarding testing development, b) epidemiological issues regarding the study design, including the need for meta-analysis/multicenter studies and for longitudinal observation, and statistical issues regarding the most adequate models for the analysis and treatment of complex neurobehavioral datasets, c) the need for scientific consensus on the significance of neurobehavioral findings. Recent work was recently added also to standardize neurobehavioral testing procedures in animal studies.
Conclusion. Neurobehavioral toxicology is an evolving scientific discipline that needs further resources for a better definition of its scopes and standardization.

ATYPICAL PARKINSONISM IN A STEELWORKER WITH MANGANESE EXPOSURE

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A 55 year old RH steel cutter, developed leg resting tremors and decreased RAM of his left arm. Over the next 6 months, he developed rigidity, pain and dystonic posturing in his left hand. His tremors were both symmetrical and assymetrical, favoring the left arm and right leg. He had difficulty with memory but no difficulty with postural instability. Manganese levels were normal; lead levels were <20 ug/dl. A brain MRI was normal. Removal from work and therapy including dopamine agonists, levodopa and later Artane lead to no improvement.
His company confirmed that he cut materials that included manganese frequently, with a torch for 30 years. He began to use PPE in the 1990's. He reported dizziness and night sweats. He had a 10 year history of elevated lead levels > 40. He denied any prior medical or psychiatric history or a family history of neurologic disease. The patient remains disabled.
Manganism has been described as a post synaptic atypical parkinsonism. Findings have been reported symmetrical for rigidity, bradykinesia and action tremor, in patients younger than 60, either during occupational exposure or soon after. Severe progression is uncommon. Recently, an increased prevalence of parkinsonism has been noted in welders. More recently, controversy has arisen regarding the inclusion of patients with classical parkinsonism as having a manganese associated syndrome since blood manganese and MRI normalize after acute exposure, and PET and pathological findings have been unhelpful in categorizing these patients.
An example of manganism in a steel worker, this patient's presentation is atypical; younger than 60 and symptoms developing during the course of his employment, with no response to medication. He has no confounding medical history, confirmed Mn exposure, and lead exposure supports insufficient PPE. A strict algorhythm is necessary to identify patients with a condition associated with occupational exposure.

MANGANESE RELATED HEALTH EFFECTS IN WELDERS

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[ID 1040]

There is evidence that occupational exposure to manganese (Mn) can be responsible for early (sub)clinical neurobehavioral and respiratory effects in exposed workers. Welders are considered as a population at risk. An orientating cross-sectional study was carried out in 19 male welders and 18 controls.
Methods: Validated questionnaires (Symptom Checklist-90, Neurotoxic Symptom Checklist-60, Parkinson Disease), nervous system assessment [hand-eye coordination (EYE), digit span backwards (DSB), symbol-digit substitution (SDS) (Neuroscreen®); hand tremor (HT), finger tapping (FT) (Catsys®)] and spirometry (FVC, FEV1, PEF) were performed. As parameters of Mn-exposure, Mn in blood, urine and air were assessed. Student's T-tests (EYE, DSB, SDS, HT, FVC, FEV1, PEF) and Fisher's Exact tests (all questionnaires and FT were recoded to 0/1) were used to examine group differences. If differences were found ANCOVA was performed, and dose-effect relations were studied (multiple regression, multiple logistic analysis; co-variables: age, education, BMI, alcohol, smoking)
Results: The Mn-air (8h), Mn-urine, Mn-blood ranged from 0,00 mg/m^3-2,33 mg/m^3 (mean:0,33); 0,10–3,5 µg/g creat (0,86); 0,6–1,4 µg/dL (0,90) respectively. There were no correlations between the exposure parameters. There were no significant group differences between exposed and control workers for SCL-90, NSC-60 and Catsys-results. However the scores on symptoms of Mn-toxicity [anxiety, agoraphobia, hostility (SCL-90), hypokinesia (PD questionnaire), equilibrium (NSC-60), broad spectrum of tremor frequencies] were higher in the exposed. Exposed workers had worse EYE, SDS, FEV1 and PEF compared to controls ($p \leq 0,05$) (ANCOVA) but no significant dose-effect with exposure parameters could be found.
Conclusions: Mn-exposure is clearly present during steel welding. Despite the small scale of this orientating study, small effects on psychomotor performances and pulmonary function were present. Thus, spirometry and computer aided systems for neurological performance testing such as Neuroscreen® and Catsys® might be very valuable in health monitoring of welders.

EARLY MANIFESTATIONS OF MANGANESE NEUROTOXICITY IN WORKERS

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[ID 904]

The aim of the study was to assess dose-response relationships between the current concentrations of manganese in the air (MnA mg/m3, cumulated exposure (MnA x y, mg/m3 x years of work)and concentrations of manganese in blood (MnB, ug/l) and the long-term neurobehavioral effects.
Neurobehavioral performance on tests of: profile mood states , simple reaction time, digit span (WAIS), Santa Ana test, tapping test, subjective symptoms questionnaire, Benton test, aiming test, percived stress scale (Cohen),digit symbol (WAIS), digit symbol(Milano) was evaluated for 75 workers exposed to manganese (mean age 39.2years). The control group consisted of 62 non-exposed male individuals (mean age 40.0 years) The workers were exposed to manganese at a dry battery factory and during welding for a period from one to 41

years (mean 17.6 years). For each worker , manganese concentrations in the air and blood were measured, and a cumulative exposure index was calculated.
Current airborne manganese concentrations at the battery factory ranged from 0.07 to 1.16 mg/m3 and during welding from 0.001 to 3.38 mg/m3. Blood manganese ranged from 2.9 to 36.9 ug/l (median 9.8 ug/l) and the cumulative exposure index from 0.28 to 35.5 mg/m3 x years.
Significant dose-response relationships were found between MnA, MnA x y and MnB and the rate of scoring on neurobehavioral performance tests outside the cutt-off level <5% and > 95% in the control group. Based on these relationships , the benchmark dose values (BMDL 10) were calculated. They amounted to 0.24 mg/m3 for MnA, 4.9 mg/m3 x y forMnA x y and 7.37 ug/l for MnB. These findings are in concordance with the present ACGIH TLV-TWA of 0.2 mg/m3 and the suggestion made by Roels(1987) that in manganese-exposed workers, the MnB concentrations should not exceed 10 ug/l.

OCCUPATIONAL DETERMINANTS FOR CRYPTOGENIC POLYNEUROPATHY

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[ID 1750]

Objectives: To investigate if occupational or hobby exposures are determinants for cryptogenic polyneuropathy.

Methods: A case-referent study included 232 cases of cryptogenic polyneuropathy, from three separate departments of neurology in south Sweden, and who were 40-79 years of age at diagnosis. From the population register 853 referents were randomly selected in the same age range. Data on exposure came from a postal questionnaire. For both cases and referents the response rate was 71%. Crude odds ratios (COR) and logistic regression odds ratios (LOR) were calculated for exposures with five or more exposed cases and referents taken together. In the logistic regression only exposures with COR >1.50 or <0.67 were included together with age as a continuous variable. The reference category was defined as individuals unexposed to any of the occupational or hobby exposures in the questionnaire.

Results: Male sex and increasing age were significant determinants. Results in the table are for men (108 cases and 274 referents) and women (56 cases and 330 referents), respectively. Only LOR >3.50 are presented.

		MEN			WOMEN		
	Exposures	Exposed cases vs referents	LOR >3.50	95%CI	Exposed cases vs referents	LOR >3.50	95% CI
OCCUPATIONAL	*LEAD*	8/12	--	--	2/4	4.58	0.62-33.36
	sulphur dioxide	4/4	5.04	0.63-39.84	*	--	--
	nitrous oxide	*	--	--	2/3	3.67	0.49-27.01
	xylene	5/5	4.20	0.61-28.57	*	--	--
	MEK	5/7	4.22	0.65-27.06	*	--	--
	HERBICIDES	11/14	3.98	0.98-16.08	*	--	--
	insecticides	7/15	--	--	3/4	7.10	0.57-87.49
HOBBY	*GASES/SMOKE*	8/4	6.62	0.64-68.10	*	--	--
	SOLVENTS	16/8	8.84	2.43-32.04	1/4	--	--

* less than five exposed cases and referents together
Interaction was seen between several occupational and hobby exposures in men.

Conclusions: Several, from animal studies and case reports, known determinants for polyneuropathy could be confirmed and new were indicated i.e. sulphur dioxide, xylene and methyl ethyl ketone.

APPLICATION OF HE WECHSLER ADULT INTELLIGENCE SCALE REVISED TO WORKERS EXPOSED TO MERCURY IN ALGERIAN COMPANY.

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[ID 709]

Objectives
To measure the intelligence quotient (IQ) in the workers exposed to high concentration of mercury using the Wechsler adult intelligence scale revised (WAIS-R).
Materials and method
The current study was carried out in 2005, 47 workers of the mercury production factory (mean age: 41 years, education 6 years, years of employment: 16, blood mercury: 9 ug/dl, urinary mercury: 142 ug /g creatinine) were matched by age, gender, years of employment to 83 controls employees in a hospital (mean age: 45 years, education 5 years, years of employment: 7, blood mercury < 1,5 ug/dl, urinary mercury < 5 ug /g creatinine).
The Wechsler adult intelligence scale revised (WAIS-R) was applied alternatively in Arabic and French language. The participants completed an individual two hours test.
This scale includes eleven subtests. The verbal IQ (VIQ) is evaluated by six subtests and the IQ of performance (PIQ) is evaluated by five subtests. Amount 69: mental of two scores (VIQ and PIQ) give the total IQ (score of TIQ deficit).
Data were analysed with the software EPIINFO.6. The Chi 2 was applied to assess the association between qualitative variables.
Results
The results of the WAIS-R are:
69 is obtained by 60 % of the exposed personnel For the total IQ, a score and 18% of the control group, the difference is statistically very significant (p = 0, 000001).
A reduction in the verbal IQ was observed for 30 % of the workers exposed to the vapor of mercury and only 8,5 % of the control group, the difference is statically significant (p = 0,0001).
The reduction is also observed in the IQ of performance for 45 % of the workers exposed to the vapor of mercury and 13 % for the non-exposed group. The difference is statically significant (p = 0, 000001).
Conclusion:
This study finds a significant reduction in the verbal and intellectual performances in the workers with high concentration of blood and urinary mercury metal.

EXPOSURE ASSESSMENT AND EXPOSURE MODELLING

ON THE USE OF DIFFERENT EXPOSURE MEASURES-EXPERIENCES FROM A CASE-CONTROL STUDY ON TESTICULAR CANCER AND PVC EXPOSURE

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[ID 1755]

Associations between exposure to PVC plastics and testis cancer have been reported. To improve the exposure-response analysis in a matched case-control study on testicular cancer and occupational exposures, a self-administered exposure questionnaire as well as expert assessment was applied and different exposure measures were developed.
The self-administered questionnaires regarding work histories and employment in PVC production, manufacturing and handling of PVC products were completed by 1582 subjects (90%). By expert assessment, 360 subjects were considered exposed and the exposure intensity to PVC-plastics for different working periods was determined. Different exposure measures to PVC-plastics were then developed, such as ever/never exposed, duration, maximum intensity, median intensity and cumulative median intensity.
The correlation between the different measures of exposure was high for exposure duration and the cumulative median exposure intensity (Spearman rank coefficient r_s=0.94), as was the correlation between the maximum intensity and the median intensity (r_s=0.94). The agreement between the answers in the self-administered questionnaire and the expert assessments was moderate, Kappa value 0.56. The odds ratio for ever exposed based on the exposure as reported in the questionnaire was 1.1 (95 % CI 0.82-1.56), and as determined by expert assessment 1.3 (CI 1.05-1.69). The odds ratios for all four different categories of exposure measures varied between 0.86 and 2.6, but decreased by increasing exposure.
An overall excess of testis cancer for the PVC exposed versus the unexposed was not supported by the pattern seen in a standard exposure -response analysis based on several exposure measures. The findings stress the importance of using several exposure measures as dose surrogates when the underlying toxic mechanisms are unknown and when there are indications of an overall effect.

EXPERT CONSENSUS RATINGS OF OCCUPATIONAL PHYSICAL EXPOSURES USING JOB CATEGORIES FROM THE THIRD NATIONAL HEALTH AND NUTRITION EXAMINATION SURVEY (NHANES III)

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[ID 362]

Objectives: Exposure assessment of occupational physical activities in epidemiologic studies is often limited by time, cost and the availability of only job titles or categories. This study describes a method of physical exposure assessment based on expert ratings. The objectives of this study were: 1) to develop expert ratings of physical activities for selected job categories 2) to assess inter-rater agreement among the experts, and 3) to validate the expert ratings by comparing them to an independent source of ratings.
Methods: Five expert ergonomists were sent a survey asking them to estimate, for 40 job categories defined in NHANES III, the proportion of the work day spent in the following activities: sitting, standing, walking/running, heavy lifting, kneeling and working in a cramped space. The estimate represented the "typical" exposure for all jobs in each category using an 11-point ordinal scale (0, 10, 20…100). In addition, experts estimated lower and upper range limits for each activity in the job category, and rated their confidence in their rating. Then experts met as a group to discuss and arrive at consensus ratings. Initial and consensus ratings were compared with ratings published by the US Department of Labor (US DOL). Weighted kappas, Pearson and intraclass (ICC) correlation coefficients were used to assess agreement.
Results: Weighted kappas and correlation coefficients were highest for initial ratings of sitting (K= 0.562; ICC=0.80) and lowest for working in a cramped space. Initial ratings and consensus ratings were well-correlated with US DOL ratings (Pearson correlation coefficients ≥ .70). Variability of initial ratings appeared to be due to ambiguous definitions of physical activities. Analysis also addresses exposure heterogeneity within job categories.
Conclusion: This method of obtaining expert ratings shows promise for use in epidemiological studies, particularly due to its ease and its ability to produce ratings on a more useful scale and that are comparable to US DOL ratings. However, further validation of ratings is needed.

CHARACTERIZATION OF AIRBORNE DUST GENERATED DURING PRODUCTION OF CEMENTED CARBIDES

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[ID 552]

Epidemiology studies suggest that inhalation of dusts generated during handling of pre-sintered "green" and post-sintered cemented carbides can cause hard metal disease (HMD). Inhalation of either cobalt (Co) or tungsten carbide (WC) powders, both used in the manufacture of cemented carbides, may not be sufficient to cause HMD. Rather, inhalation of Co in the presence of WC may be required to cause HMD via generation of reactive oxygen species (ROS). Generation of ROS may be dependent upon whether dusts deposited in the lung are heterogeneous WC/Co particles (i.e., bulk WC particles containing Co) rather than discrete Co particles or WC particles. To investigate this hypothesis, we characterized the physicochemical properties of dusts generated in different processing steps during manufacture of cemented carbides at a company with cases of HMD. General area air samples were collected from 16 separate work areas in which material properties were likely to be altered by the manufacturing process using 10-stage micro-orifice uniform deposit impactor samplers. Dust collected on stages 1 (aerodynamic diameter cutoff, Dae = 10 µm), 3 (Dae = 3.2 µm), and 5 (Dae = 1.0 µm) of each sample were characterized using scanning electron microscopy-energy dispersive x-ray spectrometry. Within each work area, chemical composition of airborne dusts was similar among the three size fractions, differing only in the relative proportion of elements. Between work areas, the chemical composition of airborne dust became more heterogeneous with processing. Dusts generated during initial powder blending were discrete Co particles and discrete WC particles, whereas dusts generated subsequent to ball milling (i.e., pressing, sintering, and grinding) were heterogeneous multi-chemical constituent WC/Co particles. If heterogeneous WC/Co particles cause HMD via generation of ROS, these data may help to explain the relationship between the handling of both green and post-sintered cemented carbides and risk of developing HMD.

ESTIMATING THE CONTRIBUTION OF PERCUTANEOUS BENZENE ABSORPTION IN RETROSPECTIVE EXPOSURE ASSESSMENT

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[ID 682]

In order to acknowledge a possible occupational etiology of chronic disorders of the haematopoietic system according to the German occupational diseases regulation (No. 1303 of annex 1: diseases caused by benzene, its homologues, or by styrene) an individual assessment of the internal

benzene exposure is compulsory. Especially the retrospective estimation of percutaneous benzene absorption has raised problems in this context. Based on general toxicological and medical considerations and extensive literature research focussing on relevant in vitro and in vivo data, we propose the following pragmatic and simplified principles for assessing the internal load by percutaneous benzene uptake:

• The percutaneous uptake of benzene vapours is negligible in most common occupational settings.

• For skin contact with liquid benzene, the fundamental algorithm is adequate:

Dermal Uptake [mg] = Penetration Rate [mg x cm-2 x h-1] x Exposed Skin Surface [cm2] x Exposure Time [h]. As a default, calculations should be based on a dermal benzene penetration rate of 1 mg x cm-2 x h-1 for exposed workers. In case of prolonged exposure to liquid benzene, especially under occlusive conditions, a penetration rate of 2 mg x cm-2 x h-1 is considered as a conservative approach.

• Benzene uptake by handling benzene solutions should be taken into account by assuming a linear relationship between benzene amount and dermal absorption.

• In order to estimate the individual total dose, the results of dermal exposure assessment have to be combined with data concerning the benzene uptake via inhalation, the latter being usually calculated from measured or estimated air concentrations. For that purpose, the dermal uptake may be transformed into a fictitious air concentration ("inhalative equivalent"), assuming an inhaled air volume of 10 m3 per 8 hours shift and a benzene retention of 50% in the lungs:

Inhalative Equivalent [mg/m3] =

Mass Absorbed by Dermal Uptake [mg] / (10 [m3] x 0.5).

EXPOSURE ASSESSMENT OF WORKERS WITH POTENTIAL EXPOSURE TO TETRAFLUOROETHYLENE

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[ID 707]

An epidemiological study is being carried out to investigate the risks amongst workers exposed to tetrafluoroethylene (TFE) during the manufacture of PTFE. Estimates of TFE and ammonium perfluorooctanoate (APFO) exposure were made to inform this study.

Seven factories in Europe and the USA were visited and detailed descriptive information about the historical development in relation to TFE and APFO exposure was collected. Inhalation exposures for both TFE and APFO were reconstructed for a number of jobs, along with dermal and ingestion exposures to APFO.

The exposure assessment method used the job description and information on frequency: both how long exposure lasted during each shift and how often subjects were exposed each year, to derive numeric task-based values for exposure. Using a combination of estimated exposure intensity and the exposure frequency (i.e. number of days per year) we adjusted our estimates to take account of the number of hours per day workers were exposed and the effects of wearing respiratory protection and protective clothing. Finally, the average daily exposure metric was calculated by summing the task-based exposures.

Exposure estimates for both TFE and APFO decreased over the years of production (1952-2002) in all factories, which can be attributed to improvements in technology and cleanliness. Typically, operators working in the polymerisation area had the highest exposure to both TFE and APFO, with exposure being at least approximately double those for other jobs. For those jobs where there was both exposure to TFE and APFO there was a strong correlation between the two estimates (rs = 0.87).

For APFO, the inhalation route of exposure was found to be the main contributor to uptake, with negligible contributions from the dermal and ingestion routes.

For the epidemiological study the numeric exposure values were classified into four broad groups: high, medium, low and very low.

TRENDS IN INHALATION EXPOSURE: MID 1980'S TILL PRESENT

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[ID 872]

The long-term changes in inhalation exposure to flour dust, wood dust, rubber dust and fume, respirable dust, quartz and toluene from the mid 1980s onwards were investigated using data sets held by the collaborators and the UKs National Exposure DataBase (NEDB). In addition, follow-up measurements were obtained in 28 companies where exposure measurements had been collected over 10 years ago, with staff being interviewed to identify factors responsible for any changes observed.

Following log-transformation of the data, analysis of the temporal trends for the relevant time periods was undertaken using mixed effect models. Average time trends were different depending on the substance and data source. For toluene yearly reduction was between 11% (NEDB) and 44% (industry). Rubber dust data showed between 6.3% (NEDB data) and 2% (industry data) yearly reduction for the whole data set whilst rubber fume decreased by 6% and 3.5% respectively. Wood dust exposures declined by 8% per year although no statistically significant trends were observed for the flour dust data (both from NEDB). For data collated from the quarry industry, respirable dust exposures declined by 6% each year, but there was no significant trend for respirable quartz. Ten follow up quarry surveys were completed, with the respirable dust exposures declining yearly by 4%, whereas quartz exposures increased by 0.4% per year. Ten follow up wood dust surveys found exposures to decrease by 8.5% per year. Following exclusion of one company with unusually high and prominent results, toluene exposures decreased by 1% per year for the remaining seven companies revisited.

Downward trends in exposure were observed for all the substances analysed except for flour dust and quartz, with the time trends being similar between the wood and respirable dust case study and large data sets. Factors thought to be responsible for these trends will be discussed.

SOCIAL DISPARITIES IN THE BURDEN OF OCCUPATIONAL EXPOSURES

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[ID 1423]

Most occupational studies focus narrowly on a limited set of exposures and a particular disease, yet workers typically experience multiple exposures simultaneously. In addition, sociodemographic factors may influence the health impacts of these exposures. The objectives of this paper were to: assess the burden of occupational exposures among a socially diverse population working in a range of industries; and evaluate whether sociodemographic characteristics affected the patterns of these exposures. Study participants were recruited through labor unions at 14 worksites. A questionnaire (English and Spanish versions) collected sociodemographic characteristics (gender, race/ethnicity, low income, immigrant status), workplace exposures (dust, chemical, noise, musculoskeletal and job strain), social hazards, and a variety of health outcomes within the past year. Workplace exposures were assessed using a 3-point scale, and prevalence of "high" exposure was reported.

1282 workers (72%) completed the survey. Study participants averaged 45 years in age, and 10 years' employment. 36% were women, 39% African-American, 23% Hispanic, and 24% White. Almost 1/3 had wages below the regional living wage. 60% had a high school education or less and 48% were born outside the US. 47% of the population reported 3 or more high exposures; only 15% reported none. High exposure reporting varied substantially among sociodemographic groups. For example, both Hispanics and Blacks were at least 60% more likely to report high shoulder strain than Whites, and women were 26% more

likely to report high job strain than men. Some of these disparities were explained by the jobs held by different groups, but after statistically controlling for job, many of the disparities in the reports of exposure remained. All gender disparities were attenuated, but many race/ethnicity disparities were not. Sociodemographic characteristics should be considered when conducting exposure assessments, especially when using questionnaires. More research is needed to understand how these factors may influence exposures.

BASICS FOR PREVENTIVE OCCUPATIONAL SURVEY WHEN WORKING IN OXYGEN DEPLETED ATMOSPHERE

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[ID 1434]

By banning halogenated extinguishing agents the producers of those systems were inspired to look for other protection processes. One of those procedures is to reduce the oxygen concentration down to approximately 13 vol% in the ambient air at the workplace to be protected.
But we habe to consider, that oxygen is indispensible to life when employees work at those workplaces with an oxygen depleted atmosphere.
In general the quality of the air at workplaces should fulfil two conditions at least: A) Sufficing concentration of oxygen for all levels of stress, B) practically no hazardous compounds.
Nowadays certain office areas or control rooms are clean air conditioned, but packed with combustible electronic equipment.
If in those areas oxygen of the atmosphere is depleted, the acceptability of such an environment has to becontrolled for preventive occupational health and social legal reasons connected herewith.
In a pilot study we examined 60 empoyees beeing destined to work in an oxygen depleteed atmosphere. The standardised examinations included an sophisticated test of lung function, cardio-circulatory function, and blood gas analysis at rest and under submaximal ergometric exercise.
One third of the group showed findings, which induce us to shorten the scheduled examination interval of three years down to two or one year.
The reduction of the examination interval was reasoned by the following sociolegal question: If an employee suffers a cardiocirculatory or cerbrovascular attack, while working in an oxygen depleted atmosphere, could he have survived such an incidence for at least twelve months, compared to work in a not oxygen depleted atmosphere. If the employee would not survive, the incidence or pass away within a period of less than one year after incidence, the employee or his relatives may be compensated for the sequelae of the incidence.
Those social legas aspects require a well-bases management of the preventive occupational health survey.

KINETIC OF URINARY ETHYLENETHIOUREA IN HUMANS: A FIELD STUDY IN AGRICOLTURE WORKERS

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[ID 1607]

Assessment of exposure in agriculture workers is scarcely performed due to difficulties in carrying field studies and little knowledge on suitable indices. Ethylenethiourea (ETU) is a major metabolite of ethylenebisdithiocarbamates (EBDCs), a class of pesticides widely used all over the world and its excretion in urine has been suggested as a biomarker of occupational exposure to EBDCs and their residues. To enlarge the knowledge on this index, and particularly to investigate the best time for sample collection, a kinetic study was conducted in the field.
With this aim we recruited 5 male Ecuadorian rose growers working in a greenhouse farm located in the Andean region close to Quito. After 7-day without spaying pesticides, the subjects applied EBDCs during a single work-shift. They collected all urinations from prior to the beginning of the application shift until the end of the day after. ETU was measured by GC/MS in the presence of a deuterated internal standard.
Median ETU values at the beginning of the shift, at the end, and prior to the next shift, were respectively 31, 38 and 67 µg/g creatinine. The profile of excretion along the investigated time frame showed that ETU level did not significantly increase for about 5-6 hours from the beginning of the application; after this time ETU started to increase and reached the highest concentrations during the night after the application (between 22:00 and 6:00 next day). In prior to the next shift sample (about 8:00 in the morning) ETU was still significantly elevated in comparison to pre- and post-application excretion. After this time ETU rapidly decreased and approached half its maximum value around noon.
The results suggested that ETU may be adopted as a biomarker of short-term exposure and that prior to the next shift is the best time for sample collection.

BIOMARKERS FOR ARSENIC EXPOSURE AMONG WORKERS EATING SEAFOOD

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[ID 1667]

Introduction
People eating seafood excrete high concentration of organic arsenics as arsenobetaine (AsBe). So speciation analysis of urinary arsenic compounds is recommended by ACGIH and DFG. In order to determine feasibility of the biological marker for people generally eat seafood, urinary arsenic species were measured in volunteers without occupational exposure to arsenic compounds.
Materials and Methods
Speciation analysis of urinary arsenic compounds was conducted among 145 males and 46 females who lived in Japan with mean age of 39.3 years old. They were not exposed to arsenic from environment and occupation, but did not avoid eating seafood. Urine sample were collected at any time. Arsenic species were measured using high performance liquid chromatography with inductively coupled plasma mass spectrometry (HLC-ICP-MS). Cation and anion exchange mode were used for separation of arsenic compounds. The ICP-MS detection masses were *m/z* 75 ($^{75}As^+$), *m/z* 72($^{72}Ge^+$), and *m/z* 77($^{40}Ar^{37}Cl$).
Results
The median and 75 percentile of arsenic levels of the 191 urine samples were as follows: Total arsenic, 114.2 and 193.2; arsenite, 2.9 and 10.0; monomethylarsonic acid, 1.9 and 4.6; dimethylarsinic acid (DMA), 37.8 and 61.3; and AsBe, 50.9 and 95.6 µg As/L, respectively. The DMA content was almost one-third of the total arsenic.
ACGIH and DFG recommended urinary arsenic level consisted of inorganic arsenic plus methylated metabolites as biological exposure levels for 0.01 mg/m^3 of arsenic exposure to be 35 µg/L and 50 µg/L, respectively. About 75% of the volunteers exceeded the BEI level by ACGIH, and 56% of them did the BAT level by DFG.
Conclusion
Most people without occupational exposure exceeded BEI or BAT level of arsenic. These results suggested not only AsBe but also AsIII, MMA and DMA in urine were elevated by seafood intake.

IMPLICATIONS OF SEAFOOD ORGANIC ARSNEIC SPECIES COMPARISON ON URINARY INORGANIC ARSENIC METABOLITES LEVELS

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[ID 1337]

The present study was conducted to explore the roles of seafood items and seafood arsenic species on the urinary inorganic arsenic metabolites, and the possible metabolism of these ingested food organic arsenic species. Twelve volunteers were invited to participate in this study. The seafoods used for this study included seaweed, clam, oyster, and shrimp. During the one-week study period, study subjects were provided with all meals for dietary seafood control, and the designated seafoods provided at the lunch and dinner on the fourth day. All the urine excretions of the

study subjects were separately collected for the day prior to their ingesting seafood, and the following 3 days. Food arsenic species were determined by HPLC linked with ICP-MS for arsenite, arsenate, monomethylarsonic acid (MMA) and dimethylarsinic acid (DMA), arsenobetaine, arsenocholine, trimethylarsineoxide, teramethyarsoniumiodide, and total arsenic species, while urinary inorganic arsenic metabolites were determined with HPLC-HGAAS for arsenite, arsenate, MMA and DMA. DMA was found the dominant one and constituted about 80% of the urinary inorganic arsenic metabolites. In general, elevation of total urinary inorganic arsenic metabolite levels were about 5~28 ug/L after ingesting 100~200 g seafoods, varying among seafood items. In addition to verifying the time effect, the present study further demonstrated the significant role of arsenosugar-containing else arsenic species, compared to arsenbetaine and DMA, on the transfer of organic arsenic species into various forms of inorganic arsenic metabolites in urine, i.e. DMA, MMA, arsenate, and arsenite ($p<0.005$). Meanwhile, the seafood item was also found with strong influence on the urinary arsenic species levels. The findings of the present study suggested that the contribution of seafood intake on the background urinary inorganic arsenic metabolites levels could be estimated by verifying the organic arsenic species in seafood, and accordingly be differentiated from the specific environmental and/or occupational inorganic arsenic exposure.

RETURN TO WORK INTERVENTION

RETURN TO WORK INTERVENTIONS FOR ADJUSTMENT DISORDERS: A SYSTEMATIC REVIEW

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[ID 937]

Absenteeism among workers is often caused by emotional and psychological stress related to significant life events. Stress often leads to symptoms and impaired functioning and can result in an adjustment disorder. Adjustment disorders in workers are very common. More than 10% of total claims for occupational diseases are adjustment disorders attributed to stress at work.

Many interventions are available for workers with adjustment disorders. Interventions can be aimed at the individual worker or groups of workers. The outcome of these interventions is often reduction of emotional an behavioral symptoms and adequate coping behavior of the worker, resulting in return to work.

Currently no systematic review on return to work interventions for adjustment disorders exists. With the help of the Cochrane Occupational Health Field, the Cochrane Depression, Anxiety and Neurosis Review Group and the Dutch Cochrane Centre we have conducted a systematic review on this topic. The objectives of the review are to evaluate the efficacy of interventions aimed at return to work for workers with adjustment disorders, and to investigate the impact of different types of interventions.

In the review we will apply the following 'PICO':

• Population:

Adults (18 years or older) with work disability related to an adjustment disorder. Adjustment disorders are defined as significant emotional or behavior problems in response to an identified stressor, as described in the DSM IV classification. Patients with other common mental health disorders and psychiatric disorders are excluded.

• Intervention:

The research will focus on interventions aimed at individual or group approaches like pharmacologic interventions, cognitive coping strategies, relaxation techniques, exercise programs, and employee assistance programs.

• Control:

Interventions without work directed components.

• Outcomes:

Return to work, functional status, and quality of life.

Electronic databases such as the Cochrane databases, MEDLINE, CINAHL, EMBASE, PSYCH Info, DARE and Biological Abstracts will be searched to identify potentially eligible studies and review articles. Final results of the review will be available in early 2006 and will be presented at the ICOH Congress.

"INCLUSIVE WORKING LIFE" IN NORWAY – WHAT IS THE CONTRIBUTION OF THE "INCLUSIVE WORKING LIFE CENTRES"?

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[ID 948]

Introduction

"Inclusive Working Life" (IWL) is a Norwegian national intervention program initiated in 2002. The objective is to reduce sickness absence, prevent early retirement and to promote employment of functionally impaired. More than half the Norwegian workforce is now included. The incentives in the IWL program are partly economical, partly advisory assistance from the regional "IWL-centres". The IWL centres are a part of the Norwegian National Insurance System. There are 19 IWL centres in Norway, one in each county.

Objective

Our objective was to study the role of the IWL centres and their contribution to the Norwegian IWL intervention program.

Material and methods

86 enterprises were in 2004 selected from the "IWL Bank of Models of Good Practice". They received mail questionnaires to one representative from the workers and one from the management. We also interviewed 16 of the enterprises and their Occupational Health Service and the local IWL centre. This paper presents the results from the IWL centre interviews.

Results

We found that the IWL centres role is mainly related to the following: They provide information about IWL to managers and employees, give guidance regarding follow-up routines and systems, give advice and guidance regarding goals and action plans for the IWL work, offer different kinds of education and training related to IWL (especially to first line managers) and give advice and guidance regarding individual employees. Most of the enterprises we interviewed were very satisfied with the contribution of the IWL centre, although we found that the contribution differed between the local IWL centres. The advantage of having a contact person from the local IWL centre who also knows the enterprise was appreciated by the enterprises. The use of external assistance from the IWL centre and Occupational Health Service seems to be associated with a decrease in sickness absence and low turnover.

Conclusion

The use of the IWL centres was highly appreciated by the enterprises and regarded as an important contributor to the IWL process in the enterprises.

COST EFFECTIVENESS OF A RETURN TO WORK PROGRAM FOR WORKERS ON SICK LEAVE DUE TO LOW BACK PAIN

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[ID 1066]

Background: Little is known on cost-effectiveness of interventions in low back pain (LBP)

Objective: To evaluate the cost-effectiveness and cost-utility of a return to work (RTW) program for workers on sick-leave due to LBP, comparing a participatory ergonomics program implemented between 2-8 weeks of sick-leave with usual occupational care, and a clinical intervention after 8 weeks of sick-leave with usual occupational care.

Design: Economic evaluation alongside a randomised controlled trial (RCT).

Study population: Workers sick-listed for a period of 2 to 6 weeks due to LBP aged 42.6 on average. Workers from all groups were comparable on all measured potential prognostic factors in all three comparisons of two groups each made (data impossible to present in an orderly fashion (table) via this website....)

Interventions: 1. a participatory ergonomics program. 2. physiotherapy based on operant behavioural principles. 3. usual occupational care.

Outcome measures were lasting return to work (RTW), pain intensity, functional status, quality of life and general health. The economic evaluation was conducted from a societal perspective. Outcomes were assessed at baseline (after 2-6 weeks on sick-leave) and 12 weeks, 26 weeks and 52 weeks after the first day of sick-leave.

Results: The participatory ergonomics group (n=96) returned to work 30.0 days (95% CI=[3.1-51.3]) earlier than the usual care group (n=100) at higher costs (ratio of 1 day: €19). Workers in the physiotherapy group that had received usual care in the first 8 weeks (n=28) returned to work 21.3 days (95% CI= [-74.1, 29.2]) later then the group with usual care only (n=32). The group that had received participatory ergonomics in the first 8 weeks and physiotherapy after 8 weeks (n=27) returned to work 50.9 days (95% CI=[-89.4, -2.7]) later then the group that received participatory ergonomics in the first 8 week and usual care after 8 weeks (n=25). Participatory ergonomics was more effective than usual occupational care in RTW at slightly higher costs and was more effective than usual care at equal costs on improving functional status and quality of life, but was not effective on pain intensity and general health. Physiotherapy was less effective than usual care and associated with higher costs.

Conclusion: Participatory ergonomics is a cost-effective treatment option resulting in a faster RTW for this group of workers.

Workers on sickleave

> 2 weeks (n=196) Workplace intervention
< 8 weeks (n=52) Usual care
< 8 weeks (n=60)
Workplace intervention Clinical intervention Clinical intervention
Yes (n=96) No (n=100) Yes (n=27) No(n=25) Yes (n=28) No (n = 32)
Baseline characteristics
Age in years (mean; SD) 44.0 (8.6) 41.2 (10.7) 43.6 (7.9) 43.5 (6.7) 39.2 (9.9) 43.3 (9.5)
Sex (male/female) 51/45* 33/67* 13/14 14/11 6/22 13/19
Job type:
- Industrial 11 6 6 0 2 3
- Transportation 2 3 1 0 0 1
- Office work 20 17 3 7 5 8
- Health Care/Services 56 65 15 17 18 18
- Other 7 9 2 1 3 2
Heavy physical work index [1-4] (mean; SD) 2.0 (0.5) 2.1 0.5) 2.0 (0.6) 2.0 (0.4) 2.1 (0.4) 2.1 (0.5)
Job control [1-4] (mean; SD) 2.6 (0.4) 2.5 (0.4) 2.6 (0.3) 2.6 (0.3) 2.5 (0.3) 2.6 (0.5)
Job demands [1-4] (mean; SD) 2.5 (0.3) 2.6 (0.3) 2.5 (0.4) 2.5 (0.3) 2.7 (0.3) 2.5 (0.3)
Supervisor support [1-4] (mean; SD) 3.0 (0.3) 3.1 (0.5) 3.0 (0.4) 3.0 (0.3) 3.2 (0.4) 3.1 (0.4)
Radiating pain (y/n) 15/81 22/77 4/23 5/20 7/21 9/23
Job satisfaction [1-4] (mean; SD) 1.7 (0.8) 1.7 (0.8) 1.7 (0.8) 1.7 (0.8) 1.7 (0.8) 1.7 (0.8)
Expectation of patients on return-to-work [1-7] (mean; SD) 3.6 (1.2) 3.6 (1.1) 3.4 (1.2) 3.6 (1.1) 3.5 (1.1) 3.4 (1.1)
Sick-leave prior to inclusion (partial/full) 20/76 35/65 21/6 21/4 22/6 24/8
Baseline values outcome measures
Sick-leave (days) of current episode of LBP prior to inclusion (median, IQR) 26 (19-36) 24 (18-30) 24 (10-38) 27(11-42) 24 (11-40) 25.5 (14-37)
Functional status (RDQ) (mean, sd) 14.9 (4.2) 15.3 (3.3) 16.2 (4.0) 15.3 (3.3) 12.7 (4.4)* 16.2 (3.1)*
Pain severity (mean, sd) 6.5 (1.7) 6.6 (1.7) 6.8 (1.3) 6.6 (1.7) 6.3 (1.5) 6.9 (1.4)
General health (mean, sd) 62.1 (16.5) 61.4 (11.1) 60.5 (17.4) 61.4 (11.1) 65.0 (14.2) 57.8 (15.7)
Table 1 baseline characteristics

DETERMINANTS OF RETURN-TO-WORK FOR OCCUPATIONAL INJURY WITH UNCOMPLICATED UPPER EXTREMITY FRACTURE: A SIX-MONTH FOLLOW-UP STUDY

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[ID 1673]

To find the return to work (RTW) status of workers suffered from uncomplicated upper extremity fracture due to occupational injuries and the determining factors, we completed a island wide prospective of study on 110 insured workers, and followed at 45, 90 and 180 days after injury by telephone interview with a structuralized questionnaire which consisted of two parts: RTW survey and quality of life survey. The RTW questionnaire collected the following information including basic demographic data, medical treatments (time lag of being sent to hospital, durations of hospitalization etc.), physiological ability (self-rated workability etc.), social support (concerns from medical personnel, friends, other financial support etc.) and employment condition (size of company, with fixed employer etc). A pilot test to patients who ever visited occupational injury clinic was launched to examine the validity in advance. Logistic regression, Cox regression model and Kaplan-Meyer analysis were executed. The study results showed one thirds of patients were still unable to return to work at 6 months after injury. Self employed workers pose great difficulty to return to work especially at 3 months than workers with fixed employer. After adjustment for other prognostic factors, workers with other-than-digit fracture (hazard ratio (HR) 0.32, 95 % CI 0.17 to 0.63), workers who are household bread earner (HR 0.23, 95 % CI 0.09 to 0.63), male workers (HR 3.45, 95 % CI 1.23 to 9.71) and employed workers who had received financial help from employer (HR 3.25, 95 % CI 1.36 to 7.76) were related to RTW. The delayed return to work for female or workers without social support may be even worse as time went by. Timely targeting on employed or non-employed workers with great difficulty to return to work, and offering assistance through early intervention of a team integrating prevention, compensation, and rehabilitation programs seems to be mandatory for meeting multifaceted needs.

CHRONIC ILLNESS AS A CAUSE OF LONG TERM ABSENCE – HOW 7 COUNTRIES MANAGE RETURN TO WORK

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[ID 455]

This paper reports on a 7 country study of chronic illness as a cause of absenteeism and how it may lead to long-term exclusion from the labour force. Undertaken in seven EU Member States, the study details the current prevalence of chronic illness as a cause of absence from work in Ireland, the UK, Sweden, Finland, the Netherlands, Italy and Germany. It also examines the response that are made to what is acknowledged as a growing problem by a range of services including public health, occupational health, rehabilitation, training, welfare and income replacement.
National systems vary with regard to the extent that they acknowledge chronic illness to be a problem in causing absence (absence rates range between 3% and 10% in the countries concerned). Most countries can demonstrate that chronic illness is a growing problem, especially amongst older workers and that it leads to early exit from the labour force. However, in countries such as Sweden, Finland and the Netherlands, which have older working populations, the response in terms of the development of new policy, regulation and new configurations of services has been most striking.
Analysis of national responses indicates that for the target groups concerned, interventions by employers, occupational and public health services need to be much more focused on return to work. Elements of a successful strategy include increasing employer responsibility, improving communications between workplace and health services, and placing a greater focus within treatment services on return to work.
The paper concludes with a set of recommendations specifically targeted at what occupational health services can do to improve return to work strategies.

THE EFFECTIVENESS OF ERGONOMIC INTERVENTIONS ON RETURN-TO-WORK AFTER CHRONIC LOW BACK PAIN. A MULTINATIONAL COHORT STUDY

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[ID 789]

Background: To date, there is little evidence about the occurrence and effectiveness of ergonomic interventions on return-to-work after low back pain.
Objectives: To study occurrence and effectiveness of ergonomic interventions on return-to-work applied for workers with low back pain (LBP).
Methods: A multinational cohort of 1631 workers fully sicklisted 3-4 months due to LBP (ICD-9 codes 721, 722, 724) was recruited from sickness benefit claimants databases in Denmark, Germany, Israel, Sweden, the Netherlands and the United States. Medical, ergonomic and other interventions, working status and return-to-work were measured using questionnaires and interviews at three months, one and two years after the start of sickleave. Main outcome measure was time to return-to-work. Cox's proportional hazards model was used to calculate hazard ratios regarding the time to return-to-work, adjusted for prognostic factors.
Results: Ergonomic interventions varied considerably in occurrence between the national cohorts: 23.4% (mean) of the participants reported adaptation of the workplace, ranging from 15.0% to 30.5%. Adaptation of job tasks and adaptation of working hours was applied for 44.8% (range 41.0%-59.2%) and 46.0% (range 19.9%-62.9%) of the participants, respectively. Adaptation of the workplace was effective on return-to-work rate with an adjusted hazard ratio (HR) of 1.47 (95% CI 1.25-1.72; p<0.0001). Adaptation of job tasks and adaptation of working hours were effective on return-to-work after a period of more than 200 days of sickleave with an adjusted HR of 1.78 (95% CI 1.42-2.23; p<0.0001) and 1.41 (95% CI 1.13-1.76; p=0.002), respectively.
Conclusions: These results suggest that ergonomic interventions are ef-

fective on return-to-work of workers long-term sicklisted due to LBP.
References
Anema JR, Cuelenaere B, van der Beek AJ, Knol DL, de Vet HC, van Mechelen W. The effectiveness of ergonomic interventions on return-to-work after low back pain; a prospective two year cohort study in six countries on low back pain patients sicklisted for 3-4 months. Occup Environ Med. 2004 Apr;61(4):289-94.

MODELS OF RETURN TO WORK IN PAIN DISABILITY

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[ID 817]

Musculoskeletal pain disorders are the most prevalent, costly, disabling and commonly researched conditions in the workplace, yet the development of overarching conceptual models of return to work (RTW) in these conditions have been lagging. This paper focuses on the critical evaluation of biomedical, social construction and biopsychosocial theories of disability, including the recent integrative World Health Organization Model (ICF, 2001), and their implications for specific conceptual RTW models in musculoskeletal pain. The specific RTW models selected for the review differ on four dimensions: the underlying theoretical construction of RTW; the research tradition; the degree to which the model focuses on the individual; the social systems or the interaction among them; and the prominence given to some key determinants of RTW. The main tenets, implications for diagnosis, treatment and disability compensation, together with the scope of applicability and limitations, are the key perspectives analyzed for the following conceptual models of RTW: biomedical, psychosocial, forensic, ecological and biopsychosocial.
The main features of the recent evolution of RTW models were identified as: replacement of a psychopathology model by a social adaptation model with emphasis on cognitive and motivational factors; the articulation of temporal patterns of disablement; the expansion of the ecological model to include societal disability stakeholders such as employer, health care, insurance systems and society at large; the inclusion of macrosystem-based economic factors; the shift away from forensic and compensability factors towards improved efficiencies in health care management; and the increased evidentiary basis of the biopsychosocial model in RTW with greater efforts to operationalize the multidimensional systems-individual interactions in RTW. Research challenges arising from the need for multivariable, parsimonious, valid, generalizable, and reliable RTW models are discussed.
Conclusions for future construction of transdisciplinary, integrative, interactive, temporal, and multidimensional RTW models, disability research, and primary, secondary, and tertiary prevention practice are drawn.

COORDINATED TAILORED INTERVENTION ON PATIENTS WITH LONG TERM SICK LEAVE DUE TO MUSCULOSKELETAL PAIN

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[ID 590]

Background Long term sick leave due to low back pain (LBP) has significant personal, social and economic consequences (1,2). In Vejle County Denmark, a coordinated return to work (RTW) program was tested on patients sick listed from ordinary work between 4 and 14 weeks due to musculoskeletal pain. The program included a coached interdisciplinary team who provided tailored intervention strategies to the existing professionals and organizations. The interdisciplinary team included an occupational physician, a chiropractor, a physical therapist with occupational skills, a psychologist and a social worker. The team had broad competencies including social and industrial law, clinical diagnosis, treatment and rehabilitation.
Objectives The main objective was to evaluate the effect of a coordinated tailored intervention on patients with long term sick leave (4-14 weeks) due musculoskeletal pain.
Design The study was done as a Randomized Control Trial (RCT) where part of the participants received the RTW program carried out by the interdisciplinary team and the other part received standard care.
Method Patients sick listed from ordinary work between 4 and 14 weeks due to musculoskeletal pain were refered from social offices in four municipalities (150.000 people) in the county of Vejle, Denmark. Patients were randomized, using a computer program, to either the RTW program by the interdisciplinary team or standard and random care.
Data analysis and preliminary results 115 were included in the study over a 12 month period. 67 in the intervention group, 48 in the control group. A number of health, social and economic variables will be used in evaluating the effectiveness of the RTW team. RTW status, number of days on sick leave as well as the proportion still at work after 12 months will be included. Results at 12 months follow-up will be available in April 2006.

DETERMINANTS OF RETURN TO WORK AND SUBSEQUENT RELAPSE AMONG SICKNESS ABSENT DANISH EMPLOYEES: PROSPECTIVE RESULTS FROM DWECS/DREAM

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[ID 513]

Aims
- Identify determinants within socio-demography, health behaviour, employer characteristics, and work environment for return-to-work (RTW) among employees sickness absent for two or more weeks
- Establish associations between time to RTW and subsequent relapse
Methods
5,357 employees were interviewed in 2000 regarding age, gender, family status, education, health behaviour, employer characteristics, and work environment. They were followed in a national sickness absence register for 18 months. Subjects experiencing sickness absence periods of two or more weeks were identified. They were followed for additionally 12 months, in order to establish associations between baseline measurements and time to first RTW. The subjects who returned were followed for additionally 12 months, in order to study associations between time to RTW and reoccurrence of sickness absence.
Results
930 (17.4%) employees experienced sickness absence periods of two or more weeks in the 18 months after baseline measurements. During the 12-month follow-up after onset of sickness absence, 856 (92.0%) returned to work. The mean period receiving sickness absence compensation was 6.6 weeks. Prolonged absence was associated with female gender, increased age, no post school education, being employed by a public employer, working at a workplace with 20+ employees, high emotional demands in work, high job insecurity and sedentary work. There were no associations between health behaviour and return to work.
The presentation will include results regarding associations between time to RTW and subsequent episodes of sickness absence.
Conclusion
The study showed an increased risk of prolonged sickness absence among women, older age groups, and the less educated. Also, RTW seemed to be faster at privately owned workplaces, and at smaller workplaces. Among the potentially more changeable determinants, the study indicates a potential for promoting RTW through interventions targeting emotional job demands, job insecurity and decreasing the risks associated with sedentary work.

SELF-EFFICACY IN A WORK DISABILITY PREVENTION FRAMEWORK

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[ID 1018]

Background
Work disability prevention (WDP) has been subject for scientific attention over the recent years. Challenges are still considerable, because WDP interferes in a complex, multidimensional process from being at work, to experiencing sickness absence, and subsequently returning to work. The behaviour is determined by the individuals' perceived ability to manage work disability and the return to work process. Self-efficacy is generally defined as confidence in being able to carry out a set of specified activities.
However, no research has been performed on self-efficacy in a working population, before sickness absence occurs. This is important in order to target the role of self-efficacy as framework for intervention and to understand the work disability process in order to prevent the risk for permanent

labor market exclusion.
Objectives
To examine the role of self-efficacy in the framework of work disability prevention.
Material and methods
5.357 employees were interviewed regarding work environment, health, and self-efficacy. A national absence register was used to identify subjects who experienced sickness absence exceeding three weeks or more during a period of 78 weeks. The subjects were followed for one year after onset of sickness absence. Logistic regression methods were used to calculate risk of sickness absence. Cox regression (time to event analyses, the event being RTW) was used to calculate age-adjusted Hazard Ratios.
Results
Self-efficacy showed no significant associations with subsequent sickness absence or RTW. However there was a significant difference in self-efficacy measured in the working population mean 82.9 (82.5-83.2) and the population with sickness absence, mean 75.1 (71.2-79.0).
Conclusion
The results indicate a need to investigate potential changes in self-efficacy in relation to changes in labor market status. This is important when designing WDP interventions, where planning should address the change in self-efficacy that can occur after onset of sickness absence.

HEALTHY LIVING AND HEALTHYWORKING: HEALTH PROTECTION AND PROMOTION

THE NEW ITALIAN LEGISLATION ON TOBACCO SMOKE AT THE WORKPLACES: A RESEARCH ON THE FIRST HALF-YEAR OF APPLICATION OF THE LAW

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[ID 234]

Introduction
In January 2005 article 51 of the Italian Act 3/2003 has come into force. This article prohibits tobacco smoking in all work environments.
We evaluated the application of the law and consequent changes occurred in working habits.
Methods
We analized 587 private or public companies, mostly in northern Italy. We divided them into private or public and into small (<20 workers), medium (20 to 99) and big companies (>99).
We studied:
-the application of the prohibition;
-the designation in the firm of the responsible for the application of the law;
-the installation of the correct warning notices;
-the possible activation of smoking rooms and their effective respect of technical specifics required;
-the number of clashes caused by the law among workers and between them and the employer.
Results
The law has been at least partially applied in 537 firms (91,5%). Firms which completely haven't activated the law are all small. We verified that 436 firms (74,3%) respected the law completely, 501 firms (85,3%) placed correct warning notices, 411 firms (70,0%) designated the responsible for the application of the law, only 13 big firms (2,2%) installed smoking rooms.
Clashes caused by the new law have been reported only in 105 firms (17,9%), mostly among workers.
Discussion
The results show the law has been widely applied, even if not in small firms. The warning notes have mostly been placed correctly, while a relevant percentage of firms haven't correctly defined the responsible for the application of the law and this could be fined. We verified that only very few firms decided to activate smoking rooms, because of the severe technical specifics imposed by the law. Finally, the small number of clashes caused by the law shows how it has been well accepted and applied by the great majority of workers.

THE SMOKING HABIT IN APPRENTICES. A PILOT STUDY

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Introduction
The smoking prevalence in adults is high in blue collar workers with a low educational level and income. Little is known about the smoking habit in young apprentices. This pilot study assessed the smoking habit in a population of young Italian apprentices.
Subjects and Methods
3674 apprentices (females: 39.2 %) undergoing a health examination to assess fitness for work in Viterbo, Central Italy, were recruited to this pilot study.
Results
Overall, 53.8% of apprentices were smokers. Smokers were fewer among female apprentices than among the males (47.2% vs 58.0%; chi-square test, p<0,001)
Logistic regression analysis showed low educational level, employment as manual workers and daily intake of alcohol and coffee significantly increased the risk of being a smoker (p<0.01), while gender was of borderline significance (p=0.05).
63.1% of the apprentices referred smoking up to 10 cigarettes daily. Logistic regression analysis showed male sex, duration of smoking habit, low educational level, working as a blue-collar worker, daily alcohol intake and drinking 2 or more cups of coffee every day significantly increased the risk of smoking more than 10 cigarettes/die (p£0.02 for each factor.
Discussion
Our results show smoking is alarmingly widespread in a population of apprentices in Central Italy. Prevalences of smokers are, in fact, much higher than estimated in the 14-24 and 25-34 age-groups of the general population (19% and 29%, respectively).
Several factors (e.g. social, cultural and behavioural) might explain, at least in part, the high prevalence of smokers among young apprentices, who may be at greater risk of occupational diseases and injuries.
Specialists in Occupational Medicine who perform health surveillance of workers could play a preminent role in the anti-smoking campaign.When offered in the workplace, advice from a health professional, individual and group counselling and pharmacological treatment to overcome nicotine addiction, increase the likelihood of quitting smoking.

HUMAN METABOLISM GENERATES INDUSTRIAL CHEMICALS WITH TOXIC AND CARCINOGENIC PROPERTIES: AN EMERGING CHALLENGE FOR OCCUPATIONAL TOXICOLOGY

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[ID 1746]

Implementation of strict regulations protecting industrial workers from overexposure to toxic chemicals has greatly reduced the concentration of several specific exposure markers measured in their biological fluids to levels now approaching those measured in the general population, which is exposed mainly to environmental pollution. Low levels of metabolites of carcinogenic chemicals are measured in subjects for whom exposure from occupational sources and from common dietary or lifestyle-associated sources, such as smoking, can be ruled out. Such exposure may causatively contribute to the incidence of cancers of 'unknown' origin in the general population. The origin of such toxic chemicals may be traced to minor products of the metabolism of endogenous or dietary compounds either by the human organism or by the host's enteric flora. A few examples will be presented:
a) Ethylene, a natural plant ripening hormone, is generated in mammals from oxidation of methionine, along with methylmercaptane, an off-odorous compound involved in hepatic coma. Metabolic oxidation to the carcinogenic ethylene oxide is testified by detection of hydroxyethyl-modified DNA and protein adducts.
b) Suspected leukemogenic phenol and its polyhydroxylated metabolites can be generated from dietary phenylalanine and tyrosine by catabolic pathways analogous to those leading from tryptophan to skatole, indole and indoxyl, the products responsible for the characteristic odour of stools. Styrene can be generated by decarboxylation of cinnamic acid, a natural metabolite of Phe, common in vegetable foods.
c) The weakly carcinogenic isoprene is the main VOC of exhaled air. Its natural occurrence is traced to spontaneous decomposition of isoprenyl phosphate, the key building block for the biosynthesis of sterols and polyprenols.
To accurately understand the biochemical pathways of their formation and the ways to reduce their production by modification of dietary and lifestyle habits represents a new trend in prevention of diseases arising from human overexposure to toxic chemicals.

IMPROVING LIPO-GLYCAEMIC CONTROL IN MALE TYPE 2 DIABETES MELLITUS PATIENTS WITHOUT INSULIN THERAPY

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[ID 172]

Aim: to study the metabolic control states of lipids and glucose in a primary industrial care setting in patients treated with oral agents.
Methods:
We selected patients from the occupational health check up who have impaired glucose tolerance (IGT) and frank type 2 diabetes during the period 2002 to 2004. 83 patients were recruited with ages between 27 to 53 years of age who have been treated by diet or oral medication. A recommended

annual fasting and lipid profile was evaluated for risk analysis as per ADA (American Diabetic association) guidelines. The outcome measures fasting glucose Triglycerides, HDL-cholesterol, LDL- cholesterol and the post prandial glucose are linked with therapeutic decisions.

Results

N= no of cases	Age group Mean+/- 2SD	FBS Mean+/_ 2SD	PPS Mean+/_ 2SD	Trg Mean+/- 2SD	HDL-Cho Mean +/- 2SD	LDL-Cho Mean +/- 2SD	Systolic BP Mean+/- 2SD	Diastolic BP Mean+/- 2SD
N=16	29.03(1.06)	113.5(16.19)	164.19(24.24)	157.87(38.88)	50.12(19.29)	97.72(29.13)	127.2(8.84)	88.93(7.08)
N=45	36.93(3.01)	112.56(35.50)	156.23(45.39)	198.68(93.42)	43.06(4.90)	118.28(38.56)	125.10(10.94)	86.35(7.59)
N=19	43.63(2.85)	114.21(41.99)	182.95(94.47)	187.42(80.08)	42(5.51)	98.01(20.26)	121.87(15.09)	86(81.6)
N=3	52.66(0.577)	115(41.21)	189.5(31.82)	355(252.1)	43.33(3.05)	83.33(37.09)	132.66(3.05)	80.66(16.04)

Conclusions:

The persons are having low to borderline risk and vascular status of pre hypertension stage. The relation of glycaemia to macro vascular disease in type 2 diabetes is modest. Aggressive glycaemic control with mixed balance of diet and exercise is necessary to improve the situation to retain work ability without complications.

MAKING THE BUSINESS CASE FOR HEALTH PROMOTION AT THE WORKPLACE

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[ID 1442]

In today's globalized world occupational health professionals find themselves in the position of making a business case for health services at the workplace. Often their jobs and the existence of the occupational health unit is on the line as increasing demands are placed upon them. In addition, companies face the pressure of maximizing productivity while work-related stress disorders and unhealthy lifestyles of their employees are on the rise. Sick leave has become a huge problem, e.g., 600 million working days are lost due to work-related illness in Europe. This has created the need for innovative health promotion programs which go beyond the scope of traditional occupational health programs.

The presentation will outline how to make the business case for health promotion at the workplace and provide occupational health professionals with useful arguments as well as a step-by-step process on how to communicate with management. This includes underlining the impact of "presenteeism" - employees at work who are not performing at their maximum capacity - and how to address this phenomenon. Presenteeism is indicative of much greater health-related productivity loss than absenteeism which merely reflects the tip of the iceberg. Several tools that measure presenteeism and work performance will be presented, e.g., health risk appraisals and self-report questionnaires.

In addition, best practices will be presented featuring companies which successfully lobbied management and proved the economic value of their health promotion programs. Special emphasis will be placed on how health promotion programs address psychosocial issues at the workplace through an integrated and holistic approach and on the new role of occupational health services. This presentation is targeted to occupational health professionals whose job profile is in transition and who are under pressure to prove their value to management and business.

IMPROVEMENT OF WORKING CONDITIONS AND ENVIRONMENT IN THAILAND BY USING PARTICIPATORY APPROACHES

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[ID 363]

Introduction

During the past decade, the Occupational Health Situation conditions in Thailand were seen as unsatisfactory. According to the Workmen's Compensation Fund, in 1994 whose scheme covered only about 4.25 million workers, the number of occupational injuries and diseases cases was 186,053, or about 73.79 cases per 1,000 workers. In 2004 whose scheme covered only about 7.39 million workers, the number of occupational injuries and diseases cases was 215,534, or about 29.18 cases per 1,000 workers.

Objective

To improve working conditions and environment in workplaces by using participatory approach.

Methods

There are various activities to improve working conditions and environment in workplaces. One of the most famous and very powerful activities is by using participatory approach. One of the popular participatory approaches is WISE (Work Improvement in Small Enterprises).

One example is that we conducted WISE for enterprises that had environmental problem, for example in a lamp manufacturing factory that had problem of environmental heat. We used WISE checklist and brain-storming to identify the problems. From the group discussion, they suggested to use barrier between furnace and workers. We measured environmental temperature of before and after improvement and found that barrier can reduce the heat from working environment. in WBGT by using ISO 7243 - 1982: Hot Environments -Estimation of the Heat Stress on Working Man, Based on the WBGT Index.

NICE also conducts a participatory approach to improve working conditions and environment for the enterprises that have problem on musculoskeletal disorders. We use ISO/TS 20646 "Ergonomics procedures for the improvement of local muscular workloads" as our guideline. We found that many workplaces can improve their working conditions and environment to reduce muscular workloads of the workers and also increase efficiency.

Conclusion

The participatory approach has been proved effective to improve working conditions and environment in workplaces and also productivity. If we focus the improvement at the source of occupational injuries, it can reduce the number of occupational accident and diseases.

MUSCULOSKELETAL HEALTH, MUSCLE STRENGTH, PHYSICAL ACTIVITY, AND ABSENTEEISM FROM WORK

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[ID 635]

Introduction: Musculoskeletal disorders, MSD, are a major concern for society in general and for absenteeism from work in particular. Therefore, strategies for health promotion in this area are pertinent. Lower muscle strength has been reported among workers with MSD compared to those without. Differences in muscle strength may be due to differences in physical activity. The aim of this study was to elucidate these relationships among office workers.

Methods: A total of 580 office workers (375 females and 205 males, age 23-67 years) answered a questionnaire and 534 of these were tested for shoulder elevation and abduction strength. The questionnaire inquired about MSD in the neck/shoulder area, absenteeism the last six month, and physical activity at work and leisure. The workers were divided into two contrast groups according to their report on MSD the last 3 month: more than 30 days (cases) and less than 7 days (controls).

Results: Cases/controls accounted for 25/48 % among females and 15/62 % among males. Further, females had approx. half the shoulder muscle strength of males. However, within each gender no major differences were found in shoulder elevation strength between cases and controls: 68 Nm vs. 70 Nm for female and 137 Nm vs. 129 Nm for males. Physical activity differed regarding overall intense activity and was higher among controls (217 min/week) than cases (140 min/week). Further, mean absenteeism was lower for controls (2.35 days per 6 month) than for cases (3.54 days per 6 month), even though no gender differences were seen (females 2.57 and males 2.36 days per 6 month).

Conclusion: Intense physical activity per week rather than muscle strength per se is related to lower prevalence of MSD and absenteeism. These results support that employers should favour intense leisure-like physical activity in conjunction with office work.

A FOREST BATHING TRIP ENHANCES HUMAN NATURAL KILLER ACTIVITY

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[ID 1720]

In order to explore the effect of forest bathing on the human immune system, 12 healthy male subjects aged 37-55 years from three large companies in Tokyo, Japan were selected with informed consent in the present study. The subjects took a three-day/two-night trip at 3 different forest fields. The schedule of the forest bathing trip was as follows: on the 1st day, subjects walked for 2 hours in the afternoon at a forest field, and on the 2nd day, subjects walked for 2 hours in the morning and afternoon, respectively at two different forest fields. Blood was taken on the 2nd and 3rd days, and natural killer (NK) activity, levels of NK, T cells, granulysin, perforin, granzymes A&B in peripheral blood lymphocytes, and concentrations of cortisol and interleukins in plasma were measured. Data were also taken before the trip on a normal working day as the control. Almost all of the subjects (11/12) showed higher NK activity after than before the trip. There are significant differences between both before and after the trip and between days 1 and 2 in NK activity. The forest bathing trip also significantly increased the number of human NK and the number of granulysin, granzymes A and B and perforin expressing cells. Taken together, these findings indicate that a forest bathing trip can increase human NK cell number and activity. This effect at least partially mediated by the induction of intracellular perforin, granzymes A/B and granulysin. Phytoncide may contribute to the increased NK activity.

This work was supported by a research project for utilizing advanced technologies in agriculture, forestry and fisheries of Japan. The ethics committee of the Nippon Medical School approved this study (No. 16-1).

LIFE STYLE RISK FACTORS EVALUATION AMONG STEEL WORKERS

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[ID 748]

The HESME (Health Environment and Safety Management in Enterprises) WHO program implementation in Macedonia gave the basis of need assessment for workplace health promotion. Aim: Evaluation of the life style risks (smoking, alcohol consuming and physical inactivity) in workers and detection of groups at risk for which promoting programs are necessary. Material and methods: In the framework of HESME program pilot implementation, with respect to methodological recommendations for interdisciplinary approach, a group of 118 employed of a metallurgy plant (108 male, 10 female) mean age 46,2 ± 8,3, range 19-61 were examined. The European questionnaire for work conditions survey was applied and fulfilled by a doctor. Descriptive and inferential statistical methods were used. Results: From the 118 examinees, 47 were every day smokers (39,8%), 22 (18,6%) were alcohol consumers, 47 (39,8%) were physically active and stress at work was present in 83 (70,3%). Alcohol consumers were 27,6% from the total number of smokers which was statistically significant ($p<0,05$) compared to non smokers that consume alcohol (12,7%). The absence from work during the previous year was more common in smokers-38,3%, compared to non smokers-16,9% ($p<0,01$). High statistical significance was registered ($p<0,001$) for the presence of stress at workplace distributed by gender-75% in male and 20% in female. Light physical activity in male examinees was present with 43,5 %, and in female was not registered at all ($p<0,01$). In workers younger then 40 years smoking was more present (54,2%) compared to individuals older then 40 years (39,8%), but statistically yet not significant. Conclusion: The evaluated life style risks were with high prevalence, more evident in younger workers, especially smoking and physical inactivity in women. This data should be basis for creating promoting programs and activities especially due to the established fact that smoking is associated with absenteeism.

INCREASING PHYSICAL ACTIVITY IN AN ACADEMIC SETTING: AN INTERVENTION FOR FACULTY AND STAFF

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[ID 1282]

Significance: A sedentary lifestyle is identified as a strong risk factor for chronic diseases such as hypertension and diabetes. Since many faculty and office staff working in an academic setting have sedentary jobs, a behavioral lifestyle intervention delivered in the worksite is an effective strategy to reach this group of adults who may not regularly participate in physical activity (PA) within or outside of the work environment. The investigators were interested in developing an effective worksite intervention that may contribute to faculty and staff health promotion by increasing PA at work.

Aims: 1) Examine theory based variables from the Theory of Planned Behavior related to self-reported PA; 2) Examine the feasibility of a self-paced physical activity intervention for faculty and staff in an academic setting

Methods: The pilot project used focus groups and a pre and post test design over a 12 week period during the academic year. All faculty and staff at a Midwestern School of Nursing were eligible to participate (N=246). The intervention included daily PA monitoring using pedometers, educational classes, motivational signs within the school, bi-weekly e-mails and a specially designed website with PA information.

Results: Repeated analysis of variance revealed that the worksite PA intervention increased behavioral and attitudinal beliefs related to worksite PA. The program was well accepted among the faculty and staff, easy to implement, affordable to all participants and promoted morale throughout the School of Nursing. Worksite cues including motivational signs strategically placed in high traffic areas, bi-weekly emails and a specifically designed web-site offered non intrusive yet highly visible information regarding physical activity.

Conclusions: Findings suggest promising results of a work-site intervention to increase walking at the work site. Decreases in self-efficacy suggest the need for stronger motivational boosters throughout the intervention.

WORK ORGANIZATION AND WORK STRESS MANAGEMENT

IMPROVEMENT OF MODERN WORKING LIFE THROUGH THE APPLICATION OF A TOTAL PRODUCTIVE MAINTENANCE METHOD

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[ID 1630]

Introduction. The contribution to improvement of quality of life at work through quality in production has not been completely developed. Total Quality Management (TQM) and Total Productive Maintenance (TPM) have introduced worldwide kaizen (kai = change to become zen = good), a new philosophy of work, mainly based on continuous people-oriented improvements. TPM implies total involvement of employees by upper level management, aiming to remove product accidents, defects, and breakdowns, as well as worker injuries, stress, and occupational and work-related diseases. Productive actions are performed while production keeps going, progressively minimizing troubles for workers and production. Maintenance: employees are empowered to initiate and suggest continuously corrective actions and improvements of work organization to reduce strain and ergonomic troubles (awkward positions, manual handling, long-term standing positions, upper limb strain injuries), and to get a better working life, fitness, well being, job satisfaction, creativity. Methods. 159 workers of a food factory have been involved on TPM. Through its five founding elements (teamwork, personal discipline, improved moral, quality circles and suggestions for improvements), they have asked for improvements in working conditions to reduce fatigue and energy cost expenditure in a few tasks on the shopfloor, with involvement of the occupational physician. Work quality has been measured in 10 different job positions before and after kaizen intervention, based on total number of final products, total number of wasted products, number of workers, average heart rate associated with work tasks. Results. After kaizen intervention (improvement of job design, job position and reduction of the number of upper limb movements per hour), average heart rate showed a 10% reduction, lost of products a 84% reduction in the boxing area, and total production a 3% increase. Conclusion. Defining and measuring what was perceived as a heavy task allowed to redesign 10 work positions, introducing a better man-machine interface, and to promote better health, safety, and productivity.

COMBINATIONS OF ORGANISATIONAL-ORIENTED AND INDIVIDUAL-ORIENTED INTERVENTIONS FOR STRESS REDUCTION IN THE WORKPLACE: A PROCESS AND EFFECTIVENESS EVALUATION

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[ID 965]

This study evaluates the effectiveness and the intervention process of an occupational stress management program, which has been realised in the Belgian subsidiary of a large chemical company. The program is conceptualised as a combined intervention integrating organisational-oriented as well as individual-oriented stress management activities. A pretest-posttest design with non-equivalent control group is applied to investigate if the program is effective in reducing work-related stress and its negative short-term and medium-term health consequences (assessed outcome variables: work-related stressors, perceived stress, irritation, psychic exhaustion and psychosomatic symptoms). In addition to these negative outcome variables positive outcome variables (decision latitude, social support, self-efficacy, sense of coherence and pleasure of work) have been considered as well. Two types of process variables (process quality and achievement of process goals) are included. Their influence on the intervention outcome is investigated in order to identify important issues for program improvement and to facilitate the interpretation of intervention outcomes. The study has been realised with a sample of 56 program participants (intervention group: N = 29; control group N = 27). Results show that process goals have only partly been achieved. The program shows a small degree of effectiveness with regard to psychosomatic symptoms. Other outcome variables are not significantly affected. Correlational analyses resulted in significant correlations between process variables and program effectiveness. For instance the identification of relevant stress sources correlated significantly with the reduction of psychosomatic symptoms. This indicates a high potential of program effectiveness if a better program implementation (i.e more concrete stress management actions) is realised.

WHEN FIRM DOESN'T GO WELL, THE SALARIES EMPLOYEES DON'T EITHER...

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[ID 1125]

Introduction: The common organization of the railways and public transports in Benin and Niger goes back to 100 years, patrimony of Benin and Niger. After a great thriving economy, it goes now through economical difficulties which have as consequences: restructuration schemes and a process of privatization. This chronical situation has an impact on the health of the workers who are under stress. This document is a study about the activities of the nurse in a firm. It highlights the relations between stress and economical difficulties and the role of the nurse in occupational health.
Aims: Assess the stress. Evaluate the professional causes and find out the part linked to the changes. Detect the consequences of the stress. Propose ways of improvement.
Methodology: Questionnaire – Observation – Interview – Literary review – Statistics with the softwares "épi info" and Excel.
Results: Detected stress is of 63 % and the clinical stress is of 25 %. The **frequent turnover** of the directors worry 91 % of the workers ; 99,2 % worry because of the economical difficulties in the society.
Conclusion: The changes linked to the economical difficulties, to the instability in the management and to the process of privatization in the long term are responsible for causing stress in the firm.

ANALYSIS OF THE ORGANIZATION AND OF THE ORGANIZED WELL BEING; QUALITY OF LIFE AND SAFETY ON THE JOB PLACES

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[ID 1288]

Although there is increasing interest in the relationship between organizational constructs and staff well-being in the healthcare workplace, information on the reliability and validity of the instruments measuring these constructs is sparse.
To elaborate a quantitative/qualitative method that would allow us to evaluate the relationship between the staff psychological well-being and workplace organization in the healthcare setting,a research was conducted in one hospital and 2 territorial departments pursuant to the following objectives:
a) Definition and Placement of a risk code for the "risk from stress";
b) Analysis of the organizational models with subsequent identification of the
critical factors, following a vision that prevents the discomfort caused by the job and that fosters the well-being of the operators staff and that elaborates corrective measures;
c) Creation of interventions finalized to the management of the risk from stress.
The intervention employed instruments that allow an analysis that is both quantitative and qualitative, necessary to assess the safety level of the organization, and to understand how an organization works, respectively. Specifically, the inquiry was based on semi-structured interviews of the hospital managers, and on questionnaires and focus groups for the personnel.
The following dimensions were evaluated: the quality of communication between the employee and the management agency/service; the emo-

tional component developed with the job objective; how the organization is suitable to the social-demographic aspects of the working population; the quality of the personal relationships on the workplace; the presence of discomfort caused by the job and/or compatible with mobbing.
The resulting data allowed us to define the risk codes of the organization in a more objective way than the questionnaire ladder, with the consequent mapping of critical areas and the identification of preventive and protective measures to apply and to monitor over time.

EFFORT-REWARD IMBALANCE: COMPARISON OF ONE GLOBAL QUESTION WITH AN ITEM-BASED SCALE

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[ID 1683]

Background: A construct is usually measured by a scale based on several items. An alternative is a single global question. Many arguments can be raised for and against the two methods of measuring a construct. One very pragmatic reason for establishing good global questions is the length of questionnaires in studies where you want to include many different constructs.
This study examines the validity of a global question on effort-reward imbalance (ERI-global)
Methods:
A random population sample of 14,124 working Danes responded to a questionnaire about work, health and sickness absence including psychosocial work characteristics and SF-36 questions . The ERI-scale was constructed from three items on effort and 6 on reward from a short-form of the Siegrist ERI-questionnaire. We also included a global question on ERI ('Do you consider that your efforts at work are sufficiently appreciated') with 6 ordinal response categories. Objective data on any sickness absence for more than 2 weeks was recorded by linkage to a Danish Register. The 7-day test-retest reliability of ERI-global had previously been examined in another study (n=138, weighted kappa 0.69 (95% CI 0.60-0.78)).
Results:
The Spearman correlation coefficient between the ERI-scale and the ERI-global question was 0.40. The ERI-global question had stronger associations to the ERI-scale reward items than to the effort items.
Effort-reward imbalance is considered to be a source of stress at work. We therefore compared the relation of the ERI-scale and ERI-global question with measures of stress (SF general health, mental health and vitality, general work satisfaction and sickness absence).
The ERI-scale had correlations of 0.22, 0.38 and 0.39 with SF-36 general health, mental health and vitality, respectively. The corresponding correlations for the ERI-global question were 0.23, 0.37 and 0.36. The correlation with a measure of overall job satisfaction was 0.36 for the ERI-scale and 0.59 for the ERI-global question. The ERI-scale and ERI-global question showed similar associations to objective sickness absence with a doubling of the OR at the highest ERI-levels.
Conclusion:
The single ERI-global question seems to perform well in comparison with the established ERI-scale based on 10 items.

ORGANISATIONAL DEVELOPMENT UNDER STRESSFUL WORKING CONDITIONS

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[ID 1290]

Work organisational conditions supporting development of health and well-being among employees is a key issue for organisational learning and development. Middle managers, in their double role as responsible for both production and for human resource management, often however tend to prioritize production issues. Perceived stress among employees may hinder innovativeness and competence development, which in the long run also hampers development of health.
Aim
To study how conditions for organizational development are associated with effort, reward and commitment among employees.
Material and methods
A questionnaire was mailed to all employees at a county council in Sweden (n=10 886), 79% responded. Most employees are health care workers. The questionnaire comprised questions on climate for development and change (climate for change- and development, open mindedness, learning from mistakes, continuous improvements), and questions on effort, reward and commitment (ERI) by Siegrist. Data were analysed with logistic regression analysis, adjusting for sex, age, profession, and night/day working hours.
Results
A negative climate for change was strongly associated with an increased risk for employees having an ERI quotient > 1.0 (7.4 < OR < 9.9 for the different items of change climate). This association was partly due to moderate associations between a negative change climate and high effort, and in particular to high associations between a negative change climate and low perceived reward at the work place. Decreasing levels of a positive change climate at the work place were also associated with increasing levels of overcommitment.
Conclusions
A limited or negative change climate is strongly associated with perceived stress, as measured by the effort reward imbalance, which may lead to negative health conditions. Employees in health care experiencing a negative change climate appear to be at increased health risks, as their commitment is elevated.

EVOLUTION OF MENTAL HEALTH SICKNESS ABSENCE DURING AN INTERVENTION ON PSYCHOSOCIAL WORK ENVIRONMENT

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[ID 125]

Sick leave due to mental health problems have increased in many industrialized countries and are among the most common, costly and debilitating types of health problems in the working age population. In studies that have measured improvements in psychosocial work factors, significant decreases in symptoms associated with mental health and sick leave, from 9% to 55% were observed. In 2000, we started an evaluative research of a participatory intervention designed to optimize the psychosocial work environment to ward off mental health problems among caregivers. Evaluation of the changes in psychosocial factors, and in certified sickness absence was an objective of this study.
A quasi-experimental design was used with a control hospital and before-after intervention measurements. Self administered questionnaires were filled by caregivers before intervention (T0), one year (T1) and two years (T2) after the intervention. Most scales had good metric qualities. Using Karasek's Demand-Control-Support model and Siegrist's Effort-Reward Imbalance model, an intervention group (caregivers, management and local unions) identified changes needed in work organization to reduce negative health effects. Sickness absence data was collected from administrative files, two years before to three years after the intervention. Medical certificates were required for absence lasting more than five days.
This intervention has produced significant results. In the experimental hospital at T2, all negative work factors except social support have decreased (6/10 significantly) and all health indicators have improved (4/5 significantly). In the control hospital, only two work factors have improved significantly but two have deteriorated. Only one health problem has improved. The evolution of absences for mental health problems, over the five-year period will be presented.
Optimizing psychosocial work environment creates winning conditions for health and well-being. The methodological strengths of this research (sound theoretical models, quasi-experimental design, validated instruments) favours its generalization outside of the health care sector.

PSYCHOSOCIAL WORK ENVIRONMENT IN DENMARK 1997 AND 2005. IMPROVEMENTS OR DETERIORATION?

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[ID 1065]

Material and methods. In 1997 a representative sample of Danish employees filled in a questionnaire on psychosocial work environment factors and health. The sampling was based on personal registration numbers. N = 1858. Response rate: 62%. The psychosocial work environment was described with a number of scales developed for the Copenhagen Psychosocial Questionnaire (COPSOQ). In 2005 a new sample filled in a similar questionnaire. N = 3517. Response rate: 61%. The purpose of the present paper is to assess the changes in the work environment of the Danish working population from 1997 to 2005.
Results. The results of the two surveys show a number of changes in the psychosocial work environment over the 8 years. Improvements had

taken place with respect to “social support from supervisors”. A number of factors showed no clear changes: “Predictability”, “commitment to the workplace”, “emotional demands”, “demands for hiding emotions”, and “quality of leadership”. Deteriorations had happened with regard to: “influence at work”, “meaning of work”, “role conflicts”, “role clarity”, “sense of community”, “possibilities for development”, “social support from colleagues”, “job satisfaction”, and “high work pace”. In a number of cases, such as “support from colleagues”, the worsening of the psychosocial factors was quite substantial.
Conclusions. The two databases have a substantial size, and the response rates are satisfactory. The scales of COPSOQ are well validated and have high internal reliability. We therefore believe that the results have high validity. It is noteworthy that only one factor showed improvements while all the remaining showed stability or deterioration of the working conditions. Our results are partly in conflict with other studies from North-west Europe. Further analyses of occupations and specific industries are needed in order to elucidate the possible causes of this unfortunate development.

THE IMPACT OF PSYCHOSOCIAL WORK ENVIRONMENT ON SHORT AND LONG SPELLS OF REGISTERED SICKNESS ABSENCE

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[ID 760]

Purpose: To investigate if psychosocial work environment factors predict short and long spells of sickness absence spells differently.
Methods: The Intervention Project on Well-being and Absence (IPAW) is a prospective study including 52 Danish workplaces. For 1919 participants data were available from both the organizations’ absence registrations during 2 years follow-up and the baseline questionnaire measuring psychosocial factors and potential confounders. Analyses were performed by Poisson regression.
Results: In women, decision authority and predictability at work were prospective predictors of fewer *short absence spells (1-10 days)* adjusted for sociodemographic factors, health-related behaviors, organization and intervention assignment (model 1). Further adjustment for physical work environment factors (model 2) attenuated effect sizes somewhat, and decision authority and predictability were no longer significant. In addition, skill discretion became a significant predictor in model 2, but opposite of the expected direction, i.e. associated with *more* short absences. In men, decision authority, supervisor support, predictability and meaning of work predicted lower numbers of short absence spells in model 1. Further adjustment in model 2 resulted in slightly attenuated estimates, but only decision authority became insignificant.
In women, low psychological demands and high decision authority predicted significantly lower numbers of *long absence spells (>10 days)* in both model 1 and model 2. In men, decision authority, supervisor support and predictability significantly predicted fewer long absences in both models.
Further adjustment for SES caused only minor changes.
Conclusion: Specific psychosocial work environment factors showed both common and different effects on short and long absence spells. Decision authority, the factor most consistently associated with absence in the literature, predicted long absences, but not short spells when adjusted for physical exposures not included in previous studies. Significant predictors included predictability and meaning at work, that were conceptualized for this study. Effect sizes were generally larger for long absences.

TOWARD INCORPORATING RACIAL AND ETHNIC DIVERSITY INTO OCCUPATIONAL SAFETY AND HEALTH RESEARCH

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[ID 1158]

The extant literature on workplace psychosocial risks to occupational safety and health (OSH) has two major weaknesses that compromise the ability to effectively address the OSH needs of minority workers in the United States. First, the research studies upon which current OSH knowledge is based have typically not included adequate samples of minority workers. Further, previous research questions have often not taken into account that workers can face race-related psychosocial risks in addition to risks that have been traditionally studied in the OSH literature. These research limitations have resulted in a body of knowledge that does not capture the psychosocial experiences of the racially/ethnically diverse American workforce in an adequate way.
The primary goal of this qualitative research study was to begin to identify psychosocial risk factors that are salient the health and safety of racial/ethnic minority workers in the U.S.
Using community-based participatory research methods, a focus group study was conducted. Study participants were adult males and females employed across a range of blue and white collar occupations and industries. Sixteen focus groups, each comprised of 7-9 participants of the same race and/or ethnicity, were conducted (N=112). Blacks/African Americans, Hispanic/Latinos, Asians, and Native Americans participated in the study. White Americans also participated in the study and serve as a “control” group. In each focus group discussion, participants identified a variety of work organization and workplace psychosocial risk factors they viewed as relevant to their OSH status.
Initial analyses indicate that minority focus groups reported greater exposure to race-related risk factors than White Americans and reported connections between these factors, stress and other OSH problems. These and other results of the study will be discussed. Particular attention will be devoted to highlighting the risk factors identified by each racial/ethnic group. Differences in the extent to which the risk factors are experienced and perceived connections between psychosocial factors and OSH outcomes will also be described.

MENTAL AND PHYSICAL EFFECTS OF TANSHIN FUNIN, JOB-TRANSFER NOT ACCOMPANIED BY FAMILY, ON MARRIED MALE WORKERS IN JAPAN

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[ID 138]

We investigated the effects of tanshin funin, job transfer not accompanied by family, on the health of married Japanese male workers. A historical prospective study using the pair-matched method was performed. One hundred and twenty nine married male tanshin funin workers in their 40s and 50s and as many matched workers living with their family (regular workers) participated. Questionnaire data were collected and the results of regular medical examinations in fiscal years 1997 and 2001 were gathered. Fewer tanshin funin workers took breakfast everyday (OR=3.3, $p<0.001$). Tanshin funin workers more frequently suffered from stress due to daily chores (OR=3.6, $p<0.001$) and from stress-related health problems, namely headache (OR=4.7, $p=0.013$) and gastric/duodenal ulcers (OR=8.7, $p<0.001$). They also developed more frequently common cold/bronchitis (OR=14.5, $p<0.001$). The levels of γ-glutamyl transpeptidase for workers reluctant to work under tanshin funin and workers who spent less than two years in tanshin funin increased significantly from the fiscal year 1997 to year 2001 (46.7 to 67.5 IU/l, $p<0.001$, and 36.9 to 72.4 IU/l, $p=0.005$, respectively), although those of their matched regular workers remained unchanged. The daily alcohol intake of reluctant tanshin funin workers (the equivalent of approximately 817 ml of beer) was higher than that of the matched regular workers (582 ml, $p=0.026$). In summary, abrupt changes in lifestyle and mental stress related to living alone were the problems manifested in tanshin funin workers. When workers were reluctant to participate in tanshin funin, their mental stress, alcohol consumption, and level of γ-GTP significantly increased. Tanshin funin can be a hotbed of work-related diseases, but there are no effective official countermeasures. It is therefore important to provide future tanshin funin workers with health and lifestyle education programs before they start to work under the system, and to supply current tanshin funin workers with mental health care.

OCCUPATIONAL AND ENVIRONMENTAL SKIN DISEASES

HAND ECZEMA AND OCCUPATIONAL SKIN EXPOSURE IN SWEDISH DENTAL TECHNICIANS

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[ID 375]

Background: The hands of dental technicians are exposed to skin irritants and contact allergens, e.g. (meth)acrylates (MA).
Aims: To estimate the incidence of hand eczema and occupational skin exposure in dental technicians.
Methods: In a retrospective cohort study dental technicians (n=2139) and randomly selected population controls (n=2288) of similar age and sex received a postal questionnaire. The questions asked about occurrence of hand eczema including year of onset, occupational skin exposure and use of protective gloves. The response rate was 57% in dental technicians and 58% in controls.
Result: In dental technicians the incidence rate of hand eczema was 8.5 cases/1000 person-years during MA-exposed time and in controls the incidence was 3.3. The incidence rate ratio (IRR) for males was 3.6 (95% CI 2.3-5.6) and for females 2.4 (95% CI 1.7-3.3). 80% of the dental technicians reported skin exposure to uncured MA and 87% had skin contact with grinding dust from MA. 39% used protective gloves when handling uncured MA. 48% of the dental technicians and 30 % of the controls reported more than 10 hand-washings per day ($p<0.001$).
Conclusions: The risk of hand eczema is more than doubled in dental technicians in comparison to the general population. The work involves frequent and unprotected exposure to MA and frequent hand washings. Efforts to raise the level of skin protection are important.

INCIDENCE OF HAND ECZEMA IN FEMALE SWEDISH HAIRDRESSERS

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[ID 405]

Objective: To estimate the occurrence of hand eczema and occupational skin exposure in female hairdressers.
Methods: In a retrospective cohort study a postal questionnaire was sent to 7203 female hairdressers, who graduated from trade schools in Sweden in 1970–1995, and to 7355 female control persons from the general population, matched by year of birth. After two reminders a response rate of 56% in hairdressers and 67% in controls was obtained. The median age of the responders was 29 years (range 19-50) for hairdressers and 31 years (range 18-50) for population controls. A drop out analysis was performed by telephone interviews.
Results: The incidence rate of hand eczema was 23.8 cases/1000 person years for active hairdressers and 9.6 cases/1000 person years for the population controls, RR 2.5 (95% CI 2.2-2.8). In hairdressers younger than 25 years the incidence rate of hand eczema was 37.1 cases/1000 person years. RR was 2.1 (95% CI 1.7-2.5) for hairdressers and 2.3 (95% CI 2.0-2.8) for controls comparing hand eczema in persons with and without a history of childhood eczema. Change of job due to hand eczema was reported by 5.5 % of the hairdressers and 2.0 % of the control persons ($p<0.001$). The drop out analysis did not reveal any difference regarding occurrence of hand eczema between responders and non-responders to the questionnaire. The self-reported exposure to skin damaging substances was extensive.
Conclusions: Hairdressing is a high-risk occupation for hand eczema. The self-reported incidence of hand eczema in female hairdressers was substantially higher than found in register-based studies. The onset of hand eczema occurs early in life for many individuals. The risk for hand eczema was increased in relation to history of childhood eczema. Measures to prevent the development of hand eczema among hairdressers should be given high priority.

A NEW SAMPLER TO ASSESS EXPOSURE DURING WET WORK

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[ID 651]

Background
Irritant contact dermatitis on the hands is commonly associated with wet-work. In the UK approximately 10% of cases of dermatitis reported to the national surveillance scheme are associated with wet working and a further 20% with exposure to aqueous mixtures where wet working probably plays an important role in the causation of the dermatitis. There is evidence that the total time the hands are wet and the number of times they are wet and dried each day are key determinants of risk, but there is no good way of measuring these exposure factors.
Objectives
The main objective of this research was to develop an objective way of measuring the duration and the number of occasions hands are wet.
Methods
We developed an electronic sensor that is worn on the finger. The sensor detects wetness from the effects of evaporative cooling. The output signal is data-logged and the periods of wet working identified using a simple data processing algorithm in an Excel spreadsheet. The device has been tested in a variety of environmental conditions and in a standardized wet-work task with four volunteers on two occasions.
Results
Wetting events were detectable in all of the standardized tests, with the proportion of time the hands were wet ranging from 15% to 49% (mean 30%). If the hands dried 10 minutes after they were removed from water then the expected proportion of time wet would have been 34% The sensor is slightly affected by abrupt changes in air temperature and rapid air movements, but these do not seem to be practical limitations.
Conclusions
This IOM Wet-Work sampler has the potential to provide reliable measurements of exposure that are probably associated with the risk of dermatitis. Further field testing is needed.

NORDIC OCCUPATIONAL SKIN QUESTIONNAIRE (NOSQ-2002) – MORE TRANSLATIONS NEEDED

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Questionnaire-tools for surveying occupational skin diseases and exposure are needed for comparable epidemiological research, workplace assessments, and evaluation of workplace interventions. The Nordic Occupational Skin Questionnaire Group has developed a standardized questionnaire-tool for surveys on work-related skin diseases and skin exposures.
Nordic Occupational Skin Questionnaire (NOSQ-2002) includes two questionnaires designed for separate purposes. NOSQ-2002/short is a 4-page questionnaire for screening skin problems at workplaces. NOSQ-2002/long is an in-depth survey tool for research purposes. The questionnaire covers occupational history, atopic symptoms, self-reported hand or forearm eczema, exacerbating factors, consequences and life impact of dermatoses, self-reported contact urticaria on hands or forearms, skin symptoms, skin tests, exposures, and protective glove use.
The NOSQ-2002 report includes a review of pertinent literature on questionnaire methods for skin disease studies. Instructions and recommendations are given on how to tailor questions to specific populations or occupational groups. The NOSQ-2002 questionnaire and report can be

downloaded via www.ami.dk/NOSQ. The Nordic Council of Ministers has the copyright to the questionnaires and the use is free of charge. The NOSQ-2002 questionnaires and their present and future translations cannot be used commercially.
NOSQ-2002 is now available in English, Danish, Swedish, Finnish, Icelandic and Norwegian. Translations to more languages are needed. The NOSQ-2002 report includes thorough instructions for the translation procedure. We strongly encourage groups in different countries to take up the task of translating NOSQ-2002 into their own languages to provide useful tools for internationally comparable hand eczema epidemiology.
Flyvholm M-A, Susitaival P, Meding B, Kanerva L, Lindberg M, Svensson Å & Ólafsson JH. Nordic occupational skin questionnaire - NOSQ-2002. Nordic questionnaire for surveying work-related skin diseases on hands and forearms and relevant exposures. TemaNord 2002:518. Copenhagen: Nordic Council of Ministers. 2002.
Susitaival P, Flyvholm M-A, Meding B, Kanerva L, Lindberg M, Svensson Å, Ólafsson JH. Contact Dermatitis 2003; 49:70-76.

INTERVENTION TO PREVENT OCCUPATIONAL SKIN DISEASES FROM WET WORK IN THE FOOD PROCESSING INDUSTRY

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Wet work occupations such as the health care sector and the food processing industry have high frequencies of work-related skin diseases. In order to prevent skin problems due to wet work, we have tested an evidence-based prevention program and a documented method for implementation. The intervention study was carried out in the food processing industry, with gut cleaning departments at swine slaughterhouses and cheese dairies as study workplaces.
The effects of the interventions were measured by telephone interviews at baseline and at one-year follow-up. The questionnaires used were based on a standardized questionnaire for work-related skin diseases and exposure (NOSQ-2002) supplemented with trade specific questions on exposure and preventive measures, and questions regarding the information on and discussions of prevention of occupational skin diseases.
Among *gut cleaners* from the intervention departments the frequency of self-reported eczema on hands or forearms within the past 3 months showed a significant relative reduction of more than 25%. A minor increase was observed in the comparison departments.
At the *cheese dairies* the frequency of self-reported eczema on hands or forearms was lower than expected. In the intervention group a significant decrease in skin symptoms in general were observed at follow-up.
Both among gut cleaners and employees at cheese dairies the use of protective measures was intensified (gloves and skin care products), in the intervention groups. Furthermore, the intervention activities resulted in increased knowledge on prevention of skin problems and discussions of prevention at the workplace.
This study has shown that especially for gut cleaners with a high eczema frequency at baseline and limited possibilities to diminish the high exposure to wet work, the frequency of work-related skin problems could be reduced by proper preventive measures.

OCCUPATIONAL DERMATOLOGY EXPERT SYSTEMS IN TELEMEDICINE (ODEST)

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[ID 1123]

Telemedicine in occupational dermatology (ODEST) is not far spread. The standardized routine use of expert systems in teledermatological diagnostics was investigated and validated by occupational dermatologists between the Occupational Diseases Rehabilitation Hospital (ODRH), Bad Reichenhall and the University Institute and Outpatient Clinic for Occupational Medicine, Erlangen, Germany (IPASUM).
ODRH-dermatologists clinical findings were shot standardized by a DCC (Databased Cam Control) driven digital camera (7.1 Megapixels, Focal width: 7.2-28.8mm) during patients admission, course of disease and check out. Dermatological anamnesis, diagnostic findings and ICD-10 data were saved in a relational SQL- (Structured Query Language) data base at the ODRH. IPASUM-dermatologists "second look" of the diagnostic findings occurred after data-„storing & forwarding". Diagnostic data except anamnesis were blinded ahead of transmission. Clinical shots, diagnostic findings and ICD-10 diagnoses were analysed and compared after database query by three IPASUM-dermatologists
Data of n=16 dermatological patients (age: 28-49 J.) working in construction industry, insulation technology and wood processing were analysed and compared. The median duration of dermatological diseases in chronic relapsing courses was 8.7 years, in chronic courses 13 years. Proceeding therapies consisted of steroids, polyvalent drugs, tanning and urea agents as well as P-/UVA treatments. In all cases the IPASUM-dermatologists "second look" ICD-10 diagnoses (L 20.8, L 23.9, and L 30.8) corresponded with clinical diagnoses of the ODRH dermatologist.
ODEST routine use in occupational dermatology is suitable to arrive corresponding clinical findings and diagnoses. Diagnoses set by occupational teledermatology can be used for quality assurance in occupational rehabilitation treatment results

DERMATOSES PROFESSIONNELLES CHEZ LES OUVRIERS DE NETTOYAGE EN MILIEU HOSPITALIER

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[ID 1266]

Introduction
Working in the hospital as well as the cleaning workplace are two risk factors for developing occupational dermatoses. The objectives of these studs were to specify the various dermatoses developed by cleaning workers, their frequencies and to identify the causative agents in the genesis of the dermatoses.
Material and methods
In a descriptive epidemiological study designed and realized by the departments of dermatology and occupational diseases of the Hédi Chaker hospital- Sfax, 164 cleaning workers of the hospital were studied during 6 month. A standard questionnaire was filled for each worker and a clinical examination was made complementary examinations(patch tests, mycological examination) were made when necessary.
Results
Among 164 workers, 39 (23.8%) developed at least dermatoses. Female predominance (64%) was found. Irritant dermatitis was the most common (29.5%), followed by allergic contact dermatitis (22.7%), irritant chemical onychopathy(20.7%) and onychomycosis (13.6%). Less commonly found, were a few cases of urticaria (4.5%), tinéa manuum (4.5%), fingertips dermatitis (4.5%) and interdigital mycoses (4.5%).
The most commonly involved agents in contact dermatoses were detergents and disinfectants (63.6%) and allergens of rubber gloves (27.3%).
Three cleaning workers changed their functions. Twelve cases of occupational dermatoses were declared.
Discussion
Our study in concordance with the literature showed that cleaning workers in hospitals are of risk to develop frequent by hand dermatoses, mainly irritant and allergic dermatoses, in relation to the various agents used in this workplace.
Irritant dermatitis was the most common dermatosis in cleaning workers, probably in relation to the frequent use of detergents, and the work in a moist atmosphere.
In our series, and in concordance with the literature detergents and disinfectants (63.6%), rubber gloves (27.3%) were the most common allergens involved in contact dermatoses.
In conclusion, lowering the frequency of occupational dermatoses would be possible by the use of protective measures and by sensitizing workers

DERMAL RISK ASSESSMENT TO CARCINOGENIC METALS BY MEAN A THEORETICAL MODEL

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[ID 1030]

INTRODUCTION: Main objective of the study was the occupational dermal exposure assessment to nichel and chromium in some galvanic factories.
METHODS: Dermal contamination risk evaluation, chemical hazard assessment and exposure time are the fundamental phases of the skin exposure risk assessment [1]. Each of steps, consisting of sections and of items which explore the contribution of different variables, are significant factors and correspond to as many values of a formula [2]which permits the assessment of dermal contamination hazard concerning the job. Ninety-three standardized observations were carried out on 11 galvanic industries comprising 12 different work activities; the observers classified the occupational scenarios into 4 levels (from green to red bands) corresponding to increasing levels of skin contamination hazards.
RESULTS: No significant differences among factories have been pointed out. The main risk for skin contamination was associated with loading/unloading the galvanic baths with more than 50% of the observations carried out in this work-activity placed in the red band. The use of suitable personal protective equipments (mean score: 4.36; range 2.10-7.80), the chemical-physical properties of the handled products (mean score: 5.37; range 1.50-9.40) and the exposure time (mean score: 0.82; range 0.13-1.00) showed the more relevant effect in the evaluation of the skin contamination.
CONCLUSIONS: The standardized observation of skin exposure used in this research enables us to classify the factors responsible for contamination risk on which carry out improvments and verify their effectiviness.
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OCCUPATIONAL ALLERGIC SKIN DISEASES IN DENTAL PERSONNEL IN FINLAND

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[ID 979]

Background: The use of methacrylate-based plastic materials in dental work has increased much in the past 20 years in Finland. They have almost totally replaced amalgam in dental fillings. Methacrylate allergy usually manifests as allergic contact dermatitis (ACD) on hands, especially on fingertips. At the same time, the use of protective gloves has become a normal practice. Disposable medical examination gloves made of natural rubber latex (NRL) or PVC plastic are most commonly used. These gloves give good protection against microbials, but small molecular weight methacrylates can permeate the materials quite rapidly. Even protective gloves themselves may cause contact allergy. Rubber chemicals may cause delayed-type allergy and ACD. NRL may induce immediate-type allergy, contact urticaria and protein contact dermatitis.
Methods and results: Allergic dermatoses from dental work have greatly increased in Finland in 1980's and 1990's according to Finnish statistics. ACD has been the most common occupational skin disease among dental workers. NRL gloves and dental plastic materials have been the most common causes. In the last few years statistics indicate that the increase has ceased.
Discussion: There are many possible reasons for the decrease in the number of new cases of allergy. Knowledge about the sensitizing capacity of methacrylates has improved. Also, techniques to avoid skin exposure have been developed. NRL gloves with a low content of allergenic proteins have been introduced to the market.
Conclusions: To prevent methacrylate allergy, which may lead to a change of occupation, direct skin contact with unhardened methacrylates should be avoided. It is important to develop non-touch techniques. PVC gloves, low-allergenic NRL gloves, or less permeable gloves, such as nitrile of neoprene gloves, are recommended for dental work.

HYSTORY OF PREVENTION

OCCUPATIONAL DISEASES - DEVELOPMENT OF REGULATIONS IN POLISH TERRITORIES

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[ID 79]

Medical practitioners and factory administration were required to report diseases which could be provoked by working conditions to the Factory Inspectorate in XIXth Century, but there were no state register of occupational diseases. In the 1880s a Polish physician, dr W. Światłowski, edited, as his own initiative, the first proposal for a general register of occupational diseases (the author divided these diseases into 13 categories). After 1918, when Poland became independent, employers continued, as in the XIX century, to engage physicians both to help solve health problems at work and because there were legal requirements to do it (but there was no one law covering all aspects of factory medicine). The tasks of factory physicians were prophylactic preemployment and periodical examinations, first aid, work inspection and prevention of occupational diseases and accidents. From 1927 the Prophylactic Occupational Diseases Act came into force and in 1928 a register of 49 occupational diseases was started. The list was used both to collect data on the adequacy of prevention and to decide when and by whom compensation was payable. These 49 diseases were grouped into two parts : A - all diseases caused by 23 defined agents in all situations and B - 26 diseases caused in specific industries only, which were described in the Act. Notification to the district physicians and to State Work Inspection of 12 diseases from part A and 17 from B was obligatory. Reporting of occupational diseases obliged the district physician (in cooperation with the factory physician) to examine case reported and his/her coworkers, and after inspection of the factory, to inform the work inspectorate about findings. Results of notifications were published in the year-reports of State Work Inspection.

THE CHANGING FACE OF OCCUPATIONAL HEALTH RESEARCH: 1930-2004

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[ID 1432]

Published occupational health papers over time can provide an interesting insight into the changing pattern of occupational health issues and the ways in which the evidence base for the prevention of occupational disease has evolved. A review of the papers published in nine of the current major international occupational health journals and a sample of journals in related areas was undertaken by retrieving and examining available papers from the first year of publication of each journal and at 10 year intervals until 2004. Review criteria included occupational versus environmental health issues, research methodologies used, types of occupational diseases and exposures investigated and occupational health disciplines involved. The earliest occupational health journal was first published in 1930, the next in 1944, three in the 1950s, one in 1975, one in 1980 and two in the 1990s, demonstrating the increasing amount of published occupational health literature over time. Five of these nine journals have 'environmental health' in their title. Three of these started as 'occupational health' journals and had the word 'environment' added some years later, demonstrating the increasing importance of environmental health research. Early editions of the occupational health and related journals concentrated on papers describing toxicological studies in animals and humans, while in more recent years epidemiological studies have been increasingly published. While chemical and physical exposures dominated the early occupational health literature, ergonomic and psychosocial hazards in workplaces have become much more common as areas of research. While occupational diseases, such as respiratory diseases and cancers, have been published consistently over the decades, in more recent years other types of conditions, such as musculoskeletal disorders, reproductive outcomes and stress, have become more common as research topics. These findings demonstrate that the occupational health research literature has expanded and evolved over time, reflecting the increasing recognition of the diversity of effects of workplace exposures on health.

OCCUPATIONAL AND ENVIRONMENTAL RISKS ASSOCIATED WITH WOOD PRESERVATIVE MANUFACTURE AND USE: AN HISTORICAL PERSPECTIVE.

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[ID 123]

The history of wood preservatives provides a clear example of how technological change leads to new occupational and environmental health hazards over time. Moreover, the history of major regional differences in the introduction and control of wood preservative chemicals is relevant to ongoing public health policy. Wood preservatives originated as water-proofing coatings largely derived from pine resins with minimal health risks. This was a major industry in northern Europe emerging in 16th-18th centuries. Early in the 19th century, as first-growth oak for shipbuilding became relatively scarce, new wood preservative technologies emerged. Mercuric chloride (sublimate) wood treatment was introduced in England and was associated with outbreaks of occupational mercurialism. In continental Europe, other less toxic metallic salts were more popular. Over the later part of 19th century, all of these treatments were overshadowed by coal-derived creosote. In North America, the relative expense of creosote delayed its commercial success for several decades, but by the early 20th century it was dominant there as well. Shipbuilding was no longer the key industrial application for wood preservatives: railway track ties and telegraph poles led market demand. The recognition of occupational skin cancer due to creosote lagged behind that for other coal-tar products, but nonetheless this link was well documented by the first decades of the 20th century. In the 20th century, pentachlorophenol (PCP) was introduced as a wood preservative, leading to large-scale outbreaks of chloracne among manufacturers and end-users, especially in the United States. Scandinavia, home of the original pine-tar-derived wood treatments and a continuing user of certain metal-based coatings, was a leader in banning PCP, which is still allowed in the U.S. on a restricted basis. More recently, arsenical wood preservatives have been widely introduced, raising concerns over lower-level environmental contamination and associated cancer risks, especially among children.

THE ORIGINS OF THE PERMANENT COMMISSION FOR OCCUPATIONAL HEALTH: HISTORICAL PRECEDENTS AND CAUSES.

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[ID 421]

The Milan Congress of 1906 officially celebrated the conclusion of the Simplon Tunnel works in terms of a real step forward for the health and safety of employees following the Gottardo Tunnel works 3 decades earlier. The cultural Milan melieu and the protagonism of Luigi Devoto, the founder of Clinica del Lavoro, fuelled the making of this initiative. The Congress especially showed the eradication of ancylostomiasis among Simplon miners and the adoption of wet drilling machine, which remarkably decreased dust exposure.

However the success of the Congress rooted in more complex causes. These included the progressive improvement of the national welfare system in industrialised countries around the turn of the century as a natural development of the previous self-help (Mutual Insurance) phase of workers' protection; employees' insurance coverage against the risk of injury, fuelled by the philanthropic attitude of employers' associations; the commitment of some governments, trade unions, and individuals and associations sympathetic to workers' rights. The first Italian Trade Unions were also founded in 1906 in Milan as the Confederazione Generale del Lavoro.

Since the 1880s, several other congresses had been held on the general issue of the technical prevention of injuries and insurance coverage, mainly in Switzerland, France, Germany, Belgium and Italy. One of the main aim of these conferences was to reach consensus on shared policies and to harmonise national legislations. Until the Milan Congress, the participation of medical doctors involved in the protection of the health and safety of workers was episodic and poorly defined, being confused with the nonmedical activities of Reformers and Trade Unionists. The Milan congress was a turning point in the rise of Occupational Medicine, a new discipline devoted to the study and the cure of work-related dis-

eases. At the end of the Congress participants decided to constitute a Permanent Commission to study the occupational diseases. The contribution of Italian scientists to the development of Permanent Commission was crucial at the very beginning as well as in the following periods. A part from Luigi Devoto, Luigi Carozzi, Gaetano Pieraccini, Enrico Vigliani, Luigi Parmeggiani are worth a mention. Since the Milan Congress of 1906 a series of congresses and the activity of the Permanent Commission for Occupational Health have profoundly influenced the scientific community as well as the public health policies of national governments and, more recently, International Agencies.

EARLY HISTORY OF THE PERMANENT COMMISSION/ICOH IN THE GERMAN-SPEAKING COUNTRIES (1906 - 1939/45)

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[ID 768]

At the end of the First International Congress of work-related Diseases in Milan the Permanent Commission for Occupational Health (later: International Commission on Occupational Health) was founded. The final composition of the first commission was completed in 1907. Of the 18 members six came from German-speaking countries (Austria, Germany, Switzerland). This communication deals with scientific and historical aspects of their work and the development of occupational medicine in these countries from 1906 to World War II. In particular the international aspects of occupational health-research in the German-speaking countries during that period, characterised by significant social and political changes, will be analysed, and it will be shown that the time-period between the end of World-War 1st and 1933 was a very fruitful time in development of occupational medicine.

As Ludwig Teleky (1872 – 1957), the organiser of the 3rd congress of the permanent commission in Vienna (1914, cancelled due to begin of World War 1st), was the most important occupational-health-scientist in Austria (- 1921) and Germany (1921 – 1933) the central part of the contribution deals with his research in occupational toxicology and infectiology and with his practical work as head of the occupational hygiene-state-department in the Rhineland (Germany).

FROM EXPERT-BASED TO CLIENT-BASED OCCUPATIONAL HEALTH CARE 1980 - 2005

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[ID 1134]

The last 20 years of the 20th century show a profound shift in the Dutch occupational health care system. In the seventies there was an offer-based care system, in which professionals decided about the contents of the services delivered to companies and their employees. Due to the economic depression in the eighties and changes in legislation in the nineties, the role of the employer became more and more active in determining the contents of care. The Netherlands Society of Occupational Medicine (NSOM) lost its influence on the provision of occupational health services. New powerful organisations with a multidisciplinary staff of experts arose. Since 1994 these organisations are working on a commercial basis in a competitive market, and provide “client-tailored” occupational health and safety services to their clients. These developments caused a crisis within the NSOM that had to redefine its targets.

A a part of a large historical research project presented in another paper, we have searched the archives of NSOM from the period 1980 – 2005, and interviewed members and key role players from NSOM and the new commercial organisations. We describe a process of transition from all-determining professional expertise to client-centered occupational health advising. We focus on consequences for the position of the Dutch occupational physician and the quality of the services provided.

THE ICOH SC ON “SHIFTWORK AND WORKING TIME”: 50 YEARS OF ACTIVITY THROUGH 17 INTERNATIONAL SYMPOSIA

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[ID 1876]

The Scientific Committee on “Shiftwork” was one of the first four PCIAOH-ICOH Committees established in 1957 with the main aims of: a) discussing basic and applied problems related to shift and night work; b) being an advisory Committee for national and international bodies; c) promoting co-operative efforts for the solution of occupational work problems in this area. These objectives are still crucial and, along these years, they have been addressed and debated by an increasing number of scholars from different disciplines (Occupational Medicine, Chronobiology, Ergonomics, Psychology, Sociology, Law, Politics) as well as by managers and unionists. This testifies of the complex aspects related to this topic, for which both analysis and preventive and compensative actions aimed at reducing or avoiding negative effects on health, require a multifaceted and multidimensional approach. These are not only associated to a careful health surveillance, but also to appropriate coping strategies, particularly in terms of arrangement of working hours. Starting from Oslo (Norway) in 1969, 17 International Symposia have been organised, on a biannual basis, with an increasing number of participants (more than 40 countries from the 5 continents) and diversification of topics: Slanchev Bryag (Bulgaria) in 1971; Dortmund (Germany) in 1974 and 1977; Rouen (France) in 1980; Kyoto (Japan) in 1982; Igls (Austria) in 1985; Krakow (Poland) in 1987; Verona (Italy) in 1989; Sheffield (UK) in 1991; Melbourne (Australia) in 1994; Ledyard (Conn, USA) in 1995; Maijvik (Finland) in 1997; Wiesensteig (Germany) in 1999; Hayama (Japan) in 2001; Santos (Brazil) in 2003, Hoofddorp (Netherlands) in 2005. The issues debated during the Symposia have been progressively developed according to the different perspectives and evolution of the scientific knowledge concerning the various aspects of the problem, mainly shifting from physio-pathological and medical consequences to psycho-social conditions and organisational strategies. Nowadays, the SC shares officers and activities with the twin Working Time Society, established in 1999 in order to keep strict links also with people not directly involved in Occupational Health, and it has recently changed his name into “Shiftwork and Working Time” to better recall the many different forms of working time organisation currently in being.

RADIATION AND WORK

RADIATION EXPOSURE AT BASE STATIONS: AN EMERGING OCCUPATIONAL RISK

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[ID 272]

1. Introduction

In Brazil, exposure to electromagnetic radiation at mobile-phone base stations (RBS) represents an emerging occupational risk, as the telecommunication sector undergoes a rapid development closely followed by the number of RBS installations.

This preliminary study was motivated by the complaint of a technician who worked for 10 years on RBS towers and now suffers from cancer. Reporting similar cases among other member of his group, he believes radiation exposure to be the common cause.

By further investigating this issue, it turned out that transmitters remain in full operation during maintenance, alignment and installation activities, continuously exposing these workers to intense radiation levels, which very close to the antennas are well above the limits established by ICNIRP.

This study also revealed that most of these workers are self-employed and lack both technical and financial resources to proper assess and control this risk. These evidences show that immediate preventive and control actions are needed, moreover when one considers that ICNIRP limits are based, exclusively, on immediate *thermal effects* of acute exposure to radiation, disregarding the potential long-term risks of *non-thermal* effects.

2. Materials and Methods

Preliminary electromagnetic field measurements were carried out on a *roof-top* RBS, with a broadband field monitor, EMR-300 (W&G), coupled to an isotropic E-field probe (100 kHz to 3 GHz). Additionally, a personal radiation monitor, RadMan-XT (Narda) was carried close to body.

3. Conclusions

This survey revealed that occupational risk management at RBS is practically non-existing in our country, urging for wide-ranging actions to change this scenario. In the short-term, the mandatory use of a dosimeter would help minimizing risks, as workers have free access to points in close proximity to the antennas.

ELECTROMAGNETIC FIELDS: RISK ASSESSMENT AND OCCUPATIONAL DISEASES IN ITALY

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[ID 903]

Every year about 8000 occupational diseases are accepted in Italy by INAIL, the Italian Workers' Compensation Authority. The occupational diseases are caused by different agents (chemical, biological, physical) but only a very little percentage resulted to be caused by non ionizing radiations.In this paper the Authors report an analysis of occupational diseases caused by non ionising radiations denounced to INAIL and compensated. It is discussed the Italian situation in light of the controversial studies related to the link between exposure and health effects. Because of the uncertainty about an EMF-health link, the main effort is to determine the probability and seriousness of EMF hazard and to realize an accurate risk assessment at workplace, which is one of the main objectives pursued by INAIL's Technical Advisory Department for Risk Assessment and Prevention.Moreover, in this paper it is also reported the state of advancement of Italian legislation on health protection against non ionizing radiations at workplace in view of the new European Directive (2004/40/CE).

GENOTOXIC EFFECTS OF EXTREMELY LOW-FREQUENCY AND HIGH-FREQUENCY ELECTROMAGNETIC FIELDS ON HUMAN CELLS IN VITRO

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[ID 1008]

The increasing use of electrical appliances as well as the ubiquitous presence of radio frequency signals generated by radio and television transmitters and mobile communication systems has provoked an urgent need to determine whether chronic exposure of people to extremely-low-frequency electromagnetic fields (ELF-EMF) and radiofrequency-modulated electromagnetic fields (RF-EMF) could have biological effects.

Cultured human fibroblasts were exposed to intermittent or continuous EMF (ELF-EMF: 50 Hz sinusoidal; RF-EMF: different GSM and UMTS signals) at different field strengths or specific absorption rates (35 µT – 2 mT or SAR 0.1 – 2 W/kg) and different exposure times (4 – 24 h). Genotoxic effects were detected using alkaline comet assay and micronucleus test; in case of ELF-EMF chromosomal aberrations were also investigated. Blinded exposure protocols were used for experiments in a temperature controlled exposure unit, each exposure condition was tested in duplicate.

Certain forms of intermittent exposure to ELF-EMF caused a significant increase in DNA strand breaks being consistent with an increased formation of micronuclei and chromosomal aberrations. The ELF-EMF-induced DNA strand breaks in human fibroblasts were dependent on frequency, magnetic field strength, the duration of exposure and the age of the donor. The first effects appeared at 35 µT and above.

RF-EMF exposure (GSM basic at 1950 MHz) induced DNA strand breaks in a dose-dependent manner, starting at an SAR as low as 0.3 W/kg. Effects occurred at exposure times no less than 8 h with stronger effects at intermittent exposure. In addition an increase in micronuclei frequencies was demonstrated.

In conclusion, our results clearly point to EMF-induced genotoxic effects *in vitro*.

MICROWAVES AND HUMAN KERATINOCYTES: CYTOKINES, INTERCELLULAR COMMUNICATION AND CARCINOGENESIS.

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[ID 1235]

The keratinocyte, the principle epidermal cell, is a also contributor to epidermal cytokine production. Many of the currently identified cytokines are produced by keratinocytes, either constitutively or upon induction by various stimuli. Interleukin-1 Beta (IL1-B) and Interleukin-1 Alpha (IL1-A) have the same biological activity, but they share only 24% amino acid sequence identity. Many authors discussed the effect of Microwaves (MW) on human, but nobody has provided data certainly final. The opinions are controversial. The aim of present article is to study the effects of MW on intercellular communication (promoter effect) and cytokines intracellular concentrations using human keratinocytes in culture.

MATERIALS AND METHODS

Primary human keratinocytes, provided by "Istituto Zooprofilattico di Brescia (I)", were cultured in Epilife Medium supplemented. The effect of Microwaves was investigated using an exposure system, which consists of two Wire Patch Cells (WPC). The dosimetry for the characterisation of WPC has been carried out by experimental measurements and numerical codes. MW exposure was realized when the cell were confluent and their effects after exposure were analyzed. Cell culture were exposed to microwaves (900 MHz) for 8 hours, using cycles of irradiation/pause of 10 min 'on', 15 min 'off' at SAR (Specific Absorption Rate). GJIC (Gap Junctional Intercellular Communication) was measured by the dye transfer method. Cell viability was assayed using Neutral Red Method. The concentrations of IL1-B and TNF were evaluated using respectively Elisa Kit (EuroClone) and Elisa Kit (R & D Systems).

RESULTS

MW exposure didn't modify cellular viability. The MW treatment resulted in a 35% decrease (with respect to control $p<0.05$) of the number of coupled cells becoming fluorescent upon dye transfer from the microinjected cell. The effect on GJIC resulted power and time dependent. MW exposure caused reduction of IL1-B, also this effect resulted time and power dependent.

DISCUSSION

It has been suggested that tumour promoters may act by inhibiting intercellular communication via gap junctions, so as to isolate initiated cells from the restraining effects of adjacent normal cells. We would discuss the hypothesis that reduction of cytokines (IL1-B) and the inhibition of gap junctional intercellular communication are correlated.

MEASURED MAGNETIC FIELD LEVELS IN RAILWAY ENGINE DRIVERS

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[ID 200]

The aim of present study is to investigate the engine drivers exposure to ELF magnetic fields inside electric trains used in Romania. The electrified network of national railway system is powered by 27 kV lines at the frequency of 50 Hz. At this frequency, Romanian regulations set a reference level of 500 μT in the case of occupational exposure, the same as the reference level of ICNIRP guidelines and the action level of EU Directive 2004/40/EC. To assess the exposure of drivers to ELF magnetic field, spot measurements were performed. Measurement had been carried out in several types of railway engines during normal work tasks or testing various phases of traction. Location of most measurement points were inside the driving cab, especially at the places occupied by drivers when railway engine is moving. Recorded magnetic field levels inside the driving cab were between 2 – 27 μT. Measurement of the magnetic flux density showed exposure of locomotive mechanics at levels that are much lower than the limit set by Romanian regulations, which is the same as the one proposed by ICNIRP and enforced by EU Directive. On the other hand, maximum levels of magnetic field inside locomotives are higher than the limits set by some exposure standards based on precautionary principle that assume subtle effects of long-term exposure to low-level magnetic fields. Based on present knowledge, it is not possible to conclude if there is, or not, any health risk related to subtle effects due to long-term exposure of electric engine drivers to these levels of magnetic fields.

EFFECTS OF OCCUPATIONAL EXPOSURE TO EXTREMELY LOW FREQUENCY – MAGNETIC FIELDS ON IMMUNE SYSTEM

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[ID 1011]

Few and conflicting data are available on the effect of Extremely Low Frequency–Magnetic Fields (ELF-MF) on immune system in humans. We examined immune function in a group of workers exposed to ELF-MF in various occupations. Seventy- two workers aged 42 ± 8,72 years (mean ± S.D.) were studied. Information on general characteristics, working activity, current and previous diseases were collected by questionnaire. Occupational ELF exposure was measured during 3 complete work-shifts using personal sampling. The immune status was evaluated by measuring lymphocyte subpopulations in peripheral blood samples by flow cytometry (Becton Dickinson, San Josè, CA, USA). Monoclonal antibodies against CD19, CD4, CD5, CD8, CD57, CD62L, CD25, CD45RA, CD45R0 and CD95 molecules were tested in order to evaluate if ELF-MF exposure could modify the number and percentage of lymphocyte subsets with different functions (B and T lymphocytes, NK cells, virgin and memory/activated cells).

Median personal exposure in the whole group (Time Weighted Average) was 0.16 μT, 5th- 95th percentiles were respectively 0.02 - 2.21. Multiple regression analysis was applied to study the relation between lymphocyte subpopulations and ELF-MF exposure, gender, age, jobs, body mass index, physical activity, pharmaceutical drugs, smoking and drinking habits. The normality of dependent variables was tested by Kolmogorov-Smirnov test. No significant relation was observed between ELF-MF exposure and leukocyte subpopulations. According to personal monitoring results subjects were then divided in Low Exposed (22 men and 19 women; ELF-MF level ≤ 0.2 μT) and Higher Exposed (11 men and 20 women; ELF-MF level > 0.2 μT). Lymphocyte subpopulations were analysed comparing Low and Higher Exposed, using Student's t test or Mann-Whitney U test. A significance level $p < 0.05$ was applied. No significant difference between groups was observed. Our results do not support the hypothesis of effects on human immune system due to occupational ELF-MF exposure.

PERSONAL EXPOSURE TO ELF MAGNETIC FIELDS IN VARIOUS OCCUPATIONAL ACTIVITIES IN ITALY

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[ID 1500]

An inadequate evaluation of exposure is one of the main problems in research on the effects of occupational exposure to Extremely Low Frequency-Magnetic Fields (ELF-MF) (ICNIRP 2001; NRPB 2004). Few and inaccurate data are currently available on exposure in Italian workers. Individual occupational exposure to ELF-MF was measured using personal dosimeters in 472 workers (303 men and 169 women; mean age 38,99±8,26) employed in more than 100 jobs, representative of the main occupational activities in Emilia Romagna Region (Italy). Workers worn personal dosimeters during two complete work-shifts. Environmental non-occupational exposure was also monitored during two days. A sampling interval of 10 seconds was adopted, resulting in the collection of 5750 measurements for each subject during work and 11550 in non-working periods. In the whole sample, the mean Time-Weighted Average (TWA) exposure during work resulted 0,73 μT (SD 3,53), while the median was 0,14 μT. Exposure was lower than 1 μT in the 90% of the workers, and lower than 0,4 μT in 78 %. In two jobs only, both in wood working, exposure (job-related median TWA) was greater than 1 μT, in other 3 jobs exposure was between 0,4 and 1 μT; all other activities (97%) presented a median TWA lower than 0,4 μT. An high variability among workers engaged in the same job resulted in various occupational tasks, as in glazers and in electricians in tile production. Non-occupational exposure resulted < 0,4 μT in more than 97% of the examined workers, and was usually lower than occupational exposure.

Our results show low to moderate occupational exposure to ELF-MF in the large majority of the workers and working activities. Also non-occupational exposure resulted low. Nevertheless the high variability observed among workers engaged in some occupations represents a problem in exposure evaluation. Personal monitoring revealed particularly useful in such a situations.

OCCUPATIONAL DISEASES RESULTING FROM EXPOSURE TO IONIZING RADIATION

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[ID 967]

During the start-up and early operations of Mayak Production Association (PA), the first Russian nuclear enterprise, in the period from 1948 to 1958 a substantial part of the personnel was exposed to ionizing radiation in high doses. During this very period the early effects of occupational exposure, i.e. deterministic effects, frequency and severity degree of which increased with the exposure dose after a definite threshold dose, were observed.

The occupational diseases such as acute radiation syndrome (74 cases) resulted from the exposure to acute external gamma-neutron and gamma irradiations in doses of 0.2 to 131 Gy, chronic radiation syndrome (1593 cases) resulted from the exposure to chronic external gamma rays (the average total dose of 2.3 Gy and the average annual dose of 1 Gy), and plutonium pneumosclerosis (142 cases) resulted from the internal exposure to incorporated plutonium-239 (average absorbed lung dose of 3.3 Gy) were observed in the cohort of Mayak PA workers employed during 1948-1958. Dose-response and dose-time-response as well as dose thresholds will be presented for the deterministic effects of occupational exposure in the report.

EFFICACY STUDY OF HEALTH SURVEILLANCE IN THE PROTECTION OF WORKERS EXPOSED TO IONIZING RADIATION

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[ID 1907]

Background: Although scientific studies have long evidenced the importance of stochastic effects (tumours), routine health surveillance programmes for external IR exposure focus mainly on the examination of few deterministic targets. These programmes, effective in diagnosing deterministic effects, may be inadequate for stochastic effect detection.
Aim: To retrospectively evaluate the ability of a health surveillance programme focused on blood, lens and skin to early detect tumours and well established pre-tumoural predisposing states (AIRM doc. 38) that might be possibly attributed to IR exposure and that might be relevant to fitness-for-work assessment, by comparing diagnoses made as a result of health surveillance to the diagnoses made elsewhere.
Methods: Health status was recorded from 6-12 month periodical medical examinations (1527 visits) in two hospitals in Northern Italy from March 2003 to September 2005. Health surveillance protocol included: medical history, clinical examination, laboratory examinations (blood tests, CBC, glucose, liver and kidney function test, proteins, urinalysis). Further examinations were at specialist discretion. OR and corresponding 95%CI of an increasing diagnostic power due to health surveillance program was estimated using unconditional multiple logistic regression.
Results: Annual exposure ranged from 0 mSv to 8.99 mSv (median 0.15 mSv). Seven tumours (17.0%) and 34 pre-tumoural predisposing states (83.0%) were recorded, most frequently affecting thyroid, liver and prostate. Sixteen (39.1%) diagnoses were due to health surveillance and 25 (60.9%) were made elsewhere. The OR for the diagnosis due to health surveillance was 0.67 (CI95% 0.36-1.25). An external underdiagnosis bias was not recorded.
Conclusions: This study showed a lower, though non statistically significant, efficacy of the applied health surveillance protocols to early identify tumours or pre-tumoural predisposing states when compared to other diagnostic sources. These results suggest the need of introducing a specific health surveillance programme aimed at an early tumour or predisposing states detection for possible IR target organs.

EVALUATION BY ELECTRONIC DOSIMETER OF EXPOSED OPERATORS IN INTERVENTIONAL IMAGERY

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[ID 370]

Ionizing radiations are largely used in medical practice for diagnostic and therapeutic aims. However, they are not denied of adverse effects for exposed operators.
To evaluate the exposure in interventional imagery, we carried out a descriptive crosss- over study, extended for six months, realising electronic dosimeters L36, Dosicard and DMC100. This study was completed in cardiology, orthopaedic and general surgery services in CHU of Monastir.
The analysis of radioscopic times noted variability according to act and operator. It was 6.06 minutes for coronarography and 21.41 minutes for angioplasty. In orthopaedic surgery, radioscopic time ranged from 0.3 to 5 minutes. For the cardiologist group, equivalent amount per act was the highest in hands. It was about 99.5 µsv against 14 µsv on the neck and 34 µsv on feet. In orthopaedic group, dose rate in hands, feet and in the neck are low. It ranged from 1.02 to 1.99 µsv/mn. Annual equivalent amounts showed a low exposure level for all operators. Exposure amount of crystalline lens and upper limbs were respectively 1.93 and 14.02 msv per year in invasive cardiology. It was respectively 1.9 and 1.6 msv per year for orthopaedists. Such amounts are widely under norms proposed by the national centre of radioprotection. In addition, annual effective amount noted a low level exposure for all operators with a maximum of 2.5 msv in invasive cardiology, 0.9 in orthopaedic surgery and 0.15 msv in general surgery.
This study enabled us to evaluate irradiation level of exposed operators in real time, integrated amount and dose rate. These factors are directly perceptible by the operator itself ensuring a permanent follow-up of radiation exposure.
Despite the low exposure level noted in this study, radioprotection should be respected.

BIOHAZARDS AT THE WORKPLACE: RISK ASSESSMENT AND HEALTH SURVEILLANCE STRATEGIES

CONTAINMENT TECHNOLOGY FOR SAFE HANDLING OF HIGHLY POTENT OR UNKNOWN MATERIALS AND MICRO-ORGANISMS

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[ID 186]

In recent years, research departments of pharmaceutical industries have developed new and more potent active pharmaceutical ingredients. These substances are so potent that all contact with the operators has to be avoided to prevent any undesired effect. Furthermore, western Countries also have to face the problems of new types of terrorism potentially striking with chemical and biological media.
The above mentioned elements and the increased sensitivity towards occupational health have increased the development and the spread of containment technology, previously used only in the nuclear industry.
Some common applications of containment technology are in the previously mentioned nuclear industry and also in the bulk pharmaceutical production of the active compounds themselves. Also the so called "secondary" pharmaceutical industry uses isolators for formulating active ingredients or sterile compounds.
Some novel utilizations of glove boxes are in the field of research and development of new chemical molecules or microorganisms and, recently, also for providing security forces with equipment for safely performing chemical and biological analysis of unknown samples when a terrorist attack is suspected.
The paper illustrates the concept of containment of an isolator using a permanent physical barrier of the shell, front glass and gloves. In addition the philosophy of negative pressure and filtration as containment measures for a glove box is also explained.
An overview is given on the more common operations of ingress/egress involving isolators and, as a consequence, potential contamination problems encountered.
Cleaning and decontamination procedures of an isolator are another crucial topic discussed.
In order to complete the illustration of the isolators, important accessories like special doors, containers and pass-boxes will be discussed.
A review of the technical international norms concerning containment, complete the paper.

PSITTACOSIS : AN UNDERESTIMATED OCCUPATIONAL HEALTH RISK?

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[ID 501]

Background : Psittacosis, a zoonotic disease caused by Chlamydophila psittaci, is an occupational health hazard for individuals employed in the importation, care and breeding of birds and poultry. This problem may occur more often than reflected by the reported cases.
Objective : A longitudinal study on a Belgian turkey farm was conducted to examine the occurrence of Cp. psittaci infections in turkeys, the risk for transmission to humans and the incidence of (sub)clinical symptoms in man.
Methods : From production onset until slaughter at 15 weeks of age, blood samples for antibody detection and pharyngeal swabs for detection of pathogens were collected, every three weeks, from 20 ad random selected and tagged turkeys. Simultaneously, the farmer and two researchers sampling the turkeys, were examined. The comprehensive human assessment included health questionnaires, evaluation by clinical examination and spirography combined with blood samples for biochemical analyses and determination of antibodies together with the collection of pharyngeal swabs for Chlamydophila detection.
Results : Positive serum antibody titers for Cp. Psittaci in both turkeys and humans, using a recombinant MOMP-based ELISA, were detected at week 3 and 9. At these two time periods, several pharyngeal swabs determined by a species-specific real-time PCR, were also positively diagnosed. During these specific time intervals, humans reported mild respiratory symptoms (eg. cough), however no significant alterations in lung function or inflammation parameters could be observed.
Conclusions : Our results confirm the high prevalence of Cp. Psittaci infections among commercial Belgian turkey poults and suggest a considerable risk for transmission to humans, higher than generally assumed. This infection usually causes mild to unapparent clinical symptoms in man. There is still a need for an easy accurate diagnostic tool to detect this pathogen and for an implementation of a general strategic approach for diagnosis, prevention and registration of avian zoonoses.

EXPOSURE TO DIFFERENT AIRBORNE MICROBIAL COMPONENTS AND PARTICLES DURING WORK AT BIOFUEL PLANTS

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[ID 859]

Background: at biofuel plants large quantities of straw or wood chips are handled and exposure to microbial components occurs which may cause respiratory symptoms. Development of respiratory symptoms is dependent on the exposure levels.
Aim: to investigate the exposure levels to different microbial components and particles at biofuel plants and to identify dusty working processes.
Methods: exposure was estimated repeatedly at five Danish biofuel plants. Inhalable bioaerosols were sampled in different working areas, and employed were monitored for exposure to: endotoxin, dust, enzymes, total number and cultivable units (cfu) of bacteria, fungi and actinomycetes. Temperature, humidity and numbers of particles were also measured. Results are presented as TWA for 5-7 hours measurements.
Results: personal exposure to inhalable endotoxin was between 2 and 23,000 EU m-3 (median =60 EU m-3, n=35) and the suggested occupational exposure limit (OEL) on 200 EU m-3 was exceeded in 29% of the measured subjects. In the working areas the median endotoxin concentration was 18 EU m-3 (max.=21,000 EU m-3, n=84). The highest concentrations of endotoxin were found at straw plants.
One third of the subjects were exposed to concentrations of fungal spores above 105 m-3 and concentrations at this level are considered as high. The median concentration for working areas was 2x105 spores m-3 (max.=7x106 m-3). The highest concentrations of thermophilic actinomycetes (3x106 cfu m-3) were in areas with chip cranes.
The task causing highest exposure to all studied components was work with a straw shredder. Tasks close to chips like fixing chips crane, caused a high exposure to fungi and actinomycetes and sometimes to endotoxin.
Conclusion: the exposure levels to microbial components were for some tasks associated with exposures much higher than suggested OELs and differences in exposures were seen between straw and wood chips plants.
Acknowledgements: This project was founded by ELTRA - PSO.

CROSS-SHIFT AND LONGITUDINAL CHANGES IN LUNG FUNCTION AND BLOOD PARAMETERS AMONG BACTERIAL SINGLE CELL PROTEIN WORKERS EXPOSED TO ENDOTOXINS. A THREE YEAR FOLLOW-UP STUDY

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[ID 1728]

Objective-To study possible effects of endotoxin exposure among bacterial single- cell protein workers on pulmonary function and blood parameters before and after a work-shift during three years of follow-up.
Methods- The study included 23 men and 5 women who were examined at the start and at the end of a work-shift at three occasions during a three year follow-up. The median endotoxin level during work-shift at baseline was 34000 EU/m^3 in the high exposure group (range:3300-89000 EU/m^3). The year after the exposure level had decreased but still 75% were above 200 EU/m^3 . The workers answered a questionnaire about work-related symptoms on all occasions. Assessment of lung function included dynamic lung volumes and flows. The blood analysis included cell count of leukocytes and mediators of inflammation.
Results- The forced vital capacity (FVC) changed significantly ($p<0.05$) from 5.34 l (SD=0.9) to 5.25 l (SD=0.9), forced expired volume in one second (FEV_1) from 4.15 l (SD=0.7) to 4.07 l (SD=0.7) during the first cross work-shift. No cross-shift change in lung function nor longitudinal change was noted the first year of follow-up. The leukocytes increased significantly during the first cross shift and a borderline significant increase was noted for the first year of follow-up as compared to the year before. There was a significant association between the endotoxin concentration and decrease of FEV_1 despite the use of powered respirators during the first

cross-shift examination. *Conclusions*- During a work-shift with unusual high levels of endotoxins at a plant manufacturing bacterial single-cell protein the results show that FVC and FEV_1 were reduced. A reduction in the level of exposure was observed during follow-up and no change in cross-shift lung function was noted. Mediators of inflammation increased along with leucocytosis in blood. The results of three year of follow-up will be presented at the conference.

LEAD SKIN ABSORPTION AND THE EFFECTS OF CLEANING PROCEDURE WITH A SURFACTANT

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[ID 106]

Background
Skin contamination by dusts containing lead and other toxic metals can cause metals absorption
The aim of our study was to investigate the skin absorption of PbO and the effect of a rapid skin decontamination with a surfactant.
Methods
The study protocol entailed using discarded excised human abdominal skin mounted in a set of Franz cells. In the donor side 5 mg/cm2 lead oxide dust (<10 um particles) was applied to which synthetic sweat adjusted to a pH of 5 was added. In one set of tests, nothing more was done to the skin until 24 hours when the test was stopped. In a second set of tests a soap containing sodium lauryl sulfate and sodium laureth sulfate was used with cotton balls to decontaminate the skin after 30 minutes and the skin remounted in the penetration cell for the remaining 24 hours with only synthetic sweat solution added to the donor side. All samples were analyzed for lead using electro-thermal atomic absorption spectrometry with Zeeman background correction, according to NIOSH Method 7105 (NIOSH/CDC, Cincinnati, Ohio).
Results
Our results confirm that Pb oxide can pass through the skin with an absorption amount in 24 hours of 3.9 ng/cm2 median (25-75 percentiles 1.2-8.5). The cleaning procedure using the soap increased significantly skin penetration with a median value of 31.1 ng/cm2, 25-75 percentiles 12.9-62.1 (Mann-Whitney U-test, p = 0.0002).
Conclusions
In our study we confirm that PbO can pass through the skin and removing Pb after 30 minutes did not cause a reduction of Pb penetration in 24 hours. These results indicate that it is necessary to prevent skin contamination from occurring, because a short contact can increase skin content and permeation even if followed by washing.
The authors acknowledge the financial support by NIOSH

MYCOTOXINS IN OCCUPATIONAL SETTINGS

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[ID 1021]

Mycotoxins are secondary metabolites of moulds. They are known in particular for their harmful effects among consumers of contaminated food products.
In an occupational setting, workers can be exposed to mycotoxins via the respiratory and cutaneous paths. Very little is known about the risks of such exposure.
This work is a review of the scientific knowledge allowing a better understanding of the risk related to mycotoxin exposure at the workplace.
It presents the data available on the risks inherent to mycotoxins via the respiratory or cutaneous paths from in vitro and in vivo studies on animals, from metrological and epidemiological studies and case observations on humans.
Means to assess exposure to mycotoxins as well as ways to interpret results and manage risks are also examined.
The presence of mycotoxins has been reported in laboratories, in the air and construction materials of damp non-industrial buildings, in the air and/or in the settled dust in the farming and food-processing sector and in waste composting plants.
The question of the exposure to mycotoxins in the occupational setting has been raised in connection with the excess risk of death by cancer in general and cancer of the upper airways, to the excess risk of cancer of the liver and biliary tract, hormone dependent cancer in women, late-term abortions, to some cases of cancer of the colon, and to some entities like organic dust toxic syndrome, sick building syndrome, etc.
There are few certainties regarding the occupational risks related to mycotoxins, but some of the data available have given rise to genuine concerns.
A special attention must be paid to airborne mycotoxins.
Regulations relative to highly carcinogenic mycotoxins such as aflatoxins should be considered.

COMPARISON OF SAMPLING METHODS FOR THE MEASUREMENT OF EXPOSURE TO AIRBORNE ENDOTOXINS IN OCCUPATIONAL ENVIRONMENT

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[ID 1022]

Endotoxins are a major cell wall component of gram-negative bacteria and are ubiquitous in the environment. Exposure to endotoxins has been associated to work-related respiratory and general symptoms in different occupational environments and the assessment of exposure to endotoxin has received many attention. However, discrepancies exist between results from different laboratories and an international standardised method still needed. The aim of the presentation is to depict the method we use and its applications in occupational environments.
The method is based on the European standard EN14031. Airborne endotoxins are sampled by filtration of the air through glass fibre filters and extraction of endotoxins from filters is performed by agitation in pyrogen-free water. Endotoxins are quantified with the Limulus Amebocyte Lysate (LAL) assay. The method is described and the technical parameters that influence the final results are discussed.
Stationary and personal air sampling were performed in order to compare different sampling methods and to assess the exposure to airborne endotoxin during sewer work. Samples were collected by air filtration through glass fibre filters (FV), polycarbonate filters (PC) and with a CIP 10-M sampler. Stationary sampling revealed that airborne endotoxins levels were higher when FV filters were used as filtration support rather than PC filters. Measurements with the CIP 10-M sampler were equivalent to PC filters. Concentrations of airborne endotoxins at workplaces measured by personal air sampling through FV filters (16 to 420 EU/m3) were higher than those measured outside the sewer network (0.6 to 10 UE/m3). Sixteen percent of the values were higher than 200 EU/m3 and endotoxin exposure of sewer workers depended on workplace and activity.
The method we have developed can be used for the assessment of occupational exposure to endotoxins. Our study have highlighted the importance of the sampling method on airborne endotoxin measurements at the workplace.

OCCUPATIONAL EXPOSURE TO BIOLOGICAL AGENTS AMONG MUNICIPAL SEWAGE TREATMENT PLANT WORKERS

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[ID 1835]

This study is intended to assess exposure to biological agents of workers in one of the biggest municipal sewage treatment plant in Poland. The study subjects comprised 99 workers directly involved in sewage treatment processes. They were divided into four occupational groups: mechanical treatment (MT), biological treatment (BT), sewage sludge treatment (SST), and auxiliary (AW) workers.
Air samples were collected at the worker breathing zone. There was evaluated exposure to endotoxins and (1→3)-β-D-glucans. Besides, air samples were also collected at workplaces to perform the qualitative and quantitative assay of mesophilic and psychrophilic bacteria and fungi with particular reference to the sewage bacteria found in the examined aerosols, such as Enterococcus gender, intestinal bacteria of the Enterobacteriaceae family or Gram-negative oxidase-positive bacteria (Pseudomonas and related genders).

Endotoxin and (1→3)-β-D-glucan concentrations showed a high variability: endotoxins varied between 0 and 223 ng/m3, while glucans ranged from 0 to 163 ng/m3. A strong correlation was found between the concentration of endotoxins and (1→3)-β-D glucans (Pearson correlation coefficient = 0.86, p <0.0005).
The concentration of viable micro-organisms (cfu•103/m3) varied, depending on sampling time and place. The highest concentrations of the mesophilic bacteria were detected in the vicinity of the sedimentation lagoon (46 531 •103 cfu/m3) and in the sludge separating hall (8983 •103 cfu/m3). The concentration of fungi was highest in the screen hall (26.7 •103 cfu/m3), in the vicinity of the sedimentation lagoon (12.6 •103 cfu/m3) and at the aeration chambers (14.2 •103 cfu/m3).
The study proved that the exposure varied and depended on the stage of sewage treatment. The SST process was characterized by the highest emission of bioaerosols. All microorganisms found in the sewage plant belong to the second occupational risk group, under the Directive 2000/54/EU.

STRENGTHS AND LIMITS OF A MODEL DESIGNED TO TARGET AND ANTICIPATE ETHICAL PROBLEMS OF THE USE OF BIOMARKERS

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[ID 1145]

An emergent model of the ethical problems of the use of biomarkers in the workplace was previously built from a qualitative research. In this study, the ethical aspects were investigated by homogeneous interviews and an Internet discussion forum with occupational health stakeholders. The model is constructed around three themes: narrative of science, validation of biomarkers and protection of workers. It is from these three themes that emanate the principal ethical problems raised by the stakeholders. These problems are described as ethical tension zones: confidentiality, interpretation of the data, consent and information, advantages/disadvantages ratio. This model also takes into account the impact of the perceptions that each group has of each other, perceptions which, as such, also involve several ethical problems. Because it is drawn from a study of stakeholders' perceptions, we believed that this model makes it possible to predict and anticipate what could be the root of ethical problems generated by the use of the biomarkers in occupational health contexts. For more than a year now, this model has been validated in many of the aforementionned contexts. Moreover, it is being used as the theoretical framework of a research on the ethical aspects pertaining to the use of the blood beryllium lymphocyte proliferation test (BeLPT) in the workplace. Even if this model shows some limits, it mostly presents many strengths. These limits and strengths will be presented as well as the best way, so far, to use this model in occupational health contexts.

RESPIRATORY DISORDERS

VARIATIONS IN NASAL REACTIVITY AND HEALTH-RELATED QUALITY OF LIFE IN FEMALE HAIRDRESSERS WITH WORK-RELATED NASAL SYMPTOMS

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[ID 944]

Background: Hairdressers are exposed to several reactive chemicals and they have an increased incidence of nasal symptoms. We have earlier shown effects on nasal symptoms from persulphates in hairdressers. In a qualitative study hairdressers claimed to become less reactive to hair chemicals after a few weeks of holidays.
Objectives: We studied changes in nasal reactivity to persulphates and in healthrelated quality of life in hairdressers with hair bleach related nasal symptoms after holidays and again after one month of exposure.
Methods: Seventeen female hairdressers with hair bleach related nasal symptoms without atopy (HS) and 20 without symptoms and atopy (HNS) participated. As a control group ten non exposed pollen allergic women (A) were employed. A medical examination including information about symptoms and relation to work, a skin prick test to common allergens and to persulphates were performed. After at least two weeks off work the hairdressers filled in questionnaires for quality of life (SF36, RQLQ). The symptomatic hairdressers were also challenged with solutions of persulphate (0.001% and 0.01%). A nasal symptom score (NSS), and acoustic rhinometry (AR) were used as markers of effects. This procedure was repeated after one month of exposure. The controls filled in the questionnaires before the pollen season and after four weeks of rhinitis.
Results: The HS group increased significantly in nasal blockage after one month of exposure compared to the preexposure situation shown both in symptoms and rhinometry. Their NSS increased significantly after the challenges both before and after exposure. However, no significant change was noticed in reactivity to persulphates, indicating a negative effect of the chemicals but no increase in reactivity to persulphates. The HS group as well as the A group had significantly lower specific quality of life (RQLQ) than the HNS group both before and after exposure. Quality of life decreased during the exposure and during the pollen season in hairdressers and atopics respectively in both ROLQ and SF36.
Conclusion: Symptomatic hairdressers increase in nasal symptoms and decrease in quality of life during exposure. However nasal reactivity to persulphates do not seem to increase during the month of exposure.

MOULD-INDUCED OCCUPATIONAL RESPIRATORY DISEASES

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[ID 950]

Introduction: Water-damaged buildings with subsequent exposure to microbial growth became a serious work environmental problem in Finland in late 1980´s. Since 2002, exposure to moulds has been the most common single cause of occupational asthma. Epidemiological data show convincingly associations with in-door microbial exposure and a variety of symptoms but also respiratory.
Methods: The material consists of all 2156 patients referred to the Finnish Institute of Occupational Health in the period 1994-2003 because of work-related respiratory symptoms suspected to be caused by exposure to moulds in association with water-damage at the work-place. Investigations included assessment of the work-place with identification and quantitative analyses of fungal species, evaluation of occupational and medical history, routine lung function testing, and IgE-measurements. In addition to a verified exposure to moulds at work and an indicative medical history, the principal diagnostic tool for rhinitis was nasal provocation, for asthma serial PEF-measurements and specific inhalation challenge tests. The diagnosis of allergic alveolitis draw heavily on symptoms and decreases in diffusion capacity in relation to work environment and bronchial lavage findings. The diagnosis of ODTS was based on symptoms in relation to work and the exclusion of differential diagnostics.
Results: Of the 2156 patients investigated, 358 (16.6%) received a diagnosis of occupational disease. The diagnoses broke up as follows: 68 cases of occupational rhinitis (22 with rhinitis + asthma), 186 occupational asthma, 70 allergic alveolitis, and 34 ODTS cases. In 1798 patients with work-related respiratory symptoms, an occupational disease could not be diagnosed.
Conclusions: Exposure to moulds in association with water-damage at work may cause a variety of symptoms, the majority of which are of irritant nature, also causing exacerbation and aggravation of pre-existing asthma. Patients with work-related respiratory symptoms ought to be clinically investigated as moulds clearly induce diseases including asthma, rhinitis, allergic alveolitis and ODTS.

OCCUPATIONAL ACCIDENTS, WORK PERFORMANCE AND OBSTRUCTIVE SLEEP APNEA SYNDROME (OSAS). RESULTS OF A PILOT STUDY

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[ID 1246]

Background and study objective: As little is known how accidents and performance in the workplace are associated with OSAS, which occurs in 2-4% of the working population (1, 2), this study evaluated the prevalence of occupational accidents and impairments in work performance in people with OSAS.
Methods: 40 Italian workers (15 white-collar and 25 blue-collar including 6 truck drivers) aged 30 to 64 years, affected by OSAS, replied to a questionnaire on the occupational accidents they had been involved in since starting their present jobs and on impairments in work performance (difficulties in concentration, in learning new tasks, in performing monotonous tasks, in vigilance, in responsiveness, in memory, in motor coordination and in manual ability).
Results: Overall 17/40 (42.5%) subjects [3/15 (20%) white-collars, 10/19 (52.6%) blue-collars and 4/6 (66.6%) truck drivers] had been involved in occupational accidents. The mean number of occupational accidents per year/employment (0.045) was higher than in blue and white-collar workers without symptoms of OSAS (0.035 and 0.008 respectively) (3). 25/40 (62.5%) subjects [10/15 (66.7%) white-collars, 11/19 (57.9%) blue-collars and 4/6 (66.6%) truck drivers] referred at least one impairment in work performance.
Conclusions: These preliminary results suggest OSAS increases the risk of occupational accidents and impaired work performance. Occupational physicians could play a strategic role in early diagnosis and treatment of OSAS and in providing appropriate information.
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ACUTE RESPIRATORY EFFECTS OF URBAN AIR POLLUTION AMONG TRAFFIC POLICE OFFICERS OF MILAN

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[ID 1612]

The study subject is topical, not only for the sake of evaluating traffic wardens' risks, but also for the effect on health of the population living in town. Study objective is assessing, among police officers of the Milan municipality, a possible increase in the prevalence of respiratory symptoms and accreted lung function impairment in relation to the atmospheric pollution levels as measured by personal samplers. Methods. The study was conducted by several methods: an interview with a physician aimed at gathering anamnestic data; completion of a questionnaire; spyrometric examinations at the beginning and the end of the workshift. Daily, during the study, for each person a passive environmental sampling of aromatic hydrocarbons was performed. Additionally, personal exposure to CO with electrochemical cell-shaped diffusive samplers and concentrations of fine dusts by means of an active personal sampler were assessed. 130 police officers operating in the eight zone commands participated to the investigation. Male police officers accounted for the 60% of the total sample. Results. The statistical analysis of symptoms

gathered at the beginning and the end of the workshift ($\chi 2$ Test) returned a significant increase of all symptoms at the shift end (with the exception of dyspnoea and palpitations), after controlling for smoke habits. Similarly, a light but significant decrease of spyrometric parameters was observed at the shift end, mainly among smokers, albeit values remained in the normality range. From the analysis of data obtained by the environmental monitoring with personal samplers, a neat overcoming of some polluters' parameters beyond the threshold environmental values established according to D.M. 60/2002 (fine dusts, benzene) was observed; nevertheless, for all polluters sampled concentrations were definitely beneath the TVL established for workplaces. From the comparison between symptoms and the various exposure levels to polluters no significant correlations were observed. Similarly, non significant differences were found from the comparison between spyrometric parameters and polluters split into tertiles. Conclusions. The clinic implications of atmospheric pollution on traffic wardens resulted as extremely modest and acute risks for the studied working population don't move away significantly from general population risk levels.

OCCUPATIONAL EXAMINATIONS OF LUNG FUNCTION OF WORKERS IN THE CONSTRUCTION INDUSTRY WITH FEASIBLE NON-SPECIFIC DUST EXPOSURE

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[ID 335]

OBJECTIVE:
The special occupational medical care in the case of dust exposure give grounds for an analysis of data on lung function examinations from preventive occupational health check up.
DESIGN and SUBJECTS:
Data from general preventive health examinations were assessed for 71,861 workers (average age: 35.9 years), who had been examined between 1993 and 1999.
RESULTS:
The proportion of smokers was 52.7%, a further 14.8% were former smokers. For 10% of those examined, the lung function showed an FEV1/VK<70%. In 4.1%, suspicion of a chronic obstructive lung disease had been diagnosed. Smokers who had smoked for at least 40 years have a 9.4x higher risk of coughing and ejection, a 3.8x higher risk of an FEV1/VK 70% and a 3.9x higher risk of the suspicion of a chronic obstructive lung disease in comparison to non-smokers. The occupational effect amongst the non-smokers, with maximum FEV1 restriction for glaziers, auxiliary workers and plasterers and minimums for fitters and tile-layers, informs largely to the expectations from the exposure. The occupational effect in the comparison between auxiliy workers and tile-layers is lower (OR = 1.8) than the smoking effect (OR - 2.2). A high proportion of 21.5% had reduction of the FEV1 >100 ml/year of life.
CONCLUSIONS:
The results indicate the need for consultation for smokers in conjunction with the restriction of exposure to dust and other non-specific irritants at the workplace. The highest demands must be placed on the quality assurance of the lung function examination.

OCCUPATION AND CHRONIC BRONCHITIS AMONG CHINESE WOMEN: A REPORT FROM A POPULATION-BASED COHORT STUDY

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[ID 1230]

Introduction: Chronic bronchitis is a common respiratory disease, with occupational exposures being an important risk factor. We examined the associations between occupation and bronchitis among women using baseline survey data in a population-based cohort study in Shanghai, China.
Methods: From 1997 to 2000, 74,942 women aged 40-70 years were enrolled in the cohort. In this nested case-control analysis, cases were 4 873 women who self-reported physician-diagnosed bronchitis as an adult. Controls were 9,746 women randomly-matched to the cases by year of birth and age at diagnosis. Lifetime occupational histories and other information were obtained since bronchitis diagnosis for cases and reference date for controls. Logistic regression was used to estimate odds ratios (ORs) and 95% confidence intervals (CIs) of bronchitis associated with ever held occupations, adjusting for age, smoking, education, annual family income, and concurrent asthma.
Results: Significantly elevated risks for bronchitis were observed for editors (OR=1.9; 1.17-3.04), performers (1.8; 1.3-2.7), typists (OR=1.7; 1.2-2.5), workers in packing and baling (OR=1.4; 1.2-1.7), welders (OR=1.4; 1.01-1.9), and spinning textile workers (OR=1.3; 1.1-1.5). Bronchitis occurred more often in industries of metal fabrication of movies and cameras (OR=2.1; 1.4-3.3), and special instruments (OR=1.8; 1.2-2.8), textile industry (OR=1.9; 1.1-3.3), postal and telecommunication (OR=1.6; 1.1-2.2), warehousing (OR=1.6; 1.1-2.3), arts (OR=1.5; 1.1-1.3), and armed forces (OR=1.4; 1.04-1.8). Significant association with duration of employment was observed for some jobs and industries (welders, metal and scientific workers, postal/telecommunication and armed forces), while not for others. The association between specific occupations and bronchitis was not substantially changed after further adjustment for passive smoking and exposure to cooking fumes.
Conclusions: An interesting finding in the study was the association between bronchitis and welding, a link previously reported in men, but not in women. Associations observed in warehousing, packing and baling, the arts, and metal fabrication in particular need further exploration and confirmation.

ADVERSE HEALTH EFFECTS OF ULTRAFINE PARTICLES AT THE OCCUPATIONAL SETTING

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[ID 1375]

Local (airway) and systemic effects of ultrafine particles (UFP) are documented, yet, scarce data are related to an occupational exposure. In 30 shooting instructors a questionnaire, physical check-up, spirometry, induced sputum (3%, 4%, 5% NaCl) and blood withdrawal were performed before exposure, immediately and 24 hours after exposure, while in 30 control non-exposed subjects the same tests were performed twice – 24 h apart. The exposure to UFP was measured by a Scanning Mobility Particle Sizer (TSI), while the exposure to inhalable dust was measured by personal air samplers. IL-2, IL-4, IL-5, IL-6, and GM-CSF, anti-Myeloperoxidase and PMN-elastase levels in serum (in IL-8, IF- addition to routine biochemical parameters) and sputum were determined by ELISA.
0,55 mg/m^3) at the police In spite of a very low mass of inhalable dust (0,81 22,39 nm, particle shooting range the level of UFP (particle diameter = 68,64 number about 500.000 particles/cm^3) was low but almost 100 fold higher compared to samples outside the shooting range. They have however not caused any acute nor delayed airway complaints in exposed subjects. In sputum and in serum neither acute nor delayed inflammatory responses to UFP could be detected. No significant difference of routine serum biochemical parameters could be found in subjects occupationally exposed to UFP compared to controls. The only statistically significant difference (p=0,0355) has been found in the lung function decline (FEV1) in exposed subjects over time (prior versus 24 h after exposure). This differences in occupationally exposed subjects between FEV1 absolute values 24 h after exposure versus baseline values were less than 10%, thus as a measurement bias in the scope of the repeatability of the measurement method in all but one subject (this one had a 16% reduction of absolute FEV1 value). This result suggests that exposure to low levels of UFP causes a trend of decrease of FEV1 absolute values 24 hours after exposure in occupationally exposed subjects without a clinical relevance (it presents a statistical dimension). Further, it might suggest that more sensitive parameters are needed to monitor the response or that no measurable effects after low occupational UFP exposure can be found.

POTENTIAL EFFECT OF TUMOR NECROSIS FACTOR- α AND TUMOR NECROSIS RECEPTOR II GENE POLYMORPHISMS ON THE PATHOGENESIS OF SILICOSIS.

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[ID 1637]

Objective To approach the role of tumor necrosis factor-α(TNF-α) and tumor necrosis factor receptorII (TNFR II) gene polymorphisms in genetic susceptibility to silicosis and their interaction with silica-dust exposure. Methods According to Diagnostic Criteria of Pneumoconiosis, 259 cases with silicosis and 341 silica-dust exposure healthy workers (controls) were selected, and the cases with silicosis were divided into three subgroups based on the various stages of I, II and III. Exposure history , pneumoconiosis history and past history of each subject were obtained by questionary. 3ml peripheral vein blood was drawn from each subject. Using polymerase chain reaction-restriction fragment length polymorphisms (PCR-RFLP) techniques, TNF-α and TNFR II gene polymorphisms of each subject were analyzed. Results In both group matching and 1:1 paired matching, there was no significant difference between cases with silicosis and controls in distribution frequencies of G/A+A/A (TNF-α-308) and T/G + G/G (TNFRII 196) genotypes. The risk of silicosis in those with G/A + A/A genotype was 6.74-fold higher than G/G genotype (OR=6.74,95%CI:1.01~44.99) in subjects whose exposure time was less than 15 years. Conclusions TNF-α and TNFR II gene polymorphisms didn't play an important role in susceptibility to silicosis of Han race. There was interaction between polymorphism of TNF-α and exposure time in the occurrence of silicosis. The risk of silicosis in those with G/A+A/A genotype was significantly higher than G/G genotype in low accumulative exposure.

RESTRICTIVE RATHER THAN OBSTRUCTIVE LUNG FUNCTION IMPAIRMENT IS ASSOCIATED WITH HIGHER MORTALITY AMONG COAL MINERS

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[ID 1220]

Introduction

Lung function impairment, usually decrease in percent predicted FEV1 as an index of obstructive changes, has been reported to predict higher mortality among coal miners as well as general population. Coal miners in Korea receive annual health examination including spirometry and chest x-ray to check for the development of pneumoconiosis even after leaving workplace. We analyzed the predictors of mortality among coal miners to examine the adequacy of current compensation criteria for functional impairment of pneumoconiosis.

Methods

We investigated 13,141 coalminers who underwent a close medical examination for pneumoconiosis between 1991 and 2000, and followed them up to the end of 2002. 2501 coalminers died between 1992 and 2002. Causes of death, coded according to the Korean Classification of Diseases(KCD), from the death certificates were ascertained. Mortality comparison were made with the male population in Korea, resulting in standardized mortality ratios(SMRs) and subgroup analysis was made.

Results

When FVC and FEV1 were simultaneously examined, the decrease in percent predicted FVC below 80% was significantly associated with the increase in mortality and the increasing trend was evident even just under 100% while the change by FEV1 was not. This association remained significant even after adjusting for profusion of pneumoconiosis by X-ray, smoking, BMI, age and sex.

Discussion

Restrictive changes set the limit in the maximum volume of oxygen uptake while obstructive changes set the limit in the maximum rate of oxygen uptake. In this sense, the limit in the rate can be tolerated as long as slowed down rate can supply the minimum requirement volume of oxygen. Restrictive rather than obstructive lung function changes when taken together can be more important predictors of death for coal miners.

THE IMPACT OF SPIROMETRY RESULTS ON DETERMINING RESPIRATORY PATHOLOGY IN THE OCCUPATIONAL SETTING

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[ID 1707]

AIM

Exposure to respiratory hazards in the occupational setting may lead to respiratory pathology. Spirometry is the method of choice for monitoring the respiratory function of workers exposed to respiratory hazards. The results are used to determine whether or not a worker is experiencing negative sequelae due to occupational exposure. A preliminary audit of spirometry, at an occupational site where workers are potentially exposed to asthma inducing agents, identified a poor level of compliance with the ATS Standard and the SATS Guidelines for this testing. The purpose of this study was to analysis all spirometry results recorded for the 1137 workers employed at this site over the past ten years and to determine the validity of the testing.

METHOD

An initial audit had prompted the decision to review all spirometry records for all workers employed at the company over a ten year period. All spirograms were reviewed for criteria of acceptability and reproducibility. The data was coded and all recorded measurements for each test captured.

CONCLUSION

Of the 1137 records only 610(53.6%) of the workers had a recorded valid result as ATS testing criteria had not been met in the remaining cases. The first valid test in many cases was recorded some years after the first year of employment. For 61% of the workers there are insufficient records on which to make a diagnosis regarding respiratory well being. Despite the fact that the company is implementing a stringent respiratory conservation program, these activities are not backed up by medical surveillance. A great deal of time and effort had been put into producing records that could not be used for the intended purpose. The effect of exposure on worker health can also not be clearly defined at this stage. Corrective action has been recommended to correct this situation.

OCCUPATIONAL HEALTH IN AGRICULTURE

IMPROVING OCCUPATIONAL HEALTH AND SAFETY OF SMALL-SCALE FARMERS: INTERNATIONAL EXPERIENCE OF THE WORK IMPROVEMENT IN NEIGHBOURHOOD DEVELOPMENT (WIND) APPROACH

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[ID 773]

Men and women farmers in developing countries often suffer poor conditions and are exposed to a range of work-related risks. Some of these are age-old (such as work postures and heavy manual handling) and some of them more recent (especially relating to agro-chemicals). These risks, combined with the effects of poor living conditions and lack of access to basic health care, undermine health and well-being, as well as labour productivity. Poverty is pervasive. The loss of income and the medical costs resulting from work-related illnesses and accidents can place the livelihood of whole families in jeopardy.

The occupational health risks of agricultural families can be tackled through a programme that promotes simple, practical, low-cost improvements at work and in the home. Inspired by the ILO's WISE methodology (participatory, action-oriented, focus on achievements, build on local practice, link working conditions with other goals, learning by doing, exchange experience) a training programme for small-scale farmers has been developed and tested extensively in Vietnam. It is a positive approach for change, based on bringing people together to solve not only their individual problems but also their common concerns. This WIND (Work Improvement in Neighbourhood Development) training programme has been highly successful in directly assisting farming families to improve safety, health and working conditions.

This presentation describes the findings of recent ILO work with local organisations to adapt the WIND approach to a wider range of agricultural and social contexts, in Africa (Senegal and Ethiopia), Eastern Europe (Moldova) and Central Asia (Kyrgyzstan), as well as in Asia (Cambodia, Mongolia and the Philippines). The main challenges have been twofold: to adapt the approach to different agriculture practices and cultural norms; and to identify delivery mechanisms and partners for effectively reaching rural communities on a large scale and assisting them to improve local conditions.

THE ASSESSMENT OF BIOAEROSOL INHALATION EXPOSURE FOR WORKERS WHILE HANDLING SHEEP AND WOOL IN EASTERN AUSTRALIA

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[ID 835]

The air found in a sheep shearing environment is normally contaminated with many different airborne substances. These contaminants include dust (predominantly organic), bioaerosols (bacteria and fungi) and gases (e.g. ammonia and carbon monoxide). Respiratory disorders, such as chronic bronchitis and asthma, have been associated with exposure to the types of airborne contaminates found in a normal sheep shearing environment. The majority of Australian and international research in the livestock handling industries that has investigated dust exposure, has focused on the poultry and pig industries. A few studies have been undertaken on feedlot cattle. Research in the sheep shearing industry in relation to worker exposure data to airborne contaminants has been identified as a major need, as no documented studies have been undertaken. This paper will provide an overview of a three year study into the sheep shearing industry in NSW, Australia, concentrating on the bioaerosol results.

Twenty nine sheep shearing sheds were sampled for concentrations of bacteria and fungi using an Andersen Instruments 2-Stage bioaerosol sampler. The use of this equipment allowed only static samples to be collected while shearing was being undertaken in the shed.

The average results for the 29 shearing sheds sampled was 2,284 cfu/m3 for bacteria and 2,069 cfu/m3 for fungi, but the range of concentrations varied greatly. Bacteria concentrations ranged from 35 to 57,224 cfu/m3 and fungi from 0 to 17,173 cfu/m3. The environmental factors that may have influenced the concentrations recorded were analyzed in relation to potential influence on mean concentrations of bioaerosols measured. Factors including indoor air temperature, region of farm, time of day the samples were collected and the number of sheep shorn during sampling, will be discussed in relation to the results presented.

The current literature regarding possible bioaerosol exposure standards will also be discussed in relation to the Australian situation.

WORKING CONDITIONS AND HEALTH EFFECTS IN ORGANIC AND CONVENTIONAL PIG BREEDING FARMERS

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[ID 1407]

Pig farmers show a higher prevalence of chronic obstructive airways diseases than the general population. The work-related exposure to bioaerosols is described as one major cause for the respiratory symptoms. In order to assess the impact of different kinds or farming, individuals on conventional and organic pig farms were addressed.

Supported by the local farmers´ representatives and by the federations for organic farming, 550 farmers received a standardised questionnaire. Besides working conditions (e.g. number of pigs, livestock building, manure handling, hygienic procedures), work ability as well as several symptoms were assessed using the work ability index (WAI) and a questionnaire adopted from other standardised instruments.

A total of 90 organic and 204 conventional farmers were included into the study. As respiratory diseases were the main focus of the present contribution, only data of "never-smokers" were shown (29 organic and 96 conventional farmers).

Age and duration of the farm work were similar in both groups. The number of pigs (e.g. fattening pigs: 70 versus 725 (median)) as well as the average number of daily working hours in the livestock building (1,5 versus 4,5 hours (median)) were higher in the conventional farming group. Similarly, the percentage of reported diagnoses (e.g. repeated airways infection (10% (organic) versus 28% (conventional)) and symptoms (e.g. coughing with phlegm 26% (organic) versus 44% (conventional)) differed in both groups. Thus the duration of daily work in the livestock building seemed to influence the farmers´ health status more than single farming activities associated with high exposure to bioaerosols.

As exposure to bioaerosols is inherent to the work in livestock farming, instruction of the farmers and their employers is necessary. Besides technical and organisational precautions, special emphasis should be put on the use of personal protective equipment (respiratory masks) during activities leading to an exposure to bioaerosols.

AGRICULTURE AND RURAL HEALTH OF COMMUNITIES IN NORTHERN AND CENTRAL TANZANIA AND THEIR CHALLENGES

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[ID 1723]

Background

About 80% of population of Tanzania live and work in rural areas. Agriculture and rural health are two basic objectives of survival for the life of rural communities. Communities in north and centre of the Country produce crops for food, cash income and other uses. Wild plants are used as complementary food and for some medical treatments.

Aims of the work

The aim of this work was to review surveys conducted in those regions and present the challenges faced in agriculture in the light of occupational and rural health and health determinants of the rural communities.

Materials and methods

We reviewed several field surveys, literature and semi structured interviews of smallholder farmers.

Results

Agriculture in the communities of the two regions is affected by occupational accidents, including risk of injury from wild animals, heavy workload, diseases, such as HIV/AIDs infection, and exposure to toxic substances such as pesticides and their residues. Also problems such as low yields, drought, unreliable rains, low income, poor soil fertility, poor crop pest and diseases management, dependence on natural rainfalls and lack of developed irrigation schemes, food loosing due to poor storage facilities and unbalanced diet are present. Medicinal facilities are either insufficient in number or too far to be reached in time in case of need.

Possible solutions for promoting occupational rural health in the Country are: improvement of food availability and provision of well balanced diet, supply of safe water and water for irrigation, promoting environmental health for safe food production, controlling pests and disease vectors, promoting awareness of safe use of pesticides and creating medical care centres at a short distance from occupational settings and villages. A further goal is represented by education of rural communities. These objectives can

be reached through an integrated approach, with the involvement of the Government.
Key words: Agriculture, Occupational and Rural health, Health Determinants Communities, Irrigation, Education, Domestication, Conservation, Market access and share, Sustainable supplies.

OCCUPATIONAL AND ENVIRONMENTAL HAZARDS IN AGRICULTURAL SECTOR IN MACEDONIA

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[ID 188]

Agriculture remains a vital economic sector in Macedonia. About 20% of the manpower is employed in agriculture. As a consequence of the economic transition in the past decade the number of the agriculture public companies is reduced from 200 in 1990 to 117 in 2002. The number of the private holdings is increased, but the production index is not changed.
Aims: The main aim of the paper is to determine the risk for development of malignant diseases among agriculture workers in relation with the pesticide consumption.
Material and methods: The data from national cancer registry where used for analysis of cancer incidence rate (IR) regarding the gender, age and length of exposure, for the period of 1990 to 2002. Public health reports were used for pesticides consumption and estimation of average daily intake by food.
Results: The total consumption of fertilisers in public enterprises was decreased for 45% in the past decade and in 2002 it was 18.8 kg/ha. The consumption of pesticides was decreased from 529 to 245 thousands tons (50% are fungicides, 30% herbicides and 20% insecticides). There is no available data for the private holdings. The pesticides import was increased from 6065 to7810 thousands tons.
Total mortality rate in Macedonia is 8.3/100000. The malignant neoplasms with mortality rates of 1.5/100000 are the second leading cause of deaths. There is no data for agriculture workers.
The average cancer incidence rate (IR) in the agriculture sector is 385.5/100000 (461.2/100000 for male and 309.5/100000 for female). The total incidence rate of malignant neoplasms in the country is 274.3/100 000. The analysis of data by occupation shows that the IR among the agriculture workers is 7-10 times higher than in industry or trade. The IR in agriculture sector decreases from 424.9/100 000 to 240.2/100 000 in 2002. The most frequent localisation is the lung cancer for male (40% of all cases) and breast cancer for female workers (25,3% of all cases). There is no any registered case of occupational cancer in the country.
The concentrations of HCH, lindane, propanyl and molinate in 10-12000 food samples from domestic origin are 5-20 times less then maximum permitted concentration (MPC). In only 0,1% of the samples the concentrations are higher of MCP. Estimated tolerant daily intake (TDI) of pesticides is 2-3 µg.
Conclusion: There is no sufficient data for estimation of the occupational risk among the agriculture workers. The appropriate methodology for risk assessment and the adequate reporting system are essential for disease prevention, health promotion and achievement of the EU's standards in this area.

EVALUATION OF PESTICIDE EXPOSURES AMONG PAPAYA INDUSTRY WORKERS IN BELIZE

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[ID 144]

An outbreak of dermatitis cases among papaya workers in Belize was evaluated. The study consisted of a questionnaire survey, and, for those workers with a positive history for work-related dermatitis within the past 12 months, a physical examination with skin patch testing for chemicals used in the papaya industry. The study population consisted of a random sample of workers at a large papaya plantation in the northern part of the country and a comparison group of residents randomly selected from nearby villages. Allergic contact dermatitis was defined on the basis of history, morphology and patch test result. Irritatant contact dermatitis would include the relevant history and morphology but have a negative patch test. The case definition categories for allergic contact dermatitis included a possible case (positive history with exposure to papaya industry chemical using questionnaire data), probable case (information based on clinical records) and confirmed case (positive physical exam and skin patch test). Contact urticaria (indicative of plant based allergens) was excluded by a history lacking any immediate dermal reaction. Of 148 participants, 66% were male and the study group consisted of 98 papaya plantation workers and 50 village residents. From the initial study group, 25 went on to get the clinical evaluation. A dose-response relationship was seen between exposure categories (different work positions) and positive dermal history. A relative risk of 2.76 was observed for development of dermatitis among workers in comparison to community residents (p value < 0.01). Based on the history, clinical exam and skin patch testing, an allergic contact dermatitis was associated with the following chemicals used in the papaya industry: chlorpyrifos, chlorothalonil, paraquat, zineb, flazifop-p-butyl, mancozeb, permethrin, and methomyl. This study constitutes one of the largest patch test confirmed case series of occupational allergic contact dermatitis thus far documented.

URINARY ETHYLENETHIOUREA AS BIOMARKER OF EXPOSURE TO ETHYLENEBISDITHIOCARBAMATES IN FLORICULTURE WORKERS IN ECUADOR

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[ID 1609]

Floriculture represents one of the major sources of income in Ecuador that is one of the greatest worldwide producers of ornamental flowers. Floriculture can be carried out both in open fields and in greenhouses with an extensive use of pesticides, among which, ethylenbisdithiocarbamate fungicides (EBDTCs). Aim of this study was to assess EBDTCs exposure in Ecuadorian floricultural workers by the determination of the urinary excretion of the major metabolite of these compounds, ethylenethiourea (ETU). Thirty-six floriculture workers and 34 unexposed healthy subjects (controls) from an Andean region entered the study. Workers were exposed to EBDTCs while applying plant protection products, and during re-entry activities or crop maintenance in one open field and two greenhouse farms. They provided morning pre-exposure (n=31) and afternoon post-exposure (n=24) urine spot samples. Controls provided one urine spot sample collected in the morning. In agricultural workers median ETU in pre- and after-exposure samples was 3.2 (<0.5-34.5) and 6.2 (1.5-26.5) µg/g creatinine. Although ETU increased after the workshift the difference was not significant. ETU was higher in workers then in controls (0.7, <0.5-7.1 µg/g creatinine, $p < 0.01$). When subjects were divided according to job titles, applicators showed the highest ETU (17.0, 1.5-34.5 µg/g creatinine) whereas growing, post-harvesting and maintenance workers showed similar levels (4.3, <0.5-26.5; 2.8, <0.5-11.1; 4.8, 3.2-6.5 µg/g creatinine, respectively). Higher ETU was observed in greenhouse compared to open field workers ($p < 0.01$). This study suggests that Ecuadorian floricultures are exposed to EBDTCs at levels approaching those observed in Italian vineyard workers. The lack of difference between ETU in pre- vs. post-exposure samples is attributable to previous day exposure, in fact the kinetic of excretion is such that in prior to next shift urine significant amount of ETU is still present.

FARMING WORK, DUST EXPOSURE AND RESPIRATORY SYMPTOMS AMONG FARMERS

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[ID 210]

Background/ objectives: The environmental conditions of the rural work, organic dust specially, has been associated with the increase of respiratory diseases. This study evaluated the prevalence of respiratory symptoms among farmers and its associations with occupational risk factors.

Methods: Using a cross sectional design, data about farming work characteristics, as well organic and mineral dust exposure, were gathered. Respiratory symptoms were measured by an adapted version of American Thoracic Society - ATS questionnaire. The multivariate logistic regression analysis examined the occupational factors associated with respiratory symptoms.
Results: The majority (52%) of 1379 farmers interviewed had an intense exposure to dust. Workers from farms with better economic indicators presented lower prevalence of respiratory symptoms. Poultry workers referred more symptoms of chronic respiratory disease (OR 1.60; IC 1.05-2.42). Farmers exposed to high concentration, of two or more types of dust, presented more asthma symptoms (OR 1.71; IC 1.10-2.67) and chronic respiratory disease symptoms (OR 1.77; IC 1.25-2.50). The main types of dust associated with increased respiratory symptoms were feather, straw, dry manure, ash and agricultural smoke.
Conclusions: The agricultural workers showed a high occupational exposure to organic and mineral dust, and those exposed to higher dust concentration presented increased risk of work-related respiratory symptoms. It is recommended to implementation of respiratory protection programs, addressed mainly to workers involved with poultry production.

OUTCOMES OF A FIVE YEAR PROJECT TO CONNECT DISABLED FARMWORKERS TO VOCATIONAL REHABILITATION SERVICES IN THE U.S.

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[ID 1154]

We describe the results of a five year project which linked disabled Spanish-speaking farmworkers to vocational rehabilitation services in order to obtain new skills for their re-employment. The region for the project was seven counties in Kentucky, covering approximately 4,970 square kilometers. The project objectives were designed to use outreach efforts to 1) identify disabled farmworkers 2) link them with vocational rehabilitation services, and 3) equip vocational rehabilitation counselors with Spanish language and cultural competency skills to address potential language and cultural barriers. Vocational rehabilitation counselors participated in either a four week Spanish and culture immersion program in Mexico or attended Spanish courses and cultural competency workshops in Kentucky. Between 2000 and 2005, we referred 356 farmworkers with disabilities to the Kentucky Office of Vocational Rehabilitation. Among the more common disabilities were HIV-AIDS, musculoskeletal injuries and mental illness. Of the 356 referrals, 227 (64%) did not meet eligibility criteria to receive services, primarily because the workers lacked legal immigration status. Of the 129 referrals (36%) who met eligibility criteria, 119 did not complete the vocational rehabilitation process because they either moved away or their disability did not meet the stringent legal definition of disability set by the Office of Vocational Rehabilitation. The remaining 10 farmworkers (3%) were successfully re-trained in other skills and obtained new jobs. The difficulties encountered in our program suggest that better efforts must be made to overcome three barriers to service: 1) immigration status, 2) legal definition of disability, and 3) the transient migration patterns of seasonal farmworkers.

MUSCULOSKELETAL DISORDERS (MSD) IN AGRICULTURE: CASE OF COTTON-GROWING POPULATION IN SOUTHERN BENIN

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[ID 1693]

In Benin, a West African country, cotton is the main item of export trade and the main provider of hard currency. Its production is characterized by very low mechanisation, prominently in the south where such rudimentary tools as hoes, matchets and others are still used.
In order to identify the causes of MSD in relation to this activity, a randomised cross study has been carried out. The study takes into account 60 cotton growers in the area of Applahoué, in the south-west (36 men and 24 women averagely aged 34). 80% of them have been growing cotton for 5 years or more. Interviews have been conducted based on a questionnaire close to INDESTEEGE and MALCHAIRE (INRCT, 1997) model.
The major causes of MSD identified are: repeated gestures,physical efforts deriving from cultivation technics, inadequate tools and cultivation postures. 57% of the population covered present MSD symptoms. They are at least 5 years old in the occupation. The dominant symptoms are: tiredness, joint pains, muscular pains (no significative difference was noted between men and women). The most affected parts of the body are, in order, the bottom of the back, the nape, the shoulders and the hips. The main activities responsible for the MSD are: weeding, ploughing and carrying heavy load on the head.
Measures aiming at educating the concerned people, reorganising the work and mostly mechanised farming are therefore required to ensure the betterment of farmers, since the youths, the children and the women are predominantly in the sector.

THE FARM INJURY RISK AMONG MEN (FIRM) STUDY: IDENTIFYING RISK FACTORS FOR SERIOUS FARM WORK-RELATED INJURY AMONG MEN

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PURPOSE
The agricultural workforce has high rates of work-related death and injury, yet few analytic studies of farm injury have been conducted world wide. The FIRM study aim is to identify risk factors for serious farm work-related injury among men.
METHODS
A prospective case-control study is being conducted in Victoria, Australia. Eligible cases include: males; 16 years or over; injured while undertaking paid or unpaid work on a study region farm; injury scoring 2 or higher on the Abbreviated Injury Severity Scale. Fatalities are identified, and next of kin recruited, via the State Coroner's Office. Non-fatally injured cases are identified on presentation to 14 regional hospitals, and 5 metropolitan referral hospitals. Two age-matched controls per case are recruited by random telephone survey. Data on hypothesised individual and farm risk factors are collected using a structured questionnaire. Conditional logistic regression models are being used to compare risk between cases and controls.
RESULTS
To date 200 cases and 381 controls have participated, with recruitment to be completed by April 2006. Audits revealed that approximately 50% of eligible non-fatal cases were not being approached for participation, necessitating additional recruitment mechanisms. Response rates among the controls are 84%. Age matching within 10 year spans has been achieved for 79% of controls. The main external causes of injury are machinery (23%), falls (20%) and transport (17%). Preliminary results indicate increased risks for those with a trade based education (unadjusted OR 2.3, 95%CI 1.3-4.1), and with less than 5 years farming experience (OR 2.5, 95% CI 1.1-5.6). Decreased risks were observed for those holding a second job (OR 0.5, 95% CI 0.4-0.8).
DISCUSSION
The results, available by June 2006, will contribute to a continuing scientific basis for selection of interventions for farm injury and targeting of prevention programs, at a time of increasing momentum in agricultural health and safety.

INTERNATIONAL COOPERATION IN OCCUPATIONAL HEALTH

A SECTOR BASED U.S. NATIONAL OCCUPATIONAL RESEARCH AGENDA: GLOBAL COLLABORATIONS

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[ID 325]

The National Institute for Occupational Safety and Health (NIOSH) and stakeholders in the United States seek your help in bringing global collaborations into the new National Occupational Research Agenda (NORA). For the past ten years NORA has served as a framework to guide occupational safety and health research - not only for NIOSH but for the entire occupational safety and health community in the United States. NORA has had substantial impact in the United States. NIOSH and partner governmental agencies have funded NORA research annually at increasing levels, rising from 15 million in 1996 to 130 million in 2004.

Building on the success of NORA, the second decade of NORA will use a sector-based approach, which includes all employers, all workers and all workplaces. See www.cdc.gov/niosh/nora. NIOSH and its partners will form eight Sector Research Councils, gathering all sectors into these eight groups. Each Council will include participants from academia, industry, labor, and government and will draft strategic and sub sector-based research goals, objectives, and action plans. These agendas will provide guidance to the entire occupational safety and health community for moving research to practice in workplaces. In addition, a Cross-sector Research Council will be formed to identify opportunities for common research (for example musculoskeletal disorders) across sectors. Global Collaborations is an important cross-cutting theme for all Sectors. In our global village, the sharing of solutions to common problems can increase the health and safety of workers on all continents. Your input to identify sector problems, needed research, and implemention practices is sought electronically at www.cdc.gov/niosh. The kick-off for the second decade of NORA is April 2006. NIOSH will continue as the steward of NORA and facilitates the work of the Research Councils, which will develop and implement research agendas for the occupational safety and health community. Please join us.

Sector definitions follow the North American Industry Classification System (NAICS), which has replaced the U.S. Standard Industrial Classification (SIC) system. The 20 NAICS sectors were aggregated into eight sector groups according to the similarity of their occupational safety and health issues. These eight Sector Research Councils are

Agriculture, forestry, and fishing
Construction
Health care and social assistance
Manufacturing
Mining
Services
Transportation, warehousing, and utilities
Wholesale and retail trade

OCCUPATIONAL HEALTH SERVICES IN ITALY: A COMPARISON ON THE BASIS OF 21 COUNTRY PROFILES

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[ID 726]

Introduction

A monograph edited by FIOH (Work and health country profiles of twenty-two European countries. People and Work Research Reports 52 – FIOH. Helsinki, 2002) reports crude data of national profiles of 21 countries about Occupational Health (OH). Data are fully comparable, although the entire set of information requested is not available for all countries. Among the available information types of activity carried out by OH services are included. Some of these activities may be compulsory, on voluntary basis or simply not included in the national OH practice, depending on the national regulation.

Methods

The Italian profile was compared with those of the other 20 European countries regarding OH services activities, particularly:

1. workplace surveys, workplace visits, exposure assessment, risk assessment and management;
2. health examinations, health surveillance (general and risk-based);
3. workplace health promotion, health education, counselling;
4. assessment of work ability, rehabilitation;
5. curative services;
6. first aid, accident management;
7. education, training, information campaigns;
8. quality assurance of OH processes, audits;
9. safety inspections;
10. initiatives and advice for management of workplace safety an health, safe workplace design.

Results

This analysis showed strong differences, pointing out the need of a closer convergence of national regulations and practices, in view of the full implementation of the principles of EU regulation in OH.

Conclusions

The analysis of population's work-related health (in its wider sense) reveals that there is an urgent global imperative to make a structure and quality of growth as a critical development issue as its quantity. The present work may contribute to the development of OH Indicators to improve OH practice. In addition it may support the production and widespread dissemination of a range of advocacy materials, regulations and standards, guidelines and training materials.

HOW MANY WORKERS WERE INJURED TO MAKE THIS CHAIR? MEASURING GLOBAL OCCUPATIONAL HEALTH IMPACT

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[ID 1426]

Trends in occupational exposures and injuries suggest that conditions have improved substantially for the average North American and European worker over the last 30 years. These improvements have often been attributed to occupational health interventions like regulations, inspections, and control technologies. While these have had positive impacts, measuring their effectiveness is complicated by profound global shifts in the nature of work. Much heavy manufacturing and many hazardous jobs sustaining the "post-industrial" economies have now moved to developing nations, where there are often fewer resources for environmental protection. Given these changes, how should we measure trends in occupational health and safety within developed nations? Before the 1970's, the U.S. manufactured most of what it consumed, which meant that the injury and illness burden of the goods consumed in the U.S was borne by U.S. workers. For example, coke is needed to make steel, and its production is very hazardous. Until the 1960's, the U.S. produced nearly all of the coke it needed, but since then, U.S. production has declined, so that now less than 30% of the coke supplying U.S. steel consumption is domestically produced. That 30% is produced under much safer conditions than 30 years ago, but the workers producing the remaining 70%, in China and other less-developed countries, are probably still exposed to serious hazards.

This example suggests a new approach to measuring occupational health trends: assessment of the total global worker health impacts of goods consumed in a country, rather than the injuries and illnesses from that nation's production. If one were to calculate the injury and illness burden of a ton of steel, a pair of shoes or a chair consumed in the U.S. in 1970, and again in 2006, would there be much improvement?

Occupational health researchers will need to collaborate globally to answer this question.

EVOLVING ELECTRONIC COLLABORATION IN OCCUPATIONAL & ENVIRONMENTAL HEALTH

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[ID 1918]

The availability of collaboration via internet has generated several well-established electronic institutions. Messaging by individual and then broadcast email represents the original grass-roots electronic application, and continues to provide essential professional contact. Later tools provide less general impact, but considerable opportunity as new media reach target audiences and special needs:

- Streaming audio recordings of public health briefings provide immediate and/or time-shifted access to reports of "breaking" news and permit widely synchronized tactics and alerts.
- Instant messaging represents the disposable end of the information spectrum, almost entirely for casual interchange.

- Occupational health blogs' individual opinions have impact which rivals traditional publications, and do so almost instantly and at minimal cost or overhead.
- Digitized and networked telephony has freed previously directly-connected calls from concerns of cost or duration.

In 2005-06, two distinct extensions from the established Occ-Env-Med-L forum began. Advances on social more than technical fronts, each is a potential model of electronic collaboration potentially useful among other groups and topics. The Rapid Response Consultation program culminates years of expectation. This international effort solicits, translates and fine-tunes questions about exposure-related disease from clinicians and public health experts in developing countries. Queries are posed to a large virtual community for volunteers' immediate opinions, and also assigned in rotation to trainee/faculty teams at N. American Occupational Medicine residency programs for comprehensive consultation. The aggregate product is a combination of focused bibliographic discovery and professional experience. The web-based collection of replies is a new source for reference and instruction. OHDEN (the Occupational Health Disaster Expert Network) is a closed, confidential-but-not-secure electronic forum and dynamic library for mutual support in crisis alerts, planning and response. Through collective effort, a parallel (but private) public health network of worker and enterprise protection has emerged, offering practical solutions to alarming situations for N. American employers.

UPPER AND LOWER EXTREMITY DISORDERS: POPULATION STUDIES

OCCUPATIONAL FACTORS AND KNEE OSTEOARTHRITIS (OA): AN ANALYSIS OF THE THIRD NATIONAL HEALTH AND NUTRITION EXAMINATION SURVEY (NHANES III) USING EXPERT RATINGS

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[ID 361]

Background: Knee osteoarthritis (OA) is a highly prevalent disease that results in a large amount of disability among the elderly. Previous studies have identified occupational kneeling and heavy lifting as significant risk factors for knee OA. However, few studies have assessed occupational physical exposures beyond self-reported and dichotomous exposure categories. As a result, it is difficult to make specific recommendations for controlling workplace exposures.
Objectives: This analysis used data from a national (USA) cross-sectional study (NHANES III) to: 1) examine the relationship between knee OA and exposure to occupational activities, 2) estimate knee OA risks associated with selected occupational activities using expert ratings.
Methods: A weighted multiple logistic regression was used to model the odds of various knee outcomes, as a function of occupational exposures and other covariates. Knee outcomes were defined using knee radiograph scores and/or symptoms. Occupational exposures were assessed by expert ratings of the proportion of the work day spent in specific work activities for each subject's longest-held job.
Results: After adjustment, the strongest associations were observed between symptomatic knee OA and kneeling (>15% vs. <5% workday: OR= 3.6; 95% CI: 1.8, 7.6) and heavy lifting (>20% vs. <5% work day: OR=3.2; 95% CI: 1.4, 7.1). A significant linear trend was also observed between increasing levels of kneeling and heavy lifting and odds of symptomatic knee OA. These results suggest that prolonged kneeling and heavy lifting result in greater damage to the knee, and increasing the odds of knee OA. The results address effects on other knee outcomes. Additionally, comparisons are made with the previous analysis of knee radiographs in HANES I.
Conclusion: Overall, this analysis provides finer detail on the relationship between knee OA and occupational activities. In addition, the use of expert ratings in this analysis shows potential for application in future studies.

PERSISTENT MUSCULOSKELETAL SYMPTOMS AND THEIR RELATIONS TO OCCUPATION AND PHYSICAL ACTIVITY AT WORK IN THE DANISH WORK ENVIRONMENT COHORT (1990-2000)

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[ID 696]

Introduction: Persistent work-related musculoskeletal disorders (WMSD) are poorly described. This is mainly due to lack of longitudinal studies and consensus on defining persistency. The aim was to study the frequency of persistent WMSD in the Danish Work Environment Cohort in a ten year period in relation to high/low physically demanding occupation (PDO) and high/low level of physical activity at work (PAW). **Methods:** Baseline telephone interviews on working conditions and health status were performed in 1990 among 6067 workers and repeated again in 1995 and 2000. In total, 2810 workers (55% males, 45% females) between 18-59 years answered the musculoskeletal health questions all three rounds. Persistent WMSD in a specific body region was defined as symptoms in a ten years period in the same region. **Results:** In total, 29% females and 13% males had persistent neck/shoulder symptoms, 20% and 18% had persistent low back symptoms, and 4% and 1% had persistent hand/wrist symptoms. Persistent low back and hand/wrist symptoms were more frequent among workers having high PDO and high PAW than among workers having low PDO and low PAW, respectively. Furthermore, persistent neck symptoms were more frequent among workers in low PAW compared to high PAW. In the total group (females and males analysed as one group) high PAW in all three rounds or only at baseline predicted development of low back symptoms, and both a high and low PAW predicted hand/wrist symptoms. There was a tendency for low PAW predicting neck symptoms, and for females separately there was a tendency for low PAW at baseline predicting shoulder symptoms. **Conclusions:** High prevalence of persistent WMSD was identified for neck/shoulder and low back regions. Approx 1/3 of the females reported such WMSD in the neck/shoulder, and which was about twice as high as that for males. In contrast persistent WMSD in the low back showed no gender differences.

PREVALENCE AND DETERMINANTS OF LATERAL AND MEDIAL EPICONDYLITIS: A POPULATION STUDY

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[ID 1009]

Background: Epicondylitis is a common disorder of the arm, yet the role of vascular diseases, lifestyle and work-related factors has not been addressed in a population study.
Objectives: To estimate the prevalence of lateral and medial epicondylitis and to investigate their individual and work-related risk factors.
Methods: The target population of this study, Health 2000 Survey, comprised of a representative sample of people aged 30 to 64 years residing in Finland during 2000-2001. Of the 5,871 subjects, 4,783 (81.5%) were included in this study. Lateral and medial epicondylitis were diagnosed on the basis of symptom history and physical examination of the elbows.
Results: The prevalence of definite lateral epicondylitis was 1.3% and that of medial epicondylitis 0.4%. The prevalence did not differ between men and women and was highest in subjects aged 45 to 54 years. Current (adjusted odds ratio (OR) =3.4, 95% CI 1.4-8.3) and ex-smoking (OR=3.0, 95% CI 1.3-6.6) were associated with definite lateral epicondylitis. An interaction (p=0.002) was found between repetitive movements of the arms and forceful activities for the risk of possible or definite lateral epicondylitis (OR= 5.6, 95% CI 1.9-16.5 for both repetitive and forceful activities vs. no such activity). Smoking, obesity, repetitive movements and forceful activities independently of each other showed significant associations with the prevalence of medial epicondylitis. Manifest vascular diseases were not related to epicondylitis.
Conclusions: Epicondylitis is relatively common at working-age in the general population. Physical load factors, smoking and obesity are strong determinants of epicondylitis.

INCIDENCE OF CARPAL TUNNEL SYNDROME IN THE GENERAL POPULATION: A DESCRIPTIVE ANALYSIS OF HOSPITAL CASES IN NINE ITALIAN REGIONS.

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[ID 1747]

Carpal tunnel syndrome (CTS) results from a compression of the median nerve at the wrist and is an important work-related disease, with biomechanical overload being the main risk factor. The social costs of CTS include lost working days, changes of occupation and frequent need for surgical treatment.
The aim of the study was to estimate incidence of in-hospital cases of CTS in nine regions of central/northern Italy.
Coded demographic, diagnostic and intervention data from hospital discharge records archived (according to residence) on regional databases were analysed alongside demographic general population data for each region (in each relevant year of 2–6-year periods between 1996 and 2002). In Apulia region, a record-linkage with social security database has been conducted, to obtain individual information on job-title.
The standardised admission rates for CTS (per 100,000 person/year) ranged from 198.2 (95% confidence interval [95%CI] 198.1–198.2) in Umbria, to 121.3 (95%CI,116.7-125.9) in Apulia.
We also considered the incidence in the Provinces of each Region. The highest incidence was recorded in Verbania-Cusio-Ossola Province, in Piedmont: 287.6 (95%CI,138.9–436.5); the lowest in the autonomous Province of Bolzano: 72.9 (95%CI,72.9–73.0).
The present analysis provides the largest available sample using hospital discharge diagnosis. As regards the magnitude of the well-known gender difference, we found that the overall incidence was three times higher in females than in males. Concerning age, we found the highest frequency of the disease occurred in women at the age interval of 50–54 year. Among females, an exponential rise in incidence was observable between 20 and 54 years of age. By comparison, males showed a linear, age-related increase of incidence. On geographical grounds, differences were observable between different regions and provinces. Such area variations (reported also for small areas within Maine State) can likely be attributed to socio-economic, occupational, environmental and health-care differentials.

OCCUPATIONAL/NON-OCCUPATIONAL RISK FACTORS FOR CARPAL TUNNEL SYNDROME. THE LONGITUDINAL OCTOPUS STUDY: FINDINGS FROM THE BASELINE AND FIRST YEAR OF FOLLOW-UP

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Carpal tunnel syndrome (CTS) is a very common diagnosis: more than 200,000 carpal tunnel releases are performed each year in the United States making it the most common surgical intervention on the hand. Cross-sectional studies linking occurrence of CTS to repetitive and forceful manual tasks suggest the need for longitudinal studies to investigate causality. OCTOPUS (Occupational Carpal Tunnel Observational Prospective Unified Studies) is a follow-up study on working populations (factories producing large [n=1] and small [n=1] domestic appliances, underwear [n=1], ceramic tiles [n=1], and shoes [n=2]; all nursery schools in Bologna) with job tasks spanning different levels of biomechanical exposure to assess incidence of CTS in relation to occupational/non-occupational risk factors (and allow a prospective validation of the ACGIH risk evaluation method). Hand activity level (HAL) and peak force (PF) were calculated for the different activities, identifying tasks with values above the action limit (AL) and the TLV. A structured questionnaire was used to collect data on "probable/classic" or "possible" CTS symptomatology (using the Katz hand diagram), anthropometric data, individual risk factors, and working history. At ordered logistic analysis (ordinal variable: asymptomatic/symptomatic subjects at the baseline and/or at the first year of follow-up), adjusting for age, gender and body mass index, workers with a biomechanical overload above the AL were at risk (OR 1.54, 95%CI 1.17-2.03) of onset of CTS symptoms, as were those above the TLV (OR 2.03, 95%CI 1.57-2.61). These findings provide evidence of a causal role of repeated, forceful hand activities in the onset of symptomatic CTS.

INCIDENCE OF CARPAL TUNNEL SYNDROME IN A FRENCH AREA IN 2002-2004

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[ID 1739]

Introduction: A network was implemented in the Maine & Loire area in the French Pays de la Loire region to estimate the incidence of carpal tunnel syndrome (CTS) in a general population according to age, gender, industrial activity and occupation. Methods: Cases were included from the only four electrodiagnostic centers in the Maine & Loire area, using the same standardized methods for diagnosis of CTS. Only new cases occurring in patients aged 20 to 59, living in the Maine & Loire area, were included without other selection criteria. Medical and work history during the past 5 years was collected by postal questionnaire. Age and gender incidence rates were estimated by patient and not by wrist, using the Census data of 1999. French classifications were used to code industrial activities (60 categories) and occupations (42 categories). The CTS risk was estimated by calculating standardized incidence ratios (number of observed cases divided by number of expected cases) for each industrial activity and occupation. Results: A total of 1,168 newly diagnosed patients were included between February 2002 and January 2005. The annual incidence of CTS was 1.40 for 1,000 women and 0.60 for 1,000 men. The incidence increased with age in both sexes. The questionnaire response rate was 97%; 29.7% of the women and 19.6% of the men reported at least one medical condition known to be associated with CTS: obesity (15.6%), diabetes mellitus (4.0%), and thyroid diseases (13.1% in women only). Employment was associated with a higher incidence of CTS in women (1.69 per 1,000 vs. 0.84, $p<0.001$) and men (0.61 per 1,000 vs. 0.31, $p<0.001$). The industrial activities and the occupations associated with a significantly higher risk of CTS were identified. In women, the most exposed occupations were not only those that require a high level of physical load or repetitive movements (material handlers, unskilled agricultural and industrial workers) but also employees of trade and commerce, of personal services and service workers. In men, the higher risk was observed for occupations characterized by a heavy physical load (material handlers, unskilled agricultural workers, unskilled industrial workers, skilled and unskilled craft workers, farmers). Conclusion: These results are in accordance with previous studies showing an increased incidence with age, a higher incidence in women and a higher risk among the working population. This surveillance is an application of a sentinel event notification system for occupational risks and a part of a larger system of epidemiologic surveillance program on Work-related Musculoskeletal Disorders implemented in the Pays de la Loire region since 2002.

ABSENTEEISM DUE TO LOW BACK PAIN IN INDUSTRY EMPLOYEES

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[ID 613]

Objectives: To investigate whether individual, work related physical and psychosocial risk factors related to the occurrence of musculoskeletal complaints also determine musculoskeletal sickness absence and health care use.
Methods: A questionnaire survey was carried out among 853 shipyard employees in Scaramanga yard, Greece. A questionnaire was used on physical and psychosocial workload, need for recovery, perceived general health (i) the occurrence of low back pain in the past 12 months, (ii) chronic low back pain during at least 1 month, (iii) sickness absence due to low back pain during last year.
Results: Carpenters, welders and, white-collar workers reported increased occurrence and chronic backache. Self-reported factors of physical load were associated with the occurrence of back pain and especially with chronic symptoms. These factors were not associated with musculoskeletal sickness absence and health care use. No consistent influence of psychosocial factors on complaints and chronicity was observed. A high need for recovery showed significant correlation with occurrence and chronic back pain but not with sickness absence. High perceived exertion and lack of decision authority showed significant association with sickness absence. A perceived moderate/bad general health was a significant factor for occurrence, chronic complaints and, sickness absence. Frequent absences were reported by lower educated employees and from those with more than one musculoskeletal complaint.
Conclusions: A healthy worker effect may account for the reported occurrence of backache and absenteeism. The physical load among industry employees seems to put them at risk for chronicity of musculoskeletal disorders. On the other hand perceived exertion, psychosocial characteristics and, comorbidity of various complaints are associated with sickness absence.

RISK FACTORS OF CARPAL TUNNEL SYNDROME: A POPULATION STUDY

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Background. In carpal tunnel syndrome (CTS), the median nerve is affected either temporarily or permanently. While a variety of individual and environmental factors have been associated with CTS, the etiology is not fully understood. The relative role and interactions of cardiovascular and physical load factors have not been addressed in large population-based studies.
Methods. We analyzed the individual and physical load factors associated with CTS in a sample of 6,254 persons who participated in the Health 2000 Survey in Finland. Participants were assessed by detailed interviews, questionnaires and a clinical examination, and the diagnosis of CTS was made by predefined clinical criteria.
Findings. The prevalence of CTS in the general population was 3.8% (95% confidence interval (CI) 3.3–4.3%), 2.1% in the men and 5.3% in the women. There was an association with the following risk factors and CTS in the multivariable logistic regression models: exposure to high handgrip forces, OR 1.7 (95% CI 1.1-2.5), work with vibrating tools, OR 1.9 (95% CI 1.2-2.9), current smoking, OR 2.1 (95% CI 1.5–3.0), obesity (BMI ≥ 30), OR 1.6 (95% CI 1.1–2.3), and history of atherosclerotic disease, OR 1.7 (95% CI 1.1–2.6).
Discussion. CTS is a common disorder in the general population. In addition to physical load, CTS is associated with manifest vascular disease and its risk factors.

OCCUPATIONAL ASTHMA

MEASUREMENT OF EXHALED NITIRIC OXIDE IN DIAGNOSTICS OF OCCUPATIONAL ASTHMA

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Background: controversial data have been reported on the features of airway inflammation and changes of exhaled nitric oxide (eN0) in asthmatic reactions induced by occupational allergens.
We measured the time course of changes in eNO in subjects with diagnosed occupational asthma and in subjects without occupational airway allergy after the specific inhalation test (SIT).
Methods: 10 subjects with diagnosed occupational asthma and positive SIT and 19 patients without occupational airway allergy and with negative SIT (the control group) participated in the study. All subjects had physical examination, skin prick tests (SPTs) with common and occupational allergens, total serum IgE level, specific anti-allergens IgE, spirometry before and after the SIT. Concentrations of eNO were measured before and immediately after and then 1,2,3,4,5 and 24 h after SIT.
Results: in the group of patients with occupational asthma, the mean age was 41.4+9.8 years, while in the control group-44.5+8.6 years. Nine subjects with occupational allergy (90%) revealed positive SPTs with any inhalant common allergen, and 10 subjects (52.6%) from the control group. IgE specific for occupational allergens were seen in the skin of 7 occupational allergics and 5 non-occupational allergics.
No significant differences in eN0 were detected before and after SIT in the patients with occupational asthma ($p<0.05$).
Conclusions: our initial results do not show, that measurement of the concentration of N0 in exhaled air offers a useful method of assessing inflammatory airway disease.

INCIDENCE OF WORK-RELATED ALLERGIC SYMPTOMS ACCUMULATING AMONG MEDICAL DOCTORS

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[ID 829]

Introduction
Medical doctors are occupationally exposed at clinics, hospitals and laboratories to many chemical and organic substances causing allergic diseases. We reported a result from a cross-sectional study on occupational allergic diseases among doctors. We currently report a result from a longitudinal study with a constructed questionnaire for doctors with baseline data obtained at the time of medical school students.
Subjects and Methods
A total of 548 medical students were basically examined for disease history, family history, allergic symptoms, life-style, and serum antibodies against common allergens. Then they were studied with self-administered questionnaire at maximum ten years after graduations. The questionnaire concerned symptoms like allergic diseases, i.e. asthma, rhinitis, contact dermatitis, and conjunctivitis, cigarette smoking, and job history as physicians since graduation. Relations of allergic symptoms to work were defined from responses to relevant questionnaire items. Atopy was defined as RAST score of two or more.
Results
272 of 548 (49.6 %) responded to the study. 27 out of 272 (9.9 %) had work-related symptoms of any organs: 3 physicians (1.1 %) developed asthma-like symptoms, 15 (5.5 %) did contact dermatitis-like symptoms, 11 (4.0 %) did rhinitis-like symptoms, and 9 (3.3 %) did conjunctivitis-like symptoms. 15 of 22 had the symptoms of two or more organs. Some of the physicians with the work-related symptoms newly developed symptoms after graduation. Latex gloves, detergents, chemical substances, e.g. formalin, and animal antigens were indicated as causatives. Atopy was in 74 % (20/27) among those with work-related symptoms, compared with 48 % (262/548) among the medical students.
Discussions
We firstly reported an accumulated incidence (9.9 %) of work-related allergic symptoms among medical doctors. In Japan about 8,000e on average every year newly come to work after passing national examinations for doctor license. Then 80,000 physicians accumulate for ten years since then. It is estimated from the present result that 8000 physicians (10 %) have work-related allergic symptoms among 80,000. The number of occupationally allergic physicians may be quite huge. Accordingly, preventive actions should be taken for medical doctors.

ASTHMA PREVALENCE IN DENMARK RELATED TO JOB AND INDUSTRY

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[ID 882]

Asthma is common and increasing in developed countries. Epidemiological studies concerning reported occupational asthma have reported attributable risk between 5-25%.
The aim of this study is to study correlations between asthma and job and industry in a random adult Danish population.
Methods:
In a accordance with the protocol of "European Community Respiratory Health Survey" (ECRHS)
a screening questionnaire was sent to a sex and age stratified random sample of 10,000 young adults (age 20-44) in five Danish counties (with in total 1.801.458 inhabitants) in 2003. The questionnaire defined current asthma by the questions "Have you ever had an attack of asthma in the last 12 months?" and/or "do you current use asthma medication?". Job data were achieved from the questions: "What is your current or most recent job?" and "In which industry or in what kind of factory is (was) this job?"
Job data were coded using the Danish ISCO code 2004 and Danish industry code 2003. Response rate was 72.7% (n=7271).
Results:
The average point prevalence of current asthma was 7.0% (95% confidence interval (CI), 6.4-7.6).
Significantly increased odds ratios (OR) were seen in cleaners, garbage collectors (OR 1.7 (1.05-2.64)) and agricultural, fishery and related labourers (OR 3.38 (0.61-12.60)). Analyses according to industry demonstrated significantly increased OR in the general (overall) public service activities (OR 1.84 (1.24-2.66)) and social institutions etc. (OR 1.55 (1.15-2.06)), while significantly low OR were observed in defence, police and administration of justice (OR 0.24 (0.03-0.90)).
Conclusion: Classical work-related exposures still appear to influence the reported asthma prevalence. In this cross sectional study "healthy worker effect" may have an influence probably underestimating the differences.

NEW EMPLOYEES DETERMINE THE WORKPLACE BURDEN OF OCCUPATIONAL ASTHMA

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[ID 1047]

Occupational asthma arising from high molecular mass agents is an immunological disease determined, traditionally, by the intensity of allergen exposure and individual susceptibility. These factors do not; however, fully explain epidemiological patterns. In 1998 we undertook a cross-sectional survey in a detergent factory and demonstrated one of the largest outbreaks of occupational asthma ever reported. We wanted to investigate when this outbreak started and to what extent employment patterns were a determinant of disease incidence.
Method: We developed a retrospective cohort of all those who had been employed in the factory for at least four months between 1988 and 2002. We collected health data from routine occupational health records and job histories from employment records. In addition we collected historical information on factory enzyme usage, and (static and personal) dust levels.
Results: The retrospective cohort included 884 employees. The incidence of chest symptoms varied between 2-9% through the study period with peak incidences in the early and mid 1990s. The latter - but not the earlier

peak - occurred, after a two year lag, in parallel to an increase in use of enzymes in the factory. When analyses were restricted to new employees – an 'at-risk' population - the incidence of chest symptoms was constant (around 25%) throughout the study period; and independent of the level of enzyme use.
Conclusion: The incidence of occupational asthma within a working population is determined not only by workplace exposure intensities but also by the rate of acquisition of new, susceptible employees. This finding is analogous to the spread of some infectious diseases and perhaps also to other occupational diseases or accidents. Such information will be valuable to occupational health providers, researchers, and employers.
Supported by British Occupational Health Research Foundation

A FALL IN THE INCIDENCE OF OCCUPATIONAL ASTHMA FOLLOWING A REDUCTION IN AIRBORNE EXPOSURES
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[ID 1104]
There is very limited information on the effectiveness of primary intervention in occupational asthma; and almost all studies report changes in case numbers rather than changes in disease rates. A European detergent factory, with a large outbreak of enzyme-induced occupational asthma identified in June 1998, subsequently implemented new work practices and re-engineered production methods. As a consequence, personal dust and enzyme exposures fell steeply. We investigated whether the incidence of occupational asthma had also fallen.
Method: We undertook two further cross-sectional surveys, in 2000 (n=414) and 2002 (n=292). These included questionnaires on respiratory symptoms and measurement of specific IgE to detergent enzymes, each undertaken in a similar manner to the first survey in 1998. We compared incidence rates in two cohorts of employees: those who started employment before the factory improvements (01.06.95 – 28.02.98) and those who started afterwards (01.07.98 – 31.03.2002).
Results: In new employees the annual incidence of work-related chest symptoms fell from 11% to 6%. The prevalence of specific enzyme IgE sensitization fell from 11% to 7%. The incidence of a combination of specific sensitization and work related chest symptoms, an indicator of occupational asthma, fell from 6% to 2%.
Conclusion: This study demonstrates that a reduction of allergen exposure and changes in work practices can lead to a fall in the incidence of occupational asthma in new employees.
Supported by British Occupational Health Research Foundation

THE ESTIMATED INCIDENCE AND CHARACTERISTICS OF WORK-RELATED ASTHMA IN SOUTH KOREA
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[ID 1130]
Background: The nationwide surveillance of work-related asthma in South Korea, KoWAS(Korea Work-related Asthma Surveillance), was established in 2004 to provide systematic information on occupational asthma.
Objective: KoWAS's objectives are to monitor the nature, extent and distribution of occupational asthma, and to increase awareness of their diagnosis and prevention. This paper describes the programme and results obtained for occupational asthma in the first 18months, starting from May 2004.
Methods: KoWAS identifies newly diagnosed cases of work-related asthma through voluntary reporting by allergists, pulmonologists, occupational physicians and worker's compensation claims. Knowledge of the overlap in reports from these sources was used in conjunction with capture-recapture methods to estimate the total number of diagnosed cases of WRA, and incidence rates were calculated using the estimated number of Korean employees ias the population at risk. Initially, recruitment of the above health care providers was done through the membership infrastructure of their respective professional societies. Booklets with prescribed reporting forms were distributed regularly to all reporting members and information dissemination and reporting feedback takes place through quarterly newsletters and issue-specific brochures on certain hazardous agents.
Results: Over the initial 18-month period, 72 cases (101cases estimated by capture-recapture method) of occupational respiratory disease were reported to KoWAS. The average annual incidence for occupational asthma in South Korea was 54.8(95% C.I. = 29.3 - 80.4) per million workers. Isocyanates(41cases; 55%) was the most frequently reported agent for occupational asthma, followed by reactive dyes and wood dusts. Automobile industry was the most frequently reported, followed by furniture/wood industry and musical instrument manufacturing.
Conclusion: The results from this initial phase show that despite some limitations, KoWAS has the potential to obtain useful data on the industries, agents and occupations causing occupational asthma in South Korea

RHINITIS, ASTHMA AND ASTHMA-LIKE SYMPTOMS IN INDOOR CLEANERS FROM SÃO PAULO METROPOLITAN AREA, BRAZIL
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[ID 261]
Background: Exposure to cleaning products was frequently reported as symptom triggers by workers with work related asthma diagnosed in five worker's health clinics in the City of São Paulo.
Objectives: To measure rhinitis, asthma and asthma-like symptoms prevalence and to analyse associated risk factors.
Method: 341 cleaners working in the city of São Paulo were submitted to a respiratory symptoms questionnaire (MRC 1976) and the International Study of Asthma and Allergies in Childhood (ISAAC) questionnaire with full occupational history coupled with skin prick tests and spirometry. Timing of beginning of symptoms and occupational history allowed an estimation of probable occupational asthma and/or rhinitis. Risk factors related to asthma and/or rhinitis symptoms were analysed by logistic regression.
Results: Eleven percent, 35%, 2.6% and 57% of the cleaners had asthma, rhinitis, chronic bronchitis and atopy, respectively. Exposure duration was a significant risk factor to occupational asthma and/or rhinitis (OR = 2.25; 95% CI: 1.47-3.59). Women had higher exposure duration (5.6 ± 5.5 years vs 2.9 ± 3.8 years, $p < 0.0001$) and more episodes of inhalation accidents (13% vs 4%, $p = 0.016$) with a higher risk for rhinitis (OR = 5,61; 95% IC: 1.87-17.89). Atopy was associated with asthma and rhinitis (OR = 2.39; 95% IC: 1.15-5.35; OR = 1.88; 95% IC: 1.18-3.05, respectively), but not with occupational asthma/rhinitis.
Conclusions: Cleaning workers are at risk for occupational asthma and/or rhinitis, which increase with exposure duration. Irritant chemical exposures are the principal agents referred to airway symptoms. Women showed highest risk for rhinitis than men.

MILD IMPROVEMENT IN SYMPTOMS AND PULMONARY FUNCTION IN A LONG-TERM FOLLOW-UP OF PATIENTS WITH TDI-INDUCED ASTHMA
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[ID 729]
Fiftyfour subjects with occupational asthma due to TDI, diagnosed in our laboratory by a positive specific bronchial provocative test from 1985 to 2000, were called by phone after 3 to 16 years from diagnosis. Fortysix subjects were contacted and invited to laboratory. The following data were collected by an interview: occupational status, occupational exposure, smoking habit, presence of chronic bronchitis and/or asthma like symptoms, relationship of symptoms with occupational exposure, use of anti-asthma drug, frequency of physician attendency for asthma, and number of exacerbations of asthma requiring emergency treatment. There was no difference in clinical and functional findings at diagnosis between contacted and non contacted subjects. Twenty four subjects were still working, and 14 of them still had indirect exposure to TDI. Attacks of asthma and wheeze persisted at follow-up in almost all subjects, while a significant reduction in the prevalence of dyspnea was reported ($p<0.05$). Bronchial hyperresponsiveness improved at follow-up (Geometric mean PD20FEV1: 397 vs 212 mcg of methacholine, $p<0.05$). Regular anti-asthma treatment was performed at follow-up by 32 out of 46 subjects.Logistic regression analysis showed that a shorter interval time from the last exposure could predict a low FEV1 at the follow-up (OR: 0.1, CI: 0.01-0.6, $p<0.05$). We conclude that the long term prognosis of TDI-induced asthma is similar to that of moderate persistent non occupational asthma, with only partial remission in symptoms and functional abnormalities.

LONG-TERM WORKING CONSEQUENCES OF A COMMON CHRONIC DISEASE: ASTHMA

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Objectives: Asthma induces lower school attendance and increased work absenteeism with potential consequences on labour force participation. However, results on employment status of asthmatic subjects are discordant. The aim of this study was to describe the working consequences of childhood and adult-onset asthma in males of the ESTEV study, a French longitudinal cohort of ageing workers.

Methods: In 1990, a random sample of 12,233 men aged 37 to 52 was selected from the occupational physicians' files and 10,608 of them were interviewed again in 1995. Medical data, self-perceived health status, absenteeism, occupational social class and employment characteristics were recorded twice by occupational physicians. Childhood asthma (226 subjects) and adult-onset asthma status (onset after age 20, 172 subjects) were determined by the physician on the first interview.

Results: Current asthmatics have a significant higher prevalence of absenteeism during the last year than non-asthmatics (38.4% versus 27.0%, p=0.005). Childhood asthmatics were more likely to be high school graduates (38.6% versus 26.5%, p<0.0001) and were older than subjects with adult-onset asthma and non-asthmatics (p=0.0013) at their first job. Childhood asthmatics were more often white-collar workers (46.1%) than adult-onset asthmatics (31.2%) and non-asthmatics (32.2%, p<0.0001). Before 1990, childhood asthmatics have less experienced inactivity since first job (58.8% versus 70.4% of adult-onset asthmatics and 69.5% of non-asthmatics, p=0.002). During the follow-up, unemployment did not differ with asthma status. But in 1995, working cessation by disability seemed to be more frequent among current adult-onset asthmatics (OR=3.77 CI95% [1.45-9.81]) than never-asthmatics.

Conclusion: Our findings suggests that the major consequence of asthmatic disease on working conditions is a selection effect, observed in childhood asthmatics at the beginning of their active life, and in adult-onset asthmatics at the end of their active life. But in subjects who entered job market we did not find increased risk of unemployment.

OCCUPATIONAL TOXICOLOGY

BIOMARKERS OF RENAL AND NEUROLOGICAL EFFECTS OF METALS IN CHILDREN

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Lead, cadmium, mercury and arsenic are common environmental pollutants in industrialized countries but their combined impact on child health is little known. We studied their effects on two main targets, the renal and dopaminergic systems, in over 800 children during a cross-sectional European survey. Control and exposed children were recruited around historical non-ferrous smelters in France, the Czech Republic and Poland. Children provided blood and urine samples for the determination of the metals and sensitive renal or neurological biomarkers. Serum concentrations of creatinine, cystatin C and b2-microglobulin were negatively correlated with blood lead levels (PbB), suggesting an early renal hyperfiltration which averaged 7% in the upper quartile of PbB levels (above 55 µg/l; mean, 78.4 µg/l). The urinary excretion of retinol-binding-protein, Clara cell protein and N-acetyl-b-D-glucosaminidase was mainly associated with cadmium levels in blood or urine, and with urinary mercury. All four metals influenced the dopaminergic markers, serum prolactin and urinary homovanillic acid, with complex interactions brought to light. Heavy metals polluting the environment can cause subtle effects on the children's renal and dopaminergic systems without clear evidence of a threshold, which reinforces the need to control and regulate potential sources of contamination by heavy metals.

STUDY OF MERCURY CONCENTRATION IN CEREBROSPINAL FLUID ON CHRONIC MERCURY POISONING PATIENTS

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[ID 1906]

Objective To investigate the changes of mercury (Hg) levels in cerebrospinal fluid (CSF) of chronic mercury poisoning and elucidate the neurotoxic mechanism of mercury. Methods Seven cases of chronic mercury poisoning (poisoning group) as well as eight cases without exposure to mercury were included in this study. Mercury concentrations of 24-hour urine (U-Hg) and CSF (CSF-Hg) were measured with cold-vapor atomic absorption spectrometry – alkali stannous chloride method. The concentration of blood (B-Hg) at the same day was measured with cold-vapor atomic absorption spectrometry – acidic stannous chloride method. In four cases of poisoning group, these concentrations were compared before and after chelation with dimercaptopropane sulfonate. Results The levels of B-, U-, and CSF-Hg in poisoning group (260.29±46.91, 162.16±100.89, 23.09±11.33nmol/L, respectively) were significantly higher than those in control group (81.04±63.01, 24.73±9.96nmol/L, undectable, respectively; $p < 0.01$). In four cases of poisoning group, CSF-Hg concentrations were correlated with B-Hg ($r = 0.80$, $p = 0.03$), but not U-Hg. After chelation therapy, the levels of B-, U-, and CSF-Hg decreased significantly ($p < 0.005$). The reduction of CSF-Hg was not related to B- and U-Hg. Conclusion CSF-Hg concentration in chronic mercury poisoning patient increased with the rise of B-Hg, but not U-Hg. When the levels of B- and U-Hg dropped to normal, the CSF-Hg level was still high enough to be detected. It indicated that mercury combined with proteins after entering brain and this complex hardly crosses through the blood-brain barrier. The complex might cause neuromuscular disorder and fremitus in chronic mercury poisoning.

NEUROLOGICAL EFFECTS OF CARBON DISULFIDE AMONG JAPANESE RAYON MANUFACTURING WORKERS: A 6-YEAR COHORT STUDY

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[ID 252]

Background: a prospective cohort study has been conducted to clarify whether current occupational exposure limit (OEL) for carbon disulfide (CS2), 10ppm, is low enough to prevent occurrence of health impairments related to CS2 or to ameliorate health effects due to past high exposure. In this study, we present an evaluation of exposure to CS2 on the nervous system.
Methods: study subjects at baseline (1992-93) were 432 rayon and 402 referent male workers from 11 Japanese rayon factories. Of those, 391 and 359 were participated at follow-up survey (1998-99; follow-up rate 90%). 140 rayon workers were truncated their exposure as some rayon factories were closed in 1994-95. Thus, for statistical analysis, 251 were allocated as CS2-workers (age at baseline; 35.6), and 140 as ex-CS2 workers (36.8). Mean age of the referent was 35.9. Both CS2 exposure concentration and urinary 2-thiothiazolidine-4-carboxylic acid (TTCA) were determined twice a year for exposure assessment during the study period. The effects were evaluated by the motor and sensory median nerve conduction velocities (MCV and SCV), neurobehavioural tests, psychological tests and subjective symptoms.
Results: mean duration of exposure was 19.3 years for CS2 workers. Geometric mean CS2 and TTCA concentrations for the study period were 5.0ppm and 1.6mg/g.Cr. Both MCV and SCV were significantly lower in the exposed group at baseline and at follow-up. Inter-individual decrease in SCV over 6 years was larger in the CS2 workers compared to the referent. The difference was small (-0.4 m/sec), but remained significant even after adjustment for possible confounders. Exposure-related changes were also observed when the CS2-group was classified into quartiles with TTCA. No difference was detected on the central nervous system.
Conclusion: exposure-related decrease in median SCV was observed in this study population though CS2 exposure in the past could be high and the difference observed was small.

HEARING ASSESSMENT IN WORKERS EXPOSED TO SOLVENTS: A FUNCTIONAL APPROACH

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[ID 650]

It has been well documented that organic solvent exposure may induce auditory damage in both experimental animals (Campo et al., 1997; Crofton et al., 1994; Johnson & Canlon, 1994; McWilliams et al., 2000) and humans (Morata et al., 1997; Sliwinska-Kowalska et al., 2000; Sulkowski et al., 2002).
The International Classification of Functioning, Disability, and Health (W.H.O, 2001) proposes five hearing functions: sound detection, sound discrimination, sound localisation, sound lateralisation, and speech discrimination. Difficulties at any of these functions may adversely affect the subject's level of functioning. Little work has been carried out to determine solvent-induced hearing loss, taking this model as a framework.
Considering that solvent-induced hearing loss may be induced by a combination of oto- and neuro-toxicity, it is likely that most of the hear ing functions may be affected. The present research aimed to compare the level of functioning on the five hearing functions proposed by the W.H.O. (2001) in a group of workers exposed to solvents (n=20) and in a group of non-exposed workers who were age and gender matched (n=20). Also, the study explored workers' self perception of their functioning in everyday listening situations. The test battery comprised pure-tone audiometry, immittance audiometry, acoustic reflex decay, random gap detection, masking level difference, pitch pattern sequence, dichotic digit, filtered speech, hearing-in-noise tests, and the Amsterdam inventory for auditory disability and handicap (a Spanish adaptation).
According to Mann-Whitney test results, in most of the tests workers exposed to solvents performed at significantly reduced levels in comparison to non-exposed workers. However, for the function of sound detection, all of the subjects obtained normal hearing thresholds. This implies that workers obtaining normal results in pure-tone audiometry may still encounter difficulties in other listening situations. This study highlights the importance of including all the hearing functions when conducting hearing evaluations in subjects exposed to solvents in the workplace.

BENZENE EXPOSURE AND EFFECTS ON THE IMMUNE SYSTEM IN TANK WORKERS IN THE UPSTREAM PETROLEUM INDUSTRY

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Introduction: The objectives of the study were to assess the level of benzene exposure and to investigate possible associations between benzene exposure and effects on the immune system for workers maintaining cargo tanks containing residues of crude oil.
Methods: Personal exposure to benzene, benzene in blood, peripheral blood lymphocytes (CD3+, CD4+, CD 8+, CD19+, CD56+ and CD4/CD8 ratio), complements C3 and C4, and total immunoglobulins (IgG, IgA, IgM and IgE) were analysed for 13 tank workers with possible benzene exposure and for 9 unexposed controls from the catering section. Benzene exposure was measured during one shift which comprised 3 consecutive work days. Blood samples were collected pre-shift, post-shift and pre-next shift.
Results: The geometric personal mean benzene exposure of tank workers on the last day of the shift was 0.11 ppm (range 0.05 – 0.54 ppm). The geometric mean level of benzene in blood post-shift was 12.3 nmol/l (range 2-38 nmol/l) in tank workers compared to 0.7 nmol/l (range 0.5-1.0 nmol/l) in the control group (t-test, $p < 0.001$). Compared to controls, the tank workers showed a statistically significant decrease in serum IgM (t-test, p=0.039) from pre-shift to post-shift and IgA (t-test, p=0.009) from pre-shift to pre-next shift. The tank workers also had a significantly decrease in the total number of CD4+ (t-test, p=0.043) from pre-shift to post-shift without significant changes in the corresponding percentages. These parameters were highly correlated with benzene exposure, blood benzene and time spent in the tank. The groups did not differ significantly in other subgroups of lymphocytes, CD4/CD8 ratio, complements, IgG and IgE.
Conclusion: In spite of a relatively low benzene exposure, the tank workers had an uptake of benzene which correlated significantly with blood parameters, indicating a suppression of the immune system.

CADMIUM AS AN ENDOCRINE DISRUPTOR IN WOMEN'S REPRODUCTION: A NOVEL CONCEPT
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Cadmium is present in today's environment through contamination from industrial wastes, consumer goods, soil fertilizers, and as a pollutant in the food chain and in tobacco smoke. It has become an important part of our ecosystem and lifestyle. Beside proven ill effects on the lung, kidney and bone, the capacity of the metal to alter the rates of ovarian and placental steroidogenesis and adversely impact female reproductive function has been demonstrated within the last two decades. Women may be at increased risk for the cadmium-related reproductive anomalies, as evidenced by increased cadmium accumulation in placentas of smoking parturients accompanied by decreased placental progesterone production. The manifestations of these effects are supported by corresponding in vivo and in vitro evidence in laboratory rats (1). The metal may also function as a potent xenoestrogen that can mimic or block the effects of endogenous estrogens (2). Direct effects on specific components of the steroidogenic pathway in both humans and animals including the low-density lipoprotein (LDL)-cholesterol receptor and cytochrome P450 side chain cleavage enzyme have been found (3,4). In addition to exerting its effects via both transcriptional and posttranscriptional mechanisms, cadmium may also regulate hormone binding and intracellular second messenger pathways (5). Collectively, our results attained from different experimental paradigms add considerably to the evidence identifying cadmium as an endocrine disrupting chemical in the female reproductive system.
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METALLIC ELEMENTS IN EXHALED BREATH CONDENSATE AS A MEASURE OF LONG-TERM INHALATORY EXPOSURE IN CHRONIC OBSTRUCTIVE PULMONARY DISEASE (COPD)
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Introduction
Exhaled breath condensate (EBC), which is formed condensing exhaled breath, is composed mainly of water, but contains also not cellular compounds which are expired as bioaerosol. Bioaerosol consists of small droplets formed by the passage of air during in/expiration, over the mucus layer lining the lung. The working hypothesis is that long-term exposure to tobacco smoke and polluted environments (which cause the development of COPD) leads to an increased lung uptake of toxic metals which can also be used as tracers of environmental pollution. Toxic metals (Pb, Cd, Cr, Ni, and Al) should provide a quantitative estimate of target tissue burden. Some transition elements modulate the response to toxic substances as they play a role in respiratory chain (Fe), or are components of mitochondrial (Mn) or cytoplasmic (Cu), (Zn) superoxide dismutases, or glutathione peroxidase (Se).
Study objectives: The aim of this study was to characterise the elemental composition of EBC.
Design: EBC was obtained from 50 nonsmoking healthy subjects, 30 healthy smokers, 30 patients with mild to moderate bronchial asthma and 50 patients with stable COPD. Trace elements and toxic metals in the samples were measured by means of inductively coupled plasma-mass spectrometry.
Results: The EBC of COPD subjects had higher levels of such toxic elements as Pb, Cd and Al, and lower levels of Fe and Cu, than that of the smoking and non-smoking controls. There were still differences in Cd, Pb and Al EBC levels between COPD patients and controls, when the former were divided into smokers and ex- or non-smokers. The control smokers had higher Pb and Cd levels than the control non-smokers.
Conclusions: Exhaled elemental levels may provide a measure of cumulative long-term exposure to toxic metals (Pb, Cd, Cr, Al, Ni) and an estimation of transition elements (Mn, Cu, Se, Fe) involved in oxidative stress as part of redox systems. EBC elemental analysis could be further apply in biological monitoring of workers exposed to pneumotoxic substances.

A CASE OF CHRONIC LEAD POISONING IN A STAINED GLASS CONSERVATOR AT CANTERBURY CATHEDRAL, UK.
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[ID 48]
Making stained glass windows is an ancient art. Windows made of coloured and painted glass have been used in churches for over a thousand years as an expression of faith, and to beautify the house of God. There has been a cathedral church in Canterbury since 600AD and it now holds the most important collection of 12th century stained glass in the UK. Stained glass conservation aims to retain old materials and to stay as true to the original work as possible. The methods used have altered little over the centuries. Canterbury Cathedral has had a stained glass conservation studio since 1830. Currently it employs six workers and is one of only three conservation studios in the UK. Although five of the six workers blood lead levels were within acceptable limits, one worker's levels exceeded the suspension level as given in the Control of Lead at Work Regulations 2002. This paper reviews the hazard of lead in this workplace, including limited results of environmental monitoring. Photographs and short video clips, in the form of a power-point presentation, demonstrate both the hazard and the methods of work. The evidence from the literature suggests that the main hazard in stained glass workshops is the dust which contains lead. This paper demonstrates that good control of lead-containing dust improves the biological monitoring results of blood lead levels. Care in personal hygiene techniques is considered the most important method in limiting the ingestion of lead. However, this paper also considers some limited evidence from the literature that there may be a genetic susceptibility to account for an individual's predisposition to high blood lead levels.
This paper looks at the historical perspective of an ancient art and its modern day use and control.

HANDICAP AND WORK

CLASSIFICATION OF ERGONOMIC TOOLS APPLICABLE TO WORK ACCOMMODATION FOR EMPLOYEES WITH LOW BACK DISABILITY

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Various ergonomics assessment (EA) tools developed for different applications and industries are used by return-to-work (RTW) programs to identify suitable duties for injured workers, investigate job accommodation options, and provide ergonomics recommendations to the employer. In the EA process the choice of a particular tool(s) for each individual case is mainly problem-driven and depends on practical issues such as costs, versatility, time, etc. Little attention is given to these issues in the context of job accommodation for employees with back pain and we lack a classification scheme to orient practitioners on the selection of tools available. This study aimed to review the relevant literature and classify currently available EA tools used to assess work demands associated with occupational back pain, focusing on their practical application during the RTW process. A comprehensive ergonomics evaluation framework (including physical, perceptual, cognitive and organizational demands) was considered. Sixty-nine tools covering various domains ranging from questionnaires to risk quantification techniques were identified. Following this review, a group of ergonomists from Quebec (Canada) working in the rehabilitation field was consulted to: 1) obtain information on the methods used in practice and which were not identified by the literature search; and 2) obtain their opinions on the quality attributes of EA tools for use in the rehabilitation context according to usability and clinical utility issues. The tools identified as applicable to this context were classified via an organization strategy called tree hierarchy (information was organized according to inclusive and exclusive categories). This study provides a basis to better understand the ergonomic evaluation process for job accommodations (based on the current literature and practitioners' perspectives), and proposes new insights for applied research in this area. The classification scheme might also contribute to better informing practitioners on the applicability of the various EA tools, thus assisting them in the tool selection process.

AN ONLINE JOB DATABASE FOR EMPLOYMENT OF PERSONS WITH PHYSICAL DISABILITIES

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Occupational rehabilitation is concerned with eliminating gaps between job demands and worker capacities through medical interventions, assistive technologies and ergonomic job enhancements. This work developed an online job database of job information including descriptions of work tasks, equipment, and related factors of musculoskeletal disorders. The database included one or more video clips of job tasks. To evaluate the database, two separate focus groups were conducted, one for a group of providers (occupational physicians, physiatrists, nurses, case managers and vocational rehabilitation specialists) and a second for potential consumers with a range of physical disabilities. Each focus group included 7-10 participants and lasted 1.5 hours. The group leader used an outline to guide the questioning but the structure was sufficiently flexible to allow for additional input from participants. There was a general consensus among the potential consumers that the website presented would be very helpful in assisting with return to work. More specifically, they thought that visual illustrations of risk factors would help them and service providers understand job requirements and narrow their job search. They had several suggestions for improving the system including listing possible job modifications for specific disabilities, additional rehabilitation resource links, a checklist of physical abilities required for each job, using multiple windows to display information, simplifying workplace layouts, inclusion of professional jobs and making the system widely available. Occupational health physicians said that they rely on occasional work place visits to gather job information and do not have time to use such a tool. They indicated that even five minutes of additional time to review job information would be excessive. The physicians acknowledged that the database could provide useful benchmarks for job evaluations. The rehabilitation case managers, physicians and therapists felt that the database could be very helpful and particularly useful for planning case management.

BRAZILIAN MINISTRY OF LABOR AND EMPLOYMENT PROGRAM FOR HANDICAPPED WORKERS INCLUSION

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According to the National Census of 2000, 14.5% of Brazilian population (approximately 24.6 million people) had some kind of handicap, classified as visual (48.1%), physics / locomotors (27.1%), auditory (16.6%) and mental (8.2%) type.

Due to the lack of effective policies for disabled people, like support for the inclusion of students with special needs, efficient transit transport systems and job access opportunities, they have suffered of an historical social exclusion.

Since 1991, a federal law obliges every company with 100 or more employees, including headquarters and all branch offices, to reserve from 2% to 5% of their workplaces for handicapped people.

The Ministry of Labor and Employment – MLE (Ministerio do Trabalho e Emprego) is responsible for controlling the accomplishment of this legal task, but, until recently, it was not one of its priorities.

Since last year, in Sao Paulo, Brazilian most economic developed state, a special program for handicapped workers inclusion in the formal work market has been carried on by MLE State Office, involving different social segments. By July, 2005 there were 30,278 job places filled by these workers, 5,4 times more than in 2004. This was possible due to cooperative policies, fining the companies only when every other alternative had been exhausted.

The goal is to achieve all companies under this obligation fulfilling the law, reaching, among other priorities, work insertion quality improvement and better professional qualification opportunities.

Based on Sao Paulo State experience, the Ministry of Labor and Employment intends to carry on this program throughout the country, aiming, more than guarantying a citizenship right, to contribute to change negative attitudes of ignorance, antipathy and contempt prevail among the general public toward disabled people.

GUIDE AND TOOLS FOR MODIFIED WORK (TMW) FOR WORKERS WITH MUSCULOSKELETAL DISORDERS: A KNOWLEDGE TRANSFER PROJECT

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Background There is scientific evidence that rehabilitation programs that provide modified work to workers with musculoskeletal disorders are more likely to improve health status and reduce work absence. But there is also evidence that the communication between the workplace and treating clinicians needed for such programs to work is often lacking. Moreover, frontline supervisors responsible for selecting modified work (MW) are often ill equipped to do so and face organizational barriers.

Objectives

1. Develop a set of organizational strategies for implementing workplace-based modified work (MW) programs, an algorithm for following individual injured workers, and disorder-specific decision aid tools that facilitate selection of MW for workers with back pain, neck pain and upper extremity disorders;

2. Evaluate their implementation in 3 workplaces;
3. Revise the organizational strategies and decision aid tools based on the implementation evaluation.

Methods Based on scientific evidence, previously conducted needs assessment and consensus discussion among co-investigators, principles and strategies for MW were elucidated and an algorithm developed and summarized in a guide. Decision aid tools were designed that allow frontline workplace personnel to assess physical demands of MW tasks, communicate them to treating physicians and allow physicians to communicate injured workers' work restrictions to the workplace. To evaluate the degree of implementation of this approach and to identify obstacles and factors facilitating implementation, a qualitative implementation evaluation study was carried out in 3 manufacturing companies. Based on the results of this study the guide and tools were revised.

Results The final version of the TMW Guide including algorithm and 3 sets of decision aid tools will be presented. The implementation evaluation results suggest that frontline manufacturing personnel can learn to evaluate physical work demands in the context of selection of MW tasks. Organizational contextual factors and characteristics of personnel implementing the program influence the degree of implementation.

A PSYCHOSOCIAL RISK-FACTOR TARGETED INTERVENTION FOR WORK-DISABILITY

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[ID 390]

This presentation will describe the development, implementation and preliminary outcome of a population-based secondary prevention program for pain-related occupational injuries. The development of the Progressive Goal Attainment Program (PGAP) proceeded from the view that successful disability prevention would entail the re-establishment of a structured activity schedule, and the reduction of psychosocial risk factors for pain-related disability. The development of PGAP also proceeded from the view that a viable secondary prevention program would need to embrace a population health philosophy, allowing for timely access to service by the entire population of individuals who require the service. To date, more than 600 rehabilitation professionals in Eastern Canada have been trained and more than 2000 injured workers have been treated. The presentation will describe the process of training front line rehabilitation professionals in the strategies necessary to effectively target psychosocial risk factors. A recent clinical trial was conducted to determine whether the addition of PGAP improved return to work rates beyond that associated with participation in a functional restoration physiotherapy intervention. Results showed that participation in the PGAP + physiotherapy treatment condition resulted in a higher return to work rate (75%) than participation in physiotherapy alone (50%), $p < .01$. Differences between treatment conditions were most pronounced for the subgroup of individuals who had the highest number of psychosocial risk factors. The presentation will also address how treatment-related changes in psychosocial risk factors bear on the theoretical and empirical foundations from which the program evolved.

AN INVESTIGATION OF THE EFFECTS OF A PROVIDER NETWORK ON COSTS AND LOST-TIME IN WORKERS' COMPENSATION

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[ID 572]

Objective: We sought to compare lost-time days and average and median workers' compensation claims costs between injured workers managed by OMNET Gold (OG) physicians and those managed by physicians not participating in OG. OG is a statewide health care provider network coordinated by occupational medicine physicians and established by the Louisiana Workers' Compensation Corporation (LWCC) to manage the medical care of injured workers. Methods: We identified and contrasted 158 lost-time claims managed by OG physicians and 1,323 claims managed by physicians not participating in OG during the first year of network operation (August 1, 2003 to July 31, 2005). Results: The average and median costs for a non-OG claim was $12,542 and $5,793, whereas the average and median costs for an OG claim was $6,749 and $3,015. The average and median number of lost-time days for an OG claim was 53.4 and 34.0 and 95.0 and 58.0 for a non-OG claim. The mean differences were statistically significant. Conclusions: A small network of physicians may have an effect on the duration of lost-time and workers' compensation costs.

WHAT ARE THE KEY MODIFIABLE PERSONAL AND ENVIRONMENTAL FACTORS THAT PREVENT DISABILITY IN PEOPLE WITH BACK PAIN? A CONSENSUS USING DELPHI AND Q-CARD METHODOLOGIES.

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[ID 1786]

Objective: To reach expert consensus on the relative impact and modifiability of personal and environmental factors that prevent participation restrictions in people with back pain (as per the International Classification of Functioning Disability and Health, ICF). **Methods:** Evidence-based summaries for 32 modifiable factors were used by 33 experts (researchers, care providers, patient representatives, employers, insurers) in a 3-round Delphi process, to reach consensus on the factors' relative impact (expected improvement in participation if the factor could be modified for a usual population of people with back pain) and modifiability (amount of time and resources required to change the factor). Consensus was strong, moderate or low (>85%, 50-84%, 33-49% of experts respectively). **Results:** Judging from ICF, available research is "unbalanced" toward return to work, with little attention to other disability outcomes. It is also "patchy", with some factors ignored and others partially studied. Despite clear definitions and evidence summaries, there was substantial disagreement. After three rounds, there was strong consensus that Care Provider Reassurance had a high impact. There was moderate consensus that Expectation of Recovery and Decreased Fears had a high impact; and that Back Supports, Care Provider Reassurance and Patient Knowledge were relatively easy to change. There was low consensus that Patient Knowledge and Appropriate Care had a high impact and that Temporary Duties were easy to change. Some experts would still rank the following factors at the top, despite majority decision to drop them: Amount of Pain, Job Satisfaction, Fitness, Function, Lifting Devices, Workstation Design and Physical Workload. **Conclusions:** Existing evidence on the factors was limited and there was substantial disagreement as to their relative impact and modifiability. Interventions could focus on Care Provider Reassurance, or be multifaceted to address several factors supported by different stakeholders. Panel findings should help define priorities for intervention and research.

WORK STRESS IN HEALTH CARE WORKERS

MOST 'BURNED-OUT' HEALTH CARE PERSONEL HAVE A HIGH DEGREE OF GRATIFICATION FROM THEIR WORK WITH PATIENTS.

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[ID 1359]

Aim: To examine the relation between burn-out and feelings of gratification from working with patients.
Methods:
The design is a cross-sectional questionnaire study of 2009 health care workers (doctors (n=303), nurses (n=783) and nurses aids (n=923)) working in a somatic hospital (n=782), a psychiatric hospital and community psychiatric centers in a Danish county (n=857) and 7 nursery homes in a large Danish town (n=370). We used two global questions on feelings related to patient work, one on 'burn-out' (How often do you feel that your work with patients makes you feel emotionally tired, worn out and exhausted?) and one on gratification (Do you think that your work with patients is emotionally enriching and satisfying?). Responses were recorded on Likert scales with 6 categories. They further responded to the Copenhagen Burn-out Inventory on patient-related burn-out, scored from 0-100 (0=very low degree, 25=low degree, 50=some degree, 75=high degree, 100=very high degree).
Results:
'Burn-out' defined as response categories 'always', 'nearly always' and 'usually' in the global question was reported by 98 (5 %). The other response options were 'often' 'sometimes' and 'seldom/never'. Among these 98 persons, 80% reported that they found their patient work gratifying to a 'very high', 'high' or 'some' degree.
The same pattern was found for the Copenhagen Burn-out Inventory scale on patient-related burn-out. 116 (5%) had a burn-out score above 54. Among these 116 persons, 74% reported that they found their patient work gratifying to a 'very high', 'high' or 'some' degree'. For both measures of 'burn-out' 94% among persons not classified as 'burned-out' found their patient work gratifying to a 'very high', 'high' or 'some' degree'.
The combination of a chronic/high degree of emotional exhaustion and a low degree of gratification by working with patients was found in only 20-30 persons (1 - 1.5%).
Conclusion:
The concept 'burn-out' signals a serious chronic condition with emotional exhaustion and depersonalisation which is not compatible with a high degree of gratification from working with patients. However, 74-80 % of 'burned-out' health care personal reported a high degree of gratification from their patient work. Emotional exhaustion related to patient work should not be labelled as 'burned-out'.

HYPERWORK IN A CONTEXT OF WORK OVERLOAD : TESTIMONIES OF PHYSICIANS WHO HAVE EXPERIENCED BURNOUT

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[ID 1690]

This research was carried out at the request of the Canadian Medical Association (CMA) and the Institute of Neurosciences, Mental Health and Addiction (CIHR) to enhance their understanding, in qualitative terms, of the nature and dynamics of burnout among physicians. Indeed, nearly half (45.7%) of Canadian physicians aged 35 to 44 who responded to a Canadian Medical Association survey in 2003, said that they suffered from fatigue and burnout.
Our clinical psychodynamic of work approach attempts to better understand the links between work organization and mental health problems. The research material draws on the accounts of life and work experience of physicians who have experienced burnout and agreed to participate in the research. The recruitment of volunteer participants was made possible through the collaboration of the Quebec Physicians' Health Program, which has formed two groups of participants, one in Montreal and the other in Quebec City. Thirteen persons (6 men and 7 women) mainly working as family physicians, participated in four 3-hour meetings spread out over a period of six months.
The first set of constraints described in this communication related to the systematized work overload, the lack of resources (financial et human), the increasing psychosocial problems of the patients (suicidal patients, battered women, drug addicts for example), the loss of autonomy (more bureaucracy), and the fear of making medical errors in this context. Hyperwork (or self acceleration) is a collective defensive mechanism which has been identified among those participants as a response to the context of work overload. The levels of constraint revealed in this research suggest that in recent decades, serious blows have been dealt to the ideal of the physician's work. These attacks stem from technical and human work organization that is increasingly based on the model of work intensification.

FLEXIBILITY OF CHOICE AND PRESERVATION OF HEALTH IN PRIVATE AGENCY NURSES

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[ID 1151]

The term «flexibility» encompasses two opposing concepts that should be differentiated. One refers to organizational flexibility that enables employees to make choices; the other to extreme variability in the service offer imposed by employers to meet client demand. Here we discuss the first kind of flexibility, which helps employees protect their health (Costa & Sartori, 2005).This paper is intended to show the advantages of flexibility of choices —institutions, departments, clienteles, schedules—that gives private agency nurses enough leeway to keep a job while taking care of their family and preserving their health.
Data and method:
Time sheets of six nurses were analyzed. The hours worked in one agency were compiled. Responses to the questionnaire on announced and actual schedules were analyzed. 11 in-depth interviews were performed. The temporal data of two working days in home care were comparend to those of nurses with regular jobs in the public sector.
Results:
Schedule organization in agencies has potentially protective aspects, as the shifts that are worked stay within the limits of availability announced by the nurses. Working hours at one agency showed a very high individual variability in workload, enabling some nurses to supplement their income from part-time work in the public system where the constraints are higher. The home care days of agency nurses are shorter and less demanding than those of their public-system colleagues who are responsible for case follow-up. Nurses tend to choose compressed schedules and develop strategies to avoid departments where the clienteles are more demanding, either because of the kind of care or the necessity for complex follow-up. They also tend to avoid institutions where they have experienced incidents arising from organizational dysfunction.
Conclusion:
The flexibility desired and achieved by agency nurses has advantages in terms of self-preservation, but at the price of compromise and sacrifice, particularly a distancing from their work which might explain their feeling of unfulfillment.
References:
COSTA, G., SARTORI, S. (2005). Influence of flexibility and variability of working hours on health. Balancing Interests: 17th International Symposium on Shiftwork and Working Time. Hoofddorp, The Netherlands, 18-22 September 2005. Book of abstracts, p 41.

FACTORS INFLUENCING TUNOVER AMONG ITALIAN QUALIFIED NURSES

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[ID 355]

Aim of the present study was to determine the impact of working conditions on work-related well-being indicators which are considered important predictors of actual nurses' exit from the workplace. Analyses were performed on 3359 Italian registered nurses who participated to both waves of the European investigation 'Nurses' Early Exit Study'. Working conditions used as predictors of well-being were: 'Physical and emotional demands', 'Time pressure', 'Decision authority', 'Possibilities for development', 'Reward', 'Interpersonal Relationships', 'Influence on working time', 'Work/Home Conflict' and 'Satisfaction with pay'. Other predictors were:

'Perceived availability of free nursing posts', 'Having received a job offer in nursing' and 'Location of birth'.
'Job satisfaction', 'Organizational commitment', 'Emotional exhaustion', 'Perceived work ability' and 'Thinking of quitting nursing' were used as well-being outcomes. Information about actual nurses' exit were obtained by the participant healthcare institutions. Simple and multiple linear regression analyses were performed to identify best subsets of working conditions explaining well-being outcomes. Regressions were run using the Backward method controlling for age, gender, occupational grade and type of institution. A multiple logistic regression analysis was then used to test the impact of well-being indicators and life and professional opportunities on turnover.
Many changes occurred between the two waves of the study regarding working conditions and consequent well-being, though differently among nurses under and over 45: in the younger nurses, well-being was associated to career advancement, professional accomplishment and satisfactory pay opportunities, while in the older to a reduction of time pressure. For both age groups, lower work/home conflict was found to significantly predict higher well-being. In our sample most of the well-being indicators were not predictive of actual turnover. The perception of low work ability, a larger availability of free nursing posts and the possibility to get closer to one's own birth location were the only significant determinants of actual turnover.

EVIDENCE FOR THE EFFECTIVENESS OF INTERVENTIONS FOR PREVENTING OR TREATING STRESS OR BURNOUT IN HEALTH CARE PERSONNEL

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Background
Health professionals suffer from work-related or occupational stress as a result of both organisational factors and imbalance of demands, skills and/or social support at work. This can lead to severe mental morbidity, burnout or psychosomatic diseases, with the result of deterioration in quality of life and service provision. The economic impact of such conditions is high.
Objectives
To compare the effectiveness of various stress management strategies with no intervention or usual care, for health care personnel, in reducing stress or burnout.
Methods
We conducted a systematic literature review of original research articles about interventions aiming to prevent or reduce psychological stress or burnout in health care personnel. Two authors independently extracted data and assessed study quality. Where data could be pooled, a meta-analysis was performed. Otherwise a qualitative synthesis was employed using levels of evidence.
Results
We included and analysed 19 original research studies including: 14 randomised controlled trials (RCTs), three cluster-randomised trials and two controlled clinical trials. Two trials scored higher than 75% on the internal validity scale of the quality checklist. Person-directed interventions consisted of various cognitive-behavioural stress management approaches, relaxation and assertiveness training. Work-directed interventions included support programs and nursing delivery change. We found limited evidence that person-directed interventions can reduce scores on the MBI and various stress– and psychological symptom scales when compared to no intervention. Some reductions could be maintained up to two years. We also found limited evidence that work-directed interventions can produce similar reductions.
Conclusions
Health care personnel can achieve reductions in burnout, anxiety, stress and general symptoms from well planned interventions. However, a large part of studies evaluating such interventions are of low quality and it is unclear whether the attained reductions are permanent or clinically significant. Larger studies with adequate randomisation and blinding are needed to confirm our results.

JOB DISSATISFACTION AND STRESS-RELATED INDICATORS IN HEALTH CARE WORKERS OF A TEACHING HOSPITAL

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[ID 1330]

INTRODUCTION The literature reports a complex framework of typical stress-related behaviours due to job dissatisfaction in health care workers. AIM Aim of this study was to define and monitor stress-related indexes from administrative data gathered from a teaching hospital of Lombardia - Italy (3620 workers). MATERIALS AND METHODS Job specific sick leave data related to 2000-2004 were collected from personnel administration office (as absenteeism indicator), while number of fitness for work assessments claimed by the workers were collected from Occupational Health Unit (as indicator of job dissatisfaction). The following stress-related indexes were calculated: job specific absenteeism rate (days/workers), years of potential working life lost (YPWLL) due to sick leave, cumulative incidence of job change requests. RESULTS Absenteeism rate was high for low skilled jobs such as cleaners (21.4 days/worker) and nurse aides (16.2), moderate for nurses (8.3) and low for skilled professionals and managers like medical doctors (2.8) and non-medical managers (4.0). During the observed 5 years, YPWLL were 529.3, and risk attributable to job dissatisfaction was about 33%. Cumulative incidence of job change requests was 12.7% for nurse aides, 10.6% for cleaners, 4.2% for nurses and 1.8% for physicians. An inverse correlation between income and sick leaves was observed. CONCLUSIONS Strong associations between high levels of stress-related indicators and low skilled jobs were observed. Psychosocial and economical factors driving to job dissatisfaction could be related to low income, poor job or inadequate support from supervisors. The cost related to job dissatisfaction was estimated as 300.000 EURO/1000 health care workers/year. Reporting to occupational physician for job change requests was higher among employees in unskilled jobs.

THE RELATIONSHIP BETWEEN WORK-BASED SUPPORT, BURNOUT, WORK ENGAGEMENT, JOB SATISFACTION AND GENERAL HEALTH OF NURSES IN THE HEALTH SECTOR.

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[ID 347]

The general objective of this research is to investigate the relationship between work-based support, burnout, work engagement, job satisfaction and general health of nurses in a health sector. A cross sectional survey design will be used. A stratified sample of 300 nursed in the specific health sector will be used. The Maslach Burnout Inventory–General Survey (MBI-GS), Utrecht Work Engagement Scale (UWES), General Health Questionnaire (GHQ) and Minnesota Satisfaction Questionnaire (MSQ) will be administered. The analysis was carried out with the SPSS programme (SPSS, 2003). The reliability and validity of the MBI-GS, UWES, GHQ and MSQ were determined by means of Cronbach alpha coefficients, mean inter-item correlations and their distribution scales, as well as confirmatory factor analysis with the SPSS (2003) and Amos (2003). Construct (structural) equivalence was computed to compare the factor structure for the different culture groups will this study. Descriptive statistics (e.g. means, standard deviations, range, skewness and kurtosis) and inferential statistics were used to analyse the data. Pearson correlation coefficient was used to specify the relationships between the variables. Regression analysis were conducted to determine the percentage of variance in the dependent variables that is predicted by the independent variables.

CONSTRUCTION INDUSTRY

RISKS OF FALLS FROM HEIGHTS IN CONSTRUCTION

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[ID 191]

Problem: The study examined risk factors for falls of construction workers.
Method: Interview with injuried workers and descriptive analyses were carried out retrospectively of investigation reports.
Results: During the period 1995 – 2004 level of fatal and seriuos accidents were almost identical in Lithuanian construction industry. However, light accidents reduced from 518 in 1995 to 354 in 2004. The results of the matching fatal and serious injury falls from height and all construction are of great importance.
About 40 % the number of serious injuries were falls from height. This number of fatal injuries during the period 2000 – 2004 vary from 47 % to 74 % of all construction industry. The average fall height was approximately 3.5 m for the serious injury falls and 4.4 m for the fatal injury falls. A paired t test showed a borderline significant between the mean of the difference for heights of the fatal and serious injury falls (1.5 m; $P < 0.08$).
The contact surface in most cases was concrete floor
Fall risks appear in different ways to different trades and occupations at different stages of the construction process and interventions must be designed with this mind. Fatigue and slipping were likely contributing factors both in terms of initiating the falls, as well as in the workers' reduced ability (reactions/reflexes) to prevent fatal injuries. Impact on industry: Occupationally and task-related appropriate engineering, ergonomics and design solutions, must be developed for the different problems highlighted above.

MEDICAL RESULTS AT THE MUSCLE SKELETON SYSTEM OF MALE CONSTRUCTION WORKERS

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[ID 337]

OBJECTIVE: The prevalence of medical findings shall be analyzed by male employees of the most important making professions in connection with her typical physical strains.
DESIGN: Cross sectional study of data of the work medical health examinations because of high physical strains and physical risks.
SUBJECTS: The saved data were evaluated statistically about the respectively last examination of 95,199 men from the years 1991 to 1999.
MEASUREMENTS: The clinical results in the regions of the muscle skeleton system were documented. As a rule, there were clinical results at a painful function or movement restriction.
RESULTS: Heavy loads have the strongest influence on the lumbar (OR 1,42) but also on the cervical spine region (OR 1.62) and the shoulder joints (OR 1.16). The professions particularly concerned are scaffolder, carpenter and plasterer. Forced postures seem stronger than the heavy loads to the results at the lumbar spine (OR 3.28) and all joint regions (shoulder 1.85/elbow 1.41/wrists 1.70, hip joints 2.30/knee joints 1.65 - everyone $P < 0.001$). The most frequent forced postures have interior decorators, plasterer and tiler. Hand arm vibrations have an effect on the joints of the upper extremities (wrist OR 2.48, elbow joints OR 2.21, shoulder joints OR 2.35), but also on the cervical and lumbar region (OR 2.01 or 1.86) and the knee joints (OR 2.71). Hand arm vibrations mentioned of street farmers, road workers and isolators, get the most frequent.
CONCLUSIONS: The examination points that not alone heavy loads but forced postures pay a greater attention at the prevention of painful disorders at the musculoskeletal system too. Heavy tools with hand arm vibrations don't only lead to troubles of hand arm system but also at the other musculoskeletal system.

THE PARTICIPATIVE EMPLOYEE: HOW PARTNERING AND LEAN CAN CONTRIBUE TO CREATING 'CAN-DO' SAFETY CLIMATES IN THE CONSTRUCTION INDUSTRY.

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[ID 629]

Aims
Partnering and Lean are increasingly prominent concepts in the Construction industry, yet little direct attention has been paid to how their implementation impacts on safety. In this study we present data which examines how specific measures in the implementation of Partnering and Lean influence the form and extent of on-site safety dialogue; how much scope employees have for proactive participation; how much they actively exploit the possibilities available to them.
Material and Methods
Researchers followed a medium-sized construction site in Denmark, where Partnering and Lean arrangements were implemented in parallel with existing safety measures practiced by the main contractor. Data evaluating active participation in safety has been obtained from employee safety climate interviews (N=100), analysis of safety content in bi-weekly site-meetings (See figure 1) and through application of the safety round method by an independent consultant (N=25).
Results
Employees and their nearest leaders interact frequently: approximately 75% of employees having had contact with their nearest supervisor within two hours of being interviewed. Safety climate, as measured in the frequency of interactions between employees and their nearest supervisors which include safety as a topic of discussion, is also extremely strong (Figure 1). The safety rounds, confirming the picture of a strong safety climate, showed a low level of safety-related faults, with an average over six months of less than 20%.
Discussion
Both Partnering and Lean bring indirect safety benefits, since planning and coordination are strengthened. This effect can be enhanced with integrated safety measures. Communication about safety on this site evolved over time and dialogue between management and employees demanded by Lean encouraged employees to be more proactive regarding safety. Partnering and Lean laid the foundations upon which existing safety measures could flourish, since they created a flexible environment in which an open exchange of opinions was possible.

DIURNAL CORTISOL PROFILES IN CONSTRUCTION WORKERS WITH 12-HOUR WORKDAYS AND EXTENDED WORKWEEKS.

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[ID 911]

In Denmark, epidemiological studies have shown that large scale construction work may be associated with an increased risk of hospitalization and disability retirement compared to construction work in general. The aim of the present study was to investigate whether large scale construction work involving 12-hour workdays and extended workweeks was more physiologically challenging in terms of increased catabolic metabolism than construction work involving regular workhours and an ordinary five day workweek.
The study group comprised 40 male construction workers. Of these, 21 worked 12 hours a day and had extended workweeks (6 days in a row, 1 day off, 5 days in a row, 9 days off). The remaining 19 participants worked regular hours (37 hours pr week, weekends off) and functioned as a comparison group. The participants were between 19-62 years of age, and had a body mass index from 20.0 to 30.9 kg/m2. Saliva samples for determination of diurnal cortisol profiles were obtained 5 times daily on 4 workdays (Tuesday and Thursday) during the two consecutive workweeks.
There was no increasing trend in cortisol concentrations during the extended workweek. However, the diurnal profile of cortisol concentrations differed between the two groups ($p<0.001$). Post-hoc analyses showed that workers with extended workweeks had lower cortisol concentrations in the late afternoon. The concentrations corresponded to 69% [95% CI: 55%-88%] of those observed in saliva from the workers with regular workhours ($p=0.004$). Further, the decline in cortisol concentrations between morning and the late afternoon tended to be larger for workers with ex-

tended workweeks (4.9 nmol/L, 95% CI: 0-9.8 nmol/L, p=0.054). However, the observed cortisol concentrations were relatively high for both groups compared to a reference interval for a healthy working population.
In conclusion, 12-hour dayshifts and extended workweeks need not necessarily to be more physiologically challenging than an ordinary 37-hour workweek.

TUMOR NECROTIZING FACTOR alpha PROMOTER AND GST-T1 GENOTYPE PREDICT SKIN ALLERGY TO CHROMATE IN CEMENT WORKERS IN TAIWAN

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[ID 1044]

Construction workers exposed to cement are known to suffer from occupational contact dermatitis due to chromate sensitization. It is not clear whether certain genotypes are associated with increased susceptibility of chromate sensitization in those workers regularly exposed to cement. The objective of this study was to determine the genotypes predisposed to cement-induced contact dermatitis in workers. A total of 150 current cement workers who had regular contact with cement were telephone-interviewed for skin problems in the past 12 months, work exposure, and personal protection. A dermatologist examined their skin and conducted patch test with common skin allergens. Blood samples were donated for genotypic determination by polymerase chain rection-based assays for GSTT1, GSTM1 (null/non-null), Tumor Necrosis Factor (TNF) alpha promoter –308G/A, and interleukin (IL) 4–590C/T. High percentage of dermatitis was noted in the 150 workers examined, which was correlated with reported skin problems. By patch testing, construction workers had a high prevalence rate (12%) of sensitivity to chromate. Sensitivity to chromate was significantly associated with TNF alpha promoter –308 heterozygous (GA) as compared with GG genotype (odds ratio 4.2, 95% confidence interval 1.2-15.2), as well as with GSTT1 null genotype (odds ratio 5.1, 95% confidence interval 1.3-34.4), but neither the GSTM1 nor the IL-4 genotypes. It is concluded that among workers frequently exposed to cement in Southern Taiwan, those with TNF alpha promoter –308 heterozygous (GA) genotype or GSTT1 null genotype had increased risk for chromate sensitization.

THE USE OF CAUSAL EXPLANATIONS OF ACCIDENTS IN CONSTRUCTION WORK

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[ID 961]

Aim
The aim was to investigate differences in conceptions of safety used by general management, site management and construction workers in order to explain different views of preventive strategies. The perspective taken in this study is, that interpretations of safety and causes of accidents form the basis, for the preventive measures taken by organisations and individual actors.
Method
In dept interviews with representatives (N=19) of a larger construction site were conducted. Interviews were transcribed and coded. The causal explanations of safety and accidents were investigated using a method for analysing accounts of explanations, developed by Charles Antakis. In total 221 accounts of incidents related to safety were identified in the interview transcripts. A number of accounts with detailed causal structures attributed to each of the accounts were identified (N=62) for further investigation.
Results
Three types of causal structures for explanations of accidents and safety were identified: a simple linear model, a co-occurrence model, and a complex model. Higher-level management and construction workers most frequently used a simple linear model, which mainly attributed causes to the individual level. Local management used the co-occurrence model, whereas site foremen to a higher degree made use of the complex model for attribution of causes to incidents. The attribution of causes to severe incidents more often made use of the complex model.
Higher-level management and construction workers more often suggested solutions related to behaviour related individual incentives. On the contrary, the foremen were more aware of constrains set by the client, design and inadequate equipment, i.e., the higher end of the risk control hierarchy, which may be related to their key position in the construction hierarchy, communicating both the company policy on safety and the production related goals to workers.
Conclusion
Site foremen are important to include in the preventive work, already in the planning stage, in order to improve risk control at construction sites.

FACTORS CONTRIBUTING TO CONSTRUCTION INJURIES IN BUILDING INDUSTRY

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[ID 1136]

Background
The official data on fatal occupational injuries in Italy provided by INAIL (Workers' Compensation Authority) are considered to be incomplete and with limited information on risk factors associated with the injury rates. Fatal injuries are still a serious public health problem in construction workers.
During the period 2002-2004 ISPESL (National Institute of Occupational Safety and Prevention), INAIL and 18 Italian Regions set up a national epidemiologic surveillance system on fatal and severe work-related injuries occurred in Italy, to study accident-related causal and contributing risk factors and circumstances.
Objectives
The aim of the study is to verify the completeness of INAIL data source and to evaluate causes and circumstances related to fatal or severe injuries in the building industry in Apulia.
Methods
We linked the official INAIL data base in Apulia with the data base on building industry injuries indipendently collected in the national epidemiologic surveillance system on fatal and severe work-related injuries. We estimated the completeness of INAIL official data on these accidents by using the capture-recapture technique applied to the two data sources.
A variant of the Haddon Matrix has been used to represent different influencing factors (host, agent/vehicle, physical environment, social/organizational environment) in the three phases of injury (preevent, event, and postevent).
Results
This survey estimated that the real amount of fatal building industry accidents is 11% higher than that reported by INAIL. In Apulia, by ISPESL-INAIL-Regions database, we collected 153 fatal (61%) and severe (39%) work-related injuries reported during the period 2002-2004, 24% occurring in the building industry. Among the major categories, human factors were the most frequently involved. Falls from elevation were by far the most frequently reported (56%).

EXPOSURE TO POLYCYCLIC AROMATIC HYDROCARBONS (PAH) IN ITALIAN ASPHALT WORKERS

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[ID 1875]

Purpose of the work was the assessment of exposure to Polycyclic Aromatic Hydrocarbons (PAH) in 100 Italian asphalt workers (exposed to bitumen fumes and diesel exhausts) and in 47 ground construction operators (exposed only to diesel exhausts). The protocol included interview by questionnaires, environmental air-monitoring (active personal sampling during the work shift), and biological monitoring (urine collected in three different moments: baseline after two days of vacation, before shift and at the end of shift on a day of the second half of the week). Since dermal exposure has been suggested as a major determinant of the total PAH dose absorbed by road pavers from bitumen fumes, we assessed skin contami-

nation: in both groups, to each subject six polypropylene pads were applied in different parts of the body, during the workshift. Median airborne levels of PAH ranged from 408 to below 0.07 ng/m3. Among different work-tasks and versus the confronted group (ground construction operators), there were not statistically significant differences in air-environmental exposure. The results show that the dermal contamination in asphalt workers is significantly higher than in ground construction operators. We did not found important differences in dose density between pads located on different body region. Cutaneous dose rate is about threefold higher than airborne dose rate, whereas considering the toxicokinetical information (Kp, lag time, experimental dermal absorption data) and the hygienistic data (particle size of bitumen fume), the relevance of dermal absorption is lower than respiratory one. The analysis of the 1-hydroxypyrene was performed in urine samples. The results of this study demonstrate that asphalt road pavers experience a moderate occupational exposure to airborne PAH, by cutaneous and respiratory absorption, resulting in a significant increase of urinary 1-hydroxypyrene during the workweek.

DIFFERENTIAL CELL COUNTS FROM INDUCED SPUTUM IN CEMENT DUST EXPOSED WORKERS

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[ID 628]

BACKGROUND: Former studies have presented conflicting data on the association between exposure to Portland cement dust and respiratory effects. Our goal was to examine airway inflammation in subjects exposed to cement-dust.
METHOD: All non smoking, dust exposed, shift workers from the largest cement plant in Norway were invited to participate. The workers performed spirometry and induced sputum (IS) after a period of 5 weeks of cement dust exposure and again after one week without exposure. Information on respiratory symptoms, allergy and former respiratory disease was given on a self-reported questionnaire. IS was performed and processed as described by Pin et al. Differential cell counts were carried out.
RESULTS: 15 non smoking male shift workers, aged 18-62 (mean 36.4), were included. Respirable dust concentration from personal-related dust measurements was 1.1 mg/m3 (mean, range 0.0-6.8). The percentage of neutrophils in sputum were 38 [95%CI 28-48] in unexposed period and 49 [95%CI 37-61] in exposed period (p=0.1).
CONCLUSIONS: Our findings show that the percentage of neutrophils is slightly, but not significantly elevated in the exposed period compared to the unexposed period. Cement dust exposure in concentrations below the Norwegian occupational limits may cause airway inflammation, but more subjects or longer avoidance from exposure are needed to test this hypothesis.

INDUSTRIAL HYGIENE

EXPOSURE TO MERCURY IN THE MINE OF ALMADEN

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OBJECTIVES: to describe the process to obtain mercury and the historical exposure to mercury of the Almaden miners and to discuss the methodological problems occurred when assessing the occupational exposure.
METHODS: we collected information on every workplace and historical data on production, technological changes in the productive process and biological and environmental values of mercury. A job-exposure matrix was built with these values and the exposure to inorganic mercury was estimated quantitatively as g/l of urine mercury. A cumulative exposure index was built for every worker by summing up the estimates of every year and workplace.
RESULTS: the productive process includes two stages. In the first one, or mining phase, there are five main tasks: excavation, extraction, fortification, drainage and ventilation. In 1960 water was introduced in the perforation of the mineral line. In 1972 technological changes improved ventilation and, in 1985 the new system of inverted craters was introduced. The second phase, metallurgy, includes mineral destillation, packaging and storage of the resulting mercury. The process was completed with the works in the laboratory and the plants of mercury derived products. In the mine, the highest exposures occurred during perforation, with air values up to 2,26 mg/m3, 2.194 ppb in urine and 374 ppb in blood. The furnace and cleaning were the tasks with the highest values in the metallurgy, peaking up to 3,37 mg/m3. The filling of mercuy bottles through free fall, originated values within the range 1,13 to 2,43 mg/m3, these values dropped to 0,32-0,83 mg/m3 after the introduction of a new ventilation system.
CONCLUSIONS: the exposure to mercury of the workers in Almaden mines has been very high. The extremely high cinnabar ore of the mine explains the elevated mercury concentrations in air in all the work places. This, jointly with inadequate working conditions, explains the blood and urine levels found along the study period.

CHARACTERIZATION OF OCCUPATIONAL PARTICLE EXPOSURE FOR WORKERS IN THE STOCKHOLM UNDERGROUND

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[ID 929]

Objectives: High levels of fine and ultra-fine particles have been measured at underground subway stations in Stockholm as well as in other big cities. To clarify the occupational exposure of subway workers for different particle sizes and content, we performed a study with four occupational groups including particle characterization for 80 workers, combined with examination of health effects in the lung and cardiovascular system.
Methods: Personal particle measurements were performed during three full shift operations for 41 workers (subway drivers, ticket collectors, platform cleaners, and ticket controllers). Fine particles were measured by a portable gravimetric sampling devices with PM1 and PM2.5 cyclons. A real time particle monitoring instrument, DataRAM, measured fluctuations of total suspended particles <10 µm. Ultra fine particles (< 0.1 µm) were measured by a direct reading P-Trak instrument. Qualitative analysis were done by X-ray fluorescence technique.
Results: The average particle exposure was lowest for tickets collectors: PM1= 6.1 mg/m3 (± 2.4); PM2.5= 10.1 mg/m3 (±3.2) and highest for cleaners: PM1=35,1 mg/m3 (±12.8); PM2.5= 79,4 mg/m3 (±17.1). The particle levels under ground were five times higher than above ground for PM1 and PM2,5, but inverse for ultra-fine particles. Ultra-fine particle levels were much higher outside the cabins than inside them. The particles had a high content of metals.
Conclusions: Subway drivers had a particle exposure level (PM1 and PM2,5) corresponding to bus drivers in Stockholm city but the particle content was different. Cleaners and other platform workers had four times higher particle levels. These exposure data will now be correlated to data on lung function and blood parameters.

DUST EXPOSURE IN THE WOOD PROCESSING INDUSTRY: RESULTS FROM A SURVEY IN PIEDMONT REGION (ITALY)

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In 2000, Italy issued the D.L 66/2000, in which the hardwood processing was included in the list of carcinogenic processes and the Occupational Exposure Limit for wood dust was set at 5 mg/m3. Aims of the study were to estimate the level of wood dust in wood-processing in Piedmont Region and to identify main determinants of exposure to wood dust. The survey was carried out during 1999-2001 in a representative sample of the wood processing industry; inhalable wood dust exposure was assessed at 24 different factories in South–West Piedmont (Italy).
Personal and environmental monitoring for airborne inhalable wood dust was conducted at each work site, recording information on job title, type of wood processed, presence of local exhaust ventilation, cleaning methods, use of personal protection devices and compressed air.
A preliminary analysis of determinants of wood exposure was done using one-way analysis of variance (ANOVA). A multifactor analysis of covariance was also done using all the factors used in the preliminary one-way ANOVA. Over 134 samples were taken (74 personal and 60 environmental). The geometric mean concentration was 0.98 mg/m3; 45% of samples exceeded the ACGIH value set at 1 mg/m3 and 16.2% the Italian limit of 5 mg/m3.
The geometric mean exposure in furniture manufacturing was 1.51 mg/m3, in frames and fixtures manufacturing 0.74 mg/m3, and in other wood products 0.80 mg/m3. Significant determinants of wood dust exposure were specific process (joinery versus sanding), cleaning methods used (manual versus automatized), cleaning operations frequency, use of compressed air and size of plant. The type of processed wood was not found to be statistically significant.
Wood dust exposure levels in this study were comparable to those found by other recent Italian investigations, where levels in a range of 1-2 mg/m3 were observed. Sanding was the operation exposing workers to the highest wood dust levels.

USE OF SEMIPERMEABLE MEMBRANE DEVICES AND BIOLOGICAL TEST ANALYSIS TO EVALUATE AIR QUALITY OF AN OCCUPATIONAL ENVIRONMENT

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[ID 1276]

Semipermeable membrane device (SPMD) is a passive sampler first designed for sampling of waterborne hydrophobic pollutants. This sampler sequesters lipophilic contaminants, mimicking the bioconcentration in the fatty tissue of organisms.
The aim of this study was to evaluate the applicability of this passive sampler (SPMD) and biological tests (Comet assay and Ames test) for air monitoring. For this purpose a sampling with SPMD in an occupational environment with expected Polyciclic Aromatic Hydrocarbons (PAHs) contamination (a cokery) was carried out. The SPMDs were deployed at 5 sampling sites that represented different work areas within the coke works and at a control site (office). In each site an airborne particulate sample was collected and analysed with GC-MS. The SPMDs dialysates were chemical analysed and examined for in vitro DNA-damaging activity in human cells (Jurkat) by Comet assay and for mutagenicity with the Ames test (TA98 strain, w/o S9).
All air samples obtained with SPMDs, except the control site, showed variable degrees of genotoxic activity with the Comet assay (31,18-108,50 Comet Length/m3 versus 29,44 Comet Length/m3 in control site) with a dose-dependent increase of DNA migration.
The highest genotoxic effect encountered with the Comet assay was found in the coke oven batteries and resulted associated with the highest level of PAHs in particulate samples.
The Ames test revealed a mutagenic activity in only one site, a dose-dependent toxic effect in two sites (probably hiding the mutagenic ef-

fect), and no effect in the control site.
The presence of genotoxic effect observed with Comet assay in all air samples within coke plant and the different intensity of DNA damage in sampling sites support the sensitivity of this method.

HEALTH RISKS IN THE CO-INCINERATION AND CO-PROCESSING OF INDUSTRIAL WASTES IN CLINKER KILNS: A CASE STUDY IN A CEMENT PLANT IN THE STATE OF MINAS GERAIS, BRAZIL

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In Brazil different types of industrial hazardous waste have been processed in clinker kilns of cement plants. Depending on the waste fuel to be burned, pre-treatment may be necessary. These operations can expose the workers to very complex mixtures of chemicals which hazards are very difficult to assess and control. The objective of this study was to evaluate the occupational health program of a cement plant in the State of Minas Gerais, Brazil, and to present appropriate approaches and tools for the assessment and control of the health hazards in the co-incineration an co-processing of hazardous industrial waste in cement plants The methodology included the evaluation of the workers risk perception, hazard analysis and the evaluation of health surveillance program. The data were gathered using interviews with workers and technical staff, workplace observation and document analysis. The results showed that the risks related to many operations were not appropriate controlled, mainly the inhalation of toxic dust, organic vapors and acid gas during the blending process, and introduction of the waste produce in recycling used oils. The hazard more recognized in the workplace by workers was exposition of residues (62%), followed by the risk of injury while they repair machines. Among the residues judged dangerous the most quoted was cyanides.50% weren't afraid of hazards at work, 30% were afraid to repair machines, 20% were afraid of tasks that need contact with residues. 17% of workers complained of headache, 13% stomach ache and 47% deny symptoms at work. Thinking about future, 45% were afraid of cancer related to work and 22% were afraid other health problems. 96% judged their work very important for society. 40% felt unsafe with information about work hazards. The occupational health care provided by employer showed a lot of faults. A specific tool to assess the hazard of each type of waste was suggested for the future hazard evaluation of new wastes to be processed. Some medical protocols were proposed in order to improve the health surveillance. These results were presented to company, union and labor inspection representatives. Based on the results and recommendation the company prepared and implements an action plan in order to control current hazards and prevention future risks. The researchers conclude that will be necessary development of occupational safety and health protocols for the co-incineration an co-processing of hazardous industrial waste in brazilian cement plants.

OCCUPATIONAL EXPOSURE TO ATMOSPHERIC POLLUTANTS OF TRAFFIC POLICEMEN

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Aim: to assess occupational exposure of traffic policemen in Milan to air pollutants such as Carbon Monoxide and Particulate Matter including respirable fraction and PM2,5.
Materials and Method: 130 local urban policemen were monitored in four different seasonal campaigns. Exposure monitoring was performed in working days between two work shifts. Personal exposure was measured by means of: CO (electrochemical cell); personal sampler equipped with Lippmann and GK2.05 cyclone for respirable and PM2.5 respectively. In both cases particles were collected on Zefluor membrane. PM samples were gravimetrically examined and then analysed for inorganic ions composition (NH4+,Ca2+,Cl-,SO42-,NO3-). Data on these pollutants were contextually acquired by a mobile environmental station (located near the working cross of the policeman), and by the fixed monitoring urban net.
Results: Personal exposure to PM2.5 and respirable fraction ranged respectively from 51µg/m3 to 203µg/m3 and 128µg/m3 to 429µg/m3. Respirable particles level widely varied in different seasonal campaigns. Compositional ion analysis showed no significant differences in the two different PM fractions. The mean composition of PM in the city of Milan was: NO3-5%,SO42-3,1%,NH4+1,7%,Ca2+1,6%,K+1,1%,Na+0,3%,Cl-0,5%,NO2-0,04%.
Conclusions: PM concentrations for PM2.5 and respirable fraction were above the PM10 actual daily limit of 50µg/m3. Respirable fraction levels showed seasonal variation: the increase in Winter versus Summer was due to the presence of additional sources (heating emissions) and adverse atmospheric conditions. Personal exposure to respirable fraction followed the PM10 variations recorded by the fixed urban net monitoring stations, but the personal concentrations were always higher indicating that environmental monitoring underestimated the real personal exposure.

EXPOSURE MODELS: CURRENT PRACTICES AND ON GOING DEVELOPMENT

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Objectives
A survey was undertaken among Swiss occupational hygienists and other professionals to identify the different exposure assessment methods used, the contextual parameters observed and the uses, difficulties and possible developments of exposure models for field application.
Methods
A questionnaire was prepared and addressed by mail to 121 occupational hygienists, members of the Swiss Occupational Hygiene Society. A shorter questionnaire was also sent to registered occupational physicians and selected safety specialists. Descriptive statistics and multivariate analyses were performed.
Results
The response rate for occupational hygienists was 60 %. The so-called expert judgement appeared to be the most widely used method, but its efficiency and reliability were both judged with very low scores by occupational hygienists themselves. Long-term sampling was perceived as the most efficient and reliable method. Exposure models were not used very much in Switzerland to predict exposure. Various determinants of exposure, such as emission rate and work activity, were however often considered important by professionals. But they were not directly included in the present exposure assessment processes. Near field local phenomena determinants were also judged important for operator exposure estimation.
Conclusion
According to these results, efforts are currently undertaken to improve the existing compartmental exposure models. Future models should give more emphasise on emission and local phenomenon and make use of parameters more easily accessible to practitioners. Various exposure situation have been reproduced in an experimental booth, and the concentration profiles have been observed simultaneously in the different points. Results have been introduced in a compartmental model in order to assess the pollutant emission and dispersion in the near field under different conditions.

MANAGING UNCERTAINTY: PRACTICAL APPROACHES TO NANOSCALE MATERIALS AND OCCUPATIONAL HEALTH IN SMALL WORKPLACES

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Nanotechnology is impacting hundreds of consumer products, and innovative applications for these "new" materials in the < 100 nm range hold great promise in areas of energy production and management, microelectronics, polymer science, foods and consumer products, as well as targeted medical treatments. To meet growing production demands, hundreds of thousands of workers in research and development (including university) laboratories, manufacturing facilities, and application sites will potentially be exposed to nanoparticles. To date, no specific occupational exposure limits for any nanoscale material has been implemented.

Nevertheless, materials are specifically produced in the nanoscale because of unique and often unusual properties not seen in larger particles of the same substance, and may pose risks not seen in the parent material. However, the scientific basis for exposure regulation will not be available for most nanomaterials for years; therefore, employers using nanomaterials have an immediate need for practical approaches for developing and managing effective employee health and safety programs. Because actual risks are unknown, short-term approaches will benefit from the integration of chemistry, industrial hygiene, materials and process engineering, toxicology and risk assessment, and health expertise – and cooperation at the corporate or organization level. Practical approaches to managing uncertain risks could be modeled after those developed for potent compounds, radioactive materials, and virulent pathogens. Important considerations include ventilation, industrial hygiene monitoring, personal protective equipment, engineering controls, and medical surveillance. We will describe such alternative approaches to protecting employees where risks are unknown, and strategies for transferring and communicating program successes to date from larger companies' experiences to academic and smaller production settings. Much of the research and development on nanomaterials is performed in smaller laboratories and companies, where the information and resources to effectively address occupational health and safety challenges may be inadequate. As this is a dynamic process, strategies implemented now to protect worker health will need to be evaluated and adjusted as new information becomes available.

NATURALLY OCCURRING ASBESTOS IN QUARRYING AND PROCESSING THE "SERPENTINO DELLA VALMALENCO" (SO), CENTRAL ALPS: GEOLOGICAL AND ENVIRONMENTAL STUDIES FOR RISK ASSESSMENT

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The serpentinite from Valmalenco (SO) is produced nowadays in 22 active quarries, with more than 150 workers involved.
Quarrying and processing activities involve sometimes asbestos veins (chrysotile); these veins (some centimetres thick) are quite common only in a limited area (Lanterna Valley, Valbrutta-Dossi di Franscia localities). Sporadic data about the worker's exposure to asbestos were available: therefore, INAIL and its Technical Directorate for Risk Assessment and Prevention (CONTARP), within a multidisciplinary collaboration (Regione Lombardia, Provincia di Sondrio, ASL di Sondrio, Medicina del Lavoro Azienda Ospedaliera di Lecco), has planned and carried out a detailed study of this activity, including air monitoring in quarrying sites, as well as laboratory researches (SEM-EDS, XRPD, PCOM).
The risk assessment has been performed according to the Italian regulations (D.Lgs. 277/91 and D. Lgs. 626/94).
Two sampling campaigns were carried out in 2004 and in 2005. The main quarrying activities were monitored (drilling, diamond wire cutting, moving) in two different sites; the workers were equipped each with two personal pumps in order to obtain samples available for both SEM-EDS and phase-contrast microscopy (PCOM). Seven area samples were also collected in the same sites.
The airborne asbestos fibre-counting took place in the CONTARP laboratories (Milano and Roma). A few massive samples were analysed in XRPD in the CONTARP laboratory of INAIL D.G., Roma.
The MOCF data show a very wide range of exposition (2-338 ff/l) with widespread "fibre-like" antigorite splinters interfering with the chrysotile in the analyses (OMS method).
SEM analysis confirms the data obtained by PCOM. The highest magnification of this technique and the EDS analysis allows to discriminate through the different kind of fibrous materials from the serpentinites.
The exposure limit of D.Lgs. 277/91 (600 ff/l as TLV-TWA) was never exceeded in the investigated sites. Values greater than 100 ff/l were observed during diamond wire cutting operations and dry-drilling; the highest values were recorded in the Dossi di Franscia area.

PNEUMOCONIOSIS

THE CHEST HIGH RESOLUTION COMPUTED TOMOGRAPHY IN THE BORDERLINE SILICOSIS CASES: WHEN INDICATE IT?

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INTRODUCTION: The high resolution computed tomography (HRCT) has been often utilized to diagnose silicosis when the results of conventional chest x-ray are uncertain. However, its performance in the diagnosis of borderline forms is not yet well established. As a consequence, there are no clear indications about its use in surveillance programmes of populations exposed to silica. OBJECTIVE: To evaluate criteria to indicate the use of HRCT based on clinical, functional and occupational data. METHODS: This Is a cross-sectional study of a 140 former gold miners, living in the cities of Nova Lima and Raposos, Minas Gerais, Brazil. They were examined between November 1997 and December 1999 taking occupational and clinical histories, chest x-rays (according to ILO standards) and spirometry. Those 69 considered as borderline cases of silicosis by means of chest x-ray were submitted to HRCT and were evaluated in the present study. Their silica exposure was assessed by means of a semi-quantitative cumulative silica index (CSI) based on previous silica measures and the evaluation of two industrial hygienists.The statistical analysis was done by multiple logistic regression models and by the decision tree (CART, Classification and Regression Trees). RESULTS: images compatible with borderline silicosis by the HRCT were associated with the cumulative exposure index (OR=1,037 per unit, p=0,034) and with a decrease in forced vital capacity (FVC) (OR=0,96, p=0,054). CART was able to establish cut-points of the CSI and FVC distribution to identify cases with the images compatible with borderline silicosis by the HRCT. CONCLUSION: Using relative simple instruments like cumulative exposure and FVC it was possible to select those patients that would benefit from HRCT.

EFFECTS OF CONTINUED EXPOSURE TO SILICA AFTER DIAGNOSIS OF SILICOSIS IN BRAZILIAN GOLD MINERS

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BACKGROUND: There is a paucity of studies analyzing the effect of continued silica exposure after the onset of silicosis with regard to disease progression. The objective of the present study was to investigate whether there are differences in the clinical and radiological presentation of silicosis among former workers with a diagnosis of silicosis, comparing subject who continued to be exposed because of their work contracts with workers who stopped silica exposure after having received the diagnosis. METHODS: A sample of 83 former gold miners with silicosis at various stages of the disease had their clinical and occupational histories taken and underwent both chest radiography (International Labor Organization standards) and spirometry. Their silica exposure was assessed by means of a semi-quantitative index. The main outcome was the radiological severity of silicosis and tuberculosis. The statistical analysis was done by multiple logistic regression. RESULTS: Among the 83 miners, 44 continued to be exposed to silica after being diagnosed with silicosis. Continuation of silica exposure was associated with radiological more severe cases of silicosis, characterized by X-ray classification in category 3 (OR=6.42, p=0.029), presence of coalescence and/or large opacities (OR=3.85, p=0.040), and more cases of tuberculosis (OR=4.61, p=0.032). CONCLUSIONS: These results reinforce the recommendation that silica exposure should be halted at an early stage in cases of radiography suggestive of the disease.

HIGH PREVALENCE OF SILICOSIS AMONG GOLDSMITHS IN CENTRAL ITALY.

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[ID 1307]

Silicosis is a well known occupational lung disease caused by inhaling free crystalline silica. Few case-reports have addressed the risk of silicosis in the jewellery trade where gypsum models containing a high percentage of free crystalline silica are often used in casting.
We conducted a cross sectional study involving 100 goldsmiths exposed silica. All replied to questionnaire and underwent a clinical examination, pulmonary function testing, a chest X-ray (according to ILO criteria) and High Resolution CT scan.
HRCT visualized signs of suspected silicosis in 23 cases, confirmed by chest X-rays in 10 cases. In the 23 workers with CT evidence of silicosis the mean Total Lung Capacity (TLC) was 96.3% (SD 8.7) of the predicted value vs 98.5% (SD 10.9) in the others; FEV1 was 92.3% (SD 31.8) of the predicted value vs 103.2% (SD 12.9); DLCOVA was 88.9% (SD 12.6) of the predicted value vs 95.2% (SD 12.9) (p= ns for all parameters, even after adjustement for smoking). TLC, FEV1, DLCOva were not correlated with duration of employment or silica exposure, measured as total gypsum use in working life.
In this study we demonstrate that the use of gypsum in casting in silver and gold jewellery causes silicosis. Our results indicate that HRCT appears more sensitive in detecting silicosis than chest X-rays, even if not yet standardized by ILO rules. In unusual workplaces associated with a risk of silica inhalation, diagnosis of silicosis requires widespread screening for which new methods, other than CT scan, chest X-rays and pulmonary function testing, are needed.

EXPOSURE RELATED PULMONARY X-RAY FINDINGS AMONG WORKERS IN THE NORWEGIAN SILICON CARBIDE INDUSTRY

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Introduction
An increased risk of death from pneumoconiosis among workers in the silicon carbide (SiC) industry has previously been reported1. Silicon carbide production involves exposure to several fibrogenic components, among them SiC fibers. Based on old pulmonary X-rays and detailed exposure information we have examined exposure response relationships for the development of pneumoconiosis among the workers.
Materials and methods
A comprehensive exposure study with detailed measurements of all relevant fibrogenic exposure factors (quartz, cristobalite, and SiC fibers) occurring in the Norwegian SiC industry has recently been performed. Based on these and historical dust measurements, a historical job exposure matrix has been developed.
Pulmonary X-rays from 1120 former and present workers in the Norwegian silicon carbide industry were collected from occupational health services and a local hospital, The X-rays covered the period from 1938 to 2003. Each worker's latest radiograph was classified independently by two ILO certified B-readers, according to the ILO 2000 classification system for pneumoconiosis. A case was defined as ILO grade 1/0 or higher. The results from the film reading were combined with the job exposure matrix from which we calculated cumulative exposure for different exposure factors. Kappa values for the agreement between independent readings were calculated.
Results
The analyses are still ongoing and will be completed during spring 2006. Time lags of 10 and 20 years will be used in the analyses. Logistic multiple regression models will be built, and models with the best fit presented. Odds ratios for different exposure factors and levels adjusted for possible confounders will be presented.
Reference List
(1) Romundstad P, Andersen A, Haldorsen T. Non-malignant mortality among Norwegian silicon carbide smelter workers. Occup Environ Med 2002; 59(5):345-347.

LONGTERM MONITORING OF MORPHOLOGICAL AND FUNCTIONAL CHANGES WITH SHIPWORKERS OCCUPATIONALLY EXPOSED TO ASBESTOS

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[ID 741]

AIM: Monitoring of morphological and functional changes during 10-year period with 360 shipyard workers occupationally priory exposed to asbestos.

METHODS: Chest x-rays of all the examinees have been coded by 3 radiologists (ILO 1980). For the purpose of this monitoring parenchymal changes are coded from 0 to 8 (from subcategory 0/0 to 2/3), and pleural changes are presented as a surface (mm2), i.e. length × width. For all the examinees the Exposure and Smoking Indexes have been calculated, spirometry and diffusing capacity for CO have been performed in the same laboratory during the years 1994, 1999 and 2004. The data have been analysed by the Program Statistics 6.0 for Windows. The tests used are descriptive statistics, t-test for dependant samples and multiple regression.

RESULTS: The examinees exposed to asbestos have significantly lower all the spirometric values then references values, but without clinical significance. During the 10 years period deterioration in MEP 25%, MEP 50% and MEP 75% (all $p<0.05$) has been registered, but without clinical significance. The increased deterioration of MEP 50 ($p=0,0023$) has been influenced by the latency period; of MEP75 has been influenced by exposure Index and parenchymal profusion ($p=0,04$). The parenchymal profusion has been influenced by the latency period and exposure Index ($p=0,0000$); the extension of pleural changes has been influenced by Indexes of smoking and exposure, and latency period ($p=0,0008$).

There are neither statistical nor clinically significant deteriorations of FVC, FEV1 or DLCO values, either at the beginning or at the end of the study.

CONCLUSION: Diffuse capacity and spirometric values are not sufficient indicator of the asbestos influence in occurrence of morphological or cklinical changes.

THE ROLE OF HRCT IN THE DIAGNOSIS OF PNEUMOCONIOSES. THE EXPERIENCE OF THE "CLINICA DEL LAVORO LUIGI DEVOTO" OF MILAN

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[ID 839]

The progress in imaging techiques in the recent years has enabled to investigate with greater accuracy the radiological patterns in subjects exposed to silica and asbestos by HRCT, which makes it possible to recognize and to study the elementary anatomo-functional unit of the lung, the secondary lobule.

We have therefore compared HRCT and thorax X-ray in the study of interstitial and pleural lesions in the patients exposed to silica and asbestos, to verify whether HRCT is more sensitive in revealing parenchymal or pleural damage in subjects with a diagnosis certain or uncertain or negative by traditional radiology.

Two hundred and thirtythree subjects have been studied both by X-ray and by HRCT. In patients exposed to silica or asbestos with positive X-ray, the HRCT has not added further informations useful for diagnostic purposes. The new technique, however, in 5 out of 39 cases (12.8%) has enabled to show areas of enphysema not otherwise definable and has offered an useful support for the differential diagnosis in cases with silicotic conglomerates. Moreover, in the 88 subjects with asbestos pleural thickening diagnosed by X-ray, the HRCT has made it possible to attribute the images more correctly to extrapleural adipose tissue in 22 cases (25%), but also to recognize minimal thickenings and calcifications in 7 out of 24 cases (29.1%), not revealed by traditional radiology. In subjects exposed to silica or asbestos, but with X-ray negative for interstitial disease, the HRCT has enabled to pick out a number of patients with early disease (30 cases out of 179, i.e. 16.7%).

The HRCT, therefore, appears to be a method more sensitive and more specific than the traditional thorax X-ray, but its use should be limited to selected cases and should not be proposed as a routine examination, due to its cost, both biological and economic.

Up to day, moreover, the problem remains still open from the medico-legal and the insurance point of view as far as regards the diagnosis of pneumoconiosis obtained by this technique, since it does not yet exist a standardized classification analogous to the ILO classification for the traditional radiology.

SILICOSIS IN STONE CARVERS OF SEMIPRECIOUS STONES IN BELO HORIZONTE, MINAS GERAIS, BRAZIL

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[ID 1185]

INTRODUTION: Silicosis is an old Public Health problem, but still not well known in stone carvers of semiprecious stones, although it's an important economic activity in some regions of Brazil. Preliminary studies demonstrated that these activities take place in small shops, and at home, including women and children work.

OBJECTIVE: To analyze the epidemiologic and clinic characteristics of stone carvers in the medical records of the Worker's Health Center of the State of Minas Gerais (CREST-MG) in a period of 12 years.

MATERIAL AND METHODS: A retrospective study of 71 medical records from 1993 to 2005. The patients were submitted to a clinical and occupational interview, physical examination, spirometry and chest X-ray

RESULTS: 71 records were revised, 63 men and 8 women. Mean age average was 39,7 years. Diagnosis of silicosis was made in one woman and 30 men. Nine of those were considered as severe silicosis. Radiological signs compatible with tuberculosis were found in 14 patients, with associated silicosis in the majority. In 12 years there were 8 deaths, all from respiratory causes.

CONCLUSIONS: Stone carvers of semiprecious stones from Belo Horizonte develop silicosis precociously, with severe forms of the disease characterized by advanced silicotic lesions, frequent association with tuberculosis, chronic airflow limitation and an excessive mortality due to respiratory causes, indicating the need of a multidisciplinary approach, including the active search for new cases.

THE VALUE OF ENDOBRONCHIAL EXAMINATION IN DIAGNOSIS OF PNEUMOCONIOSES

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[ID 1866]

For estimating the value of endobronchial examination in early diagnosis of pneumoconioses, combination of conventional and ultrathin bronchofiberscopic examination, BAL fluid constituents and lung biopsy have been developed in 50 workers. They exposed to various industrial dusts including silica (28 cases), asbestos (13 cases), alumina (3 cases) and others (6 cases). Male: 45, female: 5. Their ages ranged from 43 to 85 years. According to the criteria of Chinese X-ray classification 2002, the radiographs were classified 0+(suspicious): 21cases, I:27 cases, II:2 cases. The control group has 6 cases without dust exposure and diffuse radiographic shadow.

Result: In BAL fluid the asbestos group shows higher both in LDH, ACP and total protein, but alumina group has the highest total protein level. In 32 bjopsy specimen, main histological changes were more dust-cells and macrophages, dust deposition, perivascular fibrosis, interstitial fibrosis, thickening and disruption of alveolar walls. Asbestos bodies were found in the workers exposed to asbestos, but didn't silicotic nodules in silica group, and there are more fiber-dust foci in workers of alumina group.

Comment: 1.There are more abnormalities of pulmonary status in workers exposed to dusts and such findings related to dust exposure. 2. Of 50 workers, 48 cases had endoscopically abnormal findings, ultrathin bronchofiberscopy gave a positive result in 90%(45cases), but conventional bronchofiberscopy gave the 3 normal ultrathin bronchofiberscopic cases, a positive result, therefore combining the conventional and ultrathin bronchofiberscopic examination is reasonable. 3. BAL fluid constituents and the determination of LDH, SOD are useful for diagnosing, assessing disease progression, the response to therapy. 4. Result of biopsy is valuable for diagnosing pneumoconiosis. Of 13 suspicious cases, 12 cases met all criteria and the diagnosis of pneumoconiosis was confirmed.

Posters

AGING AND WORK

WORK ABILITY OF PUBLIC HEALTH EMPLOYEES IN BRAZIL IN RELATION TO AGE

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[ID 154] - *No. 1 in Poster Area*

The aim of this study was to determine the associations between demographics, work, lifestyle, housework, and the work ability of workers in different age groups employed in public health in Brazil.

Employees between the ages of 20 and 69 years (N=651) and employed in 29 occupations in a public health institution responded to a questionnaire on demographics, work, lifestyle characteristics, and work ability. The associations were examined using logistic regression models aimed at determining risk factors for reduced work ability, score ≤ 36.5 on the work ability index developed by the Finnish Institute of Occupational Health.

The older age groups (≥ 45 years) had less education (≤ 4 years), worked in physically demanding jobs, and had worked longer in the institution (>20 years) than the younger workers. The older age groups were also more often smokers and overweight than the younger workers. In all the age groups, about 20% had another job. Work ability decreased significantly with age among the women. The younger group had higher scores on the work ability index than the older age groups, except for mental resources. The logistic regression analysis showed that higher age, lower education, and long work history at institution were significantly associated with reduced work ability.

The progressive aging, the low level of education, and the long duration work in the studied institution were related to a reduction in work ability, which increases the risk of work disability or early retirement and demonstrate the immediate need for measures to preserve the work ability.

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THE PROCESS OF ILL HEALTH RETIREMENT AND PREDICTORS OF RE-EMPLOYMENT: A COMPARISON STUDY OF NHS STAFF AND TEACHERS IN SCOTLAND

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[ID 557] - *No. 2 in Poster Area*

Background: All major public and private sector pension schemes have provision for ill health retirement (IHR) for those who become too ill to continue to work before their normal retirement age. IHR has a heavy cost: financially for the taxpayer, for employers who may be losing skilled staff and for employees whose lifetime earnings are curtailed by early retirement.

Objectives: To compare the process, causes and outcomes of IHR in teachers and NHS staff in Scotland.

Methods: 537 teachers and 863 NHS staff who retired due to ill health between April 1998 and March 2000 were mailed our IHR questionnaire by the Scottish Public Pensions Agency. A comparison study was undertaken between the two groups of workers.

Results: The most common cause of IHR was diseases of the musculoskeletal system for NHS staff and mental disorders for teachers. Teachers retired at a younger age than NHS staff. Most NHS staff but only 11% of teachers attended occupational health services prior to IHR. 18% of NHS staff and 9% of teachers were offered part-time work in response to their ill health. 15% of NHS staff and 5% of teachers were offered alternative work prior to retirement. 17% of NHS staff and 36% of teachers have subsequently found re-employment. Multiple logistic regression analyses showed the following variables as independent predictors of re-employment: for NHS staff age group, job group and cause of IHR; for teachers having dependants, job group and cause of IHR.

Conclusion: This is the first comprehensive study comparing teachers' and NHS staff experiences of IHR in Scotland. There is clearly a need for better occupational health support for teachers and confirms the need for improved rehabilitation and retention policies and more flexibility by employers. Predictors of re-employment may help target those who could be kept in work.

THE STUDY OF THE HEALTH-PROMOTION PRACTICE FOR AGED PEOPLE USING WATER EXERCISE

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[ID 1206] - *No. 3 in Poster Area*

We have made aged people's health-promotion practice using indoor swimming pool for 5 years. The purpose of this activity was to make sure the aged people, who had retired from their industrial work and have lived in the rural area alone or only with their partner, of the healthy life in high quality. The water exercise class was held twice or thrice a month all year round, the number of the participants of one class was about 25 to 40 and the exercise was made for 1 hour per 1 class. The mild water exercises for the aged participants with 2 to 4 attendants of the investigators of this project were conducted by the professional instructor. About two hundreds of the aged have attended our practice within five years. The youngest participant was 65 years old and the oldest one was 92 who continued to attend the class for 1 year. Almost all of them stated their impression of the first experience for water exercise class as " very joyful experience", "the therapeutic effect of backache", the decrease for the pain of the genu of internal capsule or the stiff shoulder" and "the increase of the good rhythm in daily life".

The measurements were made thrice a year about "good walker's index" and once a year about the bone density, the "QOL index" and "Self-efficacy index". The good walker's index, which is regarded as the very useful index for the protection of falling down for the aged, significantly increased one year after the beginning of the practice. The bone density was not increased significantly but not decreased significantly even for ladies within these years. The QOL index and the self efficacy index were both kept in the same level as that in the beginning.

In conclusion, the continuous activity using water exercise is very useful for the maintenance of physical and mental health on aged people. We are keeping on this practise furthermore.

WORKFORCE PARTICIPATION IN AN ELDERLY POPULATION IN TURKEY

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[ID 1449] - *No. 4 in Poster Area*

BACKGROUND AND OBJECTIVE

World elderly population is on the increase both in developed and developing countries. The aging of the population raises concerns about whether shrinking working age population could still support this increasing dependent group. Population has been ageing even faster in developing countries compared with developed ones.

As a developing country, Turkey has a decreasing workforce participation rate in all age groups. According to National Household Labour Force Statistics, the workforce participation rate in urban is 9% for men and 1% for women aged over 65 in 2003. Therefore the aim of this study is to assess the rate and determinants of workforce participation among people aged over 65 in Derya Health District, Izmir, Turkey.

METHODS

In this cross-sectional study, 794 men and women living in Derya Health District were considered as study population. Assuming a 30% of prevalence and 5% error within 95% confidence intervals (CI) the minimum sample size estimated was 229 people. The study group was selected randomly using streets as clusters. In total 194 men and women were included in this study. The response rate was 85%. A person was defined at workforce if he/she is currently employed or seeking an employment. Data on sociodemographic characteristics, economic status, and current and past employment history were collected in face to face interviews at the participants' houses. Chi-square and logistic regression analyses were used to check independent determinants of workforce participation among the elderly.

RESULTS

Mean age of the study population was 70.0±4.7 (range: 65-85). Workforce participation rate was 24.9% (18.0% currently working and 6.9% looking for a job). Most of the participants (76.8%) had worked previously and 27.8% had a period of job seeking in the past. Among the participants who work currently 54.2% were self employed. Majority of the working group stated that, they work for the economical reasons (85.7%). All the

elderly who is looking for a job at the currently, seek for a part time job.
In univariate analyses, work force participation rate was statistically higher in men (34.8%) compared to women (7.6%) (p<0.001), in secondary or higher school graduates compared to primary school and below (p=0.043) and married compared to widowed/divorced/single (p=0.001).
All the significant variables were then included in a logistic regression model. In the last step of the model, gender and marital status remained as independent predictors of workforce participation; OR for men was 6.8 (95% CI 2.7-17.4) and OR for married was 5.9 (95%CI 1.9-17.9).
CONCLUSION
Workforce participation rate is quite high in elderly population of Derya District. Gender and marital status was the most important factors for the workforce participation. Studies with a focus of work ability would provide a broader understanding of work force participation to propose comprehensive policies for active aging.

A PRACTICAL TOOL TO SUPPORT THE WELL-BEING OF STUDENTS IN INSTITUTES OF VOCATIONAL TRAINING AND HIGHER LEARNING

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[ID 1793] - *No. 5 in Poster Area*

Introduction
The project *Well-being of students in vocational training and higher education* is a joint effort of the Finnish Institute of Occupational Health, the Student Research Foundation Otus, and the Finnish Student Health Service (FSHS). The project is part of the ongoing national Youth and Work Programme targeted at young people aged 15-29. The young people who are now studying will be an important part of the workforce by 2015.

Objective
The main objective of the project is to develop a tool for evaluating factors which will ensure a healthy and safe learning environment in institutes of vocational training and higher learning.

Study design
The evaluation tool is based on the existing literature and the models already developed for assessing work ability and well-being at work. The theoretical frame of reference of the project is the Finnish pyramid model of work ability. This model has been adapted to apply to the well-being of students. The model suggests that the well-being of students consists of four dimensions: 1) students' health and coping resources (physical, psychological, emotional and social factors); 2) study skills (study orientation, motivation and cognitive skills); 3) the learning environment (organizational culture, physical environment and social relationships); 4) educational practice (adequate teaching and sufficient interaction).

Results
The tool for evaluating the students' well-being and ability and motivation to study will be tested in the autumn of 2005. On the basis of the test results, the tool designed for broader use in vocational training and higher learning will be completed in the spring of 2006. A guide to support the use of the tool will be produced in 2006.

WORK ABILITY, HEALTH AND WELL BEING OF AGING WORKERS

ASSESSMENT OF WORK ACTIVITY AND ABILITY AND QUALITY OF LIFE IN OSTEOARTHRITIS PATIENTS

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[ID 1872] - *No. 6 in Poster Area*

Objective: The ageing European population suffers from different chronic diseases, including osteoarthritis (OA). The aim of this study was to investigate the work activity/ability, quality of life and reciprocal interaction between both in OA patients.
Methods: 750 OA outpatients were evaluated by a questionnaire study. Work Ability Index (WAI) and General Health Questionnaire 28 (GHQ 28) were used as tools for work ability and quality of life assessment, respectively. Statistical analysis was performed by the mean of ANOVA tests.
Results: 166 (22,2%) were still active professionally. In average, OA patient had moderate work ability (mean WAI = 32.9 ± 6.97) and poor quality of life (mean GHQ 28 = 6.62 ± 5.68) A worse work ability and a worse quality of life were related with a blue collar work as compared to white collar work (p<0.05), multi–joint localization of OA and co-existence of other diseases, however the latter two did not reach statistical significance. A negative, statistically significant correlation was found between general scores of GHQ 28 and general scores of WAI (p<0.05)– the better work ability, the better quality of life was and vice versa. Statistically significant differences have been found between general scores of GHQ 28 and five of seven WAI components.
Conclusions: Findings indicate an urgent need for the work ability promotion among OA working patients to maintain both, better quality of life and higher level of satisfaction with their job. In this activity, job requirements, co – diseases and mental ability to work should be addressed in particular.

END STAGE RENAL DISEASE (ESRD) AND EMPLOYABILITY: AN EMERGING OCCUPATIONAL HEALTH PROBLEM

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[ID 1914] - *No. 7 in Poster Area*

The workforce participation of chronically ill patients, included those affected by ESRD, is an emerging problem due to the stable rise of population mean age and to the changes in retirement politics.
In Italy, almost 50% ESRD patients are in the working age. Unfortunaltely we don't have knowledge for adequate rehabilitation.
We evaluate previous studies to suggest new research directions: ESRD and Coronary Heart Disease (CAD), a disease chosen for its relevance, have been compared in regard to literature production over 30 yrs.
We searched 7 databases including papers published since 1976. Papers were classified according to study design, main theme and keyword. We finally describe the publishing distribution over time.
Most of the papers regarding ESRD were published recently. Only 12/63 works are dated untill 1991 (CAD papers: 45/102). Studies on dialysis (33/63) are mainly cross sectional (19/33), review (3/33), editorial or case reports (6/33). Logitudinal studies mainly regarded transplantation (11/14).
The interest in this issue for CAD is at least 10 yrs older than for ESRD. Furthermore, even if the production on CAD and ESRD is quantitatively similar, the quality of papers is substancially different. Whereas almost all the studies about CAD are longitudinal or clinical trials, this ratio is inverted considering ESRD papers. The lack of longitudinal data is a main barrier in setting causal relationships between treatment choices and outcomes and it prevents to suggest evidence based return-to-work programmes.
Future researches in this field should address this gap.

HANDICAP AND WORK

WORKPLACE ACCIDENT-RELATED FINGER-FRACTURE RESOLUTION TIME AND SEQUELAE AT THE MEXICAN INSTITUTE OF SOCIAL SECURITY AND THEIR ECONOMIC REPERCUSSIONS

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[ID 380] - *No. 8 in Poster Area*

Objective: Our aim was to identify resolution time and economic impact of workplace accident-related finger-fracture permanent discapacity.
Materials and Methods: We conducted a transversal study that included multiple finger fracture, with thumb and another finger, due to workplace accidents in 2002. We diagnosed the following variables: age; sex; temporary discapacity days; evaluable sequelae, and Mexican Institute of Social Security (IMSS) Delegation. We utilized the EDC 10 Classification and carried out frequency analysis, exceeded discapacity days and cost estimation for discapacities, and pensions and direct costs. We used $\chi 2$ test for identifying differences among cases.
Results: There were 13,410 fractures nationally, including 803 multiple finger fractures, 1,982 thumb fractures, and 10,625 of another finger (p

<0.001). Resolution time in days was as follows: for multiple finger fracture, 70.5 days, standard deviation (SD) 55.1 days; thumb fracture, 50 days without differences (p = 0.083); SD, 40 days, and fracture of another finger, 51.1 days, SD 50.4 days. (Permanent discapacity partial (IPP) rate of thumb fracture was 5.3 × 100, multiple fractures, 15.8, and fracture of another finger, 5.9. Estimated temporary discapacity cost was $12'701,197 U.S., while permanent discapacity costs in cases of settlements and annual pension payments were $903,019 U.S.
Conclusions. Time resolution of 50–70 days was higher than resolution time reported in the literature (21–35 days, $\chi 2$ test = 0.001), which generates 229,337 additional discapacity days with an extra cost of $2'680,555 U.S., a situation that merits review of medical procedures to identify the factors associated with generation of discapacity days and to establish actions for improvement.

DEVELOPMENT AND COST EFFECTIVENESS EVALUATION OF A PARTICIPATORY ERGONOMICS PROTOCOL FOR WORKERS SICKLISTED DUE TO MENTAL HEALTH DISORDERS. A RANDOMIZED CONTROLLED TRIAL.

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[ID 731] - *No. 9 in Poster Area*

Background
Mental disorders are the main cause of occupational disability in the Netherlands and other countries. For workers sick listed due to low back pain (LBP) recently a protocol 'participatory ergonomics' (PE) was developed and evaluated in the Netherlands (Anema et al., 2003, 2004). PE accelerated return-to-work with almost 30 days and was evaluated positively by workers and occupational health care professionals. However, a similar protocol for workers with mental disorders is to date not available and its (cost-)effectiveness has not yet been established.
Objectives
- To develop a protocol PE for workers with mental disorders using the Intervention Mapping (IM) method (Kok et al., 2004)
- To evaluate the cost-effectiveness and applicability of the PE-protocol for workers sick listed due to mental disorders

Methods
Inclusion
In this study, 160 workers with mental disorders, visiting their OP will be selected based on the following criteria: sick leave duration shorter than 3 months and distress complaints.
Interventions
Work(place) adaptations, will be applied by a trained occupational nurse or mental health professional. A group of stakeholders (sick listed worker, the worker's supervisor, and potential other stakeholders) in the RTW-process will be formed and guided by the occupational nurse. The protocol is directed to achieve consensus among stakeholders regarding feasible work(place) adaptations to facilitate RTW. First of all the intervention will be adjusted to workers with distress complaints, using the IM method. Using this method for the adjustment of an intervention in secondary prevention is new.
Study design
1. IM using focus group discussions with workers, supervisors and OH professionals.
2. Randomised controlled trial. Workers (2x80) will be randomised to PE or usual clinical care.

Outcome measures
Main outcome measures are: sick leave duration, psychological complaints, functional status, coping and direct and indirect costs. Measurements will take place at baseline, 12, 26 and 52 weeks after inclusion.
Results
Development of the protocol using IM will be finished in March 2006. Inclusion of workers in the study will start in March 2006. First results will be expected in 2008.
Discussion
Adjustment of the intervention to mental health problems using the IM method.

THE IMPACT OF SOCIAL REPRESENTATIONS OF ILLNESS, PAIN AND RECOVERY ON THE WORK REHABILITATION PROCESS OF WORKERS WITH MUSCULOSKELETAL DISORDERS

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[ID 975] - *No. 10 in Poster Area*

A certain proportion (8%) of workers with musculoskeletal disorders (MSDs) suffer from persistent disabilities. The results of an earlier study on the decision-making and management process used at an interdisciplinary rehabilitation centre have shown that the worker reactivation and return-to-work process is non-linear and that workers go through phases within specific trajectories. These phases are characterized by a physical, psychological and social progression that is sometimes positive and sometimes negative and that has an impact on the achievement of a healthy, safe return to work.
Objective: The main objective of this study is to describe the social representations underlying these phases, especially illness representations (causes, duration, consequences, etc.), and the perception of both pain and the recovery process. It will also document the extent to which representations change during rehabilitation.
Method: A multiple-case study will be conducted on 12 individuals admitted to a work rehabilitation program following a lengthy absence from work as the result of an MSD. The participants will be interviewed on four occasions during the program. Interview guides were developed on the basis of a review of the scientific literature in disciplines such as the sociology and anthropology of illness and health psychology. This review also made it possible to pinpoint the concepts, theoretical models and measurement tools that are relevant and adaptable to the MSD problem. The pertinence of the interview content will be validated through content analysis.
Anticipated spin-offs: This study will provide a better understanding of the factors impacting on the progression followed by individuals who are managed under a rehabilitation program. The results will make it possible to adapt or create an interdisciplinary conceptual model in order to develop diagnostic, intervention and evaluation tools that will be useful for professionals involved in worker rehabilitation and that will take social representations into account.

SHARING KNOWLEDGE GAINED FROM AN INNOVATIVE TRAINING PROGRAM IN WORK DISABILITY PREVENTION (WDP)

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[ID 1197] - *No. 11 in Poster Area*

Introduction: Despite widespread recognition that Work Disability Prevention (WDP) needs to be considered from a broader and dynamic perspective, researchers around the world struggle to apply this paradigm to the reality of the workplace and occupational health systems. The complexity of the WDP paradigm requires that researchers possess a wide array of knowledge and continuously collaborate within and outside their disciplinary boundaries in order to achieve new levels of knowledge to better address this issue. This is referred to as transdisciplinarity applied to WDP research. This presentation aims to: 1) describe the profile of researchers enrolled in a unique WDP training program (funded by the Canadian Institutes of Health Research) that emphasizes the practical application of transdisciplinarity to WDP; and 2) present new perspectives of participants and applied research experiences vis-à-vis examples of knowledge transfer and exchange resulting from this training. Results: To date 27 researchers from 5 different countries representing 11 disciplines are enrolled in the 3-year competency-based program. Evidence of national, international and multidisciplinary benefits directly related to knowledge-exchange (following attendance of this program) is presented. In addition, examples are described of projects currently being developed in which the transdisciplinary concept is integrated into WDP re-

search (e.g. one relates to work injury preventive strategies for rail workers in Australia, and another involves the methodological challenges of a transnational adaptation of a Canadian WDP model to the French workers' compensation system). Conclusion: Applying a transdisciplinary model to the complexity of the WDP paradigm requires more refined and multifaceted research strategies commensurate with a globalized reality in which workplace, legal, insurance, health care, economical and personal systems are all trans-related. This presentation provides a stepping stone towards improving knowledge-transfer and exchange since innovative perspectives on WDP, as well as applied research experience, are shared with others in the field.

TRANSNATIONAL KNOWLEDGE TRANSFER IN WORK DISABILITY PREVENTION: A CASE STUDY

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[ID 1209] - *No. 12 in Poster Area*

Introduction: the Sherbrooke model (SM) is a Canadian innovative return to work (RTW) intervention for disabled workers due to subacute and chronic low back pain (LBP). The French situation presents a high prevalence of disabling LBP and the lack of appropriate RTW intervention. Although the SM is evidence-based, effective and cost-effective, it is not known wether this complex innovation is feasible or should be adapted to fit the specific context of the French workers compensation board (WCB).

The aim of this study is to identify obstacles and facilitators to the implemention of the SM in the French healthcare system, thus allowing to elaborate an evidence-based implementation strategy.

The methods stem from a qualitative and constructivist perspective. A multiple case study is used to compare the feasibility of the SM in two regions of France having a high LBP burden.

A theoretical model has been built upon the litterature in diffusion of innovations, knowledge transfer and evidence-based practice. This model is used to collect and analyze the data. Data collection proceeds with document retrieval and semi-structured interviews. Analysis are conducted with software ATLAS.ti® V5.0 with intra-case and inter-case analysis.

Results presented here are (1) the theoretical model used to collect the data and (2) the obstacles and facilitators identified in one region. It is noteworthy that obstacles and facilitators are different and distributed unevenly among the different stakeholders involved in the RTW issue (workplace, health professionals, WCB).

Conclusion The evidence-based model presented is likely to be used in other knowledge transfer activities at a regional, national or transnational scale. The results suggest that an implementation strategy of the SM in France at a regional level should be designed carefully to adress specific obstacles and facilitators among each category of the stakeholders involved.

CARDIOVASCULAR DISEASE IN OCCUPATIONAL HEALTH

PATERNAL OCCUPATION AND RISK OF ATRIAL SEPTAL DEFECT IN OFFSPRING

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[ID 64] - *No. 13 in Poster Area*

Background: Several epidemiologic studies indicate that some paternal occupations are associated with an increased risk of birth defects in offspring. Possible associations between paternal exposures and cardiovascular malformations were evaluated in previous studies.

Materials and methods: The case control study was performed during an academic year between October 1999 and 2000.All children with the diagnosis of atrial septal defect (ASD) were included in the study. The control group was selected through sex- and age-matched controls and paternal occupations were evaluated among both groups. The effect of exposure to special substances on induction of ASD in children was studied.

Results: During one year a total of 60 children (27 boys and 33 girls) aged 6 months to 16 years (mean 6.7 years) were admitted with the diagnosis of ASD at pediatric ward. Mother's age was between 15-38 years and father's age was 18-58 years. The study showed that in the case group 43.3 %(26 of 60) had fathers with occupations having exposures to different materials (painting colors, lead, copper, rubber and welding material), however in the control group only 5 patients (8.3%) had fathers with the same condition. (OR=11.9.CI=95%:4.2-33.9).

Conclusion: The study showed that offspring of fathers who had been exposed to materials such as paint, metals and rubber during the six – months period prior to maternal pregnancy are at an increased risk of ASD.

PREVALENCE OF METABOLIC SYNDROME IN ELDER JAPANESE WORKERS; EVALUATION USING VISCERAL FAT AREA MEASURED BY COMPUTED TOMOGRAPHY AND FASTING SERUM IMMUNOREACTIVE INSULIN LEVEL

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[ID 97] - *No. 14 in Poster Area*

Metabolic syndrome (MetS) is known to increase risks for cardiovascular disease. The aims of this study were first, to describe the prevalence of MetS in large worksite samples using the measurement of visceral fat area (VFA) by computed tomography (CT). Second, to investigate the relationship between visceral fat accumulation, insulin resistance and MetS. Both VFA at the level of umbilicus and fasting serum immunoreactive insulin (fIRI) were evaluated in 4521 cases (3837 men and 684 women with a mean age of 52.3 years). Study subjects included 3318 cases with no medicinal treatment for diabetes, hypertention and hyperlipidemia. We estimated age- and gender-specific prevalence of MetS. Pearson's correlation coefficients and receiver operating characteristic (ROC) analysis were done to determine associations among CT data [VFA and subcutaneous fat area (SFA)], fIRI and four components of MetS (blood pressure, fasting levels of glucose, triglyceride, and HDL-cholesterol). The prevalence of MetS was 20.3 % in men and 6.7 % in women. In men, the prevalence increased from 13.2 % in subjects aged 30-39 years to approximately 20-25% in subjects aged 40 years or older. VFA showed a stronger correlation than SFA with all four components of MetS. Among fIRI and the components of MetS, fIRI showed the strongest correlation to VFA (r = .479). For the diagnostic accuracy of the visceral fat obesity (VFA > or = 100cm2), the area under the ROC curve was larger for fIRI (Az = .769) than for the components of MetS. For the diagnostic accuracy of MetS, Az value for fIRI was .753 and for homeostasis model insulin resistance index (HOMA-IR) was .795. In conclusion, a high incidence of MetS was observed in men aged 40 years or older at the workplace. Visceral fat obesity and insulin resistance were strongly linked with MetS.

RISK OF DEVELOPING CARDIOVASCULAR DISEASE IN A GROUP OF OIL REFINERY WORKERS IN CROATIA

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[ID 249] - *No. 15 in Poster Area*

AIM. The aim of this study was to assess the risk factors for cardiovascular disease and possible differences in two groups of workers, oil refinery employees (n=174) and office workers (n=212), comparable in gender (male), age and work duration time.

METHODS. The assessment was based on anthropometric measurement, blood biochemistry analyses and use of standardised questionnaire that was completed during periodic medical examination. This examination covered blood pressure, serum lipids, overweight, alcohol consumption and smoking habit.

RESULTS. The collected data show 42% of hypertension (blood pressure of 140/90 mm Hg or greater) in oil refinery workers and 34% in office workers (OR=1,6+0,21; 95%CI=1,06-2,41). Smoking rates were 37% and 40%, daily alcohol consumption rates were 67% and 60%, respectively. Severe obesity (Body Mass Index greater than or equal to 30 kg/m2) was found in 27% of refinery workers and in 23% of office workers, serum cholesterol of > or = 5.2 mmol/L in 33% and 27%, serum triglyceride > or = 1.91 mmol/L in 35% and 32%, respectively. Blood pressure levels as well as anthropometrics and biochemical patterns don't differ significantly between two groups. In multiple logistic analyses the variables significantly related to high blood pressure were lipid levels, smoking and body mass indices.

CONCLUSION. The screening for health risks would be potentially useful for the early identification of metabolic-related disorders. The findings of high blood pressure do not seem to be related to exposure to any oc-

cupational hazard in oil refinery workers due to mostly automated tasks and scrupulous management of the working environment. As modifiable life-style traits relate to the incidence of hypertension, public health education and health promotion counselling provided by occupational health services are urgently needed. Considering the results, previous occupational exposure and psychosocial work and home environment have to be taken into account.

WELDING AND ISCHEMIC HEART DISEASE - EXPERIENCES FROM SOME SCANDINAVIAN STUDIES

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[ID 270] - *No. 16 in Poster Area*

Metal welding is associated with inhalation of gases and respirable particles. In previous cohort mortality studies of welders the reference incidence mortality was based on national rates. Most of these cohort studies observed a decreased risk regarding ischemic heart disease (IHD). When the mortality of welders is compared with death rate of the total population, it might lead to an underestimation of the true risk as the general population includes sick and disabled people unable to work. This selection bias is well known as the healthy worker effect. However, two previous studies observed an increased mortality among welders due to IHD despite this biased comparison.
This is a review of three Scandinavian studies of welders which were not biased by comparison with national rates.
The Copenhagen Male Study, comprising 3321 men, revealed an increased risk of myocardial infarction among workers exposed to both welding and soldering fumes (1).
In a Norwegian study of stainless steel welders and other metal workers an increased risk for myocardial infarction was observed (OR 2.4, 95% CI 1.1-4.9) (2).
Male welders and gas cutters were identified in the Swedish National Census of 1990 and followed until the end of 1995. The IHD mortality among the welders was compared with gainfully employed men. An increased mortality due to IHD was observed (SMR 1.35, 95% CI 1.1-1.6) (3).
Thus there are indications of an association between welding fume exposure and IHD. Further studies are needed to elucidate pathophysiological mechanisms and to describe dose-response relations for different welding fumes.
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RISK ASSESSMENT OF CARDIOVASCULAR DISEASES IN DIFFERENT OCCUPATIONAL CATEGORIES BY INCIDENCE AND AGE OF DIAGNOSIS

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[ID 271] - *No. 17 in Poster Area*

Aim of this study is to investigate the health status changes in workers employed at different activities by the analysis of disease incidence and age of diagnosis of chronic degenerative cardiovascular pathologies (hypertension and myocardial infarction).
1851 men (age 37.4+5.9 years) employed at various work activities (white collars, metalmechanical blue collars, chemical blue collars, civil servants and truck drivers) were analysed in five and in ten year follow up. The incidence of hypertension and myocardial infarction and the age of diagnosis of the considered diseases in the different jobs were calculated.
The incidence of hypertension in five year follow up was +4.9% in white collars, +3.7% in metalmechanical blue collars, +2.5% in chemical blue collars, +4.1% in civil servants and +5.6% in truck drivers. In ten year follow up the incidence was +11.6% for white collars, +9.7% for metalmechanical blue collars, +5% for chemical blue collars, +6.5% for civil servants and +10.1% for truck drivers. The incidence of myocardial infarction was significantly higher only in the group of drivers in ten-year follow up (+4.1%).
The age of diagnosis of hypertension was significantly lower in drivers (46.9 yrs) than in white collars (51.3 yrs) ($P<0.0001$) and chemical blue collars (50.9 yrs) ($P<0.01$). Also hypertensive blue collars (49.1yrs) and civil servants (48.1 yrs) were younger compared to white collars ($P<0.05$). The age of diagnosis of myocardial infarction was significantly lower in chemical blue collars than white collars ($P<0.05$). Similar differences were found when the data were corrected for smoking habits and BMI.
These results indicate that the incidence and the age of diagnosis of cardiovascular chronic degenerative diseases, in particular hypertension, could be associated both to job characteristics and lifestyle habits. These associations have to be considerate in the health surveillance and in any program focused on workers health promotion.

EXAMINATION OF THE OCCUPATIONAL AND PERSONAL CHARACTERISTICS AS RISK FACTORS OF HYPERTENSION: 7 YEARS OF FOLLOW-UP

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[ID 413] - *No. 18 in Poster Area*

The purpose of this study was to evaluate the work-related risk and personal risk for development of hypertension. According to JSH2004 (Japanese Society of Hypertension Guidelines for the Management of Hypertension 2004) criteria, at base line, we classified 923 healthy untreated men into 4 groups, as follows:1) Optimal Blood Pressure(n=273) 2) Normal Blood Pressure(n=230) 3)Pre-Hypertension(n=222) 4) mild Hypertension(n=198). As personal factors we examined the base line blood pressure level, blood pressure responses to exercise, complications, entry age, body weight, family history of hypertension, alcohol consumption, smoking, sleeping hours and exercise habits. As occupational factors we examined walking exercise in commuting, irregular working hours, frequency of business trips, working posture and overtime work. They received the health examinations (including physical fitness tests) between 1997 and 1998. At the time of the follow-up examinations in 2004, 132 workers were diagnosed as having hypertension by the physicians and they started the treatment with anti-hypertensive medication. According to the results of multiple logistic regression analysis, the following factors were detected as significantly associated with the occurrence of hypertension; base line blood pressure level, an exaggerated response to exercise, age, family history of hypertension and smoking habits. Compared with Optimal Blood Pressure group, odds ratios of Normal Blood Pressure group, Pre-Hypertension group, and Mild Hypertension group were 5.6 (95% confidence interval, 1.19 to 26.30), 15.81(3.67-68.04), and 74.48(17.54-316.257) respectively. Odds ratios of an exaggerated response to exercise, age, family history of hypertension, smoking was 2.40(1.38-4.16), 1.04(1.002-1.080), 2.01(1.27-3.18), 1.73(1.05-2.69) respectively. These results suggest that working factors are not associated with increased risk of future hypertension, and only personal factors may be an important factor in determining hypertension risk.

NONINVASIVE BRONCHIAL-ANKLE PULSE WAVE AND BLOOD PRESSURE MEASUREMENT FOR HEALTH EXAMINATION OF WORKER

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[ID 495] - *No. 19 in Poster Area*

The present study was conducted to evaluate the influences, life-style habits and a blood test on the results of noninvasive bronchial-ankle pulse wave and blood pressure measurement. The indices were pulse wave velocity (PWV) and arterial stenosis index (ASI). Subjects were 85 healthy subjects (35 males and 50 females, mean 37.1 years old). Aging influences PWV and ASI. Mean PWV of males 40~49 years was bigger than females with significant differences ($P < 0.05$). Increased PWV was positively associated with higher mean blood pressure, fasting glucose, triglycerides, r-GTP, body mass index, body weight, age and life-style; smoking, alcohol drinking, sleeping etc. The noninvasive bronchial-ankle pulse wave and blood pressure measurement is important for health examination of elderly worker, especially with relationship of life-style habits.

HEALTH EFFECTS OF OCCUPATIONAL EXPOSURE TO ELECTROMAGNETIC FIELDS AT LEVELS BELOW POLISH OEL VALUES

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[ID 737] - *No. 20 in Poster Area*

The aim of the study was to evaluate whether the hygienic limits protect against adverse health effects of exposure and to find out to what extent the EMF frequency and exposure level have influence on the type of abnormality recorded.

The study groups consisted of technical personnel, aged 21-69, period of work 1- 42 years. The examinations covered all workers employed at selected power substations (50 Hz)-group I, radio services (150 - 170 MHz) – group II, radio and TV multichannel broadcasting stations (VHF 30-300 MHz and UHF 0.3-3 GHz) – group III, AM Broadcast Stations (738 -1503 kHz)-group IV and Radio Link Stations as a control group (no EMF exposure).

For each worker was assessed: maximum electric field strength (E_{max}) and magnetic flux density (B_{max}) and doses per work shift – E_{dose} and B_{dose}.

The workers had general medical examination, an interview oriented to cardiovascular risk factors, 24-h ECG and ambulatory blood pressure (ABP) monitoring performed. In all cases, the exposure levels were considerably lower than hygienic standards for EMF in Poland. Risk assessment revealed that the probability of abnormalities in resting and/or 24-h ECG was significantly higher for group IV vs. controls (OR= 6.6). In group I, II and III the effects comprised mainly BP changes. In group I ABP monitoring revealed a significantly higher risk of increased BP values, mainly systolic BP at night-time (OR=12.5). Also in group III, BP disturbances were significantly more frequent than in controls (OR=8.6). Cardiovascular abnormalities were found to depend on EMF maximum value as well as its dose.

Our data indicate that the methods routinely used in prophylactic examinations of EMF exposed workers, i.e. office BP measurements and resting ECG, are insufficient to detect cardiovascular disturbances and should be accompanied by long-term monitoring.

OCCUPATIONAL EXPOSURE TO FINE PARTICULATE DUST AND CARDIOVASCULAR HEALTH EFFECTS - NEUROVEGETATIVE DISTURBANCES

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[ID 742] - *No. 21 in Poster Area*

Background:In view of the large number of workers exposed to fine particle dust (FPD), <10mm and <2.5mm in diameter, the research into the pathomechanics of cardiac abnormalities associated with that exposure is an essential task. One of the possible mechanism is neurovegetative disturbances.

Aim: The aim of the present study was to evaluate neurovegetative control using heart rate variability (HRV) method in FPD exposed workers. It is a sensitive method that enables assessment of activity of the particular parts of the autonomic nervous system. The subjects were 20 male workers, engaged in ceramic production, mean age 32.1±4.0 years, period of employment under exposure conditions 5.2±2.0 years, and 20 workers not occupationally exposed to dust (mean age 39.4±7.8 years) as the control group.

Methods:24-h ECG monitoring with HRV analysis (Suprima 12, Oxford) was performed on the workers' return to work after two days of resting. Dust exposure was measured with filtration-gravimetric method using individual dosimeters (SKC).

Results: In the exposed group, the geometric mean total dust concentration was 44±1.5 mg/m3 and the FPD concentration 11.5±1.6 mg/m3. For the controls, the respective values were <1.9 and <0.30. Adjustment for confounders (age, smoking habits, alcohol consumption etc.)was made using statistical methods. The findings revealed significantly lower (p=0.000) 24-h SDNN and 24-h SDANN values in the exposed than control workers (163.2±49.2 ms vs. 71.7 ±42.1 ms and 161.1±51.6 ms vs. 49.2±45.5 ms, respectively for SDNN and SDANN). No significant between-group differences could be found with respect to VLF and LF power spectrum, while HF was significantly higher (p=0.04) in the exposed group during the 24 hours of monitoring (355.2±191.2 vs. 233.7±155.7) and at night-time (710.9±398.6 vs. 417.0±256.6, p=0.005). The increased activity of the parasympathetic system was reported in cardiac patients exposed to dust. However, the consequences of such exposure for healthy workers remain unknown.

Conclusions: Occupational exposure to fine particles influence the neurovegetative regulation, what may cause the disturbances in cardiovascular system in future. These workers should be observed in follow up study.

WORK-RELATED CARDIOVASCULAR DISEASE IN AUSTRALIA

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[ID 823] - *No. 22 in Poster Area*

Background

To assess the magnitude and severity, causes, affected occupational groups and possible prevention approaches for work-related cardiovascular disease (WCVD) in Australia.

Methods

The information came from published, peer-reviewed literature and other relevant information from on-line sources. Numeric information on the extent of work-related cardiovascular disease in Australia was obtained from several sources, including national workers' compensation accepted claims and presentations to general practitioners.

Findings

There is no quantitative information in Australia covering the main known or suspected cardiovascular risk factors. The only quantitative estimate of WCVD in Australia came form a 1995 study, which used a population attributable risk in Australia of 1% to estimate that there approximately 800 deaths due to CVD arising from occupational exposure to hazardous substances. This estimate excluded non-chemical exposures such as environmental tobacco smoke, job control and noise, and is almost certainly a major underestimate of the number of WCVD deaths in Australia, based on the most recent attributable risk estimates used elsewhere. Some limited information on WCVD is available from other data sources, but the results are almost certainly gross underestimates.

The largest gains in terms of WCVD prevention activities in Australia are likely to be made by targeting six areas:

- implementation and enforcement of non-smoking policies;
- prevention of exposure to carbon monoxide;
- prevention of exposure to excessive noise;
- prevention of exposure to psychosocial risk factors in the workplace;
- optimising shift design;
- health promotion programs.

Conclusions

Work-related CVD is likely to be an important cause of work-related morbidity and mortality in Australia. However, the extent of the problem is difficult to identify accurately. Effective prevention activities exist for some exposures, but for others there is insufficient information on prevention activities and their effectiveness.

THE INFLUENCE OF NIGHT SHIFT IN THE PREVALENCE OF PREMATURE BEATS WITH 24-HOUR HOLTER ELECTROCARDIOGRAPHY IN SHIFT WORKERS IN A MANUFACTURING COMPANY

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[ID 918] - *No. 23 in Poster Area*

Introduction:

There are many studies on cardiovascular diseases in shift workers. In their review, it was concluded that shift workers had about 40% higher risk on cardiovascular diseases compared with day workers.

As a risk factor, changes of the circadian rhythm and related behaviors, and sociotemporal activities as time available for both family and recreation are proposed. However, it seems unlikely that these risk factors can fully explain the higher risk of cardiovascular diseases in shift workers. The increase in the prevalence of ventricular premature beats (VPB) leads to the increase of myocardial arrhythmogeneity. The objective is to assess the influence of night shift in the number and types of ventricular and supraventricular premature beats (VPB and SVPB, respectively) in shift workers.

Methods:

There were approximately 700 shift workers in the manufacturing company where we enrolled our subjects. Shift workers engaged in a two 12-hour shift system (day shift (10:00 to 22:00), night shift (22:00 to 10:00)). We randomly selected 30 subjects among healthy, non-smoking shift work-

ers with normal body mass index (BMI)(group 1). and 30 subjects among healthy shift workers who were smokers and /or overweight (BMI more than 25)(group 2). Among the selected 60 workers, with an age range 32-58 years, two had a history of arrhythmia. All shift workers had engaged in this shift system more than 14 years. We recorded a 24-Holter ECG using a cardiomemory RAC-102 (Nihon Kohden Co., Ltd., Japan). Monitors were carried out either the first or second day of day-shift and the second or third day of night-shift. Data were analyzed with an electrocardiograph analyzing system DSC-3100 (Nihon Kohden Co., Ltd., Japan).In the analysis, four(two each in both group) were excluded because two had a history of arrhythmia and two Holter recordings could not be used because of technical problems. In total 56 pairs were used in the analysis. Comparisons were made between the number and types of premature beats and between day and night shifts encountered for all 56 shift workers.
Results:
The total isolated VPBs ranged from 0 to 364 (mean=30.9) per person per 24 hours at day shift and from 0 to 492 (mean=29.1) at night shift in group 1. In group 2, the total isolated VPBs ranged from 0 to 1184 (mean=76.3) per person per 24 hours at day shift and from 0 to 907 (mean=58.3) at night shift. In group 2, one shift worker had more than 720 VPBs per 24 hours (Lown grade 2). The number of isolated VPBs at day shift was more than that at night shift in 12 shift workers in group 1 and 13 shift workers in group 2, respectively. The number of VPBs did not changed in 8 and 5 shift workers in group 1 and 2, respectively.
The total isolated SVPBs ranged from 0 to 6302 (mean=255.1) per person per 24 hours at day shift and from 0 to 5673 (mean=221.3) at night shift in group 1. In group 2, the total isolated SVPBs ranged from 0 to 1102 (mean=56.6) at day shift and from 0 to 33 (mean=5.6) at night shift. The number of isolated SVPBs at day shift was more than that at night shift in 14 shift workers in group 1 and 12 shift workers in group 2, respectively. The number of SVPBs did not changed in 2 and 5 shift workers in group 1 and 2, respectively.
Conclusion:
There was no study about the comparison for the frequency of VPBs and SVPBs between day and night shift. In this study, the number of isolated VPBs and SVPBs at day shifts was more than that at night shifts. Repeated night shifts may be relevant to the increase of number of isolated VPBs and SVPBs at day shift because night shift had more physical and psychological load to shift workers and disturb circadian rhythm, and finally disturb cardiac autonomic control. Working time at day shift is more sympathetic nerve dominant compared to that at night, so repeated night shift may change the arrhythmogenity and lead to increase the number of VPBs and SVPBs at day shift.. Further study is needed to confirm the results.

RETURN TO WORK AFTER ISCHEMIC HEART DISEASE: A PILOT STUDY IN THE FRENCH ELECTRICITY AND GAS INDUSTRY

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[ID 1037] - *No. 24 in Poster Area*

Most studies on return to work after ischemic heart disease [IHD] in France originate from cardiovascular readaptation centers and study small numbers. The existence of an IHD registry within a large nationwide power company (EDF-GDF) allowed performing a large size study of all aspects of return to work.
We considered 623 male employees (aged 31 to 62 years) included in the registry, who presented a non-fatal initial clinical form of IHD between 1993 and 1997. Medical variables such as diagnosis (angina pectoris [AP] or myocardial infarction [MI]), diagnostic and prognostic tests, and treatments were recorded in the registry. Because sick-leaves must be verified by the consulting physicians of the company health insurance department, they were exhaustively and permanently recorded, with their medical cause, in an epidemiological database. We studied sickness absence duration due to the initial episode of IHD by means of linear regression on its logarithm. We also studied patterns of return to work management from data of 370 of these employees, collected through questionnaires filled by occupational physicians.
Mean sickness absence duration was 80.5 days (SD=70.6), 51.3 days (SD=55.62) for AP, and 106.7 days (SD=72.4) for MI. It independently increases in case of MI (p<0.0001), coronary bypass (p<0.0001), but also according to a descending social status gradient as assessed by educational level (p<0.001) and work grade (p<0.01). There was no effect of age.
The rate of return to work was 94%. Forty-two percents of employees who resumed work returned to their previous job, 53% to a modified job; 5% had a new job after a "transfer for health reason" procedure. A pre-return visit to occupational physician was observed for 22% of the employees, those who had a severe form of IHD or a physically difficult job. This measure favored implementation of job accommodations.
The major determinant of sick-leave duration after an ischemic event is its severity. Nonetheless, educational and occupational levels (SES) also have a considerable influence. This study is the first one in France to study work-related issues of IHD from data collected in the enterprise.

MYOCARDIAL INFARCTION AND EXPOSURE TO PARTICLES AMONG SUBWAY DRIVERS IN STOCKHOLM

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[ID 1152] - *No. 25 in Poster Area*

Objectives: To investigate the incidence of first myocardial infarction (MI) among subway drivers. High levels of airborne particles have been detected in the subway system. Previous epidemiological studies indicate a potential association between exposure to particles in urban air and MI.
Methods: A population-based case-control study was performed among men aged 40-69 in Stockholm County 1976-1996. We identified all first events of acute MI using regional registers of hospital discharges and national registers of deaths. Controls were selected randomly from the general population. National censuses were used for information on occupational titles. In all 21523 cases and 128161 controls were included in the study. Among these 50 cases and 200 controls had worked as a subway driver. We calculated the relative risk of first MI among subway drivers, compared to other manual workers and to all employed respectively. Quantitative gravimetric measurement (personal sampling with portable pumps) of exposure to subway particles (PM2.5) was performed for 14 subway drivers in 2004-2005.
Results: The relative risk of MI among subway drivers compared to other manual workers was 1.00 (95% CI 0.73-1.37) and compared to all gainfully employed 1.13 (95% CI 0.82-1.55). The average particle exposure (PM2.5) for subway drivers during a work shift was 19 µg/m3 (SD=5.4). A previous sampling in another subway route in 1997 showed higher levels. The exposure levels were 5-10 times lower than on an underground platform.
Conclusions: Subway drivers do not appear to have an increased incidence of MI compared to other manual workers. Our findings do not support an effect of subway particles on the risk of MI from the exposure levels in the subway drivers´ work environment. The method for case identification was validated and found to give a very low loss of actual cases. The register-based occupational classification may introduce some non-differential misclassification.

OCCUPATIONAL EXPOSURE TO FINE PARTICULATE DUST AND CARDIOVASCULAR HEALTH EFFECTS.STUDY DESIGN AND EXPOSURE ASSESSMENT.

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[ID 1228] - *No. 26 in Poster Area*

Background. The results of recent studies indicate that the environmental and occupational hazards can also modify the risk of cardiovascular diseases. The role has been discussed of exposure to fine particulate dust on the development of cardiovascular abnormalities, mostly ischaemic heart disease.
Aims and objectives. The study focused on the evaluation of oxidative stress and inflammation markers as well as biochemical risk factors of cardiovascular diseases, heart rhythm disturbances, blood pressure changes and impaired neurovegetative balance of the cardiovascular function, in workers exposed to fine particulate dust according to work shift and working week.

This presentation covers a description of the study population and the methods used as well as measurement results for exposure to fine particulate dust, by measurement strategy, dust concentration, particles size distribution and mineral components of dust.
Methods. The study was performed on workers at a ceramic ware factory. The subjects were 56 male workers employed at different technological departments where high levels of dust concentration were recorded. The controls were non-exposed workers at the same factory. Personal sampling was used as dust exposure monitoring.
Results. In the exposed group, the total dust concentration ranged from 10 to 130.3 mg/m3. Dust particulates of less than 10 micron in diameter made up 60-80% of the total dust. Quartz content amounted from 4% to 23%. Other mineral components included mostly kaolinite, gypsum, calcite and microcline.
In conclusion exposure assessment confirmed high proportion of fine particulate fraction in the dust at the workplaces and made it possible to distinguish three exposure levels (non, low and high-exposed) that were subject to further analysis of biochemical and circulation parameters. The results connected with cardiovascular health effects are presented in separate papers (Abstract Ident. Code 742 [HGVOBJL] and 1015[HAMQEMZ]).

CARDIOVASCULAR STRAINS DURING UPPER LIMB ENDURANCE TESTS

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[ID 1462] - *No. 27 in Poster Area*

While functional tests of the upper limb have to be applied to a general worker population, their cardiovascular strain has to be checked to avoid hazards of these tests. Cardiovascular strains of 7 endurance tests of the upper limb were recorded on 30 subjects. They exerted between 20 and 30 % MVC to exhaustion for pinch (1), grip (2), arm flexion (3) and extension (4) and shoulder abduction (5), flexion (6) and extension (7). Increase in HR and systolic BP between the beginning and the end of the tests are respectively for women and men 26.5 (se = 0.9) and 29.2 (sd = 0.7) bpm and 24 (sd = 1.2) and 21 (sd = 1.0) mm Hg. These mean values represent moderate heart and low blood pressure strains. However, in our study, 5 % of the tests were achieved with HR increase of more than 50 bpm and 15 % with systolic BP beyond 160 mm Hg. While mean cardiovascular strains were low during these experiments on an active young population, this conclusion must be used carefully in a general working population. Indeed, extreme strains could occur even for tests like pinch and grip endurance.

CARDIOVASCULAR DISEASES AND SHIFTWORK

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[ID 1633] - *No. 28 in Poster Area*

Introduction. An increase in cardiovascular morbidity and mortality has been repeatedly reported among shiftworkers and nigh shiftworkers, who showed higher values of heart rate and blood pressure compared to coworkers employed on fixed daily shifts. To asses the prevalence of cardiovascular abnormalities in relation to shift work, we studied the QTc interval and several cardiovascular risk factors in day workers, current shift workers and ex-shift workers. Methods. During the periodic work place health survey conducted in 2003, we measured the frequency adjusted QT interval (QTc = QT/ÖRR) in 61 chemical workers including 40 shift workers, 11 day workers, 10 ex shift workers, who were free from such abnormalities at the time of hiring. Results. Mean age was similar between the three groups (shift workers 51 years ds 5.2; day workers 52 years ds 4.2; ex shift workers 50 ds 2.8). We did not observe significant QTc variations among the three groups. However, it was prolonged among shift workers (380 msec ds 23.0), and among day workers (382 ds 15.1) compared to ex shift workers (373.1 ds 17.0). Conclusion. The occurrence of cardiovascular disease is a reason for workers to quit shiftwork. Therefore, shift workers in our study might have been selected among subjets with a healtier life style, thus better coping with biorhythm disruption induced by shiftwork.

DIASTOLIC PRESSURE AND ACP1

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[ID 1650] - *No. 29 in Poster Area*

Several candidate genes have been identified by recent linkage studies suggesting an important role of kinase and phosphatase allelic variants in the variability of arterial pressure.
Genetic variability of kinases and phosphatases involved in signal pathways could activate or inactivate the cell to answer actively to factors responsible for pressure increase.
Acid phosphatase (ACP1) is an enzyme highly polymorphic controlled by a locus on chromosome 2p25. It has three codominant alleles and 6 genotypes/phenotypes and acts as phosphotyrosin phosphatase (PTPase) and as flavin mononucleotide phosphatase (FMN).
ACP1 has two isoforms named F and S that have different physical and chemical properties and probably different functions.
137 healthy workers from University of Rome Tor Vergata, 56 males (mean age 42±1.5 years) and 81 females (mean age 36 ± 1.0 years) have been studied. The percentage of smokers was 31% .
On these subjects,systolic and diastolic pressures were measured and ACP1 was genotyped by DNA analysis.No significant effect of ACP1 on systolic pressure has been observed.
Table 1 shows the correlation between diastolic pressure and ACP1 F and S isoforms in males and females separately.

Table 1

	F isoform			S isoform		
	r	r^2	p	r	r^2	p
Males	0.425	0.18	<0.01	-0.070	0.01	N.S.
Females	-0.029	0.00	N.S.	0.143	0.02	N.S.

Table 2 shows in males the correlation between F isoform, diastolic pressure and age.

Correlations	r	r^2
Diastolic pressure vs F isoform	0.425	0.18
Diastolic pressure vs age	0.359	0.13
F isoform vs age	-0.030	0.00
Diastolic pressure vs F isoform conntrolling for age	0.447	0.20

Table 3 shows in males the correlation between diastolic pressure and F isoform in relation to smoke

Smokers	0.572	0.33	0.02
Not smokers	0.356	0.13	0.03

The results indicate in males a highly significant correlation between F isoform and diastolic pressure. Age doesn't affect while smoke affects this correlation.

INFLUENCE OF METABOLIC STATUS, PERSONALITY TRAITS AND JOB-STRAIN ON THE HYPERTENSION RISK

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[ID 1804] - *No. 30 in Poster Area*

Aim: While overweight/truncal obesity or regular high alcohol abuse are well-established determinants of hypertension, we still have not looked at a connection to psychosocial factors. Because of that, one should look - next to known risk factors – into the effects of various kinds of job-strain and strategies of dealing with it on blood pressure (BP) and hypertension risk.
Methods: 209 subjects (126 normotensives, 83 untreated hypertensives) were examined for the influence of overweight/truncal obesity, higher lipometabolism status (elevated Cholesterol, Triglyceride, atherogenic-index: Cholesterol/HDL-Cholesterol [quotient > 3]), nicotine and alcohol consumption, "stress-modulating" personality traits (inability of recuperation, calculation, impatience, dominance) and high job strain (using the Job-Strain-Model by Karasek and Theorell 1990) towards BP behaviour and for these risk factors the hypertension risk (Odds-ratio: OR) was established.

The assessment of the BP was done by a 24h measurement for the time phases of work, leisure time and sleep. For every influence factor, a medical history was made and the biochemical parameter contained.
Results: Under high-strain work pressure the diastolic BP rose significantly for all time phases; the hypertension risk rose to 6,1 in comparison to the measured active job strain and rose because of further risk factors. The connection between BP and higher lipid levels (cholesterol, triglyceride, atherogenic-index) was proved; this went along with significant systolic and diastolic BP rise and higher hypertension risk (OR: 3,8). For the other influence factors, the hypertension risk was significantly less. However, as for mental job strain we saw a higher accumulation of a personality trait, characterized by "inability of recuperation, impatience and dominance". The correlation analysis proved significant positive, but small correlations between BP and the fat metabolism parameters as well as job strain (R=0.14-0.30) There were no interactions between metabolic parameters and job strain (R=0.02-0.09).
Consequences: The higher hypertension risk under high psychological mental stress (job-strain) and higher serum lipid levels indicates the necessity for early detection of these risk groups. Such an early-diagnosis should be made with an occupational, preventive medical examination. This includes a test of job associated BP with a 24h BP measurement and controls of the lipid metabolism.

THE RELATIONSHIP BETWEEN JOB STRESS AND CARDIOVASCULAR DISEASE RISK FACTOR IN MALE FREIGHT TRAIN DISPATCHERS

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[ID 152] - *No. 31 in Poster Area*
Objective: To explore the association between the job stress and cardiovascular disease risk factors.
Methods: The subject was 93 male freight train dispatchers, the job stressors, personality, and job strains were measured by using questionnaires, the blood pressure and heart rate were measured, the concentration of the cholesterol, triglyceride, and glycosylated hemoglobin in blood serum were analyzed.
Results: Social support score were significantly positively related to systolic pressure (r=0.22) and diastolic pressure (r=0.30) (P<0.05), job satisfaction negatively to them (r=-0.37 and -0.47 respectively, P<0.05, and self-esteem negatively to systolic pressure (r=-0.21, P<0.05), satisfaction negatively to the concentration of triglyceride (r=-0.28, P<0.01). The difference of diastolic pressure (P<0.05) within groups of social support score, body mass index(BMI) (P<0.01) within groups of job difficult were remarkable significant, difference of systolic pressure and diastolic pressure and cholesterol level in serum within groups of vulnerability to stress did (P<0.05), also did difference of systolic pressure and glycosylated hemoglobin level in serum within groups of competition score (P<0.05). In stepwise regression analysis, job time demands and negative coping were the predictors of cholesterol (R2>0.05), the decision latitude, social support, job difficult,, personality (self-esteem and anxiety trait) and negative coping were the predictors of smoking (R2>0.05). Heart rate was related to home income and competition factor of Type A Behavior (R2=0.06).
Conclusion: The psychosocial aspects of work may be related to some cardiovascular risk factors.

EDUCATION AND TRAINING IN OCCUPATIONAL HEALTH

SAFETY, HEALTH AND WORKING CONDITIONS - A NEW APPROACH IN LEARNING

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[ID 170] - *No. 32 in Poster Area*
SAFETY, HEALTH AND WORKING CONDITIONS
- a new learning model for training in cooperation between employers and employees
The parties of the Swedish labour market emphasize the importance of basic training in cooperation between employers and employees.
For the development of the training in cooperation between employers and employees we have defined new requirements as:
- Capability to learn new things
- Capability to communicate and to cooperate
- Capability to understand totality and interdependencies
- Capability to ask questions and be pro-active.

Our approach was inspired by PBL, Problem-Based Learning, with its focus on the tutorial group, on authentic or constructed realistic cases as starting points and on the own learning responsibility. Lectures given by the teacher are combined with cases describing a realistic situation. The participants work with the cases in a group according to a specific method. By solving a problem in cooperation, the possibilities of exchanging experiences within the group is enhanced and offer the participants an opportunity of deeper learning.
After the course the participant will:
- Be able to cooperate in questions regarding safety, health and working conditions.
- Know how to assess possible risks and to prevent dangerous situations.
- Understand how good working conditions correlates with good business results.
- Know how and where to find more information regarding safety, health and working conditions.

We are in the face of implementation, and have conducted a series of test courses and training courses for teachers. So far the results of test courses show that the participants are more active, engaged and reaches a higher level in understanding with this new learning model.
A training material consisting of four books are published in January 2006.
Safety, Health and Working Conditions is produced by Prevent Sweden - Management and Labour Improving the Working Environment.
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INTRODUCING HOSPITAL WIDE HAZARDS TO FIRST YEAR MEDICAL STUDENTS

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[ID 274] - *No. 33 in Poster Area*
Aims
To introduce the importance of biological, physical, ergonomic, chemical, psychological occupational hazards of hospitals to the first year medical faculty students with a lecture named "risks of health care workers".
Method
Learning Objectives
1- To define the occupational hazards in hospitals
2 -To define preventive measures and the universal precautions
Contents and used techniques
This topic is discussed in a two-hour theoretical lecture. Following the lecture small groups of students have participated in visits to different hospital units by the guidance of research assistants from Public Health Department. Each student had the chance to visit one of the following units. Biochemistry, parasitolology, and microbiology laboratories, radiology department, chemotherapy, sterilisation and internal intensive care units, and an operation room. Students were expected to make direct observations of working environment and to interview the staff of respective unit about the occupational hazards. Staff from each unit has described the hazards and the students had used a structured form for risk assessment. Their assignment was to fill in that form and add their observations and recommendations.
Evaluation
The answer sheets were prepared through a consensus of a staff from each unit and experts of the Public Health Department. The forms filled by the students have been evaluated according to these answer sheets differentiated for each department.
Results
Students' mean score was 91.38 ± 10.61 (min 38, maks 100). The quartiles were respectively 88, 94 and 100. The students reported most frequent occupational hazards of each unit visited. For sterilization unit the most

frequently reported hazards were hydrogen peroxide leakage, high noise and high temperature, for biochemistry laboratory they were working with carcinogens, biological hazards, high noise and ergonomic problems.
Conclusion
Medical students work in hospital during their education period. They face the same risks with healthcare workers. Their awareness about hospital hazards and developing attitudes for prevention is important. Students' observations of hospital wide hazards, help them to improve their knowledge and experience about their future working environment.
Keywords: Medical students, medical education, hospital hazard

FINDING THE AVAILABLE EVIDENCE FOR EFFECTIVELY ANSWER SEARCHABLE QUESTIONS: A REQUIRED SKILL FOR THE OCCUPATIONAL PHYSICIAN
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[ID 322] - *No. 34 in Poster Area*
Objective. The new trends of practice involve the need to acquire new competencies in order to better satisfy the health needs of workers. New skills are required to employ evidence-based practice, to apply quality improvement, and to make use of informatics. Aim of the paper is to examine the availability of information across the web to be used in the decision making process.
Methods and results. Searching across journals for evidence to be used in everyday practice is difficult due to the large number of journals to be consulted by occupational physicians. The use of Medline is highly recommended, but searching strategies specific to occupational health are needed. The consultation of high-quality evidence-based databases is possible, although the available data of interest for occupational health professionals should be increased. However, the web offers a number of databases established at widely known international institutions, which can help findings appropriate solutions for workers' health problems.
Conclusion. In spite of some barriers, such as time constraint, which could prevent looking for searchable information, the evidence-based decision-making process should be based on the evidence provided by major resources to answer the question emerging during the practice. Acquiring the skill for information managing facilitates the adoption of behaviours which will improve the practice.

TEACHER´S/WORKER HEALTH
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[ID 562] - *No. 35 in Poster Area*
The study examines some aspects of labor process meaning, taking into consideration the current globalized world. It aims at shortly focusing some of its characters throughout history until our days. The teacher is introduced as a "laborer for education", who has a deal with specific confliting areas within his or her professional activity. Connections between life and work conditions are outlined, presenting possible consequences for the professional´s health and highlighting the quality of life and promotion´s problem. Also, labor-related pathologis are enumered and characterized. Methodology is qualitative-oriented, taking advantage of an ethnomethodological approach: it considers the research as a present observer, connected to the teachers and educational aspects of an official state middle school, located at Rio Claro, district of São Paulo, Brazil. The facts that happened in the mentioned researched space are testified by the observer and herein narrated. Particularly interesting is the testimony of an overwhelming strike, occurred in the period.
The conclusion is that teacher-laborer´s routine has very particular characteristics, and develops in a unsettling, challenging way. In fact, teachers have to cope with confliting elements like indiscipline, violence, social and familiar pressures wich lead to decrease in there quality of life and affect also their health. New studies of the same thematic field are encouraged.

ANTONIO GRAMSCI AND OCCUPATIONAL HEALTH
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[ID 578] - *No. 36 in Poster Area*
The theory of Antonio Gramsci, Italian Communist Leader (1891 to 1937), can guide occupational health curriculum development and research for adult learners. Gramsci offers insights on the immediate and long term goal of workplace adult education, the importance of the workplace as locus for social organization, and the potential role of the peer leader. Furthermore, Gramsci offers vision regarding critique of the status quo, social transformation as a curriculum process and a nascent syllabus of curriculum content. One model posits levels of social organization in the workplace with the primary position being the person, moving to the work group and finally to the collective, commune or community. These positions may interrelate with skill and capacity development taking place simultaneously on all levels with the potential for outcomes on all as well.
We may create an occupational health syllabus based on Gramsci's ideas. On the personal level we may begin with a major theme in his curriculum: an individual's "conception of the world". He states that a worker must "work out consciously and critically one's own conception of the world". This is a major starting point from which most learning and workplace action would stem. Moving toward interaction with the work group he states that workers should "exchange ideas, hopes and sufferings" the better to learn from each other, and perhaps see the wrong turns they have made and what goal for themselves and their co-workers would inspire them to move forward. On the collective level, peer educators may lead co-workers through a process of "combination and solidary" with the goal of "transforming mentality and way of life". One may now see the link between examining the process of social transformation and the content of curriculum that Gramsci guides us to consider.

SMOKING CESSATION PROGRAMS TO COMPANIES: THE EXPERIENCE OF THE "CLINICA DEL LAVORO" OF MILAN
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[ID 597] - *No. 37 in Poster Area*
SUMMARY
«Smoking cessation programs to companies: the experience of the "Clinica del Lavoro"of Milan». Background: The "Centre for the prevention, diagnosis and treatment of tobacco addiction", set up at the Clinica del Lavoro in Milan in September 2000, within the framework of "Health Promotion" offers smoking cessation programs to companies as regards the new legislation that prohibits smoking at the workplace. The equip of the Centre includes occupational health pneumologists and clinical psychologists. The diagnostic and therapeutic process is based on an integrated approach that considers both the biological aspects of tobacco dependency and the psychological and behavioral aspects. Methods: The proposed treatment pro-gramme is based on psychological and motivational support (personal or team work), that can be associated with pharmacological therapy, either as an alternative or an addition. The drug preferred is slow-releasing buproprione, which has proved to be extremely effective compared to other drugs in increasing the probability of smoking cessation and decreasing side effects. Results: In an occupational population of more than 2000 workers, about 52 % of the subjects succedeed in quitting smoking after one year from the beginning of the programme. The best results were achieved using the association of psychological support and buproprione therapy (55%), com-pared with the other methods (psychological support alone: 42%; psychological support and free nicotine replacement 37%.This result shows the usefulness of similar programs in the workplace.

DEVELOPMENT OF BASIC LOCAL EXHAUST VENTILATION SYSTEM FOR EXPERIMENTAL EDUCATION
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[ID 845] - *No. 38 in Poster Area*
The basic experimental system for education should be necessary for undergraduate students to understand easily the principles of fluid dynamics and physics for exhaust ventilation. To enhance educational effect for local exhaust ventilation, the instructive engineering system was designed

and manufactured and experimental practice was conducted with the system. The objective of study was to 1) manufacture the basic experimental system for local exhaust ventilation, 2) experiment with this system and 3) develop methodology of local exhaust ventilation laboratory. The system consists of seven different type hoods (plain opening, slot hood etc.), acryl duct and fan by which flow rate can be controllable. Seven different hoods can be connected or disconnected optionally. Within this system, air velocity, three pressures (SP, VP and TP) and flow rate were measured using anemometer (8386-M-G3, TSI and 24-6111, Konomax) and manometer connected to pitot tube. Every measurement was determined from five times and arithmetic mean values were calculated. Three pressures were illustrated and graphic shapes agreed relatively to theoretical ones. Entry loss factor (Fh) of each hood was found to be different with hood shape, duct velocity and flow rate and was different from the existing values in the textbooks. This result implies that precise Fh should be determined case by case and an industrial hygienist should better not use the existing values simply. Pressure loss of duct was calculated using velocity pressure method. Characteristics of air movement near hoods were grasped using a fume forming tube. Air flow characteristics of blowing from a stack and exhausting from a hood, i.e., air affecting distances could be understandable. The conclusion would be that this system is very instructive to understand the characteristics of local exhaust ventilation. But the larger system should be recommended to produce more precise experimental results.

OCCUPATIONAL MEDICINE - THE CHALLENGE OF BUILDING UP A MEDICAL RESIDENCY PROGRAMS IN BRAZIL

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[ID 1182] - *No. 39 in Poster Area*

Occupational Medicine has been recognized as a specialty by Brazilian Medical Association and Ministry of Education (Residency National Commission) in 2002. This fact promoted deep changes in Occupational Medicine professionals' preparation and residency programs have arisen as the preferential means.

Brazilian National Occupational Medicine Association has performed a search on the required skills for professional practice and prepared the minimum requisites for the residency program. The current program, which started in 2004, lasts at least 2 years (5720 hours) and 80 to 90% of its contents are dedicated to supervised practice. Other activities include anatomic-clinical and clinical-radiological sessions, discussions on scientific articles, seminars, lectures. Theoretical complementary activities must contemplate themes such as hospital infection control, epidemiology, biostatistics, scientific methodology, ergonomics, bioethics, work hygiene, toxicology, and security.

The programs count on partnerships with institutions that deal with Workers' health such as Ministry of Labor, Ministry of Health, Vigilance Services, National Institute of Social Security, Services specialized on Security Engineering and Occupational Health, etc.

Seven residency programs are already implemented and an interchange net is being created to permit information and experience share. Brazilian National Occupational Medicine Association is currently concerned about expanding the number of institutions engaged to adequate professional formation that is supported by its Center of Advanced Studies on Occupational Medicine Practice.

STRENGTHENING OCCUPATIONAL HEALTH SERVICE IN SOUTHEAST OF THAILAND THROUGH OCCUPATIONAL MEDICINE PHYSICIANS NETWORK

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[ID 1299] - *No. 40 in Poster Area*

Because of certified occupational medicine specialists shortage, a 2-month short course training on occupational medicine for physicians were developed and started in 1993. Twenty physicians in southeast of Thailand have been trained since then. Problems encountered in providing occupational medicine services included the lack of; interpretation criteria for employee medical examination results, preventive intervention for occupational injuries and common occupational diseases such as work-related musculoskeletal diseases, and labour laws enforcement. To improve occupational health services in this region, first, a survey was conducted in mid 2005 to assess work performance of all trained physicians in 9 provinces. The result revealed that most of physicians worked in government hospital while only two physicians worked in private sector, one in a large international enterprise and one in a 400-bed private hospital. Half of these physicians spent 50% of their time on occupational medicine-related functions. Subsequently, funded by Bureau of Workmen Compensation, Ministry of labour, a network was formed among these physicians. Led by a senior occupational medicine physician, a regular meeting was scheduled among them. The first meeting was set in October 2005. It was clear, then, that frozen seafood and rubber industries were the prioritized target groups for this region. The first team effort began with plants survey and designing of employee medical examination protocols by occupational medicine physicians. The team, consulted by experts from Bureau of Occupational and Environmental Diseases (Ministry of Public Health), then, drafted standard guidelines for examination results interpretation and management especially for basic items such as audiometric, spirometric and visual examinations. In terms of occupational diseases diagnosis and management, the team paid their full attentions to occupational injuries and musculoskeletal disorders, the most two common illnesses in this region. The main catalyst for improvement of occupational health service should be attributed to the new occupational medical examination law launched in April 2005.

SITUATION OF OSHMS AND SUPPORT PROGRAMS FOR WELL BALANCED SYSTEM IMPLEMENTATION IN JAPAN

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[ID 1325] - *No. 41 in Poster Area*

Recently, companies that implement Occupational Safety and Health Management System (OSHMS) have been increasing in Japan. We investigated situation of health elements in OSHMS, developed tools and programs for improving them.

(1) Situation of OSHMS implemented in Japan

We investigated situation on the balance between health and safety elements in OSHMS that were implemented in Japan in 2004. As the result, although most of programs for chemical risks were included in most of OSHMS, significant rates of health management programs, such for physical risks, ergonomic risks, biological risks, fitness for work were operated out of OSHMS. We also investigated the reasons why they excluded the programs for health risks.

- Health elements need more contribution of professionals than safety elements. So, they tend to be excluded when health professionals don't actively participate in the implementation.
- They misunderstand that programs that need to evaluate personal health risks are not fit OSHMS.

(2) Development of support tools and programs for well balanced OSHMS

It was thought that tools and programs for supporting implementation of health elements were useful to establish well balance OSHMS. We developed model documents of OSHMS, training programs, risk assessment tools for chemical, physical biological and psycho-social health risks, then started to support several companies to evaluate effectiveness of the programs. They were classified into two groups by the level of OSHMS,

- companies that are newly developing OSHMS
- companies that have already implemented OSHMS but safety elements are so predominant.

(3) Training occupational physicians who can contribute implementation of OSHMS.

Active contribution of occupational professionals is essential for implementation and their roles become important in well balanced OSHMS. Several types of training programs on OSHMS for mainly occupational physicians were developed and have been provided at several occasions, and the effectiveness was evaluated.

RETHINKING AND PLANNING NEW TRAINING OPPORTUNITIES ON SAFETY AND SECURITY IN HEALTH ORGANIZATIONS

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[ID 1531] - *No. 42 in Poster Area*

INTRODUCTION: The paper presents the overall outcome of an action-research project, sponsored by ISPESL and conducted by a research team of Cattolica University of S. Cuore in Milan. Aim of this work was to develop the knowledge about new forms and structures of training programs on health and safety at work. BACKGROUND: The project started with a qualitative research, carried out on 2 focus groups of health professionals about their previous experiences in training on safety and health at work. In addition,the project explores the concept of "psycho-social risk" and safety as related to the organizational well-being. The response of these focus groups was recorded and its content was transcripted and analyzed. The most important evaluations of these focus groups were: the ineffectiveness of traditional training to modify habits and/or behaviours on these issues and the relationship between safety and organizational well-being, whereas managers play an important and strategic role in building and developing a culture of risk-taking and responsibility around safety and well-being at work, yet they rarely accept this role themselves.The aim of the research is to support managers in "accepting" their responsibilities, by means of a targeted education and/or training. METHODS: Two studies were carried out in two hospitals, one in Rome and one in Prato, Italy, aiming at defining new training approaches to health and safety. The research was carried out with the method of action-research and consisted in a one year cycle of counselling and training to the managers of two sanitary units: a Diabetics Department (DD) in Prato and a Safety and Prevention Department (SPD) in Rome.

One counsellor/trainer was attending on-field and was in touch with the researchers staff, holding a monthly meeting to discuss the results of work. The object of counselling was the relationships with external patients and clients services and the relationships within the groups, between different health professionals (technicians, nurses, medical doctors). We opted not to forward new information and directions on procedures on health and safety, but we encouraged managers and professionals to think about their own daily practices and actual problems and to explore and create new issues by themselves. RESULTS: The most important outcome of the study outlines the difficulty of taking distance from a technical and normative view on health and safety and the lack of an "organizational" competency, whereby "organizational" competence indicates the ability to understand and manage the relationship problems involved in work organization. For this reason, and in order to reach higher standards in health and safety managing, it is necessary to offer a new type of training, enabling a closer approach to the organizational micro-processes and the exploration of a new outlook and professional culture about safety problems and feasible interventions. Other relevant outcomes of the action-research were: the organizing of a training course specific for a large group of hospital managers on responsibility and safety; the relevance of aknowledging SPD counselling role and of supporting the production of a Risk Evaluation Report with the direct input of professionals and managers from other units; an improve internal organization to support diabetic patients, enhancing the input of all professionals.

CONCLUSIONS: The result of the research team's support work enable managers and professionals of the two groups, therefore, to improve the management of their in-house relationships, their relationships with patients and clients and with the hospital top management.Rethinking daily practices and problems permits changing behaviours through modify internal models and, in turn, this has obvious effects on quality relationships, both internal and external, on management quality and on safety and well-being at work.

POSITIVE INDICATORS OF OCCUPATIONAL MENTAL HEALTH

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[ID 1532] - *No. 43 in Poster Area*

Objective

The objective of the research was to determine the existence of any statistically significant relationship between the level of self-esteem and burnout in university teaching staff.

Rationale

Self-esteem corresponds to a positive or a negative self-assessment This self-assessment determines our actions and the way we participate in life.. It further determines the developmental process of the human potential and how we participate in society. Within the professional field, positive self-esteem facilitates a better perception of reality and interpersonal communication (if you have a reference for this it would be good). It may help when dealing with stress, uncertainty and during processes of change. Self-esteem has been studied in occupational health as a protective factor against illness of both physical and mental disorders (but not as an indicator per se of positive mental health).

For an organization to be productive it should encourage the development or strengthening of self-esteem among their staff through appropriate training programmes and related policies. In particular, an enterprise's supervisory system constitutes one of the areas which provide room for this through proper feedback of performance and/or the work process, for example, via :

- participation in performance reviews and development of continuous improvement plans;
- provision of positive reinforcement interventions to obtain positive and organizationally-acceptable behaviours; and
- training systems and/or staff development programmes to increase skills and to enhance acceptable and positive perceptions of self-efficacy and self-esteem when confronted with new tasks.

Method

The study conducted is cross-sectional and based on observation of the protective function, which self-esteem may have for the prevalence of burnout in teaching staff at a University Center. The Center has a total of 813 teachers, and we selected a representative sample of 144 participants. Data was generated by administering a survey designed to obtain socio-demographic information, as well as information from the Maslach Burnout Inventory (MBI) questionnaire and the "IGA-2000" Self Esteem Questionnaire.

The presence (of at least one dimension) of burnout, or its absence, and the three levels (high, medium and low-null) were crossed with "low" or "adequate" levels of self-esteem. An association between them was obtained with the Chi square. We considered the relationship significant if p were less than 0.05.

Results

High self-esteem and burnout are significantly associated with emotional exhaustion and reduced personal accomplishment. Low self-esteem is associated with depersonalization. Thus, we conclude that it would be favourable for an enterprise to include the development and strengthening of self-esteem among workers as part of an enterprise's training programme, including the provision of tools such as performance reviews in particular, and related policies.

NET-TEACHING IN ROMANIA: NETWORM

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[ID 1641] - *No. 44 in Poster Area*

Occupational Medicine is a traditional speciality but not enough developed like number of specialists, today, in Romania. Their number is in increasing, as a society demand, and their learning tools must be improved. In this context, the EU-project, NetWoRM, offer a new form of teaching in Occupational Health.

The objective is to adapt for Romanian OH doctors, students and nurses virtual cases created by Net WoRM – CASUS program. Practicing with "standard patients" like distance-learning method, they will improve the training in occupational medicine. These cases will be implemented in the Romanian curricula in some universities, in the next three years.

The occupational pathology is in changing, in accordance with new working conditions and social aspects. It is difficult to bring a specific case for a theoretical lesson, in front of the student. Net-teaching solve this problem and help the student to solve himself the case, staying at home or in laboratory.

All participants of the project create minimum one case. They translate and adapt in the national language other 9 cases. In order to ensure a high quality of the e-learning tool each case is evaluated by two experts and users. Finally, more than 10 cases will be available for teaching in each participant country.
The "Timisoara" team created the case "Work Accident Due by Alcoholism" and adapted other 2 cases in 2005. The student evaluation of the first case started in April 2005 due by German students (20) and in November 2005 in Romania, at two levels, medical students (98) and occupational health residents (29). The validation has been started in October 2005 and will be finished in the end of January 2006. All the users, including those who never worked with case based e-learning, had no major technical difficulties. The German students liked the case, but considered the questions too easy. Romanian students liked the case, the multimedia material, but more than 7% of them asked why presenting this case like Occupational Health subject. All the users rated the use of the program easy. The students needed 23-41 minutes to finish the case. The rate of completed cards was 65-100%.
This new form of teaching seems to be accepted easily by students, who need to see many cases, with specific aspects and to understand the link between professional exposure and its health consequences.
The preliminary results conduct at the necessity to implement e-learning in the core curricula of the medical students, residents in OH and in CME, in Romania.

CHANGING WORK LIFE CHALLENGES OCCUPATIONAL HEALTH SERVICE (OHS) TO DEVELOP NEW METHODS

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[ID 1725] - *No. 45 in Poster Area*

Background
The objective of this study was to find out with a survey whether the OH-practises meet the needs of the workers and work communities, and how adequate are the present methods of OH-services for these needs. Then action research was used to help the OHS and the employees together to recognize and manage the factors affecting well-being at their work.
Method
The study was carried out in 1998-2000. The data of the questionnaire study was comprised of the responses of 43 OH-units in two northern counties in Finland. Twelve of these OH-units were selected to action research in which OH-personnel were testing new methods while undertaking a development project; participative and solution-oriented methods were applied. The data included analysis of the work history and process descriptions. In addition, interviews of representatives of the employers were conducted. This data was analyzed with qualitative content analysis and the multiple-choice questions with quantitative methods.
Results
The survey: The main methods for maintaining working ability, applied by the OHS, were promotion of physical well-being and work environment.
Action research: Both the OH-personnel and representatives of the employers emphasized that the psychosocial factors, such as fluent work processes, professional competence of the workers, and leadership practices were the most important determinants. Positive changes were recorded in the work communities where more participative methods were applied and cooperation was emphasized.
Discussion and conclusions
Practices of the OHS for maintaining working ability and promoting health of the workers are focusing on the physical well-being and work environment while the employers and OH-personnel, as well, recognized importance of the psychosocial factors in well-being at work. Consequently, the OH-personnel should develop and apply more participative and cooperative methods and take the psychosocial factors more into account in the contemporary work life.

ON-THE-JOB LEARNING OF PARTICIPATIVE PREVENTION USING VISUALISATION TECHNIQUES

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[ID 1756] - *No. 46 in Poster Area*

In the contribution at hand we introduce a concept for participative prevention based on visualisation techniques. Workplace hazards are visualised by means of structured interventions using the PIMEX (PIcture-Mix-EXposure) method. A work sequence is recorded by a video camera and simultaneously, information about occurring hazards as well as medical data are recorded. PIMEX enables analyses of working processes and assessment of risks, resulting in a package of measures for the purpose of workplace improvement. A priority objective is to impart knowledge about interrelations between occupational strains, exposures and their consequences by directly involving workers in the process of knowledge development. Based on the results from PIMEX observations - including interpretations of measuring data, derived knowledge, and experiences - intensive workplace training and instruction can take place. We act on the assumption that change processes in an organisation can be optimised in a combination with workplace health promotion strategies, particularly in the course of developing novel workplaces and working processes. The discussed steps are intended to lead to the implementation of a learning and knowledge space in the organisation regarding health and safety issues and support a lifelong learning process. By its ability to reveal the association between activity and exposure, PIMEX proved to be an effective tool for measurement of dust exposure in the car repair sector, exposure to cooling lubricant mist, styrene at polyester workplaces, methyl methacrylate (MMA) in the construction sector, and flour dust in bakeries; as well as ergonomic parameters such as thermal radiation in the paper industry, lighting and climate factors such as temperature, air flow, and humidity. The degree of participation during PIMEX interventions varied depending on the complexity of exposure composition and other situational factors. Generally, by adopting visualisation techniques such as PIMEX for reducing or eliminating hazards in workplaces, workers turned out to be better motivated and engaged to take part in the seeking of solutions.

SYSTEMATIC WORK ENVIRONMENT MANAGEMENT IN SMALL ENTERPRISES

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[ID 1770] - *No. 47 in Poster Area*

Swedish enterprises shall according to law perform a Systematic Work Environment Management (SWEM). The purpose of the law is to reduce sickness absence and accidents at work. Studies though show that a large number of small enterprises (1 – 50 employees) will not perform SWEM by law.
Prevent has developed an idea which distinctly links SWEM to business development of enterprises in order to focus on the benefits of SWEM. This idea also confirms due to the fact that SWEM and business development follows the same work procedures. The concept won support by the parties of the labour market and on their mission we have started a nationwide project.
The project purpose is to increase the number of enterprises carrying out SWEM. The target group is small enterprises. The project is executed in cooperation with regional representatives of the parties of the labour market.
Enterprises are invited to take part of a training which, with simple means, integrates SWEM as a natural component in business development. The training is divided into four meetings during a period of six months. During these meetings enterprises will increase knowledge and get opportunity to exchange experiences with other enterprises developing their work environment. In between the meetings the enterprises will realize SWEM in their own businesses with better knowledge and new experiences. The project started ending 2004 and continues until the beginning of 2007.
In December 2005 we have 600 enterprises engaged in about 60 trainings of which 14 have been finalized. The participant's satisfaction in the 14 finalized trainings has been measured by a questionnaire. There are about 20 questions and the average varies revising 3.5 to 4.7 on a scale of 1 to 5 where 5 is the top value. About 75% of the participants want to continue the meetings even after are finalizing the trainings.

THE EFFECTIVENESS OF TRAINING AND EDUCATION IN OCCUPATIONAL HEALTH

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[ID 1848] - *No. 48 in Poster Area*

Introduction and objectives
The purpose of the study is to evaluate and develop the competence education and training (11 etcs) in OHS at FIOH. Today the education programme fulfils the competence requirements for OHS practice in Finland. The aim of the training is to improve participant's own expertise in OHS

and by that to change his/hers working methods and the working methods of the entire OHS unit. Training can be arranged as multiform education or traditional training.

Material and methods

The data is collected with a questionnaire to the occupational health physicians and occupational health nurses who attended the training in 2004-2005 in Helsinki, and with interviewing the managers of OHS units. The data is analyzed with qualitative content analysis.

Results

There were no differences in the effectiveness of the training, when we compared the answers of the participants from different years or different type of training. We noticed small differences in the effectiveness between different occupational groups. The participants found the training useful for their work. The nurses experienced their working methods had changed more than physicians. The effect on the working methods of participant's own OHS unit was little but also in this the nurses experienced a bigger change than the physicians. With this training the paradigm of occupational health is clarified. The managers told that after the competence training the participants needed less support and advice in their work. Especially the workplace survey - activities were more efficient and versatile. The OHS units updated their knowledge especially concerning legislation and OHS methods.

Conclusions

The training is the adequate and necessary step in participant's development in OHS. This development is the first phase in facilitating changes at the workplaces. The continuing training helps to generate changes in working methods in the future.

WORKERS' PERCEPTIONS OF CHEMICAL RISKS: A FOCUS GROUP STUDY

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[ID 1857] - *No. 49 in Poster Area*

Background

Workers' perception and experience with respect to health and safety at work are rarely taken into account while considering prevention programmes.

Aims

To explore workers' perceptions and experiences towards chemical risks in general, in order to investigate the prerequisites for a participatory approach.

Methods

Qualitative study involving seven focus groups. Because of the process of interaction between all participants, a focus group discussion is a good method to understand people's opinions and attitudes. This methodology has rarely been used in occupational medicine until now. The sample comprised 58 participants (48 men, 10 women) from five large- to medium-sized chemical companies in the Dutch- and French-speaking regions of Belgium.

Results

Several factors had an important influence on workers' perception of and experience with chemical risks. Workers assess risks by means of both sensory and empirical diagnosis and are concerned about the chronic health consequences. They perceive the threat of chemical risks to be high. Despite this threat, they are resigned to accepting the risks. Existing formal sources of information (e.g., the prevention advisor, the labelling system) are rarely consulted because they are not considered to be that relevant or trustworthy. Instead, workers tend to obtain information from informal sources (e.g., colleagues). Communication problems and lack of trust in prevention advisors and line managers were mentioned. Workers feel that their specific knowledge of their working conditions and their proposals for practical, cost-effective solutions to improve health and safety at the workplace, are insufficiently taken into account.

Conclusions

The use of focus groups proved to be valuable to identify these factors that explain workers' attitudes and behaviour. The results of this investigation were used to develop a participatory training method called TOXTRAINER focused on chemical risks.

REQUIREMENTS FOR OCCUPATIOANL BIOLOGICAL RISK PREVENTION

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[ID 1524] - *No. 50 in Poster Area*

The aim of this study was to evaluate the requirements of prevention personnel at the French Regional Health Insurance Funds (CRAM) with regard to occupational biological risk prevention.

The CRAM are regional bodies which develop and co-ordinate the prevention of occupational accidents and diseases, and help to enforce regulations relating to contribution rates. Their activities, which involve the analysis of existing or potential occupational risks are conducted within the framework of the general prevention policy developed in conjunction with the National Health Insurance Fund (CNAMTS). To assist them in their preventive activities –of which advice, training and supervision are the inseparable components– the CRAMs have a range of technical resources, regulations and incentives at their disposal, for use by their consulting engineers and safety inspectors.

After interviewing several employees with various positions in CRAM occupational risk prevention departments, we pooled and carefully analysed the information obtained. The employees gave details of their professional activities involving biological risk management, and mentioned any problems they had met. We also recorded their requests and expectations, i.e. how could the French Occupational Risk Prevention Institution help them to develop and improve occupational biological risk management within the framework of their duties. Data have been treated with a statistics software.

Requirements dealing with biological risks differ widely. Analysis of employees replies helped us to identify certain requirements depending on their various functions; general and thematic training session requirements for the safety inspectors, thematic information booklets, etc.

This study outlined several themes which have now to be developed to improve awareness and management of biological risks at work.

EXPERIENCE OF THE OCCUPATIONAL SAFETY AND HEALTH (OSH) UNIT OF SESI IN FOUR BRANCHES OF INDUSTRIAL ACTIVITIES BETWEEN 2002 AND 2005

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[ID 1823] - *No. 51 in Poster Area*

Introduction - The Occupational Safety and Health Unit of "Serviço Social da Indústria de São Paulo" (SESI-SP)* started in 1948 and has acquired considerable field experience. In 1999, management of the institution decided to concentrate on the production and dissemination of knowledge on OSH in specific branches of industrial activities.

The result was the publication so far of four handbooks containing detailed recommendations to management, workers and technical personnel, concerning identification and control or elimination of occupational risks and hazards in the footwear, clothing, furniture industries and bakeries. The main objective pursued was understanding work organization and improvement of working conditions in each one of the selected branches. The main steps followed for each handbook were: definition of the branch, meeting related labor unions and management organizations, selection of premises according to geographic location in the State of São Paulo, preliminary visits for qualitative information, supplementary visits for quantitative data; a written report for each visited company; manuscript and graphic project, printing and distribution. Visits for data collection were performed by a multidisciplinary team composed of occupational safety and health engineers and technicians, physicians, nurses, phonoaudiologists, toxicologists and chemical laboratory personnel. Data were gathered by direct observation, application of questionnaires, medical examinations, environmental evaluations and further general observations.

Results: The number of enterprises visited during the first (qualitative) phase, and the respective number of workers were: footwear (18/1592); clothing (3/2747); furniture (30/1698); bakeries (89/2139).

Results concerning medical examinations are presented on the following table:

Industrial Activity Alteration (n-workers) Findings (%)	
1617	Footwear
296	Clothing
358	Furniture
241	Bakery

Blood pressure	12,9	2	9,6	17
Musculoskeletal disorders	11,8	92	49,3	33
Respiratory disorders	6	50	37,8	0
Skin lesions	22,8	30	46,6	12
Noise-Induced Hearing Loss	15,3	6	33,5	19
Work accidents	17,3	14	40	27

One example of environmental measurements refer to urinary excretion of chromium among workers from the furniture industry, presented at the 10th International Congress of Toxicology, Tampere, Finland, July 2004. Other environmental measurements refer to heat, noise, solvents among others.
Conclusion: Each one of the visited enterprises received a detailed report with recommendations for the improvement of working conditions. The manuals are meant to provide easy consultation and suggestions, as well as
the main legal requirements concerning OSH. They are freely distributed to the enterprises that participated in the study, to industries in general though mailing lists and data-bases, institutions that deal with OSH, to participants of seminars, conferences and similar meetings, and in reply to requests from technical personnel. There are not, so far, evaluations on the results of the use of the manual. However, enterprises from one town where the shoe industry is prevalent requested instruction on specific topics covered by the respective manual, replied through courses with a good attendance. The Authors are grateful to the unit supervisor Augusto Dourado, C.E.

GUIDELINES FOR GOOD OCCUPATIONAL HEALTH PRACTICE

BLENDING OSH WITH WCM - An Indian Experience
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[ID 215] - *No. 52 in Poster Area*
The 'Mantra' for successful enterprise in today's industrial world is 'WCM' - World Class Manufacturing. This is true not only among advanced nations but also for developing economies. More & more companies worldwide are accepting and moving towards WCM, regardless of geographic location.
This paper aims at demonstrating the power of WCM tools and the remarkable change in OSH performance of the plants in India, where it was tried with gratifying results.
5S, Kaizen & Six Sigma have found application in all kinds of workplaces. International standards like ISO 9000:2000, ISO 14000 and OHSAS 18000 have become essentials of doing business.
OSH is inextricably linked with working ethos of the enterprise. It can not therefore shy away from adopting WCM tools. Even in developing world, its time OSH graduates from its traditional approach of mainly concentrating on pre-employment and periodic health check up. Since OSH deals with the way an enterprise works, OSH professionals should learn to speak the language of its clients- the language of WCM. Apart from helping to forge a bond with shop-floor personnel, these tools are extremely valuable in implementation of OSH.
Accidents, dust and noise were formidable OSH hazards in the plants where some of these WCM tools were put to use. At Mora (near Bombay), TF1 (no of lost time accidents per million man hours worked) came down from 12.1 in 2000 to less than 1.2 in 2005. Acoustic enclosure of DG set in powerhouse brought down the noise level from 102 to 89 dBA. DMAIC project on a grinder machine brought the dust level down from 5-8 mg/m3 to 2-3 mg/m3. Safety risk score moved down from 72 to 1.2 and fatigue factor from 6 to 0 on account of ergonomic modifications. At Bangalore plant, 5S and Kaizen not only brought about improved safety but also monetary benefits in terms of savings.
Integrated implementation of ISO 14000 & OHSAS 18000 led to a growing awareness of EHS (Environment, Health & Safety) issues among all levels of employees. Specific projects, methodology and results would be discussed during presentation.

MOBILE LOW BACK WORKOUT FACILITY AT DAIMLERCHRYSLER HEAVY TRUCK PLANT WOERTH/RHINE, GERMANY SAVES TIME, INCREASES ACCEPTANCE AND PERMITS TRAINING ON THE JOB.
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[ID 314] - *No. 53 in Poster Area*
Aim: The purpose of this work was to implement a machine based workout for back muscles on the job among blue- and white-collar workers of DaimlerChrysler heavy truck plant Wörth/Germany to reduce complaints and absenteeism due to back pain.
Method: A special machine-based single-set resistance training for back muscles was developed to enhance strength and to reduce complaints among blue- and white-collar workers. Since various programmes in major plants have yet failed to succeed, mostly because of the expenditure of time getting to and from the workplace, we developed a mobile workout facility. This enables us to get to the workplaces and offer the exercise/workout on the worksite during working hours, so that the workplace-to-workout-facility time which means down-time can be minimized.
Workplace-to-workout-facility time was calculated. Participation was evaluated in collecting personal data, measuring complaints, acceptance and muscular strength.
Results: We could demonstrate great acceptance in offering the prevention scheme on the job. Workplace-to-workout-facility time and waiting period were significantly reduced and thus down time saved. From the beginning in 2003 until August 2005 the number of participants was approximately 2000 workers, which is about 20 % of workforce, with about 580 participants in the first half of 2005. Complaints of musculoskeletal disorders of back were reduced.
Conclusion: A prevention programme during working hours requires that down time is minimized. In developing a mobile training facility, we were able to implement successfully a machine based workout programme of back muscles on the job, even in a huge plant like DaimlerChrysler heavy truck plant Wörth/Rhine, Germany.

REGIONAL OCCUPATIONAL HEALTH PROMOTION IN FINLAND
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[ID 531] - *No. 54 in Poster Area*
The aims of the Regional Occupational Health Promotion Project are to produce and to develop the quality of occupational health services in collaboration of each region, to minimize health hazards at the workplaces, to advance collaboration between municipal occupational and other health and safety representatives in the region, to maintain occupational health professionals' skills, and to build the regional model.
Altogether twenty municipal occupational health units from four regions began to reorganise their services in the regional collaboration and to promote workplace surveys and services in 2004 - 2005. The quality development of occupational health care services has based on analyses concerning occupational clients, enterprises, and municipal circumstances; building of process descriptions from certain services; educating and counselling occupational health professionals; identifying and assessing health hazards at enterprises by using handheld computer with the Work Environment Profile method, and participating in the development of working conditions. The evaluation of project will be focused on the changes in occupational health care services and working conditions at enterprises in 2006.
As prior results of this project, certain occupational health services are unified, priced and reorganised in a new way in each region, and the development processes have started at enterprises. The final results are expected in 2007. Other benefits in the long term are better health for employees, higher productivity for enterprises, better availability of occupational health services in the small municipalities, and collaborative improvement of working conditions.

OCCUPATIONAL EXPOSURE TO CARCINOGENS - HEALTH RISK ASSESSMENT WITH AN EXAMPLE OF 2,4 DNT
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[ID 618] - *No. 55 in Poster Area*
Increasing occupational diseases morbidity among workers exposed to different toxic agents (including carcinogens) resulting from continuing industrial development, has become a matter of interest recently. Primary steps made for improvement of occupational health were connected with

implementing the proper restrictions and employers duties into the legal system. Suitable regulations within the EU countries appeared as a result of the ILO Convention No 139 (Occupational Cancer Convention).
In Poland duties of the employers hiring the workers in the exposure to carcinogens are specified in the regulation of the Minister of Health of 1 December, 2004 concerning carcinogenic or mutagenic substances, preparations, agents or technological processes in working environment containing the registry of over 800 carcinogens and mutagens. According to this regulation the employer is not only obliged to diagnose the working environment in terms of carcinogenic agents occurrence and potential exposure levels but also to prepare the health risks assessment for the employees exposed.
As the health risk assessment is the most difficult matter for the employers and relevant labour safety services, Nofer Institute of Occupational Medicine prepares suitable guidelines to facilitate the whole process. Guidelines are being prepared on the basis of the latest studies' results described in the international scientific journals. The following chapters include information concerning physicochemical properties, occurrence, usage and exposure to the substance, its biological activity including absorption, acute and chronic toxicity, carcinogenicity, mutagenic and reprotoxic activity in humans and experimental animals, and qualitative and quantitative risk assessment of the neoplastic changes development and Polish and other occupational exposure limit values in force. The quantitative risk assessment made for each chemical described enables estimation of the potential health risk with reference to the specified exposure levels of particular carcinogenic agent within specific working conditions. As an example the quantitative risk assessment for 2,4-dinitrotoluene is presented.

FACTORS BIASING THE NUMBER OF CLAIMS FOR OCCUPATIONAL DISEASES - PRELIMINARY RESULTS

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[ID 849] - *No. 56 in Poster Area*
Introduction:
Neglecting of claiming occupational diseases was often described and is an unresolved problem. We present preliminary results of a study, evaluating risk factors of "under-claiming".
Methods:
Literature search in Medline and ISI Web of Science ending Mai 2005. Search items: (notification or claim or recognition or underreporting or underdiagnosis) AND occupational disease.
Results:
We could not identify studies, that evaluated claiming systems in whole, but we detected the number of claims affected by (1) mode and severeness of disease (2) definition of disease (3) diagnostic criteria (4) gender, age and social status of insured (5) knowledge [training, media] about occupational diseases (5) pressure of time in physician´s work, (6) feasibility of compensation, (7) trade union´s activity (8) quantity of business company (9) employer´s fear of financial damage (10) claiming administration process. The factors play a different role in separated claiming persons or institutions (physicians, insured person, employers, others).
Conclusion:
Multitude of risk-factors cause underclaiming. The relevance of these risk-factors depends on the social security system of different countries. Nevertheless basic principles of "claiming systems" (for compnesation or statistical reasons) may be identical in the whole world.

EVALUATION OF THE PRACTICE GUIDELINES OF FINNISH INSTITUTE OF OCCUPATIONAL HEALTH WITH AGREE INSTRUMENT

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[ID 1000] - *No. 57 in Poster Area*
Practice guidelines are being used to improve quality of care in occupational health. An increasing concern is the number of guidelines of questionable quality and guidelines that contain conflicting recommendations. In this study we wanted to assess the overall quality of practice guidelines produced by Finnish Institute of Occupational Health (FIOH). The information is required to establish a common, valid and transparent approach to practice guidelines development in FIOH in the future.
We screened all paper format and electronic guidelines published by FIOH without selecting any topic.
A random sample of 30 practice guidelines was evaluated by four independent researchers with the help of AGREE instrument. AGREE stands for "Appraisal of Guidelines Research and Evaluation"; it is a generic tool designed primarily to help guideline developers and users assess the methodological quality of clinical practice guidelines.
The work is still in progress. We should give at least preliminary results.
The main aim of this presentation is to awaken discussion between guideline producers in different countries. Co-operation in global evidence summaries production would benefit all national guideline producers.

ROLE OF INDUSTRIAL PHYSICIAN IN WORKPLACE HEALTH PROMOTION: AN INDIAN PERSPECTIVE

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[ID 1252] - *No. 58 in Poster Area*
Work site is an ideal place to inculcate healthy habits and proper attitudes amongst employees. It also provides an ideal platform for various health promotion programs to influence their choices and preferences in health-related issues. Industrial Physician is placed in a situation where he can forecast the threats to employee health and also initiate and influence the modification of risk factors through strategic interventions.
Reliance Industries Ltd., Patalganga, is a petrochemical and polyester manufacturing facility located in rural part of India. Workforce is organized and comprises a mixture of those with elementary education and technical education. The population is ageing with an average age of 40 years.
An analysis of employee health check up data revealed alarming findings: High prevalence of employees with Overweight - 33.65 %, High prevalence of employees with elevated Serum Cholesterol levels - 27.5%, Prevalence was significantly higher in sedentary employees, was uniformly increasing in all age / activity groups, 5 % employees were having diabetes and 8 % employees were having hypertension, 58% below 40 years.
Consequently OHS department initiated active measures for modification of risk factors like overweight / obesity, elevated blood cholesterol levels etc. through tools like extensive and sustained health awareness campaigns, innovations like 'Health Diet' at industrial canteens, regular annual medical examinations followed by counseling and other measures. These measures have resulted in slowing down of overweight trend and reversal of high Cholesterol trend.
Strategies adopted included presenting a 'Business Case' to management for support and 'Marketing Approach' for OHS to all stakeholders. These measures have yielded positive results like high compliance for medical surveillance, reduction in health hazards at workplace.
Our experiences in implementing the intervention measures and their impact on prevalence of some risk factors are being presented in this paper.

OCCUPATIONAL HEALTH PRACTICE AND CSR IN JAPAN

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[ID 1353] - *No. 59 in Poster Area*
Objectives
Japanese companies have become aware of importance of corporate social responsibility (CSR) recently for their sustainability and increasingly publish CSR reports as books or via internet homepages. CSR seems to demand Japanese companies to account sound activities to stakeholders, including employee health, however, it was found that the description

of CSR reports regarding to OH were under development and not sufficient to reflect real OH activities via our past investigations. We investigate present role and responsibility of in house occupational health professionals for CSR activities and CSR reports in Japan.
Methods
1)We interviewed OH physicians and program managers of OSH or CSR division in some major companies to their role and responsibility as part of CSR activity.
2) Based on above results, we conduct mail survey to the major companies which publish CSR reports recently to clarify the relationship between real OH activities and description of CSR report, the role and responsibility of OH professionals and prioritized matters in OH field from CSR aspects.
Results
1)In some companies, OH professionals have accountability for OH and in such a case, their role and responsibility are recognized essential. On the other hands, in other companies, there is mostly no link between OH professionals and CSR activities and CSR reports. The relationship has links to management awareness and company culture and systematic practice of OH.
2)There is certain possibility to integrate and OH practice to corporate activities in Japanese companies. Mental health care and controlling long time working are recognized priorities as issues of CSR.
Discussion
CSR concept can make Japanese companies prioritize OH activities. Mental health care and controlling long time working can be recommended as the essential components of CSR reports in addition to components by GRI for Japanese actual status.

HEALTH SERVICES RESEARCH AND EVALUATION IN OCCUPATIONAL HEALTH

OCCUPATIONAL HEALTH SERVICES IN CHILE: TAKING THE CHALLENGE

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[ID 809] - *No. 60 in Poster Area*

Background: In 1958, the Chilean government passed the Law 16744 that established the worker health regulations as well as the characteristics of the health providers. The legislation key issues were: a) non-profit insurance, financed by employers, b) prevention emphasis , and c) occupational health network across the country.
Methods. Law and regulations review and historic papers. Review of occupational statistics.
Results: Forty eight years after the establishment of the law, three compensation companies exist in the country. Asociación Chilena de Seguridad is the greatest company in the country, providing coverage for more than 76000 enterprises and 1.6 millions of workers (52% of the market). Insured workers are entitled to free health care; including medicines; transportation, sick payment, rehabilitation and pensions due to occupational injuries and diseases. Medical care is provided in 110 primary care centers, 15 clinics and 6 hospitals across the country. Primary care centers carried out hazard prevention that includes consulting, training, environmental management, industrial hygiene, medical surveillance, fire prevention, and ergonomics advice to the enterprises. Also, health care and education is provided to the workers. The impact of the system has been important; by 2004 the burden of occupational events has been a network priority. Space, safety, design construction, equipment and manpower of the health care are accredited periodically. Guidelines and measures of health outcomes are part of the medical care rendered at all levels of the system. Research to determine the extent to which administrative process changes and delivery system interventions quality and health outcomes for injures workers is carried out.
Conclusion: The Chilean model results may have relevance for health care clinicians, administrators, and policymakers.

WORKER'S QUALITY OF LIFE AND NURSING MANAGEMENT

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[ID 1198] - *No. 61 in Poster Area*

The theme of this work is the nursing worker's quality of life as socially determined and subordinate to the social production in Brazil. Its approach is qualitative according to Jaime Breilh's historical materialist dialectic referential. This study was done at the Universitarian Hospital of the city of São Paulo, Brazil. There were five subjects. All of them were nurses working as Directors of Service at the hospital. The data were collected after the approving of the Ethics Committee of the Hospital and the Participant's Free and Elucidate Consent by individual semi-structured interviews. The speeches were recorded, categorized and analyzed afterwards according to the nursing workers' health processes and/or health potentializers and the nursing workers' destructive processes. The data analysis may evidence non-existence of working methodologies, which favor the work quality of life. This consequently sets the predominance of the work's destructive profile. The absence of an institutional structured Politics make only nurse's individual and punctual action possible. That is not always efficient to promote a work quality of life. As a synthesis it is proved that there is an absence of nurse's management about the processes of health-disease in the work ambience. It makes the destructive processes accumulate in the worker's body creating wasting processes and deterioration of the quality of life. The necessity of institutional structured actions, which favor the improvement on the nursing workers' quality of life, was identified by this study.

CHARACTERISTICS OF LIFESTYLE AND NEEDS FOR WORKPLACE HEALTH PROMOTION IN JAPANESE YOUNGER EMPLOYEES BASED ON NEEDS ASSESSMENT

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[ID 1232] - *No. 62 in Poster Area*

Introduction: To improve the benefit of workplace health promotion (WHP), the assessment of needs of employees for WHP is very important. The aim of this study was to clarify the lifestyle and needs on WHP in Japanese younger employees.
Methods: 750 employees aged from 20s to 60s at a construction company in Tokyo were investigated by the cross-sectional questionnaire on March in 2005 and 439 (58.5%) were rightly responded. Of 439, male designers were 340 (77.5%); younger employees (20s and 30s) were 190 (43.8%).
Results: The results are as follows: (1) The proportion of employees who reported good health status was significantly higher in younger employees than in older employees (79.3 % vs. 70.2%). (2) The proportion of employees eating breakfast every morning, eating a balanced diet, doing exercise periodically, working less than 9 hours per day and managing mental stress adequately was significantly lower in younger employees than in older employees. (3) The needs for prevention of lifestyle related diseases in younger employees were significantly lower than those in old employees (16.3 % vs. 33.3%). The needs for management of over-working in younger employees were significantly higher than those in older employees (38.9% vs. 24.5%). (4) There was no difference between the two groups regarding the needs for nutrition, physical exercise, recreation, tobacco, alcohol and oral health.
Conclusion: As compared with older employees, younger employees have poorer lifestyle, but they are unaware of the risk of lifestyle related diseases. Meanwhile they are aware of the necessity of the improvement of working condition. When implementing WHP, it is very important to realize the difference of lifestyle and needs for WHP between younger and older employees.

WORKPLACE HEALTH PROMOTION AS PART OF OPERATIONAL SYSTEM

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[ID 1298] - *No. 63 in Poster Area*

The purpose of this development program was to create a new workplace health promotion (WHP)-model which is integrated as part of the key plans and activities of the organisation. The purpose was also to change the fo-

cus of WHP from individually centred to organisationally centred programs and policies. The aim was to develop a system where planned activities are based on up-dated information of the status of the organisation.
WHP was based on the tetrahedron WHP model developed at Finnish Institute of Occupational Health. The model brings out the fact that promoting work health and functional capacity is a multidimensional concept with several levels and factors. This model combines WHP into development of professional competence, work ergonomics, work environment and practices, organisation and leadership. Activities are linked with EFQM based quality management system and the model describes all the actors who are responsible or involved to the WHP: management, employees, specific task groups (e.g. WHP group and co-operation commission), occupational health care and work-site safety commission.
According to our experiences WHP programs can be combined with other development activities of the organisation. WHP programs can be linked to a quality management system, which can also be considered to be part of organisational developing. The monitoring principles of BSC can be adapted in the evaluation of the progress and results of WHP programs: QPSNordic, self assessment according to EFQM, indicators related to BSC, survey of professional competence, WHP-STEP-tool, report of work environment, health examination etc. The organisation should have a person or a task group that is responsible for coordination and developing of WHP. Successful development requires a defined concept of WHP as a framework for activities. The tetrahedron WHP model developed by Finnish Institute of Occupational Health seems to work well as such a framework.

NETWORK COLLABORATION: A PROMISING POSSIBILITY OF MUNICIPAL OHS IN FINLAND

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[ID 1345] - *No. 64 in Poster Area*

Occupational health services (OHS) have been organized by both private and municipal health organizations in Finland. Municipal health centres also produce OHS in rural areas, where no private services are available. However, there have been many problems in municipal OHS. For example, many occupational health units on countryside are too small to guarantee high-quality services for enterprises.
In this report a development of municipal OHS has been investigated based on two approaches. Network collaboration was launched on the area of seven small communities in the first study and on the area of five medium size communities in the second case.
In the first study the main result was that network benefits for small occupational units are very limited without administrative integration. In the bigger occupational service units also network collaboration as a strategic alliance was useful and synergistic advantages were reached. In the both approaches, communication and mutual consultation between network members increased. For example, centralized services were possible to start only in the region of the bigger occupational service units. According to the participants, the network collaboration improved the quality of OHS in the both approaches.
The present results of the network approaches showed that modern multidisciplinary OHS is difficult to produce in small municipal occupational health centres. The network collaboration between occupational health units seems to provide a lot of possibilities to offer a wider range of OHS for customers. Nowadays, in many communities in Finland have been launched regional projects to improve OHS either with strategic networking or to aim at a more closely integrated regional OHS. A tendency seems to be in the near future to regional municipal occupational health units and network collaboration.

OSH- RESEARCH IN A STRATEGIC CONTEXT

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[ID 1390] - *No. 65 in Poster Area*

Head of Effect and analysis
In the late 90ties, Denmark faced several challenges in OSH-research. The overall level of research was far too low, the funding was from many diffuse sources, and the research was in many not coordinated areas. Finally there was insufficient recruiting of researchers.
The Danish Working Environment Authority (DWEA) has since 1995 prioritized its activities under an action plan, but an equivalent plan was lacking in the OSH-research area.
The Danish ministry of employment began the planning of a strategic working environment research system in the beginning of 2000, and the Danish Working Environment Fund began its work in 2003. The present level of funding is about 50 million Danish kr. Pr. year.
The overall scope for this fund, is to increase the quality, relevance, coordination and the dissipation of the research. It is also the aim to prioritize the funding and to enhance the research quality.
One of the most important aspects of the fund, is that the funding is based on a national strategy for OSH-research. This strategy is developed in a tripartite cooperation between the social partners and the DWEA.
The strategy covers a 2 year period, the first period was 2003-4, and the present strategy covers 2005-6.
The strategy is developed via input from researchers, from the social partners and from the ministry.
The present strategy covers the following areas:
- The psyco-social working environment
- The means used in the OSH area
- The OSH-problems in sme´s
- New technologies and organizations
- Noise from non-industrial activities

The Fund operates with open tenders in all the areas in the strategy, and the projects are evaluated by two separate comities. All the projects are at first evaluated by a scientific committee of experienced researchers, and only the projects of satisfying quality are passed on the next committee consisting of the social partners and the authority, where the projects are evaluated primarily due to their relevance.
The system has been evaluated recently, and it has been greatly recognized as a important step in the right direction.

THE IMAPACT OF WORKSITE ORAL HEALTH SERVICES ON THE PERIDONTAL STATUS OF JAPANESE EMPLOYEES

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[ID 1410] - *No. 66 in Poster Area*

Objective: The negative impact of poor oral conditions on the quality of life of older adults and also on the medical care expenditure is an important public health issue in Japan. This paper reports the results of the health promotion programs by a health insurance association in improving oral health at workplace.
Methods and results: The oral health promotion programs were carried out for a total of 3373 employees (male: 2988, female: 385) of 8 companies for 5 years 2000 to 2005. Repeated tooth cleaning instructions and questionnaires of oral symptoms and health behavior, with dental check-ups were conducted every year. The effect of this program was evaluated by CPITN: Community Periodontal Index of Treatment Needs and PCR: Plaque control record. After this program, the rate of teeth with pockets 4 -5 mm deep or deeper (CPITN 3, 4) was decreased from 36.8% to 22.0%, while the rate of teeth with no sign of periodontal disease (CPITN 0) was increased remarkably from 19.6% to 29.7%. Average of PCR was decreased from 35.7 to 25.4. Conclusion: These results indicated that this program was helpful in improving the periodontal status. The workplace can be regarded as a key area for implementation of an oral health promotion to make good use of limited resources.

DEVELOPMENT AND EVALUATION OF OCCUPATIONAL HEALTH SERVICES BASED ON NEEDS ASSESSMENT IN JAPANESE WORKPLACE

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[ID 1459] - *No. 67 in Poster Area*

In Japan, conventional occupational health service(OHS) has a turning point by a rapid increase of medical cost and influence of recession. Therefore offering of effective OHS based on needs assessment is desirable, but there are a still few such reports in Japan. We reported a case of development OHS “Hirai health strategy towards 21 century” which include 6 policies and 15 concrete measures based on needs assessment in the Japanese workplace(chemical article maker in Tokyo, 710 employees) in the 10th International Congress on OHS in 2002. The purpose of this study is to evaluate the impact to employee’s lifestyle, arteriosclero-

sis-related laboratory data, self efficacy for health management skills after five years from this OHS provided. Most of employee's lifestyle showed a tendency to improve except for sleeping hours, especially the "Smoking rates" (42.9% to 30.5%) and "Thinking about nutrition balance when eating" (41.1% to 50.9%) were significantly improved. We also found the rates of "employees who could understand the result of the medical examination" increased in 80.7%(vs 70.1%, 3 years before) and "employees who could make self-goal setting about behavior change" increased in 74.5% (vs 64.0%, 3 years before). Among the medical checkup data, only HDL (35.9 to 41.6mg/dl) and triglyceride (261 to 203mg/dl) significantly improved, but obvious improvement generally wasn't seen with indeies related to the arteriosclerosis. This report must discuss about the confounding factor such as the change in the health medical situation, but we could suggested effectiveness about OHS based on needs assessment for employee's lifestyle or health management skills. Our next challenges, providing the OHS "Hirai health strategy towards 21 century, 2nd stage, 2004~2006" has has already begun. Further work on multiple-perspective approaches to needs assessment would seem necessary to promote development of OHS.

ALCOHOL CONSUMTION IN AN INSURANCE COMPANY - AGF

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[ID 1513] - *No. 68 in Poster Area*

· Objective

The systematic identification of heavy drinkers within the framework of an Employee Health Service and conducting of a limited intervention in the form of a structured advisory interview aiming to reduce alcohol consumption.

· Method

Research carried out within the framework of the national EIST survey (Effectiveness of the limited intervention in employee health) organized by the SMTOIF (Société de Médecine du Travail de l'Ouest de l'Ile de France)

- Use of a questionnaire AUDIT (Alcohol Disorders Identification Test)
- The questionnaire is handed out by the nurse during employee medicals
- The result (score) and interpretation of the questionnaire are provided by the doctor carrying out the medical
- If needed, advice to reduce alcohol consumption is given in the form of a limited intervention
- The results are interpreted and compared with socio-administrative data on Access.

· Analysis

Research conducted over 4 months :

- 214 questionnaires returned
- 11 questionnaires not accepted of which 2 by known heavy drinkers.

Socio-professional data :

- 63% are women
- Average age 46.5 years
- 65% live with a partner
- Average length of seniority in company is 22 years
- 76% work in underwriting and claims in broker-facing business
- 62% belong to middle management

Score interpretation :

- Female drinker at risk for scores between 6 and 12
- Male drinker at risk for scores between 7 and 12.

· Results

One woman identified out of the 214 employees responding.

This identification gave rise to a limited intervention on the part of the company doctor.

This result shows the low presence of the risk of alcoholism in the company.

Its employees are mainly women, middle-aged, of good socio-cultural level and with a sustained family life and long seniority in the company.

All of the employees participating showed interest in the explanation of what constitutes the standard glass.

5% of employees declined to answer the questionnaire, 18% of these 5% were target subjects identified as heavy drinkers.

The survey does not therefore allow identification of known heavy drinkers who decline to answer.

On the other hand the survey allows employees to be given information about excessive alcohol use and to be offered advice on reducing consumption when sometimes this is borderline.

· Conclusions

Our research did not reveal excessive alcohol use within a population of mainly women.

On the other hand the use of the questionnaire promoted exchange with employees especially seeking information about the explanation of the risk from alcohol and the meaning of standard glass.

The research was very useful in drawing employee attention to their level of intake and making them aware of the risk to their health of exceeding the recommended maximum levels: 2 standard glasses per day for a woman and 3 standard glasses per day for a man.

DOES PRIVATISATION OF OCCUPATIONAL HEALTH IMPROVE MEDICAL CARE?

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[ID 1730] - *No. 69 in Poster Area*

Figures for the period 2002-04 on private occupational health surgeries (POHS) in Croatia were analysed by ownership. In this country, privatisation has been going on since 1993. Until then occupational health was practiced in community health centres exclusively.

In 2002, most occupational health surgeries (61.3%) were privately owned, this share increasing to 64.2% by 2005. The comparison involves preventive medical examinations done by teams: in all three years of observation, POHS did more examinations (in the range from 6.8% to 15.5%) than such surgeries in health centres. Analysis by structure of examinations in POHS showed periodic worker medical examinations to be the most common (53.3-60.1%) followed by pre-employment examinations (30.3-38.3%), with other (general, targeted and control) examinations accounting for only 8.4-14.7%. As regards consulting rooms in health centres, there too the largest share of the examinations related to periodic health check-ups (45.4-48.1%) and pre-employment examinations (27.7-33.6%). They, however, had a considerably greater portion of other examinations (21.1-25.4%). While health centres established disability in 1.8-2.1% of the workers, POHS established disability in 1.5-1.7% of the workers.

Clients of the services offered by private practice mentioned as advantages working hour flexibility and the possibility of making an arrangement (to be examined on Saturday and in the afternoon) and better equipment of the surgery. The advantage of occupational health surgeries in health centres was their accessibility and the accompanying specialty services in case of need for extra examinations. They also considered that private consulting rooms applied softer criteria in establishing disablement and that it was easier for clients to obtain health certificates there. Occupational health specialists in private practice considered that they had taken over an active role and thus take greater trouble with and spend more time in contact with users than they did when they were health centre employees.

EVALUATION OF HEALTH CONSULTATION SKILL AT WORK PLACE IN JAPAN

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[ID 1818] - *No. 70 in Poster Area*

Introduction

The purpose of this study was to evaluate the qualitative evaluation of health guidance skills as an Occupational Health Nurse(OHN). This time we evaluated and studied the evaluation of health guidance skills in the health consultation scene from the both sides which received guidance and which provided it, with the cooperation of medium-sized and small enterprises.

Methods

We surveyed both workers and OHNs of health guidance at the same time, through the activities on the THP(Total Health Promotion Plan in Japan) from July to August in 2003. Subjects are 62 workers (52 male workers and 10 female workers) from 7 enterprises who receive the health guidance. We made a questionnaire with 11 question items, including an attitude and words of OHN's, atmosphere of the interview room, worker's satisfaction with the guidance , and so on. The way of answer of this questionnaire is (4.That's right, 3.Maybe right, 2.Somehow different, 1.Completely different), and used it as a four-step evaluation scale.

Analysis method: We analyzed the result using the coincidence rate and Wilcoxon Matched-Pair Signed-Rank Test(Wilcoxon MPSR Test). We used SPSS 11.0J as analysis software.

Results
The coincidence rate of the four-step evaluation between the workers and OHNs of health guidance was 21.0%-51.6%.
The highest coincidence rate of question was “an attitude and words of OHN’s ”. The lowest coincidence rate of question were ” being able to express worker’s concern to the OHNs” and “atmosphere of the interview room”.
By using Wilcoxon MPSR Test ,we could get useful question as follows: “getting explanations for the prospect of the health”, ”feeling of security that worker’s privacy was protected”, and “feeling that worker’s life and sense of value was respected” .

HOW OCCUPATIONAL PHYSIOTHERAPISTS CONTRIBUTE TO “INCLUSIVE WORKING LIFE” IN NORWAY
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[ID 1911] - *No. 71 in Poster Area*
Introduction
Occupational Health Services (OHS) in Norway are organized in small units, normally with one doctor, nurse and physiotherapist employed. Each OHS serves either several small enterprises or one bigger enterprise. “Inclusive Working Life” (IWL) is a national intervention program in Norway. The objective is to reduce sickness absence, prevent early retirement and to promote employment of employees with impaired capacity. Companies may become an IWL enterprise by signing an agreement with the National Insurance Service. The OHS is supposed to play an active role in supporting the enterprises in their effort to reach the aims of the intervention program.
Objective
The objective was to identify the main supporting activities given by the occupational physiotherapists.
Material and methods
Altogether 87 occupational physiotherapists were included. They received a questionnaire identifying several types of activities. All activities were a part of their support to the enterprises. The questionnaire was fulfilled and returned by 77 of the participants. In addition, 10 of the physiotherapists were interviewed by telephone.
Results
The questionnaires showed that 76 of the 77 physiotherapists contributed to reduction of the sickness absence. The enterprises asked for their support in several ways. Activities with focus on ergonomics, improvement of the working conditions, and a good dialogue with the employees had highest priority. Training and individual rehabilitation programmes were given less priority. The enterprises seemed less interested in support from the occupational physiotherapists in preventing early retirement and promoting employment of functionally impaired workers.
Conclusion
The occupational physiotherapists play an active role in supporting the IWL enterprises in reaching the aim of reducing the sickness absence. Activities concerning good working conditions and a good dialogue with both employer the employees had highest priority.

CHILD LABOUR

PATTERNS OF DAYTIME SLEEPINESS IN WORKING TEENS ATTENDING EVENING CLASSES
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[ID 128] - *No. 72 in Poster Area*
The aim of this study was to evaluate patterns of sleepiness, comparing working and non-working students.
A field study was carried out among high school students, attending evening classes (19:00-22:30h), of a public school of São Paulo, Brazil. Workers (n=51) and non-workers (n=41), ages 14-21 years old participated. Mean weekly working hours were 45.0 (SD= 2.0h). A comprehensive questionnaire about working and living conditions was answered. Activity-rest measurements were continuously recorded with Actigraph (Ambulatory Monitoring, USA). Activities, sleep dairies and Karolinska Sleepiness Scale - KSS (6 times per day, including at time of waking and before going to bed) were also reported during 7 consecutive days. Main variables were tested using ANOVA test for repeated measures with two factors (time and work).
Working students were sleepier than non-workers on Mondays after lunch (13:00-15:00 hrs) ($F(4,232)= 3.54;p=0.01$), on Wednesdays during classes (19:00-21:59hrs) ($F(4,224)= 3.53;p<0.01$) and Fridays before going to bed (22:00-00:59h). On Mondays workers showed higher sleepiness than non-workers (Means: 4.06; s.e. = 0.25 and 3.39; s.e. = 0.27, respectively). On Wednesdays the KSS means were 4.58; s.e. = 0.26 for workers and 3.76; s.e. = 0.28 for non-workers. On Fridays the KSS means were 6.22; s.e. = 0.34 for workers and 5.00; s.e. = 0.34 for non-workers.
Working teens have to follow a stricter routine of their sleep-wake cycle than non-workers due to their school-work duties. It was earlier reported that working adolescents had shorter sleep periods during all school days than the non-working ones. It is now shown that daytime sleepiness is moderately higher during the evening classes.
The patterns of sleepiness were different between working and non-working students. In working students daytime sleepiness is moderately higher during the evening. It can have negative effects on quality of life and school development.
Acknowledgments: FAPESP; CNPq; CAPES, PIBIC

THE UNDERAGE WORKER AND THE OCCUPATIONAL ACCIDENTS IN BRAZIL
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[ID 239] - *No. 73 in Poster Area*
Brazilian companies of small and medium sizes employ workers without registration that are under the legal age. When they suffer occupational accidents (OA), these are assisted by the public system of the city Of the total of 6122 medical accident victims assisted in a university hospital of Ribeirão Preto (SP), referring to two years, seeking for medical and nursing informing regarding AO with workers underage. Authors found 22 children working in different companies and they had the following characteristics: 13.6 were from 6 to 12 years old; 50% were from 12 to 16 years old, 36.4 were from 16 to 18 years old. The causes evidenced AO in 36.4 due to machines with motor, 18.8% due to bakery machines, 13.6 their due to drilling machines. These children suffered amputations, severe traumas and other similar problems. In spite of forbidden, children are used to work. Orientations to the families could be made, to show that problems can happen harming them in physical and mental development.

RISK PERCEPTION OF APPRENTICES IN INDUSTRY, MANISA TURKEY.
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[ID 357] - *No. 74 in Poster Area*
Objective: The study was conducted to define quantity and quality of the risks and effecting factors.
Method: A cross-sectional study was done in a apprentices education center in the city of Manisa. A questionnaire form was used to collect data in May 2003. Total of 544 apprentices answered the self reported form, which had socio-demographic questions and questions on 12 different risks and their occurrence in the workplaces. Sum of the number of known risks defined as risk perception score (RPS). Data was stratified according to the sectors. In order to analyze relations between independent variables and RPS “t test” and “ANOVA” methods were used; then significant results were entered into a multiple lineer regression model.
Results: Mean age of the study population was 17,7±1,5; mean work experience were 2,4±1,7 years. Apprentices reported that, they start to work at age 14,7±1,7. 4/5 of the participants were male (79.6%, n:433). Half of the participant (49.1%) were employed and trained at very small size enterprises (1-9 employees), only 15.8% of them were work at large companies (251+ employees). Mean RPS was 2.8±2.6 and, 12,9%

of the participants did not know any risks.
Among the independent variables, sex, age, work experience, personal protective equipment usage, size of the enterprises, school level was entered into the model.
Conclusion: Size of the enterprises was the single factor which had an effect on RPS in this study; as size grows RPS rises. Enterprise size is very much correlated with the institutionalization process of occupational health and safety system. That might explain our findings.

EXPLORATIVE WORK: PROFILE AND EXPERIENCE OF VICTIMS
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[ID 391] - *No. 75 in Poster Area*
Introduction: trafficking in human beings, especially in minors and young women, for the purpose of exploitative commercial sex work become an issue of major concern globally, because of its rapid growth in recent years. Nigeria and Italy are heavily affected by the problem of human trafficking in minors and girls for sexual exploitation resulting in the signing of agreements between the two countries to curb the phenomenon.
Objectives: this study was conducted to analyse the characteristics of victims of trafficking, with the hope of finding the root causes of this problem and consequently solution also to the problem
Methodology: study was conducted in Benin City, Nigeria among women victims of trafficking that had been repatriated home from Italy. Data was collected from victims through in-depth interviews and focus group discussion after informed consent had been obtained from them.
Results: All the victims interviewed were females and most of them were from low socio-economic backgrounds with most of their parents engaged in low-income occupation. Some victims agreed to be trafficked in order to assist their poor families. Most of them had primary/ secondary education and some trained as hairdressers or dressmakers, but found the incomes meager compared to what they were told they can earn abroad. At destination country, they were at the mercy of employers who seized their travel documents. They were also compelled to prostitute by their employers and all their earnings collected by them.
Conclusion: Trafficking is predominantly a problem of women and almost all victims trafficked are from poor background, so poverty is at the root of this scourge. It was also established that victims are exploited both in terms of the type of work they are forced to do, and in their wages.
Recommendations: Governments of nations where these persons are trafficked from must improve conditions of living so that these persons will not fall prey to exploiters, and traffickers should be penalized.

CHILD LABOUR AND HEALTH: DETERMINANTS, PROBLEMS AND PERSPECTIVE IN NIGERIA
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[ID 392] - *No. 76 in Poster Area*
Introduction: children are actively growing and this process entails not just physical development but mental cognitive, social, moral development as well. Although children must learn to do some tasks as they are growing and participate in various activities as members of the family, they cannot be expected to work the same hours as adults or even under the same conditions.This study was conducted to identify factors that encourage child labour and consequences on the health of children involved.
Methodology: a cross sectional study was conducted on 156 randomly selected children involved in street hawking, an aspect of child labour in Benin City, Nigeria. Information was collected through the use of an interviewer administered structured questionnaire.
Results: the mean age of the children studied was 12.9±2.3 with a male: female ratio of 1:2:1. Eighty one (51.9%) of the respondents were still in school while 75(48.1%) were not in school. Twenty three (14.8%) of the respondents were full orphans and average family size was 6.2±2.3. Many (41.7%) of them worked for their parents and mean working hour for the study was 8.13±2.3 hours.17(10.9%) of the respondents had been sexually abused and 45% had been physically infirmed from RTAs as well as from falls on highways and this was greater among those that worked for over 6 hours daily.The children had various health complaints like headaches, body aches, fever and on examination 28(34.2%) were malnourished.
Conclusion: study has again highlighted that the determinants and problems of child labour, after all these years are still very much with us. It is hoped that efforts to stem this social ill be stepped up vigorously.

CHILD AND ADOLESCENT WORKERS IN RIBEIRÃO PRETO-SP, BRAZIL
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[ID 803] - *No. 77 in Poster Area*
It is common knowledge that misery and poverty not only contribute to social exclusion, but also favor child and adolescent work, mainly in developing countries. However, other factors are responsible for this undue participation, especially the cultural idea that work “dignifies” the child, which emerged in the Industrial Revolution and was strengthened by capitalist expansion. Child workers are physically, mentally and socially exposed to unhealthy conditions and risks of Occupational Accidents (OA). This study aimed to identify causes and types of OA and medical diagnoses. We surveyed 1,589 records of people under 18 attended at a district health service during one year. 56 of these contained OA. The ages of accident victims ranged from 11 to 17 years; 75% were up to 17 years old. The most common causes of OA were contact with blunt and cutting material (39.3%), traffic accidents and run-overs (19.6%), falls (8.9%), among others. 60.7% were typical OA and 25% commuting accidents. The main medical diagnoses (33.9%) were hand and fist injuries caused by knife use, followed by 7.1% of unspecified soft tissue disorders related to excess use and pressure. Health professionals produced inadequate registers, which impairs future analysis, as statistical information does not give a reliable picture. Permanent education programs are needed to train these professionals with a view to producing adequate official OA data. Moreover, public efforts are needed to decrease the misery and poverty that give rise to the need for children to work.

WHAT CONTRIBUTION CAN ACADEMIA MAKE TO THE ERADICATION OF HAZARDOUS CHILD LABOUR?
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[ID 1328] - *No. 78 in Poster Area*
Scientific sessions at Iguassu, Brazil (ICOH 2003) raised awareness of the worldwide extent and nature of hazardous child labour in the context of the broad theme of “Equity in occupational health”. Occupational health research is predominantly western-centred in its concern with the effect of work on health and the effect of health on work. Child labour whilst clearly fitting within the definition of occupational health is very poorly represented in the academic literature relating to health. ICOH did not find it appropriate to establish any separate programme for child work.
In response to this challenge ICOH members in the UK established an academic network in 2004 to identify the role academic researchers and teachers could play. It now comprises about 30 members, mainly in the UK, in clinical, scientific and social science disciplines.
The purpose of the interdisciplinary network is to provide a focus for academic activities in relation to child labour and health. The network believes that academics have a contribution to make to the ending of exploitative and hazardous child labour. Academia can support this aim by promoting teaching, research and advocacy. A significant benefit is the application of academic rigour and hence international credibility to research. The inclusion of child labour in teaching is a further important support, informing future leaders and disseminating knowledge to an international audience.
The network has met 3 times a year and corresponds electronically throughout the year. International links include Brazil, USA, Ghana and South East Asia.
ILO and WHO have both expressed considerable interest at the development of the network and are including the network in their discussion on collaborative working, in particular “Task Force 3: Child labour and Adolescent Workers”.
Useful contacts and exchanges are already evident from these first two years meetings with possible collaborative projects under discussion.

PRIMARY INVESTIGATION OF CHILD LABOUR IN INFORMAL SECTORS IN VIETNAM

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[ID 1354] - *No. 79 in Poster Area*

Protecting children is one of public health concerns in Vietnam. According to the Code of Labour Protection, employing children under 15 is banned but child labour is seen in some workplaces in informal sectors , especially in rural areas.

Evaluating the actual situation of child labour is essential to occupational health scientists and policy makers for implication of relevant policy and measures to reduce and eliminate child labour.

This primary investigation was carried out children at work in informal sectors in 3 districts in the north of Vietnam.

The results showed that:

- In general, children were not seen in very heavy and dangerous work, but some children were carrying some jobs which was considered heavy to their physical capacity.
- Working environment at some places was polluted by micro bacteria, dust, toxic gas (1.4 - 8 times of MAC). Besides, ergonomic hazards were problem.
- The emerging health problems of children at work were allergy, noise and throat inflammations, musculoskletal disorders.

It needs to pay attention and study more on this problem.

HEAVY METAL EXPOSURE IN CHILDREN WORKING AT A WASTE DISPOSAL SITE, AND IN REFERENT CHILDREN FROM MANAGUA, NICARAGUA.

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[ID 1467] - *No. 80 in Poster Area*

Background

Around one thousand persons, of which more than 50% are children and teenagers, are collecting recyclable waste at the municipal waste disposal site in Managua. The waste is burned on open ground to retrieve metals. The site is located directly at the shore of lake Managua. Fish from this lake is an important part of the diet. This study assesses heavy metal exposure in these child workers, and in referents.

Method

Blood samples were obtained from 103 child workers aged 6-15, 102 referent children from a nearby area, and 34 children from a remote city area, with similar socioeconomic conditions. B-Pb, B-Cd, and B-Se were analyzed by ICP-MS and B-Hg (total) by cold vapour atomic fluorescence spectrometry. Additionally, determination of lead content in soil samples from the waste disposal site and the nearby area was performed by Induced Coupled Plasma Optical Emission Spectroscopy (ICP-OES).

Results

Almost one third of child workers had B-Pb values exceeding 100 µg/l. B-Hg, B-Cd, and B-Se were within reference values, but children working at the waste disposal site had higher Pb, Hg and Cd values than non-working children. For Hg there was also a correlation with fish consumption. Gradients in blood lead levels and for lead in soil between the waste disposal site and the nearby area suggest that the waste disposal site is a source of lead contamination

Conclusion

In conclusion, our study results imply that lead exposure should be of concern. B-Pb levels observed in waste disposal site child workers and in children living in Acahualinca are directly relevant for health risk assessment, not only for these children but also for the next generation. There is a current concern regarding potential neurodevelopmental effects at fetal exposure levels as low as 50-60 µg/l and many of the examined girls will be mothers in the near future. As many as 21% of adolescent females in Managua are mothers or pregnant.

ADOLESCENTS AND REPORTED WORK INJURIES: WHO IS TO BLAME?

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[ID 1795] - *No. 81 in Poster Area*

Introduction: Brazilian researchers (Fischer et al., 2002, 2003; Martins et al., 2003 and Santana, 2003) showed a high incidence of adolescents in full-time jobs (≥40 hours per week) and suffering work injuries.

Objectives: To compare knowledge and practices to prevent work hazards adopted by high school students without job experience (non-workers) and with job experience (current workers or unemployed).

Methods: A comprehensive study was conducted among 53 high school students (age 14-21 years old) in 2002 and 2003, in a public school of São Paulo, Brazil. Among those, 32 reported present or past job experience (employed and unemployed) and 21 never worked. Adolescents were interviewed and answered the following questions:

a-) In your opinion why work injuries happen?

b-) How do you avoid work hazards?

All interviews were recorded and transcript.

Analyses were performed using the software “quali-quanti”, developed by Lefèvre & Lefèvre (2003). This software allowed structuring a collective discourse of central ideas.

Results:

The discourses reported by adolescents **with job experience** to explain causes of work injuries were about: employee carelessness, employer irresponsibility, bad luck of the employee, lack of training, unsafe workplaces or never thought about this subject. According to the adolescents **without job experience** the discourses were about: employee carelessness, employer irresponsibility or never thought about this subject.

As way of prevention against work injuries both groups of adolescents (**with and without work experience)** built the following discourses: paying attention to what they are doing, wear personal safety equipment, avoid to come close to risky areas, do nothing or never thought on this subject.

Conclusions: Distinct discourses on hazards at work and prevention of work injuries were reported by adolescents with and without job experience. However both groups showed lack of knowledge about occupational hazards and methods of injury prevention.

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WORK AND MENTAL HEALTH AMONG HIGH SCHOOL ADOLESCENTS

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[ID 1856] - *No. 82 in Poster Area*

Introduction: Adolescence is a critical stage of life where physical, psychological and social changes occur. Getting into the labor market is part of the adolescent’s transformations and it could be a decisive issue in their lives with (negative and/or positive) consequences for their full development. Depression in this age group is currently considered to be usual and recurrent (Saint-Clair, 2002).

Objective: To investigate factors associated to depression in workers and non-workers high school adolescents of São Paulo, Brazil.

Methods: Out of the 1,148 high school students who were enrolled in day and night classes, a total of 724 (63%) students participated in the first phase of the research and answered a questionnaire to characterize their life and health conditions. It was also included depression and self-esteem scales (Spitzer et al., 1999). In the second phase, working and unemployed students answered two questionnaires on working conditions. Data was evaluated using Pearson Chi-square and logistic multivariate analysis.

Results: Analysis using the depression scale indicated a total of 54 adolescents with depressive symptoms. Among those 28 students attended morning classes (7,6%) and 26 were in evening classes (7,3%). There were no significant differences on prevalence of depression among working and non-working teens. This health condition was not previously diagnosed as reported by the high school students. It was not reported any usage of medication.

The logistic multivariate analysis showed depression associated with reported sleeping problems (OR=5.08; p=0.002), being female (OR=2.38;

p=0.036), consumption of alcohol (OR=2.70; p=0.011). As a protection factors were observed: a self-perception of good health (OR=0.54; p=0.009) and level of illumination of the workplace (good X poor) (OR=0.17; p=0.003). Reported family problems were used as a control variable in the final regression model.

Conclusion: Depression is an important health disorder which identification and treatment is often missed and represents a serious public health concern.

Acknowledgements: FAPESP 04/03886-0; CNPq (470917/2003-2); CAPES e PIBIC

Reference

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PHYSICAL HAZARDS AT WORK

PHYSICAL HAZARDS ASSESSMENT IN THE UNIVERSITY WORKPLACES

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[ID 278] - *No. 83 in Poster Area*

Health Physics Service, operating in University environment, attends to the major physical agents which present health hazards in University workplaces, performing monitoring procedures and controls to assure protection and safety for workers and public.

Hazards examined in the workplaces include the following:

- Ionising radiation: radioactivity presence in workplace is evaluated, including artificial sources (X-rays, usage of gamma and beta radionuclides, etc.) and natural emissions, particularly alpha particles from radon daughters.
- Non-ionising radiation (electro-magnetic fields): the electric and magnetic fields at network frequency produced by electrical equipments and the magnetic static fields produced by superconductor magnets are detected.
- Noise: sound levels produced by sources including equipments, work processes, aspirators and ventilation systems and power tools in specific workplaces are examined.

In this report a synthesis of hazards evaluations carried out at Parma University is presented, including the results of control actions performed.

For every field, the physical problems and the accordance with national regulations will be discuss.

Some remarks concerning the preventive measures and the possible remedy actions will supplement the presented survey.

THE ACTIVITIES OF ISPESL RADON LABORATORY MEASUREMENT ON RADON OCCUPATIONAL EXPOSURE

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[ID 920] - *No. 84 in Poster Area*

ISPESL (Italian National Institute of Occupational Safety and Prevention) is a technical and scientific body of the Italian National Health Service with the mission of guaranteeing safety and health of workers. In the field of ionising radiation ISPESL have created a Radon Measurement Laboratory with the aim to support the employer in his legal obligations provided in Italian legislation on the prevention of workers' radon exposure in workplaces (implementation of the 96/29/EURATOM Directive).

Radon is a natural radioactive gas; by the United Nation Scientific Committee on the Effects of Atomic Radiation (UNSCEAR) a significant contribution to world population exposure to natural sources of radiation is due to radon gas. Radon is considered a typical indoor hazard and it is one of a very small number of substances reported in the Group 1, according to the classification introduced by the World Health Organisation (WHO-IARC). In particular is the second agent - after tobacco smoke - connected with lung cancer risk. In this paper the current specific legal situation in Italy based on EU directives is presented and principal topics of ISPESL Radon Measurement Laboratory are given, including (1) technical performances of the passive radon dosimeter methodology, (2) quality control procedures, (3) quality assurance procedures, (4) public communication procedures. The main results are discussed and a future perspectives have been suggested.

STUDY OF DIAGNOSIS IN DYSBARIC OSTEAL-DAMAGE WITH X-RAY AND CT SCAN

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[ID 1898] - *No. 85 in Poster Area*

Objective To compare the results of X-ray and CT scan in diagnosis of dysbaric osteal-damage and to explore early diagnosis with CT scan. Methods Examination of both shoulders, both hips and both knees with X-ray and CT scan in 66 divers of more than one year of diving work was carried out. Result The most fragment site of dysbaric osteal-damage was the upper femurs, followed by lower femurs, upper humerus and upper tibias. The detection rates of X-ray and CT scan were 42.4% and 81.8% respectively. The diagnosis concordance rate of X-ray and CT scan was 93.2%; the early diagnosis rate of CT was 68.4%. Conclusion CT scan had higher detection rate than X-ray and had early diagnostic value and took measure of prevention and treatment for dysbaric osteal-damage.

THERMAL FACTORS

MUSCULOSKELETAL DISORDERS IN COLD WORK ENVIRONMENTS

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[ID 141] - *No. 86 in Poster Area*

Knowledge in the relationship between musculoskeletal disorders and cold exposure can be said to be limited by virtue of the few hypothetical physiological approaches that are used in the study of such relationship. The evaluation of cold exposure as an etiologic or contributing factor of musculoskeletal symptoms or diseases is difficult and there is a lack of controlled studies in this filed.

Musculoskeletal disorders have multi-factorial origin including workload, psychosocial factors and organization factors. These conditions make its difficult to evaluate the effect of cold exposure (such as a causative factor) and possibly make it a modifying factor.

However, some epidemiology studies have shown that a relationship exist between exposure to cold environment and some musculoskeletal disorders, especially for neck and upper extremities.

In this study, a cross-sectional epidemiologic approach is used to measure the prevalence of perception of musculoskeletal symptoms between cold-exposed and non-cold exposed workers. Data is collected using the Standardized Nordic Questionnaire on 162 workers in a large meet processing company in Colombia. The workers were divided in two groups: Exposed group (50 workers) working in very cold areas +2°C, and Non-exposed group (112 workers) working in less severely exposed areas +9.4°C.

Results analysis showed a high prevalence of musculoskeletal symptoms among the most exposed workers, especially for low back, neck and shoulders (48%, 36% and 24%). The estimated relative risk for neck is 11.2 (95% CI 1.34 - 93.41) while that for low back is 4.48 (95% CI 1.61 - 12.42). Based on this, we conclude that the association between cold exposure and musculoskeletal complains or diseases is plausible. Yet, we argue that there might possibly be the impact of additional factors (or contributing mechanism) to our observation that are still obscure and which need to be explored through further research (both experimental and epidemiological) using either a cohort study or case-control study designs.

CARDIOVASCULAR RESPONSE TO WORK UNDER CONDITIONS OF COLD MICROCLIMATE

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[ID 746] - *No. 87 in Poster Area*

The number of cold-exposed workers continues to grow. The problem of health effects in those people remains unsolved.The aim of our study was to evaluate the cardiovascular parameters; blood pressure and heart rate in workers occupationally exposed to cold microclimate The examinations were carried out in group of 102 workers (41 women and 61 men) of cold storage, aged 39.1±.9.9 years with period of employment in cold environment over

12 years. The study group were subdivided into four subgroups, according to microclimate conditions (I - 28 workers - ambient temperature –26°C; II-44 workers, temperature 10-14°C; III - 8 workers, temperature 18-20°C; IV, 22 workers, temperature 0-10°C). The workers had the following performed: general medical examination, cold pressor test (CPT), 24h ECG and ambulatory blood pressure monitoring (ABPM). Mean blood pressure (BP) and heart rate (HR) values in all groups were normal according to the Steassen criteria. However, systolic and diastolic BP (BPS, BPD) during daytime (D), and at night (N) were significantly higher in group IV comparing to II. Mean HR, both during daytime and at night hours, BP and HR day/night ratio did not differ between the groups. Analysis of BP in relation to gender revealed that in women BPSD and BPSN were significantly higher in group IV than in II. Among the people with hypertension (18 men and 5 women), the men reacted on CPT either by an increase or a reduction of BP while all women reacted by an increase in BP.
Our data indicated that in workers exposed to cold microclimate the physiological reaction depend on gender and ambient temperature. Women seems to be more sensitive to cold stress than men.

HEAT ENVIRONMENT IN CLASSROOM AND THERMAL SENSE AMONG SCHOOLTEACHERS

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[ID 1050] - *No. 88 in Poster Area*

Urban heat island phenomenon elevates temperatures of in-house environment where air conditioners are not installed. We targeted 18 public schools, elementary and junior-high, situated in a mega city, to evaluate heat environment in their classrooms and thermal sense among schoolteachers there. From June to September 2005, except for summer vacation period, we consecutively measured wet-bulb globe temperature (WBGT), air temperature, relative humidity, and globe temperature by WBGT Meter (type 103, Kyoto Electronics Manufacturing Co., Ltd), for 5 times per day and compared the results with meteorological data of that city. We also asked schoolteachers at work to answer questionnaires regarding thermal sense, amount of sweating, and comfortableness for teaching.
Air temperature, globe temperature, and WBGT data peaked at 2 pm in most cases. Among 6,072 measurements of air temperature by July 20, 3,630 (59.8%), 1,660 (27.3%), and 244 (4.0%) reached to 28 C, 30 C, and 32 C or more, respectively. Among 6,081 measurements of WBGT, 4,083 (67.1%), 590 (9.7%), and 10 (0.2%) reached to 25 C, 28 C, and 31 C or more, respectively. Average air temperatures at most of the schools were well correlated to those at meteorological observatory up to R^2=0.80 and about 1 C lower in average. Relative humidity data were about 6 % higher at schools than those at the observatory. Subjective symptoms of schoolteachers seemed affected by multiple factors besides environmental indices. Average WBGT was significantly elevated as the measured floor became higher; data at 1st, 2nd, 3rd, and 4th floor were 25.7, 25.9, 25.9, and 26.1, respectively. WBGT was 0.3 C lower when the windows of the classroom were kept open.
Heat environment in these classrooms can be improved by shielding radiation heat at the roof of the school building and also by allowing natural breeze come into the classroom.

EXTERNAL AUDITORY TEMPERATURE AND SYMPTOMS OF WORKERS EXPOSED TO HEAT

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[ID 1212] - *No. 89 in Poster Area*

When heat exposure at working environment cannot be controlled, monitoring core temperature of workers increases its importance. Continuous monitoring of core temperature among workers during actual work may be enabled by measuring trapped air temperature inside the external auditory canal (Teac) by inserting ear plug equipped with thermister thermometer (hereafter earplug thermometer).
We performed this study to clarify whether Teac correlates with subjective symptoms of real workers exposed to heat.
We asked 20 workers, 10 maintenance workers repairing facilities of large steel plant and 10 recycle plant workers pulling used electronic machines to pieces, to engage in real work while Teac was continuously recorded more than 4 hours during afternoon work by earplug thermometer connected to wireless data logger (TRT-51,T&D). Subjective sense of fatigue and heat was evaluated using 5-grade visual analog scale after the work. Thermal environment was monitored by WBGT meter (type 101, Kyoto Electronics Manufacturing Co., Ltd).
During 2 consecutive days of measurements, subject workers were engaged in repairing of coke oven, oil cellar, and material yard and in recycling of refrigerators, air conditioners, and washing machines. WBGT at workshop ranged from 26.5 C to 30.5 C. Teac was 36.9 C + 0.2 C (mean + S.D.) ranging from 35.6 C to 38.0 C and changed individually depending on the type of the work. The number of workers exhibited mean Teac of 36.0, 36.5, 37.0, 37,5 or more were 4, 7, 8, 1, respectively. Subjective sense of fatigue and heat among both maintenance workers and recycle workers were significantly correlated to mean Teac values (R^2=0.45) as well as peak Teac values (R^2=0.52), though each group of workers were working in the same working environment.
Mean and peak values of Teac measured by earplug thermometer may be used as indices of biological monitoring for workers exposed to heat.

VIBRATION AND NOISE

A CROSS SECTIONAL STUDY OF HEARING THRESHOLD AMONG WORKERS AND NOISE EXPOSURE IN A METAL FABRICATION FACTORY, SELANGOR, MALAYSIA

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[ID 192] - *No. 90 in Poster Area*

Introduction. A cross-sectional study was conducted in a metal fabrication factory in Selangor, Malaysia. The study was conducted among 41 workers who work at five different working areas which were the turret area, welding area, grinding area, assembly area and the administration. The objective were to determine the noise exposure and the relationship with the hearing threshold levels among the exposed workers. Methods: The study was conducted using questionnaire, a sound level meter to measure the level of noise exposure in the factory and a dosimeter to measured the individual noise dose exposure. Audiometric test was performed to determine the workers hearing threshold. Results: Prevalence of hearing impairment for both ears was 4.9%. The study results showed the level of noise produced by the machine and hand tools for grinding and assembly area exceeded the action level 85 dB(A). The level average (LAVG) for the machine in grinding area was 88.4 ± 3.8 dB(A) while for the hand tools used by the workers in the assembly area was 87.3 ± 3.3 dB(A). The workers in the welding and grinding areas were exposed to noise dose greater than action level 85 dB(A). The level average (LAVG) for welding area was 88.4 ± 3.8 dB(A) and the time-weighted average (TWA) was 78.4 ± 3.8 dB(A). For grinding area, the level average (LAVG) was 90.3 ± 5.9 dB(A) and the time-weighted average (TWA) was 80.3 ± 5.9 dB(A). The result showed there were no significant relationship between duration of works, dose exposed and the workers hearing threshold. Conclusions: The results of this study shows that a need for an effective control and preventive measures by the management in this small and medium industries to protect the workers from the losing their hearing ability.

LASER DOPPLER PERFUSION IMAGING IN THE ASSESSMENT OF PERIPHERAL CIRCULATORY FUNCTION OF WORKERS EXPOSED TO HAND-ARM VIBRATION (REPORT-2)

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[ID 472] - *No. 91 in Poster Area*

This study aimed to evaluate the peripheral circulatory function of the workers exposed to hand-arm vibration using laser Doppler perfusion imaging technique.
We examined 31men (mean age; 60.5±5.1 years) suffering from hand-arm vibration syndrome (HAV) and 24 unexposed controls of similar age without any sings of relevant symptoms. Repeated two-dimensional image scanning of the skin blood perfusion of the middle finger was performed every 2 min before, during and after the cold water immersion test (10°C, 10min) by a laser Doppler perfusion imager (Perimed, PIM-II). The average blood perfusion of the fingertip was calculated for each image and treated as the parameter for quantification of alterations in skin blood perfusion.
When compared to the controls, the HAV patients had significantly lower

values of skin blood perfusion at baseline. The skin blood perfusion in both groups reduced markedly as a result of immersion of the hand in cold water. In the controls, however, the perfusion value increased gradually until the end of the immersion, while that in the HAV patients remained at the lowest level. After removal of the hand from the cold water, the blood perfusion in the controls increased rapidly, but in the HAV patients it had a slight increase immediately after the cold immersion, and afterwards it did not tend to recover as the time span increased.
There were significant differences in the perfusion values of the two groups in the latter phase of the cold water immersion and the following recovery periods.
These findings suggest that the laser Doppler perfusion imaging technique enables visualizing and quantifying the peripheral vascular effects of cold water immersion on the finger skin blood perfusion. It seems, therefore, that the technique can provide more detailed and accurate information that may help detect the abnormalities in the digital circulation among patients with cold induced vibration white fingers.

LASER DOPPLER PERFUSION IMAGING IN THE ASSESSMENT OF PERIPHERAL CIRCULATORY FUNCTION OF WORKERS EXPOSED TO HAND-ARM VIBRATION (REPORT-1)

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[ID 524] - *No. 92 in Poster Area*

The purpose of this study was to examine the usefulness of laser Doppler perfusion imaging technique in the assessment of the changes in finger skin blood perfusion in response to cold water immersion.
The subjects were 42 healthy men (mean age; 43.3± 7.0 years) who were not exposed to hand-arm vibration. Simultaneous measurements of finger skin blood perfusion and temperature were performed every 2 min before, during and after the cold water immersion (10°C, 10min). The blood perfusion was measured by the laser Doppler perfusion imager (Perimed, PIM-II), and the laser beam scanned over the area including the index, middle, and ring fingers. The average numerical perfusion value of a given area of finger was calculated for each image.
When the hand was immersed in the cold water, the skin blood perfusion reduced markedly and a cold- induced vasoconstriction was noticed, and afterward, it showed a slight gradual increase until the end of the cold immersion. After the removal of the hand, the skin blood perfusion recovered and nearly attained the baseline value. When comparing the blood perfusion values between the tested three fingers and the phalanges within a finger, the highest value was observed in the ring finger and at the distal phalanx of finger during the course of observation. The skin blood perfusion and temperature in fingers were closely correlated with each other at baseline and the recovery phase, while it had a tendency to be weakly correlated when the hand was immersed in cold water.
These findings suggest that the laser Doppler perfusion imaging technique employing multiple points recording and spatial mapping will become an important quantitative tool for the study of changes in the finger skin blood perfusion after application of cold water immersion and thus can be used for the assessment of the peripheral circulatory function of the workers exposed to hand-arm vibration.

NOISE EXPOSURE, HEARING LOSS AND CARDIOVASCULAR RISK FACTORS OF EMPLOYEES IN CONSTRUCTION INDUSTRY

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[ID 795] - *No. 93 in Poster Area*

Problem

We analysed data of preventive medical checkups for associations between noise exposure in special professional groups, hearing loss and several circulatory and metabolic parameters.

Methods

Data: 81,412 records of the years 1991-2002, males 18-65 years old, audiometric examination (aerotympanal conduction) without one-sided hardness of hearing. Most frequent professions: bricklayers (21.4%), technical firms (11.4%), painters/varnishers (10.5%), carpenters and roofers (8.4% every) and 4.3% white-collar workers. *Statistics:* t-test, analysis of variance (snk-test), analysis of cluster centers.

Results

Carpenters have with more than 90dB the highest exposure to noise, painters and white-collars with less than 80dB the lowest (on average 81-89dB for the other professions). We found an association of noise exposure and average hearing loss at a frequency of 4kHz for age groups (strata of 10 years) above 25 years: higher exposure is associated with higher hearing loss ($p<0.05$). Furthermore, employees with more intensive noise exposure have a higher level ($p<0.05$) of systolic blood pressure. Vice versa, employees with low hearing loss up to 12dB (lower tertile of distribution of 4kHz hearing loss) show especially in age groups above 45 years lower systolic blood pressure ($p<0.05$).
Pathological findings in cardiovascular risk factors (systolic blood pressure, triglycerides, cholesterol, glucose) are related to higher hearing loss in 3-6kHz frequencies (univariate analysis $p<0.05/0.01$) in the age groups up to 45 years. Analyses of clusters for employees less than 46 years old with age, circulatory and metabolic parameters as cluster variables reveal - when same age structure is given - higher hearing loss even for clusters of persons with metabolic syndrome ($p<0.05$).

Discussion

Analyses of preventive medical checkup data proved associations of noise exposure and hearing loss. Different mathematical methods unearthed reproducible relations between hearing loss and cardiovascular risk factors. A forward displacement of cardiovascular or metabolic disorders caused by noise exposure may be presumed.

HAND-ARM VIBRATION SYNDROME: SUBJECTIVE SYMPTOMS AND FUNCTIONAL CAPACITIES IN POLICEMEN USING MOTORCYCLES

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[ID 1039] - *No. 94 in Poster Area*

INTRODUCTION

Research on military population indicates that the motorcyclists have higher prevalence and severity of reported shoulder trouble than police car drivers. However, such epidemiologic studies were not examining the relationship between motorcycle driving and hand-arm vibration syndrome.

METHODS

All policemen on duty in Bari's province, who were available, were interviewed. We collected information about age, occupation, daily motorcycles use, drinking and smoking habits, sports practiced, previous accidents or diseases and presence of subjective symptoms.
US- Doppler, Thermal Threshold Test (TTT) of upper limbs and electroneurographical examination of median nerve, were employed to evaluate disturbance in the peripheral circulatory and peripheral nerves in all subjects.
Based on the job, the workers were classified in four occupational risk groups, with differing levels of exposure to motorcycles driving.
We conducted a descriptive statistic and an ANOVA of continuous variables.

RESULTS

The sample consisted of 70 males; the mean age was 36,5 ± 5,88. Of them 16 (22,86%) smokers, 50 (71,43%) were non- smokers and 4 (5,71%) missing.
Symptoms and vascular alteration were more common in policemen using motorcycles than other police force personnel ($p<0,01$). Adversely, in different occupational groups there were not differences based on electroneurographical and TTT results.

DISCUSSION AND CONCLUSIONS

This study found a higher presence of functional alterations among motorcycle drivers. It seems as if exposure to hand-arm vibration may be associated to peripheral vascular lesion with dose- response relation, but further investigations are needed.

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ACOUSTIC CHARACTERISTIC CHANGE OF HEADPHONES ATTACHED TO LONG-USED HEAD SETS AND ITS RELEVANCE TO HEARING LOSS

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[ID 1223] - *No. 95 in Poster Area*

In 2005, we experienced a temporary hearing loss case of a young operator at a call center. Otolaryngologistic evaluation suggested the case was caused by hearing loud noise through a long-used headphone.
This study evaluated acoustic characteristic changes of the headphones attached to headsets used more than 2 years by operators at a call center. Temporally threshold shifts among the call center workers were also evaluated.
We measured acoustic characteristics of 5 old headphones and 1 new headphone (FC760A13, Fujitsu Ltd.) by using an artificial ear (4153, B&K) and a frequency analyzer (audio test station, B&K). Equivalent continuous noise exposure levels (LAeq) through the new headphones worn by 6 operators were directly measured while at work using a probe microphone (4182, B&K) connected to an amplifier (NEXUS conditioning amplifier, B&K), and a sound level measurement system (PULSE system 3560C, B&K). Hearing thresholds of 6 operators were also measured before and just after the 8 hours work using audiometer (AA-79, RION) to calculate temporary threshold shifts (TTS).
Sound emission levels of the old headphones measured by an artificial ear were more than 5 dB lower than those of the new headphone at any frequency bands. In the range below 1,000 Hz, the lower the frequencies were, the more the levels were declined. LAeq of the new headphones used by operators ranged from 77.0 to 90.1 dB(A). TTS was not observed among 6 operators.
We suspected TTS might occur when operators continue to use old headphone with deteriorated acoustic characteristics, because they have to dial up the volume of old headphones when those cannot reproduce clear human voice. Guideline for exchanging headsets should be established to prevent noise induced hearing loss among operators at a call center.

PREVALENCE OF ANGIOVASCULAR PROBLEMS IN A POPULATION OF METAL WORKERS EXPOSED TO VIBRATING TOOLS

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[ID 1336] - *No. 96 in Poster Area*

The aim of the study is to evaluate the prevalence of angiovascular disease in a population of metal workers exposed to vibrating tools.
We used the self administered questionnaire of Vibration injury network to investigate the exposure history and the presence of finger and hand angiovascular symptoms.
After all the workers was tested with a photoplethysmographic exam after cold test.
We studied a population of 74 male metal workers (average age 40,4 ± 9,4 years old; average years of exposure to vibrating tools 17,7 ± 10,4; 31 were smokers, 27 non smokers and 16 former smokers) exposed to vibrating tools to investigate the prevalence of angiovascular problems.
We divided the subjects in reason of age, age of exposition to vibrating tools, presence of symptoms and smoking habits.
Photoplethysmographic exam was pathological in 42% and normal in 58% of workers.
We observed a pathological exam in 42% of workers under 35 years, 38% in workers between 36 and 44 years old and 43% of workers over 45 years old. We noticed very similar percentage dividing the subjects for working history (46% under 10, 34% between 11 and 24 and 47% over 25 years of exposure).
48% of workers that referred positive symptoms presented a pathological photoplethysmographic exam while 35% with a pathological exam referred no symptoms.
From the analysis of our data smoking habits had no correlation with pathological photoplethysmographic exam.
From the analysys of our data we can conclude that the prevalence of angiovascular problems was higher in the workers at the beginnig of their professional exposure and after almost 25 years.
In the prosecution of the study we want to identify the presence of workers with an higher susceptibility in developing angiovascular problems.

ASSESSMENT OF HAND ARM VIBRATION (HAV) SYNDROME IN EXPOSED WORKERS

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[ID 1391] - *No. 97 in Poster Area*

Workers exposed to physical risk factors like hand-transmitted vibration at work had the highest likelihood of reporting symptoms of disorders in the upper limbs and specifically disorders in the peripheral circulation, peripheral nerve, muscles, bones and joints (vibration syndrome).
With the aim of verifying the effectiveness of our questionnaire we carry out a cross-sectional study of the hand-arm vibration syndrome and soft-tissue disorders of the upper limbs in a group of manual workers exposed to vibration compared to control group.
We studied a group of workers exposed to hand-arm vibration according to the European Directive 2002/44/CE. A medical interview has been used to collect data about job analysis, assessment and duration of exposure to risk, vascular, neurological and musculo-skeletal symptoms of the upper limb. The questionnaire was composed of items on smoking habit, drug and alcohol assumption, family anamnesis and clinical history. Therefore the study group underwent a complete physical examination.
We completed 496 questionnaire interviews and physical examinations: 209 on workers exposed and 287 on control group. The workers exposed have an higher prevalence of vascular (1.9%), neurological (7.6%) and musculo-skeletal disorders (12,9%) of upper limb compared to control group (0.0%, 1.7% and 5.2%).
From these results it may be concluded that vibration exposure is strongly associated with a subsequent risk of vibration syndrome. Therefore our data showed a less frequency of vascular disorders associated to vibration exposure. On the other hand the data seems to show a increase neurological and musculo-skeletal disorders of the upper limb associated to ergonomic risk factors (i.e. strength, unsuitable posture).

HAND ARM VIBRATION ON A CHAIN SAW: MEASUREMENT OF GRIP FORCE, PUSH FORCE AND HAEMODYNAMIC EFFECTS

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[ID 1541] - *No. 98 in Poster Area*

Grip and push forces exerted operating with a chain saw in laboratory condition and the haemodynamic effects produced on middle fingers of 6 healthy subjects are reported.Two capacitive sensor matrices and one triaxial accelerometer were used to measure the two forces and the acceleration during chain saw operations. Finger blood flow in basal conditions and after each test was evaluated in middle fingers of both hands with a photoplethysmograph and superficial skin thermometer.
Each subjects were asked to fellow the procedure reported by ISO 7505 (ISO Standard for chain saw vibration evaluation); to grip the chain saw handlebars and operate in three conditions: with engine at idling rotational frequency, at maximun rotational frequency and during a cutting phase.
The amplitude of the accelerations transmitted to the hand surface was greater during the test with the low grip (idling phase). Photoplethysmographic and thermometric values were significantly lower after either test compared with basal values.
Photoplethysmographic amplitude values were significantly lower in idling phase and during cutting phase than values registered at maximum rotational frequency phase.
The authors show that the level of grip force used for holding the chain saw handlebars causes transmission of vibration of wider amplitude, resulting in greater reduction in finger blood flow.

DETERMINING THE QUALITY OF AUDIOMETRIC TESTING IN THE OCCUPATIONAL SETTING IN SOUTH AFRICA.

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[ID 1810] - *No. 99 in Poster Area*

AIM

Uncontrolled exposure to noise in the occupational setting can cause noise induced hearing loss. In South Africa once an exposed worker has shifted 10 percentage points from his baseline reading he is eligible for compensation (COID Act, 2004). Pure tone air conduction (PTAC) audiometric screening tests are used in the occupational setting to monitor the effects of noise on the worker. If the testing is not correctly implemented a true reflection of the workers hearing is not established. This may lead to wasted expense sending workers for unnecessary diagnostic testing. The situation also arises where early shifts in hearing thresholds are missed and NIHL not prevented. The purpose of this study was to develop an audit tool to evaluate the quality of PTAC audiometric testing conducted in the occupational setting to identify weaknesses and make recommendations for improvement in testing.

METHOD

An audit tool was developed to evaluate the quality of PTAC audiometry based on South African legislation and recognised standards for this method of testing (OHS, 2003 and SANS, 2004). The tool measured recognised practice requirements for the following five key areas in testing; required documentation, technical specifications for equipment, suitability of testing environment, client controls, prescribed testing procedure and recording of results. The quality of PTAC testing implemented by ten audiometrists in the greater KwaZulu Natal area of South Africa was assessed using the audit tool. The testing was conducted in the work place using a convenience sample.

CONCLUSION

The average audit score was 70.8%. Areas of weakness included documented hearing conservation programme not present in 60% of the sites, calibration scores were poor for biological calibration (48%) and daily listening checks (16.6%). These findings indicate that the quality of audiometric testing in the tested sites does not meet the recommended minimum score of 90% (Lukes and Schiavone, 2001). The consequence of this poor level of testing is possible incorrect recording of a worker's hearing thresholds. These results suggest that the study should be implemented on a larger scale to determine whether there is a trend in this poor quality of testing. The findings can then be used to improve the quality of PTAC testing in the occupational setting.

KIENBÖCK'S DISEASE IN OCCUPATIONAL HAND-ARM VIBRATIONS: A CASE REPORT

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[ID 1928] - *No. 100 in Poster Area*

A case of Kienböck's disease in a male manual worker is described. We estimate its etiology, pathogenesis, clinic and forensic evaluation like a professional disease .Our review of the literature reveals the rarity of this association, thinking it convenient to make a scientific exposition.

RETURN TO WORK INTERVENTION

MUSCULOSKELETAL DISORDERS AMONG BANK WORKERS: CHALLENGES CONCERNING THE RETURN TO WORK

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[ID 291] - *No. 101 in Poster Area*

Objective: to evaluate the occupational rehabilitation process among bank workers with work-related musculoskeletal disorders (WRMD) of a public bank located in São Paulo, identifying factors, which facilitate or cause difficulties in the return to work. Methodology: The bank rehabilitation program involved 210 workers. This was a case study composed of individual and group semi-structured interviews with 16 workers who attended the program, with different ages and who showed good or bad results in the rehabilitation process. A content analysis was performed. Results: The program had three phases: in the first one the worker was evaluated in order to verify if he/she presents conditions to be rehabilitated. In the second phase a follow up of the treatment was performed. In the third one the remaining capabilities were established and the most appropriate job was selected. Meetings were hold with the supervisor and workers of the destination section to prepare them. According to the workers the difficulties faced during the return to work were: to assert the limitations caused by the disease, the constant presence of pain, colleagues' and manager's prejudice concerning his/her illness. The work situations which were considered detrimental to the occupational rehabilitation process were: inadequate work tasks and excessive goals, impossible to be achieved, impossibility to make rest breaks for recovery during the working time, frequent over time, the change of work demands in consequence of the introduction of new technologies. The aspects, which contributed to good results of the program, were: feelings of social acceptance and belonging and support by colleagues and supervisors. Conclusions: It was possible to rehabilitate workers with WRMD, provided that a correct evaluation of workers´capabilities and fit to the most appropriate job is performed. Realistic work goals should be established and colleagues and supervisor should provide adequate support.

EFFECTS OF A MEDICAL STRENGTH TRAINING PROGRAM OF BACK MUSCLES ON THE OCCURRENCE OF ABSENTEEISM DUE TO DORSALGIA AT DAIMLERCHRYSLER HEAVY TRUCK PLANT WOERTH/RHINE, GERMANY

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[ID 315] - *No. 102 in Poster Area*

Aim: The main purpose of this work was to enhance subjective well-being as well as to reduce back pain and absenteeism due to dorsalgia (ICD-10 M 54) through a defined strength training program for lumbar back muscles.

Method: To evaluate potential effects of a health-oriented medical strength training program the health reports of 2 major health insurance companies, the medical insurance plan 'AOK Rhineland-Palatinate' und the company health insurance fund 'BKK DaimlerChrysler', and the results of a participants survey/questioning were analysed.

Results: Absenteeism due to dorsalgia (days of absenteeism related to 100 years of insurance, DA/100YI) in the work-out-group decreased by 34,65% from the year 2001 until 2003. Overall incidents of absenteeism were even reduced by 48,3%, whereas throughout the industry an increase of 10,6% was observed. Absenteeism of AOK-members decreased from 2002 until 2003 from 866,7 to 649,9 (DA/100YI) and of BKK DaimlerChrysler-members decreased from 584,4 to 392,9 (DA/100YI). In addition, the medical strength training program caused an increase in subjective well-being and a reduction of back pain.

Conclusion: The authors know that the incident of absenteeism due to back pain is influenced by various internal and external factors and that presence at work is a common development within tense economies. However, the analysis of the health reports of the above mentioned health insurance companies implies a positive influence of the medical strength training program.

RETURN TO WORK FOLLOW UP SHEET (REWFUS)

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[ID 462] - *No. 103 in Poster Area*

PURPOSE: For occupational mental health, it is important to follow up the company employees who return to work after an extensive sick leave due to mental illness. The authors developed Return to Work Follow up Sheet (REWFUS). The purpose of this study is to examine validity, inner and inter-rater reliability of REWFUS.

METHOD: The authors developed REWFUS based on previous researches and the case episodes of occupational mental health. REWFUS consists of 26 items, which assess basic condition, symptoms/interpersonal relation, support resource, conflict/compliance at work, work ability, cog-

nition/role behavior and overall assessment. REWFUS is to be used by occupational nurses and physicians. From January to March of 2005, 71 practitioners (45 nurses, 26 physicians) participated in this research and completed 215 assessments. To examine the construct validity we performed factor analysis. Inner reliability was examined by Cronbach alpha. To examine the inter-rater reliability, with 58 physician-nurse assessment pairs we performed paired Mann-Whitney u-test.
RESULTS: The factor analysis identified 6 factors, which represent, work ability and motivation, compliance at work, health condition, compliance to treatment, basic condition and role behavior. REWFUS showed a high inner reliability with Cronbach alpha 0.92 for 215 assessments. Regarding the inter-rater reliability, no item showed a significant difference between nurse and physician with 58 samples. The single measurement of inter-rater correlation coefficients was 0.35 (ranged between 0.29 and 0.43: 95% CL) and was significant.
DISCUSSION: In addition to face validity, the construct validity of REWFUS was confirmed. REWFUS showed a high inner and inter-rater reliability. From these findings REWFUS is judged to be a good candidate as follow up tool with the company employees who return to work.

RETURN TO WORK BY MEANS OF AN EARLY INTERVENTION BASED ON INTERDISCIPLINARY COLLABORATION.
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[ID 619] - *No. 104 in Poster Area*
Aim
To evaluate the effect of early supportive intervention based on interdisciplinary collaboration including occupational medicine, physical exercise and support from social authorities.
Methods
The target group in this study was public sector employees or cleaners with limited education, on sick leave due to minor psychiatric and/or musculoskeletal disorders, in a specific municipality. They were traced as quickly as possible after taking sick leave. The participants went through medical examination by an occupational physician, and were offered an individual programme: 1) examination by rheumatologist, 2) guidance in daily life coping strategies by elements of cognitive therapy, 3) physical training and/or 4) supportive measures from the social authorities including adjustment of work tasks. Baseline evaluation of perceived stress and psychological and physical condition based on the Effort-reward questionnaire (ERI), SF36, work ability index, self-efficacy and sense of coherence questionnaires were performed.
Results
In two years 125 participated. Half of them had lost their job at the beginning of the intervention and could not collaborate with the workplace. Compared to a random sample of employed Danes the participants had lower self efficacy, sense of coherence, work ability index, SF36 scores and more stress-symptoms. Ten percent of the participants received early retirement pension or reduced working hours after the end of sick leave. The work ability index was prognostic for the return rate to work, while ERI was not. The group will be followed in five years with regard to long term sick leave and early retirement pension, and compared to a similar group from another municipality with no intervention.
Conclusion
Preliminary results suggests beneficial effect of intervention, as 12 % of Danes does not return to work after sick-leave.

WHEN THE GOING GETS TOUGH: WHAT HAPPENS TO WORN-OUT WORKERS?
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[ID 649] - *No. 105 in Poster Area*
In New Zealand, there is a comprehensive 'no-fault' accident compensation scheme administered by the Accident Compensation Corporation (ACC). ACC provides incapacitated workers with weekly compensation to the level of 80% of their pre-injury earnings. In addition, ACC provides social and vocational rehabilitation with the objective of returning injured workers to the workforce.
This presentation arises from research undertaken in New Zealand examining the efficacy of the return to work interventions provided to injured workers. The findings show that compensated workers experience an income reduction upon their re-integration into the workforce. The longer the duration spent on weekly compensation the greater the income reduction.
NZ's statutory regime does not provide for retraining or upskilling of an injured worker as part of its return to work interventions. The research examines the effect of this and whether the inclusion of retraining as a statutory right would enhance the return to work outcomes. The research is relevant to ILO Convention 159 vocational rehabilitation and employment (Disabled persons) 1983.
NZ's baby boom generation is nearing the retirement age of 65 (when NZ superannuation commences). When the realities of an ageing workforce are combined with a nationwide skill shortage there is a need to refocus Government policy on the work ability of ageing workers. Due to the inevitability of physical deterioration not to mention the possibility of injury or occupational disease, the implementation of alternative approaches to rehabilitation and retraining is needed to sustain working lives, diversify skill sets to enhance employability and to ensure financial losses are mitigated for those who are injured, their families and the community.

"INCLUSIVE WORKING LIFE" IN NORWAY – WHAT CHARACTERISES SUCCESSFUL ENTERPRISES?
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[ID 734] - *No. 106 in Poster Area*
Introduction
"Inclusive Working Life" (IWL) is a Norwegian national intervention program initiated in 2002. The objective is to reduce sickness absence, prevent early retirement and to promote employment of functionally impaired. More than half the Norwegian workforce is now included. The incentives in the IWL program are partly economical, partly advisory assistance from "IWL-centres" being av part of the National Insurance.
Objective
Our objective was to study the characteristics of successful IWL enterprises and to describe possible success factors.
Material and methods
86 enterprises were in 2004 selected from the "IWL Bank of Models of Good Practice", and received mail questionnaires to one representative from the workers and one from the management. Sickness absence data from the period 2000-2004 were collected from the National Insurance registry.
Results
A reply rate 65% was obtained. 92% of the enterprises had objectives on the reduction of sickness absence, 53% in taking care of their own employees with functional impairment, 23% in preventing early retirement and 22% in employing functionally impaired. 82% answered that they had succeeded in reducing sickness absence, 68% in taking care of their own functionally impaired, 38% in preventing early retirement and 27% in employing functionally impaired. 89% answered that they were altogether successful in their IWL efforts. The ability making IWL being a part of the internal life of the enterprise with a broad participation of the employees and the use of external assistance from the IWL centres and Occupational Health Services were associated with a decrease in sickness absence and low turnover. The same factors were, however, associated with a slightly higher use of disability pensioning and early retirement of the employees.
Conclusion
Most of the attention and assessment of being successful in IWL seem to be associated with the reduction of sickness absence as such. This raises some future challenges.

"INCLUSIVE WORKING LIFE" IN NORWAY – OLD WINE IN NEW BOTTLES?
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[ID 739] - *No. 107 in Poster Area*
Introduction
"Inclusive Working Life" (IWL) is a Norwegian national intervention program initiated in 2002. The objective is to reduce sickness absence, prevent early retirement and to promote employment of functionally impaired. More than half the Norwegian workforce is now included. The incentives in the IWL program are partly economical, partly advisory assistance from "IWL-centres" being a part of the National Insurance.
Objective
Our objective was to study the characteristics of successful IWL enterpris-

es and to describe possible success factors.
Material and methods
In addition to questionnaires to 86 enterprises, we made in-debt interviews of 16 enterprises. The manager and employee were interviewed together with the intention that this could be an opportunity for an interview based on reflection, dialogue and development.
Results
Management and cooperation: Several expressed to be good in involvement and cooperation even before they became an IWL-enterprise, but now the focus had become stronger. First line managers played a key role. It was also confirmed that it takes a lot of time to achieve good results.
Structure and process: Keywords are integration of IWL and production, continuity and focus on IWL-work. A high degree of involvement and cooperation among the employees and managers, seems to be associated with a high degree of integration of IWL-work in the production.
IWL measures: The employees had limited knowledge about IWL-measures compared to the managers. An extension of self reported sickness absence period, was applauded by all the interviewed. Occupational Health Services and Inclusive Workplace Centres seem to be important contributors to the IWL-work, but the way they contribute vary from enterprise to enterprise.
Conclusion
The success factors to achieve a good IWL-work, are the same as the success factors needed for a good health, environment and safety work. Is then IWL-work "old wine in new bottles"?

THE BELGIAN PILOT PROJECT FOR EARLY REHABILITATION OF NURSING PERSONNEL SUFFERING FROM LOW BACK PAIN

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[ID 1137] - *No. 108 in Poster Area*

Background:
The project results from both political and scientific moves in order to lessen the burden of chronic low back pain (LBP) among workers. Following a scientific review made by the Belgian Fund for Occupational Diseases (FOD), a pilot project has been launched since March 1st 2005, with a governmental funding, to promote an early return to work after a LBP episode for nursing staff in the health care sector.
Project content and access criteria
The project involves two main components, a medical one and an ergonomics one. The worker being off work due to LBP for at least 4 weeks and maximum 3 months is invited by the occupational health physician to take part to a new multidisciplinary back rehabilitation program established within the Belgian health insurance system. Throughout Belgium, 39 physical medicine departments have accepted to deliver this program under contract with the FOD. The project other component consists of a workplace intervention in the patient institution at the initiative of the occupational health physician. Both the worker and the employer get a financial incentive from the FOD when they agree to take part to the program. Several medical and occupational variables are collected in a standardised manner at the entry in the program and when returning to work.
Results
First results 6 months after the project start show that the project is facing two main challenges: effectively disseminating the information about this innovative approach to the whole target population in health care institutions, and promoting a change in professional practices among both caring physicians and occupational physicians.
Conclusions
Promoting an early return to work among LBP workers implies not only to provide the worker with a sound program to this effect but also to succeed in networking occupational physicians and general practitioners.

VOCATIONAL REHABILITATION IN THE SWEDISH PAPER INDUSTRY - A ONE-YEAR FOLLOW-UP OF 75 CONSECUTIVE CASES

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[ID 1327] - *No. 109 in Poster Area*

Employers in Sweden are by law responsible for evaluation of need for vocational rehabilitation among employees and that rehabilitation actions are taken. However, there are often difficulties to return to work in case of health problems resulting in long sick-leave periods or disability pension. In order to find out more about how vocational rehabilitation is performed in practice an explorative study was carried out in conjunction with two paper mills in Sweden.
The present part of the study focus on changes in sick leave and perceived health among rehabilitated employees during a 12-month follow-up after the employer's decision to rehabilitate.
METHOD
During a one year period need for vocational rehabilitation was found among 82 employees and 75 agreed to participate in the study (21 women, 54 men). The study subjects were followed during 12 months after start of rehabilitation. Information on perceived health and kind of rehabilitation actions performed was collected by repeated self administrated questionnaires and information about sick leave by company records.
RESULTS
Musculoskeletal disorders/problems were the dominating basic reason for vocational rehabilitation (60 %), followed by psychiatric disorders including substance abuse (27 %) and other somatic disorders/problems (13 %). Vocational rehabilitation actions were individually arranged for each subject in cooperation with the local occupational health care team and the local Social Insurance Agency, often as a combination of physical or mental training activities in combination with a gradual return to ordinary work at the factory.
Of the 75 subjects included in the study 69 participated in the 12-month follow-up. Among them 46 subjects (67 %) were sick-listed at start of rehabilitation (24 full-time, 22 part-time) and 14 subjects (20 %) at follow-up (3 full-time, 11 part-time), consistent with improved perceived health and work ability.
CONCLUSION
Improved health and frequent return to ordinary work was possible to achieve within one year after start of vocational rehabilitation, probably due to an efficient rehabilitation policy including an early evaluation procedure and effective corporation between actors in the rehabilitation process.

ROLE OF OCCUPATIONAL PHYSICIANS FOR REST FROM WORK AND RETURN TO WORK IN JAPAN

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[ID 1420] - *No. 110 in Poster Area*

Under provision of Labour Standard Law, Japanese companies have to provide 20 paid holidays for workers with long-term contract. Besides, major companies almost unexceptionally formulate systems for workers to take rest from work for a certain period, to preserve trained workforce. Meanwhile, Industrial Safety and Health Law requires workplaces with 50 workers or more to assign an occupational physician. When a worker requests rest for health problems, occupational physicians is expected to be responsible for judging and advising appropriate measures performed by the company.
This study aimed at describing how the role of occupational physicians is practiced in Japan.
We mailed anonymous questionnaire asking a system for rest from work and return to work, to 1189 companies and organizations; 984 companies chosen by stratified random sampling, 73 companies listed in the result of public-opinion poll, and 132 public or non-profit organizations.
Among total of 193 companies and organization responded, 98 (50.8%) had 1000 or more number of employees, 51 (26.4%) had less than 500 employees, 82 (42.5%) were manufacturers, 39 (20.2%) were public sectors, and 168 (87.0%) assigned an occupational physician with 39 (20.2%) at full-time basis. System of taking rest from work with guaranteed position existed at 163 (84.5%) workplaces and its median period was 13 months. Similar system without guaranteed position existed at 90 (46.6%) workplaces with median of 24 months. Connection of both systems could be claimed at 58 (30.0%) and its median was 30 months. Larger companies tend to allow longer rest period. Occupational physicians interviewed workers at return to work process in 64 (33.2%) workplaces. Full-time occupational physicians were involved at higher rate (65.7%) compared with those visiting workplaces only once per month (42.9%) or those visiting less frequently (12.5%).
Return to work judgment should be more prioritized in coporate policies as the typical function of occupational physicians to promote adaptation of work to a worker.

PREDICTORS OF RETURN TO WORK AND ONGOING WORK DISABILITY FOLLOWING INJURY

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[ID 1702] - *No. 111 in Poster Area*

The authors advise that preliminary results will be available for presentation at the conference.

Currently we have entered data for the first 87 patients recruited to the study. Data entry will continue throughout the first few months of 2006.

VIOLENCE AND HARASSMENT IN WORKPLACES

PATIENT FACTORS ASSOCIATED WITH VIOLENCE OR AGGRESSION IN AN ACUTE CARE HOSPITAL

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[ID 581] - *No. 112 in Poster Area*

Background:
Approximately 40% of all violence related workers' compensation claims in British Columbia come from health care workers, although these workers make up less than 5% of the workforce (WCB, 2000). A 1995 national study found that 80% of Canadian nurses reported some form of violence during their career. This pervasive climate of violence in healthcare poses risks for both healthcare workers and healthcare organizations. The purpose of this study was to confirm factors currently used to predict the potential for patient violence or aggression in a large acute care hospital.
Methods:
A retrospective case-control methodology was used in this study. All reported incidents of patient violence were connected to patient charts. One hundred and seven patient charts in which violence was reported were reviewed, in addition to 161 charts in which no violent episode was recorded. Logistic regression was used to calculate the odds ratios of the patient characteristics that predicted violence.
Results:
The patient variables that were significantly associated with patient violence or aggression, compared to patients who were not aggressive, were found to be: being a male patient (OR=2.76, CI=1.58-4.82), being younger (median age: 47 versus 62 years; OR [per year]=0.98, CI=0.96-0.99), having a longer stay in the hospital (median length of stay: 14 versus 4 days; OR [per day]=1.06, CI=1.04-1.09) and being diagnosed with a psychiatric illness or a mental disorder (versus all other diagnoses; OR=5.83, CI=2.84-11.96).
Conclusion:
In many instances, it is possible to predict which segments of the patient population have the potential for violence. Health care employers should incorporate this information into violence prevention methods and training to reduce this risk of violence to health care workers.

WORKING DISCOMFORT (MOBBING): SURVEY ON 800 EXAMINED SUBJECTS

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[ID 957] - *No. 113 in Poster Area*

Up till now mobbing isn't yet a clearly definite phenomenon as the committee of occupation and the social affairs of the European Parlament has underlined, so a comparison among the experts, medical doctors, psychiatrists, psychologists, working everyday on the subject is necessary to adopt objective methods for the diagnosis and the certification.
Mobbing is a real psychological persecution or an ethical violence and the actions reveal themselves in discriminating and oppressive behaviours lasting with the time (going on).
It happens when a worker is under the abuse of power of superiors or colleagues and in particular when direct practices are used to take him out of his working enviroment or to drive him out undermining the psicological balance, damaging the working capability and the self confidence causing adaptation disturbs or depressing anxious syndromes, even very serious.
The protagonists of mobbing are exentially two: The attacker or mobber and the victim or mobbed; Sometimes the spectators have an effective role.
We have analysed a survey an 796 patients in June 2001 – September 2005 and it emerges that the distribution between the two sexes is nearly unvarying (men: 50,8 %; women: 49,2%).
The phenomenon has a prevalence between the age of 51 and 60 years (34,9%) in the absence of previous psychiatric illnesses in the 89,4%.
The diagnosis of compatibility with mobbing has been verified in the 73,3% of the analised cases.
Finally it stands out the essential role the Occupational M.D. can supply activating training courses about mobbing because up to now, they are the most effective preventing methods to contrast the diffusion of the phenomenon itself, lacking specific regulations.

THE STATE OF MUNICIPAL POLICE FACING WITH VIOLENCE IN WORKING LIFE

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[ID 1333] - *No. 114 in Poster Area*

Objective: The state of Municipal Police of Izmir Metropolitan Municipality and her County Municipalities facing with physical assault and violence in working life were examined in this study.
Method: 379 Municipal Police constituted the study frame of this crossectional study. Responce rate was 97.9% and 371 participant were interviewed. Work life determinants were questioned within 2 dimentions: working environment factors such as ergonomics, stress, accidents etc, and working conditions such as wages, hours of work, employment status, training.
Results: Most of the participants were male (91.9%), 86.3% were 35 years old or older than 35, 32.9% were university graduates, 90.6% were married and 89.5% had at least one child, 69.8% had no income except their monthly salary, 50.4% employed as a municipal police yet trained or educated in totaly different occupations. 48.8% lived far away from work and spend so much time on tranportation. 87.9% of the participants were faced with physical assault on work and for 86.0% some kind of weapons used during the attack. 30.8% received forensic report after physical assault. 96.5% were faced with harassment.
Conclusion: The municipal police who have an important mission for the health of society yet his/her own health wellbeing needs to be protected. Violance was an inportant and frequent risk factor of this study group.

VIOLENCE ON THE JOB: STRATEGIES FOR ASSESSMENT AND MANAGEMENT OF ROBBERY RISK FOR BANK WORKERS

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[ID 1908] - *No. 115 in Poster Area*

The occurrence of bank robberies is on a steady growth in Italy as well as in most other countries. As an occupational risk factor, the "robbery-risk" is not directly generated by the bank productive activity, but from the criminal activity of a third party (robbers). Nonetheless, it arises concern for the health and safety of bank workers.

The Italian Bank Association (ABI) has planned a series of activities in order to protect the worker health and safety from the robbery risk, not only establishing a structured cooperation with the Police Force, but also directing the bank companies on how to train their employees as to what to do before, during and after the robbery.

In addition to reducing the cash operations at the counter, encouraging automated and electronic banking, and adopting active and passive measures of protection of bank buildings, a key element has been identified in an adequate information and "training" of the bank employees. As for the information aspect, ABI has prepared an "Anti-robbery Guide" which includes basic recommendations for the clerks at the bank counter on how to behave in the event of a robbery. Training, which can be done both in an interactive way or in a classroom, is organised also to discuss and counteract the possible psychological effects linked to the trauma of personal insecurity.

The Guidelines also address the "First Aid" measures and the post-event "Health Assistance", which can be activated at the request of the workers. Although the incidence of severe Post-traumatic Stress Syndromes after bank robberies is rather low, the intervention of expert doctors and psychologists may be important to reassure the workers and help them to re-gain confidence and sense of security at work.

OCCUPATIONAL HEALTH AND DEVELOPMENT

THE STUDY OF HEALTH IMPACTS FROM OCCUPATIONAL ASPECT OF SOLVENTS IN THAILAND

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[ID 902] - *No. 116 in Poster Area*

Background In Thailand, organic solvents are widely used in variety of occupations (industry agriculture, service). The incident of organic solvents poisoning, explosion, and nuisance are frequently reported. Even the number of exposed workers/risk group are approximately 500, 000 persons, the occupational health management for solving the problem of organic solvents effects is not established. Thus, this study was carried out on the purpose to know the data of organic solvents usage in the area and risk area for providing the suitable occupational health management to the risk area.

Methodology This study has been conducted in Thailand since 2003 and carried out in the whole country with helpful cooperation from the Office of Disease Prevention and Control, Region 1 -12. The questionnaires for the primary and secondary data survey were used. The data was calculated and shown as percentage.

Results: The data of 82 % (62 provinces) of total number of provinces in Thailand indicated that there were 21 types of widely used organic solvents. These 21 organic solvents were benzene, toluene, xylenes, styrene, trichloroethylene, hydroquinone, acrylonitrile, hexane, formaldehyde, chloroform, methylene chloride, ethylene chloride, cyclohexane, isopropyl alcohol, acetone, methyl ethyl ketone, ether, propane, and naphtha. High risk occupations were cleaning, extraction, chemicals production, petroleum oil service, automobile repair work, printing, color-painting production, process of production, storage, and distribution of pesticides. The high risk area were located in Eastern part and Central part.

Conclusion and Suggestion Occupational health management for solving the problem and setting the sustainable and equity of good health should focus on the three main points of integration in the risk area as followed: 1) Setting the rural and urban networking agencies, 2) Providing the suitable appropriate legislation, and 3) Setting the systematic report of organic solvents poisoning, including with health effects, explosion, and nuisance for each risk area.

MEDICAL PREVENTION AND MANAGEMENT OF ENI WORKERS EMPLOYED ABROAD: ISSUING THE PASS CERTIFICATE FOR JOBS AT OIL AND GAS EXTRACTION AND PRODUCTION PLANTS IN REMOTE AREAS

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[ID 1570] - *No. 117 in Poster Area*

In remote areas and in developing countries, where adequate health-care structures are few and sparse, Occupational Medicine contributes to guaranteeing workers' health.

Companies involved in activities that are carried out in remote, inhospitable areas must ensure the safety and guarantee the health conditions of workers in relation to the risk factors connected with the job as well as with the environment in which it is performed. In such situations, Occupational Medicine addresses both the health aspects of the workplace and of the community, and is the pivot around which revolves the health-care support of workers employed abroad in the sense of *protection and enhancement of health*.

The risks connected with work abroad are of three main types: 1) job-related risks; 2) risks connected with the environment; 3) risks related to the organization of work and the changes in the worker's daily life.

The job-related risks are similar to those connected with analogous jobs performed elsewhere. The risks connected with the environment are related to adverse climatic conditions, extreme temperatures and unknown and often dangerous flora and fauna. Additional risks are the endemic nature of some diseases and logistical difficulties and problems of communication with the nearest urban centres. As regards the third type of risk, subjects work 12 hour shifts, home leaves are at intervals of months, privacy is precarious, and exchanges with colleagues are the sole form of social life.

The occupational physician is called upon to assess the suitability of workers for jobs that are based in remote areas and never last less that 2 years. The main clinical conditions that can prevent issue of the pass certificate to workers for long-stay jobs abroad are discussed.

MEDICAL PREVENTION AND MANAGEMENT OF ENI WORKERS EMPLOYED ABROAD: ISSUING THE PASS CERTIFICATE FOR JOBS AT OIL AND GAS EXTRACTION AND PRODUCTION PLANTS IN REMOTE AREAS

NICOSIA V.[1], LESMA A.[1], RAPISARDA V.[2], CIUCCARELLI M.[3], FENGA C.[2], PANCIROLI M.[1], MARIANI F.[2], VALENTINO M.[3]
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[ID 439] - *No. 118 in Poster Area*

In remote areas and in developing countries, where adequate health-care structures are few and sparse, Occupational Medicine contributes to guaranteeing workers' health.

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ETHICS IN OCCUPATIONAL HEALTH RESEARCH AND PRACTICE

OCCUPATIONAL HEALTH AND CONFIDENTIALITY

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[ID 297] - *No. 119 in Poster Area*

When we work with employers' staff administration, confidentiality usually is broken in occupation health. Take care of this aspect is an obligation of all occupation health professionals workers beside the duties with the employers. This paper shows the historic path of work looking through the philosophers as Bacon, Leibniz, Hegel, Kierkegaard and others searching for the bioethics principals at the relationship between employees and employers

Confidentiality and occupational health is to use the principle of automony guarantee, to all employees, and assure the rights that all workers must have. It is not possible to let it slip as an minor error on an modern society with social and conventional morality.

THE SUPPORTIVE FACTORS ASSOCIATED TO PRIVACY IN OCCUPATIONAL HEALTH PRACTICE

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[ID 445] - *No. 120 in Poster Area*

Background. The realisation of privacy is challenging in occupational health practice where the occupational health professionals work in close collaboration with their two groups of clients, the employees and the employers.

Aim. This study describes the views of occupational health professionals, employees and employers on factors that are thought to support privacy in occupational health practice. The data were collected through in-depth theme interviews with 44 subjects and were analysed by content analysis: the relevant statements to the research tasks were identified, marked and clustered into groups, and finally, the clusters were named on the basis of the content.

Results. The supportive factors of privacy fell into two main categories: 1) patient-caregiver relationship and 2) 'tripartite co-operation' (co-operation between occupational health professionals, employees and employer). In the patient-caregiver relationship, instinct, respectful behaviour, communication skills, work experience and adequate education on ethics and legislation were found to be the supportive factors for privacy realisation. In tripartite co-operation, the supportive factors in this regard included impartiality; regular contacts; community spirit; fair play; informed consent and advocacy, i.e. the three partners – occupational health professionals, employees and employer – should strive for objectivity; respect one another's views; actively and frankly tackle problems; and ask for permission before disseminating sensitive information. It was emphasised that he preconditions for privacy realisation must be established before problems appear.

Conclusions. The supportive factors of privacy are associated to occupational health professionals' ability to separate the different roles – caregiver and co-operator – from each other. In occupational health practice, privacy cannot be seen only as a privilege of employees, but also as an instrumental value serving the interests of whole work community. More discussion and research is needed concerning the simultaneous and sometimes diverse responsibilities of occupational health professionals toward the two groups of clients before privacy can be optimally realised.

BENEFICENCE IS THE MAJOR DETERMINANT IN MEDICAL DECISION FOR FITNESS FOR WORK: THE DILEMMA OF A NURSE WITH BREAST CANCER AND EXPOSED TO RADIATIONS

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[ID 860] - *No. 121 in Poster Area*

Objective. In addition to scientific evidence, the occupational health practice requires to be based on the ethical analysis of benefits and costs.

Methods. A 41-year old nurse with previous diagnosis of breast cancer treated with surgical and chemo-radiotherapy required an occupational physician (OP) referral for fitness for work in a neuroradiology unit where computerized tomography and magnetic resonance exams were routinely performed. The job required the participation in interventional exams with exposure to ionizing radiations (3 to 6 mSv/year) and low-frequency electromagnetic fields (< 5 Gauss). No history of occupational exposure to radiations was reported. In the absence of case-targeted scientific guidelines, the nurse was excluded from radiation exposure to prevent potential cancer relapse or secondary breast cancer. Consequences for the stakeholders involved in the decision (employee, employer, OP, community) were evaluated with respect for ethical principles (beneficence: to prevent evil, to promote good; autonomy: to respect other's freedom and self-determination; justice: equity, solidarity, non discrimination).

Results. According to the principle of beneficence, prevention of potential radiation related cancer was an ethical benefit for all stakeholders. The employee considered most important the loss of radiological insurance benefit and the potential psychosocial consequences and/or work dismissal compared to her own risk of health impairment (cost). The employer considered the decision convenient for avoiding legal consequences (benefit), although the nurse needed to be reassigned and substituted (cost). OP was aware that a potential contrast between the two stakeholders was present (cost). Autonomy was limited for both worker and employer (cost), even if public health institutions could supply some regulations (benefit). The OP decision was independent (benefit). According to the principle of justice, the decision could result in work discrimination for the nurse (cost), although some solidarity with the vulnerable worker was granted (benefit). Justice was not relevant for other stakeholders.

Conclusion. On the basis of the ethical analysis of the decision among different stakeholders, the beneficence was considered the major determinant in the decision making process resulting in nurse exclusion from radiation exposure.

ETHICS OF OCCUPATIONAL HEALTH PROFESSIONALS: THE LATIN AMERICAN PERSPECTIVE

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[ID 977] - *No. 122 in Poster Area*

The occurrence of social security reforms, the reinforcement of free trade agreements, and the opening of free markets caused many changes in the working world in most countries of Latin America. Occupational Health (OH) professionals have needed to adapt to all these changes, and at the same time, interact with different groups of interested parties. Governmental agencies, employers and their associations, workers and their organizations, workers' compensation and healthcare insurancers, clinical care providers, and scientific organizations, within others, are some of the interested parties interacting. Prevention, screening, diagnosis and treatment of occupational injuries and diseases have become a core issue where all of these stakeholders have interest, for either protecting and improving workers' health, or compensating the injured or ill worker.

OH professionals must try to maintain a fair and objective judgment to provide the services and the benefits required by the workers. Many times having to confront or contain some of the forces implicated in the legitimate act of defining the occupational origin of the accident, the disease or the death of a worker. Ethical dilemmas arise when conflicts of interest put pressure on their decisions, making it very difficult to be solved. Even some times, healthcare organizations have developed incentive programs for accelerating the compensation processes that run under the responsibility of the OH professionals.

Laws and regulations on medical ethics have not yet been updated to solve this type of dilemma. In most countries of the region the ICOH code of ethics is the guideline for solving this conflicts of interest. Yet, many cases are invisible to the law, finally being unfavorable for the worker.

Strict follow up should be done, to avoid corruption and other unethical practices. Undergraduate and graduate education levels about the ethical practices dealing with workers' compensation should be reinforced.

AN ETHICAL PERSPECTIVE ON OCCUPATIONAL HEALTH RESEARCH DILEMMA: CONTEXTUAL PRAGMATISM

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[ID 1101] - ***No. 123 in Poster Area***

Introduction: Occupational health research (OHR) has to face specific dilemma due to the vulnerable nature of the workers as a research population. Three main ethical theories can be used to inform these dilemma, but they have some limitations in the specific context of OHR.
The aims are (1) to discuss the limitations of these theories to inform OHR dilemma and (2) to describe the interest of contextual pragmatism as an applied process of ethical decision-making in OHR
The method of the presentation proceeds with a dilemma illustrating the previous theoretical considerations.
Results: The case is about the evaluation of an ergonomic intervention in a shoe factory. Researchers have a dilemma about seeking the informed consent of each worker or not. If consent is sought, participation rate may fall and compromise the validity of the results. Otherwise, some workers may complain overtly and experience troubles with their hierarchy.
Classical ethical theories fail to solve the tension between the individual interests (protection of the worker) and the collective ones (validity of the evaluation). Deontologism would recommand to seek the consent in order to respect individual rights. Utilitarianism would recommand the contrary in order to get more valid results. Virtue theory would recommand like utilitarianism in order to relieve the factory from its musculoskeletal burden. Contextual pragmatism would recommand to reach a consensus between the relevant stakeholders about the values to obey and the utilisation of the evaluation's results. As a consequence, the individual and collective interests can be reconciled and the dilemma can be solved.
Conclusion. Contextual pragmatism is an applied ethical method that is flexible and potentially useful to solve ethical dilemma faced by researchers in OHR. Its participative nature is consistent with OH interventions like participative ergonomics, and with the utilization-focused evaluation approach.

EPIDEMIOLOGY IN OCCUPATIONAL HEALTH

RISK PERCEPTION AMONG YOUNG WORKERS: ALCOHOL AND SMOKE

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[ID 31] - *No. 1 in Poster Area*

The workers between 18 and 24 years old, have 50% of probability in more, regarding the average of the workers, to endure injuries and between the important factors are information and formation not adapted (1,2,3). Objective: Monitorare the perception of some factors of risk and to characterize covered formed efficacy Methods. Interview on the perception and behavior of young workers in Florence in order to some factors of risk between which “alcohol” and “smoke” (4) (year 2004). Resultate: We have been obtained information on 394 young people (13% not Italian) with average of 20 years and prevailing instruction of inferior medium school (61%) of which 11% with course of professional preparation (55% to assume in jobs with high injuries index). For 8% “drink alcohol” is not important for the health and safety and for 11% is not important to go up in car with drunk guide; for 17% drink alcohol is a high risk and almost in the young people with advanced instruction (70% vs 49%). “to smoke” is not important for the safety for 19% while it is considered elevated for 59% (more scolarizzati 67% vs 53%). For 44% the risks for health and safety can be avoid to you or reduced with suitable behaviors and 27% thinks that it is not possible (19% with SMS vs 32% with SMI). Conclusions: A not negligible part, of our champion, considers alcohol and smoke not important risks for the own health and safety in spite of the informative campaigns. The perception of the risk more elevated in the young people with level of advanced instruction confirmation the role centers of the school in this population. Bibliography 1)Ceccanti.M, Patissi V. Conference sull’Alcol. San Felice; Scientific Press 1995. 2) Alessio L., Ferioli A, Apostoli P. Interferenze esercitate da fattori occupazionali e non occupazionali sui livelli di indicatori biologici di esposizione a solventi. Atti del 52° congresso di Medicina del Lavoro e Igiene Industriale. Monduzzi editore 1989; 83-90. 3) ILO. Management of alcohol and dug-related issues in the workplace. ILO Eds Ginevra ,1996. 4) http://progetti.iss.it/ofad/

OCCUPATIONAL EXPOSURE TO SUNLIGHT AND RISK OF MULTIPLE SCLEROSIS

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[ID 450] - *No. 2 in Poster Area*

Objective: This study was prompted by a cluster of four cases of multiple sclerosis (MS) in a small and very dark workplace. The aim of the study was to investigate if the risk of MS is associated with occupational exposure to sunlight.

Methods: This cohort study is based on all individuals included in the Swedish census in 1980 (2 649 300 men and 2 163 346 women) who were followed for mortality 1981 - 1995. All deaths from MS as an underlying or contributing cause were identified in the national cause of death registry. We obtained information about occupation and socioeconomic status from the 1970 and 1980 censuses. A job exposure matrix was developed for classification of the occupational exposure to sunlight in 282 occupations in three classes: working outdoors (high exposure, 6.2 % of the cohort), working in- and outdoors (intermediate exposure, 20.7%), working indoors (low exposure, 65.9%). 8.3% of the cohort could not be classified. The association between light exposure and MS risk was estimated through Cox proportional hazards modelling, with adjustment for socioeconomic status and age group.

Results: There were 710 MS-related deaths. The risk increased with decreasing occupational light exposure, both among men and women.

	Men			Women		
Sunlight exposure	n	RR	95% CI	n	RR	95% CI
Low	295	1	-	233	1	-
Intermediate	129	0,876	0,707-1,085	15	0,686	0,377-1,247
High	29	0,431	0,208-0,896	9	0,399	0,139-1,148

Conclusions: High occupational exposure to sunlight was associated with a decreased risk of MS-related death. Experimental data as well as ecological studies support that light has a preventive role in the development of MS, and a previous occupational epidemiological study also supports the association. It was not possible to evaluate if extreme lack of light was associated with a further increased risk of MS.

QUALITY OF LIFE AND QUALITY OF WORK: A COMPARISON BETWEEN VENETO AND EUROPEAN COMMUNITY WORKERS

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[ID 457] - *No. 3 in Poster Area*

Information on exposure, health and preventive actions at work was collected by interview in a sample of workers (employees and self-employed) resident in the Veneto region, using a questionnaire designed by the European Foundation for the Improvement of Living and Working Conditions (Eurofound). Random digit dialing telephone survey conduced on 2879 active workers aged from 15 to 65 years. Non-Italians were included on condition that they could be interviewed in Italian language. When several workers lived in a household, we selected the person whose next birthday was closest to the interview date. Out of 10000 telephone subscribers, we excluded 3363 retired/unemployed persons, 3106 who refused to be interviewed, while for 652 either telephone number was incorrect or interview was incomplete. The interviews (of about 15-20 minute length) were scheduled at a time of the day when subjects were available. We here compare findings in Veneto workers with those reported in the Third European Survey on Working Condition carried out by Eurofound in European Community (EC) in the 2000. A better physical (lower exposure to vibrations, high temperatures, low temperatures, painful or tiring positions) and social environment (lower prevalence of physical violence, intimidation, unwanted sexual attention, and discrimination linked to nationality or race) and less health outcomes (lower prevalences of skin and sleeping problems, allergies, heart disease, hearing problems, stomach ache, muscular pains in lower limbs, trauma, headaches) were reported in Veneto workers compared to EC workers, along with a better organizational environment (higher possibility to decide when to take holidays or days off, to choose or change the order of tasks, methods of work, speed or rate of work, when to take breaks) and a higher probability to have undergone training paid by the employer over the past 12 months. The study should be pursued in order to exclude biases.

ESTIMATION OF OCCUPATIONAL INJURY RATE USING NATIONAL HEALTH INSURANCE DATA IN KOREA

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[ID 497] - *No. 4 in Poster Area*

Objectives: The purpose of this study was to estimate the magnitude of occupational injuries and illnesses that went underreported under the Industrial Accidence Compensation Insurance (IACI) using National Health Insurance (NHI) data.

Methods: Two datasets were used. One is a cohort established in the Gyeongin area with workers who underwent mandated health examination and the other is NHI claim data of workers employed between 1999 and 2001. Workers were classified into the two groups according to job types and the type of health examination they received: white-collar workers and blue-collar workers. The difference in the incidence of musculoskeletal diseases or injury and poisoning between the two groups was estimated as occupational injuries or illnesses unreported. Work related injury frequency rate, injury rate and incidence rate were calculated.

Results: Blue collar workers had 3.47 more cases per 100 person-years than white collar workers for medical treatment covered by the national health insurance. Based on this result, the frequency rate is expected to

be in the range between 12.57 and 18.1, the injury rate is 2.74 to 3.29 and incidence rate is 3.62 to 5.44
Conclusion: The estimated occupational injury and illness rates in this study were likely to be two to three times higher than that officially announced. But the limitation of the study should be also considered.

SPATIAL DISTRIBUTION OF OCCUPATIONAL ACCIDENT RISK IN THE CASUAL LABOR MARKET, PIRACICABA, SOUTHEAST BRAZIL.
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[ID 520] - *No. 5 in Poster Area*
Casual employment or informal work has increased in recent years. One characteristic of this sector of the economy is the large spatial mobility of these workers while executing their activities when compared with their colleagues in the formal employment sector.
The objective of this study was to estimate the spatial distribution of work accident risk in the informal work market in the urban zone of an industrialized city in Southeast Brazil and to examine concomitant effects of age, gender and type of occupation after controlling for spatial risk variation.
The basic methodology adopted was that of a population based case-control study with particular interest focussed on the spatial location of work. Cases were all casual workers in the city suffering work accidents during a one year period, controls were selected from the source population of casual labourers by systematic random sampling of urban homes. The spatial distribution of work accidents was estimated via a semi-parametric generalized additive model with a non parametric bidimensional spline of the geographical coordinates of cases and controls as the non-linear spatial component, and including age, gender and occupation as linear predictive variables in the parametric component.
We analyzed 1918 cases and 2245 controls between 1/11/2003 and 31/10/2004 in Piracicaba, Brazil. Areas of significantly high and low accident risk were identified in relation to mean risk in the study region ($p<0.01$). Significant effects of all covariates were also identified and quantified after controlling for this spatial variation.
Work accident risk for informal workers varied significantly in the study area. Significant age, gender and occupational group effects on accident risk were identified after correcting for this spatial variation. A good understanding of high risk groups and high risk regions underpins the formulation of hypotheses concerning accident causality and the development of effective public accident prevention policies.

AIRBORNE OCCUPATIONAL EXPOSURES AND RISK OF ESOPHAGEAL AND CARDIA ADENOCARCINOMA
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[ID 560] - *No. 6 in Poster Area*
Background: Reasons for the increasing incidence and the strong male predominance among patients with oesophageal and cardia adenocarcinoma remain unclear. We hypothesized that airborne occupational exposures in male-dominated industries might contribute.
Methods: In a nationwide Swedish population-based case-control study, 189 and 262 cases of oesophageal and cardia adenocarcinoma respectively, 167 cases of oesophageal squamous-cell carcinoma, and 820 frequency-matched controls underwent personal interviews. Based on each study participant's lifetime occupational history we assessed cumulative airborne occupational exposure for ten agents, analyzed individually and combined, by a deterministic additive model including probability, frequency and intensity. Furthermore, we analyzed occupations and industries of longest duration. Relative risks were estimated by odds ratios (OR), with 95% confidence intervals (CI), using conditional logistic regression, adjusted for potential confounders.
Results: Tendencies of positive associations were found between high exposure to pesticides and risk of oesophageal (OR 2.3 [95% CI 0.9-5.7]) and cardia adenocarcinoma (OR 2.1 [95% CI 1.0-4.6]).Among workers highly exposed to particular agents, a tendency of an increased risk of esophageal squamous-cell carcinoma was found. There was a 2-fold increased risk of oesophageal squamous-cell carcinoma among concrete and construction workers (OR 2.2 [95% CI 1.1-4.2]) and a nearly 4-fold increased risk of cardia adenocarcinoma among workers within the motor vehicle industry (OR 3.9 [95% CI 1.5-10.4]). An increased risk of oesophageal squamous-cell carcinoma (OR 3.9 [95% CI 1.2-12.5]), and a tendency of an increased risk of cardia adenocarcinoma (OR 2.8 [95% CI 0.9-8.5]), were identified among hotel and restaurant workers.
Conclusions: Specific airborne occupational exposures do not seem to be of major importance in the aetiology of oesophageal or cardia adenocarcinoma and are unlikely to contribute to the increasing incidence or the male predominance.

IMPACT OF SMOKING CESSATION ON REDUCTION OF MEDICAL COSTS AMONG PUBLIC SERVICE WORKERS IN JAPAN: A CROSS-SECTIONAL STUDY
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[ID 686] - *No. 7 in Poster Area*
Background: Despite the known adverse health effects of smoking, only a few studies have reported that smoking cessation improved general health status. This study aimed to clarify the impact of smoking cessation on medical costs.
Method: A cross-sectional analysis was performed on data of annual medical costs in 2002 and the results of a lifestyle questionnaire survey among 2,060 male public service workers in Japan to describe the association between per capita medical costs and smoking status. For the ex-smokers, the mean medical costs were compared according to the number of years since smoking cessation while adjusting for covariates such as age and physical fitness.
Results: Per capita medical costs (1000 Japanese yen) were 139 in current smokers, 189 in ex-smokers, and 160 in non-smokers. Among the ex-smokers, a decreasing trend of the medical costs with the length of smoking cessation was found, 249 for <5yrs, 180 for 5-10 yrs, and 146 for >10 yrs ($p<0.001$).
Discussion: This result indicated that smoking cessation may decrease medical cost through recovery of health. Despite a cross-sectional analysis, dose-effect relationship between duration of smoking cessation and decrease of medical cost was found. However, the lowest medical cost was found among neither ex-smokers nor non-smokers, but current smokers. It may be possible that the current smokers are survivors exempted from any mortal and/or ill-health condition so that they could continue to smoke. Since this is a cross-sectional study, limitations such as no actual follow-up and potential bias due to survival should be considered when interpreting the results. Further follow-up is strongly needed to confirm the effect of smoking on medical costs.
Conclusion: The results suggest that the adverse health effects of smoking may be reversible and recovered after smoking cessation for a certain number of years.

RHEUMATOID ARTHRITIS BY OCCUPATION - AN INCIDENCE STUDY OF THE FINNISH POPULATION
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[ID 692] - *No. 8 in Poster Area*
Aim. The aim of the study was to find out occupational differences in the incidence of rheumatoid arthritis (RA) in the Finnish adult population.
Methods: The incidence of subjects ≥15 years of age receiving specially compensated medicines because of RA for the period of 1970-1995 (from the Finnish Social Insurance Institution) were linked with the census data (from Statistics Finland) from the years 1970, 1975, 1980, 1985, 1990, and 1995. The age-adjusted incidences were calculated by occupation for employed men and women. **Results**: In all, 44 190 incident RA cases and 64 044 410 person-years were cumulated for the employed population in 1970-1995. The age-adjusted incidence (ID/100 000) was 50.6 for men and 87.8 for women. The incidences varied in 20 regions from 35.8 to 61.4 for men and from 69.0 to 124.8 for women. The incidences for

women were ca. twice compared to those for men in the northeastern and northwestern part of Finland and in Åland. The regional incidences varied in 9 main occupational categories from 18.3 to 133.2 for men and from 20.8 to 154.8 for women. The occupational variation was greater than the regional one. Ten highest incidences by occupation (code of three digits) and region are presented in the table.

Men	ID/100 000	Women	ID/100 000
Class, ceramic and clay workers	227.7- 55.1*	Other smelting, metallurgical and foundry workers	185.6
Tobacco industry workers	165.6	Stationary engine and motor power workers	183.3- 84.0*
Stone cutters	102.7	Grain millers	182.9
Well drillers	93.1	Stone cutters	178.3
Transport and communication workers	91.4- 46.4*	Denture makers and repairers	160.2
Glaziers	90.3	Chemical processing workers	155.9- 88.4*
Mining and quarrying workers	88.5	Concrete-mixer operators	150.7
Plastic product workers	87.2- 55.5*	Upholsterers	146.8
Agricultural, horticultural and animal husbandry workers	87.0- 49.5*	Forestry workers	142.8
Hairdressers and barbers	83.4	Textile workers	139.8- 93.5*

*Several subgroups, highest-lowest

Of the all occupational incidences 8% were at least 1.5 times the total sex-specific incidence rate for men, whereas the percentage was 28 for women. Several occupations with exposure to organic and inorganic dusts, chemicals, gases and fumes as well as viral or bacterial infections showed high incidences for both men and women. **Conclusion**. The variation in occupational incidences of RA cannot be explained by regional factors. The results indicate that occupational exposures have contributed to RA.

RESPIRATORY AND SKIN SYMPTOMS IN A SAMPLE OF PHARMACEUTICAL MANUFACTURING WORKERS

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[ID 736] - *No. 9 in Poster Area*

We studied 1286 pharmaceutical manufacturing workers: 700 exposed to chemical agents, involved in the synthesis and purification of the active drug substance and formulation of final dosage forms, and 586 controls (white collars). Data on smoking habit, risk factors, respiratory and dermatologic symptoms/diseases were collected through a self administered questionnaire. On the basis of the job titles, a panel of experts subdivided the exposed subjects in exposed to low, moderate and high occupational risk. Characteristics of the study population were: age 35.5+ 9.1 yrs, 43.1% males, 27.5% smokers, 20.4% ex smokers, 52.1 non smokers, 9.0+7.1 p/y. Prevalence rates of chronic cough and phlegm, diagnosis of chronic bronchitis and psoriasis were higher in exposed subjects with respect to controls. Subjects exposed to low occupational risk and with higher length of exposure had a higher prevalence of shortness of breath with wheeze, allergic rhinitis and diagnosis of COPD in males and females. Prevalence rates of chronic cough and phlegm, dyspnoea, diagnosis of chronic bronchitis, and skin diseases were higher in exposed subjects which have changed at least one job title, with respect to subjects without change of job titles and controls with same age and smoking habit.
In conclusion, occupational exposure in pharmaceutical plants is associated with a higher prevalence rates of chronic bronchitis and diagnosis of psoriasis. Low occupational risk associated with a higher prevalence rates of asthma like symptoms, and higher change of job task associated with a higher prevalence rates of chronic bronchitis symptoms can suggests an effect of medical surveillance.

AIRWAY INFLAMMTION IN COMPOST WORKERS EXPOSED TO BIOAEROSOLS

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[ID 751] - *No. 10 in Poster Area*

Introduction
Exposure to bioaerosols can cause respiratory health problems. So far, the health risk from exposure to bioaerosols at compost plants is less known, although hypersensitive pneumonitis, organic dust toxic syndrome (ODTS), airway irritation and occupational asthma have been reported among workers handling the compost. More information on exposure-response associations is therefore needed. Different methods have been used to measure health effects and exposure. The objectives of this work are to examine airway inflammation by use of several objective methods and to correlate the findings with the exposure during composting.
Methods
In total 47 workers and 24 controls from ten different compost plants in Norway participated in the survey. Each worker underwent spirometry, nitrogen monoxide measurements in exhaled air before and after work. Personal exposure was monitored during the work between the health examinations. Inhalable aerosols were collected with PAS-6 cassettes, one for determination of endotoxins (LAL assay) and b(1®3)-glucans (EIA), and the other for determination of total microorganisms and fungal and bacterial spores (fluorescence microscopy and scanning electron microscopy).
Results and conclusions
The results show that compost workers may be exposed to high levels of total microorganisms (range 0.01-460 x 106 counts/m3), actinomycetes (range 0-592 x 106 counts/m3) and fungal spores (range 0-41 x 106 counts/m3). During work shift a decline in FEV1/FVC (93.8 to 92.9, $p<0.05$) was observed among the workers. Compared to controls also FEV1 decreased (1.42% and -0.03% respectively, $p<0.05$) after a working day. Unexpectedly, NO in expired air was lower both before (median 12.6 and 20.9 ppb, $p<0.05$) and after work (median 9.9 and 19.6 ppb, $p<0.05$) in workers compared to controls, and a work shift NO decline (-0.4 ppb, $p<0.1$) was indicted in workers. Preliminary results show no correlation between lung functions- and NO data and the exposure to bioaerosols during the working day. The results indicate that compost workers are exposed to levels of bioaerosols during work that may have effect on the lung function and NO in expired air.

THE DANISH WORK ENVIRONMENT COHORT STUDY (DWECS). A STUDY WITH TWO PURPOSES: OCCUPATIONAL HEALTH SURVEILLANCE AND LONGITUDINAL ETIOLOGICAL RESEARCH

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[ID 756] - *No. 11 in Poster Area*

Purpose
Data on work environment and health in the working population are needed in order to prioritize work environment interventions.
Analyses of such data can meet two different purposes:
1. Surveillance
2. Etiological studies
Method
In DWECS, eight random samples were drawn 1990, 1995, 2000 and 2005 from the central population register. Questions were asked on health and – if possible - occupational exposures.
Results
The study contains four representative cross-sections, three five-year cohorts, two ten-year cohorts and one 15 year cohort. The combined 1990-2000 samples consisted of 9,653-11,437 people, of which 75-90% participated. The combined 2005 sample consists of 20,000 people – data are currently being collected. In each round, more than 5,000 were employees.
Surveillance data have been published in Danish: Three reports, numerous pamphlets and a website.
Since 1995, 31 scientific papers have been published, 5 are in press. Three were methodological (E.g., Occupation is a better proxy for exposure than work process), six were cross-sectional (E.g., Among shift workers, risk factors for cardiovascular disease are more frequent than among day workers; Trends in the Danish work environment in the 90'iers were partly explained by changes in the number of workers in occupations), 22 were prospective (E.g., Low skill discretion is a risk factor for myocar-

dial infarction; Repetitive work and high job insecurity are risk factors for self-rated health; High psychological demands increase chance for smoking cessation; Low degree of employee development and supplementary training in the organization is a risk factor for disability pension, Aggression at work is a risk factor for of early retirement pension).
Discussion
Surveillance data have been used to prioritize work environment interventions.
The cohorts of the study are usable for etiological research. Scientific use of surveillance data adds to the quality of these data.

THE INFLUENCE OF NOXIOUS METAL-COMPOUNDS ON HEALTH STATUS OF THE EXPOSED WORKERS

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[ID 793] - *No. 12 in Poster Area*
Introduction:
The non-ferrous metallurgy is one of the most polluting industrial branches today. The workers are exposed to a cumulus of noxious agents: Pb, Cd, Zn. There are also a lot of "confounders" which complicate the interpretation of the results.
Objectives:
This study was performed to find out the influence of noxious metal-compounds on health status of the exposed workers.
Methods:
Air monitoring of the workplaces was done during a 8-year period regarding the Pb, Cd, Zn. The cummulation-index was calculated for all workplaces. Two groups, each of 216, exposed workers and controls were examined by clinical and laboratory tests (blood- and urinary- Pb, Cd, Zn; urinary- DALA). An epidemiological questionnaire was conducted to collect the professional and non-professional data. Health status evaluation of exposed and non-exposed workers was done. Linear regression analyses was used to find out the relationship between the exposure and health effects on exposed workers.
Results:
The average values of Pb, Cd, Zn in the air of all workplaces were above the Maximum Admissible Concentrations. The cummulative-index was >1 for all workplaces. The indicators of exposure and of the biological effects were above the Biological Tolerable Limits for all the metals. Health status evaluation revealed the following groups of diseases in exposed versus non-exposed workers: digestiv 25% (7%)($p<0.05$); reumatismal 21% (9%); neuro-vegetative 16% (4%)($p<0.05$); cardiovascular 15% (4%)($p<0.05$) and renal 9% (1%)($p<0.05$). There were not significant differences between the two groups: exposed and control, regarding the "confounders". Linear regression analyses have shown a significant correlation ($r \sim 0.6 – 0.7$) between the studied parameters.
Conclusions:
-This study reveales the clinico-toxicological expression of an increased absorption of metal-compounds in exposed workers.
-The metal-compounds affects statistical significantly($p<0.05$) the health status of the exposed workers.
-It is advised to reduce the levels of noxious metal-compounds in the air of all workplaces.

GLUTATHIONE S-TRANSFERASE P1 GENETIC STATE IN OCCUPATIONALLY EXPOSED BLADDER CANCER CASES

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[ID 945] - *No. 13 in Poster Area*
The genotype of glutathione S-transferase P1 (GSTP1) influences the risk of bladder cancer among Chinese workers formerly occupationally exposed to benzidine (Ma et al., Pharmacogenetics 13, 409, 2003). Two studies of Caucasian bladder cancer cases without known occupational exposure show conflicting results. This research was conducted to define the role of the GSTP1 genotype in Caucasian bladder cancer cases supposed to be caused by aromatic amines. Methods: DNA from 144 subjects reported to the Industrial Professional Associations (Berufsgenossenschaften) in Germany in the years 1996-2004 as affected of urothelial cancer due to occupational exposure, and 196 surgical patients admitted for different benign diseases and without known malignancy in their medical history from one hospital in Dortmund were genotyped by means of real time PCR (LightCycler) in relation to GSTP1 A1578G (Ile105Val) polymorphism. Results: Among the subjects with bladder cancer 46% presented the AA genotype, 39% the AG genotype, and 15% the GG genotype. In the surgical (non cancer) control group analyzed, 42 % presented the AA genotype, 42 % the AG genotype and 16 % the GG genotype. In part of the bladder cancer group, represented by 46 painters, the genotyping showed a distribution of 41 % of the AA genotype, 48 % of the AG genotype and 11 % of the GG genotype. Conclusions: The data point out that in Caucasians the GSTP1 A1578G polymorphism in subjects exposed to aromatic amines does not play a substantial role as a predisposing factor for bladder cancer.

IMPACT OF AGE ON NEUROBEHAVIORAL TEST PERFORMANCE IN OCCUPATIONAL HEALTH STUDIES

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[ID 1061] - *No. 14 in Poster Area*
Aim. The aim was to study the influence of age on neurobehavioral test performance in manual workers.
Methods. The study comprises 432 men with manual professions who were tested in work site epidemiological studies during the 1990ies. Their mean age was 42.4 (SD 12.6) years, ranging from 18 to 68 years. They were tested with tests for memory, cognitive speed, motor speed, reaction time, manual dexterity, grip strength and tremor.
Results. There was a decline in test results with increased age. Cognitive speed and attention were among the functions that were most sensitive to age effects. In the WAIS Digit Symbol, the performance of subjects aged 60-65 was 35% weaker than for subjects aged 30-35. A test for tremor (Kløve-Matthews Static Steadiness Test) showed 50 % weaker results for subjects older than 55 years compared with their younger colleagues. However, the effect of age on tremor was only observed among older subjects who were smokers.
Conclusion. There was a large impact of age on neurobehavioral test results. The results suggest that the age should be controlled for in the design (groups with similar age) rather than in the statistical analyses when conducting epidemiological occupational health studies. Failure to control for age may lead to inadequate conclusions about the association between performance and exposure to neurotoxicants.

SILICA, SILICOSIS AND LUNG CANCER - EVALUATION OF THE FEASIBILITY OF AN EPIDEMIOLOGICAL STUDY IN THE GERMAN CERAMICS INDUSTRY

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[ID 1109] - *No. 15 in Poster Area*
Existing epidemiological data still do not provide a clear quantitative dose-response relationship for lung cancer or silicosis due to occupational exposure to crystalline silica. There is an urgent need for epidemiological studies which overcome the weaknesses of most previous studies, if possible, through better quality exposure data, greater consideration of potential confounding and adequate methods to eliminate selection bias. We evaluated medical examination and exposure measurement data from the German Berufsgenossenschaft der keramischen und Glas-Industrie (BG-GK), for workers in the porcelain sector of the industry, to determine the feasibility of conducting an epidemiological study that would overcome these weaknesses.
Since 1938, the BG-GK routinely has conducted a comprehensive medical surveillance program for silicosis, including chest x-rays. Since the 1960's nearly all blue-collar workers are included, and records are available from 1985 to the present for 37,460 employees.
For each employee, demographic information, detailed results of all radiological examinations and information on jobs and departments, are

well documented either in the electronic database or in paper records. Smoking information is available for around 2/3 of the cohort.
Systematic exposure measurements, since the beginning of the 1960's using gravimetric measurement procedures, have also been conducted by the BG-GK and which are electronically available since 1972. The database contains around 2,700 exposure measurements of respirable crystalline silica and some thousands more for 240 other compounds. Additional paper records and published information describing exposure levels are available back to the early 1960s.
We comprehensively evaluated the quality and completeness of various available data resources. Despite some relatively minor weaknesses, the available information appears to be an excellent source for a new study of silicosis and lung cancer risk among employees exposed under more modern conditions of lower crystalline silica exposure.

OCCUPATIONAL EXPOSURE TO CADMIUM AND HEAVY METALS AS A CLASS AND RISK FOR BREAST CANCER

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[ID 1126] - *No. 16 in Poster Area*

Background: Recent in vitro and in vivo laboratory studies have shown that cadmium at very low doses can mimic estrogen and therefore potentially affect breast cancer risk. Functionally, cadmium forms a high affinity complex with the hormone binding domain of the estrogen receptor and can activate estrogen receptor-α in breast cancer cell lines. Despite this biological plausibility, only a few human studies have evaluated exposure to cadmium and breast cancer. Occupational studies have suggested a link between working in an environment with metal-related exposures and breast cancer incidence and mortality. In order to clarify the effects of workplace exposures to both cadmium and other heavy metals on breast cancer risk we have evaluated job information using data collected in a large case-control study of breast cancer in Poland.
Methods: Cases (n=2386) for this population-based case-control study were female residents of Warsaw and Lodz, Poland, aged 20-74, newly diagnosed from January 2000 to January 2003 with histologically confirmed in situ or invasive breast cancers. Population controls (n=2502) were matched to cases by city of residence and five-year age groups. A structured questionnaire was administered, and detailed lifetime occupational histories, covering every job held for at least six months, as well as information on other potential breast cancer risk factors were obtained. Jobs were evaluated for potential exposures to cadmium (subjects, n=83) and heavy metals (subjects, n=346) by experienced industrial hygienists for probability, intensity, frequency and confidence and assigned to the study jobs. We are in the process of calculating metrics of exposure including average, highest and cumulative exposure scores for each woman in the study. We will then use conditional logistic regression to evaluate odds ratios for various levels of exposure to cadmium and to heavy metals as a group, after adjusting for other breast cancer risk predictors.

SENSITIVITY AND REPRESENTATIVENESS OF FATAL OCCUPATIONAL INJURY SURVEILLANCE SYSTEM IN CHILE

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[ID 1131] - *No. 17 in Poster Area*

Surveillance of fatal injuries at work is a key element to identify the impact of prevention programs. This study determine the sensitivity and representativeness of the National Surveillance System (NSS) of fatal injuries at work. The NSS is administered by the government and was inaugurated in 2000. A standardized data collection form is used to gather information on demographic data, injury source and sequence, worker activity at the time of the event, industry, occupation, place of death, and external cause of death. The NSS is compared to a multiple source surveillance system (MSSS) of a non-profit compensation system (Asociación Chilena de Seguridad). The comparison of the two systems was conducted using 2000-2004 data from the NSS data collection form and from the (MSSS) computer files. The MSSS was used as the "gold standard". Sensitivity and representativeness was calculated for the NSS. Also, case-by-case comparison was conducted. Sensitivity is defined as "the proportion of all deaths captured by the system", whereas, representativeness quantifies "the nature of capture" (systematic errors in capture). Over the study period, the NSS sensitivity was about 85%. The sensitivity varied from 54% in 2000 to more than 95% in 1994. The missed injuries were compared with the injuries captured to estimated representativeness. Differences in univariate analysis were found in transport injuries and agriculture workers. This is, deaths from transport injuries were more unlikely to be captured by the NSS. The same pattern is observed for deaths in agricultural workers. No other differences were found in capture and content. This study support the conclusion that multiple data sources capture more deaths due to injuries at work. Periodic epidemiological analysis of the surveillance systems is mandatory to improve and maintain the system quality.

APPLICATION OF DIARIES IN INTERVENTION STUDIES. MONITORING THE COURSE OF LOW BACK PAIN INTENSITY IN AN INTERVENTION STUDY FROM BASE-LINE THROUGHOUT FOLLOW-UP

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[ID 1296] - *No. 18 in Poster Area*

Introduction
Interpretation of intervention studies is often difficult. In most studies the study period is a black box when it comes to interpretation of the main outcome. In dealing with conditions with an episodic nature with no hard endpoints as LBP it is of interest to follow the curse of symptoms during the study period. In studies with negative or no effect the knowledge of an immediate effect of the intervention process with a subsequent decline will encourage new studies with more attention to the retention of the skills accomplished.
Material and method
In an RCT intervention (1) LBP intensity was reported by the participants in sets of diaries in four consecutive days. Six sets of diaries were collected with 3 months interval throughout the study period of 2 years. The diary data were analysed in a mixed effect model (2) with test of the overall effect of each intervention arm on the level of LBP intensity. Intervention arm, set of diary and the value of the dependent variable in the first diary were set as fixed effect and subject as random effect.
Results
The application of diaries appeared to be feasible although costly in manpower for instruction and time used by the participants.
79% (n=163) of the target population participated in full baseline and follow up program and completed 17.9 diaries /subject (out of 24 possibly) during the study period. The diary recording supported the main conclusion of the study with no transient effect on LBP intensity and no significant declining tendency at the last part of the study in the intervention arms compared to the reference arm.
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Back Pain in Female Eldercare Workers: Randomised controlled worksite trial. Accepted for publication in Spine 2:Brown H, Prescott R. Applied mixed models in medicine.Chisester: John Wiley&sons 1999

PREVALENCE OF HAND AND FOREARMS ECZEMA IN A GROUP OF CHEESE MAKER

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[ID 1340] - *No. 19 in Poster Area*

Cheese making is an activity that present some occupational risk in developing of work related hand and forearms eczema (wet working, use of salt, soap and contact with animal protein).
We studied a population of 47 cheese maker (38 male and 9 female average age 39,2 ± 10,7 years old and an average working history of 14,0 ± 10,8 years) to investigate the prevalence of eczema.
We used the Italian version of NOSQ questionnaire administered by medical personnel.
The prevalence of hand and forearms eczema was 12,9% in total population (15,7% in male versus 11,1% in female). 7,9% of male and 11,1% of female referred a work-related eczema (especially during salting proce-

dure, contact with sheep milk and using gloves).
Hand and forearms eczema was referred in 26,7% of cheese maker with less of 5 years of working history, in 10,5% of ones with a working history of cheese making between 6 and 20 years and 6,9% in the ones that worked in cheese industry for more than 20 years. 20% of workers of first group referred an occupational induction of their eczema versus 5,2 % of second group and none of third one.
Current data is in according with the hypothesis of an occupational risk for occupational eczema in cheese maker. The higher prevalence of eczema symptoms in the cheese maker with less of 5 years of working history suggest a role especially of irritant substances in the pathogenesis of eczema.
We'll obtain further information in the prosecution of study during next months expanding the group of cheese maker interviewed.

SYSTEMATIC VALIDATION OF NEGATIVE OCCUPATIONAL COHORT MORTALITY STUDIES

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[ID 1424] - *No. 20 in Poster Area*

In the absence of positive study findings, or even counterintuitive results, investigators may conclude that completed research is unpublishable. Avoiding a "publication bias" is frequently cited as a reason to publish negative (or contrary) study results. In fact, investigators generating such findings have responsibilities similar to investigators reporting positive results with respect to evaluating the robustness of their results in light of methodological or data weaknesses or errors. Approaches to a systematic evaluation of factors that might lead to spurious findings include evaluations for potential weakness and study flaws and conducting sensitivity analyses that determine the direction and magnitude of any resulting bias. It is often possible to quantify the degree of bias that would have had to occur in order to mask a true positive association of a given magnitude (compatible with study power). Methods employed in such evaluations can be qualitative (for example, direct comparisons of the study methods and results to other comparable studies) or quantitative (for example, conducting additional focused analyses that reduce selection bias and confounding). We will illustrate these methods using results from a recent historical cohort mortality study of employees in the United States carbon black industry. Basic and stratified results indicated negative findings consistent with earlier studies of U.S. carbon black workers, which reported deficits in mortality from all causes combined and specific cancers, especially lung cancer (Ingalls, 1950; Ingalls & Risquez-Irabarren, 1961; Robertson & Ingalls, 1980, 1989; Robertson & Inman, 1996). In 1996, the International Agency for Research on Cancer (IARC) questioned the validity of these earlier study results, however, due to unclear cohort enumeration and uncertainty regarding the completeness of vital status ascertainment and follow-up. A standard approach to validating negative study results will be proposed.

BLOOD LEAD DECREASE IN EX-WORKERS AFTER OCCUPATIONAL EXPOSURE IN A LEAD AND ZINC SMELTER: FOLLOW-UP AT 2 YEARS

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[ID 1438] - *No. 21 in Poster Area*

Objective: To analyze the blood lead level decrease in subjects after cessation of an exposing occupation.
Methods: An exceptional post-occupational follow-up was proposed to the 830 ex-employees of a zinc and lead smelter, which stopped its activity in March 2003. Among these ex-employees, 433 gave their agreement for the use of their biological data. They in addition answered a questionnaire to collect socio-demographical data, to recall their occupational history before and after the smelter closing, and to specify possible modifying factors of the blood lead level decrease. This information led us to exclude from the analyses 42 ex-employees, either because of an occupational exposure to lead posterior to the smelter closing (n=38), or because of renal lesions (n=4). The first analyses were carried out using simple models of exponential decay, built for homogeneous groups of blood lead level at the time of the redundancy.
Results: Most of the ex-employees were men (95%, n=373), they were 24 to 60 years old at the time of their redundancy (median at 47 years), and had cumulated durations of lead exposure varying from 2 to 42 years (median 23 years). At the time of the smelter closing, twenty-three ex-workers initially had blood lead level higher than 600 µg/l (maximum to 710, average 651 µg/l), and 72 between 501 and 600 µg/l. After a 22 months median duration follow-up, respectively 39% (9/23) and 21% (15/72) of these ex-employees had still a blood lead level exceeding 400 µg/l (biological exposure limit in France, with effect from January 1st 2006). The blood lead level decrease was statistically linked to the cumulated duration of lead exposure ($p<0.0001$).
Discussion: Two-compartmental models are under study in order to investigate more precisely the factors of variation of the blood lead level decrease.

PREVALENCE OF OCCUPATIONAL EXPOSURES IN AUSTRALIAN FEMALE VETERINARIANS, WITH PARTICULAR REFERENCE FOR ADVERSE REPRODUCTIVE OUTCOMES

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[ID 1535] - *No. 22 in Poster Area*

Objective- To identify the prevalence of exposure to potentially harmful occupational factors in Australian female veterinarians.
Design- National cross-sectional survey of a cohort population.
Procedure- A self-administered questionnaire was mailed to 5748 veterinarians graduating from Australian veterinary schools in 1960-2000. This paper reports the prevalence of occupational exposures in 1197 female veterinarians in their current job with particular reference to those exposures associated with adverse reproductive outcomes, including radiation, anesthetic gases, pesticides, and long working hours. Comparisons were undertaken between respondents by practice type and decades of graduation. Multivariate logistic regression was undertaken to predict the risk for exposure to occupational hazards in female veterinarians by age, type of practice, graduation year and number of hours worked.
Results- The response rate for females was 59%. We found that age under 30 years, small and mixed animal practice, graduation year after 1990, and working more than 45 hours/ week were all associated with greater exposure to putative risk factors. Mixed animal practitioners worked more than 40 hours/week (57%) and had the highest exposure to anaesthetic gases (94%) and pesticides (54%). Twenty two percent of those who were exposed to anaesthetic gases did not have waste anaesthetic gas scavenging systems. Small animal practitioners reported they took more x-rays (90%). While taking x-rays, 56% of respondents reported physically restraining animals, and only one in five of respondents used film holders and lead screens.
Conclusions- The high prevalence of potentially harmful exposures among female veterinarians and lack of use of protective equipment at work needs to be considered in developing and planning the safety of veterinary work.

MORTALITY AMONG EUROPEAN WORKERS IN THE TITANIUM DIOXIDE INDUSTRY

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[ID 547] - *No. 23 in Poster Area*

Objectives:
To assess the risk of lung cancer mortality related to occupational exposure to titanium dioxide (TiO2).

Methods:
We follow-up 15,017 workers in 11 factories producing TiO2 . Exposure to TiO2 dust was reconstructed for each occupational title; exposure estimates were linked with the occupational history. Observed mortality was compared with national rates. Internal comparisons were based on multivariate Cox regression analysis.
Results:
The cohort contributed 371,067 person-years of observation. 2,652 deaths occurred during the follow-up [standardized mortality ratio, SMR, 0.87, 95% confidence interval (CI) 0.83-0.90 among men and 0.58 (0.40-0.82) among women]. Among men, the SMR of lung cancer was 1.23 (95% CI 1.10-1.38); however, mortality from lung cancer did not increase with duration of employment or estimated cumulative exposure to TiO2 dust.
Conclusions: Our results do not suggest a carcinogenic effect of TiO2 dust on the human lung.

OCCUPATIONAL CANCER AND CARCINOGENESIS

NON MELANOMA SKIN CANCER AND PHOTOAGEING IN FARMERS PROFESSIONALLY EXPOSED TO ULTRAVIOLET RADIATIONS.
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[ID 301] - *No. 24 in Poster Area*
INTRODUCTION: A major factor in the aetiology of non-melanoma skin cancers (NMSC) is the chronic exposure to ultraviolet radiation (UVR). Most personal exposures to UVR occur from outdoor activities.
The aim of the study was to determine the prevalence of NMSCs and photo ageing signs in the Italian farming population.
SUBJECTS METHODS: 169 workers, employed in viticulture and olive culture on many properties in Tuscany, were studied. The mean age of the studied population was 45 13.2 years. Skin diseases and symptoms were assessed by a dermatologist.
88 other patients with squamous cell carcinoma (SCC) recovered within one year at the Section of Dermatology of the University of Siena were examined. All the patients were classified for skin phototype through the Fitzpatrick classification, for skin photo ageing through Glogau classification, for skin chronoageing and for occupational anamnesis.
RESULTS: In the agricultural population 2 basal cell carcinomas were identified.
In the group of 88 patients treated at the Section of Dermatology for SCC 32 (36.4%) were indoor workers and 56 (63.6%) were outdoor workers. 32 (18 male and 14 female) of the outdoor workers were farmers. The mean age of male and female farmers was respectively 76.3 and 80 years old and they had a respective average of 48 and 41 years of UVR exposure.
DISCUSSION: Only 1.2 % of the agricultural population examined had an NMSC. Probably this is due to the mean age of the studied population which was lower than the age when NMSCs usually appear.
36.4% of the patients recovered for SCC were farmers. The age of these patients was compatible with the long period of latency of NMSCs.
The observed results should indicate that in our Country a number of NMSCs in outdoor workers (in particular in farmers) is not recognized as professional diseases.

PARENTS' OCCUPATIONAL EXPOSURE TO CARCINOGENIC AGENTS RELATED TO THE PRESENCE OF ACUTE LEUKEMIA IN THEIR CHILDREN WITH DOWN SYNDROME
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[ID 326] - *No. 25 in Poster Area*
Introduction: There are many controversies regarding parents' occupational exposure and leukemia development in children. It has been said that susceptibility plus an exposure to carcinogenic agents at any level, could lead to a high and consistent association with the presence of this kind of neoplasia. The aim of this study was to determine parents' occupational exposure to carcinogenic agents related to acute leukemia presence in their children with Down Syndrome (DS). Method: Cases-controls study. Cases. Children with Down Syndrome and acute leukemia. Controls: Children with Down Syndrome but no acute leukemia. Three questionnaires were applied on parents' social-demographic, family and personal aspects, as well as their work history. The occupational exposure level to carcinogenic agents was determined trough a validated score based on activities, instruments and materials used in parents' jobs. Analysis plan: Non-conditioned logistic regression. Results: 30 cases and 63 controls were obtained between 1998 and 2002. Non significant associations were found for some occupations, economic activities and chemical agents. We calculated OR comparing father's score to high exposure to carcinogens between cases and controls in three different periods: before pregnancy (OR= 15.61, CI95%= 2.14, 113.71), during the pregnancy (OR= 12.98, CI95%= 1.78, 97.14) and before to the leukemia diagnosis of index child (OR= 14.23, CI95%= 2.18, 97.14). We found association for mother's score to high exposure to carcinogens and leukemia in their children only for the before pregnant period (14.72, CI95%= 1.06, 202.76). Conclusion: We found associations between high occupational exposure to carcinogens of parents and acute leukemia in their children with Down syndrome.

OCCUPATIONAL EXPOSURE TO HYDROCARBONS, HEAVY METALS, PESTICIDES AND ELECTROMAGNETIC FIELDS RELATED TO ACUTE LEUKEMIA IN WORKERS AFFILIATED TO THE MEXICAN INSTITUTE OF SOCIAL SECURITY
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[ID 327] - *No. 26 in Poster Area*
Introduction: With exception of benzene and ionizing radiations, many controversies respect to the rol of occupational exposures and its association with acute leukemias even exist. In Mexico, there are industrial processes too old or where use substances that in other countries have been prohibited. It could increase the risk of occupational exposure compared with studies made in developed countries. The main of this study was evaluate the association between occupational exposure to hydrocarbons, heavy metals, pesticides and electromagnetic fields and presence of acute leukemia in workers affiliated to the Mexican Institute of the Social Security (IMSS). Methods: A cases and controls study. Cases were workers with acute leukemia of novo diagnosis who fulfill selection criteria. Controls were taken through a random sampling of the computer registries of workers affiliated to IMSS. Three questionaires about sociodemographycal aspects, personal antecedents and occupational history were applied. Occupational exposures to hydrocarbons, heavy metals, pesticides and electromagnetic fields were estimated by an hygienist in four different time of periods: 5, 10, 15 and more than 15 years previously to diagnosis. Analysis plan: nonconditional logistic regression. Results: We obtained 69 cases and 88 controls; not differences by sex, age, alcohol consumption nor educative level were found. Familiar antecedent of cancer was associated to acute leukemia (non adjusted OR = 2,17, CI 95% = 1,04, 4,55). When the occupational exposure to hydrocarbons was adjusted for familiar antecedent of cancer, we found a borderline association with this exposure and leukemia in time of period between 10 to 15 years previous to diagnosis (OR=2.63, CI 95%= 0,93, 7,37). Conclusions. Results show differences with a borderline significance for the occupational exposure to hydrocarbons, mainly when this exposure happened between 10 to 15 years previous to leukemia diagnosis. There are not associations with pesticides, heavy metals and electromagnetic fields exposures.

ON THE POSSIBLE ROLE OF SV40 IN HUMAN MESOTHELIOMA INCIDENCE
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[ID 477] - *No. 27 in Poster Area*
Exposure to asbestos is considered to be a leading factor in the aetiology of malignant pleural mesothelioma. A number of reports have also implicated simian virus SV40, discovered in the early 1960s as a contami-

nant of poliovirus vaccines. The assumption was based on the detection of DNA sequences encoding the SV40 large – T antigen and/or its protein expression in such tumours. Recently, an article was published with a strong argument against any causative role of SV40 in human mesothelioma (Manfredy JJ, et al. Cancer Res 2005;65:2602-9).
The aim of this study was to evaluate the potential effect of poliovirus vaccines on mesothelioma incidence.
Patients included in the study were collected from the Croatian Cancer Registry over seven years and divided in two groups: vaccinated (58 subjects; median age 48,5 years, range 35-56 years) and non-vaccinated (136 subjects; median age 64, range 53-84 years). The subjects were distributed in either group taking into account their age and vaccination practice related to the time when there was a possibility of contamination with SV40. A short questionnaire was sent to the families of subjects who provided additional information on their occupation.
The results showed that there were 46 subjects (79.3%) with the history of occupational exposure to asbestos in the vaccinated group, whereas there were 87 subjects (64%) in the non-vaccinated group. The difference was statistically significant (chi square=4.44; p=0.0351).
Although the aetiology of some malignant pleural mesotheliomas not related to occupational exposure could not be accounted for, our findings do not indicate a causative role of polio vaccines used. However, as vaccinated patients were significantly younger than non-vaccinated (Mann-Whithney U Test, p<0.001), it appears that in vaccinated subjects occupationally exposed to asbestos the latency period for the development of mesothelioma was shorter than in those non-vaccinated. This raises a question about possible co-carcinogenic effect of SV40 and asbestos in mesothelioma.

DYE-MANUFACTURING WORKERS AND BLADDER CANCER IN SOUTH KOREA

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[ID 502] - *No. 28 in Poster Area*

The history of dye industry in Korea are closely related with that in Japan. Japanese government banned the manufacture and use of aromatic nitrogen compounds including benzidine, which turned out to be carcinogenic based on the epidemiological study showing the high prevalence of bladder cancer in workers or ex-workers exposed to aromatic nitrogen compounds. Japanese government forced to shut down dye manufacturer in 1972. On the other hand, Korean dye manufacturers by implementing these technology from Japan have expanded remarkably since then. In 1992, there were 22 factories making or dealing with benzidine chlorides, manufacture of which was also banned in 2000 in Korea.
Park et al. investigated 516 workers in 22 factories making or dealing with benzidine chlorides or other dye intermediates for more than 20 years in Korea, however, failed to identify any active or past bladder cancer in 1996. Furthermore, we could not find any bladder cancer even using national cancer registry database in 2000.
We discussed the cause of the failure to identify bladder cancer. Developed countries such as Germany, United Kingdom, US, and Japan had launched radical prevention measures such as work environmental control. Furthermore, benzidine base, very easily dispersable particle, was replaced by benzidine chlorides which is harder to disperse. Since Korean dye-manufacturing workers has been using benzidine chlorides in rather improved working environment from the beginning, they might be exposed to much lower concentration of benzidine than Japanese dye workers did in the early era of dye manufacturing.

MALIGNANT MESOTHELIOMA IN THE PROVINCE OF TRIESTE(ITALY)

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[ID 685] - *No. 29 in Poster Area*

The aim of the present study is to analyse the cases of malignant mesothelioma (MM) among residents of the province of Trieste for the period 1995-2003. The degree of diagnostic approximation was calculated in accordance with the diagnostic protocols drafted by the Italian National Registry of mesothelioma cases. In all cases, checks were carried out on living status in 2005.
From 1995 to 2003, 188 cases of MM were identified; 172 (91%) of which were confirmed by positive histological findings. The mean age was 70.6 years (range 46-96) for males and 74.3 years (range 40-96) for females; there were 4 cases in the age group under 50, 141 in the age group 50-80 and 43 cases among the over-80s. In 177/188 cases, the site of the tumour was the pleura, in 10 cases the peritoneum, and in 1 case the tunica vaginalis of the testicle. The male/female ratio was 9.4 for the whole case series, 10.1 for pleural mesothelioma and 4.0 for the peritoneum. A check on living status showed that, at the beginning of 2005, 171 cases (91%) were dead; the mean survival time was 22 months for males and 19 months for females. The number of incident cases per year varied considerably during the period of observation, ranging from a maximum of 28 cases in 1996 to a minimum of 14 cases in 1997.
In conclusion, in the Italian province of Trieste, as in other parts of Europe, the incidence of malignant mesothelioma is higher among men and the most common site of the tumour is the pleura. Although the limited data available makes it difficult to formulate an exhaustive estimate of incidence trends, the study shows an average of about 20 new cases per year, with only a few cases among women.

ONE-YEAR MEASUREMENT OF BENZENE AND OTHER MONOAROMATIC COMPOUNDS IN URBAN AIR BY SEMI-CONTINUOUS DIFFUSIVE SAMPLING

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[ID 688] - *No. 30 in Poster Area*

The carcinogenic properties of benzene have lead to the issuing of the European Directive 2000/69, which sets the limit value for benzene concentration in ambient air at 5µg/m^3, as an annual average, to be attained within 2010. These regulations aim at protecting the European population, both in life and workplace environments. Public transportation workers (e.g. taxi and bus drivers) are one of the highest exposure category, with respect to benzene concentration in urban air. Previous studies demonstrated that the average benzene exposure of citizens is quite higher than the urban background concentration, being two times or more for people who spend significant portions of time close to traffic emissions.
In order to evaluate the typical risk level of workers exposed to a medium-sized town's traffic emissions, a 1-year survey was carried out in one site, close to a busy crossroad. The concentrations of benzene, toluene, ethylbenzene and xylenes were measured every month, exposing four series of radial diffusive samplers during different time periods: 2-day, 4-day, 10-day and 14-day. Three replicate samples were exposed during each time period. The analysis was carried out by carbon disulphide desorption followed by HRGC-FID. The repeatability of benzene measurements was satisfactory: from 4,9% for 7-day down to 2,8% for 14-day samplings. Three series of diffusive samplings and low-flow pumped samplings were carried out in parallel during winter-time, summer-time and spring-time. These comparisons showed a very good agreement, with absolute deviations ranging, for benzene, from 0 to 10 %. Similar data are presented for the other monoaromatic compounds.
The benzene annual mean values were somewhat above the target limit value of 5 µg/m^3 when averaging each sampling series: 6,0 ± 2,4 µg/m^3, 5,3 ± 1,9 µg/m^3, 5,4 ± 1,8 µg/m^3, 5,2 ± 1,7 µg/m^3 for 2-day, 7-day, 10-day and 14-day, respectively.

ASSOCIATION BETWEEN POLYMORPHISMS OF XPD AND XRCC3 GENES AND SUSCEPTIBILITY TO CHRONIC BENZENE POISONING

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[ID 870] - *No. 31 in Poster Area*

Objective To explore the association between genetic polymorphisms of XPD and XRCC3 and susceptibility to chronic benzene poisoning. Methods A case-control study was conducted. 80 patients diagnosed with chronic benzene poisoning and 62 works occupationally exposed to benzene who were engaged in the same woking time and job title as patients were investigated. PCR-RFLP was applied to detect the single nucleotide polymorphisms (SNPs) on codon156, codon312, codon751 of XPD gene and codon241 of XRCC3. Results There was a 2.903 fold (95%CI: 1.054~7.959, P=0.0392) increased risk of chronic benzene poisoning in the subjects carrying XPD 751Gln variant allele compared with those

carrying XPD 751Lys/Lys genotype. A negative association for XRCC3-241T/M compared with T/T genotype was found (ORadj=0.140, 95%CI: 0.040~0.482, P=0.0018). Conclusion The subjects with XPD 751Gln variant allele were more susceptive to benzene. XRCC3-T241 alleles play an important, harmful role in chronic benzene poisoning.

MATLINE: A WEB RESOURCE AND THE USERS FEEDBACK

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[ID 907] - *No. 32 in Poster Area*

MATline is a database developed by the Documentation Service for Health Promotion of the Piedmont Region. It allows to gain information about approximately 600 carcinogenic chemicals, which are still regularly used in many industrial processes. It gets information from the most authoritative national and international sources.
Since 16 August 2004 an advanced system of monitoring of database accesses is going, in order to get quali-quantitative data on the number of users and the paths these follow surfing the MATline. Moreover, the collected data allow us to analyze the search strategy used and therefore to assess if the database has been able to supply the requested information. Statistics show a moderate but continuous increase both in the number of accesses and in the average number of visited pages by a single user. We recorded a mean of 492 users and 4375 pages visited monthly (September 2004 – August 2005).
In order to facilitate a more direct feedback, a survey on the Web, based on six questions, was carried out from February to July 2005. 75 users voluntarily participated at the survey.
Between them, 64% states that "frequently" retrieve the information looked for, 25% answers "sometimes", 10% "always", only 1% "very rarely".
One of the topic investigated was the utilization of the information found; : 25% of users look for the information for professional updating, 21% to complete other information sources, 17% for planning surveillance and vigilance interventions, 15% to find normative updating about chemicals. At last, 12% use data for preparing articles and reports and 8% to take decision and to plan strategic action.
We also collected suggestions on which topics would deserve greater attention in planning database's implementation; for example it has been suggested the introduction of other categories of substances like drugs or teratogenic chemical.

SITUATION OF OCCUPATIONAL CANCER IN THAILAND

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[ID 908] - *No. 33 in Poster Area*

Background: The statistical information of cancer registry in Thailand by the National Cancer Institute (NCI) shows the increment of cancer patients in Thailand every year. However, the prevention and control of occupational cancer is not presently established in Thailand.
Methodology: This study was conducted in the year 2005 on documentary data of NCI, type of occupations in the whole country, and summary of meeting on occupational and environmental cancer in Thailand.
Results: The results indicated that 47.8% of new cancer patients, who were treated by NCI in the year 2001, came from the Central Part (Bangkok and Metropolitan), 15% of patients came from the Northern Part , 10% of patients came from the North-eastern Part, 5.5% of patients came from the Southern Part, and other 0.1% occurred in the unidentified area. The type of cancer varied by carcinogen used in the occupations in each part of Thailand. The Northern Part and Central Part of Thailand had high risk to breast cancer and lung cancer caused by organic solvents, metal, pesticides, and radon. The Eastern Part had high risk to lung cancer and leukemia caused by organic solvents (VOCs) and vinyl chloride, The Southern Part had high risk to skin cancer and lung cancer caused by arsenic and radon. However, the relation between cancer and occupations is unclear caused by unidentified patients' occupations in report.
Summary: The linkage of cancer incidence and carcinogen exposure caused by occupations is necessary for cancer prevention and control planning. Thus, the list of occupational carcinogen usage and the systematic identification of patients' occupations should be integrated in the action planning.

OCCUPATIONAL CANCERS RELATED TO 1,3-PROPANESULTONE: TARGET ORGANS AND LATENCY TIMES

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[ID 916] - *No. 34 in Poster Area*

1,3-Propane sultone is a directly alkylating, genotoxic and carcinogenic substance. In rats, it induces local and systemic tumours at multiple target sites. Preponderant systemic tumours occur at the central nervous system, especially gliomas. Other localisations include the mammary gland, the intestine, the haematopoietic system and the kidneys. In one particular company of the German chemical industry, 1,3-propane sultone had been manufactured and used in limited amounts in the 1950ies and 1960ies, and for a very few purposes until the 1970ies. The number of persons in contact with the compound was limited (˜100). The medical history of some of these cases could be traced. As cerebral gliomas are a major type of tumours induced by 1,3-propane sultone experimentally, the occurrence of one glioblastoma among the previously exposed persons appeared remarkable. Three intestinal malignancies were recorded within the cases observed. Also noteworthy was one case of a duodenal carcinoma, normally a rare human malignancy. Two haematopoietic/lymphatic malignancies of different nature have been observed, and there was one case of a renal cell carcinoma. The types of these malignancies within a group of persons exposed to 1,3-propane sultone appear surprisingly consistent with the expectations from the available animal studies. In view of these coincidences, 10 cases with various neoplasms have been compensated within the period of 1985-2004 as an occupational disease in Germany, legally based on the "opening clause" of §9(2) SGB VII.

THE ROLE OF RADON AND SILICOSIS ON THE TYPE OF LUNG CANCER IN GERMAN URANIUM MINERS

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[ID 1049] - *No. 35 in Poster Area*

In East Germany, uranium mining was undertaken on a large scale from 1946 to 1990. Poor working conditions led to a high level of lung diseases, in particular cancer and silicosis. This analysis evaluates the cell type of lung cancer in relation to radon exposure, silicosis, and other factors. A database developed for the pathological tissue repository of uranium miners has been used to estimate odds ratios for developing lung cancer by major cell type regarding these factors. Silicosis information was extracted from autopsy protocols. Working level months (WLM) were calculated to assess lifetime exposure to radon with a comprehensive job-exposure matrix. We restricted the analysis to cases where two out of three pathologists agreed upon the major cell types and excluded mixed types. Risk estimates were based on 3,414 male miners who died from small cell lung cancer (SCLC, n=1,446), squamous cell carcinoma (SqCC, n=1,006), or adenocarcinoma (AC, n=962) between 1957 and 1990. SCLC and SqCC appeared to be more likely associated with high radon exposure than AC. Mean radon exposure was 868 WLM in SCLC, 871 WLM in SqCC and 743 WLM in AC. Silicosis prevalence was 26% in SCLC, 38% in SqCC, and 30% in AC. In silicotics, non-SCLC had a relative higher frequency than SCLC. SCLC occurred earlier than non-SCLC. High radon exposure was associated with a higher relative frequency of SCLC and SqCC than AC. Silicosis tended to increase the appearance of non-SCLC. Based on these distributions of cell types, we hypothesize that radiation and inflammation may both interact synergistically but could also act through different biological mechanisms and thus on different target cells. We propose a set of candidate genes to test that hypothesis.

RENAL CELL CANCER AND OCCUPATIONAL EXPOSURE TO TRICHLOROETHYLENE

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[ID 1159] - *No. 36 in Poster Area*

Objectives: A case-control study was performed to test the effect of exposure to high levels of trichloroethylene (TRI) over a long period on Renal Cell Cancer (RCC) risk. Cases and controls originated from a geographic area where screw-cutting industry was strongly developed before the

Second World War using TRI as a degreasing agent.
Material and methods: The main occupational exposures suggested in the literature as increasing the risk of RCC were studied, as were the general and medical factors. A Task-Exposure Matrix was developed in order to provide information regarding the connection between the main tasks in a screw-cutting workshop and related TRI-exposure levels. Subjects'jobs and working circumstances were described using specific questionnaires. Three approaches were developed to assess the link between TRI exposure and RCC: (i) exposure to at least 5 ppm for at least one year job period, (ii) cumulative dose (number of ppm of TRI per job period multiplied by the number of years in the job period), and (iii) the effect of exposure to peaks. Multivariate analysis was performed taking into account potential confounding factors.
Results: The analysis concerned 86 cases and 316 controls matched for age and gender. An increased risk of RCC emerged with increasing Body Mass Index (Odds Ratio = 1.98 [1.01; 3.86] when BMI ≥ 30.0) and with increasing consumption of tobacco (OR = 3.27 [1.48; 7.19] for total consumption of more than 40 pack-years). Having considered tobacco smoking and BMI, a significantly increased risk was identified for high cumulative doses: OR = 2.16 [1.02; 4.60]. A dose-response relationship was identified, as was a peak effect, the adjusted OR for highest class of exposure-plus-peak being 2.73 [1.06; 7.07].
Conclusion: This study provides new information on the possible association between high levels of exposure to TRI and increased risk of RCC.

HYDROQUINONE INDUCED ACUTE MYELOID LEUKAEMIA?

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[ID 1388] - *No. 37 in Poster Area*

Two women (A and B) hired in 1985 as X-ray assistants in a primary care center, in Greece. In July 2001, woman A, 38-years-old, was diagnosed as having acute monocytic leukaemia (FAB M5). Bone marrow aspirate showed 65% blasts with a normal female karyotype of 46XX. She did not respond to therapy and died three weeks later. In August 2001, woman B, 35-years-old, was diagnosed with acute promyelocytic leukaemia (FAB M3). Bone marrow aspirate showed 99% blasts and cytogenetics on the bone marrow showed a karyotype of 46, XX, t(15:17)(q22:q12). Since discharge, she is in continuous complete remission. Both women were non-smokers without any medical history.
Shortly after these incidents official inspectors and experts inspected workplace examined equipment, archives of repairs, notes, film badges and, interviewed employees. They concluded that: shielding was inadequate for a door of the x-ray room; personal monitoring did not show any exceeding of TLV of 20 mSv yearly; equipment for developing photos had a long list of repairs, mainly leakages of liquids and increases of temperature. On several occasions floor has been flooded especially during 1987-1993 and 1997-2001. Inspection also confirmed a complete lack of ventilation and many spoiled medical x-ray films. Employees reported that an "osmic" level was continuously evident and frequently developed symptoms of respiratory irritation and dizziness.
X-ray developer, fixer and replenisher liquids included harmful substances. Glutaraldehyde has weakly associated with lymphocytic leukemia in rats and hydroquinone has been increasingly implicated in producing leukemia, causing DNA and chromosomal damage, inhibits topo-isomerase II, alter hematopoiesis and inhibit apoptosis of neoplastic cells.
Based on the above-mentioned findings we support that AML cases had originated from occupational exposure to chemicals, mainly hydroquinone. A combined genotoxic effect of hydroquinone and ionising radiation is under investigation. This report also emphasises the significance of inspection of facilities and enforcement of compliance with regulations in order to prevent similar incidents.

CANCER MORTALITY IN EMPLOYEES OF A RAILWAY ROLLING STOCK FACTORY

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[ID 1487] - *No. 38 in Poster Area*

Introduction: From 1956 to 1979 sprayed asbestos was used as insulation for the coaches. A mortality study was carried out on the cohort of employees with follow-up to 31/12/96.
Aims: (1) presenting the results of the mortality analysis for lung cancer and mesothelioma updating the follow-up until the 31/12/2000; (2) deepen the results in relation of time from first exposure and its duration; (3) evaluate the opportunity to investigate mortality and cumulative exposure using a job exposure matrix.
Materials and methods: The cohort is composed of males blue collars workers (n. 2737). Subjects working less than one month during the period of asbestos contamination (1956-1979) were excluded (remaining: 2246). Detailed information about job was available for a subcohort of subjects (2034 out of 2737). Mortality analysis was carried out using SMR (95% CI). Expected numbers of deaths were computed using national death rates for each five year calendar period and age group. A job exposure matrix was computed by means of quantities of asbestos usage.
Results: An excess of mortality for lung cancer (SMR: 1.26; CI: 1.05-1.51) and mesothelioma (SMR: 5.53; CI: 2.65-10.18) was confirmed in the cohort of 2246 subjects. The excess of mesothelioma was mainly found among subjects with 10-19 years of exposure duration and with 20-29 years from the first exposure. The excess of lung cancer was found among subjects who experienced 20-24 years of exposure and time from the first exposure of at least 30 years. A selection for year of employment and age was found in the subcohort of 2034 subjects; the subcohort sample is not representative of the whole cohort. However the frequency distribution of the estimate values of cumulative exposure in the subcohort showed some differences between lung cancer cases (mean=2.7 ff/cc-years, range 28.96-0), mesothelioma cases (mean=5.76, range 22.53 -0.16) and not cases (mean=1.5 range 28.96-0). The opportunity of planning of a nested case-control study for investigate mortality and exposure level is under evaluation of feasibility.

THE FRENCH NATIONAL MESOTHELIOMA SURVEILLANCE PROGRAM

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[ID 1775] - *No. 39 in Poster Area*

Objectives: The French National Mesothelioma Surveillance Program (NMSP) was established in 1998 by the national Institute for health surveillance (InVS). Its objectives are to estimate the trends in mesothelioma incidence and the proportion attributable to occupational asbestos exposure, to help improve its pathology diagnosis, to assess its compensation as an occupational disease, and to contribute to research.
Methods: The NMSP records incident pleural tumours in 21 French districts that cover a population of approximately 16 million people. A standardized procedure of pathologic and clinical diagnosis ascertainment is used. Lifetime exposure to asbestos and to other factors (man made mineral fibres, ionizing radiations, SV40 virus) is reconstructed, and a case-control study was also conducted. We assessed the proportion of meso-

thelioma compensated as an occupational disease.
Results: During the 1998-2001 period, we estimated the annual incidence to be about 600 cases among men (incidence rate: 2.2 per 100,000), and between 150 and 200 for women (incidence rate: from 0.5 to 0.75 per 100,000); mean age was 69 for women and 70 for men. Pathology review confirmed the initial pathologist's diagnosis in 67% of cases, ruled it out in 13%, and left it uncertain in the others; for half of the latter, the clinical findings strongly supported a mesothelioma diagnosis. Analysis of the histological variants showed mostly epithelioid mesothelioma (approximately 70%). The mixed form was observed in 15% of the cases and the sarcomatoid form in 11%; the desmoplastic form accounts for less than 2% of the latter. In all, 62% applied for designation of an occupational disease, and 91% of these were receiving workers' compensation; of the 38% of subjects who did not make this request, about half were considered asbestos-exposed.
Conclusions: The NMSP is a large scale epidemiologic surveillance system with several original aspects, providing important information to improve the knowledge of malignant pleural mesothelioma, such as monitoring the evolution of its incidence, of high risk occupations and economic sectors, and improving pathology techniques.

IS AIRBORNE URBAN PARTICULATE MATTER A LONG-TERM RESERVOIR OF POLYCYCLIC AROMATIC HYDROCARBONS? THE INCONGRUENCE OF THE INHALED PYRENE-HYDROXYPIRENE MASS BALANCE.

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[ID 1831] - *No. 40 in Poster Area*
Exposure assessment to carcinogenic PAH is performed by integrating the measurement of volatile and particulate airborne PAH and that of their urinary metabolites. In particular, measurement of the non-carcinogenic PAH tracer pyrene (PYR) and of its main urinary metabolite 1-hydroxypyrene (1OHP) is widely employed for combined environmental and biological monitoring studies. In the occupational setting, excretion of 1OHP is well related to exposure to gas-phase PAH, which are highly bio-available and the metabolites of which are readily excreted within 24-48h after exposure. This is also true of PAH contaminating charred, baked or smoked food consumed by the general population.
We have highlighted that the dose of 1OHP excreted by non-smoking subjects of the general population without recent intake of PAH-containing food is 10-100 times higher than the PYR inhaled through exposure to airborne urban pollution. By considering literature data, we suggest that the urban airborne particulate may be a life-long reservoir of PAH, since carbonaceous material can be found at autopsy in the lungs of smokers as well as non-smokers. PAH adsorbed on the surface of diesel soot is rapidly absorbed (within 10min) after inhalation, but former smokers, even a long time after they have quitted active smoking, still have a higher 1OHP excretion than subjects who never smoke, but lower than that of active smokers. 1OHP excretion by non-smoking mothers and their children is linearly correlated to the concentration of Total Suspended Matter, which almost doubles from a rural setting to an industrialized area. The microstructure and the chemical reactivity of soot particles with oxidizing small molecules is involved in their long-term stability in lung alveoli and macrophages, so that slow release of PAH bound to the inner core of the particles or formed by disruption of covalently bound polycyclic structures may constitute a long-term source of PAH.

ENDOCRINE DISRUPTORS

MATERNAL USE OF ORAL CONTRACEPTIVES AND RISK OF FETAL DEATH

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[ID 652] - *No. 41 in Poster Area*
Background The artificial oestrogen Diethylstilboestrol has been shown to have a deleterious effect on the fetus. The increasing focus on potential hazardous effects of substances with an estrogenic- like effect such as phthalates makes it important to determine, whether artificial sex hormones used during pregnancy have deleterious effects on the fetus. Therefore it is of importance to study intrauterine exposure to other artificial sex hormones such as oral contraceptives influence on the fetus. Methods The Danish National Birth Cohort recruited pregnant women between 1996 and 2002, and 92 719 women were interviewed either during the first trimester (n=90 167) or following a fetal loss (n=2552). Information about oral contraceptives use prior to conception and during pregnancy was obtained. Outcome of pregnancy was identified through linkage to the Civil Registration System and the National Discharge Registry. The risk of fetal death after recruitment to the cohort was analysed by means of proportional hazards regression models with gestational age as the time scale.
Findings In total 1102 (1.2%) women took oral contraceptives during pregnancy. Use of Combined oestrogen and progesterone Oral Contraceptives (COC) or Progesterone only Oral Contraceptives (POC) during pregnancy did not have significantly increased hazard ratios of fetal death, HR 1.01 (95% CI 0.71-1.45) and HR 1.37 (95% CI 0.65-2.89) respectively compared to non-users. Neither use of COC nor POC prior to pregnancy was associated with fetal death.
Interpretation We found no evidence, that oral contraceptive use in the last four months prior to conception is associated with an increased risk of fetal death. However our study may indicate, that young women and smokers using oral contraceptives during pregnancy have elevated risks of fetal death compared to older women and non-smokers.

IS OBESITY A RISK FACTOR FOR REDUCED SEMEN QUALITY?

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[ID 704] - *No. 42 in Poster Area*
Background: Decline in semen quality over the last decades is of great concern. The hypothalamo-pituritary-gonadel axis may be affected by many environmental factors. We are challenged by a global obesity epidemic with 315 million people. Obesity has previously been related to reduced female fertility. Obese men have been associated with a decrease in plasma testosterone and SHBG, but not with semen quality and other hormones and peptides in a study like this.
Objective: To investigate the association between obesity and its effect on hormone and peptide concentration in serum, and semen quality in the male population.
Design and methods: This cross sectional study is based on five former, separate occupational studies, where a total of 2139 men, between 18-66 years old, provided semen and blood samples, and information on reproductive-and lifestyle factors. These studies only showed a weak association between chemical exposure and semen quality.
Results: Multiple linear regression analysis was performed, using BMI categories as explanatory variables (1=<20 kg/m2, 2=20-25kg/m2, 3=>25kg/m2, 4=>30kg/m2). The continuous variables were transformed by cubic rood to obtain normality. Semen volume follows a significant inverse u-shaped curve, normal weight men having the highest volume (2.9 ml (2.7-3)) compared to group 4(2.5 ml (2-2.9)). A lower adjusted sperm density and total sperm count was seen among the men in BMI-group 3 (56.3(51-62)) and 149.3(134-166)) than among the normal weight men (59(51-64)) and (163.9(151-178)). No effects were seen in sperm morphology and motility between the men. Our data showed a 13-50% reduction in hormone concentrations between the reference group 2 and the group of most obese men, and a 6% increase in estrogen.

Conclusion and discussion: These results showed that overweight and obese men have a massive hormonal change and maybe a moderate depression on sperm production. The findings may encourage prevention of obesity among young.

THYROID AND ENDOCRINE DISTRUPTORS (ED): POSSIBLE INTERACTIONS

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[ID 715] - *No. 43 in Poster Area*

Endocrine distruptors are chemical substances, both natural and man-made, that in spite of their significant molecular structural difference, interfere with the production, release, transport, metabolism, binding, activity or elimination of those natural hormones that are responsible for the manteinance of homeostasis and for the adaptation processes of the organism(1-2). Thyroid diseases are increasing in the general population, especially among women. Although the most frequent dysfunctions have either an auto-immune or congenital etiology, the possible effects of environmental factors on the normal homeostasys (such as exposure to industrial and non industrial ED) should not be overlooked. To this effect we have carried out detailed on national and international literature. This research confirmed that EDs influence the thyroid endocrine activity trough the inhibition of thyroid peroxidase (TPO) or trough alteration of the production of thyroid hormones (T3, T4), their transport, their secretion and biosynthesis activity of this gland, and sensorial alterations especially trough the genetic adjustment of the response to T3 (3-4). Among these ED the most significant are pesticides and biocides (ethil-bi-dithio carbamate) as well as some persistent chlorurate compounds (Polychlorinated biphenyl) and industrial compounds (polibromurate, resorcinol), hormonal drugs, vegetable substance such as toxins, mycotoxins (zearalenone) and above all phytoestrogens. More numerous investigations have been carried out on metal influence on the thyroid. The high levels of lead in the blood seem to harm the thyroid T4 deiodization function (6-7). The exposure to mercury vapours even at low-dose seem to modify serum concentration of free T3 and T4, with alteration to urinary excretion of the iodine. Although the literature outcomes diverge, it's undoutable that ED had wide and varied alterations spectrum. The thyroid system at large and the identification of the single responsible substances is complex because of its multiple target action as well as the possible interference of the complex network involving thyroid hormones their metabolism and their functions.

SMOKING DURING PREGNANCY AND RISK OF LOW SEMEN QUALITY IN MALE OFFSPRING

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[ID 852] - *No. 44 in Poster Area*

Background: The reason for the apparent decline in semen quality during the past 50 years is still unexplained.

Objective: To investigate the effect of exposure to cigarette smoke in utero on the semen quality in the male offspring.

Design and methods: In this prospective follow-up study, 350 adult sons of mothers, who during pregnancy provided information about smoking and other lifestyle factors, are sampled in six strata according to prenatal tobacco smoke exposure. Each man provides a semen sample, a blood sample, and answers a questionnaire. External quality assessment of semen analysis is performed twice a year.

Results: Until now, a total of 265 men have been included. The participation rate is 52%. The percentage of men with decreased sperm concentration (<20 mill/ml) is 23%. The unadjusted median (25-75% percentile) sperm concentration, and total sperm count and unadjusted median (range) abstinence time in the six groups is listed below.

Prenatal exposure cigarettes/day	Abstinence time days	Sperm concentration millions/ml	Total sperm count millions
Non-exposed (n=90)	3 (0-8)	49 (23-86)	136 (68-285)
1-4 (n=33)	3 (1-7)	54 (17-94)	145 (36-358)
5-9 (n=48)	2 (1-8)	28 (18-68)	83 (39-258)
10-14 (n=35)	2 (0-10)	40 (21-101)	111 (44-305)
15-19 (n=33)	2 (0-8)	30 (19-52)	98 (57-132)
>19 (n=26)	2 (1-8)	33 (12-63)	64 (26-182)

Conclusion and discussion: These preliminary results suggest that smoking 15 or more cigarettes per day during pregnancy decreases the sons' sperm concentration and total sperm count. If corroborated by adequate analyses of the complete dataset, the findings may provide clues to an understanding of the decrease in semen quality.

SEMEN QUALITY IN RELATION TO ESTROGEN, ANDROGEN AND ARYL HYDROCARBON RECEPTOR ACTIVITY AMONG INUIT AND THREE EUROPEAN POPULATIONS

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Semen quality in humans may be influenced by exposure to endocrine disrupting compounds. In this study we analyzed cross-sectional associations between semen characteristics and serum xenoestrogen receptor (XER), xenoandrogen receptor (XAR), and aryl hydrocarbon receptor (AhR) transactivity using the chemical activated luciferase (CALUX) reporter assay. XER and XAR-CALUX activity were measured in serum samples cleared for endogenous steroid hormones and AhR-CALUX activity in raw lipophilic serum extracts. For all three receptor types the activity was measured with and without a ligand with high affinity for the receptor. All together 319 men from Warsaw (Poland), Greenland, Kharkiv (Ukraine) and Sweden provided semen and blood samples. The associations between XER activity and sperm concentration and motility pointed in different directions in the different populations although the associations were not statistically different. Only in subgroup analysis across populations the following significant associations were found: Sperm concentration was increased 40% per unit increase in XER activity (95% Confidence Interval: 1 to 79%) in the subgroup with XER activity below the reference level and among subjects with XER activity above the reference level a somewhat weaker increase in sperm concentration of 14% (CI: 2 to 28%) was found, but the increase of 9 % across the whole range was not statistically significant (CI: –1 to 20%). Furthermore, a positive association between sperm motility and XER activity with an increase of 10 percentage points of motile sperm per unit increase in XER activity (CI: 0.2 to 20) in the subgroup with XER activity below reference level was found. The scattered findings among a large number of analysis performed makes us unable to exclude that associations are chance findings and suggests that minor alteration in xenobiotic activity does not markedly alter sperm cell concentration, motility or morphology.

MALE FERTILITY FOLLOWING OCCUPATIONAL EXPOSURE TO DDT

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[ID 1594] - *No. 46 in Poster Area*

Objectives. Dichloro-diphenyl-trichloro ethane (DDT) has shown reproductive toxicant properties in experimental and epidemiological studies. We explored the hypothesis of an impaired male fertility among men occupationally exposed to DDT during anti-malarial operations in 1946-50 Methods. We selected 906 men who participated in a 1946-50 anti-malarial campaign in Sardinia, Italy, who got married during the years of the antimalarial operations or afterwards. Study subjects were divided into three groups, according to the level of DDT exposure as derived from their job: DDT applicators (N = 361), bystanders (N = 273), and unexposed (N = 2732). Cumulative DDT exposure during the anti-malarial campaign was retrospectively estimated. Time-to-pregnancy (TTP) in months at the first successful conception was estimated from population Registrars, based on date of marriage, as a surrogate of date of starting unprotected intercourses, and nine months before birthdate of the first child. The fecundability ratio among spouses of DDT workers was calculated with a modified survival analysis method using Cox's proportional hazard mod-

elling, adjusting by father's age at marriage, and cutting the analysis at 12 months. Results. The median cumulative DDT exposure was 17 mg (I.Q. range 7 - 29) in bystanders, and 2210 mg (Interquartile (I.Q.) range 770-4260) in applicators. Fecundability ratio among spouses of bystanders was 1.0 (95% C.I. 0.8,1.2) compared to the unexposed, and it was 0.9 (95% C.I. 0.8,1.1) among spouses of DDT applicators. Conclusions. The low statistical power of our study does not allow definite conclusions. However, the results prompt further in depth research into reduced fertility among men heavily exposed to DDT.

HEALTH EFFECTS FROM COMBINED EXPOSURES

RISK ASSESSMENT MODELS IN FEMALE TRAFFIC POLICE INFERTILE AGE

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[ID 770] - *No. 47 in Poster Area*

During working activity female traffic police are exposed to pollutants present in urban air, essentially produced by motor vehicle exhaust emissions, industrial emissions and domestic heating; their concentration varies along with temperature, barometric pressure, domestic heating etc. In urban air are present: asphyxiating compounds (carbon monoxide), substances irritating the bronchus (sulfur oxides, aldehydes, particulate matter), cancerogenous (PAHs, benzene, asbestos), organic air toxics (lead). In the appraisal of the negative consequences on health, the Employer must keep in mind the possible effects of potentiation caused by multifactorial exposure to mixtures of substances, individual susceptibility and voluptuary habits (cigarette smoke). We propose a series of risk assessment models for female traffic police in fertile age, that integrate the existing ones (SIMLII, ISPESL). Such models preview that the Employer must be acquainted with the chemical and toxicological characteristics, the levels and time of exposure of these pollutants. Should female traffic police in fertile age result exposed to substances classified as toxic to reproduction and/or teratogenous and/or carcinogenic or mutagenous, the environmental and biological monitoring could be carried out in order to determine if the entity of the exposure is within the limits previewed for the general population. If not so, we propose: the distribution of a clinical-anamnestic questionnaire; usual chemical and clinical examinations and serum dosage of FSH, LH, PRL, 17-α-OH-progesterone, testosterone, androstenedione, estradiol; a second level survey, in selected cases. We propose: the application of the guidelines reported in Norm UNI EN 689/97 for female traffic police exposed to substances classified as toxic to reproduction and teratogenous and sensitizing; the ones reported in enclosures VIII ter and VIII quater of D.Lgs. 626/94 in case of exposure to lead; the "Model of the Piemonte Region for the chemical risk assessment" once opportunely modified in case of exposure to substances classified as toxic to reproduction.

DAILY TEMPERATURE VARIATION AND EMERGENCY ROOM ADMISSIONS FOR CHRONIC OBSTRUCTIVE PULMONARY DISEASE (COPD) IN TAIWAN

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[ID 837] - *No. 48 in Poster Area*

The objective of this study was to assess the relationship between daily temperature variation and emergency room (ER) admissions for chronic obstructive pulmonary disease (COPD) in an ER in Taichung City, Taiwan. The design was a longitudinal study in which daily temperature variation was related to COPD admissions to the ER of the city's largest hospital. Daily ER admissions for COPD and ambient temperature were collected from January 1, 2001 to March 31, 2003. The Generalized Estimating Equation (GEE) was used in the analysis. After adjusting for the effects of holiday, season, month of year and day of week, the results showed that there was a positive significant association between daily temperature variation and COPD admissions ($P < 0.01$). The daily temperature variation played an important role in COPD morbidity. COPD admissions to the ER increased by 15% when daily temperature variation was over 8.3°C. The data indicate that COPD patients must be made aware of the increased risk posed by large variations in daily temperature. Hospitals and ERs should take into account the increased demand of specific facilities during large temperature variation.

BURDEN OF SMOKING IN SOUTH AFRICAN GOLD MINERS

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[ID 1559] - *No. 49 in Poster Area*

The South African death notification statistics in 1998, showed that about 8% of all adult deaths per year in South Africa (> 20 000) were attributed to smoking. Also, smoking significantly increased the risk for deaths from tuberculosis, chronic obstructive pulmonary disease (COPD) and lung cancer, in addition to other diseases. A 2003 Safety in Mines Research Advisory Council (SIMRAC) project on smoking in the platinum mining industry showed a smoking prevalence of 44% amongst mineworkers, well above the South African population average of 27.6%. South African gold mines have very high crystalline silica content which causes silica dust related diseases, all of which are exacerbated by smoking. Smoking workers thus suffer a double insult to their lungs. The total direct costs of occupational lung disease in the gold mining industry were estimated in 1996 as R343 million. Furthermore, smoking is a risk factor for occupational back injuries, chronic musculoskeletal pain, hearing loss and hand arm vibration syndrome and these are compensable diseases, regardless of their association with smoking. Productivity losses due to smoking impact heavily in labour intensive industries such as mining. While absenteeism is higher amongst smokers (35% – 45%), at work smokers take on average 3 smoking breaks per day, the equivalent of 18 days per year.
The Mine Health and Safety Council's milestones for the eradication of silicosis by 2013 demands that strategies aimed at primary prevention to address the burden of silica dust related lung diseases on the mines, becomes top priority. Evidence suggests that eradication of smoking alone or in combination with dust, is more beneficial than eradication of dust alone. Thus a smoking cessation programme, as part of a comprehensive health promotion program may be less costly than compensation and overall beneficial to workers' health.

EVALUATION OF OXIDATIVE STRESS BY CIGARETTE SMOKE EXTRACT USING HUMAN LUNG EPITELIAL CELLS

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[ID 1573] - *No. 50 in Poster Area*

Cigarette smoke is a complex mixture of more than 3500 chemicals, some of which known carcinogens and mutagens. The cigarette smoke, as a source of exogenous pro-oxidants, can cause oxidative DNA damage increasing ROS generations and depleting redox scavengers.
Direct-oxidative DNA damage and membrane lipid peroxidation have been evaluated on epithelial pulmonary cells (A549) exposed to cigarette smoke extract (CSE) with the aim to individuate an in vitro experimental model useful to detect sensitively the oxidative effects of inhalable compound mixtures. CSE, containing mono-aromatic hydrocarbons (benzene, toluene, ethylbenzene, xilenes, styrene), aromatic amines (pyridine, nicotine, nornicotine), PAHs and some metals, was obtained from one cigarette without filter combusted with a siringe-driven apparatus and dissolved in serum-free RPMI medium. Direct and oxidative DNA damage was evaluated by Fpg-modified comet assay and membrane lipid peroxidation by thiobarbituric acid reactive substances (TBARS) analysis. The cells were exposed to 1.25, 2.5, 5 and 10% of CSE for 30 min and comet percentage and Tail moment values from fpg-enzyme treated cells (TMenz) and from untreated cells (TM) were evaluated. The comet percentage reached the highest values at 5% of extract. Tail moment values increased in a dose-

dependent manner with the highest values for TMenz that indicates the presence of oxidative damage. TBARS analysis performed on cells exposed to 1.25, 2.5, 5 % of CSE for 30 min showed an increase of membrane lipid peroxidation related to the concentrations of CSE. In addition, the effect was still evident, showing a time-dependent increase, also after the substitution of CSE with fresh medium. The results show induction of oxidative stress by CSE and point to the suitability of our experimental model to evaluate oxidative effects of mixtures of inhalable compounds on target organ.

EVALUATION OF GENOTOXIC EFFECTS AMONG PAVING WORKERS EXPOSED TO ASPHALT FUMES

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[ID 1574] - *No. 51 in Poster Area*

Paving workers are occupationally exposed to asphalt fumes containing several polycyclic aromatic compounds (PAC). In this study we evaluated in 19 paving workers and 22 controls early genotoxic and oxidative effects due to asphalt fume exposure. Environmental and biological monitoring of exposure was carried out measuring, on personal air samples from exposed workers collected during 3 working days, the concentration of 14 PAHs and urinary OH-pyrene following three working days. We analysed Micronucleus (MN) frequency on exfoliated buccal cells while Sister Chromatide Exchange (SCE) frequencies and direct-oxidative DNA damage, by Fpg-modified comet assay, were evaluated on lymphocytes. Tail moment values from fpg-enzyme treated cells (TMenz) and from untreated cells (TM) were evaluated and the TMenz/TM ratio higher than 2,0 was used to indicate the presence of oxidative damage. DNA damage was also evaluated analysing comet percentage. Personal air samples showed low level of total PAHs (2,84 μg/m^3) with prevalence of 2-3 ring PAHs (2,69 μg/m^3). Urinary OH-pyrene after work-shift of the three working days was significantly higher than that found at the beginning of working week. MN and SCE analyses didn't show any difference between two groups while an oxidative DNA damage was found on lymphocytes of 37% of exposed in respect to the absence in controls. Comet percentage was significantly higher (P=0.000 ANOVA) in the exposed than in controls. The interference of smoke on DNA damage was not statistically significant. The results demonstrate the high sensitivity of comet assay to assess early oxidative effects induced by exposure to asphalt fumes and confirm the suitability of urinary OH-pyrene as biomarker of PAH exposure. The results suggest the combined use of Fpg modified comet test as biomarker of early genotoxic effects and that of urinary OH-pyrene as biomarker of PAH exposure to characterize and prevent the occupational risk of exposure to mixtures of potentially carcinogenic substances.

IN VITRO STUDY OF GENOTOXIC AND OXIDATIVE EFFECTS OF AIR POLLUTANTS FROM TWO AREAS OF THE CITY OF ROME (ITALY)

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[ID 1575] - *No. 52 in Poster Area*

An increase of lung cancer risk in association with exposure to urban air pollutants is suggested by several studies. We investigated on lung epithelial cells A549 the genotoxic and oxidative effects of atmospheric particulate matter collected at two monitoring sites in Rome. Airborne particulate matter was collected over an eight-hour period, by PM10 High-Volume Air Sampler, at two locations at different traffic intensity (stations 1 and 2) and the concentrations of 16 PAH and 13 nitro-PAH were analysed by gaschromatograph coupled with a mass selective detector. Early direct and oxidative DNA damage were evaluated by the high sensitive Fpg-modified comet assay. The cells were exposed for 30 min to extracts of 1/6 of the filters from the two sampling sites diluted at 0.01 % and 0.005%. Oxidative and direct DNA damage were evaluated analysing Tail moment values from fpg-enzyme treated cells (TMenz) and enzyme untreated cells (TM) respectively and by comet percentage analysis. Stations 1 and 2 showed different levels of total PAHs (2.16 and 14.46 ng/m3 respectively) and nitro-PAHs (0.071 and 0.878 ng/m3). The cells exposed to extracts from both sampling sites showed a dose-dependent increase of comet percentages, particularly for enzyme treated cells, more evident for station 2. TM and TMenz values were both higher in cells exposed to extracts in respect to control cells. In particular the extract from station 1 induced a dose-dependent increase of TM and TMenz with a significant effect only at 0.01%. While the station 2 extract showed a significant increase of TM and TMenz values even at lower dose. The results indicate an induction of direct and oxidative DNA damage by the particulate organic matter from both sampling sites. Moreover our findings suggest to use Fpg modified comet test on A549 cells to evaluate on target organ, the effect of exposure to complex mixture of potentially carcinogenic substances.

RENAL DYSFUNCTION IN WORKERS EXPOSED TO ARSENIC AND CADMIUM

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[ID 1645] - *No. 53 in Poster Area*

Objective To research the renal dysfunction and combined effect of arsenic and cadmium in workers exposed to arsenic and cadmium. Methods The concentration of urinary arsenic (UAs) and urinary cadmium (UCd) were used as exposure biomarkers. Urinary β2-microglobulin (Uβ2-MG), N-acetyl-β- glucosaminidase (UNAG), and albumin (UALB) were determined.as biomarkers of renal dysfunction. The total number of participants was 147, made up of 114 workers exposed to arsenic and cadmium, 33 workers unexposed. Results UAs and UCd concentrations in the exposed group was significantly higher than that in the unexposed group (P<0.01). The levels of Uβ2-MG, UNAG and UALB in the exposed group (257.04 ug/g creatinine, 26.91 IU/g creatinine and 13.18 mg/g creatinine, respectively) were significantly higher than that in the unexposed group (95.50 ug/g creatinine, 7.76 IU/g creatinine and 5.49 mg/g creatinine, respectively) (P<0.01). There had positive correlation among the concentration of UAs and UCd and Uβ2-MG, UALB and UNAG. And has significance of dose-effect relationship. The combination of cadmium and arsenic produced even more renal injury than caused by either of the chemicals given alone in same dose. Conclusions It was suggested that cadmium and arsenic can cause both glomerular and tubular damage. Tubule is the main target of cadmium and glomerulus is the main target of arsenic. The combined nephrotoxicity of cadmium and arsenic was additive effect in workers exposed to arsenic and cadmium.

ETIOLOGY OF SYSTEMIC VASCULITIDES: HINTS FROM OCCUPATIONAL HISTORY?

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[ID 1916] - *No. 54 in Poster Area*

Introduction. Primary systemic vasculitides (PSV) are rare diseases of unknown etiology. Previous reports suggest an association with environmental and occupational agents, namely silica and solvents exposure.
Objective. The objective of this study was to explore possible occupational precipitants of Wegener Granulomatosis (WG), Churg-Strauss Syndrome (CSS) and Microscopic Polyangiitis (MPA).
Materials and Methods. Thirty-five PSV cases (16 WG, 15 CSS, 4 MPA) were identified following diagnostic criteria of the American College of Rheumatology and the Chapel Hill Consensus Conference. All patients were interviewed using a structured questionnaire; exposures to solvents, pesticides, silica, asbestos and metallic elements (e.g., Fe, Zn, Cu, Pb, Cd, fumes and particulates) were investigated by length and modality.
Results. Fifteen patients have been exposed to high levels of solvents; 56% of patients with WG showed an exposure to solvents, whereas a lower proportion was detectable among patients with other PSV (CSS= 33,3%, MPA= 25%). Occupational silica or welding fumes exposures were found only in patients affected by WG (both of them 25%). Patients affected by CSS were exposed to aromatic polycyclic hydrocarbons (13,3%) or asbestos (20%). Only one patient with diagnosis of MPA reported recreational exposure to solvents and pesticides.

Conclusion. Several autoimmune diseases may be associated with silica, dust and solvents exposure. Such triggers have been proposed also for PSV. Our data suggest a relationship between WG and solvents, silica and welding fumes, but not such an association was found for CSS and MPA. Further epidemiological and experimental studies are needed in order to confirm these preliminary findings.

OCCUPATIONAL AND ENVIRONMENTAL RISK FACTORS IN AMYOTROPHIC LATERAL SCLEROSIS: RESULTS FROM A CASE-CONTROL STUDY IN PIEDMONT (NORTHERN ITALY), 1998-2005

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[ID 1926] - *No. 55 in Poster Area*

OBJECTIVES: To identify productive activities potentially at risk for ALS by comparing whole life occupational, environmental and lifestyle data of ALS patients with those of a control group.
METHODS: ALS patients, incident and prevalent cases fulfilling El Escorial diagnostic revised criteria, referring to our Neuroscience Department since September 1998 till January 2005 were enrolled in the study. Patients were matched by age (2 years), gender and province of residence with controls selected among subjects admitted at CTO Hospital (Turin, Italy) for accidents, surgery or medical diseases. Neurological, psychiatric, metabolic and neoplastic diseases were exclusion criteria. Cases and controls were interviewed by an Occupational Health physician, by means of a dedicated questionnaire. Lifelong occupational history, environmental and lifestyle data were recorded in a data-base for statistic evaluation.
RESULTS: 254 ALS patients and 254 controls (138 men and 116 women in each group, with a male/female ratio of 1.18) entered the study. Age ranged from 26 to 82 years, with a median value of 63. Cases and controls showed similar smoke habits. Agricultural work had an OR value of 1.42 (CI 95%: 0.90-2.26). Also, more ALS patients than controls worked in metal manifacturing industries (OR: 1.44, CI 95%: 0.97-2.14), but these data did not reach statistical significance. Conversely, welders were significantly over-represented among ALS patients (OR: 5.24, CI 95%: 2.49-11.02).
CONCLUSIONS: Our results indicate that ALS incidence is increasing among females, possibly due to changes in lifestyle or occupation. Smoke does not appear to be a relevant factor.
The occupational distribution of ALS cases compared with controls indicates a statistically significant excess among welders. These data encourage further specific studies in the productive settings and working tasks potentially at risk.

THE INVESTIGATION OF TRACE METALS IN UMBILICAL CORD BLOOD IN THE TAIPEI METROPOLITAN AREA

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[ID 1431] - *No. 56 in Poster Area*

There are various kinds of metal elements unevenly distributed in the environment. People may be exposed to them every day through food intake, traffic, and human activities, etc. Some of these heavy metals are concerned as toxicants to humans. The present study was conducted in the Taipei Metropolitan Area. Between May and December, 2004, a total of 486 cord blood samples were collected from one medical center, one area hospital, and two local clinics. Trace elements determined in cord blood samples included manganese, arsenic, cadmium, and lead. Arsenic level was distributed widely from 0.41 to 21.8 μg/L, and significantly associated with the intake of seafish (p=0.022). As to lead, it widely ranged from 0.16 to 52.4 μg/L, and was significantly higher among participants of Clinic B (16.3 ± 7.4 μg/L), compared with the Area Hospital group (10.4 ± 3.0 μg/L). The lead level was also found associated with the exposure to environmental tobacco smoke and pesticide use (p=0.019 and 0.008, respectively). Mean manganese level (51.7 ± 17.5 μg/L) was significantly higher than the reference level, partially attributed to the replacement of tetraethyl lead with MMT in gasoline as anti-knock agent. Other factors associated with the elevation of manganese level included the usage of herb medicine (p=0.008) and the mother's nationality (p=0.006). Mean cadmium level in cord blood was unusually higher in Clinic A participants (2.37 ± 3.33 μg/L), compared with all the other groups (p<0.0001). Through the monitoring of heavy metals in umbilical cord blood in the Taipei Metropolitan Area, we are able to get a clearer picture about the amount and the type of environmental pollutants we are exposed to. Since these toxicants may cause health damage either to the embryos or to the infants, we really should better understand them before setting out controlling them.

NANOTECHNOLOGIES AND NANOPARTICLES

RISKS RELATED TO MANUFACTURED NANOPARTICLES: A METHODOLOGY FOR ESTIMATING EXPOSED WORKERS IN ITALY

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[ID 605] - *No. 57 in Poster Area*

At present, the nanoparticles originating from dedicated industrial production are marginal in relation to those produced and released unintentionally. However, high levels of exposure are expected from the industrial processes in which nanoparticles are intentionally produced or used. Furthermore, as nanomaterials become more widespread in use, the range of scenarios in which exposure becomes possible will increase in relation to the growing investments in this sector worldwide. The main goal of this study is to develop a methodology for assessing the productive sectors and the numbers of workers in Italy potentially exposed to nanoparticles deliberately produced.
We used the *ATECO'91 Classification of economics activities* and the data of workers involved in nanotechnologies in Italy reported by the *Italian Centre for Nanotechnologies* (*NanotechIT*), in order to identify the traditional and innovative productive sectors using nanotechnologies. From these parameters we developed a model for assessing the numbers of workers exposed in manufacturing nanoparticles on the basis of the model previously used by the *HSE* in the UK. In order to obtain these estimates, we have matched the *Italian National Institute of Statistics (ISTAT)* and the *NanotechIT* data.
The results show more than 1,300 individuals working in nanotechnology R&D sector. Moreover we estimate that over 1,670,000 workers are potentially exposed to nanoparticles by-products, mostly due to metal manufacturing and refining processes. This number is lower for the main activities in which exposure to deliberately manufactured nanoparticles can occur: ultrafine manufacturing and powder handling processes.
These figures will grow with nanotechnologies development and dissemination. Actually, the limited knowledge for assessing the exposure, including the effects on health, shows the importance to further develop the research in this field. Our proposals for future actions are:

- To improve the methodology we proposed including risk assessment and characterization in nanotechnologies applications.
- To propose a multidisciplinary approach for the experts in this field.
- To promote an international cooperation to develop criteria for assessing exposed workers.

SINGLE WALL CARBON NANOTUBES INDUCE CELL APOPTOSIS

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[ID 1651] - *No. 58 in Poster Area*

Carbon nanotubes (CNT) are recently discovered forms of carbon-based materials and represent one of the most promising research fields for their unique properties and applications. Many reports showed the possibility to tailor CNT with pharmacologically relevant compounds and, therefore, the potential to use them for therapeutic applications. Recently, some groups reported the use of carbon nanotubes as vehicles into cells to deliver macromolecules that are not able pass through the cellular membrane by themselves. The immobilization of specific biomolecules on CNT is usually based on activation of carboxylic groups left on the tips and the

sidewall of CNT by reflux in strong acid. Oxidized CNT have been coupled to several bio-molecules such as oligonucleotides, proteins or peptide nucleic acids.
Few studies have focused on cytotoxicity of CNT, especially of purified, shortened and carboxylated CNT, which represent a useful base for bionanocomposite. In the present study we analyzed the toxicity of commercial carbon nanotubes, pristine and with different amounts of carboxyl groups, on human lymphocytes, and we carried out assays both in the human Jurkat T cell line, and in peripheral blood lymphocytes (PBL) from human healthy blood donors. We found that CNT citotoxicity was dependent on the level of carboxylation and on the concentration.
Contaminants in CNT can be classified as carbonaceous (amorphous carbon and graphitic nanoparticles) and metallic (typically transition metal catalysts). In order to understand the role of the contaminants on the CNT citotoxity We analyzed the toxicity due to some carbonaceous material (carbon black and graphite) and to fluorescent particles isolated from the soot. We observed no toxicity deriving from compounds, suggesting that CNT citotoxicity is strictly related to their structure (the helicity in the arrangement of the carbon atoms in hexagonal arrays on their surface honeycomb lattices), topology (the closed nature of individual nanotube shells), concentration and superficial chemistry and not to contaminants present in the soot commercially available.

POTENTIAL HUMAN HEALTH RISKS FROM MANUFACTURING AND USE OF ENGINEERED NANOPARTICLES
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Engineered nanoparticles are increasingly used for commercial purposes. New nanotechnological processes and their products may expose humans, especially at workplace to new health risks. Recently, exposure to nanoparticles may occur in R&D sector, existing chemical and pharmaceutical companies, powder handling processes including paints, pigments and cement manufacture, welding and where nanoparticles are used as by-products. However, there are only a few documented workplace exposure data, which will be presented and discussed. Reduction in size to the nanoscale changes the characteristics of particles, primarily due to the increased surface to volume ratio. The biological behaviour of nanoparticles is determined by the chemical composition, the decrease in size and corresponding shifts in chemical and physical properties, the associated increase in surface to volume ratio, and the shape. One mechanism of toxicity of nanoparticles is likely to be induction of reactive oxygen species and the consequential oxidative stress in cells and organs. Thus, we have studied the toxicity of nanoparticles of titanium dioxide covered with silver ions in rats. Levels of different biomarkers: lactate dehydrogenase (LDH) and glutathione peroxidase activities (GPx), total protein and thiobarbituric reactive substances (TBARS) concentrations, Clara cell protein level in bronchioalveolar lavage fluid (BAL) were determined along with the lung and BAL morphology. Changes in the biomarkers were evaluated 1, 3, 7, 14 and 28 days after intratracheal instillation of nanoparticles to rats in two doses of 2 mg and 5 mg suspended in 0.5 ml of 0.9% NaCl, and compared to the results of the control group.
We have found dose-dependant cytotoxic (elevated BAL LDH and protein level), and oxidative stress induction (GPx and TBARS elevation, then time-dependant decrease) effects caused by exposure to TiO_2/Ag nanoparticles.

MUSCULOSKELETAL DISORDERS

MUSCULOSKELETAL SYMPTOMS AND QUALITY OF LIFE AMONG PHYSICIANS AT UNIVERSITY HOSPITAL
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[ID 92] - *No. 60 in Poster Area*
This research intends to contribute with information about musculoskeletal symptoms and quality of life among physicians and surgeons at Campinas, São Paulo. The author described individual and occupational aspects, evaluated quality of life and identified occurrence of musculoskeletal symptoms in this population. A three section self-applied questionnaire was applied, asking general and occupational information, quality of life questions (SF-36) and general part of Nordic Questionnaire. There were 91 surgeons and 96 physicians. Among surgeons, 16 were female and 75 male gender; physicians were 39 female and 56 male. The average age among surgeons was 44.5 years and among physicians 46 years. The average length of work at the institution was 14.8 and 16.1 years for surgeons and physicians respectively and work time was 51.8 hours weekly for surgeons and 44.1 for physicians. 87.9% of the surgeons and 51.6% physicians also worked in other hospitals with the same activities. Lack of better working conditions was referred by both groups as the most bothering situation. Only in SF-36 “Physical Aspects” there was significant statistical difference between groups, with lower rates among physicians. Nordic Questionnaire showed 84.6% of the surgeons and 83.1% physicians referring musculoskeletal symptoms in at least on part of body during the last 12 months and 52.8% of the surgeons and 50.5% physicians in the last week. Comparing both groups according to possibility of performing usual activities, physicians complain more of symptoms in the lumbar and hip and leg regions. 43.3% of the surgeons and 30.4% physicians referred to seek another health professional help because of musculoskeletal symptoms, mainly in lumbar, neck, shoulders and thoracic regions. The search for help from a health professional and the influence to usual daily activities reinforce the importance of musculoskeletal disorders to these people. The obtained results confirm existence of the problem and the need of following researches.

ERGONOMIC EVALUATION OF A WHEELCHAIR UTILIZED IN THE TRANSPORTATION OF HOSPITAL PATIENTS
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[ID 134] - *No. 61 in Poster Area*
Back problems are prevalent among nursing personnel and usually attributed to involvement in lifting and transferring patients. Reports in the literature have identified that assistive equipments for use with handling tasks could reduce back stress for health care workers. However, few devices have been systematically evaluated.
The objective of this study was to assess the ergonomic evaluation of a wheelchair type used in the transportation of hospital patients.
A descriptive study was conducted with the participation of workers of the Escort Section and patients of an university hospital. Separate instruments were applied for the workers and the patients. The workers answered a questionnaire with 3 instruments: a) demographic characteristics; b) wheelchair ergonomic evaluation; c) ratings of perceived exertion to all body parts from the transferring patient using Borg scale (Borg’s CR-10). In this version of this scale, numbers from 0 to 10 are used. The number 10 implies an extremely strong perceptual intensity. The patients rated their feelings of comfort and security using Likert scales of 0 = extremely comfortable and 7 extremely uncomfortable; 0 = extremely secure and 7 = extremely insecure.
The wheelchair presented several ergonomic problems. The mean of perceived physical exertion indicated a strong (heavy) level of exertion. The mean for patient comfort was 1.7 (SD=1.7). The average was 1.6 (SD=1.7) for patient security. It is expected that the findings offer subsidies for the hospital equipments ergonomic evaluation in the selection process.

COSTS OF MUSCULOSKELETAL DISORDERS (MSD’S) IN DEVELOPING COUNTRIES: COLOMBIA CASE
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[ID 140] - *No. 62 in Poster Area*
The real burden of occupational diseases specifically work-related musculoskeletal disorders and their impact on productivity is not known. The situation is critical in developing countries where information doesn’t exist and only cases that result in disability are recorded. In Colombia with a population of more than 46 million people only 25% of the working population are protected by a General System that covers Professional Risks. The non-registration level of professional diseases is high. Official National Statistical figures shows a rate of 2,2 cases per 10.000 workers. For this study the incidence of MSD’s in Colombia was estimated by using the age and sex specific double incidence rate of repetitive strain injuries recorded in Finland for 2002 which has been used by other authors for developing countries. For the cost analysis was used one previous study from the public Professional Risk Manager Company in Colombia. The results showed that the estimated number of MSD’s in Colombia for the year 2005 will be 23.477 cases (64,4% men, 35,6% female) with a rate of 11,6 cases per 10.000 workers. The total direct cost was estimated to be $63,6 million. By adding indirect cost the final value will be $171.7 million. The final cost represent around 0,2% of the estimated Colombian Gross

Domestic Product for 2005. The estimated total number of working days losses to be caused by MSD's in the year 2005 will be 324.000. It is recommending that in Colombia the systematic revision of the incidence and the cost of MSD's should be considered at different levels. This will produce reliable information that can be used to make good polices that can lead to the reduction of the impact of MSD's on productivity and increase the well-being of the working population.

PREVALENCE OF WORK-RELATED MUSCULOSKELETAL DISORDERS AMONG HAIRDRESSERS OF BEAUTY PARLOUR IN TWO DISTRICTS OF THE CITY OF SAO PAULO- BRAZIL

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[ID 308] - *No. 63 in Poster Area*

An activity poorly studied in Occupational Health in Brazil is the work of professionals in Beauty Parlours. In this study it was decided to analyze the job of hairdressers. The objectives of the study were to assess the prevalence of Work-Related Musculoskeletal Disorders (WRMD) among hairdressers through reported symptoms during last year, to characterize the most injured anatomic regions, and to identify and analyze the risk factors for WRMD present in the activities of these professionals. A cross-sectional study was employed together with the theories of the method for evaluation of the work situation and its consequence on health developed by the French Ergonomics, in order to discuss associations between working conditions and reported morbidity. Between April 2002 and February 2004 a total of 220 hairdressers who worked in Beauty Parlors in the districts of Pinheiros and Jardim Paulista were studied. A prevalence of WRMD of 70,5% was found. The body region most reported with symptoms was shoulder (48,6%), followed by neck (47,3%) and spinal column (38,6%). It was noted that the risk factors for WRMSD in hairdressers were related to: a) Annoying Factors and Fatigue at Work (connected to the work organization and the psychosocial aspects of the work) that after factorial analysis the only remaining factor statistically significant was the one that contains the variables lack of recognition at work and uncomfortable position at work (OR=3,54; p=0,004); b) Postures during attainment of activities – not feeling comfortable in the body/neck/shoulder while working (OR=2,78; p=0,004); c) Time at this occupation above 15 years (OR=3,04; p=0,022). Through reported symptoms and ergonomic analysis it was identified that the occupational risk factors associated with the development of WRMD in hairdressers corroborate the risks already described in the literature for other occupations, that is, those related to biomechanical, organizational and psychosocial factors.

THE JOBFIT SYSTEM: FITTING WORKERS TO JOBS AND JOBS TO WORKERS IN THE NEXT CENTURY

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[ID 384] - *No. 64 in Poster Area*

One of the biggest challenges for practitioners involved in the prevention and management of work-related musculoskeletal disorders is the coordination of the information and needs of the key stakeholders – workers, employers, insurers, safety and health professionals. The JobFit System is a software program developed by a physiotherapist who identified these needs and has found a solution for linking these diverse groups to improve the effectiveness and efficiency of workplace injury prevention and management strategies.

Traditionally, task requirements and worker capabilities have been collected and assessed using one of many different formats and then stored in what is essentially, different languages. Health and hygiene measures for workers and jobs have also been typically assessed and managed in isolation. When it comes to comparing workers to jobs for the identification of risk factors, trends and decision-making, the professional has to source many pieces of information in numerous locations and formats and convert them to the 'same language' before they can begin to solve the problem. The JobFit System stores worker capabilities and task requirements in exactly the same format to save users time and money when making decisions and recommendations regarding job placement, suitable duties programs, health surveillance and risk management strategies.

The coordination of this information and its objective format assists employers mitigate potential legal claims, provides a tool for compliance with OH&S legislation, monitors the health and wellness of an aging workforce and facilitates a targeted approach using participatory ergonomics for the identification and improvement of high-risk tasks and jobs.

The development of the JobFit System and its associated services has been supported by Australian government grants for commercialisation and an ACARP industry grant for scientific research into the reliability and validity of the JobFit System functional health assessment method. Reliability study results have been good and the validity study will be reported early 2006.

This presentation will outline the functions of the JobFit System and the processes behind the development and commercialisation of this unique technology (international patent pending). It will be of interest to practitioners involved in all aspects of workplace injury prevention and management, particularly musculoskeletal injury, as well as those entertaining the idea of commercialisation of their own practises and strategies. The JobFit System may be the missing piece in the puzzle of fitting workers to jobs and jobs to workers.

PROGRAM IMPACT THEORY FOR A WORK DISABILITY PREVENTION PROGRAM: OPENING THE "BLACK BOX" OF AN INTERVENTION

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[ID 669] - *No. 65 in Poster Area*

Theory based evaluation is based on the idea that the beliefs and assumptions underlying an intervention can be expressed in terms of a sequence of causes and effects. A program of work disability prevention (WDP) for Australian railway workers aims to improve physical preparedness for the job as well as minimise risks of injury at work. The expectation of such a program is that workers will gain new skills and adopt new behaviours which will translate in a reduction of the incidence and duration of work disability. The exact mechanism of action by which such a program may be effective has not yet been fully explored.

A program impact theory (PIT) is defined as the set of assumptions about the manner in which a program relates to the social benefits it is expected to produce and the strategy and tactics the program has adopted to achieve its goal and objectives. In other words, a PIT explores the mechanisms that exist between the delivery of a program services and the occurrence of outcomes of interest.

This paper aims at facilitating the process of evaluation of this intervention by reviewing the details of how this WDP program is currently working, with particular focus on how the stakeholders interact with each other and with workers involved as well as at presenting the link between the scientific evidence that underpins the implementation of this program and the reality of it's implementation.

The diagram below represents the progressive development and validation process leading to the final version of the program impact theory.

RISK ANALYSIS AND RESEARCH FOR THE BEST PRACTICES IN THE FISHING SECTOR

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[ID 713] - *No. 66 in Poster Area*

The objective of the research, promoted and financed by ISPESL in Rome and carried out by ASUR healthcare district no. 7 in Ancona in collaboration with healthcare district no. 4 of Senigallia, was to identify, evaluate and analyse some working risks implied in the fisherman's profession such as: manual movements of loads, incongruous positions, and repetitive movements of the upper limbs; these are relapse risks affecting the fishing workers' health according to NIOSH, OCRA, Snook and Ciriello models.

The results of the research showed the presence of risks in all typologies of fishing studied, even though not in a homogeneous way.

The research on best practices focused its attention on operations without added value, on basic organisational matters (work macro-organisation) and specific organisational matters (micro-organisation of tasks).

A time method analysis with the MTM method has been used when studying the selection operations. We have reached some hypotheses concerning ergonomic solutions which consist in a first phase of redesigning and a second phase of experimentation up to the moment when all modifica-

tions will be finally validated.
In 2004 one of the hypotheses was tested by setting up on board the "Destriero" motor trawler, a raisable and inclinable platform to elevate the working deck in the screening phase carried out in the stern units during a fishing's wisecrack.
In 2005 the shipyard which modified the "Destriero" was committed to build complex equipment for a new fishing boat ("Dragut") practising trawling fishing. The new equipment includes the following elements:
a reclining plane actioned by a pneumatic device and positioned on the stern, aimed at hosting the fish taken from the net, a tapis roulant, a system of canals and holes positioned in such a way to facilitate the elimination of the waste, a washing device jet of water positioned over the selection area.

MUSCULOSKELETAL DISORDERS RELATED TO THE ECONOMIC ACTIVITY AND OCCUPATION

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[ID 745] - *No. 67 in Poster Area*

AIM. Musculoskeletal disorders are very common work-related illnesses and the most frequent cause of work disability. Therefore, identification of a high risk workplace conditions is very important for development of musculoskeletal disorders.
METHODS. Medical records of 500 patients who have carried out physiotherapy during a 5 years period have been reviewed for musculoskeletal disorders. As a reason for physiotherapy the musculoskeletal disorders were classified according to ICD-10 in four groups: upper extremity disorders, lower extremity disorders, neck and low back disorders. Descriptive analyses have been performed as per gender, occupation of patients (according to the ISCO-88 COM) and the economic activity of patient's employer (according to the NACE Rev.1).
RESULTS. Neck (33%) and low back disorders (33%) have been the most frequent reason for physiotherapy treatment. Females underwent physiotherapy mainly due to neck (45%) and upper extremity (19%) disorders and males due to low back (46%) and lower extremity (23%) disorders. Upper extremity disorders were present mostly with office clerks and workers employed in financial intermediation. Lower extremity disorders were reason for treatment primarily with service and sales workers and workers in agriculture and forestry. Neck disorders were diagnosed mainly with office clerks and workers employed in public administration, and low back disorders with machine operators, service workers and workers employed in agriculture, forestry and health and social work.
CONCLUSION. According to the obtained results, higher risk for neck and upper extremity disorders is present in occupations and economic activities including static and awkward posture and repetitive procedures. Risk factors contributing to lower extremity disorders exist in occupations and economic activities including long-term standing, walking and force. Higher risk for low back disorders is present in occupations and economic activities demanding static posture, vibration and force.

OCCUPATIONAL AND INDIVIDUAL FACTORS RELATED TO MUSCULOSKELETAL SYMPTOMS AMONG X-RAY TECHNOLOGISTS

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[ID 796] - *No. 68 in Poster Area*

Objectives
The aim of the study was to investigate the prevalence of musculoskeletal symptoms with respect to work-related and individual risk factors in X-ray technologists.
Methods
A cross-sectional study was carried out among 136 X-ray technologists working in five hospitals of Apulia (Italy). A questionnaire was used to collect data on personal characteristics, physical workload, psychosocial workload, and the presence of musculoskeletal symptoms in the neck, shoulders, low back, hand/wrist and knees. Univariate analyses and multiple logistic regression analyses were performed and yielded similar results.
Results
Overall prevalence of reported musculoskeletal symptoms was 69,9%. The prevalences of low back, neck, shoulders, knees and hand/wrist pain in previous 12 months were 64%, 18,4%, 16,9%, 16,2% and 10,3%, respectively. Individual factors togheter with high-risk tasks execution were related to sypmtoms in the neck and low back.
Conclusions
The results of the present study suggest that musculoskeletal pain among X-ray technologists may have association with the execution of some biomechanically taxing tasks.

TARGET GROUPS FOR PREVENTION OF NECK/SHOULDER AND LOW BACK DISORDERS: AN EXPLORATORY CLUSTER ANALYSIS OF WORKING AND LIVING CONDITIONS

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[ID 952] - *No. 69 in Poster Area*

Musculoskeletal disorders (MSDs) have a multifactorial etiology. Therefore, a holistic approach to identifying target groups for primary/secondary prevention is essential. In this study, an exploratory person-oriented approach was applied, using cluster analysis of variables related to physical and psychosocial work conditions, and conditions in the private sphere, on a data set of 1,341 Swedish women and men who had not sought care for MSDs the 6 months preceding enrollment in the study. Three groups at risk and five "healthy" groups regarding MSDs were identified. Two of the risk groups had a strained situation regarding psychosocial work conditions or domestic/family conditions, respectively. The majority of individuals in these groups were women. The third risk group had a strained situation regarding both physical and psychosocial work conditions. This group consisted largely of men working in male-dominated jobs. The five healthy groups had low/moderate metabolic demands at work, and none of them had high proportions of subjects with a low education, and fairly even distributions of men and women. In conclusion, the results indicate that gender-specific working and living conditions are associated with an increased risk for MSDs. The identification of these subgroups in the population may facilitate a selective prevention approach.

DIFFERENT LIFE CONDITIONS AND THEIR ASSOCIATIONS WITH NECK/SHOULDER OR LOW BACK DISORDERS

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[ID 955] - *No. 70 in Poster Area*

Objectives: To investigate whether different combinations of life conditions (occupational and living conditions) are associated with neck/shoulder and/or low back disorders. The underlying purpose of this contextual approach was to identify target groups for primary/secondary prevention.
Methods: In a baseline study, eleven groups with different combinations of life conditions were identified by cluster analysis. In the present study, these groups were followed up by a postal questionnaire 5 years after baseline (response rate 82%, n = 1,095). Logistic regression analyses were used to determine whether any of the eleven groups were associated with the two outcomes of interest – moderate disorders and persistent disorders.
Results: Three of the groups, the onerous human services job group, the free agent group, and the family burden group, were associated with moderate disorders (OR 1.94–2.44) as well as persistent disorders (OR 2.39–2.65), compared with the sedentary work group. Two of the groups, the manual colorless labor and the physically strained groups, were associated only with moderate disorders (OR 2.05 and 2.35), while one group, the mentally stretched group, was associated only with persistent disorders (OR 2.38).
Conclusions: The results support the hypothesis that different combinations of life conditions are associated with neck/shoulder or low back disorders to different degrees. The results showed that gender-specific life conditions were associated with moderate as well as persistent disorders. Altogether, the method applied to identify target groups for prevention may facilitate a selective approach in preventive work to reduce musculoskeletal disorders, by enabling preventive actions in the most appropriate target groups.

HISTORY OF PHYSICAL WORK EXPOSURES AND CLINICALLY DIAGNOSED SCIATICA AMONG WORKING AND NON-WORKING FINNS AGED 30-64 YEARS IN THE HEALTH 2000 STUDY

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[ID 1029] - *No. 71 in Poster Area*

Background: Associations of strenuous physical work and difficult work postures with sciatica have found in several studies but the results have been inconsistent. We hypothesised that due to health-related selection the association between history of workload and sciatica is accentuated among persons outside the workforce.
Methods: The nationally representative Health 2000 survey sample comprised 8,028 Finns aged 30 years or over. The diagnosis of sciatica was based on a standardized clinical examination by trained physicians and recurrent symptoms that had lasted for more than the past three months. Analyses were restricted to subjects aged 30-64 years and stratified into two groups according to the working status during the preceding 12 months. Altogether 71 (2.1 %) of the working subjects and 49 (5.4 %) of the non-working subjects had sciatica. Previous exposure to physically loading work tasks, and covariates, were assessed by interview.
Results: In a logistic regression model allowing for age, gender, education, marital status, BMI, smoking, back injuries, depression, perceived health, and job strain, 11-20 years of exposure to high physical strenuousness and kneeling work were associated with sciatica both in the working and the non-working subjects. Among the latter a history of recurrent bending and lifting heavy objects at work and among the former exposure to frequent lifting of lighter objects were associated with sciatica. Most of the associations were more obvious among those outside the workforce than among those currently at work.
Conclusion: Heavy manual work in general and recurrent bending, kneeling, and lifting in particular are risk factors of sciatica. Sciatica may be an important cause of premature health-related selection outside the workforce.

MUSCULOSKELETAL DISORDERS IN SCHOOL KITCHEN WORKERS

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[ID 1216] - *No. 72 in Poster Area*

Introduction. Musculoskeletal disorders are among the leading causes of occupational injury and disability in industrialized countries. Food service workers were found to have higher risk of musculoskeletal symptoms from the national survey of work-related illnesses in Taiwan. The aim of this cross sectional study was to investigate the prevalence and risk factors of musculoskeletal symptoms in school kitchen workers.
Methods. School kitchen workers in Taiwan were responsible for cooking lunch for students, teachers, and school personnel. We recruited female workers from all school kitchens of the 60 elementary and middle schools of Tainan city to participate in this investigation. The referent group included the school supporting personnel not involved in kitchen work. A structured questionnaire was used to obtain work exposure and musculoskeletal symptoms, including the Nordic musculoskeletal questionnaire (NMQ). Physical examination was carried out among kitchen workers by a physician. Job-related risk factors were examined by using the MSDs checklist.
Results. A total of 152 female kitchen workers and 153 referent workers completed the questionnaire. The kitchen workers reported high prevalence of pain over the shoulder/neck, low back, elbow, wrist, and numbness over the hands. Physical examination on the kitchen workers found high rates of lumbargo (46.7%), carpal tunnel syndrome (45.4%), neck-shoulder syndrome (41.4%), and lateral humeral epicondylitis (33.5%). Neck/shoulder syndrome was associated with frequently raising arms over shoulder. Lumbargo was associated with waist-twisting for more than 20 times/day. Carpal tunnel syndrome was related to the number of grasping and contact with ice or frozen materials.
Discussion/conclusion. School kitchen workers were exposed to intensive workload for the preparation of lunch for the school children. They had higher prevalence of musculoskeletal disorders than the supporting personnel. Job-related activities were identified to be contributing to the musculoskeletal conditions in school kitchen workers. Preventive strategy targeting these risk factors is warranted.

CORRELATION BETWEEN TWO METHODS OF RULA AND REBA IN EVALUATION OF WMSDS RISK FACTORS

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[ID 1259] - *No. 73 in Poster Area*

Nowadays work-related musculoskeletal disorders (WMSDs) are one of the most important work-related diseases in the majority of workplaces in different industries. For evaluation of WMSDs risk factors, a cross-sectional study was performed to estimate the possible correlation between two methods of REBA and RULA in an ophthalmic lens manufacturing company. In this study, all job processes and subtasks were investigated and recognized. The results revealed that, there was a significant correlation between final score of two methods (r=0.781) and also action levels of two methods (r=0.821). In comparing the action levels, in all jobs, there was no significant difference between action levels in all workplaces separately (r=0.16). The results obtained from REBA and RULA methods revealed that, the risk level of lower arm, upper arm, and wrist organs were higher than trunk, neck, and legs organ. This was because of awkward posture of the mentioned parts. Results of RULA technique indicated that in 82.5% of jobs, further investigation is needed and changes may be required (action level 2). In 17.5% of jobs, quick changes are needed (action level 3). On the basis of obtained results, this study indicated that, there was a significant correlation between two methods and both methods have a strong correlation in identifying critical work site and limb. Therefore, both methods are recommended for evaluation of work-related musculoskeletal disorders risk factors in different industries.

FACTORS AFFECTING BODY DISCOMFORT AFTER WORK

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[ID 1286] - *No. 74 in Poster Area*

Objective: Recent studies indicate potential links between various ergonomic and psychosocial factors and work-related musculoskeletal disorders. The purpose of the study is to investigate related factors on body discomfort after work to prevent work-related musculoskeletal disorders.
Methods: This study was performed from February to October in 2005 among 254 for automobile workers and shipyard workers. Self-administered questionnaire to check general and work related characteritics, job stress, and body discomfort including hand, wrist, forearm, elbow, upper arm, shoulder, neck, back, knee and ankle/foot. Body part discomfort scales before and after work were evaluated using 10 point VAS. Ergonomic risk factors were checked using electrogoniometer on the wrist and elbow, and surface EMGs on the skin of flexor digitorum superficialis (FDS) muscle, extensor carpi radialis (ECR) muscle, and trapezius muscle, and heart beat monitor during work to check joint movement, local muscle tension and energy consumption during work, respectively. Job stress was evaluated by KSOS (Korean standardized occupational stress questionnaire). Although all body part discomfort were studied, difference of sum of those scales were analyzed. Joint movements, muscle utility and energy expenditure during work were categorized high and low group according to 10 freq/min suggested by Kilbom (1994), 2 % MVC suggested in RULA, and 3.05 kcal/min suggested by Korean worker study conducted by us.
Results : Whole body discomfort score difference between before and after work were related with job demand, wrist flexion frequency, elbow flexion frequency, and energy expenditure during work. Regular exercise was negatively related with body discomfort score.
Conclusions: Various factors including work related and not related items would increase body discomfort after work. Proper and comprehensive approach which specifies specific risk factors on body part discomfort should be applied to reduce WMSDs. Each variables on each body part will be analysed and be shown.

MSDS REGARDING PHYSIOTHERAPISTS IN FRANCE AND PROFESSIONAL CONSEQUENCES

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[ID 1352] - *No. 75 in Poster Area*

Introduction

A lot of studies have been done regarding Muscular Squeletal Diseases (MSD). However some professions have been neglected up to now, for example physiotherapists.

Objectives: Know osteo articular diseases prevalence, determine co-factors intervening, know the professional consequences.

Method : National transversal study by postal auto questionnaire done upon 7000 physiotherapists. Standardised questionnaires used, in particular the scandinavian questionnaire on MSDs, Karasek questionnaire for psycho-social factors.

Results : 1344 questionnaires have been used concerning men in 65 % of cases, in self employed activity in 87 % of cases, average age is 47 years old (± 13), average number of years of practice in this profession 23 years (± 11). Number of working hours per week is important, over 48 (± 14). High level of back pain found: 76 % complain of low back pain, 74 % of neckpain. Upper limbs diseases come in 2nd position with over 66 % of shoulder pain, nearly 60 % of wrists and hand pains. Prevalence is more important in women in a very significant way regarding upper limbs MSD (shoulders and hands) and neck pains. These diseases have resulted in reduced professional activity in over 30 % of cases for low back pains, shoulder diseases have led to changing job in over 6 % of cases. The threee most painful professional factors are heavy postural constraints, working hours, time schedule management with frequent task interruptions. Elaborated strategies to face these diseases: modification of operating process in 70 % of cases, ergonomic adaptation of the consulting room in over 50 % of cases, development of new professional competencies in over 45 % of cases.

Conclusion : The results confirm the importance of « MSD » problem regarding physiotherapists and of course the need of elaborating adapted preventive measures.

THE PREVALENCE OF PLAYING-RELATED MUSCULOSKELETAL DISORDERS OF FRESHMEN PLAYING STRINGS IN SOME COLLEGES OF MUSIC

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[ID 1415] - *No. 76 in Poster Area*

Introduction: This study was conducted to investigate the symptoms and diagnosis of performance-related musculoskeletal disorders of students who major strings in university.

Methods: To identify the prevalence of symptoms and diagnoses of musculoskeletal disorders and the related factors including dermographic factors, practice or performance-related factors and nonperformance-related factors, especially in string players, the authors carried out the survey with self administered questionnaire and physical examination by physicians.

Results: The subjects consisted of 208 string players (violin 100, viola 35, cello 40, double bass 24, guitar 3 & harp 6). The students played strings for 9 years 4 months in average until being university students. The symptom prevalence of musculoskeletal disorders according to the modified NIOSH surveillance criteria was 88.0 %. The shoulder pain and discomfort (75.9%) were the most common. In order of frequency was back (51.0%), neck (51.4%), elbow and arm (19.2%), wrist, hand and finger (46.2%), leg and foot (18.8%). The most common diagnosis was myofacial pain syndrome (39.8%) and the others were tendinitis, De Quervain's syndrome, radiating neck complaints, carpal tunnel syndrome, cubital tunnel syndrome, fibromyalgia syndrome and so on.

Conclusions: This study suggests that students who major strings in university are high risk group of musculoskeletal disorders. The education of performing posture and exercise program such as musical and physical stretching before and after practice or performance is needed to prevent of musculoskeletal disorders.

ERGONOMIC CHALLENGES FOR DENTAL PRACTITIONERS

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[ID 1735] - *No. 77 in Poster Area*

Introduction

The problems of musculo-skeletal disorders in Dental practitioners has been highlighted in the medical literature over the last ten years. Dental practitioners are involved in a range of tasks, many of which can be linked to poor ergonomics in the work place and long term musculo-skeletal problems.

Method

The study was based on a questionnaire survey of 65 dental practitioners. This included questions on dental practitioner demographics, range of practice work tasks, the prevalence and type of musculo-skeletal symptoms experienced, impact on work performance and usual methods of treatment interventions.

Results

Fifty two questionnaire responses were analysed, The average age of the dental practitioners was forty eight (48) years. Sixty six percent (66%) of the responders stated that they had experienced significant musculo-skeletal aches and pains while at work. Sixty seven percent (67%) stated that the musculo-skeletal problems affected their ability to work. Seventeen percent (17%) stated they required regular medication at times for pain relief of their symptoms. Ninety per cent (90%) of the sample stated they considered preventative education would be worth while.

Conclusions

Work related musculo-skeletal health problems are common among dental practitioners and require more effective preventative and intervention strategies.

These strategies can include ergonomic improvements at the work place as well as more effective personal health education and treatment interventions. These will be described more fully in the presentation.

SPINAL DISORDERS AND FITNESS FOR WORK AMONG NURSES OF THE "L. SACCO" HOSPITAL IN MILAN

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[ID 1846] - *No. 78 in Poster Area*

Introduction

Several studies have shown that manual lifting of patients is an important risk factor for the development of low back pain and spinal disorders, representing a main problem in the health care facilities.

Aim

To describe the distribuition of spinal disorders among nurses and the strategy of actions planned for the prevention of risk by manual lifting of patients.

Methods

The Occupational Health Unit conducted a specific assessment of health status among 683 nurses whitin the health surveillance programme of the hospital workers. The presence of spinal disorders was assessed and analysed in relation to age, gender, personal health history, length of hospital service. A fitness for work evaluation was carried out for each worker, taking into account the results of a preliminary analysis of risk related to the tasks.

Results

Nurses affected by spinal disorders were 137 (20%), out of them 69 (10,1%) were assigned to other wards in order to avoid tasks involving manual lifting of patients.

The affected workers had the following characteristics: age (mean 41 years; SD 9 years), gender (96 female and 41 male), body mass index (mean 24; SD 5), length of service (mean 19 years; SD 8 years). The spinal disorders presented the following distribution: 16 spondiloarthrosis, 38 discal hernia, 46 degenerative discopathy, 31chronic low back pain and 6 malformative diseases.

Conclusions

The management of nurses with spinal disorders represents a critical issue in hospital, since a method for quantifying exposures is lacking.

The following actions were planned to address the depicted situation:

- to perform the risk assessment in all wards, applying recent indicators of exposure (MAPO index),
- to provide a specific training programme for personnel,
- to evaluate the needs of device to support patients lifting,
- to improve the environmental features of the wards.

STUDY OF THE PREVALENCE OF MUSCULOSKELETAL DISORDERS AND PSYCHOLOGICAL HEALTH DISORDERS OF 9-1-1 EMERGENCY CENTRE DISPATCHERS

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[ID 1769] - *No. 79 in Poster Area*

Work and its effects on the health of 9-1-1 emergency centre dispatchers are still not well known. Contrary to police officers and firefighters, the dispatchers' work is carried out behind the scenes. It was only recently, with the changes made to 9-1-1 emergency centres, that the need for research on musculoskeletal disorders (MSDs) and psychological health disorders (PsyHDs) emerged. With this perspective, the researchers' strategy was to address these two issues in the same study. The prevalence study was carried out in five 9-1-1 emergency call centres in Québec, with 176 dispatchers. The data were collected using a self-administered questionnaire addressing the socioprofessional characteristics, the physical and psychosocial factors of the work, and the symptoms of MSDs and PsyHDs. The results obtained were compared to those from the 1998 Québec social and health survey as well as those from a study of white-collar workers in the Québec City region. The response rate was 85%. The results of the study show a very high prevalence of symptoms and physical and psychosocial risk factors in dispatchers compared to reference populations. Also, a significant relationship is observed between high psychological distress, significant MSD pain, workstation-related constraints, and little rewards. However, the study does not produce a description of the nature of these relationships so that one can go directly to the risk correction step. A step that combines ergonomic analysis of the activity and psychological analysis is indispensable for a better understanding of how the risks of MSDs and PsyHDs emerge in the work of 9-1-1 emergency centre dispatchers.

LOW BACK DISORDERS

CROSS-CULTURAL ADAPTATION OF THE OSWESTRY DISABILITY INDEX

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[ID 67] - *No. 80 in Poster Area*

Reports in the literature have identified a need for internationally standardized and reliable measurements to analyse back pain. The Oswestry questionnaire has become one of the principal outcome measures used in the management of spinal disorders.
The objective of this study was to translate and adapt a version of the Oswestry questionnaire into Brazilian Portuguese and evaluate its reliability.
The cross-cultural adaptation was performed according to internationally recommended methodology, using the following guidelines: translation, back-translation; revision by an expert committee and pretesting. First the questionnaire was independently translated into Portuguese by two bilingual translators. Second, two other professional translators whose mother tongue was English performed a back-translation independently from one another. A committee consisting of six specialists was brought together and developed a final version. This version was pretested on 40 subjects suffering from low back pain. Reliability was estimated through stability (test-retest) and homogeneity assessment. The validity was tested comparing scores of the Oswestry with the following measures: The Roland-Morris Disability Questionnaire, the SF-36 questionnaire and a numerical pain scale.
The psychometric properties of the translated version were evaluated by administering the questionnaire to 120 subjects with back pain. Results indicated good content validity and internal consistency (Cronbach alpha = 0,87). Intraclass correlation coefficient for test-retest reliability was r = 0.99. The Oswestry questionnaire showed moderate correlation with pain measure using a numerical pain scale (r = 0,66). Relatively high correlation was also found between the Oswestry and the Roland – Morris scores (r = 0,81). There was significant correlation (p< 0.001) between the Oswestry scores and the eight scales of the SF - 36 questionnaire. The highest correlation coefficients were for physical functioning (r = 0,83); bodily pain (r = 0,58) and role physical (r = 0,53). This study confirmed that the process used for adaptation of the Oswestry questionnaire was successful and that this version had excellent psychometric properties.

UPPER AND LOWER EXTREMITY DISORDERS

COMPARISONS OF THE FOUR DIAGNOSTIC METHODS OF CARPAL TUNNEL SYNDROME

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[ID 68] - *No. 81 in Poster Area*

Background: The incidence of musculoskeletal disorders in Taiwan has increased considerably in recent years, particularly repetitive strain injuries like carpal tunnel syndrome (CTS).
Aims: The objective of this study was to assess the prevalence rate and affecting factors of CTS using diagnostic methods among in a teaching hospital in central Taiwan.
Methods: 144 members of the healthcare practitioners were assessed using a modified Nordic musculoskeletal questionnaire (NMQ), physician's diagnosis of musculoskeletal status, physical examination (Tinel's signs and Phalen test), and a nerve conduction velocity (NCV) test. In addition, participants' physical activities at work were observed and recorded using a video camera.
Results: Comparing the four diagnostic methods, the prevalence rate of CTS was highest for the NMQ (52%), followed by physician's diagnosis (47.9% for the right hand; 27.9% for the left hand), physical examination (32.5%), and nerve conduction test (motor nerve = 26.1% and 29.7%; sensory nerve =15.3% and 22.5%, for left and right hands, respectively.) Based on logistic regression models for the NMQ and physician's diagnoses, there was a significantly higher risk of CTS among participants with a higher upper extremity index, but this was non-significant based on the physical examination and nerve conduction tests. Based on the physical examination and nerve conduction tests, multiple logistic regression models showed that there was a dose-response relationship between the risk of CTS and work duration, but this did not reach statistical significance.
Conclusion: The authors conclude that the results of the four diagnostic tests for CTS were inconsistent and therefore we suggest that the physical examination and nerve conduction tests may be more suitable for detecting severe CTS, compared to NMQ and physician's diagnosis.

DUPUYTREN DISEASE AND WORK

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[ID 543] - *No. 82 in Poster Area*

Dupuytren's disease is a rather uncommon illness consisting of a chronic and progressive lesion of palmar aponeurosis, characterized by thickening and retraction of one or more hand fingers, resulting into a permanent, progressive and irreducible flexion.
As regards etiopathogenesis, there is no agreement so far on the origin of Dupuytren's disease. There are several working activities characterized by intense and repetitive manual activity such as to expose workers to biomechanical hyperstrain of upper limbs. It is well-known that jobs exposing subjects to such a risk may cause with time a series of morbid diseases affecting muscles, tendons, joints and nerves at upper limb different segments. While for diseases like for example carpal tunnel and tendonitis there is such a huge amount of epidemiological data in the scientific literature giving convincing evidence of their occupational origin, for others, like Dupuytren's disease, it is not so.
The case of a metal worker is examined who at 35 years of age is affected by Dupuytren's disease in the right palmar region and, two years later, also in the left region and by Ledderhose disease in the right foot. These diseases, different in denomination, have however similar histologic and ultrastructural characteristics. The nearly simultaneous onset of such diseases, as well as kind and minimum duration of working activity and lack of evidence of positive correlation in the scientific literature, testify in the case examined causality absence or effective and decisive concausality between work and Dupuytre's disease.
The simultaneous onset of Dupuytre'sn and Ledderhose diseases is the evidence that it is a subject with Dupuytren's Contracture Diathesis" that is with a constitutional inclination to a series of fascia diseases or metabolic or structural anomalies.

BIOFEEDBACK EFFECTIVENESS TO REDUCE UPPER LIMB MUSCLE ACTIVITY DURING COMPUTER WORK DEPENDS ON THE STRESS LEVEL

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[ID 853] - *No. 83 in Poster Area*

Introduction: Intensive computer mouse use for long periods of time may lead to the development of musculoskeletal disorders due to sustained muscle activation. Biofeedback could then be a useful means to reduce activity in activated muscles during computer work. The aim of the study was to test the effect of biofeedback from trapezius (TRA) or extensor digitorum communis (EDC) on the EMG activity of TRA and EDC during standardised computer work at different grades of stress. We tested the following hypotheses: 1) biofeedback can reduce muscle activity within the biofeedback muscle itself; 2) biofeedback is more effective in the non-stressed vs. stressed working condition. Methods: Eleven healthy women performed standardised computer work for 3 min during two different work types (with/without stress) while receiving biofeedback in a randomised order. Biofeedback was given from right TRA or EDC through two different modes (visual or auditory) by the use of electromyography (EMG) or mechanomyography (MMG) as the biofeedback source. Results: During control sessions, EMG muscle activity was (mean±SD): 2.4±1.1, 2.5±2.1, and 9.1±3.1 %max EMG for the right and left TRA and the EDC, respectively. Muscle activity was significantly reduced when feedback was given from TRA compared to control in both right and left TRA (1.7±1.6 and 1.2±2.0 %max EMG, respectively). During feedback from EDC, muscle activity in EDC was significantly reduced (8.3±.3.3 %max EMG). During no stress, muscle activity was significantly reduced in left TRA and EDC, when receiving feedback from right TRA and EDC, respectively, compared to when working with stress. No difference in muscle activity was seen between visual or auditory biofeedback. Conclusions: 1) biofeedback can reduce muscle activity within the biofeedback muscle itself without affecting productivity; 2) biofeedback is more effective in the non-stressed vs. stressed working condition.

WORK-RELATED CARPAL TUNNEL SYNDROME IN ALICANTE, SPAIN, 1997-2003

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[ID 981] - *No. 84 in Poster Area*

Carpal tunnel syndrome (CTS) is a major problem in occupational health, particularly in occupations requiring highly repetitive and/or forceful hand motions. Official Spanish statistics of Occupational Diseases show a growing in the number of “pressure induced nerve paralysis” from 388 cases in 1995 to 2055 cases in 2003. However, it is estimated that most of work-related CTS cases are hidden as common pathology.
Objectives: Describing labour characteristics of affected persons and their illness process until the reincorporation to their jobs.
Methodology: We made a cross sectional study, using Occupational Diseases Reporting (ODR) from 1997 to 2003. We use NIOSH definition to notify the cases. The information was collected using a structured questionnaire, including data from ODR and results from clinic examination. A descriptive study and a multivariate analysis were conducted.
Results: 266 occupational CTS have been declared. The incidence was 4.2 cases for each 100.000 workers. (95% CI: 3,556-4,788). 62.8 % were women of those of which, 25% of those are younger than 30 years (media for both sex are 39,5 years, with 10,43 years of standard deviation (sd)). Bilateral presentation is more frequent. The media of antiquity in the job is of 132.3 months, but women work a media of 49 hours per week (sd: 9,73) and men 43,4 hours per week (sd: 8,7). Risk activities more frequently presented are those that need hand force (90% of women and 95,8% of men) and forced hand positions (90% of women and 84,5% of men). Clinical characteristics present a similar pattern for gender being more frequent the presentation of night parestesias and unilateral night pain. There was a diagnostic delay of 26,1 months (sd: 28,57), and the treatment was mainly surgical (92,1% of women and 82,6% of men). After that, 62,5% of women and 40,8% of men presented hands force absence. 64% of women and 70,2% of men went back to the same work place after recovery.
Discussion: Incidence of CTS in workers in this study is between 9 and 126 times lower than estimated using international and population data, so we need to improve ODR CTS to know the real incidence of it. Enhance Government to make preventive actuations and readapt work place to women characteristics is needed because of high number of physical problems related to CTS shown after the treatment.

RELATIONSHIP OF FINGER PAIN WITH RADIOGRAPHIC OSTEOARTHRITIS AMONG MIDDLE-AGED FEMALE DENTISTS AND TEACHERS

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[ID 1034] - *No. 85 in Poster Area*

Objectives. To investigate the association of radiographic finger osteoarthritis (OA) and finger pain, and the possible effect of finger use on their co-occurrence.
Methods. Radiographs of both hands of 295 female dentists and 248 female teachers were examined for the presence of osteoarthritis using grades 0=no OA, 1=doubtful OA, 2=mild OA, 3=moderate OA, 4=severe OA. The occurrence of pain in each finger at least sometimes during the past 12 months was assessed by questionnaire.
Results. In a multivariate log-binomial regression model, the prevalence ratios of finger pain among those with mild osteoarthritis was 1.54 (95 % CI 1.32-1.80) and among those with at least moderate osteoarthritis 3.06 (2.68-3.52), allowing for age, occupation, hand laterality and finger. Based on the same model, pain was more common in the right (PR 1.40, 95 % CI 1.25-1.56) than the left hand, and more common in the thumb (PR 2.09, 95 % CI 1.74-2.50), index (PR 1.68, 95 % CI 1.40-2.02), and middle (PR 1.55, 95% CI 1.29-1.86) fingers than in the little finger. The dentists had a slightly increased risk of pain in comparison to the teachers (PR 1.13, 95 % CI 1.01-1.25).
Conclusion. We found evidence for a close association of the severity of radiographic changes of hand OA and finger pain in finger-wise analysis. Our findings suggest that hand loading may play important role in the development of pain and may alter the co-occurrence of pain and osteoarthritis.

THE NORDIK QUESTIONNAIRE FOR THE EVALUATION OF DISORDERS OF UPPER LIMBS FROM REPETITIVE MOVEMENTS AND AWKWARD POSTURES: A RESOURCE IN OCCUPATIONAL MEDICAL SURVEILLANCE OF VDT/PC USERS

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[ID 1251] - *No. 86 in Poster Area*

Introduction
The study of the pathologies of the upper limb from repetitive movements and awkward postures has been frequently carried out without the use of standardised international guidelines.
Methods
To evaluate the possible pathologies of the upper limb in a group of 100 VDT/PC users (more than 6 hours a day of VDT/PC use), we used the Nordik Questionnaire which is frequently used mostly in Northern Europe.
The VDT/PC users didn’t have any previously diagnosed upper limb pathology reported in their anamnesis.
The Nordik questionnaire, which is directly drawn up by the patients, is referred to be a valid instrument for the preliminary screening of the presence of occupational upper limb pathologies.
We also carried out a complete clinic examination, structured as European Clinic Guidelines suggest.
Results
60 workers didn’t report in the questionnaire the presence of signs or symptoms of pathologies of the upper limb.
Using the clinical upper limb examination in the other 40 VDT/PC workers, we diagnosed 11 cases of specific upper limb disorders (from repeated strain injuries) and 17 cases of aspecific upper limb disorders.
No instrumental examination was necessary for a diagnosis of the pathologies.
All the patients were sent to orthopaedic specialists for the necessary therapy.

Discussion
The results showed that Nordik questionnaire is a valid screening tool that can be easily applied in groups of workers having relevant upper limb use.
The Nordik questionnaire allows the occupational medical doctor to better direct his attention on patients potentially affected by upper limb disorders.
The clinical examination, according to the European Clinic Guidelines, is a valid and exhaustive instrument for a diagnosis of upper limb pathologies from repetitive movements and awkward postures and can avoid a relevant number of instrumental examinations and a relevant time consuming for the patients.

RISK FACTORS OF WORK-RELATED MUSCULOSKELETAL SYMPTOMS ON THE FOREARM USING SURFACE ELECTROMYOGRAPHY AND ELECTROGONIOMETER

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[ID 1285] - *No. 87 in Poster Area*

Objectives: As automobile part manufacturing is characterized by high speed and high repetition, so observation method which is usually utilized for static posture would be inappropriate to evaluate musculoskeleatal risk factors. This study was conducted to quantify the risk factors of musculoskeletal disorders on the forearm and to suggest exposure limits by estimating the risk factors using surface electromyography (EMG) and electrogoniometer.
Methods: Among 3 automobile part manufacturing factories about 10% of total workers were randomly selected, and 99 male workers were recruited finally. Study was conducted from May 2003 to September 2004. The workers equipped electrogoniometer on the wrist and elbow, surface EMGs on the skin of flexor digitorum superficialis (FDS) muscle and extensor carpi radialis (ECR) muscle, and heart beat monitor during work to check joint movement, local muscle tension and physical work load, respectively. Job stress was evaluated by KSOS (Korean standardized occupational stress questionnaire).
Results: After controlling age, body mass index and job stress, wrist flexion maximum angle, FDS relative activity (RA) and ECR RA were significantly associated with forearm musculoskeletal symptom. Odds Ratios of forearm symptoms were 5.0(95% CI: 1.1-22.7), 14.0((95% CI: 1.5-128.8) and 7.3(95% CI: 1.1-49.4) when wrist flexion maximum angle more than 76°, and FDS RA more than 2.8%, and ECR RA more than 3.5%, respectively.
Conclusions: Joint angle and focal muscle activity were associated with forearm musculoskeletal symptom. To reduce forearm musculoskeletal symptom among automobile part manufacturer, it is needed to reduce the wrist flexion angle, and to reduce FDS and ECR activity below the guidelines that this study suggested.

ELBOW ULNAR NERVE COMPRESSION AT WORK : CASE CONTROL STUDY

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[ID 1350] - *No. 88 in Poster Area*

Introduction
Occupational aetiologic factors of elbow ulnar nerve compression syndrome are less known than those of the carpel tunnel.
Objectives
Identify hazardous professional movements of elbow ulnar nerve compression syndrome taking into account extra professional factors so as to advance its recognition or admission as occupational disease. Make propositions regarding prevention measures.
Method
Comparative control case study type involving 59 cases with elbow ulnar nerve syndrome confirmed by electrophysiological explorations and 74 controls taken in professional environment. Both groups are comparable in terms of age, sexe, work and hobbies. The MSD questionnaire validated by INRS has been used.
Results
The following variables are significly linked to ulnar nerve compression syndrome : work bearing upper limbs strength: OR = 5,3 [2,4 - 12], worries: OR = 4,5 [1,97 -10,5], work output: OR = 3,6 [1,3 -10,8], prolonged elbow bent work: OR = 3,1 [1,5 - 6,9], physica exhaustion: OR = 2,8 [1,3 - 6,1], stress : OR = 2,7 [1,3 - 6], driven or pulling efforts: OR = 2,5 [1,2 - 5,4].
Multivariate logistic regression analysis has finaly allowed to retain essentially the following aetiologic variables: the fact of having past elbow trauma, prolonged elbow bent work, work bearing upper limbs strength and stress.
Conclusion
Our study shows that the elbow ulnar nerve syndrome is a multifactoral disease and its recognition or admission as occupational disease must not be limited to work with prolonged support on elbow.

VALIDATION OF A SELF-ADMINISTERED QUESTIONNAIRE ON ERGONOMIC ASPECTS OF THE PERSONAL COMPUTER WORK STATION.

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[ID 1450] - *No. 89 in Poster Area*

Background: In order to study the relations between computer work and muskuloskeletal disorders (MSDs) a large population is required. Direct observations of computer work station ergonomics is costly and may sometimes be impossible.
The NUDATA study (Neck and Upper extremity Disorders Among Technical Assistants) is a 1 year cohort study of musculoskeletal disorders related to computer work. The study included 6943 computer workers selected from members of the Danish Association of Professional Technicians. They worked in more than 3000 companies. Ergonomic aspects of work, therefore, could not be observed. In stead they were queried about in a postal questionnaire. The aim of the present study is to validate this quetionnaire information on ergonomic aspects of computer work.
Methods:
139 computer users at the Copenhagen University Hospital in Glostrup filled a questionnaire with the NUDATA-questions about ergonomic aspects of their personal work station. The validation method was inspection, measurements and interview, depending on the item. Examples of validated items are ‘support of wrist/arm during keying’ (validated by inspection); location of the ‘center of the screen’ in relation to eye height, and the ‘center of the keyboard’ in relation to the ‘body’ (validated by measurements); and general satisfaction with the lay-out of the work station (validated by interview).
Results:
In general, questionnaire items showed a significant positive association with the corresponding validation measure. The tightest association was for items validated by interview, eg. the weighted kappa for the general satisfaction with the work station layout was 0.67 (95% CI 0.58-0.77). The questionnaire terms ‘center’ of the keyboard and to the left or to the right of the ‘body’ turned out as ambiguous reference points.
Conclusion:
The validation process, of course, showed differences in the validity of different items.
Specific points for the improvement of the questionnaire were revealed,

REPORT ON 13 CASES OF EPICONDYLITIS AMONG FISHERMEN USING FISH TRAPS: A RISK FACTOR STUDY

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[ID 1542] - *No. 90 in Poster Area*

Jobs involving upper limb biomechanical overloading entail a high incidence and prevalence of musculoskeletal arm diseases.
We report on 13 cases of lateral epicondylitis among Sicilian fishermen using fish traps. They were males aged 40.8 ± 8.9 years who had been doing the same job for 15.5 ± 4.2 years. On average they handled about 27 traps/h over approximately 195 days/year.
We studied 280 Sicilian fishermen working with fish traps to investigate the risk factors for epicondylitis and compared them with 360 fishery workers

as controls. All subjects were given a questionnaire; physical examination included tenderness on epicondyle palpation and epicondylar pain by resisted wrist extension and flexion. Pain was assessed using a visual analogical scale (VAS) and an algometer according to Fisher. To evaluate the risk of arm biomechanical overload, we used the occupational repetitive actions index (OCRA) and the strain index (SI).
Fishermen exhibited a significantly greater incidence of epicondylitis (14.5%) than controls (2.5%). The VAS and algometer values pointed to a functional impairment of the joint in 21%; the OCRA index value was 8.7 (high risk) and the SI value 7.6 (high risk). Intense muscle effort and highly frequent and repetitive arm movements (OR 3.7, 95% CI 1.7 to 8.3; OR 5.4, 95% CI 2.4 to 11.9), especially in some phases of the work cycle, are risk factors significantly connected with the arising of epicondylitis among fishermen using fish traps.
In conclusion, fish trap handling exposes fishermen to the risk of developing epicondylitis due to intense exertion and repeated arm movements, concentrated is some phases of the work cycle.

PREDICTION OF HAND FUNCTION AFTER OCCUPATIONAL HAND TRAUMA BY EVALUATION OF INITIAL ANATOMICAL SEVERITY

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[ID 1837] - *No. 91 in Poster Area*

Hand trauma is a common occupational injury in Taiwan. The Hand Injury Severity Scoring (HISS) system was developed to predict time to return-to-work after hand trauma using a composite score combining integument, skeletal, motor, and neural components. However, direct examination of the predictability of this system for hand function after hand trauma was lacking. The purpose of this study was to examine the relationship between initial HISS and recovered hand function after occupational hand trauma.
Patients hospitalized between January 1, 2000 and December 31, 2003 in one tertiary referral center in South Taiwan for surgery due to occupational hand trauma were recruited. The severity of hand trauma was evaluated by chart review, and coded using HISS. Hand function test, the Purdue Pegboard test, was performed at least 6 months after the trauma. The Purdue score was compared with initial HISS by correlation and multiple regression analysis. Ninety five patients completed the study. We found significant negative correlation between total HISS score and scores of the Purdue Pegboard test, including that for both hands, assembly, and injured hand, respectively. However, not all individual components of these four were significantly associated with the hand function.
The study showed that after occupational hand trauma, initial anatomic severity evaluated by the HISS system could predict hand function post-surgically. However, further adjustment is warranted to improve the predictability.

THE PREVENTION OF UPPER EXTREMITY WORK MUSCULO-SKELETAL DISORDERS IN THE WORKPLACE – A CAR SEATS PRODUCTION EXPERIENCE

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[ID 1356] - *No. 92 in Poster Area*

Introduction: Generally accepted principles for the management of health and safety at work provide a framework, under which specific actions for upper extremities work musculoskeletal disorders (ueWMSDs) prevention may be considered. The effectiveness of the principles included in ergonomic programmes and interventions aimed at primary prevention is not yet clear.The aim of this study was to evaluate the efficacy of primary prevention, and in particular occupational health measures, in a group of highly exposed subjects to risk factors for upper limb musculoskeletal disorders.Subjects and methods: Incidence of symptoms reported by workers in a car-seat production plant was studied in the same subjects from 2001 to 2003. A total of 82 subjects were considered, 17% females and 83% males. In 2001 a risk assessment with the OCRA (Occupational Repetitive Action Risk Index), a risk index (RI) was attributed to each workstation (1: no risk, 2: possible risk, 3: presence of risk) and job-rotations (JR) were introduced at the end of the year. In the same year occupational health measures (exercise/relaxation programmes, physiotherapy, use of functional orthesis) and physioterapy with therapeutic and functional electrical stimulation with LF (Low Frequency) magnetotherapy were adopted. The effectiveness of the measures applied was evaluated on a descriptive statistical basis.
Results: The total number of symptoms decreased progressively from 61/85 workers (74%) in 2001 to 44/85 (52%) in 2002 to 29 out of 82 (36%) in 2003. The higher risk indices progressively faded with the introduction of the job rotations at the end of 2001.
Conclusions: Since 2001, different preventive measures have been adopted in the plant. The total number of symptoms decreased since the first intervention, and proportionally decreased physiochinesis sessions. Results suggest the effective weight of all the interventions and the importance of physiokinesis therapy in the workplace; physiotherapy alone brought to a significant decrease in symptoms in 2002 and 2003. The technical primary prevention demonstrated a short term effect whilst the physiotherapy effect had a longer latency and is the factor that is still contributing in lowering the symptoms incidence in association with the technical measures taken. This study suggest the importance of the integrated secondary prevention in increasing the effects of primary technical-organizational prevention.

NON-IONIZING RADIATION: EXPOSURE AND HEALTH EFFECTS

DOES THE IMPLANTATION OF AN ICD LEAD TO A WORK INAPTITUDE IN AN ELECTRICAL COMPANY?

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Objective
An EDF worker had been implanted with a ICD. His occupational doctor had to define his work aptitude. This person was working in hydroelectric plants, so was exposed to 50Hz magnetic field. The ICD may be perturbed by magnetic field, and the risk had to be evaluated.
From this case study, we present in this paper our approach to define the work aptitude or inaptitude.
Method
The protocol consists in measuring magnetic field in the presence of implanted worker. A pluridisciplinary team performed the study: the cardiologist was there with cardiac reanimation material; the ICD constructor questioned the ICD with the telemetry material and the engineer performed magnetic field measurements. All areas of the hydroelectric plants where the worker could go were visited (substations, alternators, turbines, control rooms, proximity of cables), beginning with the areas of lowest magnetic field, and questioning the ICD in all situations.
Results
The ICD was Medtronic, bipolar and a 3mV sensitivity setting. In the different areas, 50Hz magnetic field has been measured from 0 to 650µT at the ICD location. No dysfunction of the ICD has been seen with the bipolar mode.
Conclusion
Following these measurements, this person has been declared apt to work and has worked again in hydroelectric plants. Six months after, no incident has been reported.
This example shows the interest of measuring magnetic field and questioning the implant in the same time, at the different working places, in order to evaluate risks of ELF interference and to help the occupational doctor to define the work aptitude or inaptitude.

EFFECTS OF 50 Hz MAGNETIC FIELD INTERFERENCE ON RECENT GENERATIONS OF IMPLANTED PACEMAKERS

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[ID 220] - *No. 94 in Poster Area*

Objective: The objective of these study is to evaluate the behavior of implanted pacemakers in the presence of a magnetic field of 50 Hz 100 µT, the value retained in the European recommendation 1999/519/EC.

Materials and Methods: Patients recently implanted with pacemakers from different manufacturers were monitored while passing through, and standing between a system of two coils generating a 50 Hz 100 µT magnetic field.

Recordings were made with the field on and off for each patient position. The tracings were analyzed in real time, with the physician blinded to the intensity of the patient's exposure. At the end of the tests, the pacemaker programming was controlled.

Results: The population included 265 patients, aged from 18 to 87 years. Pacemakers from 10 manufacturers were included in the study, with 1 to 23 different models per manufacturer and 1 to 23 patients with the same model. Pacemaker dependency was found before testing in 145 cases. The sensing configuration was bipolar in 165 cases and unipolar in 53. Bipolar was combined with unipolar sensing in 47 patients.

Mode reversion to asynchronous mode pacing during the test was recorded in 3 patients with atrial and or ventricular unipolar programming. In 2 of these cases, this interference was asymptomatic. In a third case, persistent asynchronous mode reversion was followed by pacing inhibition, resulting in complete atrioventricular block with severe bradycardia and dizziness. Only one mode reversion was recorded in 145 tests with bipolar sensing, transient ventricular pacing in safety mode with shorter than programmed atrioventricular delay. No change in programming was observed at the end of the tests.

Conclusion: High magnetic field at industrial frequency (50 Hz) can cause intermittent mode reversion or pacing inhibition in patients with unipolar sensing programming. The overall incidence of this interference is low with usual pacemaker settings.

EMFs GENERATED BY VIDEO DISPLAY TERMINALS AND EMF BY FREQUENCY 40.68 MHz HAVE OPPOSITE EFFECTS ON VIABILITY OF ORGANISMS

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[ID 281] - *No. 95 in Poster Area*

Very important to understand whether the extremely low-frequency electric and magnetic fields generated by sources such as household appliances, video display terminals, and local power lines are capable to influence on the living organisms and, in particular, human.

Effects of video displays terminal (17" computer monitor with cathode-ray tube) and EMF (40.68 MHz), which is widely applied in medicine, are studied on viability of living organisms. Capacity of electric field generated by the monitor was measured. At the frontal side of the display at 4 cm distance minimal capacity was in the central point (1 V/m) and maximal - at right bottom corner (11 V/m). The average meaning was 6.4±3.57 V/m and with increase of distance it reduced up to 4.8±2.04 V/m on 30-40 cm of a distance, 0.1±0.02 V/m on 100 cm, and on distance 200 cm was equaled to zero. Exposed samples settled on distance 4, 40 and 250 cm opposite to the central point of the monitor. The part of samples was in metal boxes and served the controls others were in glass flasks. An irradiation carried out at room temperature 24.5±0.5 oC and 19.5±0.5 oC at daylight during 24 h.

Electromagnetic field of 40.68 MHz (27.5 V/m, 22 A/m, capacity of radiation 30 W, polarized in a horizontal plane) was generated inside of the solenoid connected to the generator. The irradiation of samples was performed in strict thermostatic conditions (28 oC) during 30 minutes with shielding of visible light. The control tests were conducted in the same conditions without irradiation.

Yeasts S. cerevisiae, S. pombe and C. utilis were used in experiment. S. cerevisiae and S. pombe are modeling organisms for studying of eukaryotic cells. Exposure of cells was done in the sterile distilled water. Viability was determined according to the colony forming units of the cells.

Video display terminal and EMF 40.68 MHz did not influence on viability of microorganisms but changed their resistance to stress-factors action.

Exposure of yeasts with EMF 40.68 MHz during 30 minutes causes 100 % resistance of S. pombe and C. utilis cells to action of antibiotic nystatin (concentration of nystatin was 10 µg/106 cells). Antibiotic in concentration 10 and 20 µg/106 cells inhibits growth of, correspondingly, 50 % and 100 % of cells in S. cerevisiae populations and EMF increased a level of viability only by 10 %. This suggests the different sensitivity of cells to EMF though each time we used homogeneous population of yeasts where all cells were in G1-phase of cell cycle. These data is confirmed by our previous research which marked the increase of viability of the exposed with EMF 40.68 MHz organisms in the presence of different stress-factors of physical and chemical nature [Voychuk et al., 2004].

Same time, influence of electromagnetic fields generated by video display terminals inhibits resistance of S. cerevisiae to nystatin (15 µg/106 cells). Effect depended on distance up to the computer monitor and was maximal at a minimum gap between an experimental sample and display. In a control sample death rate was about 70 %. In the exposed samples after three hours the amounts of viable cells reduced and were 4 %, 15 % and 25 % accordingly on distance 0.04, 0.4 and 2.5 miters, after 6 hours they were 6 %, 17 % and 21 %, and after 24 hours – 8 %, 19 % and 39 %. Thus, we see, that the long exposure does not have the same effect as short-term, that can be explained by adaptation of cells to the influence of radiations from video displays terminals.

Effects of 40.68 MHz EMF and electromagnetic fields generated by video display terminal have opposite character. Researches in the given direction with the use of modeling organisms will allow to reveal mechanisms and ways of EMFs action on biological systems and to estimate the real risk from influence of weak and superweak electric and magnetic fields on ecological safety and human health.

A DOSIMETRIC STUDY OF SWEDISH LIFE SAVERS' UV-EXPOSURE.

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[ID 784] - *No. 96 in Poster Area*

Introduction. Age-standardized incidence of UV-induced skin cancer is high in the county of Halland compared to the rest of Sweden. We studied the occupational UV-exposures in the summer 2005 of life savers at a beach on the Swedish west-coast close to the city of Halmstad. Other groups whose outdoor UV-exposure has been studied in Sweden have been preschool children (BOLDEMAN C. et al).

Aim. To assess life saver's UV-exposure, increase the knowledge of measurability of environmental UV exposure by dosimetry in occupationally highly exposed subjects and to investigate the correlation with global UV monitoring.

Material and methods. Weekly UV exposures of participating life savers was measured using polysulphon film dosimeter badges (26 persons, 44 dosimeters, June 20 - August 7). The badges were attached by a safety pin to the shoulder of the pique shirt. Working hours were registered in a diary. The dosimeters had been purchased from Newcastle General Hospital, UK and were analyzed there (B. Diffey).

The solar UV-index is continously recorded in Stockholm and in Halmstad by SSI. Calibration of the dosimeters was validated by comparing exposure results of four dosimeters to global UV measurements at SSI in Stockholm. The Halmstad UV-index data serves to express the life saver's UV-doses in percent of maximum available global UV.

Here exposures are indicated in erythemally effective Joules (JouleCIE/m2), MED (Minimal Erythemal Dose, approx. 250 JouleCIE/m2 for skin type II) or in SED ("Standard Erythemal Dose" = 100 JCIE/m2).

Results. The daily UV dose of the life savers ranged between 105-1555 JouleCIE/ m2 (0,4 - 6,2 MED). The exposures were highest between June 26 - July 10, which correlates well with the best weather that summer. Surprisingly, 21 dosimeters were exposed to >40 SED and 11 were exposed to >3MED/day.

Conclusion. Results confirm that Swedish life savers are exposed to high UV-doses and regular use of UV protection is highly motivated.

EVALUATION OF THE ELECTROMAGNETIC IMPACT PRODUCED BY THE RADIO BASE STATIONS OF THE MOBILE PHONE SERVICE IN AN AREA OF ROME

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[ID 1077] - *No. 97 in Poster Area*

The Laboratory of Radiation and Ultrasounds Pollution of the Italian National Institute of Occupational Safety and Prevention (ISPESL), has carried out an evaluation of the global impact produced by the electromagnetic field generated by the radio base stations of the mobile phone networks, in a specific area in the western part of Rome.
The aim was: to measure and theoretically estimate the electromagnetic field levels in this area; to verify the respect of the exposure limits, "Attention levels" and the "Quality target" assessed in the D.P.C.M. 8 July 2003 to prevent hazardous due to long term people exposure; to define an useful tool for the new radio base stations location in order to minimize people exposure.
The activity has been carried out: collecting the information concerning as the shape of the ground as the position and the height respect to the soil of all the buildings included in the area; performing a census of all the radio base stations in the area under examination; collecting the technical data of the antennas; carrying out the evaluation of the theoretical electromagnetic field due to the base stations, assuming the plans working at the maximum power; carrying out a measurement campaign of the electromagnetic field levels as in the inhabited places more exposed, as in the working areas more sensitive like schools, hospitals, etc..
The results of the work allowed to create the map of the electromagnetic impact produced by the productive installations formed by the radio base stations working in the examined area.

THE INDOOR USE OF THE MICROCELLS FOR MOBILE COMMUNICATIONS: THE ISPESL EXPERIENCE IN A WORKPLACE

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[ID 1527] - *No. 98 in Poster Area*

To implement the networks for mobile communications, often it has been installed the microcells which are useful to allow telephone conversations also in confined areas like tunnels and subways. These are small antennas or driving systems that allow to produce high electromagnetic field levels only near the emitting systems. Often these systems are installed also in the buildings used as an office; in such circumstances, it often produces an atmosphere of tension between the workers, because of the worry about the health effects due to the exposure to the electromagnetic fields emitted by these systems during the office hours.
Here are presented the electromagnetic field measurements carried out by the laboratory of Laboratory of Radiation and Ultrasounds Pollution of the Italian National Institute of Occupational Safety and Prevention (ISPESL) in a workplace interested by the presence in the passages between the offices of such kind of systems.
The measurements have been carried out with a wide band equipment in each workplace and in the common areas; the electromagnetic field levels have been compared with the exposure limits, "Attention levels" and the "Quality target" assessed in the D.P.C.M. 8 July 2003 to prevent hazardous due to long term people exposure.

THE IMPACT OF ENVIRONMENTAL ELECTRIC, MAGNETIC AND ELECTROMAGNETIC FIELD SOURCES IN THE WORKPLACES

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[ID 1528] - *No. 99 in Poster Area*

In the last years, it attends to a huge request of the public national administrations to ISPESL to carry out electric, magnetic and electromagnetic field measurements related to sources not strictly occupational but environmental like power lines, electric panels, transformer rooms and high frequency antennas close to the workplaces.
In this work are presented examples of the measurements carried out by the Laboratory of Radiation and Ultrasounds Pollution of the Italian National Institute of Occupational Safety and Prevention (ISPESL) on demand of the internal protection services of national public institutions.
The environmental monitoring has been carried out using wide band probes, electric and magnetic probes. The measurements have been compared with the exposure limits, "Attention levels" and the "Quality target" assessed as in the D.P.C.M. 8 July 2003 to prevent hazardous due to long term people exposure to the electromagnetic sources with frequency between 100 kHz and 300 GHz, as in the D.P.C.M. 8 July 2003 to protect people from the exposure to the electric and magnetic field at the frequency of 50 Hz.

PARENTAL OCCUPATIONAL EXPOSURE TO ELECTROMAGNETIC FIELDS IN THE "SETIL" CASE-CONTROL STUDY ON THE CAUSES OF CHILDHOOD LEUKEMIA

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[ID 1840] - *No. 100 in Poster Area*

SETIL is an epidemiologic multicentric case-control study carried out in Italy in order to investigate the association between selected childhood neoplasms (acute leukemia, non-Hodgkin's lymphoma and neuroblastoma) and environmental risk factors, namely physical, chemical, and infectious agents. The cases are 0 to 10 years old children diagnosed with acute leukemia (ALL, AML, other) or non-Hodgkin lymphoma, or neuroblastoma. The study took place in 15 Italian regions, conducted by an 'ad hoc' unit in each region. Trained interviewers administered a structured questionnaire to the parents of the cases and controls; a total of 686 acute leukemia cases, 102 non Hodgkin lymphomas and 158 neuroblastoma and 1,066 controls were interviewed.
Concerning parental occupations, subjects were interviewed with job-specific questionnaires. The collected data concerning exposure to chemicals and radiation were evaluated by expert industrial hygienists who, blind to disease status, recorded their judgment on probability, intensity, and frequency of exposure. Occupational exposure to electromagnetic fields (ELF) was also assessed separately for mother and father considering their job, electrical machineries used and possible other indirect exposure to ELF.
In four of the regions the ELF exposure assessment has already been performed: results show high degree of variability in different exposure circumstances. For the same job title differences were found according to workshop dimensions, distance between the workers and their machinery, furthermore a high variability was also found on the frequency of use. Differences among women and men were also highlighted. In particular within 293 mothers 129 subjects (44%) were exposed to a very low level for the whole work shift and 15 (5%) to medium level. Within 388 fathers 128 subjects (33%) were exposed to a very low level and 27 (7%) to medium levels of but not for the whole work shift.

HUMAN EXPOSURE TO ELECTROMAGNETIC FIELDS AT WORKPLACES WITH HAND-HELD RESISTANCE WELDING EQUIPMENT

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[ID 1896] - *No. 101 in Poster Area*

Hand-held resistance welding equipment for connecting thin sheet metals is frequently found in the metalworking industry. During a welding operation a high short-term electric current of over 20 kA is used to heat and melt the metal. The current generates a strong magnetic field in the immediate vicinity of the welding equipment.
Since the welder is standing close to the welding equipment, exposure to magnetic fields can be correspondingly high, thus stimulating nerves and muscle cells in the human body: Therefore, the magnetic field must not exceed certain limit values.
The contribution describes exemplarily the exposure at different types of welding equipment and points out possible measures for exposure reduction.
Exemplarily for two hand held resistance welding guns with different tongs windows the distribution of the magnetic flow density is shown around a spot welding gun as a function of the welding current. Here the results from laboratory measurements and field surveys are presented. Furthermore the results are presented by job analyses concerning the exposition of a welder which can be expected when welding. The different working positions and the distances of the body resulting from it are described to the source of field. At the end of the contribution are represented the results of an EM field simulation. With consideration of real welding tongs geometry and working positions the body current densities as a function of the height of the welding current within the range of the head,

the trunk and in the hands were computed.
The results are to be used for the evaluation of the exposition at spot welding guns the magnetic flow density at the place of the exposition action the VALUES of the EC Directive 2004/40/EC exceed.

THE OCCUPATIONAL HEALTH DEMAND DUE TO ELECTROMAGNETIC FIELD ENVIRONMENTAL SOURCES: THE ISPESL'S EXPERIENCE

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[ID 1526] - *No. 102 in Poster Area*

The exposure to the EMF sources has been mainly treated as an occupational health problem, but it seems to be also an environmental health problem, due to the increasing of the electromagnetic field sources like electric powers and radio-television and mobile communications systems. With regard to this subject, ISPESL often deals with an occupational health demand due to environmental electromagnetic field sources. A lot of requests have been submitted to ISPESL in the last decade due to power lines and radiobase stations close to the workplaces, and also due to the increase in using electromagnetic devices such as the systems to control the entrances in the workplaces. The objective of this study is to investigate the demands get to ISPESL in the last fifteen years on this argument. All the requests related to occupational and environmental health problems due to EMF have been evaluated in order to quantify and qualify the intervention requirements. Their origin has been identified and the demands for environmental monitoring considered. In general more than two thousands demands have been collected. Half of them comes from mobile communication companies, followed by local health units, local/regional authorities, public administrations and schools. The demands were mainly on high frequency EMF systems (radiobase stations and radio television systems) and less on power systems at low frequencies (typically power lines). It has been investigated also where these requests come from, in the Italian territory.
This study shows the need for a integrated approach on treating occupational and environmental exposure to the EMF. In fact, if people and workers are exposed to environmental sources, actually they are submitted to the same restrictions. Under this point of view, the UE directive 2004/40 seems to be not clear on the occupational safety.

EFFECTS OF POWER FREQUENCY ELECTROMAGNETIC FIELDS ON CARDIOVASCULAR SYSTEM

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[ID 231] - *No. 103 in Poster Area*

Recently published studies dealing with a link between exposure to 50 Hz electromagnetic fields (EMFs) and cardiovascular diseases have failed to provide consistent results.
To estimate the risk of cardiovascular diseases in workers exposed to 50 Hz EMFs, different studies were performed.
In a cross-sectional study the study group included 7587 persons who passed periodical medical examination in a regional center of occupational diseases. The prevalence of cardiovascular diseases was investigated. Four experts estimated occupational exposure to 50 Hz EMFs using an absolute scale (from 0 to 5 scores). Experts based their judgment on workers' job titles, as well as information on occupational division and equipment. Both sources of power frequency electric and magnetic fields were taken into account. For each outcome receiver operating characteristic (ROC) curve was used to find out the cut-off point of exposure score scale and convert the scale into the dichotomous variable. Workers with exposure scores above the cut-off point had elevated risk of arterial hypertension (the cut-off point 1,75) - adjusted OR 1,14 (95% CI 1,06-1,23), heart attacks (the cut-off point 2,75) - adjusted OR 1,44 (95% CI 1,03-2,02), and chronic coronary heart disease (the cut-off point 3,0) - adjusted OR 1,3 (95% CI 1,06-1,60) as well.
A case-control study was conducted on the base of four outpatient clinics. Questionnaire was used to collect data on occupational and non-occupational risk factors, special questions on sources of either electric or magnetic fields being included. The same experts estimated occupational exposure to 50 Hz EMFs according to an absolute scale for 35 cases of first ever coronary heart disease, 128 cases of first ever arterial hypertension, as well as 330 controls. As in the cross-sectional study, ROC curves were used to convert the exposure score scales into the dichotomous variables (the cut-off points 0,125 for both outcomes, it means that workers either not exposed to 50 Hz EMFs or with very low possibility to be exposed were compared with those worked with sources of 50 Hz EMFs). Workers, for whom exposure to 50 Hz EMFs was combined with age below 40 and excessive body weight, had an increased risk of arterial hypertension - adjusted OR 3,21 (95% CI 1,37-7,49). Exposure to high level of job stress, as well as 50 Hz EMFs increased the risk of coronary heart disease - adjusted OR 2,48 (95% CI 0,91-6,78).
For another cross-sectional study 113 men employed in an electric company were selected. It was shown that exposure to 20-2000 Hz magnetic fields measured by a personal dosimeter was linked with deterioration of diastolic function of the left ventricle, changes of lipid metabolism, and increase of fibrinogen levels in blood as well.
Conclusions. Results obtained have shown that cardiovascular diseases might be linked with occupational exposure to 50 Hz EMFs.

RADIATION AND WORK

OCCUPATIONAL RADIATION EXPOSURES IN RESEARCH LABORATORIES

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[ID 277] - *No. 104 in Poster Area*

Radioactive sources are widely used in many research activities at University centers. In particular, the activities concerning use of sealed form (57Co in Mössbauer application) and unsealed form (3H, 14C, 32P… in radioisotope laboratories) are analyzed. The radiological impact of these materials and potential effective doses to researchers and members of the public were evaluated to show compliance with regulatory limits. A review of the normal procedures performed by researchers and technicians in the research laboratories with the relative dose evaluations is presented in different situations, including normal operations and emergency situations.
Accidents may be viewed as unusual exposure events which provide possible high exposures to a few people and low exposures to large populations. Because of the wide range and variety of hazards and the numerous possible complicating factors, we cannot examine all possible situations. A fire involving radioactive material can generate airborne contamination hazard, also a larger distance from the release point, with serious effects respect to the consequences of the fire alone.
This fire type can give rise to accidental uncontrolled diffusion of radioisotopes in different forms: work surfaces and floors contamination, atmospheric dispersion and direct gamma exposure.
Based on the mathematical models and computer simulations, a study of the possible exposure to radiation by workers, restricted groups of people, and public in general, as well as environmental releases, is presented. For each radionuclide examined, the spatial and temporal distribution of released radionuclides sources and the effective doses for the workers and for the restricted groups of people are evaluated.
The description refers to specific isotopes only, but methods, analysis and approach can easily however exportable to the other cases and to the occurrence of several accidental situations.

FREE RADICALS AS MARKERS TO MONITOR OXIDATIVE STRESS IN WORKERS EXPOSED TO PHYSICAL AGENTS.

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[ID 719] - *No. 105 in Poster Area*

Free radicals are oxidant (reactive oxygen species, ROS) normally produced during metabolism and strictly controlled by anti-oxidant molecules. In wealthy people there is a good balance between free radicals and anti oxidant. When free radicals in a tissue are not counter balanced with anti oxidant the body undergoes "oxidative stress".

Oxidative stress results in proteins breakdown and DNA damage: this leads to the appearance of degenerative disorders and premature aging. Besides the oxidant anti oxidant unbalance, oxidative stress can also be induced by factors such as carcinogen or ionising radiation. This points out the importance to monitor free radicals in workers professionally exposed to such agents.
The assay used to monitor free radicals in this study has been based on the evaluation of the colour developed in the serum of the donors according to the Fenton reaction. At 505nm the colour developed in the sample is proportional to the concentration of reactive oxygen metabolites (ROMs) according to the Lambert & Beer's low.
Two population of workers were examined: workers working in hospital and workers working in open space (wineyards). The first population was divided in three sub-groups: workers exposed to ionising radiation (radiololgist), workers exposed to physical stress and/or to chemicals (first aid, surgery, oncology). The second population (wineyards) was divided in two sub-groups composed by the same individuals at time zero, in the month of may (not yet exposed to sunlight) and after one month working exposed to UV radiations.
Compared to our reference normal value (250/300 U.C) radiology workers showed an increase in circulating free radicals (>300 U.C). The same results were obtained for the people exposed to UV radiations.
The Fenton reaction test demonstrated to be a suitable and low cost assay to evaluate reactive oxygen metabolites in peripheral blood of worker potentially exposed to oxidative stress.

SIMULTANEOUS IN VITRO EXPOSURE TO HYDROQUINONE AND IONISING RADIATION: SCE AND CHROMOSOME ABERRATION ANALYSIS IN PERIPHERAL BLOOD LYMPHOCYTES

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[ID 1110] - *No. 106 in Poster Area*

Hydroquinone [HQ, C6H4(OH)2], a metabolite of benzene, is a widely used chemical and a potential hazard to humans. Exposure of humans may occur both via the natural (diet, tobacco smoke, cosmetics) and occupational environment. In particular, HQ is a reagent of black and white photographic developer solutions. Therefore, radiologists and X-ray technicians may be exposed both to HQ and ionising radiation. However, until now there is limited data available concerning the combined effect of ionising radiation and chemicals such as hydroquinone.
The objectives of the present study were to investigate (1) the cytogenetic effect of hydroquinone in peripheral blood lymphocytes (2) the combined action of hydroquinone and ionising radiation and (3) the possible action of hydroquinone as a radiosensitizer in donors with different sensitivity to ionising radiation.
The endpoints used are chromosome aberrations and sister chromatid exchanges (SCEs). The cytogenetic methods used are based both on the conventional analysis of metaphase lymphocytes of healthy donors as well as G2-phase prematurely condensed chromosomes (PCCs). The effect of combined genotoxic action of HQ and ionising radiation was examined using the G2-chromosomal radiosensitivity assay. Moreover, flow cytometric analysis was applied to investigate the possible effect of HQ on cell cycle kinetics.
The results obtained demonstrate an additive effect of HQ when combined with ionising radiation in terms of SCEs. In particular, we obtain 2.5±0.1 SCEs/cell after treatment with HQ, 0.9±0.1 SCEs/cell after exposure to ionising radiation and 2.7±0.3 SCEs/cell when HQ treatment is combined with ionising radiation. Moreover, the results obtained a synergistic effect when chromatid breaks are analysed after G2-phase irradiation. Although, there was no statistically significant difference in the number of chromatid breaks/cell after treatment with HQ only, we obtain 3.8±0.5 chromatid breaks/cell after exposure to ionising radiation and 6.2±0.9 chromatid breaks/cell when HQ is combined with ionising radiation.

USING MEASUREMENTS OF COSMIC RADIATION DOSES TO ESTIMATE FLIGHT CREW EXPOSURES

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[ID 1163] - *No. 107 in Poster Area*

Flight crew are occupationally exposed to cosmic radiation at aircraft altitudes. Exposure estimates are needed for epidemiologic studies of flight crew and must be obtained from exposure models since direct exposure measurement is infeasible for historical exposures and large scale prospective studies. We measured cosmic radiation ambient dose equivalent on 37 commercial flights using tissue-equivalent proportional counters and compared the measured doses to equivalent dose estimates for the same flights obtained from the U.S. Federal Aviation Administration computer model CARI versions 4Q. Flight times ranging from 49 to 851 minutes. No major solar particle events took place during data collection. The measured dose equivalents ranged from 0.69 to 65.4 uSv. CARI-4Q model estimates of equivalent dose ranged from 11% to 61% lower than TEPC measurements of dose equivalent. In general less model bias was observed for low latitude and trans-equatorial flights than for high latitude flights. Differences in measured versus modeled data should be considered when estimating doses using a model for epidemiologic studies and correction for bias made where possible. We also evaluated four potential sources of measurement error of ambient dose equivalent which could result in 5-12% differences in the measured ambient dose equivalent. These data can be used to adjust CARI model estimates for epidemiologic studies of flight crew.

BETA RADIATION OCCUPATIONAL EXPOSURE IN NUCLEAR MEDICINE

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[ID 1202] - *No. 108 in Poster Area*

The increasing number of medical procedures using beta radiation sources in Nuclear Medicine requires special attention to extremity doses of radiopharmacy workers in Nuclear Medicine. The workers are potentially exposed to ionizing radiations while the radiopharmaceuticals are being prepared, while they are administered to the patients and while the gamma camera is positioned to obtain the images. During the image acquisition, after the injection of the radiopharmaceuticals, the patients constitute the exposure sources to the workers.
As the gamma dosimetry is already very established, this work aims to develop a wrist dosimeter using detectors of CaSO4:Dy, for beta radiation dosimetry in Nuclear Medicine. Tests were accomplished with the wrist dosimeter prototype during a therapeutic procedure with 153Sm.
The results showed that the nurse auxiliary received a personal equivalent dose (at the skin) higher than the physicist and the biochemist. The nurse auxiliary remains closer to the source during the injection of the radiopharmaceuticals in the patients, without using any additional shield for her extremities, and she stays there during a longer time to administer the injection. It was also verified that the monthly equivalent dose values of the extremities in Nuclear Medicine are underestimated, once only the gamma monitoring of those workers is usually realized. The study showed that the equivalent doses at the skin received by the workers exposed occupationally to 153Sm beta radiation represent the doses received during the handling of this radiopharmaceutical source.

EXPOSURE TO ELECTROMAGNETIC FIELDS ON HIGH FREQUENCY WELDING PRESSES

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[ID 1511] - *No. 109 in Poster Area*

When tackling the problem posed by exposure to electromagnetic fields for industrial workers, and more particularly those working on high frequency welding presses, it is necessary to consider the environment of occupational physicians who have to make decisions regarding job skill, either at recruitment, during regular medical check-ups or under specific circumstances.
The physical measurement centre in Ile de France was asked to measure the electromagnetic fields for a company manufacturing fancy-leather

plastic goods. The work stations were equipped with high frequency welding presses (27.1 MHz) and there were electric cutters near each press.
The measured values were 50% above those recommended by the International Commission on Non-Ionising Radiation Protection (ICNIRP). The employer was provided with solutions to comply with the required standards, including placing radiation shielding around the welding area and displaying warning signs.
Occupational physicians responsible for monitoring the health of employees using high frequency presses must bear in mind the following cases: people fitted with active implants, pregnant women, employees with particular diseases and those who have been over-exposed.
Occupational physicians are well placed to answer employees' questions about electromagnetic fields in the work place, since they know the techniques used and are aware of the effects of machines on health. This work station report focuses on the difficulties encountered when measuring electromagnetic fields. The results observed have revealed the need for preventive measures.

BYSTANDER EFFECT AND ADAPTIVE RESPONSE IN THE EXPOSITION TO LOW DOSES OF IONIZING RADIATION. IS IT A PROTECTIVE SYSTEM?

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[ID 2264] - *No. 110 in Poster Area*

In the last decade some effects of exposure to low doses of ionizing radiation have been highlighted, especially the "Bystander effect" (BE) and the "Adaptive response" (AR). The first is the transmission of cell's damage, due to radiation exposure, to non irradiated neighbours; the second is a cellular radio resistance induced by irradiation with low doses of ionizing radiation. The two effects are chancing our knowledge on biological damage of human tissues after irradiation to low doses of ionizing radiation. The opinion of the most researchers, ICRP included, of a linear no-threshold dose for stocastic effects on human is questioned.
Apparently the two effects are in contrast because of while Bystander effect theoretically is an expansion of the radio-induced damage, Adaptive response seems to have a protective action against irradiation. Many researchers connect the two effects like two aspects of the same phenomenon. BE and AR in fact are linked together because they have the same chemical mediators, they don't appear after exposition to high doses and if AR appears there isn't any BE. The author, after examination of the physiologic aspects of the two effects, hypothesizes that both are part of an homeostatic system of radio protection evolved to shelter biological tissues by action of natural found of ionizing radiation.

OCCUPATIONAL HEALTH FOR HEALTH CARE WORKERS

ADHESION FROM THE WORKERS OF HEALTH TO THE EXHIBITION PROTOCOL TO THE BIOLOGICAL FLUIDS: PROBLEM LIVED IN THE WORKER'S UNIT HEALTH, IN THE HOSPITAL OF THE WORKER FROM UFPR-BRAZIL

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[ID 51] - *No. 111 in Poster Area*

The Ministry of Health of Brazil established a protocol of procedures for the workers' of monitoring health that get injured with biological fluids seeking to avoid that these develop diseases, as AIDS and the Hepatitis. This study intends to characterize the injured workers' profile with biological fluids and to analyze the adhesion to the established protocol. It is characterized as epidemic, of cohort and quantitative. The data were captured in the injured workers' reports, in the Worker's Health Centre, of the Worker's Hospital, Brazil, through the Record of Attendance of Accident with Biological Material and of the Register of Emergency. 491 reports were analyzed of April to December of 2004. The analysis of the data allowed to verify the total of the 491 workers, the great majority belongs to women (80,4%). the most exposed age group was from 21 to 25 years (25,8%). the most incident category was among the nursing auxiliaries (46%), following by the workers that develop the hospital cleaning (12%). The accidents happened due to the exhibition to the sharp pointed instruments (88,6%) and splashes in the eye membrane (11,4%). In relation to the adhesion to the protocol, we apprehended that 35,6% of the workers returned in the second consults, after 30 days of the accident; 21% in the consultation of 90 days and only 10,2% of the workers completed the monitoring protocol in the Clinic. Summing up this study shows the workers' difficulty in the adhesion to the monitoring protocol of exposition to the flowed corporal and the great possibility of they come to develop serious health problems. That indicates the need of development of strategies that make it possible, as well as to prevent the exhibition of the workers of health to these risks, as better the answer of the injured workers to their health monitoring.

OCCUPATIONAL EXPOSURE TO THE HEALTH CARE WORKERS TO ORGANIC FLUIDS

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[ID 145] - *No. 112 in Poster Area*

The aims to verify the characteristics of workers and occupational accidents, evaluate the adhesion to chemoprophylaxis and controls tests and following after occupational accident with risk of human immunodeficiency virus contamination, hepatitis B and C virus. This is a descritive epidemiological study which data was collected from notification occurred in a region the Health State Secretariat of São Paulo, Brazil, between 2000 and 2001. It was noticed that 7,3% of chemoprophylaxis against human immunodeficiency virus by antiretrovirals was refused. And 40,6% of the workers who accepted the chemoprophylaxis did not complete the treatment in the four weeks stimated period. In the prophylaxis against hepatitis B 72,8% of the pacients had received three doses of vaccine before the accident. In the serologic follow up of the pacients, 24% of the care workers did not finished the necessary tests to analize in the sixth month after the accident. Through this diagnosis there is the necessity from the institutions to establish strategies that make it possible an increase in the adherence of health workers regarding their care.

PERSONALITY AND WORK-RELATED EXPERIENCE AND BEHAVIOR PATTERNS AMONG HOSPITAL PHYSICIANS IN POLAND

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[ID 387] - *No. 113 in Poster Area*

The personal and organizational strains associated with job burnout and more generalized psychiatric morbidity affect doctors' well-being and his/her relationship with patient outcomes. An analysis of dispositional factors and coping resources leads to early identification of health risks – burnout symptoms or other consequences of chronic stress.
The aim of this study was to explore the role played by the physician's personality traits in individual coping patterns with professional demands and stress.
Methods:
The research sample comprised 343 Polish hospital doctors of five specializations: surgeons (N = 69), psychiatrists (N = 70), anesthesiologists (N = 64), clinical radiologists (N = 61) and palliative care physicians (N = 79). They filled up the personality inventory NEO-FFI, and Occupational Stress and Coping Inventory *AVEM*.
Results:
There are personality traits that differentiate physicians in the various specialties. There was a significant difference (p<.004) in four of five personality traits: Neuroticism, Extraversion, Openness to Experience and Conscientiousness between doctors.
The groups of physicians differed from each other significantly on their individual ways of coping. The frequency of the Risk Pattern B (*burnout/resignation*) was more common among anesthesiologists (34%).
Risk Pattern A (excessive ambition and exhaustion) was statistically more often observed in surgeons (50%) than in other groups of doctors. The largest degree of Protection Pattern S (inner balance, satisfaction) was demonstrated by Psychiatrists (27%).

Moreover, it was proved that individual coping patterns correlated significantly with four of the five personality dimensions, three of which showed independent effects in a multiple regression.

Conclusions:

Identification of personality traits in physicians has potential implications for selection of trainees, assessment of coping patterns and may have a role in analysis of professional activity. Typology as suggested by the AVEM can be used as an indicator for personal preconditions that may in turn determine health risks associated with medical specialization.

BURNOUT AND MENTAL HEALTH AMONG DENTIST: JOB STRESS-RELATED NEGATIVE OUTCOMES

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[ID 388] - *No. 114 in Poster Area*

Dentists are faced every day with many stressors that must be identified and managed in the early stages before serious physical and psychological consequences develop.

Objectives

The aims of this research were to identify the work-related experience and behavior patterns and to assess the prevalence of burnout and psychiatric disorder among Polish dentists.

Methods

The study population comprised 71 Polish dentists (43 women, 28 men). They filled up the Occupational Stress and Coping Inventory (AVEM), General Health Questionnaire (GHQ-12), Maslach Burnout Inventory (MBI).

Results

The main results indicated that:

(1) most dentists (39%) tended to use the Risk Pattern A – characterized by excessive commitment, striving for perfection and ambition, on the one hand, and excessive exhaustion and diminished resilience, on the other; men used this risk pattern more often;

(2) risk Pattern B (*burnout/resignation*) was more often displayed by women than men ($p<.02$) and significant positively correlated with all three dimensions of burnout and with psychological distress;

(3) Over 35% of the doctors have high scores on emotional exhaustion, whereas 15% respondents demonstrate both high levels of depersonalization experience and low personal accomplishment;

(4) 30% of dentists reported significant psychological distress and this is similar to the rate among Polish doctors of another specialization, but above average for the general population;

(5) GHQ-12 score was positive associated with the emotional exhaustion and sense of reduced personal accomplishment. Conversely, depersonalization was negatively correlated to psychological distress - presumably through an ego-defense mechanism;

(6) dentists who felt insufficiently trained in communication and coping skills had significantly higher levels of distress and burnout pattern B than those who felt sufficiently trained.

Conclusions

It is hoped that this research will raise awareness and positively impact on the individual dentists' level of self-care, clinical practice and facilitate the development of intervention for burnout and emotional distress.

QUANTIFERON-TB AND TUBERCULIN SKIN TEST IN THE SCREENING OF HEALTH CARE WORKERS DURING A HOSPITAL TRANSMISSION OF MULTIDRUG-RESISTANT (MDR) MYCOBACTERIUM TUBERCULOSIS

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[ID 396] - *No. 115 in Poster Area*

Objective. Health care workers (HCWs) are at high risk for latent *M. tuberculosis* infection (LTBI) and tuberculosis (TB). Risk assessment and tuberculin skin test (TST) screening for LTBI in occupational contacts are recommended. However, interpretation of TST results can be difficult in not naïve high risk groups. Quantiferon (QFT)-TB test, a blood interferon-gamma (IFN-γ) assay, has been shown as a method for LTBI detection among high risk individuals. The aim of this study was to compare TST and QFT results and to evaluate the association with exposure in HCWs investigated as recent contacts of an infectious index case (IC) with multidrug-resistant TB.

Methods. HCWs were evaluated for demographic, community and workplace factors, and underwent both TST and QFT administration 3 months after contact.

Results. The HCWs [n=41, Caucasians 100%, age 37±9 yrs, years of employment 11±9 yrs, BCG vaccinated 44%, previously TST positive 19%, work history in units at TB risk 32%] showed a brief close exposure to IC [31±22 minutes (min)]. TST response identified 5 infected workers (4/5, 80% QFT positive). TST and QFT positive results were obtained in 11/41 (26.8%) and 10/38 (26.3%) individuals, respectively [kappa test 0.69 ($p<0.00$)]. Both tests were significantly associated with a history of work in units at TB risk [QFT (OR=5.50), TST (OR=7.00)], but with any other factor (i.e., age, years of employment, job title, BCG vaccination, past contacts with TB cases, number of previous TSTs). Trend for association with the longer exposure to IC (60-90 min) was shown only for QFT [QFT (OR=3.57), TST (OR=1.44)].

Conclusion. QFT results showed good agreement with TST and statistical trend for association with the longer exposure compared to TST. These results indicate that QFT may represent a more risk-associated marker of LTBI than TST and suggest the opportunity to use both tests in surveillance programs.

MONITORING THE HEALTH OF NURSING WORKERS IN BRAZIL

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[ID 519] - *No. 116 in Poster Area*

Nursing workers total 854.200 but they are insufficient for the health assistance needs for 184.000.000 Brazilians. The health problems occurred in this job result in high absenteeism and often medical licenses. The studies about this theme have indicated that there is large the exposition to workloads. These workloads submit the workers to strain processes and they imply in intervention needs. This study aims to diagnose these health problems in university hospitals and to base a proposal for a health surveillance system for these workers. The population of study was 1.637 workers. The data were collected in a hospital in the North and another one in the South region of the country by focus group which is compound with workers to discuss the problem and to suggest ideas. The data were introduced in an electronic date base for analysis. The results showed that the majority of workers are women, they are between 25 and 45 years old and they are working in nursing more than 10 years. They are exposed to many kinds of workloads such as biological, physical, chemical, mechanical, physiological and psychic in different work situations. About 90% of work accidents are caused by sharp instruments and 10% are caused by bones and muscles problems. The workers also report as strain process: infective and infectious diseases (B and C hepatitis, AIDS, tuberculosis, influenza, conjunctivitis, urinary infection, gastroenteritis, pneumonia); back pain and other bones and muscles problems job related diseases, venous diseases, allergies, burns, decrease of auditory acuity, high blood pressure, metabolic diseases, chronic headache, stress, depression, fatigue, anguish and behavior disturbs. The results are being entered in the informatics health surveillance system and it allows for monitoring the health problems and the exposition of workloads. It also allows for establishing the interventions for better work conditions and quality of life.

ALLERGIC SYMPTOMS IN HEALTHCARE WORKERS AND ORTHO-PHTHALALDEHYDE CONCENTRATION IN AIR OF THE ENDOSCOPY UNIT

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[ID 681] - *No. 117 in Poster Area*

Introduction

Recently, the use of oltho-phthalaldehyde (OPA) is increasing as an alternative of glutaraldehyde (GA) for endoscope disinfection. Since the vapor pressure of OPA is much lower than that of GA, air concentration of OPA much lower than GA meaning safer microbiocidal agent than GA. However, we found development of allergic disease in workers engaged in endoscopy unit. We report here the results of health examination of the workers

and the work environmental measurement of the endoscopy unit.
Materials and Methods
OPA was introduced as a substitution of GA in March, 2003. After we found a patient with dermatitis who was working in an endoscopy unit, we performed non-periodic health examination for 70 workers who had opportunities to be exposed to OPA in October, 2004. After OPA in air of the endoscopy unit was sampled for 30 min using DNPH-silica cartridge, the hydrazone derivative of OPA was desorbed from the cartridge with 2 ml acetonitrile and analyzed by HPLC-UV at 365 nm.
Results
Subjects of the medical examination were 53 nurses, 13 medical assistants and 4 medical technologists. Their OPA exposure duration was 1 year 7 months. Seventeen workers had experienced skin, respiratory or eye symptom. Allergic dermatitis was occurred in 5 workers and one of them developed asthma. Eye injury was occurred in one worker. All of six workers were treated as industrial injuries.
OPA concentration in air of the endoscopy unit ranged from 0.06 to 2.01 ppb. The highest OPA concentration was obtained during a cover of a bucket for soaking endoscopic equipments opened.
Conclusion
This survey revealed that in spite of very low level of OPA in air, sensitization and irritation of skin and respiratory tract were occurred. Wide spread use of OPA as substitution of GA may hold serious health risk for workers. To prevent hazards from OPA exposure in medical field, use of closed-system and fully automated washing machines for endoscope equipments is recommended.

OCCUPATIONAL HEALTH FOR HEALTHCARE WORKERS IN THAILAND

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[ID 721] - *No. 118 in Poster Area*

Background: Thai population mostly get their health services at the Ministry of Public Health hospitals located throughout the country. Recently, existing of SARS and Avian Influenza, and re-emerging of TB seem to be obvious occupational health hazards for healthcare workers in Thailand. Therefore, promotion of recognition on occupational health for healthcare workers becomes more essential for these workers. Objective of this study was to evaluate current situation of occupational health programs provided for healthcare workers.
Methodology: Questionnaire concerning occupational health (OH) programs for healthcare workers had been distributed to responsible unit for occupational health in hospitals under the Ministry of Public Health. In-depth interview had been conducted in some hospitals encountered problems in provision of OH programs.
Results: The ministerial policy on establishment of occupational medicine work group for responsible of provision of OH programs and services, has been promoted in every provincial and general hospitals. Data from this survey showed that most hospitals have already established OH programs for their healthcare workers. Only 3.4% of target has encountered their internal managerial problems in set up the OH policy and programs. Determination of in-house OH policy, participation of internal and external parties, OH capacity building, higher-level supervision, in-house public relations, and information system were required for strengthening of the OH programs. Additionally, there are Hospital Accreditation and Health Promoting Hospitals programs that include OH programs for healthcare workers as an accredit element of the program. Most hospitals including provincial and general hospitals, community hospitals, and private hospitals also participate to these programs, which help ensuring the safety and health at work of healthcare workers.
Summary: Occupational health programs for healthcare workers becomes more essential since healthcare workers are core personnel for provision of OH services to other groups of workers, meanwhile, they are facing number of OH hazards.

EVOLUTION AND EVALUATION OF VOCATIONAL REHABILITATION FOR OCCUPATIONAL NURSES IN A FRAMEWORK OF A COMPREHENSIVE WORK ABILITY MODEL

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[ID 996] - *No. 119 in Poster Area*

The Social Insurance Institution of Finland organizes vocational rehabilitation (VR) for employees who are under the risk of impairment of work ability (WA) (early rehabilitation) or whose WA has impaired due to diseases (WA improving training). Several RCs conduct VR courses which consist of several periods of 5 to 12 days during one or two years.
VR courses for occupational nurses (ON) has been organised since 1997 in Kiipula RC. The development of the comprehensive WA model (Ilmarinen et al) at the Finnish Institute of Occupational Health has had a remarkable influence on the evolution of these courses. The model is illustrated by a metaphor of a house. The first floor comprises of individual's health and the second floor of professional competence. The third floor, i.e. personal values, attitudes and motives, mediates between the employee's personal characteristics and the characteristics of work and work community (fourth floor). The stability of the roof, i.e. employee's WA is dependent on every floor of the house, and the social environment, e.g. family and friends, as well as the financial conjunctures, cultural values and legislation have an influence on the house. Participants of the courses visit in every floor and the time spent in each floor depends on the needs of the participants.
Evaluation: The first floor has shown to be important even for health professionals. Most of the time ON spend, however, in the forth floor discussing and studying the work characteristics and the changes in work demands, both their own and their clients'. The personal values (the third floor) seem to be a key factor in interpreting WA and formulating future intentions. This is a great challenge for VR courses as well as for professionals in occupational care.

EXPOSURE TO ETHYLENE OXIDE AT WORKERS HEALTH. VALENCIA. VENEZUELA. 2004.

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[ID 1430] - *No. 120 in Poster Area*

In this descriptive cross-sectional study, the risks of the workers health to ethylene oxide exposure were analyzed in 3 Clinics and 1 hospital type IV of Valencia, was applied to an occupational survey to 80 subjects and 20 controls, all volunteers and with informed consent, distributed in 67 nurses, 13 technicians in infirmary and 12 waiters; who referred abortions in a 37.3% (25 women of 67), loss of memory (75 %), headhache (55 %), sickness (52,5%), parestesia (36,25%), itch (88,46%) epigastralgia (43,75%), face eritema (66.11 %), among others, which agrees with the symptoms reported by universal Literature concerning Ethylene Oxide toxicology; The results were grouped in tables of frequency allocation and the percentage, averages and standard deviation were determined. They were statistically analyzed by means of the test of t of student, chi square; the values of hemoglobina in blood were found low in 5 of the exposed women, with respect to the control group (VN: 12-14 ug/dl). Ignorance on the exposure to chemistry, legal use of equipment of personal security and aspects was significant. Wear appropriate personal protective clothing to prevent skin contact, and eye protection to prevent eye contact should be required,in the same way, working environmental control and occupational hygiene management should be required. The toxicológica card (MSDS) use sets out for the security handling of ethylene oxide.
Keys word: Oxide Ethylene, Works health, toxicologycal cards.

PREVENTION OF TUBERCULOSIS BY HEALTH CARE WORKERS

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[ID 1510] - *No. 121 in Poster Area*

Aim: The infections of tuberculosis is the most frequent infectious disease worldwide. The incidence of tuberculosis has increased every year by 0,4 %. In Germany, tuberculosis is the third frequent work related infectious disease in health care workers. Every year 180 tuberculosis diseases are registered as an occupational disease.
Method: We examined 38 employees working in a home care institution in Berlin. The study included a standardized questionnaire about the tuber-

culin status as well as BCG vaccine, a clinical examination and tuberculin test were carried out.
Results: 39,5 % of the interviewed persons reported a negative tuberculin status, 15,8 % a positive one and 44,7 % an unknown tuberculin status. The last test took place between one year and twenty years in the past. We use a Prick test in 76,3 % of the employees, which showed a positive reaction in 7,9 %, without showing signs of tuberculosis on the x-ray radiograph of the thorax.
Conclusion: Our results show that the last tuberculosis-test of the employees was carried out several years in the past. However, tuberculosis infection, was not found in our population. The mycobacterium tuberculosis and bovis are classified as 3rd risk group in the technical rules for biological work substances. For Employees who have an elevated risk of an infection with tuberculosis due to their occupation, preventive medical checkups (Anhang IV, §15a Abs. 1, BiostoffV) as well as special hygiene measures with contaminated materials are mandatory.

PHYSICAL WORK LOAD AFFECTS THE MAXIMUM OXYGEN UPTAKE - A LONGITUDINAL STUDY-

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[ID 1602] - *No. 122 in Poster Area*

Purpose: Maximum oxygen uptake ($\dot{V}O_2max$) is known to be influenced by life-style factors, such as exercise and smoking. We aimed to further test the hypothesis that, besides these, work form also contributes to increase O_2max among workers.
Subject&Method: 799 male workers with age 37.1±10.6 and 395 female workers with age 37.7±10.5, ranging from 20-years old to 59-years old, who participated in Total Health Promotion Plan at workplaces in Fukui, Japan from 1997 to 1998 were selected; those whose work form, exercise habits, and smoking factor did not change from the first year to the second year.
Data on o_2max were analyzed for age, systolic blood pressure (SBP), body mass index (BMI), work form (sedentary, standing or ambulatory), exercise, and smoking.
Results: Multiple regression analysis showed that work form ("ambulatory"), and exercise habits might increase $\dot{V}O_2max$ for one year while $\dot{V}O_2max$ in base line, ΔBMI for one year, BMI in base line, and age might decrease $\Delta\dot{V}O_2max$ for one year in male participants. In females O_2max in base line BMI in base line, and age might decrease $\Delta\dot{V}O_2max$ for one year.
Conclusion: After adjusting for age, BMI, SBP, exercise, and smoking, it was suggested that the physical work load, represented by the work form, may contribute to increases in $\Delta\dot{V}O_2max$ for one year in males.

SHIFT WORK AND THYROID DISORDERS AMONG HOSPITAL WORKERS

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[ID 1652] - *No. 123 in Poster Area*

Introduction. Shift work represents an important risk factor for several disorders. In particular, thyroid disorders have been recently reported with increased frequency among workers with nocturnal shifting. This kind of shifting is particularly common among workers of the Health System.
Aim of the study. Aim of the study is to assess the frequency of thyroid disorders among 147 shift workers of a large teaching hospital.
Material and methods: Physicians, nurses, and technicians working in shifting, seen at our center during January-June 2005, have been included in the study. The following procedures have been performed in all subjects: medical history, physical examination, and serological evaluation of TSH, FT3, FT4,, antibodies against thyreoglobulin (Ab anti-TG) and against thyreoperoxidase (anti-TPO). The threshold for abnormal TSH level was 4.22 U/ml, and for abnormal anti TPO levels was 60 IU/ml. Exclusion criteria were: history of thyroid disorders, more than 60 years of age, contraindication to shift working. 233 workers at the same hospital, not included in shifting, were chosen as controls. The same exclusion criteria used for shift workers were applied to this group.
Results: Among clinical and demographic characteristics, female sex was more frequent in shift workers; the mean age was lower in shift workers in comparison to controls (32.46 vs 35.02) years. Overt autoimmune hypothyroidism was more common in shift workers (3.4% vs 1.7%; $p<0.05$), as well as TSH serum increase not associated with anti-thyroid antibodies (9.5 vs 2.1 %; $p<0.01$); similarly, serum increase of anti-thyroid antibodies not associated with TSH serum increase was more commonly found in shift workers (14.2% vs 9.8%; $p<0.05$).The differences were more marked in males than in females.
Discussion and conclusions: In this study, we found more thyroid alterations in shift workers than in controls. However, most differences were subclinical, and their relevance remain unclear. Further studies, including a larger sample of subjects, and a morphological evaluation of the gland, are needed).

A CASE AND CONTROL STUDY OF PLEURAL MESOTHELIOMA IN MEXICAN SECURITY INSTITUTE-AFFILIATED WORKERS

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[ID 1790] - *No. 124 in Poster Area*

INTRODUCTION. In Mexico, the study of cases of MPM and its relationship with exposure to asbestos is a high-priority public health problem due to the fact that cases of MPM have tripled in incidence from 1998–2000. **OBJECTIVE.** To identify the association between cases of MPM and the category of occupational exposure to asbestos in workers affiliated with the Instituto Mexicano del Seguro Social (IMSS) and to calculate the proportion of these cases that were occupation-attributable. **METHODS.** A case-control study of MPM in IMSS-affiliated workers at two IMSS hospitals that concentrated oncologic care in the center of the country from 2004–2005 was carried out. An occupational and environmental questionnaire was applied to study participants. The job history, evaluated by a panel of experts in Industrial Hygiene, was characterized by asbestos exposure at four levels: definitive; probable, possible and not exposed. Univariate, bivariate and logistic regression analyses to calculate odds ratios (ORs) took place. **RESULTS.** Analysis involved 47 cases of MPM and 93 controls. The cases had a mean age of 61±11.3 years; range, 42–87 years, while controls: 65±10 years, range: 41–87 years. ORs in logistic regression by exposure level and sex-adjusted were as follows: definitive, 55.7 (95% CI: 14,221.3); probable = 9.8 (95% CI: 2.7–35.4), and possible, 18 (95% CI: 3.3,96.5). The diagnostic model demonstrated that 81.43% were correctly classified. **DISCUSSION.** Association of MPM and exposure to asbestos was confirmed, and OR increased according to the certainty of work exposure. A total of 57.4% of cases were attributable to an occupational exposure to asbestos. These results provide information, and ban the use of asbestos as the only way to prevent effects in Mexican worker population and the consequent economic impact of these effects on society and the State.

MEASUREMENT OF SURFACE CONTAMINATION FROM ANTINEOPLASTIC DRUGS AND BIOLOGICAL MONITORING FOR ASSESSMENT OF THE ADEQUACY OF PREVENTIVE MEASURES IN ONCOLOGIC HOSPITAL DEPARTMENTS.

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[ID 1833] - *No. 125 in Poster Area*

Exposure of hospital staff to hazardous antineoplastic drugs (ANDs) is a peculiar field of occupational hygiene and medicine of healthcare workers. To correctly assess the health risk associated to manipulation of ANDs in hospital premises and to rationally advice intervention priorities for exposure abatement, reliable quantitative information on the exposure levels and a wide-scope interpretative framework for data management are mandatory.
We present results from a decade of measurements of surface contamina-

tion from ANDs drugs performed in the oncology departments of general hospitals in Milan with the use of original sampling and analytical methods allowing to detect surface contamination in the 5-10μg/m^2 range. Our interpretative framework allows: *(a)* to trace the source of contamination mainly in the manual transport of spilled drug traces on the surface of containers such as bottles and infusion bags, rather than from dispersion of aerosolized drug solutions; *(b)* to quantitatively assess the extent of drug dispersion as being proportional to the amount of processed drug; *(c)* to quantitatively monitor over time the constant efficiency of preparation and manipulation protocols with regard to personnel safety, to assess the efficacy of modifications and to compare the effectiveness of the procedures applied by the different hospitals.
What can be derived from our data, as well as by other in the literature, is that large and consistent reduction of the contamination of workspaces, itself a prerequisite to personnel exposure, could be achieved by enforcement of detailed requirements for preparation and administration of AND. These include pressure towards centralization of AND preparation in dedicated pharmacies with definite layout and equipment, the establishment of working procedures for drug manipulation within safety cabinets and with the use of tailored equipment and personal safety devices by specially trained personnel, followed by systematic decontamination of workspaces.

ORGANISING BASIC OCCUPATIONAL HEALTH SERVICES FOR CHINA

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[ID 1932] - *No. 126 in Poster Area*

China has a workforce of about 740 million of whom 370 million (50%) work in the primary sector, 158 million (21.4 %) in the secondary sector, and 211 million (28.6 %) in tertiary sector. The rapid growth and parallel occurrence of traditional and new safety and health hazards constitute a great challenge to OHS policies and practices. Special problems are faced with 60 000 coal mines and the 160 million mobile rural workers who migrate to urban areas to seek for employment, mostly in construction sector.
Despite of positive trends during the past years, the burden of occupational diseases and accidents still is high. A total of 580,000 cases of pneumoconiosis have been detected, with over 10,000 new cases on a yearly basis. Nearly 140,000 persons have died of pneumoconiosis. Some one million occupational accidents are reported leading to about 136 000 deaths annually (including road traffic accidents), and 700 000 disabilities. About 6000 miners have been reported to die annually in mining accidents. The 10th five-year development plan of the Government of China for years 2001-2006 contains several targets which have an impact on work life. As a part of this strategy the legislation on prevention and control of occupational diseases and a new work safety act as well as an act on insurance for occupational accidents and diseases have been passed and are in the stage of implementation.
China has in collaboration with WHO, ILO and ICOH introduced Basic Occupational Health Services, BOHS as a model for practical OHS development. The BOHS was included as element in the National Programme for Prevention and Control of Occupational Diseases and in the National Programme for Occupational Safety and Health. The practical implementation of the BOHS at the local level will be piloted in selected provinces of China and the necessary support services will be organised appropriately. The piloting also includes a preparation of a local profile on occupational health and intensive training of trainers and training of services providers programs. After the pilots have been completed an evaluation will be made to design the BOHS model which is feasible to China.

PSYCHO-SOCIAL FACTORS, BURNOUT SYNDROME AND CLINIC MANIFESTATIONS IN PHYSICIANS OF PRIMARY LEVEL OF ATTENTION, GUADALAJARA, MEXICO.

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[ID 1418] - *No. 127 in Poster Area*

The amount of labor factors of risk to which some workers are exposed, combined to them the presence of extra-labor variables, cause that the individual get stressed. The most well-known pathology by this stress, is indeed the Burnout Syndrome. This Syndrome is a set of signs and symptoms derived from a progressive and gradual process to negative stressors that are present in the labor area. Those stressors cause that the individual feels failed, worn out, exhausted, tired, dehumanized, and depersonalized. The objective of the study was to analyze the presence of negative psycho-social factors in the labor area, Burnout Syndrome and the repercussions in health in the familiar physicians of the primary level of attention, Guadalajara, Mexico.
In order to analyze that was proposed, a questionnaire of labor and socio-demographic data was used. This questionnaire included the variable "You have had annoyances and/or illness in the last six months"; besides to apply the Guide of Identification of Psycho-social Factors (IMSS, 1986) and the scale of Maslach Burnout Inventory (MBI).
197 familiar physicians were included. The prevalence found on the Burnout Syndrome, was of the 42.3%. The 64,8 % (81 individuals) expressed to be patients, themselves The most frequent diseases were: the muscle-skeletal ones (20%), respiratory (19.2%), gastrointestinal (18.3%) and the psychological ones (15.2%). Several reagents as much of the MBI as the guide of Identification of Psycho-social Factors were associated with the development of the disease, with values of p< to 0.05.
There was relation between almost all the reagents of the syndrome with the gastrointestinal diseases, cardiovascular, neurological and psychological, but the dimension that behaved as factor of risk towards the development of the disease was the "emotional exhaustion". Seemed to the previous associations with burnout, muscle-skeletal disease were associated above the presence of negative psycho-social factors.
It is to be taken into account the results, since they are indeed the physicians who take care of the patient in the first intention. The accomplishment of proposals focused towards the prevention of the Syndrome and of treatment for those who already suffer it, becomes necessary.

INJECTION PRACTICE AND RISK FOR HEALTH CARE WORKER' HEALTH IN SOME SELECTED HEALTH CARE SETTINGS IN HANOI

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[ID 1262] - *No. 128 in Poster Area*

INTRODUCTION: According to the World Health Organization, unsafe injection has become common in many countries and is the major transmission route of blood-borne pathogens such as Hepatitis B (HBV), Hepatitis C (HCV), and HIV. This raised a new occupational threat to health care workers (HCWs), especially in developing countries where equipment, technology and sanitation are in a limited condition.
AIMS: To investigate the actual status of injection practice of HCWs in order to identify common unsafe practices and risks of occupational needle-stick injury.
METHODOLOGY: With cross-sectional study design, 419 observations on injection practice and 656 questionnaire interviews on HCWs were implemented in 2 governmental hospitals (1 in urban, 1 in rural area) and 1 private hospital in Hanoi. Collected data were analyzed by STATA 8.0 software.
RESULTS: The results showed that good practices of injection included almost all HCWs were equipped with personal protective equipment (89.9 - 98.6%) and sharp containers (84.1-94.5%), using sterilized disposable syringes and needles for injection (93.9-97.6%), preparing injections in a clean designated place (91.4-98.8%), giving injection as prescription (100%), isolating needles and syringes in sharp containers (89.0-96.6%). However, there remained some poor practices such as standard safety boxes were not applied widely (short in number and quality), no washing hand before and after injection (44.8-58.3%), and two-hand recapping (6.9-26.4%).
CONCLUSION: Safe injection is an emerging problem for HCWs in Vietnam and it raises a big threat to occupational NSI and risk of blood-borne pathogens transmission.
RECOMMENDATION: Some recommendations were made for reducing unsafe injections and prevention of needle-stick injury for HCWs.

ORGANIC DUSTS

DETERMINANTS OF (1→3) β-*D*-GLUCAN EXPOSURE IN GRAIN HANDLING

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[ID 1007] - *No. 129 in Poster Area*

During grain handling, farmers are exposed to grain dust containing multiple microbial components. One group of such components is glucans, major carbohydrate constituents of fungal cell walls and some bacterial and plant cell walls. Glucans activate the proinflammatory and immunoregulatory intracellular signalling pathways leading to cytokine expression in mammalian cells. It is therefore important to map the glucan exposure and possible determinants in grain production practices, which is the purpose of this study.

Personal sampling of airborne grain dust (n=113) was carried out on 92 farms in 3 climatically different regions in Norway during threshing and storage work in 1999 and 2000. Information of grain production practices of relevance for mould growth was obtained through personal interviews of each farmer. The concentration of (1®3) β-*D*-glucans in the airborne grain dust was measured by EIA, whereas mould spores and the presence of hyphae were quantified by SEM.

Glucans were found in all the samples, whereas 96% of the samples contained spores and hyphae. The concentration of glucans was median 160 μg/m³ (range 1-6 200), whereas the concentration of mould spores and hyphae was median 4.2×10^6 spores/m³ (range 0-5200) and median 0.5×10^6 arbitrary units/m³ (range 0-199), respectively. Glucans were strongly correlated with mould spores ($r=0.7$, $p<0.01$) and hyphae ($r=0.6$, $p<0.01$), but also to inhalable dust ($r=0.9$, $p<0.01$), that predominantly explained the glucan exposure variability as assessed by linear regression analysis ($R^2=0.7$, $p<0.001$). The individual contribution of mould spores and hyphae was hard to identify due to strong mutual correlations. The glucan exposure was correlated with storage work ($p<0.001$) and handling barley ($p<0.02$), whereas visible mould damage of the grain on the field was associated with increased concentration of airborne glucan during later work with the damaged grain.

Frequent observation of hyphae indicated that hyphae may be important exposure factors that should be included in bioaerosol exposure studies. Correlation analysis suggested that both spores and hyphae can be important for glucan exposure, but the dust overrode their predictive effects. As a substantial amount of glucans probably was grain-derived, glucans should not be used as fungal exposure markers in grain handling, but the grain-derived glucan should rather be included in health effect considerations of inhaled glucans.

HIGH DUST AND BACTERIAL ENDOTOXIN EXPOSURES IN POULTRY PROCESSING - A RESPIRATORY HEALTH RISK?

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[ID 1517] - *No. 130 in Poster Area*

Background: Occupational exposure to organic dust and bacterial endotoxin is a recognised risk factor for respiratory symptoms including (non-allergic) asthma, chronic bronchitis and COPD. Workers in several industries are known to experience high levels of dust and endotoxin exposure, however little data on exposures in the poultry processing industry has been reported. The aim of this study was to assess exposure among these workers, and to test the effectiveness of extraction ventilation.

Methods: Full shift personal exposure to inhalable dust and bacterial endotoxin was assessed, using PAS-6 sampling heads. Dust levels were calculated by gravimetric analysis, while endotoxin levels were analysed using a kinetic chromogenic limulus amoebocyte lysate (LAL) test.

Results: Forty four samples were analysed. Dust levels observed ranged from <0.08 to 30.2 mg/m³, with a geometric mean (GM) of 2.08 mg/m³ and a geometric standard deviation (GSD) of 4.63 mg/m³. Endotoxin levels ranged from <2.0 to 18,416 endotoxin units (EU)/m3, with a GM of 139.60 EU/m³ and a GSD of 23.83 EU/m³. The highest dust exposures occurred in the hanging bay in the slaughterhouse (GM=7.12 mg/m³, GSD = 2.67 mg/m³) and the takeoff in the hatchery (GM=12.28 mg/m³, GSD=2.09 mg/m³), while the highest endotoxin exposures were in the hanging bay (GM=3165 EU/m³, GSD=3.77 EU/m³) and in the takeoff (GM=918 EU/m³, GSD=1.31 EU/m³). Extraction ventilation at the hanging bay reduced exposure to dust from GM=21.4 mg/m³ (GSD=1.45 mg/m³) to GM=3.7 mg/m³ (GSD1.51 mg/m³), and to endotoxin from GM=14,198 EU/m³ (GSD=1.11 EU/m³) to GM=1,286 EU/m³ (GSD=1.84 EU/m³). Dust and endotoxin levels were strongly correlated (r=0.85).

Conclusions: Dust and bacterial endotoxin exposures in the poultry processing industry have the potential to contribute to the development of respiratory symptoms. There is a significant correlation between the dust and endotoxin levels, and extraction ventilation significantly reduced exposures at the hanging bay.

EVIDENCE-BASED OCCUPATIONAL HEALTH PRACTICE

SOCIAL SECURTIY ORGANSITION (MALAYSIA)- RETURN TO WORK PROGRAM EVIDENCE BASED APPROCH

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[ID 867] - *No. 131 in Poster Area*

Malaysia is taking great leaps to be an advanced industrial nation by the year 2020 and has it has a comprehensive national plan of action to address the associated occupational accidents and diseases. Surveillance by Social Security Organisation (SOCSO) indicates that the number industrial accidents have decreased from 95,006 in 2000 to 69,132 in 2004, however payments for temporary and permanent disablement benefits, including invalidity pension has been on the increase. In 2005 it was estimated that 9,000 workers fall under the permanent disablement category and 30% of these suffer from back or cervical problems. This can seriously affect the productivity of the worker, company and nation.

The Return to Work Program (RTW) has been implemented by Social Security Organisation (SOCSO) with the coordination of other agencies to help insured person gain financial independence in their present or new job that suits their individual capacity. The objective of this program include:-

1. Under section 57, Social security Act 1969. an insured person suffering from or claiming to suffer from invalidity or permanent disablement may be provided by the SOCSO, free of charge facilities for physical or vocational rehabilitation.
2. To design a program to help Social Security Organisation (SOCSO) insured persons with prolonged temporary disablement for them to return to work as early as possible. The program is also catered for those who claim for invalidity pension, so that they may remain in the workforce, thus improving productivity of the country.
3. The aim of the program is to set up an “Intensive multidisciplinary biopsycho-social rehabilitation with a functional restoration approach for chronic low back pain and neck pain patients to improve pain and function.
4. In line with Section 57, it is proposed that Social Security Organisation (SOCSO) should provide a complete and comprehensive rehabilitation programme for the insured person with Lower Back Pain (LBP) prior to consideration of permanent disablement benefits and invalidity pension. This is to reduce the loss of working days and to facilitate the insured person to return to work.

This paper will highlight the success and challenges faced during the implementation of the Return To Work (RTW). Additional highlights include sharing experiences on how the problems can be solved.

HISTORY OF PREVENTION OF OCCUPATIONAL AND ENVIRONMENTAL DISEASES

PHOSSY JAWS– AN OLD OCCUPATIONAL DISEASE – UP TO DATE?

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[ID 29] - *No. 1 in Poster Area*

Recently a few reports of osteonecrosis of the jaws associated with a bisphosphonate therapy were published. There seemed to be some clinical commonalities with the old occupational disease "phossy jaws".
We give an historical and medical overview of "phossy jaws". Because of many industrial changes that old disease has become rare; in Germany there are no cases reported in the years 1998 until 2002 – according to the German *Hauptverband der gewerblichen Berufsgenossenschaften*. Maybe the old knowledge about phossy jaws is able to clear up some secrets of the new drug-associated phenomenon.
First observations of phossy jaws date back to the years 1839 and 1843, they are seen with workers in match stick factories. The causality between phosphorus and phossy jaws was re-cognized in 1845.
Phossy jaws are a consequence of endothelium-damage by elemental phosphorus inhaled when working with it. Especially the jaws are exposed to a number of foreign substances, i.e. bacteria by tooth decay or other circumstances. Thus – decreased blood flow **and** bacteria lead to an Osteomyelitis, so called phossy jaws.
Our poster is subdivided into following chapters:
chemical characterization of phosphorus, historical overview, actual expositions, effects of phosphorus, phossy jaws – clinical image and pathophysiology, therapy und prophylaxis.

HEALTH HAZARDS AS A RESULT OF OLD WORKING TECHNIQUES; A CASUISTRY

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[ID 37] - *No. 2 in Poster Area*

A Casuistry

An 42 old woman (Mrs. X) suffers from an idiopathic thrombocytopenic purpura (ITP) since 1999. The initial examination of the bone marrow showed the typical picture of an ITP and after a therapy with cortisone the number of thrombocytes increased adequately. Nevertheless the patient did not believe in the diagnosis of an idiopathic disease, she had a strong desire for causality.
Mrs. X worked from 1985 up to 2003 as archaeologist in a museum, where she demonstrated above all old working techniques such as pitching a tent made from reindeer skins. She supposed the skins coming from Norway to be radioactive caused by catastrophe of Tschernobyl in 1986. She thought her blood disease to be a consequence of the dermal and inhalative contact with radioactive hair derived from the skins. Even if the development of an autoimmune disease like ITP by radioactive radiation is implausible, we measured the radiation of the patient and the skins; both showed only a K40 activity, Cs134 and 137, isotopes derived from Tschernobyl were not detectable. In addition to that, we found out that not the skins of reindeers were radioactive, but the muscles by eating radioactive food.
Furthermore Mrs. X showed how to get started a fire in the Stone Age. She used for that a mushroom called Phellinus, which was lighted by spark resulting from a fire stone. Inhalation of the smoke coming from the Phellinus caused above all hallucinations and made a good feeling. So Mrs. X inhaled that smoke over some years every day. With view to a possible causation of the ITP by any toxic agent derived from Phellinus, we examined the mushroom, but beside of Ergosterol, a non-toxic component, no toxins were found, particularly no haemotoxic substances. We thought that the hallucinations are a consequence of hyperventilation combined with CO_2 effect.

TRAINING OCCUPATIONAL PHYSICIANS FOR BRIEF RECOMMENDATIONS ON TOBACCO CESSATION TO SMOKER WORKERS

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[ID 892] - *No. 3 in Poster Area*

The workplace is a fundamental circle to develop positive actions to favorite the cessation of smoking, to avoid use of tobacco products among young people and to protect the not smokers from the exposure to passive smoke. There are scientific evidences that a brief counselling from Family Physicians and Nurses favours cessation of smoking. Also Occupational Physicians, if adequately formed, into the overseeing sanitary to the workers, have the opportunity to fight the dependence from the tobacco's smoke formulating brief recommendations ("ask and advise") on the importance to stop smoking and to propose to avoid to get into the habit of smoking. The Department of Occupational Medicine of ISPESL and the Department of Prevention of ASL Rome B are realizing training initiatives about these themes, addressed to Occupational Physicians. The events adopt a didactic methodology that founds on frontal lessons, role playing and plenary discussion. The objectives of the courses are to training Occupational Physicians to practise the counselling of the smokers and to use the National and International Guidelines to promote the struggle to the tabagism also in the workplace; to individualize people to start to the cessation of smoking among the workers submitted to sanitary overseeing; to practise a periodic follow-up on the effectiveness of the counselling. The topics of the educational programme are: 1) Occupational Physician's role in cessation of smoking; 2) smoker worker's management; 3) passive smokers's protection and the withdrawl symptoms's management in smokers; 4) the psycho-behavioural therapy for smokers; 5) cycle of smoke addiction and the cycle of reasons to stop smoking; 6) how to use at best the short time for the brief recommandations; 7) role playing for 5 physicians's groups and plenary discussion.

HISTORICAL ASPECTS OF MULTIPLE CHEMICAL SENSITIVITIES AND RELATED ILLNESSES

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[ID 1240] - *No. 4 in Poster Area*

[Objectives] The concept of 'multiple chemical sensitivities'(MCS) is still controversial and 'sick building syndrome'(SBS) and 'sick house syndrome'(SHS) emerged as health problems due to indoor air quality(IAQ). In this paper, the historical aspects of these illnesses in the workplaces are reviewed.
[Methods] Extensive literatures are reviewed regarding MCS, SBS and SHS.
[Results] The MCS was firstly named by Cullen in 1979 by reporting a worker who was intoxicated by organic solvents in workplace and after recovery from poisoning complained of nonspecific symptoms by exposure to low level of various chemicals. Since then, about 30 illnesses such as universal allergy, 20th century disease, etc. are adopted to same conditions of MCS. International program on chemical safety committee of WHO and ILO suggested "idiopathic environmental intolerances(IEI)" instead of MCS because the causal relation with chemical exposure was not proved, the clinical entity was not established and no definite criteria was present.
In Europe and USA during the late 1970s to 1980s, SBS emerged as a health effect of IAQ due to poor ventilation for saving energy. In the criteria of SBS, more than 20 % of residents complains of symptoms in a problem-building and their nonspecific symptoms disappear on leaving the building. In Japan, traditional residences changed into those with energy saving structure by use of synthetic staffs, and this condition gave rise to SHS in the late 1900s. SHS includes allergy, poisoning and symptoms with undefined mechanisms, while SBS is specified as an undefined illness. The specified illnesses such as allergy and infection due to IAQ are named as "building related diseases".
[Conclusion] The occurrences of SBS and SHS are expected to be decreased by improvement of IAQ. The prevention of MCS is harder than SBS or SHS since personality of affected person seems involved in development of this condition.

ACCIDENT PREVENTION

SAFE AND ENVIRONMEMT FRIENDLY SHIP RECYCLING PROJECT: IMPROVING WORKERS HEALTH AND WELAFARE IN BANGLADESH

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[ID 46] - *No. 5 in Poster Area*

Bangladesh has 35 ship-recycling yards located in the Bay of Bengal. Around 16,000 workers are directly involved in ship recycling. Work is done under open sky with legal and technical procedures not complied with resulting in accidents, occupational health problems and deaths. The poor working conditions and the deprivation of basic rights of workers lead to the development of the Safe and Environment Friendly Ship Recycling Project or SAFEREC by the Government of Bangladesh, ILO and UNDP. The target beneficiaries are owners and workers of the yards and concerned government institutions. The project aims for adherence by the industry to international agreements; ensure pre-beaching, beaching and recycling formalities as stipulated by law, minimize environmental pollution, improve working conditions; and to ensure occupational safety and health of workers. The project addresses problems at national and enterprise level. At the national level, an inventory of the presence of the necessary elements and a system of analysis of the functioning, coherence and consistency of the national occupational safety and health system are to be implemented. At the enterprise level, ILO guidelines are used for improving working conditions. Four elements in developing a holistic OSH system are incorporated to create safe work: regulatory OSH framework, advisory and expert service, implementation structure and monitoring system. Some of the specific activities of the project are: involvement of the Shipbreakers association members in training activities, training leading to social dialogue between workers and owners and training of the government sector for capability building. Indicators for measurement are to be developed which include: mandatory decommissioning certification, improved legislation, OSH inspection institutionalized, develop training packages and autonomy in carrying out shipbreaking affairs. Participatory process is a major element of the framework where involvement of important stakeholders such as the Bangladesh Shipbreakers Association and the Government of Bangladesh is recognized.

IDENTIFICATION AND ANALYSIS OF HUMAN ERRORS BY PHEA TECHNIQUE IN ISOMAX UNIT OF AN OIL REFINERY

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[ID 84] - *No. 6 in Poster Area*

According to industrial accident's investigation 60 to 90% of all accidents have directly been caused by human error. In this study , which has been done in the Isomax unit of an oil refinery , totally 25 existing occupational tasks were reviewed by aid of the results produced from interviewing the workers , discussing with supervisors & line managers and considering all the past accident's reports .From all 25 , 10 tasks were selected as susceptible and critical to human error occurrences .All selected tasks were analyzed by Hierarchal Task Analysis..

In the second stage , PHEA(Predictive Human Error Analysis) technique was used for predicting and extraction of human errors in the selected tasks .

Apart from determination of identified error's type (action , checking , retrieval , selection, sequence and communication error), description of errors , the consequences of their occurrence and proper solutions for prevention and recovering from errors were developed and entered into PHEA worksheet .

The performed PHEA technique was identified totally 161 errors in all 10 tasks .The type of identified errors were different and their number were , according to the sequence written in the pervious paragraph , 108 , 12 , 24 , 4 , 5 , and 8 respectively . some important of these errors which have had , according to the accidents occurring the past , high frequencies were : the task was not done , too much done , too early or too late was done , has been done in different sequence and … .

Finally for preventing and recovering from the identified errors some proper solutions , particularly in the area of hardware change in equipment design , have been proposed : labeling of equipments , making the colure pumps or switches different with each other , installing acoustic telephone booths in the site and … .

KNOWLEDGE MANAGEMENT IN OCCUPATIONAL SAFETY AND HEALTH: FROM DATA TO KNOWLEDGE.

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[ID 127] - *No. 7 in Poster Area*

The history of epistemology (the theory of knowledge) began with Aristotle and Plato and, including Descartes and Foucault, is ongoing through to the present. In the informational and technological 90s, G. Bellinger placed knowledge in the following sequence emerging from data: Data – Information (understanding relations) – Knowledge (understanding patterns) – Wisdom (understanding of principles).

Systematic collection of computerized data began in Israel in the early 90s. The National Occupational Hazards Survey in Israeli Industry, which was carried out from 1993 to 2000, encouraged a serious effort to collect and record data. From the data that was gathered during those years, two main methodological issues were developed – a Chemicals Database and a List of Technological Processes. In 2000 the Ministry of Labor and Social Affairs introduced these methodologies as the standard for occupational hygiene practice, thus unifying the collection of data. The standardization enabled the creation and management of the United National Database and its use as an extensive informational source of knowledge.

Knowledge management has been implemented or is in the process of implementation in different areas of the country's occupational safety and health (OS&H): 1) exposure assessment (Chemicals Database, Probabilistic Exposure Matrix); 2) planning of supervising visits to enterprises by the staff of the Ministry; 3) statistically based quality control of supervisors' work, etc. The Ministry is also continuing its attempts to develop an expert system for a computerized definition of priorities in the country's OS&H.

In order to continue the development of a national information medium in OS&H, the Ministry has instituted guidelines for creating an informational system and is planning to establish a National Data Warehouse.

Conclusion: Israel has created a system for knowledge management in OS&H, based on extensive databases containing standardized data.

NTEGRATED MANAGEMENT SYSTEM FOR SAFETY, HEALTH AND THE ENVIRONMENT: A CONTINUAL IMPROVEMENT SYSTEM

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[ID 157] - *No. 8 in Poster Area*

The session presentation will outline an integrated management system (IMS) for safety, health and the environment (SH&E) developed by the Industrial Accident Prevention Association (IAPA). The system reflects injury prevention values, beliefs, best practices of successful organizations and supports an integrated approach towards managing SH&E. As a result of researching organizational best practices and the culmination of the experience providing consultative and educational interventions to organizations since 1917, the IAPA has developed a unique and integrated management system to assist organizations in successfully managing and continually improving their SH&E performance. The foundation of this approach is constructed upon an organization's ability to clearly develop, articulate and integrate an injury prevention vision into their business strategy. The organization must then proceed to integrate the vision into the development of policy to create and nurture a supportive safe and healthy working environment. It is realized that improvements in safety, health and environment requires being continual, and that an evolving, systematic effort is needed to improve performance. To support this, a Continuous Improvement Management System Model (CIMS) has been developed and successfully tested within several organizations. CIMS is composed of ten components, each with its relevant characteristics and attributes, supported by guidelines. The ten components are: Leadership, Risk Assessment, Implementation Strategies, Standard/Policy Development, Procedures/Guidelines/Practices, Effective Communication, Effective Training/Personnel Development, Measurement Strategies, Evaluation Strategies, and Recognition/Improvement/Corrective Strategies. An effective integrated approach together with the use of a continual improvement managing system can assist organizations to successfully manage their injury prevention program resulting in reduction/elimination of causes of incidents, losses to the environment, property, process, equipment, materials as well as personal injuries and adverse health effects.

ELECTRONIC NETWORK FOR PREVENTION OF OCCUPATIONAL ACCIDENTS INVOLVING BIOLOGICAL SUBSTANCE IN HOSPITALS IN BRAZIL

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[ID 175] - *No. 9 in Poster Area*

In an attempt to stimulate information exchange and use the Internet as a research instrument in Occupational Health, we constructed the Electronic Network for the Prevention of Occupational Accidents involving biological substance in Brazilian hospitals–REPAT, available on www.eerp.usp.br/repat. The network consists of 15 university hospitals from different states, demonstrating Brazil's important regional differences in terms of quality of life, health and occupational conditions. The interdisciplinary team includes 16 researchers, 3 international collaborators, 15 hospital representatives and 8 undergraduate students. This project aims to disseminate REPAT data by examining occupational accidents which involved biological substances among hospital workers in order to identify what prevention strategies were adopted. Data for this descriptive study were collected electronically from 2003 to 2004 using REPAT forms from six university hospitals in São Paulo, Santa Catarina, Paraná and Federal District. All institutions used accident prevention strategies, and notification below accidents was found in half of them. REPAT made it possible to exchange and systemize information and conduct elaborate research at each hospital, thus supporting the implementation of prevention strategies. Hospital staff ranged from 883 to 5,282 workers. 343 accidents were registered including: female workers (76.7%); age 40 or younger (72.0%); on the nursing team (51.6%); caused by needles (49.6%); when discarding the material (27.7%). More than 20% of accident victims had not been vaccinated against Hepatitis B. Flaws were discovered in information on the results of the source patient's and the worker's serology. 0.3% of these accident records (11.7%) were positive for HCV. All HBV and HIV tests were negative. Clearly, more urgent action is needed to notify of accidents, protect workers through vaccination, and improve prevention strategies.

NEEDLE STICKS INJURIES AMONG HEALTH PERSONNEL AND ASSESSMENT OF RISK FACTORS IN HOSPITALS AND HEALTH CENTERS OF ASTARA,IRAN

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[ID 190] - *No. 10 in Poster Area*

Objectives: Blood born diseases are large concern of health personnel because in our frontier city STDs are in high prevalence. Since there isn't any study in this region, a cross sectional study was conducted to assess the occurrence and risk factors of needle stick injuries among health personnel.

Methods: 90 midwives, nurses, physicians, laboratory technicians, operation technicians, nurse aids, and anesthesia workers, involved in the direct management and care of patients answered a questionnaire that had questions about occurrence of needle sticks injuries in last year and some predictors, including: duration of work, number of patients, training, number of night shifts, and work habits.

Results: A 67% of health personnel had at least one needle stick injury in the last year. Only 20% of those hadn't any injury from needle stick duration entire work period. The rate of needle sticks injuries was 109 per person-year. Multiple logistic regression analysis showed that the most important risk factor for needle sticks injuries risk factors was high number of night shifts (OR:2.2, 95%CI 1.5-4.8)

Other important risk factors were number of patients in every shift. (OR: 1.5, 95% CI 1.1-2.8) recapping needles (OR: 1.4 95% CI 1.1-2.3)

Conclusion: The rate of needle sticks injury although is not very high but in high prevalence regions in aspect of STDs for example HIV, it isn't desirable. The most important risk factor was the number of night shifts. Then training for this group and reducing work hours has been suggested.

LIMB INJURIES IN A CONTAINER TRANS-SHIPMENT PORT IN OMAN: RISK FACTORS, ECONOMIC IMPACT AND PREVENTION

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[ID 195] - *No. 11 in Poster Area*

Background: Container handling is a dangerous operation in any port and prone for injuries. We present a retrospective study of limb injuries in Salalah Port Services Company, a Container Trans-Shipment Port in Oman. During 2003-2004 the port handled 2434 container vessels and 4.2 milllion containers with staff of 760 container yard workers.

Objectives: (1) Analyze risk factors for accidents resulting in limb injuries, (2) Analyze economic impact, (3) Identify necessary corrective preventive actions.

Methods: Interviews of injured workers using root-cause analysis approach, inspections of the work site, consultations with work managers, review of medical records

Results: Number of Injuries:

174 (incidence rate of 11.76 per 100 workers per year);

injuries of limbs formed 77%, of hand & finger 30%, of finger alone 21% of all injuries. Major injuries include two cases of traumatic amputation of digits (loss of 140 days), dislocation of index finger (loss of 42 days). Time of Injury: 30% of accidents happened in last hour of shift. Economic Impact: Total loss of work days due to limb injuries alone for 2003-2004: 1406 (Upper Limb injuries 72%, lower limb 28%), i.e. 0.925 days per worker per year. Total cost of all accidents: 99,957EUR per year; Average cost of accident: 1.150 EUR, of which 11% are direct cost.

Identified Risk Factors: Work pressure, work fatigue, non-compliance with safety procedures like use of PPE, inadequate training & awareness of supervisors and workers, missing safety policy, use of subcontracted casual workers

Prevention: Training the employees in safe work practices and proper tool handling, specific training of casual workers, training of employees and management in hazards identification and accident prevention, job rotation, sufficient time off, proper use of personnel protective equipment, implementation of safety policy, inclusion of OSH as key performance indicator for supervisors.

CONTRUBUTION OF EMERGENCY DEPARTMENT RECORDS TO OCCUPATIONAL INJURY SURVEÌLLANCE

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[ID 255] - *No. 12 in Poster Area*

Objectives:

In Turkey the statistics of occupational accidents are based on notifications of employers and the application records of the employees to Claims Department of Social Insurance Institution (SII).

Occupational accident rates are very low due to underreporting. Majority of work related injuries are treated in SII Hospitals, especially in emergency departments. The aim of this study was to identify and describe the probable contribution of SII Hospital records to occupational injury surveillance.

Methods:

This descriptive study is based on the one months' records (june 2004) of Tepecik SII hospital which is the biggest in the region. 15 467 records of Emergency Department, 605 records of hospitals insurance service and 471 compensation files of SII Regional Hospital Office were investigated. Among these records all cases, who have been injured while working were included in this study.

Results:

Totally 936 occupational injuries were detected. The information was obtained from different resorces. 50,2 % of the data has been taken from Emergency Department records, 26,6 % SII from regional hospital office compensation files and 23,2 % from the both sources. Only 49,8 % of the occupational accident records of Tepecik Hospital was appeared in National Statistics. Four of 10 amputations, 40 of 56 fractures, 200 of 411 sprains and strains were underreported. In both data sources the information of age, gender, type of accident and injury were included, but number of days lost, time of accident, affected body part, shift start time weren't included in Emergency Department Records.

Conclusion:

Occupational injuries are mainly underreported in Izmir. This study demonstrated that an emergency department can be a data source for work related injuries.

INFORMATION SYSTEMS IN WORKER HEALTH: TEN YEARS EXPERIENCE IN A REGION OF SÃO PAULO STATE.

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[ID 289] - *No. 13 in Poster Area*

There is still no information system in Brazil on work accidents and diseases which covers the whole working population, even though the Ministry of Labour has given it considerable priority for many years. Official data, restricted to workers with a formal work contract, are incomplete and not analysed by municipality, and are thus not useful to local health services. This report presents experiences of implanting an information system for these events in six municipal areas of São Paulo State.

A database was created in 1995 covering four municipal areas in the Botucatu microregion (populations between 10,000 and 120,000). Thanks to help and collaboration from Botucatu Regional Agency, we gained access to copies of the Social Security work accident and diseases register. However the transfer of two of these municipal areas to other agencies, data continuity was lost in 1998 from one and in 2000 from the other. Also since 2001, the reduced effectiveness of Botucatu Regional Agency due to retirements and prolonged strikes (months), information has been progressively more difficult to obtain.

In 1997, the system was extended to a fifth municipality with 350,000 inhabitants, started by a study of the local health monitoring service. Local publication of this data lead to the local health authority incorporating these activities and incorporating an information system into their Worker Health Program.

In 2001, with the aim of including casual workers, a project was started to collect data on work accidents and diseases from emergency units in a sixth city (55,000 inhabitants), with local health authority support. However, local political changes progressively impeded data collection, which was finally interrupted at the end of 2002.

These experiences indicate that creating an information system for registering work accidents and diseases in Brazil to support local worker health activities is affected by unstable local circumstances.

IMPACT OF THE PREVENTIVE PROGRAMS ON WORK ACCIDENTS AND ITS CONSEQUENCES IN ENTERPRISES AFFILIATED AT THE MEXICAN INSTITUTE OF SOCIAL SECURITY.

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[ID 377] - *No. 14 in Poster Area*

Objective: To evaluate the impact of several preventive programs at affiliated enterprises to the Mexican Institute of Social Security in 2004.

Material and methods: Transversal studio, in a universe of 987 enterprises, variables: work accidents (WA), temporary incapacity days, permanent incapacity and deceases. Analysis: simple frequencies, relative frequencies, rates and Anova application for differences.

Results: The 64.4% of the enterprises decrease WA ($p<0.04$), with a decrement of 2,602 WA (16%), the rate of WA per 100 workers get down of 4.19 to 3.60 ($p<0.08$), diminish 43,369 incapacity days (10.93%) which represents $8'456,955 Mexican currency. Delegations with most decrement: Queretaro (80%) $p<0.05$. Sinaloa (63%) $p<0.05$, Morelos (61%) $p<0.05$. The permanent incapacities diminish 12.1% $p<0.09$, the rate of permanent incapacity for 1,000 workers diminishes from 1.37 to 1.32, deceases increment from 42 to 49.

Conclusions: The expenses in consultancy of Mexican Institute of Social Security was estimated on $9'341,955, the savings on temporal and permanent incapacities were $33'691,255 with a retaining of the expenses of $24'349,300. The preventive programs are profitable, in order that they generate benefits for workers, Institute and enterprises.

ALCOHOL AND WORK

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[ID 541] - *No. 15 in Poster Area*

Alcohol proves to be one of the major risk factors for health at individual and collective level. Consumption of alcohol may produce at workplace an even remarkable increase of risks because of psychophysical commitment with consequent higher probability to run into accidents and of interference with metabolism of some industrial toxic agents.

The data available in the literature show that building, oil mining and transport are the sectors with the highest fatality rate caused by alcohol-correlated accidents. Consumption of moderate alcohol amounts is associated with an excess of non fatal accidents at work. According to some studies, approx 17% of all work accidents should be ascribed to alcohol consumption with the following age range distribution: 16-24 years (19%), 25-44 years, (21%), 45-64 years(9%).

The 2002-2006 European Union Programme, while specifying that preventive strategies of new social risks should include addiction incidence on accidents - and specially alcohol and drug addiction - highlights the need for specific actions against addiction risks. Besides, the need is reaffirmed for a cooperation between community strategy in OHS and the activities conducted by international authorities specially as regards drug and alcohol addiction effects on OHS whose importance is acknowledged by WHO and ILO.

Therefore it is necessary to identify the jobs for which even an accidental alcohol-correlated risk may exist, in view of identifying strategic preventive lines. With the support of the figures indicated in law decree 626/94 (employer/managers/persons in charge, company occupational physician, workers' representative, head of prevention and protection service), this preventive path should be a practicable one during risk assessment, health surveillance and information/education.

WORK RELATED ACCIDENTS IN A GROUP OF GROOMS IN PISA AREA

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[ID 615] - *No. 16 in Poster Area*

Background: Pisa has an old tradition of horse racing: workers, mainly grooms, have a high risk of accidents during their activities.

Aim: to investigate the prevalence of accidents in a group of grooms in Pisa area.

Methods: 242 grooms, 186 males and 56 females (mean age = 37,72 + 12.47; mean years spent as grooms = 15 + 11;) were interviewed. Informations on accidents occurred during operations with horses and on preventive education were collected through a questionnaire.

Statistical analyses were performed using SPSS 10.0 package.

Results : Only 32% of grooms received specific informations in order to prevent injuries during the operations with horses. We found a very high frequency of bites (60%), kicks (43%), crushes of thorax (35%) during operations like cleaning the horse and saddling. We also found a high frequency of crushes of feet (60%) while leading horses.

Conclusions: our data suggest a need of improving education and training in grooms in order to prevent accidents during the operations with horses.

OCCUPATIONAL INJURIES IN LEBANON: WHERE IS THE TRUTH?

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[ID 776] - *No. 17 in Poster Area*

Background: In 1998, work-related compensation claims in Lebanon were reviewed. The direct cost of work-related injuries in insured workplaces was estimated at US$ 4.5 million with minimal differences in type, severity, cause, and cost between Lebanese and non-Lebanese workers. Women accounted for 1.7% of all injured workers. Though informative, the results were unexpected.

Objective: To explore the legal, social, and political issues that underlie assessing the true magnitude of occupational injuries in Lebanon.

Methods: Key people interviewed. Relevant documents reviewed.

Results and Discussion:
1) Insurance policies
- Employers are required to cover all costs of work-related injuries. Most employers elect to pay out-of-pocket rather than purchasing insurance plans.
- Insurance premiums are mostly based on the total salaries of an establishment.
- Insurance policies are issued for the worksite and not individual workers, with a quota for the number of insurance claims per workplace.
- Insurance companies collect no socio-demographic information about the workers in insured workplaces; i.e., denominators are non-existent.
- Work-related injuries might be reported as non-occupational to allow Lebanese workers to benefit from the medical services of the social security system. The reverse cannot be eliminated.

2) Foreign labor
- In case of injuries, Syrian workers might be seeking low-cost medical care in their own country adjacent to Lebanon.
- Other foreign workers might be using the obligatory medical insurance policy to treat work-related injuries.

3) Women workers
- Working women concentrate in occupations that are self-insured (hospitals) or use cooperative insurance schemes (public schools).
- Musculoskeletal injuries, which are leading work-related injuries among working women, are excluded from coverage as work-related by the Lebanese law.

Conclusion: Only a surveillance system sensitive to the listed challenges is capable of capturing the true picture of work-related injuries in Lebanon. Establishing a network of randomly selected and cooperative workplaces is a start.

SURVEILLANCE OF OCCUPATIONAL INJURIES ABOARD DANISH MERCHANT SHIPS AND FISHING VESSELS

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[ID 875] - *No. 18 in Poster Area*

Background: Prevention of occupational injuries (OI) among seafarers and fishermen is highly important. This demands an overview of the character and magnitude of all types of injuries by a valid surveillance system. OI should legally be reported to the Danish Maritime Authority and when compensation is expected, to the insurance companies, and the National Board of Industrial Injuries. There are some problems in this system that hinder an effective and valid surveillance:
a. The report system is not well coordinated as not all OI reported to the insurance companies are reported to the Danish Maritime Authority, resulting in an underestimation of the risk based solely on data from this register.
b. Studies have shown a marked difference in incidence rates in different types of fishing and seafaring. Furthermore OI can be classified according to the different working processes. This knowledge is not used in the regular reporting system, neither is information about the seriousness of OI related to the specific working processes.

Aims: To improve prevention of OI in merchant seafaring and fishing by improving the surveillance facilities, and pointing out high risk areas according to ship type and working processes and the most serious type of injuries.

Method: Surveillance data are gathered from: a) the Danish Maritime Authority, b) the National Board of Industrial Injuries, c) the Occupational Health Services for Danish Fishermen, d) the Danish Shipowners' Accident Insurance Association, and e) the Danish Fishermen's Accident Insurance Association.

A supplementary coding of ship type and occupational function for seafarers, and the type of vessel and working processes for fishermen is performed. Denominator data for fishermen are based on the tax system, and for seamen the registration of the tours of duty. The register will be updated once a year.

CORRELATION BETWEEN HORSE RELATED ACCIDENTS AND SAFETY CONDITIONS: A GIS APPROACH TO MAP EQUESTRIAN ENTERPRISE IN PISA AREA

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[ID 888] - *No. 19 in Poster Area*

Aim
In order to investigate the correlation between safety characteristics of equestrian work environment and horse related accidents prevalence in workers, in 2004 a survey was conducted in Pisa area.
Methods
A GIS (Geographical Information Science) approach was adopted to map data about general and safety features of 94 equestrian enterprises. Each site was georeferenced and two different types of maps were produced: descriptive maps and correlation maps. Descriptive maps represent general characteristics of the equestrian enterprises: horse activity performed, number of workers and number of horses. Correlation maps aim to visualize the relationships between different parameters calculated for each enterprise. These parameters are quality and safety indicators. We considered accidents reported by workers, general status of structures, machinery (general evaluation index), number of horses respect to total dimension (crowding index), number of horses respect to number of workers (horses/workers index). To visualize relation between each pair of indexes (e.g. accident index vs crowding index) we used a symbolization method based on concentric circles. The quality is represented using three colors: red (bad), orange (medium) and green (good). For example a red external circle for crowding index and a red internal circle for accident index means that crowding may have a negative effect on workers safety.
Results
Correlation maps showed a weak correlation between quality/safety indexes and accident index as well as a strong correlation between: activity and crowding index, activity and general evaluation index, activity and horses/workers index.
Conclusions
Using a geographical information system (GIS) a multilayer analysis of land allowed spatial phenomena to be highlighted. Map representation gives a qualitative evaluation of data respect to classical statistical output (tables, graphics), which gives a quantitative one. Maps in fact allow data to be simply and directly interpreted.

THREE OCCUPATIONALLY EXPOSED CASES OF SEVERE METHYL BROMIDE POISONING: ACCIDENT CAUSED BY A GAS LEAK DURING THE FUMIGATION OF A FOLKLORE MUSEUM

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[ID 1078] - *No. 20 in Poster Area*

Methyl bromide (CH3Br) was designated by the Montreal Protocol that depletes the ozone layer in 1992. Although its use is to be fully phased out by 2005 and 2015 in developed and developing countries, respectively, its use is still being allowed for such purposes as quarantine processing, shipping pretreatment and emergency processing since an alternative product does not exist. It is frequently used, and poisoning accidents caused by its use are common.
We herein report an edifying case: an accident involving three men who appeared to have suffered CH3Br poisoning during the fumigation of a folklore museum occurred in Japan on December 29, 2002. They began spraying at around 6:00 p.m. on December 27. The agent used was comprised of 86% CH3Br and 14% ethylene oxide. There was a slight gas leak from a hose immediately after the start of spraying, but it was repaired, and the operation lasted about one hour. The employees then ate and rested in the museum's a reception room and later slept in the same room. They began venting the gas at around 1:00 a.m. on the 29th, after about 30 hours of fumigation. They were experiencing generalized tonic-clonic seizures with impaired consciousness at around 4:00 p.m., at which time all three were rushed to hospital. An analysis of serum bromide showed considerably high concentrations: 84.7 microgram/ml, 164.9 microgram/ml, and 157.3 microgram/ml, respectively on December 30, the day after onset (normal value: 3.7 +/- 1.5 microgram/ml).
In the course of pest extermination work at places like museums and libraries, fumigators often sleep and wait in the same building for the dura-

tion of the fumigation work. To eliminate this kind of poisoning in the future, both the government and exterminators must improve fumigation methods and do a more thorough job of educating and training fumigators.

TRENDS IN NON-FATAL INJURIES AND ILLNESSES AMONG U.S. WORKERS

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[ID 1170] - *No. 21 in Poster Area*

Objective: To assess temporal trends in non-fatal workplace injuries and illnesses.

Methods: Data from two national occupational injury/illness surveillance systems were compared for temporal trends from 1998 through 2003. The U.S. National Institute for Occupational Safety and Health collects data on work-related injuries/illnesses treated in emergency departments (ED) through a probability sample of U.S. hospitals. The U.S. Bureau of Labor Statistics (BLS) annually surveys occupational injuries/illnesses among a sample of private industry employers.

Results: There was no apparent significant change in the number or rate of occupational injuries/illnesses treated in U.S. EDs between 1998 and 2003. There were about 3.6 million ED-treated cases in 1998 and 3.4 million in 2003 with rates of 2.8 and 2.5 incidents per 100 fulltime equivalents (FTE), respectively. There was an apparent peak in ED-treated cases in 2000 with 4.1 million visits and a rate of 3.1 incidents per 100 FTE.

The BLS total injury/illness counts consistently decreased from 5.9 to 4.4 million and rates decreased from 6.7 to 5.0 incidents per 100 FTE. Similarly the counts and rates for cases involving days away from work (DAFW) decreased from 1.7 to 1.3 million and 2.0 to 1.5 incidents per 100 FTE, respectively. During this period the proportion of DAFW cases were essentially constant at about 30% of the total reported injuries/illnesses. There was a change in case reporting definitions in 2002 making 1998-2001 not directly comparable to 2002-2003. However, there has been a continuing decrease in BLS counts and rates since the early 1990's.

Conclusions: ED surveillance did not demonstrate a significant change over the 6 year period, whereas private industry employer reports suggested that there may have been a steady improvement in occupational injuries/illnesses. Differences in temporal trends between these surveillance systems should be explored further to understand the implications for injury prevention.

TRENDS OF OCCUPATIONAL ACCIDENTS AND PHYSICAL VIOLENCE IN FINLAND

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[ID 1760] - *No. 22 in Poster Area*

Occupational accidents have been registered for over 100 years in Finland. The number of accidents increased between 1900 and the 70's because of industrialization and the development of registration systems. Following this, the number of accidents decreased, and stabilized during the 80's. During the last years there has been slightly over 35 accidents per million work hours. The aim of this paper is to describe the trends of occupational accidents and physical violence at Finnish workplaces from 1997-2003.

This paper is based on the data sets from the National Work and Health Survey conducted every three years by the Finnish Institute of Occupational Health. The data were collected through computer-assisted telephone interviews. The number of currently working interviewees was 2156 in 1997, 2053 in 2000, and 2335 in 2003.

A tenth (9.7%) of those interviewed were involved in an occupational accident in 1997. The proportion decreased to 9.1% in 2000 and grew again to 10.5% in 2003. These changes were not statistically significant. In both 1997 and in 2000 1.4% of the subjects experienced violent acts at work but the proportion decreased to 1.2% in 2003. In 1997 2.7% were faced with the threat of violence at work and this proportion increased to 3.7% in 2000, only to fall again to 2.4% in 2003. None of these changes were statistically significant.

The stability of occupational accident figures shows that it is difficult to reach the zero accident vision, which aims for no deaths or serious injuries at work. To reach this goal, we have to transform the entire safety culture in Finland from authorities to shop floor level. On the other hand, the reason for the previously rising trend of violence at work now decreasing, could be the new work safety law prohibiting violence and new methods for being more prepared for violence at workplaces.

Key words: Occupational accidents, Violence at work, Interview study

PROFILES OF WORK ACCIDENTS ACCORDING TO THE OFFICIAL REGISTERS IN BRAZIL: A COMPARATIVE ANALYSIS

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[ID 1841] - *No. 23 in Poster Area*

In Brazil, despite the high cost of labor accidents, the statistics about this subject are know as partial and limited. Situation basically explain thru the fact of such information is derivate of federal administrative registers databases and not a result of national research of population basis, still inexistent in the country. Even when are extracted from the referred bases, often, the statistics lack of several problems as data quality and consistency of historic series, that generate problems of reliability, even obstacles related to their representativity regarding the time and space cover grades, the absence of information regarding informal work, and aggregations converging with similar information. In fact, immediate and specific questions are still unsolved like the absence of extensive information about workplace conditions, and differenced profiles about modalities of work accidents. In these, the work diseases, presenting identification problems, have been very under numerated, despite their growth in the occupied population. The following administrative records were examinated: Mortality Information System, Hospital Internment Authorizat ion,Occupational Injuries Report,General Cadastre of Employment and Unemployment, and the Annual Social Information Relation. Thru methologies of data extraction for each tabulator, tables have been generated and operated, verifying the data coherency and some field filling level. With the data transportation to Statistical packages programs, discrepancies have been detected, when modeling the bases directing to "occupational injuries". Structurally, when the same tabulator is used, variables are able to be more integrated; even with informatics resources, inconsistencies and no convergence of variables are frequent; there are problems with time references, as, for example, day of accident, day of retirement etc. In addition, others problems related to the place of accidents, and different age classes amongst the bases, all of this making more difficult adjustments and more accurate figures. Even so, some inferences have been reached that could contribute either to an effective harmonization of the data, either, under new technical conditions, to improve the quality of the statistics in this subject in order to support the formulating, monitoring and evaluation of public politics related to several workplaces in Brazil.

ACCIDENT PREVENTION IN SUGARCANE WORKERS IN COSTA RICA

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[ID 1887] - *No. 24 in Poster Area*

In Central America, sugarcane is one of the industries with highest accidents rates. Within a program on Health and Work in Central America (SALTRA), we developed a project to reduce the risk to suffer accidents and occupational exposures in the sugarcane industry in four countries: Belize, Costa Rica, El Salvador and Nicaragua. In this abstract only data for Costa Rica are presented, where two sugarcane enterprises are participating.

Participatory workshops were held in workers to identify risks and possible solutions, using risk maps. Risks were grouped into eight categories: safety; chemical; biological; physical; ergonomic; electricity, fire and explosion; order and cleaning; mental and organizational risks. To prioritize the identified risks, select solutions and design a plan of action, additional workshops were organized with workers, foremen and management. Special sheets were used to facilitate the priority setting.

Six workshops for identification of risks and solutions were organized in different departments; agriculture, milling, sugar production and maintenance. In total, workers identified 246 risks and mentioned for practically all one ore more solutions. Safety risks were mentioned most often (37%), whereas order and cleaning risks were mentioned least frequent (5%). During two priority-setting workshops, all the identified risks were accepted by foremen and management. Together with workers, definite solutions were chosen and an action plan was defined. About 50% of the actions were planned for <1 month, 14% for 1-6 months and 36% for 6 months-1 year.

The participatory methodology used appeared to be successful for creating awareness in workers and management about occupational health

and safety problems and for creating commitment to solve these problems. We expect that accident rates will reduce with at least 20% after one year from now. In this moment, the methodology is being applied as well in Belize, El Salvador and Nicaragua

MORTAL INDUSTRIAL ACCIDENTS:

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[ID 1368] - *No. 25 in Poster Area*

Death following an industrial accident is a dramatic event in oneself. It is also a problem of public health with considerable socio-economic repercussions. The present study of 128 cases of mortal industrial accidents examined in the department of forensic medicine of Tunis over two years period, from January 2003 to December 2004, proposes to draw up the profile of the victims, the circumstances of the accidents and the causes of the death.

The victims are male in 96 % of the cases with an average age 38 years. They work in 51.6% of the cases in the sector of the construction industries. Indeed, the building sites in constructions were the theatre of 48.4 % of the accidents.

The falls of a high place constituted the main part of the accidents (42.2% of the cases) followed by the traumatisms caused by the fall of a heavy object (39.1 %), electrocutions (9.4%) and the burns (4.7 %). In addition were noted 3 cases of hiding and two cases of traumatism caused by sharp agents.

The cranial traumatism either isolated or associated with other injuries remains the major cause of the death (39.1%).

Half of these accidents occurred at the very beginning or at the end of the week and lead to death immediately in 59.4% of the cases and in less than 24 hours in 1/5 of the cases.

Mortal industrial accidents occur mainly in the construction industry sector, the major risk is that of the fall from an elevated height. This might lead to the reinforcement of the safety and prevention measures on the building sites.

POST-TRAUMATIC DIABETES INSIPIDUS AN OCCUPATIONAL INJURY CASE REPORT

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[ID 1400] - *No. 26 in Poster Area*

Post traumatic diabetes insipidus is rarely observed either in clinical practice or in the field of judicial compensation of corporal damage.

Specialised investigations are usually required to diagnose the trouble and impute it to the incriminated trauma.

We report one case of diabetes insipidus following head trauma which occurred in the occasion of an occupational injury, allocation criteria related to this case, as well as damage compensation terms.

FIBERS AND FIBROUS MATERIALS

EXPOSURE ASSESSMENT TO CHRYSOTILE ASBESTOS AND RESPIRATORY HEALTH IN SEMNAN BRAKE LINING WORKERS

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[ID 15] - *No. 27 in Poster Area*

Objective- The overall objective of this study was to assess occupational exposure to airborne chrysotile asbestos fibers and the respiratory health of workers in a brake lining plant.

Materials and methods- A cross-sectional study was carried out. Workers' exposure to chrysotile asbestos fiber was assessed in different production areas by collecting samples of airborne asbestos fibers using personal sampling pump with mixed-cellulose Ester filters(MCE) and analysis of the asbestos content by phase contrast microscopy (PCM).Total exposure to airborne dust was also gravitationally measured. Respiratory health was examined by measuring pulmonary functions and a questionnaire that included questions on respiratory symptoms completed by interviewing with individual workers. Workers' health records were examined to study exposure history.

Results-Workers exposure to different concentrations of chrysotile fibers ranged from 0.05 to 1.52 fibers/ml. higher values around 1 fibers/ml were obtained in mixing, pressing and finishing operations. No significant differences were found in lung functions between exposed and unexposed subjects. A statistical difference, however, was found among exposed workers in FEV1 between smokers and non-smokers ($p<0.05$). Respiratory symptoms were more frequent among smokers than non smokers in exposed workers.

Conclusion-Current exposure to asbestos fibers seems to be higher than the established limit value i.e. 0.1 fibers/ml. Engineering control measures are needed to reduce exposure level. Smoking may also increase the risk of respiratory symptoms.

ASBESTOS-RELATED DISEASES: A FIVE YEARS CLINICAL EXPERIENCE

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[ID 93] - *No. 28 in Poster Area*

Occupational and environmental asbestos exposure continues to represent a public health problem, despite increasingly restrictive laws adopted by most industrialized countries[1].

We present 59 subjects with past asbestos exposure (42 males, 17 females; mean age: 62 years), who came to our observation from November 2000 to September 2005, as outpatients (36) or day-hospital cases (23). They underwent occupational health visit (with accurate occupational and environmental anamnesis) and laboratory/instrumental diagnostic procedures (as indicated in the single cases), including: blood/urine testing, ECG, chest radiography with ILO classification, computed tomography (conventional or high resolution), spirometry, six minutes walking test, hemogas-analysis, bronchoalveolar lavage (with search for asbestos bodies or fibers), histopathology, and immunohistochemistry (in mesothelioma cases).

Fortyfive subjects had been exposed to asbestos occupationally, and 6 in the general environment. In 8 cases the exposure had been combined (occupational and environmental). The occupational exposures had occurred in the following productive activities: building, shipyards, hydraulics, electrotechnics, metal industry, textile industry, agriculture. At least one asbestos-related pathological condition was diagnosed in 32 patients: 17 cases of pleural plaques, 8 of asbestosis (with pleural plaques in 6 patients), 6 of pleural mesothelioma, 1 of peritoneal mesothelioma. The occupational cases were reported to the Judicial Authority (as established by the Italian Penal Code), and referred to the Italian Workers' Compensation Authority (INAIL).

Our case record indicate that, although asbestos is banned in Italy since 1992, asbestos-related diseases continue to be commonly observed in the clinical practice. Worrisome is the individuation of 7 cases of mesothelioma (one of them peritoneal). This finding agrees with epidemiological projections suggesting that the mortality from pleural mesothelioma in Western Europe each year will almost double until around 2018[2]. Thus, sanitary and epidemiologic surveillance of people ex-exposed to asbestos should continue, to identify and treat the long latency cases, and to evaluate the effects of low doses exposures.

1. American Thoracic Society Docements *Am. J. Respir. Crit. Care Med.* 2004; 170: 691-619.
2. Peto et al. *Br. J. Cancer* 1999; 79: 666-672.

MINERALOGICAL ANALYSIS OF FLUID OF REPEATED BROCHOALVEOLAR LAVAGES IN ASBESTOS EXPOSED WORKERS

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[ID 300] - *No. 29 in Poster Area*

There is a lack of data regarding occupational exposure to asbestos fibres in a number of industrial activities. Mineralogical analysis of bronchoalve-

olar lavage fluid (BALF) by electron microscopy can represent a suitable method for assessing asbestos exposure.
Objectives: The aim of the present study was to assess the reliability of asbestos fibre concentration in BALF by carrying out at different times 2 bronchoscopies on the same patient.
Subjects and Methods: BALF has been examined in 193 exposed workers (189 males, 3 females) and in 84 patients (65 males, 19 females) who underwent diagnostic fibreoptic bronchoscopy for various clinical purposes. Asbestos Bodies (AB) in BALF were counted with a phase contrast microscope, while fibres were counted and analysed by TEM. Fibre counting by TEM has shown a significant difference in the two populations, being positive in all exposed subjects. 14,5% of the exposed population was AB negative.
Some years after the first BAL 22 patient underwent diagnostic fibreoptic bronchoscopy a second time, for different clinical reasons. Mineralogical analysis of BALF was repeated a second time.
Results: In 16 patients (72.7%) a reduction of concentration in BALF of all asbestos fibres was observed. The concentrations of both chrisotile and amphiboles in the first BAL are related to their concentrations in the second BAL and the observed differences are not statistically significant.
Conclusions: The reliability of the fibre concentration in BALF as a marker of past asbestos exposure seems quite good. Despite the high CV this biomarker allows to distinguish workers in different classes of exposure.

FLUORO-EDENITE POLLUTION AROUND BIANCAVILLA: STUDY OF THE RELATIONSHIP BETWEEN MORTALITY FROM MALIGNANT PLEURAL MESOTHELIOMA AND FIBRE DISTRIBUTION

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[ID 442] - *No. 30 in Poster Area*

A significantly increased standardised rate of mortality (SMR) from malignant pleural mesothelioma (MPM) recorded among the population of Biancavilla (a town lying on the SW slope of the Etna volcano in Sicily, Italy) has been attributed to exposure to fluoro-edenite, a fibrous amphibole identified in lava rocks and in building materials extracted from a local stone quarry.
We calculated the SMR from MPM in the area of Biancavilla from 1988 to 2001 and compared it with that of the general Italian population. Data were collected from death certificates, discharge sheets; tumour registries. To establish fluoro-edenite fibre diffusion, we studied their concentration in the lymph-nodes draining the pulmonary lobes of 40 healthy sheep from 4 flocks (10/flock) whose pasture areas lay about 3 km from Biancavilla and from 10 control sheep from a flock grazing 30 km away. Half of the cranial tracheobronchial and one middle mediastinal lymph-node, and four lung tissue samples were collected from each animal and studied by light and scanning electron microscopy (SEM).
Between 1998 and 2001, 25 patients (17 males and 8 females, mean age 58.2 ± 12.3 years) died from MPM in the area. The SMR was 471 (95% CI: 225-833) for males and 442 (95% CI: 146-1,010) for females and was significantly greater than that of the general population. Analysis of the occupational background of these subjects showed that only 7 (29%) had been exposed to the risk of inhalation of fibre-containing dust, and that the remaining 17 were farmers and housewives. SEM observations showed fluoro-edenite fibres 8-41 µm in length and 0.4-1.39 µm in diameter in both lymph-nodes and lung tissue from all exposed animals, but never in those from control sheep. The mean number of fibres ranged from 0.06 ± 0.01 to 0.11 ± 0.05 x106 fibres/g dry tissue.
Our results document the risk of inhalation of fluoro-edenite fibres a few kilometres from the town.

EXPOSURE TO REFRACTORY CERAMIC FIBRES (RCF) – A FEASIBILITY STUDY FOR A FUTURE COHORT STUDY OF LUNG CANCER IN SWEDEN

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[ID 949] - *No. 31 in Poster Area*

Objectives: Synthetic high-temperature fibres can be grouped into refractory ceramic fibres (RCF) and alkaline earth silicate fibres (AES). They are used in applications where previously asbestos was used. RCF have been classified as potentially carcinogenic to humans (Class 2B) by IARC. There is a lack of epidemiological studies, and the knowledge is based primarily on animal data. Therefore, this study was designed to evaluate the possibility of creating a cohort study in Sweden, to investigate mortality and cancer incidence in relation to RCF/AES exposure.
Methods: A questionnaire was designed to investigate type of fibre used (RCF/AES), amount of fibre used, and number of fibre exposed workers today, 10 and 20 years ago, respectively. We also asked if the workers were continuously or intermittently exposed, and also, by self-reported appraisals, how many workers were directly, indirectly or background exposed. Possible confounding agents were also covered on a company basis in the questionnaire. Participating companies were from the following industries: steel, foundries, ceramics, heating, cellulose, concrete including subcontract workers.
Results: In 2005, 808 workers were exposed to RCF and/or AES directly or indirectly as reported by 47 % of the contacted companies. During the last 20 years the reported number was 1238 workers of which 238 were continuously exposed. Subcontract workers have the highest exposure, median 1.2 fb/cm3 ,but it is usually intermittent. It is within the steel industry and foundries that most of continuously exposed workers are found. Measurements in six plants 1996 observed median RCF levels for directly exposed 0.26-1.2 fb/cm3 and 0.03-0.24 fb/cm3 for indirectly exposed. Confounding exposures need further evaluation.
Conclusions: Within Sweden, there are not enough exposed workers to perform a cohort study with respect to lung cancer, especially as confounding exposures will have to be taken into consideration.
With the data collected, one possibility is to expand the study to include the other countries, or to look at non-malignant lung disease as an end-point.

APOPTOSIS OF ALVEOLAR EPITHELIAL CELLS EXPOSED TO ENVIRONMENTAL DUST / FIBER

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[ID 1205] - *No. 32 in Poster Area*

Occupational exposure to dust / fiber such as silica and asbestos causes lung injury, pulmonary inflammation and fibrosis in human. It has been theorized that apoptosis in bronchoalveolar epithelial cells plays a critical role in the mechanism of cellular damage and fibrosis. In order to examine whether lung injury by dust / fibers is related to apoptosis in alveolar epithelial cells (AECs), we performed both in vitro and in vivo studies. Min-U-Sil 5 as crystalline silica and Canadian chrysotile were used in this study. In vitro study, A549 (human type II alveolar epithelial cell line)(2 x 104 cell/well) were incubated with crystalline silica and chrysotile (25 µg/cm2) for 48 hours, and assessed apoptosis by TUNEL staining. Crystalline silica and chrysotile caused an increase of apoptotic cells at dose dependent fashion. In vivo study, we also exposed Wistar rats to 2 mg of crystalline silica or chrysotile by intratracheal instillation. Rats were sacrificed at 3 days, 1 week, 1 month, 3 months, and 6 months.

Apoptotic cells were mainly alveolar and bronchiolar epithelial cells. The number of apoptotic cells was significantly increased in rat lung exposed to crystalline silica and chrysotile from 3 days to 6 months compared to control. These finding suggest that occupational dust / fiber may cause lung injury through apoptosis in the pulmonary epithelial cells and lead to pulmonary fibrosis.

MAGNETOMETORIC EVALUATION FOR CYTOTOXICITY OF SILICON CARBIDE WHISKER ON MACROPHAGE CELL LINE RAW 264.7

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[ID 1218] - *No. 33 in Poster Area*

[Objective] Alveolar macrophages are considered to play a major role in the pathophysiology of lung diseases caused by exposure to various kinds of pathogens and particles. In this study, the cytotoxic effect of silicon carbide whisker (SiC) is one of the man-made vitreous fibers (MMMV) on macrophages was evaluated by means of magnetometry method, lactate dehydrogenase (LDH) release, apoptosis measurement, and morphological observations. [Method] Mouse macrophage cell line (RAW264.7) were incubated in vitro for 48h with Fe3O4 as a magnetometric indicator and SiC20、40、60μg/ml as test materials. [Result] In the control cells incubated in phosphate-buffered saline (PBS), rapid attenuation of the remanent magnetic field (RMF), so-called "relaxation," was observed immediately after cessation of the external magnetic field. In comparison, a delay of relaxation was observed in exposed to SiC60μg/ml. The decay constants which are calculated from decreasing RMF for the first 2min and 20min, in the group exposed to 60μg/ml of SiC had significantly lower values than the control. [Discussion] Relaxation is thought to occur due to the random rotation of phagosomes containing magnetized iron oxide particles in an intracellular environment. Since impaired cytoskeletal movement causes delayed relaxations, this phenomenon indicates cell damage due to exposure fiber. Precise mechanism of fibers causing delayed relaxation are still do be clarified to confirm the usefulness of this technique for evaluation of fiber toxicity.

COMPARATIVE CYTOTOXICITY STUDY OF LONG AND SHORT CHRYSOTILE BY CELL MAGNETOMETRIC EVALUATION.

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[ID 1291] - *No. 34 in Poster Area*

[Objective] Asbestos excels in heat resistance, insulation performance, and durability and has been used for building construction materials. However, it has been reported to cause fibrosing lung disease, lung cancer, and malignant mesothelioma of the pleura and peritoneum, and proved to have toxicity through many in vitro and in vivo experiments. Therefore, the use of asbestos including chrysotile, amosite etc has been banned or restricted all over the world. With regard to fibers that are 5 mm or more in length and 3 mm or less in width, the thinner and longer the fiber is, the more carcinogenic it becomes. We have evaluated harmfulness of chemical substances with newly developed methods of cell magnetometry.

[Methods] Specimen was prepared by 48-hour incubation of cultured mouse macrophage cells(RAW264.7) in the presence of long and short asbestos as study material, and PBS as negative control. In the present study, cytotoxicity of long and short chrysotile fibers(CFs) were investigated by cell magnetometry, enzyme assay, DNA ladder detection and electron microscopic morphological evaluation. Rapid decline of remnant magnetic field, relaxation, was used as a parmeter of cytotoxicity.

[Results/Discussion] In magnetometry, relaxation was delayed in both long and short CF-added groups, while the relaxation was rapid in PBS-added groups. The smallest toxic level was 20 μg/ml in long CFs and short CFs.

[Conclusion] It was suggested that long and short CFs had almost same cytotoxic effects on cultured cells in magnetometric evaluation.

TREMOLITE: ENVIRONMENTAL EXPOSURE IN BASILICATA REGION

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[ID 1759] - *No. 35 in Poster Area*

Introduction: In the Mesothelioma Register (ReNaM) of the Basilicata region, 12 cases of malignant mesothelioma (MM) were registered among the residents in the Lagonegro area (ASL 3). In the 1999 Regional Asbestos Plan 7 towns with presence of "green stones" are listed in this area. MM cases occurring among residents in this area were investigated for the possible etiologic role of outcropping green rocks with the certain presence of asbestos minerals: tremolite.

Materials and Methods: In accordance with ReNaM procedures, for all detected cases the clinical and exposure history was investigated.

Results: The ASL3 crude mortality rate, reported in Basilicata Mortality Atlas (1982-2001), ICD 163-163.9 was 1.28 x 100.000, the same rate calculated for the seven towns of the ASL3, where was registered these 12 cases, is 3.12 x 100.000 (1989/2004). Among 12 cases, 2 females and 10 males: 5 cases were resident in towns with the presence of green stones: 4 men have an exposure classified as possible employment and all of them also did farming (woodcutting, breeding), the woman's exposure was classified as environmental, she lived in an area where outcropping tremolite was detected but she also did farming and breeding. Interestingly, for 3 of these subjects the search for tremolite fibers in the lung was positive, at post mortem examination or in biopsy samples. As to the exposure of the other 7 cases not resident in towns with the presence of green stones: 3 cases have an exposure classified as probable employment (building, railroads, sugar refinery), 4 an exposure classified as possible employment (1 tyre repairer and 3 farmers).

Discussion: The presence of 4 cases of MM in subjects resident in towns with the presence of green stones emphasized the etiologic role of tremolite contained in the outcropping green rocks of the area, geologically characterized as argilloscisti. This underlines the role of the mesothelioma register as a system of epidemiological surveillance and an instrument for promoting public health and scientific research. The ReNaM COR Basilicata activities have introduced the requirement to adopt the aarliest protective measures for public health: plan of health-epidemiological surveillance of exposed population, counselling programs to help quit smoking, evaluation of fibers exposure of residents.

FLUORO-EDENITE POLLUTION AROUND BIANCAVILLA: STUDY OF THE RELATIONSHIP BETWEEN MORTALITY FROM MALIGNANT PLEURAL MESOTHELIOMA AND FIBRE DISTRIBUTION

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[ID 1572] - *No. 36 in Poster Area*

A significantly increased standardised rate of mortality (SMR) from malignant pleural mesothelioma (MPM) recorded among the population of Biancavilla (a town lying on the SW slope of the Etna volcano in Sicily, Italy) has been attributed to exposure to fluoro-edenite, a fibrous amphibole identified in lava rocks and in building materials extracted from a local stone quarry.

We calculated the SMR from MPM in the area of Biancavilla from 1988 to 2001 and compared it with that of the general Italian population. To establish fluoro-edenite fibre diffusion, we studied their concentration in the lymph-nodes draining the pulmonary lobes of 40 healthy sheep from 4 flocks (10/flock) whose pasture areas lay about 3 km from Biancavilla and from 10 control sheep from a flock grazing 30 km away. Half of the cranial tracheobronchial and one middle mediastinal lymph-node, and four lung tissue samples were collected from each animal and studied by light and

scanning electron microscopy (SEM).
Between 1998 and 2001, 25 patients (17 males and 8 females, mean age 58.2 ± 12.3 years) died from MPM in the area. The SMR was 471 for males and 442 for females and was significantly greater than that of the general population (95% CI). Analysis of the occupational background of these subjects showed that only 7 (29%) had been exposed to the risk of inhalation of fibre-containing dust, and that the remaining 17 were farmers and housewives. SEM observations showed fluoro-edenite fibres 8-41 µm in length and 0.4-1.39 µm in diameter in both lymph-nodes and lung tissue from all exposed animals, but never in those from control sheep. The mean number of fibres ranged from 0.06 ± 0.01 to 0.11 ± 0.05 x10^6 fibres/g dry tissue.
Our results document the risk of inhalation of fluoro-edenite fibres a few kilometres from the town.

HEALTH CARE WORKERS

WORK ABILITY AND PSYCHOSOCIAL AND ORGANISATIONAL FACTORS IN NURSING PERSONNEL IN HOME CARE IN BELGIUM

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[ID 55] - *No. 37 in Poster Area*

Aim.
The aim of the study was to evaluate the influence of psychosocial and organisational factors on work ability (WA) in nurses working in home care.
Methods.
Within the NEXT study project a cross-sectional questionnaire study was performed in 2075 nurses working in 10 home care services in Belgium. WA was assessed by means of the Work Ability Index (WAI) questionnaire. Logistic regression analysis was used to identify the variables that contributed significantly to a 'poor' WA (WAI <37). Organisational, psychosocial and physical work factors considered in the analysis were: emotional demands, quantitative demands, decision latitude, social support from superiors and colleagues, possibilities for development, quality of leadership, harassment, insecurity at work, rotating shifts, underqualification, lack of information, conflicting demands and dissatisfaction with information transfer between shifts, lifting, bending and use of lifting aids. As confounders were considered: number of working hours, job title, seniority, age, gender, overcommitment and family strain affecting work.
Results.
Eventually 1649 nurses took part in the study (79.5% response rate). The mean WAI was 40.9. After correction for age (OR 1.03; 95%CI 1.01-1.05), overcommitment (OR 1.18; 95%CI 1.12-1.25) and family strain affecting work (OR 1.27; 95%CI 1.07-1.50), conflicting demands (OR 1.69; 95%CI 1.31-2.18) increased the risk for a poor WA, while decision latitude (OR 0.70; 95%CI 0.55-0.88) and possibilities for development (OR 0.60; 95%CI 0.46-0.77) decreased the risk for a poor WA.
Conclusion.
Three non-occupational factors turned out to be significant confounders (age, family strain affecting work and overcommitment). These findings are similar to a previous study in Belgian hospital nurses within the same study project. Increasing decision latitude and possibilities for development would increase WA. Measures to decrease conflicting demands would increase WA.

PRELIMINARY INVESTIGATION ON SPECIFIC WORKING CONDITIONS IN SOME HEALTH CARE FACILITIES

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[ID 165] - *No. 38 in Poster Area*

A cross sectional study was conducted in 80 health care facilities at Central, provincial, district and commune levels to aim at evaluation of specific working conditions in health care workers and recommendation of measures for improvement of working conditions. Measurement of working conditions was done in some Central health care facilities. 1509 medical staffs were interviewed on perceptual current working conditions in their health care facilities.
The study results showed that in almost studied health care facilities, the working environment met Permissible Exposure Limits (PEL) in terms of room temperature, humidity, air velocity, noise level and lighting, except some departments. The toxic gas (CO2, focmon, HCL) exceeded PEL by 1-30 times at the pathological departments, rooms for treatment of medical wastes and patients' rooms. The radiation level in some X-ray rooms and radiative treatment rooms of Cancer Hopsital exceeded PEL by 224 times. The microbiological and diseases virus/germ indexes in some departments also exceeded PEL. These results of working environment measurement were in accordance with the results of interviewing medical staffs on perceptual working conditions. In general, the working environment in investigated health care facilities was assessed as rather good by medical staffs in terms of temperature, humidity, ventilation and noise. However, 74.5% of staffs were exposed to dusts, to chemicals/toxic gases (31.5%), radiation (19%) and disease viruses/germs (65.6%); 36% of them were working with prolonged standing postures. 58.8% of staffs had to work in night duty. 67.6% of staffs assessed the current work with high and very high responsibility. The work in health care facilities was very stress due to reaction by patients and patients' relatives (35.3%) such as quarrelling (59.4%), threatening (28.8%) and 11.8% of medical staffs were ever assaulted by patients and patients' relatives. 96.6% of medical staffs were frequently exposed to blood and other body liquids during work. Many staffs were contaminated by blood and other body liquids in their skin and membranes (99.6%). Majority of staffs were provided enough PPEs (91.6%), especially protective clothes.
Authors proposed that measures for improvement of working environment should be applied in health care facilities, especially, at workplaces where medical staffs were exposed to toxic chemicals/gases, radiation and disease germs/viruses. In addition, appropriate work-rest cycle should be developed and measures for reducing physical workload and occupational stress should be applied for medical staffs.

OCCUPATIONAL HEALTH AND INJURIES IN MEDICAL STAFFS AT SOME HEALTH CARE FACILITIES

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[ID 166] - *No. 39 in Poster Area*

A cross sectional study was carried at 74 health care facilities at provincial, district and commune levels to evaluate the current situation of occupational health and injury in medical staffs and to propose measures for health care, health protection and promotion for medical staffs. Interview by questionnaire was applied in 1494 medical staffs working in therapeutic and epidemic preventive medicine.
The study results showed that the rate of sickness among medical staffs one month before investigation was 85.4%. The common diseases were coughing, cold, fever (51.6%), low back pain (17.)6%), headache and insomnia (6.4%), ENT diseases (6%), diarrhea (3.2%). Total number of sick days were 1304 days, in which sick leave for 1-3 days were majority (70.7%). The rate of getting chronic diseases lasting more than 3 months was 26.6%. The common diseases were stomach and duodenum ulcer (41%); goiter (39.3%); occupational diseases (23.8%); hypertension (18.1%); chronic arthritis (6.8%), respiratory diseases (6%); cardiovascular diseases (5.8%); and diabetes (1.3%). The rate of disease infection at work during the last 5 years was 25.5%. The infectious diseases included respiratory diseases (27.6%) such as acute respiratory diseases (SARS) (10.5%), tuberculosis (20%), and pneumonia (37.1%); digestive diseases (8.4%) including mainly dysentery (71.9%), chochlea (12.5%); blood transmitted diseases (6.8%) including malaria (26.9%), HIV/AIDS (23.1%), hepatitis B/C (50%); infectious skin and membrane diseases (11%). The rate of general injuries among investigated medical staffs was 37.5%. The location of injury was mainly on hands and legs (39.6%). The severity of injury was mainly mild (84.6%). The rate of needle stick injuries in investigated medical staffs was 32.3%. The instruments/equipment causing most injuries were needles for injection under skin (31.8%) and wing needles (20.8%). The operations causing mostly injuries were cleaning patient care instruments and doing surgery (15.1%), during and after injection (11.3%), covering needles and during operation (7.5%), disposal of instrument/equipment after use (5.7%) and reusing health care instruments (1.9%). The location of injuries were mainly on hands (92.5%). The major types of injuries were

chapped skin/blooding (61.6%) and peeled skin (38.4%). Majority of medical staffs when getting needle stick injuries did not use PPEs (69.2%). When getting injured, two third of staffs sterilized the injured areas. 1/3 of staffs pressed/squeezed blood and 1% of staffs did nothing. After getting injuries, almost of staffs were vaccinated (92.3%), taking antibiotics (2.7%) and taking anti virus drugs (5.1%). Authors suggested that measures for enhancement of knowledge on occupational hazards and risks and awareness on prevention of disease infection by themselves among medical staffs should be applied in health care facilities in order to protect medical staffs' health

EFFECT OF WEB-BASED ASSERTIVENESS TRAINING FOR STRESS MANAGEMENT OF JAPANESE NURSES

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[ID 196] - *No. 40 in Poster Area*

Job Stress of Japanese hospital nurses was reported to be high; one of the main reasons is personal relation. Assertion skills could help nurses manage their personal relations and job stress; low cost web-based training was easy to introduce and be used by shift-workers. This study examined the effects of web-based assertiveness training programs for Japanese nurses based on their knowledge and skills of assertion, job stress, and mental health status.

Twenty-five nurses from an urban tertiary hospital in western Japan completed the 70 minute program during three weeks in Mar 2005. To investigate the training effect, participants responded to the questionnaire at pre-training, post-training, and a month later. The questionnaire included knowledge and skills of assertion, job stress, and mental health status.

Average age was 32.7, and over three response times, average job stress scores were similar to previous research. The average assertion-skill scores were moderately high at around 3 points out of 4 on a Likkert scale.

We tested the changes between pre- and post-training, and pre- and a month later training using Wilcoxon Signed Rank Test. Assertion knowledge and voluntary behavior in assertion skills had increased at post-training, and stayed higher a month later.

For each factor, we selected the lower score participants below median and tested the changes again; it was difficult for high score participants to increase their assertion knowledge and skills. From the result, self-expression, respect for others, and rational belief in assertion skills tended to increase for lower score participants.

When we focused on job stress, mental workload of job stress tended to decrease in low-score participants in self-expression, respect others, and voluntary behavior of assertion skills.

MEDICAL STUDENTS - A SPECIFIC TARGET GROUP FOR HEALTH PROMOTION AND OCCUPATIONAL HEALTH?

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[ID 233] - *No. 41 in Poster Area*

Worldwide medical students are trained in their professional roles as physicians healing patients from diseases. But future medicine will be more and more preventive, assisting people in keeping healthy by different preventive measures. The question wether future generations of physicians will be skillfull in the art of health and healing, has been answered by the American Medical Students Association in the way that they say: Your first patient is you.

This challenge in mind we started a couple of years ago to look at the health and health behaviour of medical students with the aim to find out whether there is an elevated risk for them to fall ill or take over risky behaviors due to an unstable training-life-balance during university training.

After a literature review we conducted from 2004 to 2006 several questionnaire and interview studies with n=400 medical students at Freiburg university to find out to which degree our hypotheses of potentially hazardous training conditions are suitable to be tested in greater samples. Research work was mainly done by medical students themselves, so that their own questions and experiences could be included. Standardised questionnaires and focus interviews were conducted under the supervision of an university teacher.

The more practical question was how medical students would assess the need for an occupational health services for themselves offering screening, diagnosis, consultation and treating services with regard to already existing services in the university setting. A special focus will be laid on psychosocial risk factors.

First results show that especially medical students often are not aware of their own health risk and a lack of skills to cope with these conditions either personally or as a group.

The contribution finally will discuss the question, wether an occupational health service could be helpfull in supporting those students in seek for help.

PREVALENCE OF WORK RELATED ILLNESSES IN HEALTHCAREWORKERS IN A HOSPITAL OF LIMA DURING PERIOD 2000-2005.

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[ID 240] - *No. 42 in Poster Area*

Background: There are numerous reports of illnesses for biological agents in healthcareworkers (HCW), however every day enlarge the number of illnesses caused by other factors in this type of workplace.

Objective: To determine the annual prevalence of Work Related Illnesses (WRI) in the population of HCW of HNGAI, during period 2000-2005.

Design : Cross Sectional

Methods: We reviewed 7361 Occupational Medical Exams were achieved, one per year for HCW of the HNGAI from January 2000 to June 2005. The occupational data, pathological antecedents, occupational injuries and results of ancilliary tests were registered in Occupational Medical Record designed specifically for this population. The evaluations also included a physical examination according to occupational risk factors identified by UOH, chest x-rays, and a blood sample for measurement biochemistry (alanine aminotransferase levels), hematological and serologic assays . The criteria used were International Statistical Clasification of Diseases and Related Health Problems in Occupational Health (ICD10) of World Health Organization.

Results: 944 WRI was diagnosed in the period of study; 133, 225, 254,181, 94 respectively and 57 cases in first six months of 2005.

The annual rates were 8.7, 14.3, 16, 13.3, 14.5 and 8.6% of the total of HCW evaluated. The most frequent were for ergonomic factors (93.5%; 883), continued by chemical factors (3.9%; 37). In the first group, Lowback pain (59%; 521), Upper back pain (13%; 115), Neck pain (11.6%; 103) and Visual Fatigue (8.3%; 73), while Contact Dermatitis for soaps represented 94% of those related to chemical.

Nine workers were diagnosed with Hepatitis C, and 4 with Hepatitis B chronic.

Conclusions: The WRI for ergonomic factors are high prevalence in this population. The illnesses for biological agents in this population were not diagnosed in this exam, but through specific survaillance programs of occupational injuries and immunizations as well as of tuberculosis in HCW.

PREVALENCE OF WORK RELATED ILLNESSES FOR BIOLOGICAL AGENTS IN HEALTHCAREWORKERS IN A HOSPITAL OF LIMA DURING PERIOD 2000-2005

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[ID 241] - *No. 43 in Poster Area*

Objective: To determine the morbidity for TB and HV in HCW of the HNGAI, during the period 2000-2005.

Design : Cross Sectional

Methods: Population: 3662 workers. Were revised database of survaillance program of: a) TB and b)Occupational Injuries and Immunizations of UOH, from January 2000 to June 2005.

Definition of case TB: HCW who had identification of M.Tuberculosis in sputum sample and/or culture and/or bronchoalveolar o gastric lavage and/or abnormal chest radiograph, and was treated with standardized course chemotherapy.

Definition of case HV: If HCW had a blood sample with AcHVC and/or, HbsAg and/or HbcAcIgM positive. The samples were analyzed in Immunodiagnostic Lab2-HNGAI, with Microparticles Enzymatic Immunoanalysis techniques (MEIA, AXSYM -Lab. Abbott) and a confirmatory test INNO-LIA HCV Ab III Update (Lab. Innogenetics).

Results:

TB: 53 HCW; 14, 17, 10, 8 and 4 cases per year, respectively. During the first semester of the 2005 there was not any case. The rates of incidence were 3.82, 4.64, 2.73, 2.18 and 1.1 for 1000.

HV: Hepatitis C: For groups, the seroprevalence of AcHVC was 0.75% in

nurses, 0.78 in nursing technicians and 0.63% in physicians. The rates of HVC indeterminate was 1% in nurses, 0.58% in nurse technicians, 0.63% in physicians and 11.1% in odontologists. There was not cases in Obstetricians or laboratory technician.
Hepatitis B: There were 8 HCW with HbsAg and Anti Hbc reactive in the period of study, the rate of seroprevalence were: 3.3% (1/30) in obstetricians, 0.79% (1/126) in laboratory technician, 0.39% (2/510) in nurse technicians, 0.38% (3/777) in nurses, y 0.18% (1 /547) in phyicians.
Conclusions: We founded high rate of incidence of tuberculosis in HCW of the HNGAI that maintains a decreasing course in the period of study.
The prevalence of infection for Hepatitis C and Hepatitis B is low in this population of HCW evaluated.

MENTAL HEALTH, BURNOUT AND JOB SATISFACTION OF PRIMARY HEALTH CARE WORKERS IN KOCAELI-TURKIYE, AFTER THE MARMARA EARTHQUAKE.

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[ID 269] - *No. 44 in Poster Area*

Aims: Natural disasters were responsible for about 3 million deaths during the past 20 years and have adversely affected the lives of at least 800 million people. Among health workers and other rescuers have been observed examples of psychological symptoms/disorders after disasters. The first aim of this study was to determine psychological distress of health workers in the primary health care units in the Körfez District of Kocaeli, and secondly the investigation of the job related stress, burnout, job satisfaction, and their association with the psychological distress of health workers.
Material and methods: The study was carried out on 10 primary health care units in Körfez. Of a total 101 health staffs, 82% was accepted to participate in the study; data was collected from 83 health staff. In this study, psychological distress was measured using the 12 item GHQ-12.
Findings: In our study 73.7% of the health workers had high GHQ scores. There is a positive correlation between GHQ scores and work related strain and emotional exhaustion ($p<0.000$). There was negative relation between work related strain and job satisfaction and positive relation between emotional exhaustion and personal accomplishment ($p<0.05$).
Working in the region during the earthquake has had no effect on the GHQ scores, job satisfaction, work related strain and burnout levels of the workers. The facts that work related strain, burnout and job satisfaction are not correlated to earthquake and that similar results were obtained in the researches which were carried out at ordinary times, make us think that working conditions are more effective than earthquake.
Conclusion It is a fact that the improvements in both well-being and job satisfaction of health workers will also improve the quality and efficiency of the services they render.

JOB RELATED STRESS, DISSATISFACTION AND THEIR ASSOCIATED FACTORS AMONG DOCTORS IN KARACHI, PAKISTAN.

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[ID 353] - *No. 45 in Poster Area*

OBJECTIVES: Job stress is a recognized problem among health care providers. Job stress and dissatisfaction among doctors affect the quality of health care and patient's satisfaction. The objectives of this study were to assess the levels of job stress, dissatisfaction and their associated factors among doctors of three teaching hospitals in Karachi.
METHODS: A postal-survey was conducted in Karachi through which level of job stress and dissatisfaction were assessed and graded by Likert scale (1 = very low to 5 = very high). Out of 270 doctors approached 189 (70%) responded and 182 questionnaires (males 58%, females 42%) were found complete for analysis.
RESULTS: Overall, 48% of doctors graded job stress from high to very high levels. The mean stress score was 3.32 (SE 0.09). Females had slightly higher level of stress than males (females: mean score = 3.39; males: mean score = 3.27). Job stress was affecting 66%, 45% and 53% of doctor's family lives, physical health and mental health respectively. Sixty-eight percent of doctors were not satisfied with their jobs (males 65% and females 72%). Overall, the mean lowest scores for job dissatisfaction were found for pay and benefits 2.12 (SE 0.8), safety and security 2.15 (SE 0.8), resources 2.69 (SE 0.09), workload 2.69 (SE 0.9) and physical working conditions 2.79 (SE 0.08).
CONCLUSION: Majority of doctors working in these teaching hospitals of Karachi had higher levels of job stress and dissatisfaction. Factors found to be associated with theses conditions were preventable/modifiable to a larger extent This study invites further research and intervention studies to identify preventive strategies and interventions and also to assess the impact of these interventions.

SUPINE PATIENT TRANSFERS: MUSCLE ACTIVITY AND PERCEIVED EXERTION USING DIFFERENT SLIDING SHEETS

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[ID 537] - *No. 46 in Poster Area*

Sliding sheets are commonly used in clinical and community care settings and are advocated as a risk reduction measure. Despite their extensive and recommended use, currently, there is a lack of research investigating their effects.
This study aimed to investigate Upper Trapezius (UT) and Lumbar Erector Spinae (ES) muscle activity and ratings of perceived exertion when using three different types of sliding sheets during a supine patient transfer up the bed.
Twelve right-handed females participated in this laboratory experiment. For ethical reasons and protocol standardisation a resuscitation mannequin weighing 30 kilograms was used as the patient. The 'patient' was transferred with the Phil-E-Slide, Maxislide and Multiglide, using a two-person technique. Surface electromyography was used to assess bilateral UT and Lumbar ES muscle activity, and the 10-point Borg CR-10 Scale was used to rate perceived exertion (RPE). All EMG results were normalised as a percentage of reference voluntary contraction (%RVC).
There was very little variation in results between the three different sliding sheets. UT activity levels for the right and left sides respectively were: 101.2%RVC and 86.8%RVC for the Multiglide; 100.7%RVC and 86.5%RVC for the Phil-E-Slide, and 90.2%RVC and 74.2%RVC for the Maxislide. ES activity levels for the right and left sides were: 147.6%RVC and 143.3%RVC for the Multiglide; 141.4%RVC and 151.9%RVC for the Phil-E-Slide, and 147.6%RVC and 155.4%RVC for the Maxislide. The median RPE scores were low, ranging from 1.0 for the Multiglide; 2.0 for the Phil-E-Slide; and 1.5 for the Maxislide. None of these differences were statistically significant ($p>0.05$) in the activity of right or left UT or ES muscles, or RPE when comparing the sheets.
All the sliding sheets required approximately the same amount of muscle activity. However, the differing muscle activity levels between right and left sides demonstrate that sliding patients up the bed is an asymmetrical technique, implying that healthcare practitioners should endeavour to alternate regularly between sides of the bed.

INVESTIGATION OF CARE WORKERS' LOW BACK PAIN IN SPECIAL NURSING HOMES

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[ID 657] - *No. 47 in Poster Area*

In Japan, the elderly population is growing rapidly. The long term care insurance system was established in 2000. It's intended to provide social support for the elderly, therefore nursing facilities and home-care services are increasing. Along with it, the number of care workers also is increasing every year. The low back pain (LBP) is raised as one of the most important health problems for care workers. Actually a lot of reports say that the morbidity of LBP in care workers is almost over 80%. Care workers are in one of the occupational groups that are most frequently affected by LBP, because they're always doing physically heavy labor and repetitive and static work.
In addition, it is suggested that lack of care workers, irregular working schedules and psychic stresses also cause LBP. Consequentially, it is feared that care workers' LBP leads to lowering of the quality of nursing. The purpose of this research is to clarify the current state of preventive measures against LBP and problems for care workers in the special nursing homes.
Method:
Interviews were done to 17 special elderly nursing homes in September and October 2005.

Result:
A lot of the facilities held seminar or guidance for the way of nursing focused on body mechanics. The improvements of the way of nursing were useful for decrease in amount of work.
There were a lot of care workers who were using the corset in order to prevent LBP, too.
However, few facilities have the opportunity for discussing care workers' own health problems.
Conclusion:
In order to keep the quality of nursing, care workers should keep being healthy.
For that, it is important that they have consciousness to improve their own ways of nursing.
Consequentially, it is suggested that those improvements will lead to care receivers' safety and ease.

ANALYSIS OF THE MICROCLIMATIC CONDITIONS AND CONTAINMENT OF RISK FROM PROFESSIONAL EXPOSURE INSIDE THE SURGERY ROOMS: PRELIMINARY RESULTS

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[ID 701] - *No. 48 in Poster Area*

In this work the microclimatic and ventilation data, collected during surgical operations inside 80 surgery rooms of 20 hospitals in order to evaluate the exposure conditions of the staff, have been statistically treated and compared with the appropriate limits recommended by the Italian law (ex d.p.r. 37/97) through a specific government decree issued to protect surgeons and nurses from risks deriving from their particular working typology.
Data analysis shows a good microclimatic condition for all the categories of workers involved in the screening, being less than 20% the number of cases for which the Predicted Percentage of Dissatisfied (PPD) >10. Nevertheless this evidence is not always associated with the respect of the microclimatic parameters established by law which are exceeded in more than 50% of the measurements. In particular the air temperature exceeds the limits in 24%, whereas air speed and relative humidity exceed the respective limits in 56% and 76% of the investigated surgery rooms. The last circumstance represents a weakness point in the definition of the criteria of acceptability which could be reviewed considering the technical and economical efforts of the administrations in maintaining those parameters within the recommended range.
The air conditioning systems analysis shows a more complex and worrisome condition since these plants should ensure 15 hourly air changes to keep the air healthy. Only 18% of cases have complied with the law but, the correlation between the measured physical parameters and the monitored anesthetic gases levels show just a weak coherence between the expectations due to the observance of the prescriptions and the real containment of the risks. Furthermore, the preliminary results show that the recommended number of air change is a sufficient condition in the absence of the anesthetic equipment failure but not a necessary condition in standard operation.

CHRONIC PSYCHOSOCIAL STRESS AT WORK AMONG MACEDONIAN DENTISTS

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[ID 775] - *No. 49 in Poster Area*

The aim of this study, as a segment of a national project concerning occupational risks in healthcare workers (HCW), was to demonstrate the impact of stress at work on the health of examined group of dentists.
Methods: Two groups of HCW were examined: Group-I (68 dentists) and Group-II (Control group – 29 administration HCW), without significant difference according to age, gender, and work duration. Cornell index test was used in the evaluation of general neuroticism and neurotic tendencies and Profile Index of Emotions test in the personality characteristics and internal conflicts estimation. Stress factors and effects were assessed by "Occupational stress in HCW" and "Maslach Burnout Inventory". Results and discussion: General neuroticism was registered in both groups - Group-I (16,2%) vs. Group-II (13,79%) (p>0,05). The most frequent neurotic tendencies in Group-I were: anxious (29,4%), phobic (17,6%), cardiovascular conversion (19,1%) tendency, linked with behavioral and somatic disturbances. Deviations of emotional behavior were recognized: exploration (29,4%) with basic emotion expectation, deprivation with sorrow (29,4%), and lack of self-control with surprise (11,8%). The most frequent workplace stress factors in Group-I were: self accomplishment reduction (75%), lack in work organization (69,1%), work with infectious diseases (66,2%), and low estimation (66,2%). Emergency interventions (33,8% vs. 10,3%, p<0,05) and work with infectious diseases (66,2% vs. 31%, p<0,01) as a stress factors at work were significantly higher in Group-I. An emotional exhaustion (25%), depersonalization (14,7%) and self accomplishment reduction (33,8%) were recognized as a strong effects of chronic psychosocial stress at work in dentistry HCW. Emotional exhaustion was significantly related to workplace sharp injuries in examined dentists (p<0,01). Burnout Syndrome was defined in 4,4% of examined dentists. There is a urgent need for implementation of health promotion program and preventive actions against stress at work in Macedonian dentistry HCW.

PSYCHOSOCIAL JOB FACTORS AND MUSCULOSKELETAL DISORDERS: A SURVEY AMONG NURSING PERSONNEL IN AN ITALIAN HOSPITAL

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[ID 964] - *No. 50 in Poster Area*

Background: epidemiological studies show that psychosocial aspects could be risk factors for musculoskeletal disorders (MSD) in nursing staff.
Objectives: to study the association between psychosocial factors and MSD risk among nurses performing manual handling of patients at a large Northern Italy hospital.
Methods: a cross-sectional study was performed within the framework of a multidisciplinary intervention on MSD, involving 438 nurses and aides employed in wards with medium-high risk level for low back disorders. A questionnaire was administered to collect information about occupational history, individual characteristics and MSD occurrence (low back, neck, shoulders). Psychosocial aspects were evaluated by means of self-administered Karasek's "Job Content Questionnaire" (JCQ), Maslach Burnout Inventory (MBI) and Spielberger's state-trait anxiety inventory (STAI). For JCQ, high and low categories were determined by a cut off point at the median of the distribution of the total score of each of this two variables. Workers were classified into four groups: "high strain", i.e. high psychological demands and low decision latitude; "active" group, i.e. high decision latitude and high psychological demands; "passive" group, i.e. low decision latitude and low psychological demands; "reference" group, i.e. high decision latitude and low psychological demand.
Results and discussion: among nursing personnel (71,5 % females, 21,5 % males; 55,7% nurses; 38,6% aides; 5,7% head nurses; length of employment 10 years), prevalence of acute low back pain (LBP) (< 12 weeks in the preceding 12 months) and chronic LBP (> 12 weeks in the preceding 12 months) was 29% and 18%. 390 Psychosocial questionnaires were analysed. For JCQ, 24% were classified as high strain, 22% as passive, 24% as active and 33% as reference.
No relevant association was detected among all JCQ groups, MBI and STAI scores and any back pain. Analysis is under way for neck and shoulder data; longitudinal follow-up of psychosocial factors is scheduled next months within the current health surveillance activities.

ANALYSIS OF THE STRUCTURE OF A QUESTIONAIRE ABOUT HOSPITAL WORKERS' WELL BEING AT WORK

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[ID 1067] - *No. 51 in Poster Area*

A questionnaire about hospital workers' well-being at work needs had been set up from the workers' expressions in a previous qualitative study in the University Hospital of Liège. The core of this questionnaire is composed of 62 items and one question about the 5 top priorities among the 62 items. For each item, the subjects can give an assessment of its frequency/intensity in their work and of its importance for their well-being at work on a 4-point Likert scale.
The items are distributed in 7 domains:
1. work environment, (20 items)
2. individual protection and services to the staff, (6 items)
3. quality and interest of the work, (9 items)

4. relationships with patients and visitors, (8 items)
5. relationships with co-workers and unit members, (11 items)
6. relationships with management, (12 items)
7. work organisation (including workload and stress) (16 items).
Because of their phrasing, some items were present in 2 domains (e.g. "ambient noise makes conversations between colleagues difficult")
The questionnaire has been distributed in 4 hospitals in the Liège area (2410 workers, 609 valid questionnaires – overall response rate 25,27%).
A principal component analysis has been performed on the importance scores for each domain, in order to extract the main factors explaining the variability of the subjects' well-being at work. Here are the factors extracted:
Domain 1 : climatic conditions (temperature, ventilation), noise and lack of space, working equipment;
2 : protection against and information about infectious risks;
3 : one about quality of work and errors, and the patient's gratitude;
4 : explanations to and dialog with the patients, and the patients attitude towards the staff;
5 : relationships with the team's head, relationships with and attitude of co-workers, and noise;
6 : relationships with management, and the doctors' attitude;
7 : working in a hurry, material conditions of work (noise, lack of space), and involvement in work organisation.
Most of the factors extracted agree with job satisfaction factors revealed in other studies and this analysis may lead to a shorter version of this questionnaire, easier for the subjects to answer to.

WORK STRESS, EFFORT-REWARD IMBALANCE AND ANXIETY DISORDERS IN YOUNG DOCTORS

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[ID 1188] - *No. 52 in Poster Area*

Objectives:
Medical doctors are at greater risk for developing mood disorders than the general population. In this study, we examined the relationship between work stress, effort-reward imbalance (ERI) and anxiety disorders in medical doctors in training, working in several hospitals.
Methods:
1000 eligible doctors in training for different medical disciplines received standardized questionnaires by mail covering the analysis of work load (an objective description of stressors and resources), as well as aspects of subjective strain, health, personality and social situation. 318 women and 303 men took part in the study (response rate: 62.1%). The mean age of the participants was 30.5 (± 2.7) years.
Results:
We found critically high levels for the stressors time pressure, poor information management, responsibility, contradictory goals, interruptions, allocation of patients, and employee turnover and low levels for the resources autonomy, participation chances, personnel resources and training. The effort-reward ratio ranged between 0.2 and 2.93, mean ratio: 0.8 (±0.3); 17.9 % of all subjects had a critical ratio >1. 23.3% of the participants had critical levels on the Anxiety-State-Scale. There were no gender, age, or position differences regarding critical levels of anxiety or ERI; yet, women and single persons had higher mean anxiety levels. Objective work stressors and work-related resources correlated moderately to high to perceived effort and reward. Anxiety as state and trait correlated positively to effort and negatively to reward. Results of linear regression analysis revealed that work factors explained about 50% of the effort and 37% of the reward variance. The work factors and the ERI components explained 24.7 %, gender and partnership added 2% of the anxiety variance.
Conclusions:
Adverse working conditions strongly contribute to the perception of effort-reward imbalance at work by young doctors, which in turn is related to general anxiety. Those well defined working conditions are thus potential targets for interventions.

WORKING ENVIRONMENT AND HEALTH WORKERS: A RECLECTION ABOUT THE SOCIAL INTERACTION

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[ID 1196] - *No. 53 in Poster Area*

It's a theoretical reflection, whose aim is to incite health workers to think about working environment as a place of interactions. Working in health area involves contact with persons: clients, their relatives and the different team members. However nowadays, due to requirement for specialization, work has been carried through in an isolated way, in which each professional answer for a certain part of the activity. This way, the straight contact among people that share the same working environment is decreasing and the relationship between them is impersonal and has little constructive meaning. Consequences of this superficiality are incomprehension, misunderstanding and conflict. The data to this theoretical reflection were obtained through non-systematic observation and literature review. We notice that even tough interaction constitute part of daily work in health area, many interpersonal relationships developed in this environment are destructive, generate physical and mental disorder and don't propitiate the self-esteem, neither the professional valorization. It could be demonstrate by increasing incidence of illness and mental disorders in health workers as stress, depression, burnout, panic syndrome. Besides the diseases there many others aspects related as absenteeism, dissatisfaction, abandon of profession, indifference in the contact with clients and colleagues, and also suicide could be pointed. Thus, is important that the health workers and the institutions look for alternatives that propitiate a suitable working environment to the own worker. Is necessary to improve the human relationships, to fortify the communication, to form team spirit and sustain high ethical patterns. Human beings need to learn again to live with each other, respecting the differences, valorizing qualities and looking for understanding the others by their perspective. In this way, we will be able to coexist in a harmonic and equalitarian way, receiving the same treat with ourselves and guarantying the right of expression, autonomy and freedom.

THE EFFECTS OF QUALITATIVE AND QUANTITATIVE JOB INSECURITY ON DEPRESSION AND ANXIETY IN NURSES

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[ID 1210] - *No. 54 in Poster Area*

Introduction
Structure of working life has changed over the past two decades. In particular downsizing and free market economy have contributed a shift in the labour market from permanent working to flexible working, including the health care services. Among the health care workers, nurses have been prone to negative consequences of job insecurity.
Aim: To determine the effects of quantıtatıve and qualıtatıve job insecurity on depression and anxiety among nurses.
Design: Quantitative and qualitative measures of job insecurity were assessed by means of a questionnaire. A hospital anxiety and depression scale were used to assess subjective anxiety and depression.
Setting: A cross sectional study (n=462). Participants were nurses in private hospitals in Izmir, Turkey.
Results:
Interitem reliability coefficients for the quantitative and qualitative job insecurity scale were 0.73 and 0.83 respectively.
Mean age of the study group was 27.7 ± 7.3 (range between 19 and 57). 34.4% of the study group were involved in shift work, 34.4% were working in night shifts and 72.3% were doıng overtime work. Anxiety and depression levels were not associated with education, gender, and income.
Anxiety scores were significantly higher among the workers involved in shift work (p=0.001).
Job insecurity was significantly associated to depression and anxiety levels (p<0.001, and p<0.001 respectively); the higher the job insecurity, higher depression and anxiety scores.
After adjusted for age, shift work and work duration, anxiety (OR=4.5 CI:

2.5-7.9) and depression (OR=3.0, CI: 1.9-4.7) risks were higher among quantitatively insecure nurses.
Similarly age, shift work and work duration adjusted odds were significantly higher for anxiety (OR=3.5 CI: 2.0-5.9) and depression (OR=3.8, CI: 2.4-5.9) among qualitative insecure nurses.
Conclusion:
Qualitative and quantitative job insecurity significantly effect anxiety and depression levels of nurses working in private hospitals.

OCCUPATIONAL STRESS AMONG NURSES IN GENERAL HOSPITALS IN TAIWAN

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[ID 1214] - *No. 55 in Poster Area*

Introduction. Job stress in nurses can be caused by heavy workload, shift work, emergency, needle stick and infectious disease. A significant relationship was found between job stress and depression, frustration, hopelessness, job dissatisfaction and burnout in nurses. The objective of this study is to assess the association between job stress and nurses' subjective perception of mental health.
Methods. Our participants are nurses working in 5 psychiatric hospitals and 4 general hospitals in Taiwan. A structured questionnaire was used for this survey. Job stress questionnaire was based on the conceptual framework of job stress model- Karasek's demand-control model (JCQ), Johannes Siegrist's effort-reward imbalance model (ERI) and added items of job stressors which included assault and shift work. Mental health status was assessed by the Taiwan Depression Questionnaire (TDQ).
Results. A total of 1030 questionnaires were completed . In psychiatric hospitals, the 14.8% of the nurses were in the effort-reward imbalanced group and the 16.7% were depressive syndrome. Working in direct patient care was associated with effort-reward imbalanced than administrative nurse and rotating shirt work was associated with poor mental health. On the other hand, 21.8% of nurses had effort-reward imbalanced and 24.0% had depressive syndrome in general hospitals. Working in direct patient care and rotating shirt work were associated with effort-reward imbalanced and less than 5 years of working tenure was associated with poor mental health. The percentage of nurses with depressive syndrome was not different between psychiatric and general hospitals after adjusting for age. High demand and low control was a risk factor for depressive syndrome in nurses. High effort and low reward is also a risk factor for depressive syndrome in nurses.
Discussion/Conclusion. Nurses in general hospitals had higher effort-reward imbalanced then nurses in psychiatric hospitals. Younger age groups suffered from more depressive syndrome. As measured by JCQ and ERI model, job strain is a risk factor for depressive syndrome in nurses.

THE COMPARISON OF JOB STRESS IN JAPANESE HEALTH CARE WORKERS

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[ID 1265] - *No. 56 in Poster Area*

Aim: The aim of this study was to clarify the comparison of job stress in Japanese health care workers.
Methods: A survey was conducted of 433 full time workers of a general hospital using a self-administered questionnaire. A total of 349 health care workers (including 7 occupations; response rate, 93.1%), aged 21 to 60 years (mean=35.5, SD=10.4), were subjected to the final analyses. Job demands, job control, supervisor's support, coworker's support, physical response, and psychological response were measured using the Job stress questionnaire (Shimomitsu et al, 2004).
Results and Discussion: Oneway analyses of variance revealed that there were significant effects of occupational differences on job demands, supervisor's support, physical and psychological response ($p<0.05$). Nurses had the highest scores of job demands and psychological response. Clerks had the lowest score of supervisor's support and the highest score of physical response.
These findings indicate the importance of reduction of job demands and psychological stress actions for nurses. Similarly, these results are shown that clerks need the support from supervisors.

THE EXAMINATION OF THE SPECIALITIES OF HEALTH CARE WORKERS DEMANDING WORK

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[ID 1324] - *No. 57 in Poster Area*

OBJECTIVE: to evaluate the socio-demographics of the unemployed health care workers who is seeking jobs.
METHOD: our study was comprised of a diverse group of 65 unemployed health care workers who applied to the emloyment organization of Izmir. This group was a cross-section of 8812 unemployed workers applying for employment between January and April of 2005 at the Izmir Employment Organization (Turkey). The 65 unemployed health care workers represented 0.7% of the total applicants.
RESULTS: 80.0% of unemployed health care workers were female, 43.01% were between ages of 25-29, 93.8% graduated from a university or academy, 72.3% are married, 47.7% nurses, 3.1% doctors, 3.1% dentists, 1.5% dental lab. technicians, 1.5% dieticians, 7.7% doulas, 6.2%veterinarians, 12.3% biolog, 3.1% emergency room technicians, 1.5% biomedical technicians, 1.5% radiologist, 4.6% medical lab technicians, 3.1% biomedical research technicans, 1.5% biomedical appliance technicans, 1.5% medical records technicans. 63.1% of the group were applying for their first jobs, while 35.4% were laid off or otherwise let go from existing employment. 1.5% were seeking more lucrative or prestigious employment. 53.8% were unable to find jobs placement at the time of this study.
CONCLUSION: The fact of finding unemployed health care workers especially doctors in this study is baffling. Given the rising need for quality health care in Turkey makes it absolutely necessary that we evaluate the situation and find employment for these health care workers.

TAKING CARE OF HEALTH PROFESSIONALS

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[ID 1384] - *No. 58 in Poster Area*

The occupational health of the care givers has been studied and the hazards are known. But with the changes of the health services with new demands and conflicts, the professionals involved in health care are requested to take for their patients more care in their psychosocial aspects. In spite of their technical competence, these professionals aren't trained to handle with this special kind of demand.
This paper discuss the importance of opening a space of dialogue with health care staff permanently to help themselves to deal with the hand demand that patient ask for constantly.
Facing their difficult to deal with suffer, to support palliative care, for example, and to help their patients to go throw this period of life, whether it is acute or chronic, simple or complex disease, plus the difficulties of work conditions, these professionals often tend to leave their patients without a personal support and to be more technical.
Caring of the health professionals, beyond classics hazards, looking to how physicians, nurses and others members of health staff can be in touch with their own emotions, feelings, unconscious aspects and their workforce is necessary and must be improved in all health services. This methodology protect their own well-being and improves their emotional conditions to work in a more humanistic way, in order to minimize their patients suffering.

AN ASSESSMENT OF EXPOSURE TO GLUTARALDEHDE IN HOSPITALS: TYPICAL EXPOSURE LEVELS AND SUBJECTIVE SYMPTOMS AMONG WORKERS

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[ID 1621] - *No. 59 in Poster Area*

OBJECTIVES
Glutaraldehyde (GA) has been reported as a cause of skin and ocular toxicity among the hospital staff who used it as a disinfectant. An assessment of exposure to glutaraldehyde in endoscopy units was undertaken in 3 locations at six hospitals in Tokyo and Kanagawa area (Japan).
METHODS
Exposure measurements included personal sampling for peak (during biocide changeover) and background (endoscopy room, excluding biocide changeover) concentrations.
To characterize any exposure-response relations between GA vapor and the occurrence of work related symptoms. Subjective symptoms such as ophthalmic symptoms, nasal symptoms, respiratory symptoms, pharyngeal symptoms and nausea were more prevalent among workers than controls by the questionnaire survey.
RESULTS and CONCLUSION
The results obtained indicate that routine exposures of hospital workers to GA vapors concentrations of this compound are within the current United State occupational exposure limit of 50 ppb (Threshold Limit Value-Ceiling by ACGIH 2005). In Japan, however, the harmfulness of GA is still to be recognized in general and so, not yet recommended allowable concentrations for GA in the Japan Association of Industrial Health in 2005.
The personal exposure levels at the time of refilling work in the two units showed 94.2 and 84.9 ppb, which exceeded TLV-C 50 ppb in the ACGIH (U.S.A.).
Comparing with Subjective symptoms in the control groups, a total of 31 GA disinfecting workers complained more frequently ophthalmic symptoms in 14 (45.2 %, $p<0.01$), nasal symptoms in 12 (38.7 %, $p<0.01$), respiratory symptoms in 10 (32.3 %, $p<0.01$), pharyngeal symptoms in 8 (25.8 %, $p<0.01$), and nausea in 4 (12.9 %, $p<0.05$).

DETERMINANTS OF HEALTHCARE WORKERS COMPLIANCE WITH INFECTION CONTROL PROCEDURES IN HEALTHCARE: THE ROLE OF INDIVIDUAL, ORGANIZATIONAL AND ENVIRONMENTAL FACTORS

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[ID 1729] - *No. 60 in Poster Area*

Objectives: To ascertain determinants of healthcare worker (HCW) compliance with hospital-based infection control procedures. Design: Self-reported survey administered to a convenience sample of HCW from high-risk acute care hospital departments. Setting: Sixteen acute-care hospitals in British Columbia, Canada. Participants: A total of 1,290 HCW surveys were collected. Nurses (N=932) in intensive care units, emergency departments and general medical wards as well as physicians (N=114), respiratory technicians (N=118) and physiotherapists (N=126). Method: The survey was administered confidentially at the workplace. It included standardized tools measuring organizational and environmental factors, safety behavior and compliance, demographic factors and other health and work-related attributes. While the overall response rate was low (39%), this varied considerably across occupational groups. Results: In general, physicians were less likely to report complying with infection control procedures such as hand-washing and wearing an N95 mask than the other occupations although they were more likely to wear a disposable outer garment. Younger (<30 years) workers had better self-reported compliance than older (>50 years) workers. Only 5% of respondents rated their training on protective measures against infectious diseases as excellent and 30% felt they are not offered the necessary training to protect themselves. Self-reported compliance correlated strongly with both organizational factors (e.g. policies/procedures, training, communication, safety climate) as well as environmental factors (e.g. availability of equipment and supplies). However, no statistically significant correlation was found between individual factors (e.g. risk behaviour, perceptions) and compliance. Conclusions: Compliance with infection control procedures appears to be most strongly tied to environmental and organizational factors rather than individual factors. More attention is needed on infection control training for HCWs at high-risk for occupational exposures.

PREVENTION OF OCCUPATIONAL NEEDLE STICK INJURY IN SOME SELECTED HEALTH CARE SETTINGS IN HANOI

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[ID 1741] - *No. 61 in Poster Area*

A follow-up study was carried out in 642 health care workers (HCW) from 3 hospitals in Hanoi aiming at supporting the MoH in raising the awareness on the risks of needle-stick injury (NSI) transmission of HBV, HCV and HIV among HCWs in selected health care settings; applying effectively the prevention measures in practices; developing critical indicators for evaluating the impact of implementing measures for prevention of NSI and developing guidelines on prevention of NSI. The data collection tools were made based on the assessment tools recommended by WHO. Some adjustments were made to adapt to Vietnamese settings.
After a wide range of activities of the project on prevention of needle-stick injury among HCWs supported by WHO, such as questionnaire survey of HCWs, structured observation of injection, structured observation of equipment and supplies, interviewing of injection supervisor, providing training courses.... all of those 3 hospitals provided themselves with safety boxes in sufficient quantity for HCWs. It was one of the most important interventions of the project. Almost HCWs in selected hospitals assumed that activities of infection control and measures of needle-stick injury were very important and effective. 95.70% of HCWs assumed that the prevalence of NSI was reduced; 98.22% of HCWs took into more consideration the prevention of NSI at work…
In order to eliminate unsafe injections, to prevent occupational NSI and blood-borne transmissions to HCWs', to enhance HCWs' health as well as community health, some recommendations for application were given.

IMPLEMENTING THE UK VZV VACCINATION GUIDANCE FOR HEALTH CARE WORKERS - INCLUDING A HEALTH ECONOMIC EVALUATION.

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[ID 1921] - *No. 62 in Poster Area*

Introduction. This study investigates the implementation of new guidance in the UK on varicella vaccine for health care workers. HCWs with no previous history of chickenpox or shingles infection are tested serologically for their immunity. Those who are seronegative should be recommended the vaccine.
Methods. Staff numbers were estimated from workforce statistics (national and local), and the pre-employment health assessment activity of the occupational health service. The number of attendances of staff, after VZV exposure, at the occupational health service in one year (2003-04) was obtained. The cost of exclusion was based on the standard number of days of exclusion and the cost of an E-grade nurse (mid-point) for the year 2003-4. The workforce within NHS Argyll and Clyde included 500 staff working in priority groups, 1265 new entrants, and 7766 other staff with direct patient contact. Based on published papers an estimated 5% of staff were seronegative with an equal number in the positive and negative history groups. 68% of staff vaccine acceptance was taken from published work. In one year 48 staff attended the occupational health service after VZV exposure. A figure of 50 staff was used to calculate the number and cost of exclusions in this analysis.
Results: Overall 490 staff would be seronegative. Half of these would not be identified by the method of using the history as evidence of seropositivity. Of the other 245 seronegative staff only 163 would accept vaccination. 82 staff with a negative history would continue to be susceptible. A total of 327 staff would be seronegative and potentially susceptible to future VZV infection and the risk of transmitting VZV infection.
The estimated overall costs of the guideline, including the cost of exclusion from work were: a) High risk staff in post: £4,895 b) Cost of other cur-

rent workers and new starts in Year 1: £86,689 c) Annual cost of new staff screening thereafter: £22,418.
Conclusions: The implications of the current policy are that it will provide protection to approximately only 33% of the susceptible staff within the NHS area by testing the staff who do not give a history of past chickenpox or shingles infection. The health economic evaluation indicated that implementation of the guideline was not cost-neutral as suggested by UK Departments of Health.

OCCUPATIONAL HEALTH NURSING

CURRENT STATUS AND FUTURE DIRECTION OF OCCUPATIONAL HEALTH NURSING PRACTICES IN WORKPLACE MENTAL HEALTH PROMOTION IN JAPAN

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[ID 164] - *No. 63 in Poster Area*

This research aims to elucidate the current activities of occupational health nurses(OHNs) and their need for further development in workplace mental health promotion(WMHP) based upon a postal-questionnaire conducted on 830 OHNs.The sample population was characterised with either their memberships to recognized Japanese societies in related disciplines,or their records of taking the professional training at the Tokyo Occupational Health Promotion Center.
The results showed that more than 95% of respondents were aware of the necessity for further involvement in WMHP.And 85% of them implemented it actually and 78% considered their skills enough.There existed a strong need for further development of knowledge and skills for WMHP.
One of the salient function of OHNs in WMHP was providing the clients with appropriate consultation as their first professional contact point.Their intermediating role, in particular, is deemed of foremost importance in promoting and enabling the intra-firm collaboration and the linkage with external professionals in supporting the clients.
Despite an increasingly active enrolment by OHNs in WMHP, their activities ware often found to face with practical difficulties, due predominantly to;(1)the corporate culture that doesn't allow an organisational programme to support clients,(2)the general lack of concerns to WMHP by their superiors and OH physicians, and (3)the lack of understanding on the reles of OHNs by other professinoals.
Overall,the current activities facilitated by OHNs in the sample population were oriented more towards the promotion of inter-functional efforts to tackle an individual case in a given environment.However,relatively a little has been attempted to theorise a systemic organisational-wide approach to prevent OH problems.This gives implications to the future tasks in OH nursing in both practical and educational senses.
This research is funded by Japan Labour Health and Welfare Organization.

TREND OF OCCUPATIONAL HEALTH NURSING IN JAPAN – ANALYSIS OF PUBLISHED LITERATURE IN THE PAST TWO DECADES

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[ID 382] - *No. 64 in Poster Area*

Purpose
To describe the Japanese trend of occupational health nursing research by reviewing the literature published in the past two decades in Japan.
Methods
Published literature in respective fields of medicine and nursing were searched. The indexed articles were identified through a search of the Japana Centra Revuo Medicina (Japan Medical Abstract Society) because this index represents an important reference source for these two disciplines. A computer search identified all literature indexed under the subject heading "Occupational Health Nurse" from 1982 to 2005. The search uncovered 414 articles. We created a database for these articles and included the titles, authors, type of articles, keywords, and year of publication. The content of the articles were analyzed by the framework of "occupational health nursing practice expertise" by Rogers (1997). The results of the content analysis were also included in the database. The database of the literature was analyzed to define the trend of occupational health nursing research in Japan.
Result & Discussion
We found that the number of articles concerning occupational health nursing increased notably in the last several years. Half of the articles recorded in the Japana Centra Revuo Medicina (Japan Medical Abstract Society) were conference proceedings. More than half of the articles were related to occupational health nursing practice; but not so many articles were related to occupational health nursing research. Some articles were contributions to journal of occupational health from specific organizations. Overall, there were only a few articles published in medical and nursing journals on contents beyond the field of occupational health.

USE OF LIFTING AIDS AND LOW BACK/NECK SHOULDER COMPLAINTS AMONG NURSES ON MEDICAL/SURGICAL WARDS - RESULTS FROM THE EUROPEAN NEXT-STUDY

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[ID 1127] - *No. 65 in Poster Area*

Introduction:
Registered Nurses and – especially – nursing assistants are exposed to high levels of lifting and bending (L&B) activities. L&B is clearly associated with musculoskeletal disorders. Earlier NEXT analysis showed that L&B exposure is highest in nursing homes and on medical/surgical wards (see www.next-study.net). We investigate the availability and usage of lifting aids (LA) on medical/surgical wards in 8 European countries.
Methods: The NEXT–Study is investigating working conditions of nurses. This analysis bases on the basic (2002/3, N=39,898, here: n=13,262) and follow up (2003/4, N=23,523, here: 3,329) questionnaire assessments. Health outcome used was the 'von Korff-Disability-Score' (DS): self-reported disability in daily activities due to neck/shoulder- or low-back pain' (range from 0(low) to 6(very high).
Results:
The availability of LA on medical/surgical wards was high in NL(66,9%) and BE(56,7%), followed by FR(44,3%), IT(37,3%), FIN(33,4%), GER(29,6%). It was low in POL(6,9%) and SLK(2,2%). The proportion of those who had LA available but were not using them was lowest in NL(20.2%) and FIN(30%), followed by IT(38.1%) and FR(41.1%). The proportion of users was lowest in BE(52%) and GER(64.7%).
For assessing the longitudinal effect of LA the data from 3,329 participants participating in both assessments was used:
a) No LA available (n=2183): initial DS mean score 1.34 (95%CI 1.27-1.41), one year later DS was 1.40 (1.33-1.48).
b) Having LA and using them (n=724): initial DS=.95(.84-1.05), one year later: .99 (.85-1.08).
c) Having LA but not using them (n=422): initial DS=1.27(1.11-1.44), one year later: 1.43 (1.22-1.54).
Conclusions:
Our analysis shows that in spite of high physical exposure on medical/surgical wards both availability and degree of LA usage varies substantially between European countries. The findings reflect economic constraints but also national work cultures indicating best conditions in NL. Analysis of the follow up data implies/confirms that the LA usage influences the prevalence of disability due to low-back/neck-shoulder pain. medical/surgical wards should be recognised as physical risk working areas requiring good LA equipment and adequate teaching activities.

THE IMPACT OF OCCUPATIONAL HEALTHCARE TRAININGPROGRAMMES ON THE WORK LIFE OF EMPLOYEES IN THE SOUTH AFRICAN CONTEXT

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[ID 1849] - *No. 66 in Poster Area*

Introduction

Occupational health education is one of the most prominent health care areas to be addressed in South Africa with a population of 40 million people in an environment with many industries and mines. In the absence of financial support from government to monitor the exposure of employees to work related stressors in their working environment, the private sector has taken the lead in addressing this enormous role. This requires adequately trained occupational nurses to maintain a safe and healthy work environment for employees.

Problem

In overseas countries occupational health services are mainly provided by medical practitioners compared to professional nurses in the South African context. The assumption could be made that professional nurses are not able to deliver effective occupational nursing services as compared to their counterparts overseas. However, in South Africa the training of occupational nurses is comprehensive in nature and the latter assumption could be debated.

Purpose

The purpose of this poster is to compare and outline the different contents of the occupational health programs offered to occupational nurses in the South African context.

The presentation will focus on the certificate, advanced qualification (diploma) and the B Tech degree in occupational health sciences, offered in Universities and Technicons in South Africa.

Method

A literature study was undertaken to compare the similarities and differences in the content of the certificate, advanced qualification (diploma) and the B Tech degree in occupational health sciences. This comparison will aim to outline the possible impact on the effectiveness of occupational health care delivery.

Results

The findings will indicate that the duration of training and focus of the content have an impact on the abilities (skills and knowledge) of the occupational nurse to be placed in a certain managerial position and setting in occupational health care services.

SHIFTWORK, NIGHTWORK AND FLEXIBLE WORKING HOURS

VIGITEST, A DEVICE THAT ALLOWS AN ASSESSMENT OF WORKERS VIGILANCE DURING WORKING TIME.

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[ID 505] - *No. 67 in Poster Area*

Objectives : As demands for flexibility of the working hours increase, fatigue and lack of vigilance may lower the ability to ensure work safely. We studied the feasibility of short tests at the workplace , on a light, cheap, manual device, in order to assess the abilities of a worker to carry out simple actions. Variation of the tested performance in different situations of lack of sleep were studied.

Methods: After a survey to define the most suitable device, the VIGITEST was designed as an easy handheld box usable at the workplace. Monitoring the light emitting diodes of the device and using the four available push buttons, the worker is invited to perform 3 different and successive tests, each involving several repetitions. The worker performance is recorded on the device and transferred on a computer for statistical analysis.

120 workers with a situation of night shift or lack of sleep performed the tests and were compared to230 workers without a history of sleep deprivation .

Results :

In age and gender comparable populations, time to push the right button was measured for the three tests. Only the last three repetitions of the third test showed a significant difference between the two populations ($p < 0.01$ to $p < 0{,}0001$). The differences were positively correlated with the duration of the distraction task included in the third test. There was a good acceptation of the test by the workers .

Conclusion : A simple test is feasible at the workplace and help workers to be aware of their possible decrease in vigilance. Future development of the VIGITEST device and the included tests will be discussed

SLEEP SCALE CHARACTERISTICS OF A POPULATION OF FLEMISH TRUCK DRIVERS AND ACCIDENT RATE.

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Objective:

To explore the link between sleep (as expressed by 3 sleep scales) and road traffic accident (RTA) rate in a population of Flemish truck drivers.

Materials and methods

In this cross-sectional study 474 drivers filled in a self-administered questionnaire that included 3 sleep questionnaires: PSQI (Pittsburgh Sleep Questionnaire), ESS (Epworth Sleeping Scale) and BQ (Berlin Questionnaire).

Spearman's coefficient of correlation was used to measure correlations. RTA rate differences between sleep scale subgroups were evaluated with the Kruskal-Wallis test.

Results

Mean age of the drivers was 42.7±10.2 years. Drivers had a mean body mass index (BMI) of 27.3±5.1 kg/m2. 75.5% had more than 10 years experience as a trucker. Their mean monthly professional driving distance was 10149±5739km. The RTA rate averaged 3.66 accidents during the entire career of the drivers.

The mean PSQI score was 5.03±2.80 and correlated significantly with age (ρ=-0.107, $p<0.05$) but not with BMI. There was a positive correlation with RTA rate (ρ=0.175, $p<0.005$). The accident rate in the PSQI quartiles (Q1: 2.24 – Q2: 3.04 – Q3: 3.53 – Q4: 4.23) was significantly increasing ($p<0.05$)

The mean ESS score was 6.79±4.17 and correlated significantly with the BMI (ρ=0.097, $p<0.05$) but not with age or RTA rate.

The BQ indicated that 14.9% had a higher risk of obstructive sleep apnoea syndrome (OSAS), which is lower than in comparable studies. Berlin outcome correlated significantly with the BMI (ρ=0.304, $p<0.01$), but not with age. Drivers at risk of OSAS showed a significantly ($p<0.05$) higher RTA rate (4.23) than the drivers not at risk (3.26)

Conclusion

Poor sleep quality (PSQI) and being at risk of OSAS (BQ) are associated with a higher RTA rate. These results stress the importance of sleep hygiene education in truck drivers in the prevention of road traffic accidents.

A SURVEY USING THE "CHECKLIST FOR FATIGUE DUE TO OVERWORK" AMONG EMPLOYEES IN A MANUFACTURING COMPANY

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Background: In Japan health hazards that are associated with overwork are a social problem. According to the 2004 Labor Force Survey, more than 6 million people work more than 60 hours per week. That year 294 cases of cerebrovascular and ischemic heart disease were recognized by the Ministry of Health, Labor and Welfare (MHLW) as occupational and caused by overwork (Karoshi). In 2002, MHLW launched a "Comprehensive Program for the Prevention of Health Impairment Due to Overwork". To support this program and as a tool for management, we have developed a checklist for fatigue due to overwork.

Design of the checklist: We consider that overtime health impact will be either aggravated or mitigated greatly by other job stressors and sleep-rest. The checklist, with a total of 21 items, consists of four subscales; specifically, overtime working hours, other job stressors, sleep-rest, and subjective fatigue. The degree of fatigue is evaluated into four grades one-dimensionally using the results of the four subscales.

Results of a survey: A cross-sectional study was conducted to examine the association between the degree of fatigue, as evaluated by the checklist, and the incidences of diseases during the previous six months. The incidence of several diseases in the group with high degree of fatigue was significantly higher than that in the group with low degree of fatigue.
However, there were actually four kinds of fatigue state depending on subjective fatigue and fatigue factors of working hours, job stressors, and sleep-rest. For example, the state of subjective fatigue (+) and fatigue factors (-) was actual and was thought to suggest diseases or continuing fatigue due to fatigue factors exposed long before. It will be more useful to distinguish the four kinds of fatigue state, (-, -), (-, +), (+, -), and (+, +), in the estimation of fatigue.

EXCESS WORKLOAD AND SLEEP-RELATED SYMPTOMS AMONG COMMERCIAL LONG-HAUL TRUCK DRIVERS

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[ID 827] - *No. 70 in Poster Area*

Excess workload has been regarded as an important psychosocial factor at work in Japan. In particular, overtime work could reduce sleep time and consequently exacerbate both physical and mental health, and excessive sleepiness induces work-related accidents. This study aimed to investigate correlations between excess workload and sleep-related symptoms among commercial long-haul truck drivers, who are representative of overloaded workers. We conducted a self-administrate anonymous questionnaire survey to 2054 commercial long-haul truck drivers in a medium-sized city in northern Japan. 1385 replies were collected and 1005 replies from male workers (mean age 41.8±9.0 years old) were examined. The questionnaire mainly consisted of questions of sociodemographic characteristics, work conditions, the Japanese version of Pittsburgh Sleep Quality Index (PSQI-J) and the Japanese version of the 12-item General Health Questionnaire (GHQ12-J). 33% of the subjects worked more than 80 hours per month in addition to their regular work. 34.6% mainly worked at night and 54.2% worked at night and during the day. 41.5% of the subjects replied that their work schedules were irregular. A multiple logistic regression analysis revealed that excessive sleepiness while driving was significantly associated with overtime work, working hour distribution (night dominant), irregular schedules, GHQ12-J score. Similarly, an association between subjective sleep quality and overtime work, irregular schedules, habitual exercise, and GHQ12-J score was found to be significant. Sleep disturbance was significantly associated with body mass index, overtime work and GHQ12-J score.

ROLE OF HEALTH COUNSELING IN REDUCTION OF HEALTH PROBLEMS AMONG SHIFT WORKERS IN A PETROCHEMICAL INDUSTRY

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[ID 842] - *No. 71 in Poster Area*

Introduction & Objective:

It is well established that workers working in the shift or rosters are more vulnerable to health problems then the workers working in general shifts (regular shifts). Due to working against the natural rhythm, loss of circadian rhythm as well as physiologic demand of body, workers in the shift faces a wide range of health problems. These include digestive disorders, sleep disorders, behavioral changes, mood changes, hypertension & even increased risk of heart diseases. There is also a significant impact on their social & family life leading various kinds of psycho-social disorders. This not only increases the morbidity & financial burden in the organization but also affects the productivity and profitability adversely by reducing efficiency of the individuals. So, this study was carried out with an attempt to reduce the health problems related to shift among shift workers by counseling & educating them.

Materials & Methods:

Total 180 employees working in shifts in 24hours running petrochemical plant located in Bharuch, Gujarat (India) were interviewed using a pre-designed structured questionnaire. Then they were counseled in person and advised to follow the guidelines for improvement in their health problems. The counseling session were repeated once in a month's time for all the participants of the study. After the period of three months, the same group was interviewed for their health status using the same questionnaire. The data was analyzed using the EPI info.

Results:

There is significant reduction in the morbidity related to digestive disorders ($p<0.001$), sleep related problems ($p<0.05$) as well as anxiety & irritability ($p<0.05$) among the employees. There is also a noticeable reduction ($P<0.05$) in the systolic as well as diastolic blood pressures among the hypertensive. The frequency of complaints related to physical & mental fatigue has also shown statistically significant ($p<0.05$) decline. There is reduction in the frequent episodes of URTI (Upper Respiratory Tract Infection). Overall alertness & efficiency has also increased among this group compare to that of before the start of this study.

Discussion & Conclusion:

Healthy work force is valuable asset to the organization in this era of competition & quality. Working in the shift definitely have a deleterious effect on individuals health affecting their efficiency and there by productivity & profitability of an organization. So, those working in the shift should always be addressed specifically for their health problems as a special group. These will not only raise the quality of work done by them but will also reduce the accidents within the organization due increased level of concentration & reduction of job related stress. Thus, the role of Company Medical Officer / Occupational Health Physician is beyond the limits it was sought till date, by providing the health counseling & education to the employees working in the shifts. So, this study is very important as it provides opportunity for Company Medical Officer to contribute indirectly to the productivity & profitability of the company by promoting healthy, safe & productive working life among the employees.

SHIFT WORK AND METABOLIC DISORDERS

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[ID 1146] - *No. 72 in Poster Area*

Shift workers are a diffused and gradually increasing workforce (about 20% of total workers of industrialized countries). Epidemiological studies evidenced that shift workers have a higher risk of developing cardiovascular diseases compared to day workers. This is probably due to metabolic disorders caused by maladaptation of endogenous circadian rhythms to abrupt changes in shift times. The contemporary presence in the same subject of various metabolic abnormalities defines a disorder called metabolic syndrome which is a strong risk factor for cardiovascular morbidity and also for all causes of mortality.
This cross-sectional study investigates the possible relationship between shift work and the prevalence of metabolic syndrome and metabolic risk factors.
A total of 212 subjects were studied: 135 shift workers (mean age 39.9±9.1) and 77 day workers (mean age 37.2±11.5). All subjects were male; body mass index was similar between the two groups (26.5±3.5 and 26.1±3.5 respectively) and smokers were equally represented.
Results demonstrated that one or two metabolic variables of metabolic syndrome were significantly more present in shift workers than in day workers: 51.9% vs. 35.1% and 23.0% vs. 13.0%, respectively. However, considering three metabolic variables clustered together, there was no difference among two groups: 8.9% vs. 7.9%.
The study revealed that shift workers have a higher significant prevalence of single parameters correlated with metabolic syndrome (central obesity: 14.8% vs. 7.8%; low HDL cholesterol: 14.1% vs. 6.5%; hypertriglyceridemia: 23.7% vs. 11.7%); the prevalence of hypertension (24.4% vs. 19.5%) and hyperglycemia (6.7% vs. 7.8%) was not significantly different between the two groups studied.
Metabolic syndrome is not differently present in the two groups. However shift work is associated with a significant, higher prevalence of single or coupled metabolic risk variables. These probably play a relevant role in the excess of cardiovascular morbidity observed in this class of workers.

EFFECTS OF WORK STRAIN ON CIRCADIAN PATTERNS OF PSYCHOPHYSIOLOGICAL PARAMETERS IN CONTROL ROOM SHIFTWORKERS UNDER 12-HOUR SHIFTS

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[ID 1682] - *No. 73 in Poster Area*

Short-term memory and attention were measured in electricity distribution network controllers at the end of 12-hour shifts under 2-day rotation (16 controllers, 192 subject-observations). Heart rate (HR), blood pressure systolic (BPS) and diastolic (BPD) were registered each 2 hours during the shifts (17 controllers, 1224 subject-observations). In the end of every shift controllers evaluated perceived level of work strain using a 5-point scale ("1" and "2" – low strain, "3" – medium. Lack of high strain shifts ("4" and "5") caused their expulsion from analysis). Intershift "day-night" changes were analysed at a p-value of 0.05 and evaluated in terms of a circadian pattern.

Overall, no significant "day-night" changes in performance were found. Yet, such a tendency ($p<0.14$) was revealed in the 2nd medium strain shifts in every performance parameter.

Overall, BPS showed its normal circadian pattern: average day-shift figure was higher than average night-shift score. But BPD, HR and majority of haemodynamic parameters manifested inverted circadian patterns (compared to the individual). In the 1st shifts of low strain no significant "day-night" changes in cardiovascular system activity (CVSA) parameters were found. The most pronounced changes (9 from 10 parameters) were found in the 1st medium strain shifts, less pronounced – at the 2nd shifts of low (7 parameters) and medium (5 parameters) strain.

Thus, the smoothed fluctuations in cognitive performance and inverted circadian patterns of intershift differences in majority of CVSA parameters were revealed in controllers. This could reflect normal human-operator reliability in round-o-clock industry against the overstrained CVSA. Strain increase in the first 12-hour shifts increased the pronouncement of CVSA revealed pattern, in the second shifts, in the opposite, - smoothed it, reflecting the attenuation of CVSA strain reserves. The revealed tendency of increase in cognitive performance fluctuations proves decrease in the human-operator reliability it the second 12-hour shifts under medium work strain.

HEALTH EFFECTS OF NIGHT SHIFT DUTY ON NURSES IN A UNIVERSITY TEACHING HOSPITAL IN BENIN CITY, NIGERIA.

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[ID 1826] - *No. 74 in Poster Area*

Introduction: Medical services in the health sector are required on a continuous basis and nurses have to work all through the day in order to cope with the health needs of the patients. Shift duty thus becomes imperative since no single person can work continuously for the entire twenty four hours of the day.

Aim: To identify effects of night shift duty on the health and wellbeing of nurses in order to make recommendations on suitable shift schedules.

Methods: The study was of a cross sectional type using a total sample of nurses in the hospital. Data collection was by means of a self-administered structured questionnaire and the analysis by the Computer Programme for Epidemiologic Research (CPER).

Results: The response rate was 79.3% with a total of 211(68.1%) having one or more health complaints, which included muscle ache and pains (58.7%), frequent headaches (21.9%), lack of concentration (21.3%) and a negative effect on social life (66.1%). The younger nurses disliked night shift more than the older ones ($X^2 = 57.5$, df = 6, p = 0.000) and 57.7% felt they were less productive during night shift. The shorter the period of sleep after the night shift, the lesser the level of productivity and the more the manifestation of health symptoms ($X^2 = 45.5$, df = 4, p = 0.000 and $X^2 = 29.0$, df = 2, p = 0.000 respectively).

Conclusion: Night shift duty caused both medical and psychological problems on the nurses. There is need for medical surveillance, educational programme and the application of sleep hygiene techniques for shift working nurses.

STRESS AND WORK

GENDER DIFFERENCES IN JOB STRESS: A SURVEY OF JAPANESE WORKERS

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[ID 86] - *No. 75 in Poster Area*

Objective: We conducted a job stress survey on employees in Japan to assess the relationship between work circumstances and job stress, and also identify targets and tools for preventive interventions.

Methods: Perceived job stress of 549 employees in Japanese food-product company was evaluated in a Japanese version (Haratani, et al.) of the National Institute for Occupational Safety and Health (NIOSH) job stress questionnaire. The data was collected in March 2005 and will be collected again in November 2005. The purpose of the investigation and the contents were explained in written form, and consent was obtained from the participants. In addition the consent to present the results of this study will be obtained from the ethics committee of the faculty of medicine at University of Yamanashi.

Findings: 511 of the 549 employees (395 male and 116 female) responded the survey, response rate of 93.1%. Levels of 'job control' score of male workers were higher than that of female workers ($p<0.01$), and also significantly higher levels of ' quantitative work load' ($p<0.05$),'responsibility for people'($p<0.01$), 'self-esteem'($p<0.01$), and 'social support from superior'($p<0.05$) were found amongst male workers. On the other hand, higher levels of dissatisfaction due to 'underutilization of abilities'($p<0.05$), 'role ambiguity($p<0.01$), 'job future ambiguity'($p<0.01$), 'depression'($p<0.01$), 'somatic complaints'($p<0.01$)were found amongst female.

Conclusion: High levels for 'job control' showed that many workers could work better in an environment where they were given decision making power. It doesn't seem that female workers, however, think that they have enough decision-making opportunities on their jobs compared to male workers. Ongoing studies are currently being conducted, therefore the poster will present results gathered from the analysis that will be conducted in November 2005.

LOW CONTROL AT WORK AND RISK OF SUICIDE IN THE JICHI MEDICAL SCHOOL COHORT STUDY

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[ID 95] - *No. 76 in Poster Area*

Background: Although adverse psychosocial job characteristics are suspected as predictors of suicide death, prospective studies based on established stress instruments are limited.

Methods: In a multicentre community based cohort study of Japanese people, we prospectively investigated the association between psychosocial job characteristics and the risk of death from suicide among male workers. The baseline examination conducted from 1992 to 1995 determined the socioeconomic, behavioural and biological variables in addition to the psychosocial job characteristics of 3,125 male workers aged 65 and under and free from major illness. Low job control and high job demands were measured as adverse psychosocial job characteristics according to a job demand-control model questionnaire. Suicide deaths were identified using the Cause-of-Death Register.

Findings: During the 9-year follow-up study, 14 suicides were identified. Multivariate analysis revealed an over fourfold increase in risk of suicide among men with low control at work compared with the counterpart men, after adjustment for age, marital status, educational attainment, occupation, smoking status, alcohol consumption, total cholesterol level, and studied area. High job demand had a rather protective but insignificant association with suicide.

Interpretation: A major limitation of the present study is that personality factors, in particular mental disorders, were not ascertained at baseline. The observed association could be spurious if people with such disorders exhibit a higher probability of reporting negative experiences at work. Nevertheless, the protective (but insignificant) effect of job demands on suicide contradicts this conjecture. In addition, recent studies indicate that the impact of a tendency toward negative affectivity should not be overstated. Furthermore, the mean length of follow-up of the suicide cases was 6 years. It is unlikely that a temporal depressive episode at baseline was responsible for an increased risk of suicide. In conclusion, increasing job control in the work environment could prevent death from suicide among men.

JOB STRAIN, EFFORT-REWARD IMBALANCE, AND HEALTH FUNCTIONING IN CHINESE PHYSICIANS

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[ID 162] - *No. 77 in Poster Area*

Work stress has drawn much attention from the public so far, and health care workers are regarded as high risk group generally. A number of studies have been conducted in western countries on work stress and its health effects among health care workers, while few studies were reported from Asian countries, particularly from China. Thus, in order to examine the association between work stress measured by job strain and effort-reward imbalance and health functioning in a sample of hospital-based Chinese physicians, a self-reported survey with a standardized questionnaire was conducted in three hospitals in China, among 256 men and 266 women. It was found that both job strain and effort-reward imbalance were associated with impaired health functioning in men and women, but that effort-reward imbalance indicated a stronger association. Men's job control was significantly higher, and was related to men's physical health; whereas women perceived relatively higher job reward which predicted women's mental health. The findings provide evidence of the adverse effects on health functioning of both job strain and effort-reward imbalance, but effort-reward imbalance appears to have more explanatory power as a model of work stress in this sample of Chinese physicians. We suspect that effort-reward imbalance might have more power for explaining stress in the service occupations and professions, while job strain might be more suitable for blue collar industrial workers, in particular for men. In addition, gender differences of work stress with respect to health are present.

MOBBING AMONG PHISICIANS IN BOSNIA AND HERZEGOVINA: A QUESTIONNAIRE SURVEY

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[ID 205] - *No. 78 in Poster Area*

BACKGROUND: Workplace mobbing is repeated, unreasonable behaviour directed towards an employee, or group of employees that creates a risk to health and safety. Mobbing is associated with stress, depression, and intention to leave.
OBJECTIVES: The purpose of this study is examination the prevalence of mobbing and its characteristics and consequences in a sample of medical doctors.
SUBJECTS AND METHODS: A questionnaire survey was conducted among medical doctors in Bosnia and Herzegovina national health sector (N=511). We used questionnaire about Mobbing by Quine. The questionnaire collects demographic and work related information and then asks participants a number of questions related to the funding of research and writing up their relationships with the head of department and colleagues, and their perception of support, isolation, and overwork in the past 12 months. Finally participants were asked about their experiences of five major categories of mobbing behaviour: threat to professional status, threat to personal standing, isolation, overwork and destabilisation. The frequency of mobbing behaviour as intensity of exposure to mobbing was graduated: never, rarely, sometimes, often, and almost daily. At the last section of questionnaire, participant were asked about the main symptoms of stress and mobbing, extent support from whom, recognised effects of mobbing to personal life, effects of mobbing to performed work tasks and wishing to change workplace. We used the standardised abridged form Occupational Stress Questionnaire (OSQ) in assessing characteristics of the work, perceived work environment and its effects, stress, health, satisfaction with work and life.
RESULTS: 76% (387 out of 511) of the examined doctors reported being subjects to mobbing behaviors in the workplace in the previous year. The most common mobbers was the head of department or supervisor in 320 (83%) of cases, general manager in 55 (14%) of cases. But, the most often mobbers were the head of department and colleagues of similar status, together, in 251 (65%) of cases. The correlation between mobbing and stress indicated that stress increases if mobbing has frequency like "sometimes", "often" and "almost every day". In addition, using a linear regression model, strong correlation's was found between mobbing behaviours and: physical and emotional exhaustion ($P<0.000$), difficulties in performing duties ($P<0.000$), experienced stress ($P<0.02$), unsatisfaction with present work ($P<0.01$), and difficulties in enjoying daily activities. Mobbing behaviour was the main stress for distressed doctors. . The prevalence of diagnosed depression was significant higher in hospital consultants (37%) in relation to general practitioner (23%).
CONCLUSIONS: We found the prevalence of mobbing to be higher than previously reported. It is essential to prevent mobbing, which has negative consequences not only for the workers but also at the managerial level: absenteeism, turn over, loss of productivity and negative effects of mobbing to performed work tasks which results possibly by medical error.

HUMAN RESOURCES POLICIES FOR TRAINEES AND SUPERVISORS OF THE COLLECT SECTION OF AN INTERNATIONAL BANK AS WORK-RELATED STRESSORS.

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[ID 268] - *No. 79 in Poster Area*

Objective: To understand which were the human resources policies for trainees and supervisors of the collect section of an international bank and how they acted as work-related stressors.
Method: It was a case study composed of ergonomic work analysis according to the method described by Guérin et al. (1991) of the jobs of trainees and supervisors, as well as individual semi structured interviews with key informants (1 manager, 5 supervisors and 12 trainees, 3 from each sub sector), 2 group interviews, questionnaires answered by the total population (70 workers), global observations in the department as a whole (credit and collect sections), observations of 20 workstations, at different periods of the day, in all the sub sectors, including electronic monitoring, and document analysis (monitoring forms, trainees classification, organograms, prescribed procedures, etc.). A total of 25 interviews were performed. All the interviews underwent content analysis. The questionnaires underwent a descriptive statistical analysis. A total of 20 visits to the sector with medium duration of 6 hours each took place in order to collect data.
Results: There were 67 trainees. 85% females. 83,7% between 18 and 23 years. 68,8% were in the job for least than one year. There were 5 supervisors. All of them between 21 and 26 years, 2 males and 3 females. All of them were promoted from the job of trainees.
The research showed the presence of different stressors related to the human resources policies for trainees and supervisors. There was lack of opportunities for career for the majority of the trainees and absence of information about the criteria for hiring, career and promotion. The horizontal and vertical mobility demanded great adaptation from the trainees and made difficult the development of relationships, demanded constant training and support from the supervisors. Very young workers were hired and submitted to an intense work load. The training was dense and theoretical, lacking examples of concrete and possible situations. The performance appraisal stressed supervisors and trainees due to its inadequacy concerning procedure and form. Electronic Monitoring of Performance was used as a tool for performance appraisal. The reward system led to acceleration and competition.
Conclusion: In the formulation of human resources policies their impacts on the health of the target population should be considered. That would demand a change on the beliefs and values concerning workers, health/illness, and power.

PREVENTION OF ILL-HEALTH EFFECTS OF STRESS AND LIFESTYLE (PART 25)

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[ID 460] - *No. 80 in Poster Area*

Objectives
To examine the relationship among sleep quality and lifestyle factors.
Materials and Methods
A self-administered questionnaire survey was distributed among 242 male workers aged 21-58 during an annual physical examination performed at their work place at July 2003. The questionnaire consisted of lifestyle factors, sleep quality, and demographic variables. Lifestyle factors included eight health practices recommended by Morimoto (exercise, alcohol consumption, smoking status, sleeping hours, nutritional balance, eating breakfast, working hours, subjective stress), and sleep quality included the Pittsburgh Sleep Quality Index (PSQI). Mean points and standard deviations (SD) of points for PSQI by each lifestyle factors (good lifestyle / poor lifestyle) were analyzed by t-tests. Odds ratio (OR) and 95% confidence in-

terval (CI) for points of PSQI (>5) were calculated using qui-squared test.
Results:
Mean points (SD) for PSQI of workers who had good daily habit of sleeping hours (sleeping 7-8 hours; p<0.001) and subjective stress (moderate subjective stress; p<0.01) were significantly lower than workers who had poor daily habit. That of workers who had poor daily habit of alcohol consumption (drinking alcoholic beverages every day; p<0.05) were significantly lower than workers who had poor daily habit.
OR and 95% CI for points of PSQI (>5) were 2.19 (1.24-3.88) for physical exercise (less than 1 per week / 1 or more per week), 6.57 (3.37-12.79) for sleeping hours (less than 7 or more than 8/ 7-8 hours), and 2.36 (1.38-4.05) for subjective stress (too much or too little / moderate).
Conclusion
These results indicate that good sleep quality is associated with adequate alcohol consumption, weekly physical exercises, adequate sleeping hours, and moderate subjective stress.

A 15 YEARS OBSERVATION OF MENTAL ILL DISORDERS AT THE INSTITUTE OF OCCUPATIONAL HEALTH OF BRESCIA, ITALY

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[ID 604] - *No. 81 in Poster Area*

Objective: To describe all cases of mental ill disorders observed in the outpatient clinic of Institute of Occupational Health, University of Brescia, from 1990 to 2005, using computerized registration.
Method: Individual information about age, sex, request for observation, work sector and specific task, pathological and work history, with particular attention for psychiatric diagnosis, in accordance with DSM-IV RT were collected and classified in a specific dataset.
Results: A total number of 93 cases was identified, starting from 1 case in year 1990 to 25 in 2004, with a clear increase in the period 2001-2005, when the average annual number of cases was 14,7. Male were 67% (mean age 41,52 ±11,43) and female 33% (mean age 41,2 ±11,45). 51% of the cases were sent by employers with a request for job fitness evaluation, whereas 30% of the cases were sent by family doctors for suspected work-related psychopathy. The remaining 19% of the cases were sent by the work compensation Institute (INAIL, 13%), by the neurology department of the Spedali Civili of Brescia (5%) and by the local Public Health department (ASL, 1%).
The most represented work sector was industry (62%) with white collar workers in most cases, health care (14%), public administration (10%), transportation (7%), school (6%) and commerce (1%). The most frequent diagnosis was mood disorder (22%), followed by personality disorders (16%), mixed anxiety-depressive disorder (13%), anxiety disorder (12%), adaptation disorder (12%) and psychotic disorders (4%).
Conclusion: The descriptive analysis of our case list points out the evident increase of examinations carried out in the past 5 years. This situation affects largely the category of white collar workers, that are mostly affected by mood and adaptation disorders. This trend is likely related to an increased attention toward psycho-social factors in the workplaces.

PSYCHOSOCIAL STRESS FACTORS AMONG JAPANESE EXPATRIATES WORKING IN DUESSELDORF, HO CHI MINH CITY AND VANCOUVER

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[ID 673] - *No. 82 in Poster Area*

[Objective] The aim of this study is to clarify psychosocial stress factors among Japanese male and female expatriates. In the second ICOH international congress on psychosocial factors at work, we showed the difference of stress factors between the wives and their accompanied husbands who were working abroad at Japanese companies or Japanese subsidiaries in Duesseldorf, Germany. In addition to Duesseldorf, we did the survey in Vancouver, Canada, and Ho Chi Minh City, Vietnam. In this study, we limited the subjects to male expatriates to enable good comparison, and stress factors were compared in three cities.
[Subjects and Methods] The same self-administered questionnaires containing GHQ-12 and seventeen stress factors were distributed and collected through the Japan Chamber of Commerce and Industry in each city. Excluding permanent residents and insufficient answer sheets, 578 subjects in Dusseldorf, 108 in Ho Chi Minh City and 69 in Vancouver were obtained.
[Results] Taking score 2 and score 3 as the cut-off point of GHQ score in GHQ-12, 25.1% of the subjects in Duesseldorf, 35.8% of that in Ho Chi Minh City, and 17.2% in Vancouver were possibly regarded as neurotic level. Multiple regression analysis showed that amount of work, medical services, and marital situation (married or not were the common factors related to GHQ scores, while there were some other factors specific to each city.
[Conclusion] It is suggested that some common stress factors may exist among the Japanese male expatriates working in different cities. Further studies are needed to confirm these findings and to identify the common stress factors among female expatriates.

COGNITIVE ACTIVATION THEORY OF STRESS AND PROGRESSION IN INTIMA MEDIA THICKNESS

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[ID 844] - *No. 83 in Poster Area*

Background: The Cognitive Activation Theory of Stress, CATS, links psychology with physiology. In this model physiologic stress response and risk of stress related disease is considered dependent on the individual perception of the stressor. Negative outcome expectancy is hypothesised to be related with a katabolic stress response and stress-related disease.
Intima media thickness, IMT, of the common carotid is measured by the use of ultrasound and is a valid measure of early non symptomatic atherosclerosis positively associated with coronary atherosclerosis. IMT is associated with all known risk factors for ischemic heart disease.
Method: At a 4 year follow up examination of IMT 53 women and 26 men participated in a 15 minute picture interference and arithmetic stress test. All participants were healthy and in work and had volunteered to participate in the study after public announcement. Immediately before the test they were asked about their expectation of test results. Outcome expectancy was scored as positive (POE, N=40) or negative (NOE, N=39). Progression in intima media thickness, IMT-progression, during the preceding 4 years was used as dependent variable in a univariate analysis of variance to evaluate the association with outcome expectancy. Gender and outcome expectancy were used as between subjects factors. IMT in 1998, cholesterol, HDL-cholesterol, systolic blood pressure, tobacco (gr. /day), and age were included as covariates.
Results: The mean IMT-progression was 0.166 mm (SE 0.015mm). Participants with POE experienced an IMT-progression (mean/SE) of 0.122 mm /0.019mm, while those with NOE had experienced an IMT-progression of 0.210 mm/0.024mm, 72 % more than in POEs (F 8.1, p 0.01). An interaction between gender and outcome expectancy resulted in the following: Women with POE vs. NOE had an IMT-progression of 0.096 /0.026 mm vs. 0.149 /0.029 mm, respectively. The corresponding values for men were 0.102 /0.022 mm and 0.318 / 0.043 mm, respectively (F 5.9, p 0.02). IMT in 1998, cholesterol, HDL-cholesterol, systolic blood pressure, tobacco (gr. /day), and age were included as covariates and could not explain the results.
Conclusion: Outcome expectancy was associated with IMTprogression during the four preceding years. In healthy people, negative outcome expectancy to stressors in daily life may predict future stress related illness.

STRESS PATTERNS AND ITS ASSOCIATION WITH SELF REPORTED HEALTH AMONG DENTAL STUDENTS OVER AN ACADEMIC YEAR

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[ID 1219] - *No. 84 in Poster Area*

Dentistry training has been recognised as being associated with high levels of stress. We investigated stress patterns of dental undergraduates at different times of the academic year. We also investigated the association of stress with students' self-reported health.
Methods
85 male and 51 female dental undergraduates (Year 1 to Year 4) answered these questionnaires at the beginning (T1), middle (T2) and the end (T3) of the academic year.
Dental Environmental Stress (DES): to assess stress from academic work, clinical, faculty /administration and personal factors
Perceived Stress Scales (PSS): to assess self-perceived stress level
GHQ-28: to assess self reported health

Results
Overall, academic work was the top ranked stressor for all students throughout the year as compared to clinical, faculty /administration and personal factors. The means (C.I.95) of academic work at different times of the year were T1=2.79 (2.68-2.89), T2=2.86 (2.75-2.96) and T3=2.89 (2.78-3.00). The means (C.I.95) of overall DES score for all students over the year were T1=2.49 (2.40-2.38), T2=2.52 (2.43-2.61) and T3=2.65 (2.56-2.74).
There was an increase in proportion of students who scored higher than the conventional GHQ-28 cut-off of 5 for distress from the beginning to the end of the year: T1=(46.3%), T2=(56.4%) and T3=(63.6%). The increase in proportion was statistically significant from T1 to T3 (Pearson chi-square=8.2, df=2, p=0.02)
PSS was positively correlated with GHQ-28. Spearman's correlation coefficients for PSS and GHQ-28 at T1, T2 and T3 were 0.8 (p<0.01), 0.7 (p<0.01) and 0.7 (p<0.01), respectively.
Conclusion
Academic work was the primary source of stress for all students throughout the year. PSS was positively correlated with GHQ-28. There was an increase in proportion of students with the GHQ scores >5 from the beginning to the end of the academic year, which correlated with the timing of the examinations.

STRESS EXPOSURE, MENTAL HEALTH AND WORK PERFORMANCE IN HEALTH CARE WORKERS

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[ID 1343] - *No. 85 in Poster Area*

There are indications that employees in the health-care sector have an increased risk of stress-related mental health problems and, ultimately, exhaustion syndrome or burnout. Baseline data on stress exposure, mental health and work performance is reported from an ongoing longitudinal study in Region Västra Götaland.
Aim: To investigate the relation between self-reported stress exposure, mental health and work ability and performance among health care workers and social insurance professionals.
Methods: A questionnaire was mailed to 6000 employees randomly selected from the personnel records of Region Västra Götaland and the regional social insurance office. It included questions of the demand-control and the effort-reward imbalance models, the Hospital Anxiety and Depression scale, the Shirom-Melamed burnout scale, the Stress-Energy scale, the Work Ability Index and a newly constructed instrument for assessing exhaustion syndrome according to new diagnostic criteria adopted in Sweden. The response rate was
61 %, and 3108 participants, not on sick-leave, were included in the analysis.
Results: A state of increased stress level combined with frequent sleeping problems was reported by 18 % of both men and women. Between 10 % and 20 % were classified as having a state of anxiety, depression or burnout. 17 % (95% CI 15,5 – 18,4) of the women and 14 % (95 % CI 11,1-17,4) of the met the criteria of having (or being in the process of developing) an exhaustion syndrome. 58 % of these had experienced a decreased work performance, and 45 % had a less good or poor work ability compared to 7 % among the other participants.
Conclusion: Stress-related mental health problems are common among health care workers and social insurance professionals in Sweden. Apart from the individual suffering this is also a problem with regard to work performance and sustainability in this important sector of the working life..

CORRELATION BETWEEN RAPID AND CONVENTIONAL COLLECTION METHODS FOR SALIVARY ALPHA-AMYLASE, AN ACUTE STRESS BIOMARKER

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[ID 1348] - *No. 86 in Poster Area*

Rapid sampling of acute stress markers is crucial in order to observe real time and transient fluctuations caused by acute stressors. Salivary alpha-amylase has been shown to be a possible surrogate marker of plasma nor-epinephrine, and can potentially be utilized in studies of acute stress in occupational settings. However sampling techniques for saliva are non-standardized and vary widely. We studied the correlation of salivary alpha-amylase between rapid and conventional collection methods for saliva samples.
Method
One hundred and eight paired saliva samples were collected using two sampling methods; a single spit sample (M1), followed by a 3-minute unstimulated accumulation method (M2). Saliva samples were collected from 9 healthy adults under these conditions :
Food consumption - 15-min before lunch; immediately, 20-min and 40-min after lunch.
Running - 5-min before a 20 minute run; immediately, 15-min and 30-min after the run.
Exposure to cold - before entering a cold room (5ºC), after 10-mins in the cold room, and 15-min and 30-min after leaving the cold room.
A kinetic assay method was used to determine salivary alpha-amylase activity.
Results
As the data was positively skewed, log transformation was performed prior to further parametric statistical analysis. Salivary alpha-amylase showed acute and transient increases after running and cold exposure. The geometric means (GM) of M1 were higher than M2, and highly correlated (Pearson's r = 0.77, 0.89 and 0.90 for food consumption, running, and cold exposure. The overall GM (95% confidence interval) for M1 and M2 samples were 165.3 (143.8-190.0) U/ml and 153.7 (135.4-174.3) U/ml, respectively (Pearson's r = 0.87, p<0.00).
Conclusion
There is good correlation of alpha-amylase activity between both collection methods. We suggest that spit samples can be used as a simple and rapid collection method for obtaining saliva for alpha-amylase measurement.

PSYCHOSOCIAL WORKLOAD OF PROTESTANT AND CATHOLIC PRIESTS IN GERMANY - RESULTS FORM THE GERMAN COPSOQ INVESTIGATION

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[ID 1363] - *No. 87 in Poster Area*

Introduction:
Reports about burnout among priests in Germany implicate a high psychosocial workload. It is not known whether such reports reflect high psychosocial work strain – implicating urgent preventive measures – or merely base on incidental cases.
We report the a) nature of psychosocial workload and b) extent of burnout in this profession in relation to other professions.
Methods:
Copenhagen Psychosocial Questionnaire (COPSOQ, www.copsoq.de) data have been collected from 2659 workers. 100 protestant priests (PP) and 98 catholic priests (CP) are included.
Results:
68 PP (mean age 47 years, +/- 9.1) and 52 CP (57.9, +/- 10.5) have responded. 11 additional professional groups (n=30-556, N=1986) were categorised. PP and CP shared similar results for most indicators, except: CP reported lower 'cognitive demands' (ANOVA adj. for 'age', p<.05), more 'role clarity' (p<.05), higher 'work commitment' (p<.05) and higher 'job satisfaction' (p<.01).
In relation to the other professions, PP and CP reached considerably positive scores for many scales, e.g. 'decision latitude', 'predictability', 'possibilities for development', 'role clarity', 'procedural justice', 'quality of leadership' [only PP] and 'job insecurity'. 'Job satisfaction', 'work commitment, and 'work meaning' were high. 'Burnout', 'health' and 'work ability' was on average level.
Comparably adverse scores were found for:
a) Work content: high 'quantitative' and 'emotional demands',
b) Work organisation: high 'role conflicts' (only PP),
c) Social Work Environment: low 'social support' (PP), low 'feedback' (esp. CP),
d) Outcomes: 'work privacy conflict' (extremely high for PP, also high for CP).
Conclusions:
Our results implicate that in Germany priest is a rewarding profession with largely positive work exposure – when compared to other professions. The few adverse scores are compensated by many positive work aspects. Outcomes (esp. attitudinal) are markedly positive. Consequently, there seems to be no need for systematic review and improvement of the psychosocial working life of the priest profession in Germany.

STRESS AS HUMAN ELEMENT AT WORK: 2005 SURVEY OF FILIPINO SEAFARERS

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[ID 1768] - *No. 88 in Poster Area*

Introduction. Seafaring entails working on board ships for a long period of time away from home. This results into various psychological experiences by the world's 1.2 million seafarers working on international commercial vessels. Filipino seafarers comprise almost 30% of the world's seafarers. The study will look at the stress management profile of Filipino seafarers including how stress is manifested and implications for prevention.
Methods. Questionnaires were administered to 2,500 Filipino seafarer respondents representing various ranks/positions. Respondents were chosen from different manning agencies and training centers in different parts of the Philippines. Different sets of questionnaires were administered to different sectors such as management and labor. Data gathering was done from August to September 2005. The questionnaire was divided into the following categories: socio-demographic profile, health and lifestyle, attitude towards work and family/home, work and home-related experiences, symptoms/signs of stress, coping with work experiences, and infrastructure on board.
Results and Conclusion. Respondents were 69% ratings and 31% officers mostly within the age of 25-50 working in bulk carrier vessels and tankers. Health problems normally experienced are vision, hypertension, muscular, hearing and respiratory. 50% drink alcohol and 20% smoke on board. 55% sleep well and 87% exercise. Most workers are satisfied with their jobs. Significant sources of stress are routinary nature of job, long hours of work, tension among crew, and thoughts of impending early retirement. Home-work interface elements are major sources of stress such as family concerns and careers of wives. Socio-psychological problems need to be addressed by developing appropriate programmes. This should be mainstreamed in the occupational health agenda for seafarers.

VALIDATION AND MODIFICATION OF KARASEK JOB STRESS QUESTIONNAIRE IN THAI POPULATION

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[ID 1779] - *No. 89 in Poster Area*

Abstract (297 words)
There have been few studies on job stress and its effect in Thailand while the magnitude and intensity of stress is increasingly recognized. The Karasek job strain questionnaire has been implemented internationally over the last two decades as well as been studied for its psychometric property, but its reliability and validity among Thai population is not known. The study aimed to investigate the reliability and validity and to modify the Karasek instrument for Thai population. The study is a cross-sectional survey of 10415 subjects from 102 occupational codes, conducted between June 2001 and January 2004 in Songkhla province, using 64 items (9 scales) of Karasek job stress questionnaire. We assessed the reliability and validity of the instrument by internal consistency; subject interview for content validity; exploratory factor analysis and confirmatory factor analysis for construct validity.
Reliability reported as Cronbach's alpha for different factors were as follows: excellent for supervisor support (0.84), hazards in workplace (0.86); good for physical exertion (0.76); moderate for skill discretion (0.68), decision authority (0.68), psychological job demand (0.68), coworker support (0.68); unacceptable for job security (0.60).
For construct validity using exploratory factor analysis, 11 scales were extracted from 64 items with cumulative percent of variance 55.29 and 16 items were dropped. Five new scales extracted were emotional demand, work overload, insufficient payment, supervisor unsupported and psychological hazard. Skill discretion was combined with decision authority into decision latitude scale while psychological demand was combined with physical exertion into job demand. Karasek scales confirmed were physical hazard, supervisor support, coworker support and job security. Confirmatory factor analysis yields 10 scales (work overload was dropped) with 44 items with better goodness of fit than the original model. This study implied that modified Karasek questionnaires are reliable and valid instruments for assessing job stress in Thai population.

SPECTRUM CONCEPT AND DIAGNOSTIC MANAGEMENT OF PSYCHOLOGICAL OCCUPATIONAL DISEASES

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[ID 1883] - *No. 90 in Poster Area*

Raising awareness on psychological harassment at workplace requires clinical data and test instruments to evaluate psychiatric diseases connected to this phenomenon.
According to DSM IV the only two recognized disorders caused by traumatic events inclusive of work-related ones are the Adjustment Disorder and the Post Traumatic Stress Disorder.
DSM IV is a reliable diagnostic tool supplying widely accepted diagnostic criteria and a clear diseases classification. However, it may not provide sufficient characterization of clinically significant symptoms leading to the exclusion of some disturbances non fully complying with the given criteria. This may represent a limitation from a medico-legal, as well as a preventive point of view.
Recently, a new general conceptualization of psychiatric disturbances, consisting of an array of related symptoms and behavioral features defining the "spectrum" of each disorder, has been introduced.
The term 'spectrum', implying a dimensional approach, refers to areas of psychiatric phenomena related to a single disorder. The spectrum model weights and ranks symptoms, signs, lifestyles and persistent personality features as a dimensional continuum.
A sample of 56 patients was examined by the centre for Work-related Adjustment Disorder of the Pisa University Hospital in order to check work-related stress effects. Subjects completed a self-administered measure of life-time psychosis spectrum symptoms. Patients falling above and below a predefined clinical threshold for psychosis spectrum were compared for clinical characteristics and stressful workplace events.
Differences in symptoms and behavioural patterns and personality traits connected to psychosis in healthy patients, patients with classical psychiatric disorder and with work-related Adjustment Disorder will be discussed.

WORK ORGANIZATION, WORK RELATED STRESS AND PSYCHOSOCIAL FACTORS

MOBBING AT WORK: A FIVE YEARS CLINICAL EXPERIENCE

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[ID 94] - *No. 91 in Poster Area*

Mobbing at the workplace, i.e. reiterated psychological harassment by a person or a group of people against one or few workers, is an emerging problem in occupational medicine. The number of reported cases has increased dramatically worldwide during the last years, attracting the attention of the media, and calling for accurate diagnostic strategies, as well as for effective preventive and rehabilitative measures. Currently, both the ICD-10 and DSM-IV individuate two psychopathological conditions that may be caused by stressing situations, including mobbing: Post-Traumatic Stress Disorder (PTSD) and Adjustment Disorder (AD).
This study proposes a method for assessing mobbing in the clinical setting. We present 135 outpatients (59 males, 76 females; mean age: 40 years) who asked medical assistance, during the last five years, for psychopathological problems by them ascribed to mobbing in the working environment. 37 subjects were employed in public institutions, 98 in private companies. All patients underwent occupational health visit, psychological counselling (including personality tests administration), and psychiatric evaluation.

A clinical picture probably due to mobbing was diagnosed in 25 workers (19% of the cases): 2 cases of PTSD, 22 of AD, and 1 of anxiety disorder. Three cases of AD were work-related but not due to mobbing. In 4 patients the correlation with the working activity was possible but difficult to demonstrate, due to concomitant (non-occupational) stressing situations. A pre-existing psychiatric disorder was identified in 55 subjects (41%). Altered interpersonal relationships with the colleagues were present in 42 cases (31%). Six patients did not complete the diagnostic protocol.
In conclusion, a pure "mobbing syndrome" was diagnosed in a lower proportion than that reported by other investigators (1-2). This difference probably depends on patients preselection criteria. The described interdisciplinary approach appears useful for the diagnostic assessment of suspect mobbing cases, that in turn is crucial for prognosis and treatment, as well as in relation to medico-legal issues and work-related compensation claims (3).

PSYCHOSOCIAL RISK FACTORS ASSOCIATED WITH GASTROINTESTINAL DISORDERS

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[ID 208] - *No. 92 in Poster Area*

OBJECTIVE
To identify the psychosocial risk factors (PRF) associated with gastrointestinal morbidity in a representative sample of Colombian workers, through the analysis of occupational and non occupational psychosocial aspects.
The psychological risk factors searched for, were those related to the working, the individual (behavioural patterns, personality, particularly anything related to sexual abuse) and the social and family conditions.
Concerning the relationship between psychosocial aspects and functional gastrointestinal disorders, most studies mention stressful vital experiences, psychiatric disorders and an overall increasing concern for healthcare (Drossman D.A. et al., 1999 , 2004). Studies quoted by Theorell, T. (1987) showed that the inability to make decisions plus the lack of social support at work, were associated to a gastrointestinal complaints (Alfredsson, L. et al. and Nyrén, O). Similar findings are registered by In Bennett's, Piesse's, Palmer's et al reviews, 1998 , Creed et al., (1988) , Wilhelmsen, I. (2000) and Levenstein and Kaplan, 1998 . It has also been established that the prevalence of ulcers is more frequent among shift workers (Segawa K. et al, 1987) .
The role played by stress is considered to be complementary, because there are several interacting factors involved in gastrointestinal disorders.
METHODS
Hypothesis: The exposure to the psychosocial risks is higher among people who actually are treated for gastrointestinal disorders (PUD, IBS) than in those free of the symptoms associated to the diseases studied.
A cross-sectional, case-control study was conducted on a sample of 344 workers: 175 of them suffered from gastrointestinal diseases (PUD, IBS), and 169 had neither such diseases nor any other stress-related disorders. Both, cases and controls, were paired by gender, age, economic activity and current employment. The controls were selected from those employees who consulted simultaneously with the cases at the same health centres. The reason for gathering the controls at the same health centres was to make a selection biases control.
The instruments used were:

a) Questionnaire to evaluate the psychosocial factors, designed and standardized by Javeriana University (Villalobos G. 1996). The Questionnaire evaluates employees' perception concerning the presence and frequency of exposure to psychosocial risk factors, and consists of 77 multiple choice items (always, often, seldom, never). Cronbach's Alpha was 0,834 (p=<0,001, n=1.891).
b) Semi-structured Interview to broaden up qualitative information on the workers' attitude towards the study and the risk factors.
c) Helicobacter Pylori Test

RESULTS
The association between factor and exposure was established by the odds ratio. A stratified analysis was performed for possible confusion variables not controlled by the design (i.e. the presence of Helicobacter Pylori and cognitive-affective moderating factors). With the associated variables was calculated the logistic regression, looking for the best prediction model. Finally were calculated the model's sensitivity and specificity.
Cases and controls were compared, and after controlling the effects of the confusion variables, the strongest association found between PRF and the gastrointestinal disorders was the individual characteristics' (personality traits) Odds Ratio (OR): 3.615 (1.84 – 7.12) p= 0.000, a result which in turn showed the biggest difference between both groups. Diseases were also associated with the vital experience OR: 2.03 (1.20 – 3.46), p = 0.009.
Considering the PRF of the work, results proved an association with the characteristics of the organization (technology, organizational structure, communication, autonomy, schedule, and quantitative workload) Odds Ratio: 2.10 (1.10 – 4.00), p= 0.024.
The prevalence of helicobacter pylori bacterium was 58%, and the analysis demonstrated that including helicobacter pylori dramatically improves model prediction (0.974 Hosmer-Lemeshow Test), Specificity: 83 %, sensitivity: 44 %
CONCLUSIONS
According to the results, the convergence of certain personality traits, the characteristics of the organization, the loss of a loved person, and the presence of helicobacter pylori are associated with diseases studied. There is no evidence to say that infection caused by helicobacter pylori is related to a particular psychological condition.
The associations found can not be explained by factors such as age, gender, education, occupation or economic activity.

ABSENTEEISM AND SATISFACTION: A POWER PLANT CASE STUDY FROM SOMA, TURKEY

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[ID 358] - *No. 93 in Poster Area*

Objective: To define the relation between sickness absence and Job Satisfaction (JS) among employees in a power plant that was on the privatization list of the government.
Method: A cross-sectional study, which constituted 627 unionized employees, was carried out in year 2000. The participation rate was 95,8%. Job satisfaction was measured with one Lichert scaled question. In the analysis job satisfaction was used as a dichotomized variable. For sickness absence, one year data was collected retrospectively from "Human Resources Department's" registry. Spell frequency and spell intensity were calculated. Variables were entered into Logistic Regression models for further analysis.
Results: Almost all employees were male (99,4%); mean age was 41.1±4; mean, work experience length were calculated as 16.7±3.4 years. 1/10 of the participants (9.1%) were employed as supervisors or foremen, 69.5% were skilled workmen, 21.4% were unskilled workers. JS score was higher among workers who were in the nightshift system. Workers who complained from job burden, who had less control over job, who were unsatisfied with their close contacts in work environment, and whose spell rates were high had lower JS scores. Weak control over job (OR: 3.48; 1.33-9.06 95% CI), having unsatisfactory social environment at job (OR:12.89; 6.54-25.4 95% CI), and high spell rates (OR:1.05; 1.01-1.09 95% CI) had lower job satisfaction by analysis of Logistic Regression.
Conclusion: High absenteeism measures showed risk for lower job satisfaction along with other factors. Further in depth field work is needed in order to use absenteeism measures as JS indicators.

PERSONALITY AND THE JOB-DEMANDS RESOURCES MODEL: A STUDY OF AUSTRALIAN ACADEMIC STAFF

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[ID 434] - *No. 94 in Poster Area*

Over the past two decades, Australian universities have undergone profound change, and these changes have been associated with rising stress levels in university staff. To provide some insights into work stress mechanisms in academics we tested an extended Job Demands-Resources (JD-R) model of occupational well-being incorporating personality (neuroticism and extraversion) as well as job demands (work pressure, work-home conflict) and job resources (autonomy, perceived trustworthiness of management, procedural fairness, job security), on a sample of 3753 Australian academics. Consistent with the model, structural equation modelling showed that job demands predicted health impairment, while job resources predicted both health impairment and commitment. In addition, neuroticism predicted health impairment, both directly and indirectly through its effect on job demands, while extraversion predicted organisa-

tional commitment, both directly, and indirectly through its effect on job resources. Overall, the model accounted for 85% of the variance in health and 46 % of the variance in organisational commitment. The results support the capacity of the JD-R model to integrate work environmental and individual perspectives within a single model of occupational well being. The findings also point to the value of considering interventions at both the individual and workplace levels to improve occupational well-being.

JOB SATISFACTION AND PSYCHOLOGICAL MORBIDITY AMONG TEACHERS IN PUBLIC PRIMARY SCHOOLS IN A DEVELOPING COUNTRY

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[ID 595] - *No. 95 in Poster Area*

Introduction:
A high quality teaching staff is the cornerstone of a successful educational system. Teachers' job satisfaction will affect the quality of service they render. Poor job satisfaction could result in job stress and negatively impact their psychological health. This study aims to determine the level and causes of job dissatisfaction and psychological morbidity among teachers in public primary schools in a developing country.
Methods
This cross-sectional study was conducted from July 2004 to December 2004 among a total population of 384 teachers who had worked at least one year in public primary schools in Benin-City, Edo State, Nigeria. A self-administered designed questionnaire and a standard instrument – The General Health Questionnaire (GHQ 28) were the tools for data collection.
Results
Two hundred and fifteen (56.0%) of the teachers were satisfied with their jobs. One hundred and two (26.6%) had psychological morbidity (GHQ score of 4 and above). The proportion of teachers with psychological morbidity was significantly higher in those who were dissatisfied (44.6%) than those who were satisfied (19.1%), with their jobs, $p < 0.0001$. The causes of job dissatisfaction were poor salary, inadequate promotion, poor working conditions and school facilities.
Conclusion:
This study revealed a significant degree of job dissatisfaction and associated psychological morbidity amongst Nigerian teachers. The causes identified here are largely correctable and this would improve their job satisfaction.

AN INTEGRATED MODEL FOR STRESS-RISK EVALUATION IN HEALTH CARE PROFESSIONALS

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[ID 602] - *No. 96 in Poster Area*

Objective. To assess the risk from exposure to stress and burnout in health care workers, a pilot study was planned to compare and integrate the information based on the risk evaluation obtained through different parameters that can be quantified and elaborated to
produce a numerical index, called the Stress Index, and the subjective symptoms from the individual workers.
Methods. The study examined six different units from three divisions of Internal Medicine of a large public hospital in Northern Italy, and a total group of 228 health care workers (nurses, doctors and ancillary staff) in the six units.
Three internationally validated questionnaires were administered: the Job Content Questionnaire, the State-Trait Anxiety Inventory and the Maslach Burnout Inventory. Moreover, for each unit several objective parameters, thought to reflect job stress, were collected. The numerical
estimates of each parameter was summed to obtain a final numerical index, the Stress Index.
Results. The results showed an association between the Stress Index scores and the scores from the questionnaires. In particular, in the two units with the highest levels of the Stress Index, a significantly higher unbalance between job demand and decision latitude was observed,
together with the highest levels of state and trait anxiety and of depersonalization, indicating higher burnout levels. Age and seniority were significantly lower in the same two units.
Conclusion. The instrument adopted in our study has demonstrated good reliability in assessing the risk due to occupational stress in health care workers and in detecting higher risk situations. Our results suggest the necessity of developing standardized methods to confirm qualitative measures with quantitative parameters.

POSITIVE AND NEGATIVE LEADER BEHAVIOURS: DIFFERENCES IN INDIVIDUAL AND ORGANIZATIONAL EFFECTS

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[ID 622] - *No. 97 in Poster Area*

Leadership behaviours have the potential to affect the psychological well-being of employees, as well as employee behaviours that influence the productivity of organizations. In this survey study involving health care professionals (N=72), we investigated the impact of positive (transformational leadership), neutral (laissez-faire) and negative (abusive supervision) leader behaviours on employee job-related affective well-being (both positive and negative), organizational citizenship behaviours (OCBs) and organizational deviance. We hypothesized that positive leadership behaviours would be positively associated with positive affective well-being and OCBs, and negatively associated with negative affective well-being and deviance, while negative behaviours would be negatively associated with positive affective well-being and OCBs, and positively associated with negative affective well-being and deviance. We hypothesized that laissez-faire behaviours (tendency to abdicate responsibility) would not be associated with the outcomes. The results (all significant at the .05 level) showed that while transformational leadership was positively associated with OCBs and positive affective well-being, it was not associated with deviance nor with negative affective well-being. Abusive supervision was negatively associated with positive affective well-being and positively associated with negative affective well-being, but not associated with OCBs nor deviance. Finally, laissez-faire behaviours were positively associated with deviance, and negatively associated with positive affective well-being. It appears that while positive leader behaviors have a positive impact on positive outcomes, they do not affect negative outcomes. Negative leader behaviours appear to have the greatest impact on affective well-being at work, and laissez-faire behaviour is found to be more detrimental than hypothesized. In response to these findings, we explore the possibility that conceptualization of leadership behaviours on a continuum is unwarranted. Each of these leader behaviour constellations appear to be conceptually distinct. The results also suggest that different interventions may be necessary for organizations to accentuate positive and minimize negative employee health and behavioural outcomes.

THE IMPACT OF PSYCHOLOGICAL EMPOWERMENT AND SOCIAL SUPPORT AT WORK AMONG SWEDISH EMPLOYEES REGARDING SELF-RATED HEALTH AND BURNOUT IN A LONGITUDINAL ANALYSIS

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PURPOSE: To explore the gender-specific longitudinal association between psychological empowerment and social support at the workplace, and self-rated health and burnout in a working population. MATERIAL AND METHOD: The respondents were 715 employees working in the public service sector in Sweden (overall response rate 67%). Measures used were the Psychological Empowerment Instrument, the social support dimension in the Demand-Control-Support Questionnaire, the SF-36, the EQ-5D, and the Copenhagen Burnout Inventory. Multivariate comparisons adjusted for demographics and SRH/burnout at baseline were performed using multiple linear regression analysis. RESULTS: For women, a combination of high psychological empowerment and high social support at the workplace, in comparison with a combination of low psychological empowerment and low social support, is associated with better SRH (bodily pain, general health, vitality, social functioning, emotional role, mental health, the EQ-5D VAS, and EQ-5D index) and lower levels of work-related burnout at the 2-year follow-up after adjusting for demographics and baseline SRH and burnout. For men, there are univariate associations with burnout and some associations with SRH. After adjustments for demographics and baseline SRH and burnout, psychological empowerment and social support is associated with SRH as measured by the EQ-5D VAS for men. The gender differences regarding bodily pain, social function, and

work-related burnout are confirmed. Implications: Practitioners and researchers who are active in health enhancement in working life should gain from implementing these findings, whether the focus is on health promotion, disease prevention, or rehabilitation back to work.

METHODS FOR THE ASSESSMENT OF MENTAL WORK LOAD – TESTING THE COPSOQ

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The undisputed increase of the relevance of mental work load is confronted with a lack of qualified or at least well documented measuring instruments.
The COPSOQ (Copenhagen Psychosocial Questionnaire), a very comprehensive
instrument for the assessment of psychosocial factors at work tested in a party modified version in a large German sample (N = 2561 employees). Aims were the detailed check of the psychometric measurement qualities, and based on these results, the development of an abbreviated instrument.
The analysis of the objectivity, acceptance, practicability, sensitivity and content validity of the questionnaire as a whole, did not show any problematic results – with some limitations regarding the length of the questionnaire.
The assessment of the reliability, generalizability, construct validity, criterion validity and diagnostic power of the single scales applied showed medium to good measuring qualities for the majority of the scales. In addition these results were very similar to the Danish COPSOQ-study.
Under consideration of all aspects of the measuring quality an abbreviated instrument was created. It tries to achieve measuring qualities as high as possible with a number of questions asked as low as possible.
The German COPSOQ questionnaire is a screening - instrument for the recording of mental work load and strain at free disposure for all enterprises interested. A promising next step would be the construction of a „job exposure matrix“ for the psychosocial factors at work, that means a central database with work load profiles and reference values for as many occupational groups as possible.

AN IMPLEMENTED STRESS POLICY - A DANISH EXAMPLE

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[ID 762] - *No. 100 in Poster Area*

Policies against e.g. alcohol and tobacco abuse are widespread in companies world-wide. However policies to prevent and handle stress among employees are only sparsely implemented in human resource policies. In Denmark such efforts have been made in different trades like the pharmaceutical industry, oil companies and hospitals.
We describe core elements in such a policy that have shown beneficial effects, especially regarding sickness absence, turn-over and job satisfaction. Stress policies are characterized by elements like work-family interface, personal development, coping strategies, work environment improvements, and work stress effects like sick-leave, reduced performance etc. The following elements constitute the common trunk of the stress policies studied in Danish enterprises:

1. Addressing stressors related to work content (cognitive and emotional demands, lack of decision authority, skill discretion, predictability, risk of violence, and isolated work)
2. Rules and incitements to improve social relationships (support from colleagues and leaders, role clarity, involvement and rewards).
3. Agreements on work-time related factors (shift work, deadlines, home work, over time, pauses and work-hours)
4. Company related factors like indoor climate, job security and organisational structure
5. Improvement of individual coping strategies
6. Strengthened resistance to stress (improving physical fitness and social network)
7. Reducing effects of occupational stress among individuals (conflict handling, therapy etc.)

Successful procedures to develop and implement such policies have included the following factors:

1. Strong commitment from management
2. A stepwise systematic approach
3. Time for implementation
4. Local foundation of policies in order to deal with differences in work content and culture within companies
5. Organisational structures to develop and implement proposals from employees
6. Repeated measurements of psychosocial work environment in order to make adjustments
7. Feedback to the whole organisation

Systematic evaluations of such policies are ongoing, and examples of results from these studies will be presented.

THE VALIDITY OF THE CENTER FOR EPIDEMIOLOGIC STUDIES DEPRESSION SCALE AS A SCREENING INSTRUMENT OF MAJOR DEPRESSIVE DISORDER FOR JAPANESE WORKERS

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[ID 797] - *No. 101 in Poster Area*

Objective: The Center for Epidemiologic Studies Depression Scale (CES-D) is often used at workplaces to screen for depressive disorders. However there are no studies that examined the validity of the CES-D to detect major depressive disorder for workers. The aim of this study is to examine the validity of the CES-D in the workplace.
Methods: The self-reported CES-D was administered to 2219 workers (84.2% men; age 21-68 years) at an electronic device manufacturing company in Japan during the periodic examination. Concomitantly all workers had an interview with the trained public health nurses that used the Mini International Neuropsychiatric Interview (MINI). The results of the MINI was used as a gold standard for the diagnosis of major depressive disorder (MDD). The validity was evaluated by a receiver operating characteristic (ROC) curve and the sensitivity, specificity, positive predictive values and negative predictive values were calculated for different cut-off scores of the CES-D.
Results: The area under the ROC curve of the CES-D was 0.96 (95% Confidence Interval: 0.94-0.99). The optimal cut-off score of MDD was 19 (Sensitivity=92.7%, Specificity=91.8%, Positive predictive value=17.6%, Negative predictive value=99.9%) for screening.
Conclusions: The validity of CES-D is confirmed and it is a valid instrument for detecting MDD in working populations in Japan. The optimal cut-off score for screening is 19.

WORK, FAMILY AND PSYCHOLOGICAL DISTRESS: ARE THERE ANY GENDER DIFFERENCES?

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[ID 807] - *No. 102 in Poster Area*

This study analyses the moderating effect of gender on the relationship between work and family conditions on the experience of psychological distress of working parents. Data are derived from the Quebec Health and Social Survey (Canada) conducted in 1998. This survey allows evaluating the responses from a sample of 4309 workers living with minor children. Results show that psychological distress prevalence is 23% for females and 15% for males. Controlling for age, physical health, alcohol intake, smoking, physical activity, childhood stressful events, and social support outside the workplace, logistic regression analysis reveal the contribution of work conditions related to physical and psychological demands (OR=1.06, 95%CI=1.02-1.09), harassment (OR=2.13, 95%CI=1.64-2.75) and unionization(OR=0.77, 95%CI=0.60-

0.98). For family, living with a partner (OR=0.68, 95%CI=0.46-0.99), marital strains (OR=1.73, 95%CI=1.55-1.94) and parental strains (OR=1.48, 95%CI=1.29-1.68) are significant factors. While males and females parents diverge regarding the distribution of work and family conditions, gender is not, in general, interacting with work and family conditions. Sole exception found is the interaction between work schedule and marital status. The increase in the odds of psychological distress associated with working on an irregular work schedule is significant only for single males and females living with a partner. Overall, the results suggest that as male and female parents will become more and more similar regarding the working life, work and family stress will be equally important in explaining variation in mental health of both genders. However, gender differences in the trade-off between working on an irregular work schedule and children responsibilities need to be more closely investigated.

RELATIONSHIP BETWEEN CHANGE OF JOB DEMAND/CONTROL AND ABSENCE FROM WORK

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[ID 826] - *No. 103 in Poster Area*

Objective:
To elucidate the effect of change of job demand/control on absence from work by a 6-year follow-up of the Japanese employees.
Methods:
We obtained data on job demand/control/support as psychosocial work characteristics at two separate points in time, 1996 and 2002, in a metal-products factory. The scales were dichotomized at the median values each year, and then categorized into four groups as follows: I: low (1996) to low (2002), II: low to high, III: high to low, IV: high to high.
We adopted both sickness absences and paid leaves from 1996 to 2002 as the data reflecting absence from work. We analyzed rates of different durations (short spell: 1-6 days and long spell: more than 6 days) to examine absence from work as related to changes in psychosocial work characteristics. The data of 3201 male and 2001 female employees were analyzed. Group I in each work characteristic was regarded as a reference group.
Results:
Group II and group IV on job control showed lower rates of absence compared with group I for both sexes. On worksite support, short spell of absence in group II and group IV and long spell in group IV were decreased for males. On job demands, long spell in group II and group IV were lower for males. For females, short spell in groups II, III and IV and long spell in group IV were decreased.
Conclusion:
High levels of job control, worksite support and job demands were associated with decreased absence from work. However, scales of worksite support and job demands reflected no coherent change in the rate of absence from work which varied with different spells and according to sex.

TYPE OF COPING AND INDIVIDUAL ACCUSES OF HEALTH AFFECTION

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[ID 894] - *No. 104 in Poster Area*

Aim of study. To establish relationships between the resistance to psychosocial stress and individual accuses of health affection.
Material and methods. In 239 Ss from food industry were related the significant associations (p<.05) between 8 types of resistance to psychosocial stressful events (by Sense of Coherence Questionnaire–SOC) and percent of individual accuses localized in different segments of the body.
Results and discussions
Tabel: Relationships between individual accuses and the types of coping

Localization of accuses	Percent of accuses significantly associated with the type of coping							
	Type 1	Type 2	Type 3	Type 4	Type 5	Type 6	Type 7	Type 8
Face	21.88*	40	46.67	37.5	36	33.33	27.78	**52.38**
Head	18.75*	33.33	40	37.5	40	44.44	22.22	**52.38**
Hair	31.25*	46.67	**60**	**75**	44*	**88.89**	50.00	52.38
Eyes	36.72*	**80.00**	**66.67**	25*	**60**	44.44	55.56	**71.43**
Nose	15.63*	26.67	**46.67**	0*	20	11.11	27.78	28.57
Mouth	86.72	86.67	100	100	92	100	94.44	100
Ears	22.66*	**53.33**	**53.33**	0**	32	33.33	22.22	**47.62**
Neck	27.34*	26.67	40	37.5	24	22.22	**55.56**	42.86
Hands	36.72*	53.33	60	50	52	44.44	**66.67**	57.14
Nails	25*	**60**	**60**	37.5	24*	22.22	22.22*	38.1
Legs	47.66*	60	**80**	50	52	33.33*	66.67	61.9
Back	39.06*	**80**	60	62.5	56	**77.78**	61.11	**76.19**
Skin	32.81*	**60**	46.67	50	44	44.44	44.44	42.86
Joints	29.69*	40	46.67	37.5	44	0*	38.89	**52.38**
Digestives	62.5	66.67	86.67	87.5	68	66.67	66.67	80.95
Neurovegetatives	38.28*	46.67	**66.67**	25*	44	55.56	44.44	**71.43**
Circulatory	27.34*	33.33	33.33	**75**	36	33.33	38.89	**52.38**
Endocrines	47.66	60	**73.33**	25*	52	33.33	38.89	61.9
Excretory	67.97	66.67	86.67	87.5	60*	88.89	66.67	**90.48**
Emotional	68.75*	**93.33**	53.33*	75	60*	55.56*	72.22	71.43

The analysis of these differences put in evidence that: 1) the type 8 (stable negative, with a diminished resistance to psychosocial stress), is significantly associated with many groups of accuses; 2) the type 5 and 6 (with a pressure toward negative evolution, because of a reduced motivational component), as well as the type 2 (with a reduced comprehensibility, ability to predict the psychosocial challenges), the type 3 (with a reduced manageability, resistance ressources for the impact with stressful events) and the type 7 (both the manageability and the meaningfulness components are reduced) appears significantly associated with some groups of accuses; 3) the type 4, wich although has a reduced comprehensibility and manageability, is not only nonsignificantly associated, but also has reduced percentages for some groups of accuses; 4) the type 1 (with a good resistance to psychosocial stress, a good or at least moderate comprehensibility, manageability and meaningfulness), is associated with significantly reduced percentages for many groups of accuses.
Conclusions. These study offer useful informations about accuses significantly related to stress resistance, proving the importance of motivational component in coping with potential stressful events, with a positive influence on the appearance of different accuses of health affection.

SATISFACTION WITH PSYCHOSOCIAL WORK CONDITIONS AND SICKNESS ABSENCE

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[ID 958] - *No. 105 in Poster Area*

Background: Sickness absence has been shown to be associated with a variety of psychosocial work conditions but cross-sectional designs and lack of independent measurement of exposure and outcome preclude causal inference.
Objectives: To examine sickness absence as a function of satisfaction with psychosocial work conditions in public service-workplaces.
Methods: The participants were 1542 employees from 106 different psychiatric-care service-workplaces in the County of Aarhus. The study is part of a larger project including different types of public service-workplaces and several dimensions of the psychosocial work environment. Satisfaction with psychosocial work conditions was rated on a 0 (low) to 10 (high) scale in questionnaires administered by the County of Aarhus in February 2005. Individual ratings were aggregated to a workplace-unit level to reduce reporting bias. Average values for the overall satisfaction

with psychosocial work conditions and the average number of days of sickness absence during the 6 months around the collection of exposure data were calculated for each workplace-unit. Linear regression was used to perform the analysis.
Results: No linear association was found between the satisfaction with psychosocial work conditions and the proportion of employees who had had 1 or more days of sickness-absence during the study period. Among those who had been absent we found a 1.30 decrease (beta = -1.30 (CI: -2.63 – 0.03)) in the number of sickness absence-days with one-unit increase in satisfaction with psychosocial work.
Conclusion: The average level of sickness-absence decreased with increasing satisfaction with the psychosocial work conditions at the workplace-level. However, cautious interpretation is warranted, as the association found is crude and cross-sectional. Subsequent follow-up-analysis will adjust for potential confounders.

THE RELATIONSHIP BETWEEN JOB STRESS AND PSYCHOSOCIAL STRESS AMONG NURSES AT A UNIVERSITY HOSPITAL

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[ID 991] - *No. 106 in Poster Area*

Objectives: This cross-sectional study investigated the relationship between job stress and psychosocial stress among nurses at a University hospital in Incheon, Korea.

Methods: A questionnaire survey was conducted targeting 476 nurses, of which 320 (67.2%) questionnaires were returned and 299 (62.8%) were regarded as being reliable data for analyses. A structured self-reported questionnaire was used to assess the respondent's sociodemographics, job stress and psychosocial stress. Seven domains of occupational stress (eg, Job demand, Insufficient job control, Interpersonal conflict, Job insecurity, Lack of reward, Organizational system and Informal climates) according to the Korean Occupational Stress Scale(KOSS) were used and psychosocial stress was measured using Dr Chang's PWI-SF (Psychosocial Well-being Index-Short Form).

Results: In multiple regression analyses, 'Job insecurity', 'Organizational system' and 'Lack of reward' were related to psychosocial stress (**Table 1**).

Table 1. Multiple regression analysis on psychosocial stress

Variables	Psychosocial stress		
	Beta	T	p-value
Job demand	-0.03	-0.61	0.543
Insufficient job control	0.00	0.04	0.967
Interpersonal conflict	0.10	1.92	0.056
Job insecurity	0.14	2.64	0.009
Organizational system	0.12	1.98	0.049
Lack of reward	0.14	2.22	0.027
Informal climates	-0.01	-0.19	0.846
R^2 (Adjusted R^2)		0.341 (0.305)	

Adjusted for age, marital status, exercise or leisure activity, tenure, shiftwork, grade, sleep quality and physical burden

Conclusions: Our results tend to suggest that job stress is associated with psychosocial stress. It is need to recognize the importance of job stress and to provide stress management program to minimize psychosocial stress caused by job stress.

EVALUATION OF YOUNG PEOPLE PERSONALITY QUALITIES DURING OPERATOR WORK

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[ID 1076] - *No. 107 in Poster Area*

The widely spread professions of human-operator type in modern society including shift or not usual working hours is shown to be the most sensitive to the anxiety, neuroticism, extraversion and morningness
The purpose was to reveal the correlations of personal qualities with some objective and subjective evaluations in the body activity.
171 students (aged 16-24) were observed using tests on the anxiety by Schwartze.a.(Sc.), Spilberger-Khanin (S-K), neuroticism and extraversion, morningness, objective and subjective health, psychological age and work ability evaluations (SWAE), tests on attention switching and concentration, tapping test (VMR), cardiovascular system work, static balancing (SB).
Increase in the anxiety was related on the decrease in weight, general and physical SWAEs, health state self esteem, increase in the anxiety by (S-K) with an increase in health problems. Increases in cognitive anxiety (Sc) and anxiety (S-K), were accompanied with the decreases in systolic volume, increase in somatic anxiety by (Sc) with the decrease in pulse pressure and subjective age felt. Low anxiety by (S-K), was coupled with better quality of the attention concentration and worse quality of attention switching and also worse VMR. High anxiety by Schwartz e.a.was noted with the worse velocity and attention concentration and switching and the most low VMR.
Increase in neuroticism was accompanied with the decrease in physical SWAE, health self esteem, decrease in systolic volume.
Increased extraversion was coupled with an improvement in velocity and quality of rings cancellation, in VMR, tendency to the improvement of the attention switching velocity, decrease in the desirable age, increase in communication SWAE and subjective estimation of the health state.
Morningness was related on better velocity and worse quality of attention concentration, increase in systolic blood pressure, age, SB, mental and physical SWAEs. Revealed results could be used for solving tasks of professional selection and orientation.

OCCUPATIONAL HEALTH SERVICES FOR WORKERS WITH LONG WORKING HOURS IN JAPAN

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[ID 1117] - *No. 108 in Poster Area*

Workers' compensation insurance in Japan covers some cardiovascular diseases occurred among workers with long working hours (hereafter LWH). Occupational health legislation in Japan requires employers to ask their occupational physicians to give advice for preventing health disorders caused by LWH after let them interview the workers at risk; working 100 hours or more in preceding month, in addition to the legally-admitted working hours of 40 hours a week.
We interviewed 25 occupational physicians at exemplary Japanese companies regarding their occupational health services for workers with LWH.
Most companies used various indices in addition to overtime working hours registered for payroll to select workers at risk; self-reported overtimes, overload observed by their supervisors, by labor union, or by occupational health staffs, health information obtained at annual health examination, holiday works, and overnight works. They also applied various questionnaires before and/or during interview. Most frequently asked question was sleeping time and quality, followed by commuting time, commuting method, real working hours, numbers of holiday work, subjective workload, human relationships at work, support from colleague or supervisors, perspectives of current task, and adverse effect on personal schedule and hobbies. Representative advises given by occupational physicians to the employers as for the measures to shorten working hours are the induction or improvement of shift schedule, the recalculation of staffing, the induction of automated system, the permission to use express train. Advices for the improvement of the subjective sense of heavy workload were the facilitation of communication and support from supervisors and co-workers, the teaching stress coping methods, the increasing opportunity of return home for dispatched workers. They also gave advices to improve hazardous environment, to receive medical treatments, and to solve other problems such as nursing care problem of the family, facilitating familial support, and advising measures to return debts.
Personal information collected through these interviews must be carefully handled among occupational health professionals.

WORKERS' SICKNESS ABSENCES IN FOUR FOOD INDUSTRY FACTORIES

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[ID 1331] - *No. 109 in Poster Area*

The study is part of a research project concerning sickness absences in a food industry company which consists of four factories in different localities in southwestern Finland. Workers' absences in years 2002 and 2003 were recorded from registers. The absence rates were analysed in order to reveal potential differences between the factories.
Crude figures of short (< 4 days) and long spells as well as days showed

considerably lower rates in one of the factories (table). The figures of factory B were low throughout the main diagnostic groups (infections, musculoskeletal diseases, accidents, mental problems).

	Sickness absences / person year		
	Short spells	Long spells	Days
Factory A	3.16	2.08	35.4
Factory B	1.44	1.31	22.1
Factory C	2.42	1.69	30.7
Factory D	2.41	2.36	41.3

Statistical significance of the differences was assessed with sex and age adjusted Poisson regression analyses. With reference to factory B the probability of a short spell was 2.30 (95% confidence interval 1.76-2.35) in factory A, 1.70 (1.42-2.04) in factory C and 1.60 (1,37-1.88) in factory D. Corresponding results for a long spell were 1.97 (1.68-2.33), 1.83 (1.49-2.25) and 2.28 (1.92-2.71).
The factories applied same collective agreements of sickness absences. Only blue collar food production workers were included, i.e. there was no factory difference with rregard to occupational status. Further analyses, employing data obtained from questionnaire surveys, will show whether the low figures in factory B are due to differences in well-being of the employees or in the working conditions. Moreover, qualitative analysis of interview data may reveal factory differences in the absence control practices. Finally, we intend to use sickness absence data of other work places in the localities to study whether the relatively low figures of factory B might reflect a locality level cultural practice.

STRESS AND HARASSMENT IN THE JAPANESE WORKPLACE
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[ID 1362] - *No. 110 in Poster Area*
According to the national survey by the Ministry of Health, Labor and Welfare, the proportion of workers who reported strong anxieties, worries or stress concerning their job or working life has gradually increased from 50.6% in 1982 to 61.5% in 2002. The main causes of stressed workers were human relationships at work, 35.1%; quantitative workload 32.3%; qualitative workload, 30.4%; future of my company 29.1%. Suicide has becomes a main cause of death in Japanese working population. 654 managers and 7,893 employees were killed by themselves in 2004. The Ministry of Health, Labor and Welfare upheld 130 worker compensation claims for mental disorders including 45 suicide deaths in fiscal year 2004. The Law on the Resolution of Individual Labour Disputes were enacted in 2001. The Prefectural Labour Director shall provide workers, job applicants and employers with information on matters concerning labour relations, recruitment and employment and give consultations and other assistance. About 300 comprehensive labour consultation corners were opened to prevent and resolve individual labour disputes. Workplace harassments are included individual labour disputes. In fiscal year 2004, there were 160,166 consultations on civil individual labour dispute, 5,287 requests of advise or guidance to the Prefectural Labour Director, and 6,014 requests of conciliation by the Dispute Adjustment Commission. Among them 3,818 consultations (2.4%), 50 request of advice or guidance (0.9%), 233 requests of conciliation (2.9%) were concerning sexual harassment, and 14,665 consultations (9.2%), 410 request of advice or guidance (7.8%), 505 requests of conciliation (8.4%) were concerning other harassment or bullying. Stress and harassment at the workplace are serious social issues in Japan. They interact with each other. Changing work organizations may be increasing them. Prevention of stress and harassment in the workplace are needed for promoting health and well-being of workers and creating healthy workplaces.

QUALITY AND SAFETY SYSTEM INTEGRATION IN MANIFACTURING INDUSTRY
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The aim of this work is to reduce the jobs through-put time in middle small enterprises, trough the integration of different enterprises' management systems.
We have recognized which are the principles processes in a generic enterprise and then we have subdivided these processes in sub-processes, using a typical method of the project management, i.e. the WBS (Work Breakdown Structure). Trough this approach we have demonstrated the opportunity to integrate, mainly the Quality and Safety processes.
In addiction to this aim we have proceeded to investigate which are the best management models to create an integrated management system among them we have recognized the ISO 9001:2000, for the Quality, and the OHSAS 18001:1999, for the Safety as the most integrable.
We have recognized there are some integration problems, and for each of these problems are given some solutions, among them it has been chosen the solution that had the largest number of advantages instead of the disadvantages.
In addiction to this work we have conducted an applicatory study that have the possibility to reduce the enterprise trough-put time.

STRESS AMONG HEALTH CARE WORKERS
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[ID 1767] - *No. 112 in Poster Area*
Stress is the feeling of fatigue, distress and not being able to cope up with the demands and pressures placed on individual workers that do not match the resources available, or do not meet the individual's needs and motivations.
GENERAL OBJECTIVES: To study the stress level, causes and coping strategies among various healthcare workers.
SPECIFIC OBJECTIVES: to study the stress level among ;
1) Doctors and nurses
2) Caucasians and Asians
3) Males and females
4) The Different age groups

METHODOLOGY:
It was a cross sectional study consisting of 140 respondents selected by convenience sampling. The respondents were from a Government General Hospital and University Hospital in Malaysia together with a Government General Hospital in the United Kingdom. The respondents consisted of nurses, interns, doctors, housemen and various specialists. The study duration was four weeks and it consisted of a questionnaire-based study conducted in English that was distributed to the medical professionals. Stress level was rated through a scoring system for each question given.
EXCLUSION CRITERIA:
Expatriate healthcare workers on contract work in Malaysia were excluded.
RESULTS:
- Level and causes of stress between doctors and nurses: Higher level of stress was noted among the nurses attributed to traffic jams while commuting to work.
- **Level and causes of stress among Caucasians and Asians**: Higher level of stress was seen among Malaysian Healthcare workers attributed to traffic jams while commuting to work.
- **Comparison of support received by Caucasians and Malaysians**: Malaysians received better support in comparison with Caucasians. Support was derived from family and colleagues.
- **Management of stress between males and females:** In both groups use music and television seem the most common method of stress management.
- **Comparison of how different age groups manage stress:** Younger age have a tendency to express their feelings to their close ones or practice better planning and problem solving. Older age group respondents have time management.

Conclusion
This study has given some fairly significant insights with regards too the stress levels among healthcare workers. It be a good source of data in analytical research.

AN APPLICATION OF THE GREDED RESPONSE MODEL OF ITEM RESPONSE THEORY TO THE PSYCHOLOGICAL STRESS RESPONSE SCALE IN JAPANESE MALE WHITE-COLLAR WORKERS.
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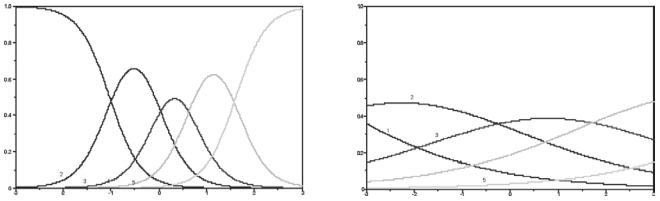
[ID 1800] - *No. 113 in Poster Area*
Aim. The aim of this study was to investigate the discrimination and the level of difficulty of a psychological stress reaction scale based on Item Response Theory (IRT) among Japanese male white-collar workers.
Methods. A cross-sectional study was conducted in 2004 in order to assess employees' psychological stress reactions. A total of 3,808 Japanese

male white-collar workers from three companies participated in the study. The mean age was 39.1 years (±SD 9.84). The revised version of the Job Stress Scale (JSS-R) was used to measure the participants' psychological stress reactions in 27 items. The response categories ranged from (1) strongly agree to (5) strongly disagree. The graded response model of IRT (Samejima, 1969) was conducted to evaluate the discrimination and the level of difficulty regarding each item.
Results. Certain items such as 'I feel blue' could discriminate subtle differences in employees' potential levels of psychological stress reaction. Other items such as 'I always get exhausted' did not show extremely high or low levels of difficulty in answering. However, some items such as 'I get angry easily' might not be suitable for measuring workers' potential psychological stress reactions because their estimated scores of discrimination and difficulty were not appropriate.



'I feel blue' 'I get angry easily'

Fig. Item response category characteristic curve

Conclusions. The results of the IRT analyses supported the measurement effectiveness and sensitivity of the psychological stress reaction items in the JSS-R. However, some items showed poor levels of discrimination and difficulty. Further research is needed to select more appropriate items for measuring employees' potential levels of psychological stress reaction.

THREE-YEAR ASSESSMENT OF THE MENTAL SUFFERING OF THE EMPLOYEES OF A SERVICE COMPANY

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[ID 1854] - *No. 114 in Poster Area*

Aims:
After an initial assessment of mental suffering, carried out in 2002, within a company of 600 employees (*Arch. Mal. Prof.* 2004; 65: 326-334), a second investigation was conducted in order to assess the changes in this suffering three years after the implementation of measures aimed at reducing stress at work.

Methods:
Standardised questionnaires (General Health Questionnaire: GHQ 12, Maslash Burn-out Inventory: MBI, Job Personal Interaction Scale: JPIS, Duke's Social Support) were given to 240 employees, randomly selected from a company of 602 employees, in 2002 and in 2005. The main corrective measures introduced during this period concerned improvements in training, information and the organisation of work; these different elements were statistically linked to mental suffering at the time of the first investigation in 2002. The tests applied were Pearson's Chi-square and a logistic regression with a threshold of 0.05 using SPSS software, version 13 (CDC Atlanta).

Results/ Discussion
Between 2002 and 2005, there was a significant improvement in the levels of suffering; thus, psychological distress (GHQ 12 >12) had been reduced by 44% ($p = 10^{-7}$). Very great psychological distress (GHQ 12 >21) had been reduced by 75% ($p < 10^{-8}$). The state of « Burn out », not measured in 2002, was 5.8 % in 2005. Moreover, the main aspects linked to suffering had changed during this period: a person's age and their position in the hierarchy of the company were no longer determining factors of suffering; the same was true for training and fairness at work. The only factors still statistically linked to mental suffering were the workload, the unpredictability of tasks and appreciation at work.

Conclusions
The efforts made by the management in terms of supporting changes (with more appropriate training) and encouraging employee participation have contributed to the reduction in the levels of mental suffering in the company. However, there are still improvements to be made in the organisation of work, particularly regarding the exploitation of employees and the recognition of work carried out. It is hoped that these would lead to an even greater decrease in mental suffering and, above all, a better level of self-esteem among employees. The use of standardised and validated questionnaires has become necessary for the assessment and follow-up of cohorts; the choice of GHQ 12 or of MBI depends on the research interest of the investigator.

INTEGRATION OF A SIMPLE ASSESSMENT TOOL FOR PSYCHOSOCIAL RISK FACTORS WITH PHYSICAL HEALTH AND SAFETY

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[ID 189] - *No. 115 in Poster Area*

The concept of psychosocial hazards is one that is not an easy sell to many businesses, especially small and medium-sized enterprises (SMEs). There is often a need to demonstrate to employers the link between psychosocial factors and more traditional indicators of health and safety.
A very simple assessment tool for psychosocial risks has been developed and validated by Health Canada, called the Stress-Satisfaction Offset Score (SSOS). This tool consists of four questions about demands, control, effort and rewards in a job, and when scored mathematically, gives a simple quantitative measure of the degree to which workplace stressors and satisfiers are working for or against the health of an individual, and, in aggregate, against the health of a business.
The Industrial Accident Prevention Association (IAPA) in Canada has integrated this tool into broader health & safety audits or ergonomic assessments, and has found a striking correlation between the SSOS score and other health and safety effects, such as back pain. While this correlation does not imply or prove causation, it provides a rather dramatic visual connection that is useful to start a conversation with the employer about the issues surrounding back pain or other physical complaints.
This instrument could be used by small and medium-sized enterprises to assess the level of psychosocial risk in the enterprise, and the predictable effects on health and safety. Or, it could be used by internal or external consultants to draw attention to the fact that physical pain or injuries may be influenced by psychosocial factors that must be addressed at the same time as physical factors.

WORK AND VISION

BUSINESS PROCESS ORIENTED OCCUPATIONAL SAFETY AND HEALTH FOR MOBILE IT-WORK

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[ID 81] - *No. 116 in Poster Area*

Today, more and more areas of work face an increasing pervasion by mobile computing. Traditional areas of work are evolving to mobile computing based processes; new areas of work are emerging due to the potential of mobile computing.
Nevertheless, work sciences today rather remain in more traditional concepts of exploring and designing work conditions. Especially the role and potential of occupational safety and health (OSH) in these new kinds of work today are not fully explored and realised in practice.
OSH in order to establish general valid principles needs a set of invariants which remain constant under different viewpoints to work. Traditional invariants of work are, e.g. work place and work time, the objects of work, and tools. If these invariants suddenly turn into variables by facilitating mobile information technology, they can no longer serve as a basis for effective OSH. In general, the attempt to make use of traditional invariants of work for OSH within mobile IT-work must fail in almost any case. Instead, new invariants have to be found, which lead to a new basis for and probably a new understanding of OSH for mobile IT-work.
Practical experience has lead to the conjecture that there are especially two aspects of mobile IT-work which are important: First, mobile IT-work should be referred to as a multidimensional complex work space rather than a set of single factors. Second, appropriate design of business processes is crucial to efficient and ergonomic work
This paper investigates new invariants for OSH in mobile IT-work based on business processes and gives perspectives for a new understanding of the role of work science and OSH within this future field of work.

INFLAMMATORY EYE DISEASE AND WORK STRESS - CENTRAL SEROUS RETINOPATHY AS A PARADIGM

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HECONET - Torsby, Värmland - Sweden [2]

[ID 504] - *No. 117 in Poster Area*

Chronic diseases whose natural course includes flare-ups are sensitive to stress. To put it quite generally, stress increases the probability that a disease that depends on homeostatic processes – as what diseases do not? – will appear or take a turn for the worse. This applies to inflammatory eye disease as much as to any other. A special case – which may sometimes 'snowball' in it s course – occurs when the patient carries out concentrated *visual* tasks. In our poster we present the cases of a few patients with central serious retinopathy in whom exactly this happened. The works doctor is called for, and the question of his or her understanding of psychosomatics in the workplace now arises. Industrial medicine has a primarily preventive role, and the question now is, what status is given to psychosocial relationships, and what status do we accord to a systemic field in which pathological conditions arise without classical cause–and-effect relationships. In other words:

1. Does industrial medicine see itself as a discipline whose area of competence includes the field of work in a general and comprehensive way, wherever work by human beings is involved?
2. Is the same true of ergophthalmology, i.e., is its sphere of activity quite generally the whole area of interaction between visual organ and work?

Our poster gives a clear answer: yes, a modern works doctor must be familiar with the whole spectrum of psychological and social interactions between work and health, even if nowadays there is no-one he can refer to.

REDUCING LOAD IN REMOTE REPAIR SITUATION

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[ID 1089] - *No. 118 in Poster Area*

Remote repair enables complex technologies to be maintained without the need to displace engineers physically from their current location. Technical limitations, such as available bandwidth for signal transmission, delay in signal transmission or available displays (acoustic, visual, stereoscopic) are an important cause for stress of the operators, resulting in complaints and degrading the quality of work. In many cases, the implementation of automatic diagnostic routines is more expensive than analysing a broken system using human workforce or it can not be implemented due to the large variety of factors to be considered. In such a case effects of technical limitations in the communication are more pronounced since operators are at both ends.

In this study we investigated the role of display modality in efficiency and experienced load in completing a 3D task (popular game), in which a novel operator is guided by an expert operator. Three modality settings, differing in required bandwidth for signal transmission, were used. In the first setting, novel and expert operator used only the audio channel for communication. In the second setting, the expert was equipped with a monitor displaying the work area at the novel operator's side. In the third setting, audio and stereoscopic display are used at both ends. Here the operators share a common workspace in which, for instance, the expert can point to a specific part of the object to be manipulated.

A total of 24 subjects (12m, 12f), all naïve to the 3D game used, participate in the study. The order in which the three settings are administered is pseudo random and counterbalanced across subjects. Subjects rate the task load by means of the NASA TLX questionnaire. Time required for completing the task, number of instructions given and index of the NASA TLX questionnaire are used to compare the three different settings.

WORK ENVIRONMENT AND FATIGUE OF NURSING STUFFS IN NICU

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[ID 1519] - *No. 119 in Poster Area*

Background: For newborn babies, lighting in NICU is recommended to be 60 Lx or less. However, on the other hand, sufficient luminance in workplaces is indispensable for medical and nursing staff to work safely and correctly. It is important to provide a proper work environment, which is appropriate for not only the development of a newborn baby but also prevention of accidents and exhaustion of medical staff. Subjects and Method: Twenty-three nurses working at NICU in a university hospital were chosen as subjects, and their mental and physical stress under their work environment was examined. They answered questions about their physical conditions, especially focused on their sleepiness, instability, weariness and dimness with self-administered questionnaires before and after each shift. In addition, visual acuity and flicker tests were performed as objective indices about their fatigue. From the viewpoint of their mental states, we used a checklist on job content and estimated their job stress. Temperature, humidity and luminance were measured all through their shifts in seven days as the evaluation of their work environment. Results: It was confirmed that their sleepiness, dimness were increased after their night shift, and value of flicker test were reduced after their morning and afternoon shifts, but no significant changes could be recognized in visual acuity. In the result of multiple regression analysis, luminance, sleeping hours a day, degree of work control and degree of satisfactions to their work are related to their fatigue in this study. Though luminance was 597.0 Lx during morning shift in average, it was decreased to 96.3 Lx in afternoon and night shifts (from 21 to 427 Lx). Conclusions: Work environment in NICU and fatigue of nurses are closely related. Luminance control in this working environment must be adjusted to both the newborn baby and the workers.

A EUROPEAN VISION ON OCCUPATIONAL HEALTH

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[ID 1584] - *No. 120 in Poster Area*

• Introduction:

Rapidly changing work environments with mergers, acquisitions and reorganisations (together with ageing and increasing workpressure) increasingly take their toll on work populations. In poorly designed workplaces and organisations, problem solving takes up much time and energy, and contributes significantly to cost. The benefits of sound human resources management will be explained.

• The healthy organisation:

With the introduction of the concept of organisational health, European occupational physicians present a framework to realize a common goal: improving worker's health and contributing to the realisation of healthy organisations. The way to realize this will be further worked out.

• The role of the occupational physician:

The occupational physician is an expert covering the relationship between work and health, both from a preventive viewpoint as well as in terms of diagnosis, treatment and recognition of occupationally induced diseases. This role will be explained.

• Problem areas:

There is substantial room for improvement in a number of areas which are now subject to concern: An overview is given.

• Creating a healthy organisation:

To create and maintain a healthy organisation, the following three basic elements must be in place: 1) good working conditions, 2) a supportive work climate and 3) healthy employees. In the document these elements are further elucidated.

• The benefits:

If the above is in place (ie. working conditions, working climate and healthy employees) we can create a healthy organisation: healthy employees in safe and healthy working conditions. In the poster the benefits will be highlighted.

• In conclusion:

Through reduction in costs and rising profitability in a company Occupational Health can thus be a major strategic factor in the European economy.

EVALUATION OF SENSITIVITY TO COLOR CONTRAST AND VISION IN WORKERS EXPOSED TO ORGANIC SOLVENTS. PRELIMINARY DATA

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[ID 1821] - *No. 121 in Poster Area*

Objective. We evaluated changes in sensitivity to color contrast and vision and determined whether these are related with exposure to organic solvents (OS). **Materials and Methods**. We conducted a transversal study in 150 paint-factory workers; we applied a work history to these workers and evaluated optometric characteristics. We utilized the Lanthony desaturated D-15 hue test to evaluate color vision. We also determined sensitivity to contrast, which detected the presence of minimal differences with regard to luminescence between objects or areas of space (Vistech 6000). **Results.** With an average age in years, standard deviation (SD), and range of 36 years (9.5) (range, 19–62 years), on-the-job time of 6 years (9.6) (range, 1–47 years), 84.56% (125) of the workers were healthy, 6% (nine) were hypertensive, and 2% (three) had diabetes mellitus. Thirty nine percent (56) presented no ophthalmologic alterations, 19% (28) had allergic conjunctivitis, 12% (17) had irritative conjunctivitis, and 30% (49), other pathologies. For the left eye, 4% (six) had congenital dichromatism and 1% (two) presented a probably acquired change in yellow-green vision (tritane), while for the right eye 3% (five) had congenital dichromatism and 2% (three) presented probably acquired changes in yellow-green vision (tritane). For sensitivity to contrast, we evaluated 125 workers; in the right eye, 6% (eight) were below the superficial range, 4% (five) below the mid-range, and 1% (two) were below the deep range, while in the left eye 4% (five) were below the superficial range, 6% (seven) were below the mid-range, and 0.5% (one) was below the profound range. **Conclusions.** We observed acquired clinical and color vision alterations (1–2%) and contrast changes (5–6%). After adequately defining exposure and controlling the diverse confounders, we can determine whether these alterations are associated with exposure to OS.

SIGNIFICANCE OF HETEROPHORIAS IN THE ASTHENOPIC SYNDROME OF HOSPITAL VIDEO DISPLAY UNIT OPERATORS

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[ID 1845] - *No. 122 in Poster Area*

Introduction
Occupational asthenopia includes a number of unspecific ocular symptoms, whose causes are not completely defined. A prolonged and intense use of eyes, exposure to environmental risk factors, and individual predisposing conditions are known determinants. Psychological status may also contribute to the development of the asthenopic syndrome. A rapid recovery from symptoms has generally been reported.
The occurrence of occupational asthenopia is very high among video display unit operators (40-60%). However the disease has also been reported in the general population in the absence of exposure to occupational risk factors.
Aim of the study
To assess the relation between occupational asthenopia and the use of video display units (VDU) at work.
Materials and methods
The study was conducted in the Department of Occupational Medicine of Hospital L. Sacco in Milan. The study population included 150 hospital workers using VDU for more than 20 hours per week. The workers included three job groups: administrative personnel, laboratory technicians, and laboratory physicians. Personal history was carefully collected according to a standardised protocol. The presence of current and/or past ocular diseases, and the presence of refractive disorders were investigated; the presence and degree of occupational asthenopia was assessed according to the method proposed by the Italian Society of Occupational Medicine (SIMLII).
An ergo-ophtalmologic examination was then performed with Ergovision orthoanalyser.
Results
The occurrence of asthenopia among hospital workers was 55%. The degree of the symptoms was low or moderate. Inadequate workplace lighting conditions were rarely identified. No association between asthenopia and the presence of refractive abnormalities was demonstrated. A significant association was found between asthenopia and the presence of heterophorias, as documented by the orthoanalyser examination.
Conclusions
The assessment of heterophoria is important in VDU workers with an asthenopic syndrome to avoid a wrong causal attribution of the condition to occupational risk factors.

ASTHENOPIC SYMPTOMS AND EYE DISORDERS IN VDU OPERATORS OF A BANK

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[ID 1913] - *No. 123 in Poster Area*

Introduction
Eye and musculoskeletal disorders are the most common work-related diseases affecting visual display unit (VDU) operators. In Italy, VDU operators working at least 20 hours/week are subjected by law to a periodic health examinations to assess their fitness to the VDU job.
Aim
To analyse the prevalence of asthenopic symptoms and ocular disorders in 1,099 VDU operators of a bank and assess relevance for fitness to the VDU job.
Methods
Data, including ocular disorders and asthenopic symptoms, were collected from 1,099 employees who had been examined by ophthalmologist and occupational physicians during the health surveillance programme. Asthenopic symptoms were investigated with two different methods: 2004 (551 subjects) and 2005 (548 subjects).
Results
Only few subjects (7.8%) were affected by serious ocular diseases. However, these disorders caused a significant impact on job fitness as limitations were prescribed for 24.7% of them as compared with 2.6% limitations for healthy subjects. Among refractive defects, only astigmatism determined a modest increase in job fitness limitations (5.0% versus 2.0% in emmetropics).
Asthenopic symptoms as investigated with the 2004 method resulted to be present in 17.7% of the subjects, while the evaluation scale adopted in 2005 gave a 59.3% frequency of detection. While refractive disorders were not found to be associated with the presence of asthenopia, so did etherophoria that caused an increase in asthenopia to 40.8% if compared with 14% in orthophoric subjects. The weekly duration of VDU use by the workers did not show any association with the presence of asthenopic symptoms.
Conclusions: Serious eye disorders are rather infrequent among VDU workers but when present may significantly limit job fitness. On the contrary, refractive disorders are very frequent but have a modest impact on job fitness if adequately corrected. According to the method of investigation used, asthenopic symptom frequency may range from 18% to 59% in VDU workers. The presence of etherophorias proved to be significantly associated with an increased frequency of asthenopic symptoms in the examined workers.

OCCUPATIONAL HEALTH IN AGRICULTURE

ROLLOVER PROTECTION AND NEW YORK FARMERS' READINESS TO CHANGE

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[ID 113] - *No. 1 in Poster Area*

Tractor overturns contribute significantly to fatalities in New York agriculture. On-site inspections a decade ago indicated approximately 60% of tractors without effective rollover protection. Our objectives were: to describe the prevalence and distribution of a rollover protective structure (ROPS) on NY farm tractors; to identify characteristics associated with the absence of ROPS; to explore segmenting the NY farm community on readiness for ROPS retrofitting; and to identify demographic characteristics that might assist in this segmenting. A random selection of 644 livestock, dairy, fruit, cash crop, vegetable and organic farms were contacted for survey. Of 562 farms (87%) participating, 102 (18.1%) had all tractors equipped with ROPS, 138 (24.6%) had none. A disproportionate number of livestock, cash crop and organic operations had no ROPS. Rates of ROPS-protected tractors correlated directly with farm size and annual hours of tractor operation. Older farmers had a lower proportion of ROPS tractors. Unprotected tractors are most prevalent on cash crop and livestock farms. After weighting the sample, the total number of ROPS-less tractors in NY is estimated at more than 90,000 (61% of all tractors). In addition to providing key farm demographics, the survey enabled placement of farmers on a "stage of change" continuum related to readiness for retrofitting. Three- quarters of NY farmers are in the "precontemplation" stage of change relative to ROPS retrofitting and this varies little by commodity, age, presence of child operators or hours of tractor operation. The goal of retrofitting all NY farm tractors with ROPS appears as daunting as it did a decade ago.

RESPIRATORY SYMPTOMS AND DISEASES IN A GROUP OF GROOMS IN PISA AREA

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[ID 340] - *No. 2 in Poster Area*

Background: Pisa has an old tradition of horse racing: workers, mainly grooms, are exposed to inorganic and organic dusts and allergens. Such exposures were reported to be related to asthma, allergic and chronic respiratory symptoms and to lung function impairment.
Aim: to investigate the prevalence of respiratory symptoms and diseases in a group of grooms in Pisa area.
Methods: information on respiratory symptoms and diseases were collected through a Italian National Research Council (CNR) standardized questionnaire.
242 grooms, 186 males and 56 females (mean age = 37,72 + 12.47; mean years spent as grooms = 15 + 11; 47 % smokers, 19 % ex smokers, 34 % non smokers) were compared to a control group of 242 subjects, 186 males and 56 females, not occupationally exposed to respiratory hazards, derived from general population surveys conducted in Pisa and Po river delta (mean age = 35,90 + 15.65, 30 % smokers, 29 % ex smokers, 41 % non smokers).
Results : by multiple logistic regression analysis adjusting for gender, smoking, child respiratory trouble, and education, any habitual cough (odds ratio 2.08, 95%C.I. 1.22- 3.54) and the diagnosis of sinusitis (odds ratio 6.33, 95%C.I. 3.24-12.39) were significantly associated with the job of groom.

DIOXINS AND FURANS RESERVOIRS IN MEXICAN AGRICULTURAL FIELDS

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[ID 1811] - *No. 3 in Poster Area*

Introduction: Cancer, endocrine disruption and immunosuppression are known health effects by exposition to polychlorinated dibenzo-dioxins (PCDDs) and polychlorinated dibenzo-furans (PCDFs). Most important environment reservoirs of these compounds are soils for farming, despite the amount of PCDDs/PCDFs deposited in lithosphere is higher than the amount emitted to atmosphere, these have been scarcely studied.
Objective: To determine PCDDs/PCDFs in Mexican agricultural fields' soils.
Material and Methods: Ten agricultural fields located in Northwest Mexico were included; fields without farming in the last 5 years, with minimal farming, with fertilizing-irrigation farming method, and fields with intense use of agrochemicals were considered; in each field, at 20–50cm depth, ≈50 gr soil sample was obtained; all samples were submitted to CALUX® cell bioassay (***C***hemical ***A***ctivated ***Lu***ciferase gene e***X***pression) to determine PCDDs/PCDFs concentration; moreover, cell viability was also examined by microscopy looking for any indication of toxicity after exposure to sample extracts. Pentachlorinated biphenyls analysis was excluded.
Results: PCDDs/PCDFs were quantified in TEQ-ppt relative to 2,3,7,8-tetrachloro dibenzo-*p*-dioxin after luciferase expression induced by CALUX®. As a whole, all samples contained 4.2±1.2 TEQ-ppt PCDDs/PCDFs. In fields without farming in the last 5 years, with minimal farming and with fertilizing-irrigation farming method (n=5), PCDDs/PCDFs concentration: 4.72±1.23 TEQ-ppt, whereas fields with intense use of agrochemicals (n=5): 3.6±1.1 TEQ-ppt (p=0.47). Microscopic examination of cells following exposure to sample extracts did not reveal any indication of toxicity.
Conclusions: Soils from analyzed agricultural fields could be considered as PCDDs/PCDFs reservoirs, even those without farming in the last 5 years. In accord to ATDSR, concentrations found in these soils samples are of minimal risk and with few probabilities to represent human health effects, however, because are from agricultural fields, promote more detailed studies in more specific sites is required.

THE SENSORIAL MEASUREMENT OF ODOR EMISSION AS A TOOL FOR THE ASSESSMENT OF NUISANCE TO WORKERS AND NEIGHBOURING POPULATIONS.

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[ID 1853] - *No. 4 in Poster Area*

Olfactory nuisance is a recent topic in environmental science and toxicology. Its reconnection to specific sources, such as emissions from agriculture, animal breeding activities and urban waste and wastewater management activities is a difficult analytical task, since the concentration of organic odorants is often below analytical detection thresholds, the time pattern of the emissions is intermittent and several different organics are responsible for the off-smell of such emissions. 'Dynamic odorimetry' is a sound alternative for the regulatory assessment of olfactory nuisance, such as the cmbh, Honigsee, D) and examples of the application of dynamic odorimetry to the solution of technical management problems in advanced-technology plants for the treatment of urban and industrial waste and wastewater.
Odorimetric determinations performed on the incoming and emitted air from the biofilter unit of composting facilities for urban waste show that, after an induction phase of approx. 2 months, the efficiency of odour abatement reaches its maximum (95-98%) and that the mean odour strength of the emissions never exceeds the local regulatory limit of 200OU/Nm3. GC-MS analyses of the airborne effluents allow to identify some VOCs and to correlate the advancement of the composting process to the reduction of odour intensity.
Odorimetric data can be employed as surrogate of mass concentrations in computational dispersion models to calculate the perceived odour level at distance from the emitting plant.

TWO YEARS OF STATEWIDE CHOLINESTERASE MONITORING IN WASHINGTON STATE

KEIFER M.
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[ID 1889] - *No. 5 in Poster Area*

A lawsuit brought by a group of pesticide poisoned farm workers forced the Washington State OSHA (WISHA) within the Department of Labor & Industries (L&I) to require cholinesterase (ChE) testing for exposed pesticide handlers. The State Supreme Court found L&I had failed to conform to its mandate to protect workers and ordered rulemaking. In February 2004, WISHA began requiring agricultural employers to offer ChE monitoring to all agricultural workers who mixed, loaded or applied EPA class I or II organophosphates or both organophosphates and carbamates for more than 50 hours per 30 day period. Both plasma and red blood cell ChE must be tested. Political compromises led to a rule with progressive protection over a two-year period and included scientific scrutiny of the process. The Washington State system differs from the only other state system (in California) in several important respects. The Washington Department of Health Laboratory does all ChE testing, a single baseline is required, L&I maintains a centralized data base of results, growers are required to report hours of exposure to covered pesticides and scientific and stakeholder advisory committees analyze results and oversee the program. In year 1 when 50 hours of exposure triggered monitoring, nearly 20% of monitored handlers sustained at least one ChE depression of 20% from baseline. This dropped to less than 10% of monitored handlers in year 2. Most depressions were seen in PChE values. No symptomatic cases were reported in year 1. Two cases were reported in year 2. A significant but weak association was found between hours of exposure and degree of depression only in year two. This unique statewide ChE monitoring may provide a snapshot of the effectiveness of efforts to protect workers from overexposure to organophosphate pesticides nationwide. The results have implications for the Worker Protection Standard nationwide.

PSYCHOSOCIAL RISK FACTORS ASSESMENT IN THE BANANA PLANTATIONS WORK ENVIRONMENT IN BOCAS DEL TORO 2005

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[ID 101] - *No. 6 in Poster Area*

I- Background The Social Security in Occupational Health Service in Changuinola Hospital, Panama, observing an increase in complains related to psychosocial risk factors among Bananas Plantation workers of Bocas Fruit Co. a subsidiary of Chiquita Brand, decided to research.
II- Aims:
1- Detect the most common psychosocial problems in these workers.
2- Classify the type of psychosocial problems experienced and its effect.
III- Material and methods
We used several methods for the research:
1- Questionnaire
2- Survey to identify the Psychosocial risk factors
3- Direct observation of eleven workers of one processor installation out of population 42 were chosen randomly stratified by occupation
Interview was carried out by Psychologist and Social Worker.
IV- Conclusions
The results and conclusions of this study showed that the most frequently psychosocial factors were:
-Peer pressure, excessive and strict supervision, work harassment, low salaries, production based goals, psychological abuse and lack of safety.
-85% of workers reported a severe work content deficiency.
-85% of workers indicated that there is a deficient organization a mechanical personnel administration.
-40 % of workers reported inadequate work organization._ 65% of workers reported inadequate interpersonal relationships._ 98% of workers perceived exposure to high mental stress.
-70% of workers were presenting psychological and physical health problems, such as musculoskeletal, sleep and gastric disorders.
As a conclusion of the study we were able to identify the presence of a work culture geared to continually be aggressive, abusive and uninterested with the workers welfare, causing serious physical and psychological health effect.

OCCUPATIONAL HEALTH IN AGRICULTURE A MEANS TO PREVENTION OF MUSCULOSKELETAL AND TOXICOLOGICAL DISEASES CASE STUDY: BOCAS FRUIT COMPANY 2005

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[ID 102] - *No. 7 in Poster Area*

Background:
Bocas Fruit Company (BFC) is a banana grower established in Bocas Del Toro, Panamá. On December 2003 BFC introduced changes on processes, whose effects on health risk were studied..
Aims:
1. Detect the effect of new work patterns on occupational health risk factors.
2. Propose low cost solutions to reduce risks related to the new processes.
Materials and methods:
Two adjacent farms out of the 20 that BFC owns in the District of Changuinola were selected for this study. Sensorial surveying by observation of each process was done; photographs, and instrumental measurements of chlorine, temperature and noise were made. Posture, movements, workload, and adequacy of the working machinery, instruments, tools and personal protective equipment were analyzed. Psychosocial questionnaires and clinical evaluations were undertaken and statistics of work related injuries and diseases from those farms were reviewed.
Conclusions
Our study showed that the workers under study are exposed to factors as:
1. Psychosocial pressures such as negative incentives and psychological abuse that require a better human resource policy.
2. Noise, that could be reduced with better work practices, including occupational hygiene.
3. Heat and poor ventilation in packing plants; some modifications on buildings are possible at low cost.
4. Higher frequency and amount of accidents due to aerial chemical spraying; adequate communication and work organization is required
5. Due to increase of the number of expositions, organophosphorous insecticides, on tree bag workers, caused a decrease of cholinesterase level in more than 45% of the exposed workers. Constant supervising, and modifying of work organization would resolve the situation.
6. Ergonomic overload, related to inadequate protective equipment, inappropriate organization, with injury of neck, shoulders, low back, knees wrists and ankles. The need of a better work organization has been pointed out..

OCCUPATIONAL RISK FACTORS IN WINE CELLARS AND OIL MILLS OF CENTRAL ITALY: A STUDY CASE

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[ID 1177] - *No. 8 in Poster Area*

Occupational risks in wine and olive oil production activities are currently very poorly investigated, despite their huge relevance in Italian socio-economic context.
This might be partly explained by actual peculiarities of the above mentioned agricultural activities which are strongly marked out by seasonality and family business.
On the other hand, they seem to be characterized by a remarkable incidence of injuries at work, although only rarely giving rise to permanent disabilities or even deaths.
Owing to the foregoing statements, the Technical Directorate for Risk Assessment and Prevention of Italian Workers Compensation Authority started a research project aimed to characterize occupational risks in these divisions, by means of detailed environmental monitoring to perform the biological, chemical and physical risk assessment.
More particularly, airborne bacteria, yeasts and fungi total counts are performed in order to characterize biological risk; furthermore mycetes are qualitatively identified by means of ribosomal DNA sequencing. Chemical risk investigations consist of CO_2 and VOC levels meausurements in both wine cellars and oil mills; additional radon measures are collected in cellars dug out in pyroclastic rocks characterized by natural radionuclides content, as commonly found in Central Italy. Air sampling for both biological and chemical analyses is always carried out together with temperature and relative humidity measurements.
Physical risk investigation involves noise monitoring, which can be particularly prominent during both wine bottling and olive oil production, and whole-body vibrations while operating forklift trucks and farm tractors.
Moreover, muskoskeletal affections risk is evaluated by postures and repeated movements analysis, especially during weights lifting.
Fire raising and electrical risks are also estimated.

The monitoring activities are performed in several companies located in Central Italy, having different wine and olive oil amount production. In present work, project details and goals are presented and first data on occupational risk factors are preliminarly discussed.

ASSESSMENT OF OCCUPATIONAL HEALTH AND SAFETY STATUS IN AGRICULTURE IN THE REGION OF LOMBARDY - ITALY.

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[ID 1882] - *No. 9 in Poster Area*

Background: The General Directorate of Health of the Region of Lombardy, in collaboration with ICPS and seven Local Health Units, has promoted a survey on the occupational health and safety status of a sample of farms.
Aim: to assess the occupational health and safety status and compliance with OHS legislation of the farms
Methods: a sample of 180 farms, including the major Lombardy crops (rice, corn, barley, soy bens, wheat, vineyards) and employing 1,129 workers, was selected in seven provinces. On-site inspections were carried out to collect information on a list of items contained in a standardized questionnaire (description of activities, workplace conditions, training of workers, availability of personal protection equipment, status of tools and devices, safety assessment, health surveillance, use of pesticide); for each farm a final judgment was carried out for five main areas of interest.
Results: More than half of the farms showed a good to very good overall level of compliance with the safety norms and only 6% showed serious deficits. The main deficiencies consisted in lack of adequate PPE (7%), absence of occupational physician (17%), lack of medical surveillance protocol (20%) and workplace periodical inspections (23%), lack of risk assessment (2%) and noise exposure assessment (11%). As to prevention in pesticide use, 62% of the farms showed good to very good practice, 24% showed some deficiencies and 14% a totally inadequate situation. The failures in prevention of risks resulted more frequent in the small farms (<5 workers) than in the larger farms.
Conclusions: Overall health and safety conditions in the farms of Lombardy seem to be better than expected. However, particularly in small farms, serious deficiencies need proper correction.
These results provide support to the Regional Authority for promoting and planning strategic interventions aimed at preventing old and emerging risks in agriculture.

EXPOSURE ASSESSMENT AND EXPOSURE MODELLING

DERMAL EXPOSURE TO METALS

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[ID 343] - *No. 10 in Poster Area*

Dermal exposure to metals may contribute to the development of health effects, such as immune sensitization and respiratory disease. Beryllium and cobalt are metals of industrial significance with recognized adverse effects on worker respiratory health. Significant reductions of inhalation exposures to beryllium have failed to reduce prevalences of beryllium sensitization and chronic beryllium disease. The lack of a clear inhalation exposure-response relationship suggests that skin contact, an exposure route that has been historically ignored, with soluble beryllium salts and relatively insoluble particles is relevant to the development of beryllium sensitization. Similarly, inhalation exposure-response relationships for cobalt are confusing, suggesting that inhalation exposures alone do not determine risk of cobalt-related disease. Thus, we hypothesize that skin exposure to these metals contributes to the initiation of an immune response, allowing inhalation exposure to result in respiratory disease.
To assess workplace skin exposure to metal particles, we classified workers into exposure groups; measured concentrations of metals on tools, equipment, and other work surfaces; compared hand, face, and neck skin-wipe measurements; and determined physicochemical properties of the particles. In one facility, we documented measurable cobalt on the hands of all (57/57) hard metal workers in the absence of glove use to assess association with health outcome. In another facility, we measured 0.05 to 46 µg beryllium on the hands of most (120/122) ceramic workers, suggesting failure of latex gloves to protect hands from exposure. In a third facility, levels of metal on contaminated surfaces were positively correlated ($p<0.01$) with levels of metal measured on cotton gloves ($r=0.88$), necks ($r=0.87$), and faces ($r=0.86$). These results add to the growing body of information necessary to investigate a possible link between skin exposure and respiratory disease caused by beryllium and cobalt and to support control practices designed to protect workers from skin exposure to these metals.

OCCUPATIONAL CANCER RISK: THE ISPESL REGISTER OF EXPOSED WORKERS

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[ID 765] - *No. 11 in Poster Area*

Introduction: Most epidemiological studies have demonstrated that the cases of cancer related to occupational exposure are underestimated. The registration of the occupational exposure values to carcinogen substances is a fundamental step for the qualitative and quantitative assessment of exposure risk factors at workplace. In Italy, the ISPESL has realized a register of occupational exposures to carcinogen agents according to the provisions laid down by the Italian legislative decree n. 626/94. Methods: A database of occupational exposure levels has been set up collecting data from the registers sent to the ISPESL in the period 1998-2005. This database contains: the denomination, the fiscal code (VAT number) and the territorial location of the industry; the name, surname, gender and date of birth of each worker; the carcinogen substances used and the exposure levels. In this study are included all the agents classified by the European Union (UE) in carcinogenicity or mutagenicity category 1 and 2 (referring to the 28° updating), and all the agents classified in the VIII list attached to the Italian legislative decree n. 66/2000. Results: The number of registers electronically realized in the period 1998-2005 is about 2,080. In the database are recorded more then 37,050 workers and for about 19,100 of them are known the exposure levels. More than 10,800 workers result to be off-duty. Among the notified agents the most active are: Wood dust (about 23%), Benzene (12%), Polycyclic Aromatic Hydrocarbons (PAHs) (10%), 1,3-Butadiene (9%) and Hexavalent Chromium compounds (8%); the number of workers exposed to Wood dust amounts to about 9,500. The economic activities highly involved are: wood and wood products manufacture included furniture (Wood dust); retail sale of automotive fuel (Benzene); treatment and coating of metals (Hexavalent Chromium compounds); chemicals and chemical products manufacture (1,3-Butadiene and PAHs). Conclusion: The databases of exposed workers can be used to carry out epidemiological studies (e.g. mortality cohort studies) considering the latency period of diseases.

RISK EVALUATION AND MANAGEMENT PROGRAMME FOR MINING INDUSTRY

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[ID 1173] - *No. 12 in Poster Area*

OBJECTIVES. Respiratory pathology caused by exposure to industrial aerosols takes a leading place in occupational diseases rate. As a rule, such pathologic processes in lungs are irreversible. This determines the leading role of prophylactic measures.
METHODS. A cross-sectional study of chrysotile miners and millers was conducted. Health status changes were correlated with individual exposure data. All detected cases of asbestosis and occupational bronchitis

were complicated by other diseases. It was recognized that the development of dust-related diseases might be a result of complex occupational and nonoccupational risk factors exposure. On the base of these and previous studies a programme for monitoring of occupational hazards and workers health was created.
RESULTS. Developed draft programme consists of three interconnected units. The first unit performs registration of working conditions and their automatic appreciation in accordance with national threshold levels and other criteria as well as marking of dangerous professions and sectors, preventive measures proposals. Second unit contains results of preventive and current medical examination, data concerning each appliance for medical aid during the period between prophylactic examinations. Recommendations on medical examinations and prophylactic measures are provided. Accumulation and analysis of data concerning working conditions and health during all time of monitoring is performed in the third unit. On background of results of analysis and comparison of received data the programme provides individual recommendations concerning correction of working conditions, possibility of further working activity, prophylaxis needs, etc. Now this programme is under testing at the asbestos mining and milling enterprise as a part of its work management system.
CONCLUSION. This system would allow to introduce occupational risk and workers health monitoring and management. At the same time further studies of occupational risk factors influence on human health, separately and in complex, could be provided based on the accumulated information analysis.

DETERMINANTS OF DUST AND GAS EXPOSURE IN THE NORWEGIAN SILICON CARBIDE INDUSTRY

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[ID 1231] - *No. 13 in Poster Area*

Earlier studies have found increased risks for lung cancer and other lung diseases among workers in the silicon carbide (SiC) industry. The objective of this study is to further explore associations between lung cancer, other lung diseases, and exposure to the complex mixture of particulate material in the SiC industry.
Methods : the three Norwegian silicon carbide plants have been assessed for exposure to total dust, respirable dust, respirable quartz, respirable cristobalite, respirable non-fibrous SiC, fibres and sulphur dioxide. A total of 4400 personal measurements were collected from 293 randomly chosen workers from the raw material, furnace, processing and maintenance departments. Each plant was sampled twice to determine variations in exposure due to seasonal and process related changes. In addition information on different production parameters, work tasks and weather conditions were collected.
Results : the highest exposures to respirable silica, fibers and SO_2 were found in the furnace and raw material departments. Exposure to respirable SiC was highest in the processing department, while for mixed respirable dust and total dust there was no difference in exposure between the departments. The component with the highest exposure compared to the Norwegian occupational exposure limit (OEL) was fibres with 23% of the samples exceeding the OEL (0.1 fibres/cm^3). Between 8 and 0.4 percent of the samples for the other components exceeded the OEL. Exposure was measured on more than one occasion on 77% of the workers.

A STUDY ON DETERMINATION OF (N-2-HYDROXY-ETHYL)VALINE(HEV) IN HEMOGLOBIN ADDUCTS FOR BIOLOGICAL MONITORING OF ETHYLENE OXIDE EXPOSURE

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[ID 1401] - *No. 14 in Poster Area*

Ethylene oxide is a genotoxic carcinogen with widespread uses as industrial chemical intermediate and gaseous sterilant. Adducts formed by reaction of chemicals and their metabolites in Hb provide a measures of assessing exposure and of measuring internal dose. Adducts with N-terminal valine of Hb are chemically stable. In contrast to most other proteins, Hb disappears from the circulation with apparent zero-order kinetics. These apparent zero-order kinetics are explained the stability of Hb in erythrocyte, which is not affected by the adduct of ethylene oxide with its N-terminal valine. Hb is stable in erythrocytes and as a consequence, its removal is entirely determined by the life-span of the erythrocytes. This means the exposure dose as measured by determination of Hb-adduct concentrations is integrated over the average life-span of human erythrocytes, which is approximately 4 months.
We studied the determination method of (N-2-hydroxy-ethyl)valine in hemoglobin adduct by using GC/MS. PFPITH(pentafluorophenylisothiocianate) and TBDMS(tributyldimethylsilylation) were used as appropriate derivatives. Ethylene oxide formed Hb adducts as (N-2-hydroxy-ethyl)valine(HEV) in mouse with ethylene oxide inhalation exposure. Standard HEV can be synthesized with 2-amino-ethanol and and, bromoisovaleric acid(BIVA). GC/MS can measured them after derivatization with PFPITH and N-(tertiary butyl dimethylsilyl)–N-methyl-trifluoroacetamide(TBDMS-TFA) by using Edman procedure. Concentrations of Hb adduct were proportionally increased with exposure levels. They were 168±43.8 and 512±104(nmol g-1 globin) at 200ppm ethylene oxide exposure, and 631±217 and 2265±99.4(nmol g-1 globin) at 400ppm ethylene oxide inhalation exposure for 1 and 4 weeks, respectively.

RELIABILITY AND VALIDITY OF SELF-REPORTED DURATION OF COMPUTER USE (PROMO)

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[ID 1492] - *No. 15 in Poster Area*

Introduction: Many studies on duration of computer use and musculoskeletal disorders use self-reports for exposure assessment. The aim was to investigate the reliability and validity of self-reported duration of computer and mouse use at work.
Methods: In the PROMO project, 2000 computer workers filled out an internet-based questionnaire. Questions were asked on several risk factors, such as ergonomic and psychosocial factors. Duration of computer use and mouse use at work was reported in 7 categories (never, 0-1, 1-2, 2-4, 4-6, 6-8, and > 8 hours/day). To investigate reliability, questionnaires were filled out twice by 81 workers, with an intervening period of two weeks. To investigate validity, exposure to computer use was measured using the software program WorkPace (Niche Software Ltd/ErgoDirect) (n=386) as a gold standard.
Results: Test-retest reliability of the self-reported question on duration of computer use was high: Kappa=0.85 for computer use and Kappa=0.75 for mouse use. Regarding validity, mean computer duration measured by the software program differed significantly from self-reported data and increased with increasing duration of self-reported computer use. However, values within self-report categories showed a large variability. After categorising the software-measure into categories comparable to the self-reported data, sensitivity varied between 30% and 80% for computer use and 0% and 30% for mouse use, dependent on the cut-off point used. Specificity varied between 40% and 90% for computer use and between 90% and 100% for mouse use. Kappas were all below 0.10.
Conclusion: Test-retest reliability of the question on duration of computer use was satisfactory, but validity was low. Workers tended to overestimate the duration of computer use on average with 2.5 hours per day, but this overestimation did not occur systematically. It is recommended to use objective ways of exposure assessment, such as software programs, to estimate the duration of computer use.

CEMENT DUST EXPOSURE AND LUNG FUNCTION

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[ID 1660] - *No. 16 in Poster Area*

Nowadays the results of the studies on the association between occupational exposure to cement dust and respiratory effects are controversial. Some epidemiological studies have shown that occupational exposure to cement dust increase the risk of pulmonary dysfunction (Yang et al, 1996; Mwaiselage et al, 2004) while others did not find any association between occupational exposure and lung diseases (Fell et al, 2003; Vesbo et al, 1990).
Aim The objective of this 5 years follow-up study was to evaluate the re-

lation between exposure to inspirable dust and lung function in cement workers.

Materials and methods The study population consists of workers employed in five italians cement production plants. All health check-ups that included clinical exam and spirometric measurements were carried out at the production sites. A total of 400 workers that performed lung function tests both in 2000 and 2005 were enrolled in the study. Workers with previous occupational exposure to respiratory risk factors or medical history of pulmonary disease were excluded.

Personal dust exposure measurements were performed during the period of 1992–2005 on a random sample of workers from each job group. Obtained data for inspirable dusts were used to identify two groups of exposed workers (see table 1).

The lung function measurements were performed in accordance with the ERS guidelines (Quanjer et al, 1993). The recorded evaluated variables were: FVC, FEV_1, FEF_{25}, $FEF_{50,}$ FEF_{75}.

Differences in lung function change were evaluated in the two groups of exposed workers.

Results A significative difference, for the variables studied, was not found among the two groups.

Conclusion Ours negative findings can be explained by the relatively low levels of dust exposure at the cement plants enrolled in this study. This study represents the preliminary phase of a 10 years follow up survey that will end in 2010.

Table I. Classification of exposure for inspirable dust fraction

Exposure level <2,25 mg/m³	Exposure level >2,25 mg/m³
Limestone quarry	**Raw millers**
Marl, shale, sandstone quarry	**Cement millers**
Manager/assistant control room	**Lepol Grate cleaners**
Crusher	**Cement Loaders**
Bridge/Crane operators	**Fork-Lift operators**
Burner/Kiln operators	**Electricians**
Bulk cement loaders	**Mechanics**
Electro-instruments operators	Lubrication

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EXPOSURE ASSESSMENT IN COLLEAGUES OF PATIENTS WITH TRICHLOROETHYLENE-RELATED GENERALIZED CUTANEOUS DISORDERS

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[ID 1743] - *No. 17 in Poster Area*

Background and Aim

Series of case reports indicate that generalized cutaneous disorders mimicking severe drug hypersensitivities can occur sporadically in workers exposed to trichloroethylene (TRI). Since late '90s the growing number of cases have been reported in Asia, which is not well recognized worldwide. This study aims at clarifying TRI exposure in the patients and their colleagues.

Methods

We conducted on-site surveys in factories where TRI was used: 6 factories (PF1-6) where 8 patients occurred and 2 factories (CF1 and CF2) without patient occurrence. Time-weighted averages (TWA) of personal exposure concentrations of healthy workers (PF1, n=5; PF2, n=3; PF3, n=6; PF4, n=6; PF5, n=9; PF6, n=9; CF1, n=5; CF2, n=8) were monitored with diffusive samplers. Urine of these workers and 18 hospitalized patients was collected at the end of the shift and after being away from work for 8.8±4.6 (Mean±SD, range 3-16) days, respectively, and trichloroacetic acid (TCA) and trichloroethanol (TCE) concentrations were measured.

Results

TWA TRI concentrations were 37.5±39.2 (Mean±SD of mean concentrations in each factory, range of individual concentrations 3.9-404) ppm in PF1-6, 252±99 (78.3-315) ppm in CF1, and 5.3±5.1 (0.4-13.0) ppm in CF2. Urinary TCA and TCE concentrations were 207±127 (9.9-1617) mg/L and 234±144 (21.5-1804) mg/L in PF1-6, 342±240 (5.5-650) mg/L and 575±354 (168-1049) mg/L in CF1, 48.6±46.9 (3.4-136) and 42.0±36.7 (5.0-103) in CF2, and 51.4±61.7 (1.1-216) mg/L and 9.8±20.9 (0-90.7) mg/L in the patients, respectively.

Conclusion

The disorders seemed to occur in the factories where urinary metabolites were increased. Though the available information from the literature suggests the rare occurrence of the disorders could be attributable to the very limited number of the susceptible population, the present results show the necessity to control occupational TRI exposure in the concerned region to reduce the health risk.

EFFECT OF PHYSICAL EXERTION ON THE BIOLOGICAL MONITORING OF EXPOSURE TO SOLVENTS IN HUMAN VOLUNTEERS: 2. N-HEXANE

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[ID 1813] - *No. 18 in Poster Area*

This study was undertaken to evaluate the impact of physical exertion on two exposure indicators of n-hexane (HEX) in human volunteers exposed under controlled conditions in an inhalation chamber. A group of 4 volunteers (2 women, 2 men) were exposed to HEX (50 ppm) according to several scenarios involving several periods during which volunteers were asked to perform either aerobic (AERO), muscular (MUSC) or both (AERO/MUSC) types of physical exercise. The target intensities (W) for each exercising period of 30 min - interspaced with 15 min at rest - were the following: REST, 50 W AERO [Time-weighted average intensity (TWAI): 38 watts], 50 W AERO/MUSC (TWAI: 34 watts), 100 AERO/MUSC (TWAI: 63 watts and 100 W AERO (TWAI: 71 watts) for 7 h and 50 W MUSC for 3 hr (TWAI: 31 watts). Alveolar air and urine samples were collected at different time intervals before, during and after exposure for the measurement of unchanged HEX in expired air (HEX-A) and urinary 2,5-hexanedione (2,5-HD). HEX-A measured during exposures involving AERO activities (TWAI: 38 and 71 watts) were significantly enhanced (approximately +14 %) compared to exposure at rest. MUSC or AERO/MUSC exercises also produced higher HEX-A but only at some sampling time points. Conversely, end-of-exposure urinary 2,5-HD (mean ± SD) was not modified by physical exertion: 4.14 ± 0.75 mg/l (REST), 4.25 ± 0.77 mg/l (TWAI 38 watts), 3.6 ± 0.78 mg/l (TWAI 71 watts) 4.02 ± 1.52 mg/l (TWAI 34 watts), 3.73 ± 1.04 mg/l (TWAI 63 watts). Overall, this study showed that HEX kinetics is almost insensitive to variations in workload intensity since only HEX-A was slightly increased and urinary 2,5-HD remained unchanged, even though all types of physical exercise increased the pulmonary ventilation. (Supported by IRSST, Québec)

EFFECT OF PHYSICAL EXERTION ON THE BIOLOGICAL MONITORING OF EXPOSURE TO SOLVENTS IN HUMAN VOLUNTEERS: 1. TOLUENE

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[ID 1815] - *No. 19 in Poster Area*

This study was undertaken to evaluate the impact of physical exertion on two exposure indicators of toluene (TOL) in human volunteers exposed under controlled conditions in an inhalation chamber. A group of 4 volunteers (1 woman, 3 men) were exposed to TOL (50 ppm) according to the following scenarios involving several periods during which volunteers were asked to perform either aerobic (AERO), muscular (MUSC) or both (AERO/MUSC) types of physical exercise. The target intensities (W) for each exercising period of 30 min, interspaced with 15 min at rest, were the following: REST, 50 W AERO [Time-weighted average intensity (TWAI): 46 watts], 50 W AERO/MUSC (TWAI: 38 watts) and 100 W AERO (TWAI: 71 watts) for 7 h and 50 W MUSC for 3 hr (TWAI: 29 watts). Alveolar air and urine samples were collected at different time intervals before, during and after exposure for the measurement of unchanged TOL in expired air (TOL-A) and urinary o-cresol (o-CR). Results showed that TOL-A measured during and after all scenarios involving physical activities were higher (approximately 1.4-2 fold) compared to exposures at rest. In addition, physical exertion also increased end-of-exposure urinary o-CR (mean $\pm$ SD): 0.87 $\pm$ 0.1 mg/l (REST) vs 2.0 $\pm$ 0.1 mg/l (TWAI 46 watts). However, exposure at a TWAI of 71 watts did not further increase o-CR excretion (1.7 $\pm$ 0.2 mg/l) or TOL-A. This study confirmed the effect of workload on TOL kinetics and showed that o-CR excretion increased proportionally with workload when expressed as TWAI. Finally, the present study demonstrated that exposure to TOL (50 ppm) involving a workload at or above 50 W (light intensity), and possibly below 50W, is likely to produce urinary o-CR values that clearly exceeds the current ACGIH Biological Exposure Indices (BEI®) value for TOL (0.5 mg/l). (Supported by IRSST, Québec)

RELIABILITY AND VALIDITY OF A GENERIC JOB EXPOSURE MATRIX APPLIED IN A SMALL MEXICAN ENTERPRISE

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[ID 1839] - *No. 20 in Poster Area*

Introduction: The use of Job Exposure Matrixes (JEMs) can be beneficial in small businesses where environment and/or individual surveillance are limited and workplace records are scarce. In using JEMs it is important to evaluate their reliability and validity. Methods: We evaluated procedures for developing a JEM prepared by the American Industrial Hygiene Association in 1988. This JEM is composed of six sections: Number of exposed workers, Exposure frequency, Exposure time, Exposure level, Safety controls, and Proximity to exposure source. It also includes a section to obtain information on health effects due to exposure to occupational/environment agents. Two individuals developed estimates of exposure to epoxy resins for 31 workers employed in an epoxy resin facility in Mexico City. The estimates developed by the two individuals were compare by percentage agreement calculation (%A), weighted kappa (κw) and intraclass correlation coefficient (ICC). Results: %A and κw were 64% and 0.58, respectively for every exposed to epoxy resins. Major disagreement was present for the Number of exposed workers (κw=0.24, ICC=0.33), Exposure level (κw=0.25, ICC=0.56), and Safety controls (κw=0.23, ICC=0.69) sections. Nonetheless, in accord to Landis & Koch, Altman, Fleiss, and Byrt classifications for the interpretation of kappa value, final agreement (κw=0.58) is moderate to fair to good level. Conclusions: Despite disagreement in some sections, final reliability of the J.E.M. employed almost achieved a good level. This procedures for developing a JEM is enough transparent to allow identification of major sources of inconsistency.

EXPOSURE AND PROTECTION OF WORKERS IN THE REMEDIATION OF SITES CONTAMINATED WITH CHEMICALS

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[ID 1901] - *No. 21 in Poster Area*

The goals of this study were to characterize workers' exposure to soil contaminants and evaluate the need for protection.
A lead smelter area was contaminated with lead fumes from the smelter. The measured lead concentrations in the air were <5-37 µg/m3, lower than the binding occupational exposure limit (OEL) of 100 µg/m3. The blood lead levels of the men working in the field separating old scrap from soil rose, however, from about 0.5 to over 1.0 µmol/l; this change suggested that worker protection was not sufficient.
The remediation of soil contaminated with creosote oil involves the risk of exposure to polycyclic aromatic hydrocarbons (PAH). Our results indicated that the exposure of remediation workers is on the same level as that of coke oven workers. The uptake of PAHs was greatest for workers who smoked. Dermal exposure occurs and is an important route of exposure.
Old petrol stations are mainly contaminated with petrol and diesel oil. The main health risk of gasoline stems from its benzene content, which increases the risk of leukaemia. During remediation work the benzene level in the air was less than 1 mg/m3, less than one third of the current OEL. Nevertheless the blood benzene level exceeded the recommended action level 50 nmol/l in one specimen.
For the most part, exposure to air impurities can be reduced by technical means and by the use of personal protective equipment. Technical prevention includes moistening of soil to reduce its dustiness and better air filtration of work machines. New excavators are normally equipped with air filtration, which at least removes coarse dust particles. Active charcoal-based filters are available as an option. At the end of this study a general recommendation concerning the use of respirators and protective gloves was presented. In addition recommendations on biomonitoring of workers is presented.

RISK ASSOCIATED WITH HAZARDOUS MATERIALS IN HEALTH CARE ENVIRONMENT: A METHOD FOR EVALUATION

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[ID 1444] - *No. 22 in Poster Area*

INTRODUCTION
Hospitals are a place where lots of treatments and interventions involve all sorts of materials and supplies. Over the years, a host of chemicals have been gradually added to the healthcare environment, bringing new technology to patients and new risks to those who care for them.
A number of pharmaceuticals in the health care setting may pose occupational risk to employees through acute and chronic workplace exposure.
METHODS
The aim of this study is to elaborate an evaluation method for chemical risk in hospital, with special attention to chemotherapeutic agents: comprehensive data on chemical injuries and illness was difficult to find because we did not have safety data sheets existing for others chemicals.
We collected 159 chemical substances from four different work environments in hospital and for each chemical we collected data about manipulation and administering: we utilized criteria provided by OSHA (Occupational Safety and Health Administration) for classifying drugs as hazardous.
We obtained an index which allows to point out four different levels of risk. We defined a hazardous chemical as a chemical that represents a physical hazard or a health hazard. Physical hazard refers to characteristics such as combustibility or reactivity. A health hazard is defined as a chemical for which there is a significant evidence that acute or chronic health effects might occur in exposed employees.
RESULTS AND CONCLUSIONS
Our evaluation method provided a quantitative useful index to develop an *Hazardous Drug Safety and Health Plan* which assists in protecting employees from health hazards and keeping exposures as low as reasonably achievable. This analysis gave us evidence of a low risk from manipulation of chemotherapeutic agents, medium risk from other chemicals used in some work areas such as Laboratory (many solvents used for analysis).

PESTICIDES

CHARACTERIZATION OF SUBACUTE POISONING AND PESTICIDE EXPOSURE IN AGRICULTURAL WORKERS

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[ID 411] - *No. 23 in Poster Area*

Different authors had suggested that chronic cholinesterase inhibition may produce tolerance which diminishes acute effects and cause subacute symptoms with light decrease of cholinesterase levels. Objective: To determine acute and subacute poisoning incidence and their relation with exposure and cholinesterase level in an agricultural workers group. Methods: A prospective study was conducted. Basal cholinesterase concentration and frequency of symptoms were evaluated in 488 workers. Second measure included 106 workers. Exposure was defined with an index. It was made up by 15 quantitative and qualitative variables of the organization and division of work, and the migrant farmer's habits and customs. The statistical tests were performed by SPSS. Results: There was a significant increase of symptoms between first and second measures, p=0.03 Repetitive, intermittent and continuous symptoms in last 15 days were found in 54% of total population. These were classified in general, probable, and specific. Last two symptoms were associated with exposure level, p=0.03 and p= 0.005 Subacute poisoning was defined in accordance with type and number of this symptoms, their incidence rate was 24 x 100 in the most exposed group, RR=1.55, p<0.001, IC=.663 - 3.636. Subacute poisoning was associated with no use of personal protective equipment (p=0.05), extra hours job (p=0.02) and more than 40 hours of work by week (p= 0.05) Acute poisoning incidence was 6 x 100. Cholinesterase and haemoglobin diminished significantly between the first and the second measure, p<0.001, however we didn't observe a significant association with subacute intoxication. Both first and second measures, we detected anaemia. It increased from 21% to 28%, p< 0.001 There was an important difference among men (16%) and women (63%) p< 0.001. Conclusion: Increase of symptoms and high incidence rate of subacute poisoning, without a significant cholinesterase decrease association, support the hypothesis about a probable cholinesterase level adaptation and presence of persistent symptoms when chronic but moderate exposure occurs.

A COHORT STUDY ON CANCER INCIDENCE AMONG DANISH GARDENERS

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[ID 482] - *No. 24 in Poster Area*

This study was performed to examine the risk of certain cancer types among Danish gardeners having been highly exposed to different kind of pesticides especially before mid 1990. Previously many of these gardeners had been exposed to pesticides which according to IARC are regarded as possible carcinogenic to human (group 2B) e.g. DDT, Lindan and chlorophenoxy acetic compounds, and a mixture of other pesticides, where data of carcinogenicity still are inadequate. Since 10-15 years far most of these potentially carcinogenic compounds has been banned in Denmark.

The cohort was recruited in 1975 and consisted of members from 10 local trade unions of gardeners situated nationwide. The cohort constitutes three fairly separate groups according to work area, namely workers in greenhouses, nursery garden and public parks, gardens, and cemeteries. In general, the gardeners display a low job-turnover and a pronounced stability of employment. The cohort consisting of 4015 individuals (857 females and 3156 male) were followed from 1975-2004 with regard to cancer incidence. The observed incidence was compared with that which would be expected had sex-, age-, and period-specific cancer incidence rates of the total Danish population applied to the study cohort. Information on the cancer incidence was obtained from the Danish Cancer Registry and vital status was obtained from Danish Central Population Register searched by the individual civil registration number. Preliminary results show an overall lower standardized incidence rate for both female and male (SIR: 0.91 and 0.89, respectively) and no significantly elevated risk of neoplasm derived from blood or lymphatic forming tissues. A slight but not significant elevated risk of soft tissue sarcoma was observed among men (cases=4, SIR: 1.49; 95% conf. 0.56-3.96). The results of the cohort study do not suggest any overall increased risk of cancer even that Danish gardeners in the past have been highly exposed to mixtures of pesticides some of which are considered carcinogenic.

FLORICULTURE IN GREENHOUSES: AN INVESTIGATION OF INHALATORY EXPOSURE TO PESTICIDES AND OF MICROCLIMATE

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[ID 484] - *No. 25 in Poster Area*

The widespread floriculture activities in greenhouses have pointed out the need of approaching problems connected to the main job risks of the sector.

The ornamental plants production in greenhouses involves the presence of a microclimate not always suitable for the workers and a large use of pesticides which can produce health risks depending on the intrinsic toxicity of the active substances, on the exposure levels and on the patterns and frequency of applications.

The present work has the aim to estimate the health risks for the workers caused both by the exposure to widely used pesticides and by thermical stress in greenhouse and, then, to examine the concomitant preventional aspects.

Especially we have studied the workers inhalatory exposure to the active substances "iprodione", that is a fungicide with a broad range of activity, and "methomyl", a commonly used carbamate insecticide.

Respiratory exposure to these substances was evaluated by personal and ambient samplings, involving both the vapour phase and the airborne particles.

The samplings have been carried out both during the application of pesticides and at the re-entry into greenhouse for crop activities.

Chemical analyses of the "iprodione" and "methomyl" were performed by using respectively a gas chromatographic method with ECD detector and an HPLC method with UV – VIS detector.

The microclimatic measures were accomplished under different seasonal conditions: during the hottest hours of a summer day, an autumnal day and a spring day.

The obtained results show that, in the examined work conditions, the inhalation risk of the two active principles is low for the workers and a light thermical stress risk appears only during the hottest hours of a summer day.

We, at last, emphasize that the use of other more persistent or more volatile substances can produce an important environmental pollution.

A STUDY OF HEALTH EFFECTS FROM PESTICIDES USAGE IN A GROUP OF FARMERS, THAILAND

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[ID 716] - *No. 26 in Poster Area*

Background: As an agricultural country, pesticides have been long used in Thailand. Health effects of pesticides poisoning both short-term and long-term effects have been well acknowledged. The Bureau of Occupational and Environmental Diseases, Thailand has recognized of theses health effects especially chronic effects of pesticides since number of cancer cases in the country is higher every year. Objective of this study was to review and collect current data related to health effects of pesticides usage in Thailand.

Methodology: Review of related literatures and collect of questionnaire concerning health effects both acute and chronic effects in a group of farmers in an agricultural area in Thailand

Results: It was found that during 1997 – 2001, there had been increasing number of imported pesticides in Thailand from 42,180,335 kilograms in 1997 to 60,541,450 kilograms in 2001. Some of the top-ten imported pesticides were glyphosate, and endosulphan (banned in Thailand in October 2004). Cases of occupational pesticides poisoning reported to national diseases surveillance scheme in 1997 – 2001 were 3,297, 4,398, 4,169, 3,109, and 2,627 respectively. Interviewed data found that about 4.3 % of 92 interviewed farmers showed chronic symptoms due to pesticides e.g. chronic skin irritation. However, reports of cancer cases due to this cause at local hospital in the area were unclassified as occupational or work-related diseases since diagnosis of this issue has not been definited. The Ministry of Public Health has pres-

ently promoted the "Food Safety" as a national policy in collaboration with the Ministry of Agriculture in promoting pesticides-free farms and integrated pest management programs in order to reduce health effects of pesticides.
Summary: Health effects of pesticides especially long-term health effects need long-term follow-up studies and surveillance of related diseases. However, promotion of health education on prevention and concern of such health effects should be done promptly and widely.

CANCER INCIDENCE IN FARMERS EXPOSED TO LINDANE WHILE SHEEP DIPPING

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[ID 753] - *No. 27 in Poster Area*

Introduction: The objective of this study was to determine whether site-specific cancer incidence among farmers exposed to the insecticide lindane (gamma-hexachlorocyclohexan) while dipping sheep differs from that of the general population in Iceland.
Methods: Dipping of sheep to combat ectoparasites has been compulsory by law since 1914 in Iceland. Gamma-hexachlororcyclohexane (Gamatox®) was used from 1947 onwards, and was the only insecticide used for this purposed until the dipping practice was replaced 1980 by annual prophylactic injection of ivermectin. Cohorts of 7882 men and 429 women, who, according to records on sheep dipping were sheep owners, were followed from 1962 to 2003 in the Cancer Registry for cancer incidence. The observed number of cancers was compared with expected values, calculated on the basis of person-years of risk and cancer incidence for male and female in the general population of Iceland.
Results: Among men the standardized incidence ratio (SIR) for all cancer sites was 0.79 and 95% confidence interval (CI) 0.76-0.83 and corresponding figures for women were 0.72, CI 0.57-0.90. Among both males and females a significantly increased risk for lip cancer was found, with SIR 1.50, 95% CI 1.08-2.04 and SIR 9.09, 95% CI 1.02-32.82 respectively. The SIRs for several cancer sites were lower than unity both among men and women. Examples of this were cancers of the colon, rectum, pancreas, stomach, lungs, kidney, bladder, and brain and nervous system. For men the SIRs for soft tissue, Hodgkin's disease, non-Hodgkin's lymphoma, multiple myeloma, and leukaemia were near unity.
Conclusions: The decreased risk of most cancers among these sheep farmers is concordant with findings reported previously among farmers from other countries as well as in Iceland. The number of sheep owned by each farmer should be used as a surrogate for the lindane exposure in an attempt to elucidate the relationship between such exposure and cancers of lymphatic and haematopoietic tissue in future studies.

PESTICIDE MANAGEMENT AND SYMPTOM PREVALENCE IN AGRICULTURAL WORKERS IN THE VALLEY OF TIXTLA, GUERRERO, MEXICO

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[ID 808] - *No. 28 in Poster Area*

Objective. Our aim was to describe the prevalence of symptoms associated with pesticide use and management among agricultural workers of the Valle of Tixtla, Guerrero, Mexico.
Methods. In 2004, we carried out a transversal study in 303 male agricultural workers who used pesticides, principally organophosphate and carbamate pesticides, throughout the year in the cultivation of orchards, grains, and flowers. We applied to these workers a standardized questionnaire on work history, and the management and frequency of use of pesticides, and another questionnaire on their symptoms related with pesticide exposure.
Results. Average worker age was 44.5 ± 16.85 years; 19.5% (59) of workers were illiterate. Symptom prevalence was 23% (70), with one to five symptoms each. The most frequent symptoms experienced were cephalea, itchiness, dizziness, and burning and numbness of the skin. Average use of these products was for 19.2 ± 13.9 years. Use and risk y management included the following: 95% (289) of workers did not utilize personal protection equipment; 82.5% (250) mixed several pesticides together; 1.7% (5) applied pesticides with a bucket or directly with their hands; 17.2% (52) applied pesticides during the hours from 11:00 a.m. to 3 p.m.; 36.4% (110) applied pesticides for >2 hours; 3.3% (10) applied pesticides against the wind; 26.4% (80) applied these with the wind as well as against the wind; 4% (13) smoked during pesticide application; 37.4% (114) bathed after 3 hours of having applied pesticides; 34.5% (103) changed their clothes after 3 hours of having applied pesticides, and 18.8% (57) reinitiated cultivation hours after having applied pesticides. 32.8% of workers which mixed three or four pesticides and 20.3% which used two combined pesticides expressed one or more symptoms of poisoning.
Organophosphates, dithiocarbamates and quaternary ammonium compounds were the most associated with previous intoxication.
Most of agricultural workers reported applied pesticides against the wind were one of the principal causes of poisoning.
Conclusions. Prevalence of symptoms associated with exposure to pesticides is in agreement with the characteristics of its use and management, although it is necessary to know the toxicologic characteristics of the pesticide mixtures, as well as broadening the investigation of possible chronic effects.

STRESS PREEXPOSURE ALTERS RESPONSIVENES TO CHLORFENVINPHOS, AN ORGANOPHOSPHATE PESTICIDE.

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[ID 947] - *No. 29 in Poster Area*

Organophosphate pesticides (OPs) are cholinesterase (ChE) inhibitors and OP exposure results in a acetylcholine (ACh) accumulation in cholinergic synapses. A transient Ach excess is the main cause of the acute OP neurotoxicity. It also triggers long-lasting neuroadaptive changes which may determine the effect of subsequent exposure(s). Some literature reports indicate that physical or psychological stressors may trigger neuroadaptive changes which are similar to those triggered by OPs. This makes it likely that prior exposure to such stressors will influence the effect of a subsequent OP exposure. We have shown recently that subjecting the rat to a 20s foot shock alters the animal's susceptibility to some acute as well as long-term effects of chlorphenvinphos (CVP) - an OP pesticide - given two weeks later. The purpose of the present experiment was to find out whether exposure to social defeat or restraint may result in similar effects. Adult male WISTAR rats were used. The model of social defeat consisted of single or repeated (once a day for five days) exposure of the subject animal to a stronger opponent. Restraint stress relied on placement of the animal inside a plastic tube for 2 hr/day once or five times. Blood cholinesterase (ChE) was measured before and after stress. Results obtained so far indicate that: 1) single social stress or 2 hr stay in the restrainer, both resulted in a transient decrease in ChE activity in plasma but no change in the erythrocyte ChE; 2) after the repeated stressing the direction of the ChE response was the opposite - the plasma ChE activity was markedly increased for about 3 h after the stress; 3) In control rats, exposure to CVP (1.0 mg/kg i.p.) resulted in about 50% decrease of ChE activity. Repeated social stress or restraint two weeks before the CVP exposure prevented significantly the CVP-induced decrease in ChE activity. These results confirm that stressful experience may significantly influence the effects of a subsequent exposure to an OP pesticide.

STUDY OF BONE OSSIFICATION AFTER EXPERIMENTAL ADMINISTRATION OF CARBARYL

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[ID 1132] - *No. 30 in Poster Area*

Pesticides are widely used to protect crops and breeding cultures from insects, fungus and other undesirable pests. 1-naphtylcarbamate is used as a pesticide in agriculture, some soaps and during some manufacturing processes. Chronic toxicity of 1-naphtylcarbamate is not well characterized, nor is its effects on the offspring.

The purpose of this study is to evaluate the effects of 1-naphtylcarbamate on the offspring, when given to parents.

Two groups of rats Wistar were used. Group I was the control group, with no manipulation. Group II was submitted to the administration of the pesticide in the drinking water with a concentration of 3mg/l, beginning five days before mating, and during pregnancy and breast-feeding, until the age of 20 days. The juveniles were sacrificed at the age of 20 days and the growth plate cartilage of the femur was studied by microscopy. The parents were sacrificed at the same time.

In the animals born from parents of the control group the growth plate was 487.1±16.2 µm, the reserve and proliferative zones were 260.0±12.1 µm and the hypertrophy zone was 222.1±8.0 µm. In the animals born from the parents submitted to the administration of the pesticide the growth plate was 535.9±159.4 µm, the reserve and proliferative zones were 262.7±61.6 µm and the hypertrophy zone was 335.5±170.3 µm. In the animals born from group II there was a reduction of the density of the bone on the proliferative zone. The study of the parents submitted to the administration of 1-naphtylcarbamate shows no significant morphologic changes. These results suggest that the administration of 1-naphtylcarbamate during pregnancy and breast-feeding interferes with endoncondral ossification of juveniles.

PESTICIDES RETAILERS AND POSSIBLE HEALTH RISKS ASSOCIATED WITH THIS TRADE

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[ID 1273] - *No. 31 in Poster Area*

Tanzania lies under tropics where the climate is favorable for crop disease and pests. Pesticide is one of the method used for control of various pests. Due to the destruction caused by pests and diseases forces most of the farmers to apply different kinds of pesticides both in agricultural sector and in the public health.

Various pesticides dealers, which include importers, distributors, fumigators, and formulators / manufactures, handle pesticides in Tanzania. In Arusha most pesticides dealers are engaged in distribution and sale of pesticides in retail or on wholesale basis.

The firms, which are responsible to distribute pesticides, are generally small-scale enterprises which employ people from urban areas. Some of workers are subjected to pesticides exposure through handling especially unregistered and repacked Pesticides, staying in the shops/store for long period's, failure to use protective gear and poor ventilation system in premises where pesticides are kept/sold.

Tanzania has a legislation scheme, under the Ministry of Agriculture and food security which governs the protection of plants/ crops in the country. The firms and pesticides dealers are therefore licensed according to Plant Protection Act of 1997 and Plant Protection Regulations. For instances, Currently there are roughly 100 pesticides retail shops in Arusha city of Tanzania. The shops in Arusha-Tanzania, which are licensed to undertake pesticides business, are believed to employ about 400 workers.

Despite the stringent surveillance and regular monitoring, pesticides are believed to cause adverse health effects and environmental problems. Possible health risks encountered by pesticides dealers are based on the nature of products distributed and workers handling pattern include inhalation of poisonous dusts and fumes, skin infections, headaches, accidental ingestion of some toxic chemicals. The long term effects include cancer, developmental and reproductive effects etc.

This paper highlights pesticides retail shops relevant to occupational health risks and possible interventions.

OCCUPATIONAL EXPOSURE TO ORGANOPHOSPHOROUS INSECTICIDES IN FLORICULTURE IN ECUADOR

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[ID 1603] - *No. 32 in Poster Area*

Background

Floriculture represents one of the major sources of income in the Andean Region, and Ecuador is one of the greatest worldwide producers of ornamental flowers. Floriculture can be carried out both in open fields and in greenhouses with an extensive use of chemicals, as fertilizers, growth hormones, and pesticides. Despite the wide use of pesticides, data on occupational exposure of Ecuadorian floriculture workers were never collected. Among pesticides, organophosphorous insecticides (OPs) represent one of the most widely used group.

Aims

The aim of the study was the assessment of exposure to OPs in Ecuadorian floricultural workers by the determination of the urinary excretion of selected metabolites of these compounds, that is dimethylphosphate (DMP), diethylthiophosphate (DETP), and diethyldithiophosphate (DEDTP).

Materials and methods

Thirty-six floriculture workers from an Andean region close to Quito, Ecuador, were recruited for the study. Workers were exposed to OPs while applying OPs-based plant protection products, and during re-entry activities or crop maintenance in one open field and two greenhouse farms. Urine samples were collected in the morning (pre-exposure specimen, n= 36) and after workshift (post-exposure specimen, n = 34).

Alkylphosphates were determined by highly sensitive high-performance liquid chromatography/selective reaction monitoring mass spectrometry method (HPLC-SRM-MS/MS). The assay was linear in the range concentration of 1-50 mg/L for the three compounds in human urine.

Results

Statistics of OP excretion (mg/L) were as follows:

Metabolite Median Minimum Maximum
DEDTP IT 2.5 2.5 65.5
DEDTP FT 11.3 2,5 48.6
DETP IT 2.5 2.5 25.5
DETP FT 4.9 4.4 18.5
DMP IT 20 10 26
DMP FT 29 12 78

Conclusions

This study suggests that Ecuadorian floricultural workers are exposed to OPs, to concentrations approaching those observed in similar conditions of use. The comparison among different activities suggests that mixing, loading and application bring about level of exposure higher if compared to other jobs; however, the significant presence of metabolites also in workers engaged in other activities, in which no pesticide exposure is anticipated, poses the need of identifying the source of exposure of these workers, which could be attributable either to an ubiquitous OPs pollution in the productive settlements taken into account or to other sources of exposure to be identified.

THE ASSOCIATION BETWEEN CHOLINESTERASE AND CPOASE ACTIVITIES AMONG ORCHARD WORKERS EXPOSED TO CHLORPYRIFOS IN THAILAND

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[ID 1888] - *No. 33 in Poster Area*

BACKGROUND: The aim of this study was to determine whether differences in chlorpyrifos oxonase (CPOase) activity levels correlated with cholinesterase activity changes among chlorpyrifos exposed agricultural workers in Klaeng District, Rayong Province, Thailand.
METHODS: This prospective study was conducted among 53 farm workers in Rayong Province, eastern Thailand who were pre-selected for their relatively exclusive use of chlorpyrifos on fruit products during the study exposure period. Farm workers were asked to maintain a structured exposure and pesticide use diary, and were tested for plasma (PChE) and erythrocyte cholinesterase (AChE), and CPOase serum activity levels. Baseline blood samples were collected for PChE AChE and CPOase activity before the spraying season. Follow-up samples were also tested towards the end of the pesticide application period. The associations between independent variables as: chlorpyrifos concentration, recorded over-exposure events, personal hygiene practices, personal protective equipment (PPE) use, CPOase activity, sprayed acreage and dependent variables: PChE or AChE % change --were assessed by multiple regression.
RESULT: Our results suggest that independent variables - CPOase activity, reported PPE use, chlorpyrifos concentration, and reports of becoming wet when spraying - are significantly associated with PChE activity among farm workers exposed to chlorpyrifos (R-square = 0.446, p = 0.028). CPOase activity, PPE, chlorpyrifos concentration, and being wet at the end of application after work--were significant at p = 0.05, 0.012, 0.012, and 0.004, respectively. In the case of AChE, a significant correlation was not found between AChE activity and exposures variables. Given the known propensity for chlorpyrifos to inhibit ACHE only weekly, this is an expected result. The data indicated that inter-individual differences in CPOase activity, and PChE, are basic risk factors for susceptibility to chlorpyrifos exposure.

SENSITIVITY TO AMPHETAMINE AND SUSCEPTIBILITY TO AMPHETAMINE SENSITIZATION AFTER REPEATED EXPOSURE TO CHLORPHENVINPHOS IN RATS.

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[ID 850] - *No. 34 in Poster Area*

Some data suggest a relationship between increased sensitivity to psychostimulants and psychostimulant dependence. It is well known that sensitivity to psychostimulants may increase after exposure to agents able to activate the HPA axis. Organophosphate pesticides are strong activators of the HPA axis. Interestingly, we found that in the rat a single exposure to chlorfenvinphos (CVP), an organophosphate pesticide, at a moderate dose, results weeks later in hyposensitivity to amphetamine (AMPH). The aim of the present study was to find out the consequence of repeated dosing with CVP on the rat's behavioral sensitivity to AMPH and propensity to AMPH sensitization. For this purpose adult male WISTAR rats were given CVP i.p. injections (one injection/day, 5 injections/week for two weeks) at the daily dose: 0.5mg/kg (low dose - LD) or 1.0mg/kg (high dose - HD). After a time necessery for a full recovery of the erythrocyte acetylcholinesterase (rbcAChE) activity they were challenged with 0.5mg/kg AMPH dose in an open field to test for the locomotor stimulating effect of the psychostimulant. In the next step (sensitization induction) all rats were given in their home cages five daily i.p. injections of AMPH at the dose of 1.0mg/kg . Two weeks later they were again challenged in the open field with the test (0.5mg/kg) dose of AMPH. Results: 1/ in case of the LD exposure AChE activity returned to normal within 14 days postexposure (PED). In case of the HD exposure the AChE activity returned to normal 35 PED. 2/ In LD exposure group the response to AMPH challenge dose given a week after the recovery of AChE activity did not differ from that produced in control animals 3/ After the repeated treatment with AMPH, the response to AMPH test dose was markedly augmented in rats of the LD group compared to control. In rats of the HD group the response to AMPH was suppressed. The results indicate that repeated LD exposure to CVP increases and HD exposure reduces the rat's susceptibility to sensitization by a repeated AMPH injections.

GENE-ENVIRONMENT INTERACTION IN OCCUPATIONAL AND ENVIRONMENTAL HEALTH

ASSOCIATIONS BETWEEN GPX1 PRO198LEU POLYMORPHISM, ERYTHROCYTE GPX ACTIVITY, ALCOHOL CONSUMPTION AND BREAST CANCER RISK IN A PROSPECTIVE COHORT STUDY

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[ID 399] - *No. 35 in Poster Area*

Breast cancer may be related to oxidative stress. Breast cancer patients have been reported to have lower antioxidant enzyme activity than healthy controls, and the polymorphism GPX1 Pro198Leu has been associated with risk of lung and breast cancer. The purpose of the present nested case-control study was to determine whether GPX1 Pro198Leu and glutathione peroxidase (GPX) activity in prospectively collected blood samples are associated with breast cancer risk among postmenopausal women and whether GPX activity levels are associated with other known breast cancer risk factors. We matched 377 female breast cancer cases with 377 controls all nested within the prospective "Diet, Cancer and Health" study of 57000 Danes. Carriers of the variant T-allele of GPX1 Pro198Leu were at 1.43-fold higher risk of breast cancer compared with non-carriers (95% CI=1.07-1.92). Pre-diagnostic GPX activity tended to be lower in cases compared to controls. GPX activity was positively associated with intake of alcohol (P<0.0001) and the catalytic activity was lowered 5% for each additional copy of the variant T-allele (P=0.0003). Alcohol intake was associated with increased GPX activity for the C-allele but not for the T-allele. Results from this prospective study suggest, that the GPX1 Pro198Leu-associated lowered GPX activity is associated with higher breast cancer risk among Danish women.

INTERACTION OF OCCUPATIONAL POSTURE, LIFESTYLE AND GENETIC COMPONENTS OF THROMBOPHILIA

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[ID 509] - *No. 36 in Poster Area*

Cardiovascular diseases, major causes of temporary and/or permanent working invalidity, are multi-factorial disorders with several acquired (lifestyle, diet) and genetic components, producing a wide spectrum of susceptibility or risk through synergic and/or additive mechanisms. Standing at work might represent a candidate risk factor, however its interaction with lifestyle, physical activity and genetic susceptibility are largely unknown.
The study was conducted on workers of a factory leader in the field of production of tracked vehicle components. Administered questionnaires enquired about occupational posture, leisure-time physical activity, smoking status, alcohol consumption and the presence of clinical conditions. Plasma variables (total and HDL cholesterol, triglycerides, C-reactive protein, coagulation factors and reactive oxygen species) recognized or suggested cardiovascular risk factors, and DNA mutations predisposing to thrombosis were also investigated.

Overall data collected from 403 subjects (males, median age 40; range 23-64) indicated that: 1) the prevalence of vascular disorders was higher in workers with standing position than in workers with other postures; 2) among workers with standing position hypertension was less frequent in leisure-time physically active subjects as compared with sedentary (5% vs 21%, P<0.05); 3) leisure-time physical activity was associated with a favourable lipid profile and with reduced levels of C-reactive protein (marker of inflammation) in all subgroups of workers; 4) in workers with vascular disorders carriership of Factor V Leiden (1.8%) and of prothrombin 20210G/A (7.2%), frequent thrombophilic mutations, were similar to that found in control subjects (2.3% and 6.7% respectively). Thus association among thrombophilic mutations, occupational posture and vascular disorders, was not detected.
Overall, data supported a major role of health-related habits, particularly the negative role of standing position and the positive role of physical activity, as compared with recognized genetic components of thrombophilia.

THE ASSOCIATION BETWEEN GENE POLYMORPHISM AND SUSCEPTIBILITY TO TRICHLOROETHYLENE INDUCED SEVERE GENERALIZED DERMATITIS AMONG EXPOSED WORKERS: A CASE-CONTROL STUDY

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[ID 633] - *No. 37 in Poster Area*

In this study, a case-control design was used to investigate the relations between genetic polymorphisms and individual susceptibility to TCE-induced allergic dermatitis in 111 patients and 154 healthy TCE-exposed workers.
NAT2 genetic polymorphism was related to the TCE-induced allergic dermatitis. The frequency of NAT2*4 allele and NAT2 fast phenotype in cases was significantly lower than that in controls, subjects with slow metabolic phenotype of NAT2 have a 2.01 fold (95% CI = 1.10 - 3.65) higher risk for allergic dermatitis than subjects with the fast phenotype. For NAT1, the allele and genotype frequencies were distributed similarly between the patients and the controls. However, when slow phenotypes of NAT1 and NAT2 were combined, the risk for allergic dermatitis was significantly increased (OR=2.71, 95% CI = 1.29 - 5.70) to the level higher than that observed for NAT2 slow acetylators alone.
Significant association between TNFa genetic polymorphism and risk for TCE-induced allergic dermatitis was found. The frequency of TNFa-308 wild allele in cases was significantly higher than that in control subjects (P = 0.049). Individuals with heterozygous genotype of TNFa-308 were associated with the decreased risk of TCE-induced allergic dermatitis relative to the homozygous genotype (OR = 0.398, 95% CI = 0.164 - 0.967).
No significant differences in the allele and genotype frequencies could be demonstrated at any other polymorphic loci among both groups including CYP1A1、CYP2E1、GSTT1、GSTP1、GSTM1 in metabolic genes and TNF-a G-238A、IL-4 C-590T、IL-10 A-592C、TNF-b in genes of immune related cytokines.

GSTS, NAT1, NAT2, SULT1A1, XRCC1, XRCC3 AND XPD GENETIC POLYMORPHISMS, INTERACTIONS WITH COFFEE CONSUMPTION AND BLADDER CANCER.

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[ID 693] - *No. 38 in Poster Area*

N-acetyltransferases (NAT1, NAT2), glutathione S-transferase (GSTM1, T1), sulfotransferase (SULT1A1) are involved in the metabolism of many carcinogens and are polymorphic. Polymorphisms in DNA repair genes such as XRCC1, XRCC3 and XPD may lead to genetic instability and carcinogenesis. Caffeine and other coffee substances could have direct or indirect metabolic effects and modify concentration of carcinogenic or anticarcinogenic substances by interacting with metabolic enzymes or DNA repair.
Since coffee drinking has been associated with an increased risk of bladder cancer (BC) in some studies, we aimed to investigate the modulating effect of genetic polymorphisms on BC risk due to coffee consumption.
A hospital-based case-control study (201 incident BC cases, 214 controls) was performed in 1997-2000. Detailed lifetime information on several environmental and occupational BC risk factors was collected through direct interview. Genotyping was carried out with PCR-RFLP. Unconditional multivariate logistic regression evaluated the association between genetic polymorphisms, coffee drinking and BC risk, taking into account age, education, smoking and occupational exposures to PAHs and aromatic amines.
Distributions of GST-M1-T1, NAT1-2, SULT1A1, XRCC1-3 and XPD genotypes were not significantly different between cases and controls.
The risk of BC showed no increase for consumption of 1-3 cups of coffee/day and a moderate, though non-significant, increase for >3 cups/day (OR=1.22; 95%CI: 0.6-2.6), with non drinkers as the reference category.
A non significant increased BC risk was detected for GST-M1 null (OR=1.8; 95%CI: 0.6-5.4), GST-T1 null (OR=5.3; 95%CI: 0.9-30.4), NAT2 slow (OR=1.6; 95%CI: 0.5-4.7) and XPD AA genotype (OR=1.6; 95%CI: 0.4-6.6) among drinkers of >3 cups/day, with respect to non drinkers.
No role of SULT1A1, NAT1 and XRCC1-3 polymophisms was found on BC risk.
These findings suggest possible interactions between coffee consumption >3 cups/day, common polymorphisms such as NAT2 slow and GST M1 and T1 null, XPD AA genotype and BC risk.

ENVIRONMENTAL AND GENETIC DETERMINANTS OF ANTI-BENZO [a]PYRENEDIOLEPOXIDE-(B[a]PDE)-DNA ADDUCT FORMATION IN LYMPHOMONOCYTES OF HUMANS ENVIRONMENTALLY EXPOSED TO POLYCYCLIC AROMATIC HYDROCARBONS

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[ID 868] - *No. 39 in Poster Area*

Objective of this study was to evaluate environmental and genetic determinants of anti-benzo[a]pyrenediolepoxide-(B[a]PDE)-DNA adduct formation (an adduct induced by the ultimate carcinogen of B[a]P) in lymphomonocytes of humans environmentally exposed to polycyclic aromatic hydrocarbons (PAHs). Sample population were 585 Padua municipal workers recruited during their periodic check-ups at our Preventive Medicine Ambulatory after a signed informed consent. Questionnaire regarding different sources of exposure to PAH (B[a]P) and blood sample (20ml) were collected from each participant. Anti-B[a]PDE-DNA adduct levels were detected by (HPLC)/ fluorescence analysis and genotypes by PCR. We found that tobacco smoke (smokers (N=128, 22%) vs non smokers (p<0.01)), diet (non smokers who consume PAH-rich meals ⩾ 52 times/year (N=171, 48%) vs <52 times/year (p<0.01)) and high indoor exposure (high (N=15, 3%) vs medium- low- and not-exposure, also excluding the above PAH exposure factors (N=6, 2%), p<0.01) significantly increase DNA adduct levels. In these groups of exposed subjects GSTM1 null genotype significantly influence DNA adduct levels (p<0.01). In the whole population multiple linear regression showed that major determinants in rising anti-B[a]PDE-DNA adduct levels are smoke (t=3.43, p<0.01), indoor pollution (t=3.37, p<0.01) and lack of GSTM1 activity (t=2.63, p<0.01). The influence of the diet was not evident in this statistical analysis.
In conclusion our results indicate that anti-B[a]PDE-DNA adduct formation, associated not only with tobacco smoke exposure (information already known in small group of subjects), but also with indoor and diet exposures, is modulated by GSTM1 (active and null) genotype. The information provided here seems to be important since very probably DNA adduct levels in LMF correlate with those in lung tissue. Therefore subjects with higher adduct levels linked both to exposure and genetic characteristics could be at higher risk to PAH–induced cancer in the lung.
Acknowledge: Cofin 2003

UDP-GLUCURONOSYLTRANSFERASE 2B7 STATE IN BENZIDINE-EXPOSED BLADDER CANCER CASES

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[ID 972] - *No. 40 in Poster Area*

UDP-Glucuronyltransferase 2B7 (UGT2B7) is involved in benzidine metabolism, as demonstrated by in vitro experiments with liver slices. To evaluate the possible association of UGT2B7 gene polymorphism with blad-

der cancer risk for benzidine-exposed subjects, diagnosed bladder cancer cases (n=36) who were members of a cohort of benzidine exposed workers in the Chinese dyestuff industry were investigated. UGT2B7 polymorphism at locus C802T (His268Tyr) was detected using a PCR-RFLP based procedure. Non-diseased cohort members (156 men, 95 women) were taken as work-related control and unexposed healthy individuals (113 men, 105 women) were taken as community control. The data showed that the polymorphism at locus UGT2B7 C802T in a general Chinese population significantly differs from that in a Caucasian population (p=0.00018) displaying a distinctly lower frequency of T/T genotypes (9.2% vs. 25.3%), while no significant difference to a Japanese population could be detected (p=0.17). A higher prevalence of T/T genotype carriers was found in the cancer cases, compared with unexposed healthy controls (25% vs. 9%, OR 3.30, 95% CI 1.37-7.98, p=0.006). A higher presentation of T allele carriers in the patients group was also confirmed (46% vs. 33%, OR 1.73, 95% CI 1.05-2.87, p=0.03). A higher portion of the T/T genotype was also observed in bladder cancer patients compared with non-diseased members of the same benzidine-exposed cohort although some of them displayed different degrees of cellular alterations in their exfoliated urothelial cells. This study points for the first time to an association between a homozygous mutant genotype of human UDP-glucuronosyltransferase 2B7 catalyzing the biotransformation of benzidine and an elevated bladder cancer risk for formerly benzidine-exposed workers of the dyestuff industry.

GENES POLYMORPHISM OF GLUNANIONE-S-TRANSFERASE AT PATIENTS WITH PNEUMOCONIOSIS

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[ID 978] - *No. 41 in Poster Area*

Background: The most common occupational respiratory diseases are pneumoconiosis (PS) and chronic bronchitis. In the recent years, a search for new approaches for primary prevention and prognosis of the PS duration, based on biomarkers determination has been under way. The biomarkers allow to determine the mechanisms of individual susceptibility and resistance to the exposition of coal dust.
Methods: The ratio between the normal (+) and null (0) alleles of the genes encoding glutatione-S-transferases M1 (GSTMl) and T1 (GSTT1) were investigated in 253 normal individuals (control group) and in 96 miners with PS, that have minimum 15 years of underground work experience.
The presence of GSTM1 and GSTT1 genes was determined using multiplex PCR.
Results: The frequency of the GSTMl 0/0 genotype in the population sample was significantly higher (50,6%) than in the patients with PS (37,5 %; $\chi 2 = 4,28$; p = 0,039). For the GSTTI gene similar data were obtained. The frequency of the GSTT1 0/0 genotype in healthy donors was not significantly different(14,2%) from the patients with PS (18,75%; $\chi 2 = 0,77$; p = 0,38). A significant preponderance of the compound homozygotes for the GSTMl and GSTTI null alleles among the patients with PS was observed. The frequency of the GSTMl 0/0, GSTTI 0/0 individuals among the patients was 7,3%, while it was 8,7% among the controls ($\chi 2 = 0,04$; p = 0,836).
Conclusion: results indicate that the GSTT1 null genotype does not influence the predisposition to PS in this sample, while the GSTM1 normal genotype is associated with the risk of PS.

GENE-ENVIRONMENT INTERACTION: ENVIRONMENTAL AND OCCUPATIONAL EXPOSURE TO PAHS

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[ID 1093] - *No. 42 in Poster Area*

Background: The inter-individual variability in susceptibility to chemical carcinogens largely depends upon factors affecting the metabolic pathway of the compounds. This study aims at investigating the influence of genetic polymorphism of the cytochrome P450 1A1 (CYP1A1), glutathione S-transferases μ (GSTM1) and θ (GSTT1) and of polymorphism of DNA repair gene (XPD) on biomarkers levels and specifically biomarkers of internal dose (urinary 1-hydroxypyrene, 1-HOP) and of biologically effective dose (PAH-DNA adducts).
Material and Methods: To investigate the gene-environment interaction at different exposure levels, the study includes a group at high – occupational – exposure represented by n.100 coke oven workers, a group at intermediate exposure (n. 50 residents living around the industrial area), a control group (n. 50 residents living in a rural area).
Each subject in the study has been asked to sign the informed consent form and has been administered a structured standardized questionnaire to collect personal data, occupational history, smoking habit, clinical history in order to control for potential confounders in the analysis of the relationship between exposure and investigated biomarkers.
External exposure has been measured by personal samplers. Each subject provided blood and urine samples. Biological samples have been collected and the beginning and at the end of the work shift for occupational exposed subjects and early in the morning for non exposed subjects.
The analyses are still going-on.
Results: A preliminary evaluation of PAH exposure levels in the coke-oven workers, based on 45 urinary samples, shows that the median value of 1-HOP at the end of the shift is equal to 0.75 $\mu Mol/Mol_{creat}$. No significant differences have been observed in relation to smoking habit. The most exposed workers are topside workers (median value 2.18 $\mu Mol/Mol_{creat}$).
Conclusion: Increasing knowledge on the role of polymorphisms involved in the metabolism of xenobiotics in modulating the host response may enhance the capability to prevent harmful effects of environmental factors.

POLYMORPHISM OF CARBOXYLIC ESTERASES AND SUSCEPTIBILITY TO LONG-TERM EFFECTS OF ORGANOPHOSPHATES PESTICIDES

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[ID 1128] - *No. 43 in Poster Area*

This work investigated both effect of organophosphorus pesticides (Ops) exposure on activity of carboxylic esterases, including buturylcholinesterase (BChE), carboxylesterase (CarbE) and paraoxonase (PonE), and relationships between BChE and PonE polymorphisms and the individuals' genetic susceptibility to OPs exposure, among 75 exposed and 100 controls. Our results showed that both BChE and CarbE activities were inhibited for the long-term OPs exposure in the exposed workers, which were 27.3±21.65 nmol.h-1.ml-1 and 235.6±104.03 nmol.min-1.ml-1 with the references 78.313±30.354 nmol.h-1.ml-1 and 362.681±194.997 nmol.min-1.ml-1, respectively. The PonE activity was not affected by the OPs exposure which was 307.8±107.00 nmol.min-1.ml-1 in the exposed group with the reference 332.611±96.157 nmol.min-1.ml-1. The means of AChE activity of the exposed workers with BCHE-K genotype UU (61 cases), genotype UK (12 cases) and genotype KK (2 cases) were 105.05, 84.42 and 79.00 mmol.h-1.ml-1, respectively with the symptom scores 3.74, 9.17 and 12.50 accordingly; The means of AChE activity of the exposed workers with PON-192 genotype BB (37), genotype AB (27) and genotype AA (11) were 116.8, 91.2 and 72.3 mmol.h-1.ml-1, respectively and the scores were 2.00, 6.74 and 9.73; The mean AChE activities of those with PON-55 genotype LL (70) and genotype LM (5) were 102.4 and 82.8 mmol.h-1.ml-1 and the scores were 4.53 and 9.20, respectively. The symptom scores of the individuals with abnormal homozygote of these three gene loci were the highest, which indicated they were most susceptible to OPs. Multiple variance analysis showed there were no interactions among the three gene loci and the age, gender and exposure time had no statistical significance, while genotypes of the three gene loci had statistical significance to health status. It is deduce that BChE and CarbE activity may be useful to indicate exposure to OPs and more attention should be paid to the individuals with mutant homozygotes.

ENVIRONMENTAL AND BIOLOGICAL MONITORING OF BENZENE EXPOSURE IN TAXI DRIVERS

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[ID 1493] - *No. 44 in Poster Area*

Aim: Benzene is a ubiquitous pollutant arising from automobile exhaust emissions, and tobacco smoke. Due to the very low benzene levels currently detected in most Italian cities (<10 μg/m^3), exposure assessment in workers operating in urban environments is difficult. An integrated approach, based both on environmental and biological monitoring was applied to characterize benzene exposure in a group of 37 taxi drivers of the city of Parma (Italy). The genetic pattern of polymorphic enzymes known to modulate benzene biotransformation was also determined.
Methods: Environmental monitoring was carried out using passive-diffusive samplers (Radiello®). *trans,trans*-Muconic acid (*t,t*-MA) and *S*-phenylmercapturic acid (*S*-PMA) were measured by liquid chromatography *tandem* mass spectrometry in pre-shift (PS) and end-of-shift (EOS) samples. Urinary benzene (U-B) was determined by solid-phase microextraction gas chromatography-mass spectrometry in EOS samples only. The genotypes of microsomal epoxide hydrolase (*EPHX1*), quinone oxidoreductase (*NQO1*), glutathione-*S*-transferases M1-1 (*GSTM1*), T1-1 (*GSTT1*), P1-1 (*GSTP1*), and A1 (*GSTA1*) were characterized by PCR-based methods. Environmental data were normally distributed and therefore are expressed as mean ± SD, whereas biological data showed a skewed distribution and are expressed as geometric mean [GSD].
Results and Discussion: Airborne benzene concentration assessed by 24-h personal sampling was 5.85±1.65 μg/m^3, the corresponding figure in the taxicab being definitely higher (7.71±1.95 μg/m^3, p<0.005). In EOS samples, smokers excreted higher concentrations of U-B and *S*-PMA than non-smokers (2.58 [4.23] *vs.* 0.44 [1.79] μg/l for U-B; 3.79 [1.50] *vs.* 2.14 [1.87] μg/g creat for *S*-PMA, p<0.002). Within smokers, *S*-PMA was increased at the end of the work-shift (EOS *vs.* PS, p<0.05). The number of cigarettes/die correlated with both EOS *S*-PMA (r = 0.72, p<0.01) and EOS *t,t*-MA (r = 0.51, p<0.05). In subjects bearing the *GSTM1pos* genotype, *S*-PMA excretion (3.61 [1.15] μg/g creat) was higher than in *GSTM1null* subjects (2.19 [1.18] μg/g creat, p<0.05).

HEME OXYGENASE 1 EXPRESSION IN ELECTRIC ARC STEEL PLANT WORKERS

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[ID 1502] - *No. 45 in Poster Area*

Exposure to polycyclic aromatic hydrocarbons (PAHs), metallic elements and particulate matter is associated to generation of intracellular oxidative stress. Heme oxygenase 1 (HO-1) catalyses the oxidation of heme to biliverdin, with release of iron and carbon monoxide. Both these products have anti-inflammatory and anti-oxidant properties, and their expression is induced by oxidative stress and inflammation.
This study was aimed at assessing the role of metabolic polymorphisms (CYP1A1, CYP1B1, GSTM1, GSTP1, EPHX) in the modulation of HO-1 gene expression in 37 foundry workers. Blood and urine samples were obtained at the beginning (BS) and at the end (ES) of work shift, in winter (T1) and in summer (T2). Urinary 1-hydroxypyrene (1-OHP) was measured as a tracer of PAH exposure.
HO-1 gene expression in ES samples normalized to BS values (HO-1 ES/BS) was higher in summer as compared to winter. HO-1 gene induction was related to ES 1-OHP when considering either T2 samples or the combination of the two samplings. HO-1 ES/BS was significantly increased in subjects with at least a mutant allele for GSTP1 as compared to subjects with GSTP1AA genotype (1.23±0.002 vs 0.88±0.002, p<0.05). Only in subjects with at least one variant allele for GSTP1, a positive correlation between HO-1 ET/IT expression and 1-OHP FT levels was observed (r2=0.21, p=0.016).
The present study demonstrates a correlation between PAH exposure, as assessed by urinary 1-OHP, and the induction of HO-1 expression. Such a correlation seems to be limited to subjects bearing variant alleles for GSTP1, possibly due to a higher oxidative stress in the subjects expressing the mutant GSTP1-1 isoform, which could imply a limited scavenging capacity. HO-1 expression was particularly enhanced during the summer campaign, when high ozone levels were recorded, and contributed to the complex mixture of air pollutants.

BLADDER CANCER, GENETIC POLYMORPHISMS AND FRUIT AND VEGETABLE CONSUMPTION: A CASE-CONTROL STUDY

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[ID 1616] - *No. 46 in Poster Area*

BACKGROUND: some genetic polymorphisms modulate bladder cancer (BC) risk. Fruit intake has been associated to a protective effect on BC risk.
OBJECTIVE: to investigate the interaction between total fruit and vegetable consumption and genetic polymorphisms on BC risk.
METHODS: a hospital-based case-control study was performed in the Brescia province, Northern Italy. Lifetime environmental and occupational BC risk factors were obtained through direct interview for 200 incident histologically confirmed BC male cases and 214 controls, with urological non neoplastic diseases. Data about fruit and vegetable consumption were collected by means of a food-frequency questionnaire. Odds ratios and 95% confidence intervals, adjusted for age, education, smoking, were calculated with unconditional logistic regression,.
RESULTS: Low vegetable and fruit intake (<1/month) was recorded, respectively, in 15% cases, 7% controls and 45% cases, 50,5% controls. Vegetable intake >1/month was associated with a reduction in BC risk (OR: 0.42, CI 0.22-0.81). Increased BC risk was calculated for GST-M1 and T1 null, MnSOD Val/Val, NQO1 Pro187Ser variants and NAT2 slow acetylators, whereas protective effect was found for MPO G-463A homozygous variant, XRCC1 399 codon and XRCC3 241 Met allele.
A significant reduction of BC risk was detected for GSTM1-null (OR 0.53; CI 0.31-0.91), MNSOD Val/Val (OR 0.36; CI 0.2-0.67) and total fruit consumption >1/month, GSTM1 present (OR 0.27; CI 0.08-0.8), MNSOD Ala/Val (OR 0.33; CI 0.14-0.75) and NAT2 fast (OR 0.34; CI 0.12-0.87) and vegetable consumption >1/month.
Both the multivariate logistic regression (OR 0.42; CI 0.21-0.88) and the Bayesian model (OR 0.40; CI 0.18-0.89), adjusted for age, education level, occupational exposure to polycyclic aromatic hydrocarbons and aromatic amines, confirmed the role of vegetables intake only as the independent protective factor.
CONCLUSIONS: such findings seem to highlight the role of vegetable intake in modulating the effect of some genetic polymorphisms on BC risk.

BIOHAZARDS AT THE WORKPLACE: RISK ASSESSMENT AND HEALTH SURVEILLANCE STRATEGIES

RISK ASSESSMENT OF RESPIRATORY HEALTH HAZARDS AMONG APPARENTLY HEALTHY WORKERS AT INDOOR AND OUTDOOR CAR PARKING GARAGES

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[ID 103] - *No. 47 in Poster Area*

Background: workers at car parking garages usually exposed to a wide variety of hazards. These hazards may be chemical, mechanical, physical or psychosocial. The common source of hazards inside garages is engine exhaust. Objectives: to screen the apparently healthy workers inside indoor and outdoor car parking garages for chest problems. Methodology: A cross sectional study was conducted in Cairo governorate and Giza governorate of Egypt. 53 workers from indoor garages and another 53 workers from outdoor garages were included in the study. Data collection was done by using an interview sheet and all subjects at outdoor and indoor car parking garages were subjected to spirometry to measure the ventilatory functions. Results: This study revealed that prevalence rate of chest tightness (32.1%), wheeze chest (20.7%), cough (39.6%), dyspnea (13.2%), sinusitis (16.9%), allergic rhinitis (11.3%) and bronchial asthma (30.2%) among workers at indoor garages was higher than the prevalence

rate in workers at outdoor garages (20.7%, 13.2%, 26.4%, 0.0%, 7.5%, 3.8% and 16.9% respectively) without statistical significant difference between both groups. This is in spite of overall prevalence rate of workers with chest manifestations at indoor garages (58.5%) was higher than prevalence rate in workers with chest manifestations at outdoor garages (30.2%) with statistical significant difference. All spirometer results were lower in the indoor group than in the outdoor group with statistical significant difference. Conclusion: This study concluded that workers at indoor and outdoor car parking garages were affected by chest tightness, cough, dyspnea, chest wheeze, sinusitis, allergic rhinitis and bronchial asthma. The overall prevalence rate of workers with chest manifestations at indoor garages was higher than prevalence rate in workers at outdoor garages with statistical significant difference. Mean pulmonary functions showed more decrements among workers at indoor car parking garages than outdoor car parking garages with statistical significant difference.

RISK ASSESSMETN IN GREEK HOSPITAL AREA

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[ID 568] - *No. 48 in Poster Area*

Risk assessment is obligatory by law in all workplaces in Greece. Hospitals however, have not yet started implementing it. Although there are guidelines and tools for risk assessment from other sectors, these are not applicable to hospital and other health care services, because of the different organization and hazards that exist.
The aim of the study was the development and evaluation of a methodology for risk assessment in Greek hospitals, in order to improve the working conditions and promote the health of the workers.
A cross sectional study, using multiple triangulation, by different data sources and methods (observation, questionnaire, measurements) was designed. Based on literature, a tool was developed which consists of three parts: 1.Three Inspection Checklists on Health and Safety Hazards (General, for Clinical Laboratory and for Operation Room) 2. A Hazard Identification and Action Record sheet, 3. An Occupational Health and Safety Staff Questionnaire. A sample of hospital staff in two hospitals in Athens (A) and Thessaloniki (B) participated in the study.
There were filled, 248 questionnaires in hospital A, 199 questionnaires in hospital B. There were also completed, 40 checklists in hospital A and 58 (29*2 by 2 experts) in hospital B. Reliability coefficients in all instrument were over 0,90, which is considered very high. The degree of agreement among the different experts was also high. The perception of risk by the staff showed that their contribution to risk assessments, at least in the hospital environment, is invaluable.
Respondents, measurements and observation, made it clear that the application of risk assessment is an urgent need, in order to confront the hazards in the workplace. Triangulation, as a study design and research strategy, improves the possibility of the disclosure of multiple dimensions of the reality and enhances validity and reliability of the study.

CHARACTERIZATION OF MICROBIAL PARTICLE RELEASE FROM STRAW, WOOD CHIPS, AND BUILDING MATERIAL SURFACES FOR INHALATION EXPOSURE RISK ASSESSMENT

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[ID 858] - *No. 49 in Poster Area*

Background: Respiratory health symptoms have been associated with exposure to particles of microbial origin. Straw and wood chips are examples of microbial dust releasing materials [1]. Ex-posure assessment for epidemiology and for problem identification in work scenarios and in buildings is hampered by insufficient knowledge of the complex behaviour of particle release.
Aim: To characterize
- o microbial particle release from straw and wood chips during repeated mechanical handling
- o release of spores from mouldy gypsum boards as a result of exposure to repeated airjets.

Methods: A rotating drum has been used to simulate standardised mechanical handling. A Par-ticle-Field and Laboratory Emission Cell, which exposes a test surface to air-jets (1.5 m/s), has been used to simulate particle release from building materials.
Results: Most microbial components were released at higher rates during the first agitation pe-riod than during the following period. Differences were seen between different microbial compo-nents, and endotoxin from straw was released at the same rate during two successive agitation periods. Fungal particles smaller than spores and fungal spores were released from mouldy gypsum boards at amounts that were up to 30 respectively 5 times higher during the first agitation period compared to the release during the following period.
The release patterns of microbial components were different for wood chips and straw and the time for maximum to half maximum particle release was longer for straw than for wood chips.
Practical implications: A strategy for measuring personal exposure must take into account both the difference in the time dependent release of the different microbial components from a given material and the difference between materials. Preventive measures may have to be different for materials having a high initial release of particles or specific microbial component than for materi-als for which the release increases with time.
Acknowledgements
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MOLECULAR ANALYSIS ON ACINETOBACTER SP. AND NEISSERIA SP. ISOLATED FROM BIOFILM OF REACTOR SLUDGES.

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[ID 932] - *No. 50 in Poster Area*

In this work we show the preliminary results of a study on the bacteria associated with the biofilm of a laboratory scale reactor (inocula derived from the treatment of a municipal wastewater) for the carbonic and the nitrogen removal by the biological nitrification and denitrification. We carried out a molecular phylogenetic approach by using sequences of the small ribosomial subunit gene (16S rDNA) and of two transcription factor protein-encoding genes (Rho and rpoD), generally resulting suitable for the identification and delineation even of closely related bacteria. Among the gram negative denitrifying strains, two proteobacteria (a coccus and a diplococcus) belonging to Acinetobacter and Neisseria genera, respectively, have stimulated specific molecular investigation for the increasing pathogenic importance in various opportunistic infectious diseases caused by several members of these two taxa. In the Acinetobacter sp. we demonstrated by PCR amplification and DNA sequencing the presence of the comE and comF pilin like competence factor genes. Moreover, in the Neisseria sp. the porin precursor - outer membrane protein gene (por) was PCR amplified and subsequently sequenced. These results are compared with other experimental data both on the natural transformation and on the virulence attributes of Neisseria and Acinetobacter taxa. Finally, all these observations are discussed considering various aspects of the biological risk assessment at workplaces and the management for the protection of the environment and human health.

GENE SEQUENCING STUDIES AND ANALYSIS ON THE VIRULENT ROLES OF THE BACTERIAL DENITRIFYING ENZYMES.

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[ID 943] - *No. 51 in Poster Area*

To understand the origin and emergence of pathogenic bacteria, knowledge of the homologous genes from their non pathogenic relatives is an essential prerequisite. Diverse groups of bacteria including some pathogens can express genes encoding denitrifying reductases for using nitrogen oxides as electron acceptors. In this context, investigations on the NOx reductases are of particular interest to lead to a more complete understanding of their roles in the bacterial virulence. Here we present results of the molecular analyses on the denitrifying β-Proteobacterial taxa identified by microscopy and sequences of the small ribosomial subunit gene (16S rDNA) and of two transcription factor genes (rpoD and Rho, respectively) as Acidovorax temperans, Brachymonas denitrificans, Comamonas denitrificans (family Comamonadaceae), and Neisseria sp. (family Neisseriaceae). In the representatives of the Comamonadaceae, the narG, nirS, norB and nosZ genes, encoding the subunit of the nitrate

reductase (nar), nitrite reductase (nir), nitric oxide reductase (nor) and nitrous oxide reductase (nos), have been PCR-amplified and sequenced. By the same nucleotide sequencing based approach, in the Neisseria sp. we studied the gene encoding the quinol-oxiding nitric oxide reductase (qnorB, formely norZ). The translated amino acid sequences are compared with the structure of these enzymes considering molecular aspects of the denitrification pathway in closely related pathogenic bacteria.

RISK ASSESSMENT OF TICK BORNE DISEASE IN OFFSHORE INSTALLATIONS

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[ID 1320] - *No. 52 in Poster Area*

Introduction

Historically tick bites have presented a problem for offshore oil workers in the Arabian Gulf. In 1982 Hoogstraal described workers being admitted to hospital for around two weeks with bullae at numerous bite sites, intense pruritis and fever from such bites.

Over a 5 year period on one offshore field regular wellhead tower workers reported around 1 case of bites requiring medical attention per man per annum. The ticks were carried by the Socotra cormorant, a globally threatened and protected seabird. Concern was raised regarding the risk of tick borne infections such as Congo Crimean haemorrhagic fever, Alkhurma virus, and relapsing fever.

Method

Tick samples were taken from wellhead towers every 2 weeks, from the tower being worked on that day, to date for 9 months, which gave a good representation of the towers being worked on. The species were identified by an entomologist and the ticks then analysed for the presence of several human pathogens using PCR and RT-PCR analysis. These included CCHV virus, Alkurma virus, Tick borne encephalitis virus, Borrelia spp, Ricketstsia spp, Ehrlichia spp and Babesia spp.

Results

One species of tick, Ornithodoros lahorensis Neumann, a known carrier of Rickettsia spp, has been identified. To date no viruses have been identified however the presence of Coxiella burnetti is strongly indicated and results suggest the presence of Ehrlichia, Rickettsia , Babesia , Borrelia , and Bartonella spp.

Discussion

The results suggest a potential risk of transmission of Coxiella and to a lesser extent the other organisms listed in the results. These risks will be clearer with further results.

As most workers return to their native country during the off work part of their work rotation, multilingual warning cards detailing potential infecting organisms will be developed for those bitten to show their own physician if they become unwell.

OCCUPATIONAL PSITTACOSIS: RISK ASSESSMENT AND PREVENTION WITH THE TRANSMISSION CHAIN

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[ID 1523] - *No. 53 in Poster Area*

The epidemiological chain can be the basis of an occupational infectious risk assessment and metrology is not necessary. This epidemiological chain is composed of five links; the reservoir, the exit doors, the transmission routes, the entrance doors and finally, the worker at his workplace.

Using the example of ornithosis/psittacosis risk assessment, the epidemiological chain is applied to three working situations; sale of birds(as pets), poultry abattoir and roof maintenance.

Chlamydophila psittaci is often located in bird bowels (the reservoir) with no problem for those birds. The bacteria are excreted in droppings (exit doors) which then contaminate feathers and the environment. Dried faeces form dust which can be breathed in (transmission route) and then lead to a sever air-borne infection in humans. Any activity with infected birds or their environment (bedding, breeding premises, transport vehicles, etc.) presents a risk of exposure.

Conclusion: The epidemiological chain is the Ariadne ‘s thread for infectious risks assessment and a tool for prevention. Preventive measures should be adapted so that at least one link is broken.

THE RISKS OF BLOOD-DRAWING PERCUTANEOUS INJURIES AMONG HEALTH CARE WORKERS IN JAPAN

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[ID 1852] - *No. 54 in Poster Area*

To identify the risks of exposure to bloodborne pathogens by occupational percutaneous injuries associated with the blood-drawing procedures (BDPs) among health care workers in Japan. We evaluated 3,922 needlestick-injuries associated with the blood-drawing procedures (BPIs) among a total of 23,215 exposure events to blood-borne pathogens from 1996 to 2001 at 214 hospitals in Japan using the case report format as Japan-EPINet. Over a half of BPIs occurred in the patient room. Nurses had the highest frequency of BPIs, but BPIs per 1,000 full-time employees (FTEs) indicated that the resident was the highest rates. Device-specific analysis indicated three devices were mainly caused BPIs, these were; disposable syringes (DS, 41%), winged steel needles (WSN, 32%) and vacuum tube phlebotomy needles (VTPN, 20%). The majority (94%) of devices being occurred BPIs were non-safety-designed devices. These findings suggest that applying safety-designed devices may be effecive to control these BPIs and improving the design availability of them should be concidered.

GENE EXPRESSION PROFILING TO MONITOR IONIZING RADIATION EXPOSURE

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[ID 889] - *No. 55 in Poster Area*

The estimation of exposure risk to ionizing radiation in the environment is a public health challenge. The use of radioactive materials in medicine, power generation and industry raises questions concerning also the effects due to low doses of ionizing radiation. As complex molecular mechanisms at the cellular level, in response to environmental stresses, are evoked, the application of high-throughput screening, like the microarray technology, may provide a more detailed analysis of a potential damage. In this study we focused on workers exposed to low-LET ionizing radiations and we compared the expression profile of their peripheral blood lymphocytes (PBMC) with a reference sample of non-exposed people, working at the same hospital. According to our technology, the experimental design that better fitted our objective was the balanced block consisting in the equal distribution of cyanine 5 and cyanine 3 labels within the two classes of exposed and control samples. The purpose was to combine the oligo microarray technology with informatics in order to develop a specific stress gene profile to be used as a molecular signature of the radiation exposure. Our study aims at providing further insight into the harmful effects of low-dose radiation exposure in humans in order to increase the bulk of information on the radiation-inducible genes that have been identified so far, and whose modulation was mainly described as the result of an immediate-early response in ex-vivo irradiated PBMC. The identification of such a gene set in human peripheral blood lymphocytes would improve the classical methods to estimate ionizing radiation exposure, enabling a rapid and non-invasive monitoring for any populations at risk.

LEGIONELLA CONTAMINATION IN WORK ENVIRONMENT: A CASE REPORT.

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[ID 1058] - *No. 56 in Poster Area*

Background
Many sporadic community acquired cases of Legionnaires' disease have been observed in Italy but the source of the infection and the reservoir for the organism rarely have been identified.
The patient, materials and methods
We report a case of a 48-years-old man who died 2 days after the admission to the hospital. He had a history of smoking 2-3 packs of cigarettes per day and was affected by chronic obstructive pulmonary disease (COPD). Broncholavage fluid (BAL) and urine specimens were examined for Legionella infection. Samples of hot water tanks, faucets, and showerheads were collected in the workplace where the victim occasionally had a shower. Monoclonal antibodies (MAb) analysis and Amplified Fragment Length Polymorphism typing were used to determine respectively the monoclonal subgroup and the genomic profiles of environmental and clinical isolates.
Aim of the study
To identify all potential environmental sources of infection and to assess the risk of exposure to Legionella bacteria. To demonstrate the clonal correlation between clinical and environmental isolates in order to establish the source of infection.
Results
Analysis of clinical specimens revealed the presence of Legionella pneumophila serogroup 1 in BAL secretions and positive result was obtained with urinary antigen test. Legionella pneumophila serogroup 1 was also isolated from several sites of the water system, particularly in the staff reserved bathrooms (range from 8,9 x104 to 2x106 CFU/L). Air samples collected by the showerheads showed the presence of the microrganism in the bioaerosol (range from 5 to 11 CFU/m3).
Both MAb and AFLP analysis gave no correlation on the analysed isolates, being different both the monoclonal subgroup and the genomic profile.
Conclusions
Control measures in order to re-establish acceptable hygienic environment conditions and to assure healthy workplace have been performed. Further investigations are being carried out to find the environmental source of infection.

EFFECTS OF CHLORINATION AND HEAT DISINFECTION ON AQUATIC LEGIONELLA PNEUMOPHILA

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[ID 1306] - *No. 57 in Poster Area*

Background: Legionella pneumophila has caused occupational death and severe pneumonia known as Legionnaires' diseases. In order to protect the workers from Legionella infection, it is necessary to control the growth of L. pneumophila in aquatic environment normally under starvation.
Objective: The aim of this study was to characterize the efficacy of widely-accepted heat and chlorination on Legionella pneumophila.
Methods: The culturability of L. pneumophila was determined in response to 50-70°C heat treatment and chlorination at 0.5-20 mg/L during a 70-day starvation period. Fluorogenic BacLight stains were also used to assess whether the membrane integrity of L. pneumophila was damaged by heat and chlorine challenges. The ability of starved cells to resist disinfection treatments and to regain membrane integrity was also determined.
Results and Discussion: For L. pneumophila starved for 1 day (S1), heating at 60°C or above for 30 min or chlorination at 0.5-20 mg l-1 for 60 min, a loss of 6-8 log culturability was observed, whereas only 17% - 47% of cells were characterized with membrane damage. Nonculturability was also revealed by heating or chlorinating for cells starved for 14 days (S14). The efficacy of heating on membrane deterioration was reduced for S14 cells while the chlorination effect remained. As for nonculturable L. pneumophila, collected at the 4th (N4) and the 35th (N35) days of nonculturability phase, the disinfection efficacy of both heating and chlorination decreased, indicating the development of disinfection resistance among nonculturable cells having been long-term starved for 1-2 months. Post incubation of heat-treated S1, S14, N4 and N35 cells at 37°C for 7 days demonstrated the recovery of membrane integrity, whereas this not happened to chlorinated samples. It is concluded that heating and chlorination significantly reduce the culturability of L. pneumophila, and damage cell membrane but to a much less extent. The present study shows the ability of L. pneumophila to resist against disinfection treatments and to repair cellular damage, which stands for great implications of concern in occupational health.

NEUROTOXICOLOGY AND PSYCHOPHYSIOLOGY

NEUROMOTOR FUNCTION IN A COHORT OF DANISH STEEL WORKERS

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[ID 718] - *No. 58 in Poster Area*

Objective: The aim of this study was to evaluate possible neuromotor impairment in a cohort of steel workers occupationally exposed to manganese by using a longitudinal design.
Material: 92 employees from a steel works were examined in 1989 and 1995. 60 were re-examined in 2003. A non-matched control group was examined in 1996 (n=19) and in 2003 (n=14). Median blood manganese in 1989, 1995 and 2003 was 149, 171 and 155 nmol/l and median blood lead in 1989 and 2003 was 0.76 and 0.22 µmol/l. Air concentrations of manganese at the steel works were estimated below 1.9 mg/m3 in the 1970's. In the 1990's most air concentrations of manganese were below 0.28 mg/m3. Most air concentrations of lead were below 0.10 mg/m3.
Method: The Catsys 2000™ system developed by Danish Product Development is computer based device for measuring hand tremor, hand coordination and reaction time.
Results: Over all there were no statistically significant differences in neuromotor function between the participating steel workers, non participating steel workers and controls in 1995/1996. Only reaction time for the right hand was slower for the participating steel workers. Compared with the control group the steel workers showed a decline in the ability to perform fast precise hand pronation/supination and finger tapping from 1995 to 2005. Correlation analysis showed no associations between test results for fast hand coordination and blood manganese and lead. Duration of employment was associated with deterioration of beat regulation of fast pronation/supination of the hands.
Discussion: On a group basis the changes were subclinical, but they should none the less be taken seriously.
Conclusion: Decline of neuromotor function measured as the ability to perform fast precise pronation/supination of the hands and fast precise finger tapping was shown in this cohort of low to medium manganese and lead exposed steel workers.

PUPIL SIZE VARIABILITY AS AN INDICATOR OF DEPRESSIVE STATE IN WORKING POPULATION

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[ID 1287] - *No. 59 in Poster Area*

Objectives: to examined a hypothesis that variability of pupil diameter is decreased in the subjects in depressive state, or in the patients with depression.
Methods: Changes of pupil diameter in darkness were recorded continuously for 660-720 seconds using infrared video cameras (IRIS C7364, Hamamatsu, and F2D, AMTech). Average pupillary diameter (PD), slow pupillary oscillations<1.0Hz (FFT amplitude), and the pupillary unrest index (PUI; cumulative changes in pupil size based on mean values of consecutive data sequences) were calculated as parameters of pupillary activity. 1) Depressive symptoms were assessed by the Japanese version of CES-D scale in 38 middle aged male workers (mean age: 43.4 yrs) visiting a clinic for their health check-ups. The subjects were dichotomized into two groups; high and low CES-D score group, by using a median split. 2) Pupillary activity was measured in 3 patients with depression who admitted to the Sleep Disorder Center at Aichi Medical University Hospital. Slow

pupillary oscillations<1.0Hz (FFT amplitude) of the patients were compared with those in 128 normal controls (mean age: 43.9 yrs for men and 35.2 yrs for women).
Results: 1) In 38 workers, PUI in the high CES-D score group was significantly lower (p=0.030) than those in the low CES-D score group. 2) The FFT amplitude values in all the three patients with depression were quite low comparing with those in the normal controls.
Conclusions: Variability of pupil diameter were decreased in the subjects in depressive state and in the patients with depression.

EVALUATING EFFECTS OF SOLVENT ON WORKERS' HEALTH IN SOME ENTERPRISES IN VIETNAM

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[ID 1351] - *No. 60 in Poster Area*

A cross-sectional study was carried out on 4032 workers (1274 males and 2758 females) in 7 enterprises where much solvents was used. Among that 2126 workers exposed to solvents (group A) and 2904 didn't exposed (group B).
The results showed that: In comparison to the group B, in the group A the rate of workers who had central nervous symptoms (fatigue, nausea, headache..), sympathetic system disorders (dry skin, hot skin, dry throat), peripheral nervous (numbness) and melanosis was significantly higher ($P < 0.05$). Results from psycho-physiological tests showed that: in group A, the time of simple reaction was longer and the memory capacity decreased remarkably after working shift ($P < 0.05$). The rate of females who had complaints tended higher than that of males ($P < 0.05$). The rate of workers with above symptoms in the group who implemented the rule of occupational hygiene and safety well (such as using PPE, hygiene practice...) was lower then the other ($P < 0.05$).
The results had shown adverse effects of solvents on workers' health. Recommendations have been given in order to reduce the risks of solvents and to protect workers' health.
INTRODUCTION: With development of technology and science, use of chemicals is increasing in term of both quantity and quality. Solvents are used widely in industry: detergents, degreasants, component substances in paint, ink, paste, vanish and coating materials... and together is the adverse effects of solvents to workers' health.
AIMS: To evaluate the effects of some organic solvents on workers' health in order to establish a system for management of organic solvents at enterprises and protection of workers' health and working environment.
METHODOLOGY: A cross-sectional study was carried out on 4032 workers (1274 men and 2758 females) in 7 enterprises where much solvents was used (included footwear, pesticides, furniture and chemical companies). Among that 2126 workers exposed to solvent (group A) and 2904 did not expose (group B). Data collection methods included: questionnaire on subjective symptoms, psycho-physiological tests (simple reaction, pursuing test, memory test) and medical examination. Collected data were cleaned and analyzed by STATA 8.0 software.
RESULTS: In comparison to the group B, in the group A the rate of workers who had central nervous symptoms (fatigue, nausea, headache..), sympathetic system disorders (dry skin, hot skin, dry throat), peripheral nervous (numbness) and melanosis was higher significantly ($p < 0.05$). Some test showed that: in group A, after working shift the time of simple reaction was longer, memory capacity decreased remarkably ($P < 0.05$.). In comparison to men, the rate of females who had complaints tended higher ($P < 0.05$). The rate of workers with above symptoms in the group who implemented the rule of Occupational hygiene and safety well (such as using PPE, hygiene practice...) was lower then the other ($p < 0.05$).
RECOMMENDATION: Some recommendations were given to reduce occupational hazards of solvents and improve worker's health.

FACTORS THAT MAY AFFECT EFFECTS OF ACRYLAMIDE ON SIGNAL TRANSDUCTION IN HUMAN NEUROBLASTOMA CELLS (SH-SY5Y)

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[ID 1504] - *No. 61 in Poster Area*

Acrylamide has been widely used in industry including water treatment, grouting, paper and film production. It is indispensable in biotechnology for electrophoretic separation of proteins and nucleic acids. Although the neurotoxicity of acrylamide (monomer) in humans and animals has been well established, neither its mechanism nor an agent to suppress or prevent the toxicity has been known. We have found that acrylamide increased p53, phosphorylated p53, and p53-associated protein murine double minute 2 (MDM2) in human neuroblastoma cells (SH-SY5Y). The phosphorylation of p53 was specific for the Ser15 site. Among mitogen-activated protein kinases (MAPKs), acrylamide caused phosphorylation of extracellular signal-regulated protein kinase (ERK) and p38 but not c-Jun NH2-terminal kinase. Whereas blocking p38 pathway by LL-Z1640-2 did not suppress the phosphorylation of p53 at Ser15, a specific inhibitor of ERK kinase (U0126 or PD98059) could abolish the accumulation as well as the phosphorylation of p53 at Ser15. Elevation of MDM2 was also abolished by U0126. An inhibitor of phosphatidylinositol 3-kinase-related kinase (PIKK) pathway (wortmannin) suppressed the increase of p53 and its phosphorylation at Ser15. Hence, acrylamide increases p53 protein and its phosphorylation at Ser15 through ERK and/or PIKK pathways. On the other hand, U0126 and PD98059 suppressed to some extent the cytotoxicity of acrylamide evaluated by trypan blue exclusion and lactate dehydrogenase (LDH) leakage, whereas neither LL-Z1640-2 nor wortmannin was effective in suppressing the toxicity. These suggest that ERK pathway plays a role both in causing the phosphorylation of p53 at Ser15 and in the cytotoxicity of acrylamide in SH-SY5Y cells. We have further examined effects of factors that may affect above mentioned alterations caused by acrylamide, such as FK506 that has been reported to suppress the neurotoxicity of acrylamide in animals. The results of these will be presented and the significance will be discussed.

PARKINSONISM IN WELDERS:ANALYSIS OF CASE REPORTS

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[ID 1561] - *No. 62 in Poster Area*

Objective: Recent epidemiologic evidence has raised attention on possible increased prevalence of parkinsonian disturbances in welders, as a result of manganese exposure in welding fumes and particular individual predisposition. The aim of this work is to present supporting evidence from case reports.
Methods: Two cases were evaluated at the Institute of Occupational Health, University of Brescia, Italy. Diagnostic procedure was based on accurate work and pathological history, analysis of life style, neurological and neuropsychological examination, brain MRI scan, measurement of biomarkers of exposure to manganese and other metals, parameters of liver function, iron metabolism and challenge test with a chelating agent (calcium disodium ethylenediamine tetra-acetic acid, CaNa2EDTA, 15 mg/kg body weight in 150 cc of physiologic solution). Diagnostic criteria were based on a consensus document by the «Institut de recherche Robert-Sauvé en santé et en sécurité du travail (IRSST)» of Québec, Canada, available on http://www.irsst.qc.ca/en/_publicationirsst_100134.html.
Results: The analysis of the case reports indicates that the two welders show extrapiramidal dysfunction at neurological examination, indicating an atypical parkinsonism. The brain MRI scan shows a bilateral and symmetric hyperintensity in T1-weighted images located in the globus pallidus. The biomarkers of exposure to metals indicate an increased level of manganese in blood, and the challenge test with CaNa2EDTA determines a significantly higher excretion of manganese in urine.
Conclusion: Long term occupational exposure to manganese can determine a manganese overload with extra pyramidal disturbances. Fine particle size and high soluble chemical form of manganese in welding fumes may be particularly dangerous in subjects with possible individual predisposition. Adequate control of exposure should be further envisaged in welding sites and early signs of neurological impairment should be immediately examined by occupational physicians according to a standardized diagnostic procedure.

ADEQUACY OF ANIMAL STUDIES TO EVALUATE THE NEUROTOXICITY OF LOW LEVEL MANGANESE EXPOSURE IN HUMANS

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[ID 1565] - *No. 63 in Poster Area*

Objects: Due to the use of the gasoline additive methylcyclopentadienyl manganese tricarbonyl (MMT), prolonged environmental exposure to manganese may have deleterious consequences for public health. Existing animal studies on chronic low exposures level may not be adequate for human extrapolation and risk characterization.
The literature on rodent and non-human primate studies was evaluated to determine whether there is a consistent dose - response pattern across studies, and whether these studies are adequate to evaluate the neurotoxic effects of chronic low level manganese exposures in humans.
Methods: To facilitate comparison, neurochemical and behavioral effects were plotted along the common axis of internal cumulative manganese dose, calculated independently of exposure route.
Results: Internal cumulative manganese doses utilized in animal studies extend more than two orders of magnitude (20 to 5300 mg Mn Kg-1) above the doses at which occupationally exposed humans have shown neurobehavioral dysfunction (10-15 mg Mn Kg-1).The most consistent effect in rodents was an increase of striatal GABA concentration throughout the internal cumulative dose range of 18 mg Mn kg-1 to 5300 mg Mn kg-1. A variable effect of manganese on striatal dopamine concentration appeared at internal cumulative doses above ~200 mg Mn kg-1. Monkey studies conducted with MnCl2 showed effects at doses from 20 to 70 mg Mn kg-1, whereas the vast majority of those conducted with the less soluble MnO2 showed effects above 260 mg Mn kg-1. Overall, monkey studies showed motor deficits and effects on the globus pallidus at relatively low doses and harmful effects on both the globus pallidus and the caudate and putamen at higher doses (> 260 mg Mn Kg-1).
Conclusions: Although confirming the hypothesis on neurotoxic mechanism of action, most of animal studies are currently of limited relevance for risk assessment of prolonged low-exposure level to manganese in humans.

MEASUREMENT OF TREMOR IN CHLORALKALI WORKERS WITH LOW MERCURY VAPOUR EXPOSURE

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[ID 1805] - *No. 64 in Poster Area*

Background: High exposure to mercury (Hg) vapour has well-known hazardous effects on many organs, but the central nervous system (CNS) is considered to be the critical organ. Several studies have indicated subtle effects on neuromotor function even at moderate or low Hg exposure. The aim of this study was to examine tremor among chloralkali workers with relatively low exposure to Hg vapour using new highly sensitive quantitative methods. **Methods:** We examined 43 chloralkali workers with current Hg exposure, and 22 unexposed referents, comparable in age, in two different plants. The median U-Hg concentration was 5.9 (range 1.3-25) µg/g creatinine (C) for the exposed workers and 0.7 (range 0.2-4.1) µg/gC for the referents. A total cumulative exposure index was calculated for the exposed subjects. The exposed workers and referents were examined clinically for tremor, and by quantitative tests of postural, static and kinetic finger using laser techniques developed by Beuter et al. and arm tremor using an accelerometer-based method (Catsys system). In addition, the Q16 questionnaire was used for assessment of subjective symptoms. **Results:** Clinical examination revealed no differences in tremor between the exposed and referents, and the number of subjective symptoms was similar in the two groups. Taking age, shift work and smoking into account, we found no effects of current or cumulative Hg exposure on the majority of quantitative tremor measures. The only finding was an association between exposure and tremor frequency in the non-dominant hand, and an interaction with smoking. **Conclusions:** This study indicates no significant adverse effects of mercury vapour on CNS at the present low exposure levels. There is limited support for a lowering of tremor frequency by Hg^0 exposure, but the significance of this finding is unclear.

OCCUPATIONAL TOXICOLOGY AND BIOMONITORING

DETERMINATION OF URINARY PHENOL BY GAS CHROMATOGRAPHY IN BIOLOGICAL MONITORING OF WORKERS USING PHENOLIC RESINS IN FOUNDRIES

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[ID 73] - *No. 65 in Poster Area*

Phenol is used as an industrial chemical, disinfectant agent, in the preparation of phenolic resins and paint pigments. The biological monitoring is important in occupational exposure situations. Thus, urinary phenol, used as biological indicator in phenol exposure was determined. Urine samples from sanitary foundry workers in molding and melting area, as well as from control group, were analyzed by gas chromatography with flame ionization detector (GC/FID). The analytical procedure showed linearity in the dynamic range of the assay (5 – 200 µg/mL). The limits of detection (LOD) and quantification (LOQ) were: 2,0 and 5,0 µg/mL, respectively. Intra-assay and inter-assay precision coefficient were between 4,5 – 8,9 % and 5,7 – 14,2, respectively. The accuracy coefficient was between 6,2 – 11,9 %. Recovery values were higher than 87 %. The coefficient of determination was 0,999. The medium value obtained from samples in the molding material area was 6,470 mg/g creatinine, in the melting area was 5,395 mg/g creatinine and for the control group was 2,813 mg/g creatinine. The validated method can be efficiently used phenol determination in urine. The results showed that the workers, in the exposure conditions, are below limit levels established by NR-7, a Brazilian occupational normative and international LEO´s for phenol biological monitoring.

OPTIMIZATION OF SOLID PHASE EXTRACTION FOR 1-HYDROXYPYRENE AS A BIOMARKER OF OCCUPATIONAL EXPOSURE TO PAHS PRIOR TO HIGH PERFORMANCE LIQUID CHROMATOGRAPHY

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[ID 142] - *No. 66 in Poster Area*

Polycyclic aromatic hydrocarbons (PAHs) are commonly occurring environmental and occupational contaminants generated by various processes that involve incomplete combustion of organic materials including fossil fuels. Urinary 1-hydroxypyrene (1-OHP) is frequently used as a major metabolite and biological indicator of the overall exposure to PAHs. In this study, solid phase extraction (SPE) was optimized with regard to sample pH, sample concentration, loading flow rate, elution solvent, washing solvent, sample volume, elution volume, and sorbent mass. C18 silica cartridge has been found successful in simplifying sample preparation. Using methanol to extract the analyte from spiked urine gave a clean sample for reverse-phase HPLC-fluorescent analysis. The isocratic HPLC analysis was done at a constant flow rate of 0.8 ml/min, the mobile phase was methanol/water and a fluorescence detector was used, setting at 242 nm and 388 nm. In the developed SPE conditions (sample pH: 5, sample concentration: 10 µg/L, washing solvent: HPLC grade water, eluent: methanol, sample volume: 200 ml sample flow rate: 10 ml/min), the extraction recovery exceeded 99.96%, achieving detection limit of 0.02 µg/L. The factors were evaluated statistically and also the procedure was validated with three different pools of spiked urine samples and showed a good reproducibility over six consecutive days as well as six within-day experiments. All CV were less than 3.1%. The developed method promised to be applicable for evaluation of other hydroxylated PAHs probably present in biological samples as suitable results were obtained for both day-to-day and within-day reproducibility. It is concluded that, this optimized method can be successful in simplifying sample preparation for trace residue analysis of PAHs metabolites.

SIMULTANEOUS DETERMINATION OF O-CRESOL AND PHENOL IN URINE WITH A NEWLY DEVELOPED READY TO USE HPLC KIT.

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[ID 171] - *No. 67 in Poster Area*

The monitoring of exposure limits for organic compounds (e.g. benzene, toluene) on the workplace is based on the act of protection against hazardous substances, which is legislated by the government. There are threshold limits for benzene, toluene and their metabolites in the human body. The objective of this work was to design a simultaneous method for the determination of o-cresol and phenol.

We examined 54 subjects - workers occupationally exposed and non exposed patients (persons from the radiation protection checkup) aged between 22 and 63 years. Urine spot samples were obtained from each person.

The determination of o-cresol and phenol was carried out according to a procedure originally described by Angerer (1979a). Initially, 7 ml urine was added to a mixture of 15 ml water and 7.5 ml cc H2SO4, and the solution was immediately subjected to steam distillation. These conditions provide a complete hydrolysis of the conjugates of o-cresol.

Then 25 ml of the distillate was collected and three aliquots of 2 ml were used for reversed-phase HPLC/FLD analysis of o-cresol. Then 5 ml of the distillate, 5 ml of distilled water,

0.2 ml 4- aminoantipyrine and 0.2 ml of potassium hexacyanoferrate (III) were mixed. Then three aliquots of the coloured solution were used for the photometric determination of phenol at 493 nm.

As a new method, we used a ready to use HPLC kit (Recipe, Munich) with solid phase extraction (SPE) and HPLC/FLD analysis. 1 ml of the spot urine sample was incubated for 2 hours with an enzyme, then concentrated on a reversed phase column, washed, eluated and then analysed with the HPLC/FLD system.

We injected 20 µl into the HPLC system (Hewlett Packard, USA), and the detection of the analytes was carried out with a fluorescence detector operating at 277 nm (excitation) and

300 nm (emission). The calibration curve in urine was linear in the range from 0 to 50 mg/l o-cresol, with a detection limit of approximately 0.2 mg/l. The calibration curve for phenol was linear in the range from 0 to 50 mg/l phenol, with a detection limit of approximately 0.6 mg/l.

The results of the HPLC/FLD analysis of phenol was confirmed by the photometric analysis.

Regression analyses revealed highly significant correlations between the photometric and the HPLC/FLD determination of urinary phenol ($r = 0.99119$; $p < 0.05$).

An excellent correlation was also found for determination of o-cresol with steam-distillation and the new solid phase extraction kit ($r = 0.9272$; $p < 0.05$).

The results of our study show that the determination of the urinary o-cresol excretion with the solid phase extraction HPLC/FLD kit represents a diagnostically specific and sensitive way for the estimation of an individual toluene uptake. Furthermore the determination of phenol and o-cresol in one single analysis is possible.

Angerer J (1979a) Occupational chronic exposure to organic solvents. V. Chromatographic methods for the determination of phenols in urine. Int Arch Occup Environ Health 42: 257-268

OCCUPATIONAL AND COMMUNITY MERCURY EXPOSURE IN A FORMERLY MERCURY-POLLUTED COASTAL AREA IN VENEZUELA

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[ID 178] - *No. 68 in Poster Area*

The objective of the study was to evaluate mercury exposure in individuals living and/or working in the Central-North coast region of Venezuela (Falcon and Carabobo States). Part of this area was formerly known to be contaminated due to a chlor-alkali plant installed close to one of the tributaries' rivers of the Caribbean Sea. It was an analytical, case-control study. The Study Group was constituted by 60 people: 13 of them are currently working in the same plant and 20 of them are retired workers from the plant. The 27 people left are individuals living in the area with no occupational exposure to the metal. The Control group was constituted by 100 individuals (50 male; 50 female) selected from Carabobo State with no-known exposure to Hg. Total and methyl mercury in hair (THg-H and MeHg-H) levels were determined in both groups (87 male; 73 female) to characterize this population in terms of Hg-exposure and risk, comparing the results from the occupational versus non-occupational exposure. The Study group was selected from 4 main points according to the inclusion criteria designed by the authors. A questionnaire assessed demographic, health information, work activities, history of miscarriages, area characterization and frequency of fish consumption. Hair samples were analyzed for THg. Samples with THg-H > 5 ug/g were also analyzed for MeHg. The mean THg-H for retired and current workers was 1.57 ± 1.72 and 2.04 ± 1.07 ug/g respectively. Study group had statistically higher THg-H values ($p<0.01$) than Control individuals. Two (2) retired workers had THg-H > 5 ug/g (5.19 and 7.00 ug/g) and their MeHg-H values were 2.17 and 4.49 ug/g respectively. No significant differences in THg values were found either between residing areas or between occupations of the Study Group. Ten percent of the subjects of the Study Group consumed fish from the surrounding sea, daily, and they had the highest mean THg-H level (2.97 ug/g). Associations were made between Hg-H and fish consumption in the occupational and non-occupational individuals. Relatively low values for THg-H and MeHg-H and absence of high frequencies in the Hg-related symptoms in both groups may indicate that Hg pollution in the area is not very serious however should be monitored periodically.

BLOOD BENZENE AND URINARY TRANS,TRANS MUCONIC ACID (T,T-MA) AS BIOMARKERS OF OCCUPATIONAL EXPOSURE OF PETROL STATION WORKERS

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[ID 373] - *No. 69 in Poster Area*

Lowering to 1 ppm of the benzene concentration allowed in the workplace by Italian legislation (D.Lgs. 66/00) has raised the problem of identifying a suitable biomarker for the biological monitoring of exposed workers. Monitoring of airborne benzene concentrations was conducted using portable and fixed sampling devices by adsorbing benzene in 200/400 mg SKC activated carbon vials. The portable samplers were applied to the collar of the work clothes; the fixed ones were placed 150-160 cm from the ground close to the work stations. Overall, 320 samplings were performed. We also measured plasma benzene and urinary trans,trans muconic acid (t,t-MA) levels in 80 petrol station workers (40 pump attendants and 40 cashiers as controls). Subjects compiled a questionnaire providing information on smoking and drinking habits, use of medications and consumption of food containing sorbic acid, a common food preservative which may interfere with the t,t-MA assay. Blood samples were collected before and after an 8 hour shift, urine only at the end of the shift.

Smoking and drinking habits, use of medications and consumption of food containing sorbic acid were not significantly different between the groups. The airborne benzene concentration was < 1 ppm in all workplaces. Blood benzene concentrations before and after the work shift were not significantly different between groups (pre-shift: 163 ± 37 vs. 155 ±31 ng/l; post-shift: 175 ± 30 ng/l vs. 165 ± 27). Stratification based on smoking habit showed a significant difference in plasma values (203 ± 37 ng/l vs. 245 ± 22 ng/l). t,t-MA values exhibited wide within-group variability but between-groups differences were not significant (388 ±270 vs 376 ±295 µg/g cr). t,t-MA correlated with the number of "interfering" foods consumed ($r=0.73$), but not with number of cigarettes smoked ($r=0.24$).

Data suggest that dietary sorbic acid, smoking habit and benzene inhaled for non-job-related reasons are relevant factors that are difficult to quantify and capable of masking urinary t,t-MA concentrations used to monitor job-related exposure to benzene concentrations < 1 ppm. In contrast, plasma benzene values proved to be useful markers even though for exposure levels as low as those recorded in this study cigarette smoke provides an important source of plasma benzene.

MOLECULAR DOSIMETRY OF HEMOGLOBIN ADDUCTS AS OCCUPATIONAL EXPOSURE BIOMARKERS: DIFFICULTIES AND PERSPECTIVES

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[ID 395] - *No. 70 in Poster Area*

In occupational medicine, hemoglobin adducts were widely used as exposure biomarkers. Analytical techniques commonly used in the past – as the modified Edman degradation- could be inadequate for protein adducts quantification, because of current adducts concentration levels of ppm with respect to the unmodified protein. Hence, if adducts have to be quantified, biological samples should be enriched for adducts and/or high sensitive instrumentation should be used. Both these analytical and technological approaches were tested.

The first one consisted in selective enzymatic digestions of alkylated hemoglobin with respect to the unmodified one. Hemoglobin was digested with Calpain I (a neutral calcium-dependent thiol protease) at various protein:enzyme weight ratios and reaction times, and optimal digestion conditions were established (25:1, 18hrs). Cleavage sites were determined by the MSMS identification of proteolytic peptides, by unitary resolution ITDMS. Primary cleavage sites were preferentially located at the C-terminus ends of both hemoglobin chains and many secondary cleavage sites were found within the sequence. Calpain ability to discriminate between unmodified and modified globin chains was evaluated by applying the same digestion conditions to samples containing both haemoglobins. The LC/MS analysis showed no peptides originated from modified hemoglobin, even when analytical sensitivity was increased by LC/MSMS analysis.

The relative abundance between modified and unmodified chains was estimated by extracting the ion current of most abundant ions from the TIC, confirming that modified hemoglobin was not preferentially recognized by Calpain, because an enrichment of 60% of protein adduct level was obtained. Nevertheless, this result is by far distant from the goal, and a second approach was used, based on the evaluation of sensitivity properties of HRMS, with respect to the unit mass resolution mass spectrometer previously used. Samples at various protein adduct levels were directly analysed by LTQFT (FWHM 500,000) both in the scan and SIM modes, without sample pre-treatment or liquid chromatography, so that the ability to discriminate, in the same mass spectrum, low intensity signals coming from substances present in small amount, from higher ones, was checked. In these conditions, signals related to proteins mainly corresponded to [M+19H]19+-[M+16H]16+ ions, so that the distance between ions carrying the alkylation and unmodified ions was too small, hence the SIM analysis did not remarkable improve sensitivity. That is why, also in this case, we did not get the desired results yet, and a protein adduct level of only 150ppm was detectable, towards ppm levels we intend to discriminate. The use of LTQFT instrument requires further experiments aimed to optimize chromatographic conditions as well as instrumental parameters, nevertheless, perspectives are positive. The combination of both approaches could achieve the goal and results here reported are intended to stimulate future investigations and scientific collaborations in this direction.

CRITICAL DOSE OF LEAD INDUCING ANEMIA AND NEUROMOTOR DYSFUNCTION IN JAPANESE MALE WORKERS

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[ID 461] - *No. 71 in Poster Area*

Objectives This study was carried out to estimate the critical dose of lead to induce anemia and to cause neuromotor dysfunction in workers by using the benchmark dose (BMD) method of a hybrid approach.

Methods The effects of lead on hemoglobin (Hb) and hematocrit (Hct) levels, and red blood cell (RBC) count were examined in 388 male lead-exposed workers with blood lead (BPb) levels of 1~115 μg/dl (0.05~5.5 μmol/L). In addition, postural sway parameters with spectral analysis were compared between 121 lead workers and 60 unexposed controls.

Results The blood lead (BPb) level was associated with Hb (r=–0.240), RBC (r=–0.237), and Hct (r=–0.201) among the workers with BPb levels of 1~115 (median 22) μg/dl; these linear relations were statistically significant ($p<0.001$) even after controlling for age and working status. The lower 95% confidence limits of BMD (BMDL) of BPb were estimated to be 19.5 μg/dl (0.94 μmol/L) for Hb, 19.4 μg/dl (0.94 μmol/L) for RBC, and 29.6 μg/dl (1.43 μmol/L) for Hct.

All sway parameters, except for sagittal sways with eyes open, were significantly larger in the lead workers than in the controls. The BPb level was significantly related to sagittal sways at 1-2 Hz and 2-4 Hz with eyes open, and sagittal and transversal sways at 1-2Ha and 2-4 Hz with eyes closed. The mean BMDL of BPb for postural sway were estimated to be 14.4 μg/dl (range 0.58~0.83, mean 0.69 μmol/L).

Conclusions The reduction in hematopoietic indicators and postural instability in lead workers may be initiated at BPbs below the level currently considered no effect.

BIOLOGICAL MONITORING OF OCCUPATIONAL EXPOSURE TO DI(2-ETHYLHEXYL)PHTHALATE (DEHP).A FIELD STUDY

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[ID 774] - *No. 72 in Poster Area*

Background: Di(2-ethylhexyl)phthalate (DEHP) is the most widespread plasticizer used, particularly in the polyvinyl chloride (PVC) industry. DEHP is classified as a reproductive and developmental toxicant (R 60 and R 61) by the European Union regulation. Occupational exposure data being particularly sparse this study contributes to fill this lack.

Objective: To assess exposure to DEHP by biological monitoring in the production of vinyl compounds and application of plastisols, two specific areas of PVC industry.

Method: Pre- and post-shift concentrations of three urinary metabolites of DEHP, mono(2-ethylhexyl)phthalate (MEHP), mono(5-carboxy-2-ethylpentyl)phthalate (MCEPP) and 2-ethylhexanoic acid (2-EHA) were quantified in 14 workers from two factories surveyed in 2004 during five days. Analyses were performed by high performance liquid chromatography with tandem mass spectrometry (HPLC-MS/MS) with on-line extraction.

Results: Median concentrations of pre- and post-shift urinary samples in workers using plastisols (n=25) were 16.1 and 55.9 μg/l for MEHP, 37.6 and 103.7 μg/l for MCEPP, 46.3 and 72.1 μg/l for 2-EHA respectively. In controls (n=19), values were 12 and 12.4 μg/l for MEHP, 38.1 and 11.4 μg/l for MCEPP, 31.9 and 46.0 μg/l for 2-EHA respectively. In workers making PVC compounds, pre- and post-shift values (n=41) were 18.9 and 52.0 μg/l for MEHP, 57.5 and 166.4 μg/l for MCEPP, 23.3 and 237.6 μg/l for 2-EHA respectively. In controls (n=37), values were 5.3 and 5.7 μg/l for MEHP, 18.2 and 19.2 μg/l for MCEPP, 23.7 and 28.5 μg/l for 2-EHA respectively. The comparison of median values (Mann-Whitney test) shows a significant increase ($P<0.05$) of excretion in exposed workers vs unexposed controls and in post-shift vs pre-shift concentrations only in the exposed workers.

Conclusion: There is clear evidence of occupational exposure in these factories. The three metabolites were shown to be useful biomarkers in assessing DEHP exposure.

A CASE REPORT OF CADMIUM ELEVATION ASSOCIATED WITH A BRAND OF CIGARETTES

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[ID 811] - *No. 73 in Poster Area*

A 45 year old male paint technician was identified as having an elevated whole blood cadmium of 5.9 ug/L (OSHA, ACGIH reference ranges < 5.0 ug/L) through a routine workplace biomonitoring program. Other than smoking one and a half to two packs of cigarettes daily for 23 years, no additional non-occupational exposures to cadmium were identified. Whole blood cadmium results taken five, four and two years earlier were 3.1, 4.0, and 4.3 ug/L respectively. After reassignment to a position without cadmium exposure, his whole blood cadmium level seven weeks later was 6.1 ug/L. A careful exposure history revealed that he had recently changed the brand of cigarettes he smoked. When he switched back to his original brand and reduced his consumption to one pack per day, his cadmium level fell to 2.9 ug/L taken twelve weeks after the initial elevated result. Eight weeks after returning to his original position with cadmium exposure (twenty weeks after the first

elevated result), the value was 3.4 ug/L. No elevation in urine cadmium was noted at any point. An analysis of the tobacco revealed a substantial difference in mean cadmium content (1.22 versus 0.833 ug/g) between the two brands. These results suggest that the consumption of different brands of cigarettes can lead to marked variations in whole blood cadmium levels.

EXPOSURE TO BENZENE IN PETROCHEMICAL WORKERS DURING TURNAROUND PROCESS

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[ID 843] - *No. 74 in Poster Area*

INDRODUCTION: This study was performed to estimate the exposure to benzene, one of the most serious hazards to health, during the turnaround process, and to evaluate the availability of trans,trans-muconic acid (tt-MA) as a biomarker of exposure to low-level benzene in a petrochemical industry.

METHODS: Trans,trans-muconic acid levels were determined in 152 urine samples collected for 4 phases ('before daily work', 'after daily work', 'purge' and 'inspection' phase of turnaround process) from 19 exposed workers participated in a turnaround process and 19 clerical workers as control group. The monitoring for ambient benzene levels was performed simultaneously during 'purge' phase of the turnaround process in exposed group.

RESULTS: The median urinary tt-MA levels for 4 phases were respectively 0.046 mg/L, 0.082 mg/L, 0.507 mg/L, and 0.468 mg/L in exposed group and 0.050 mg/L, 0.065 mg/L, 0.269 mg/L, and 0.331 mg/L in clerical workers. The median urinary tt-MA level for exposed group was significantly higher than that of clerical workers during purge phase ($P<0.05$). In exposed group, median urinary tt-MA level for 'before daily work' phase was significantly lower than those of other phases ($P<0.05$). Even in clerical workers, urinary tt-MA level for 'before daily work' phase was significantly lower than those of turnaround ($P<0.05$). The urinary tt-MA levels were very significantly correlated with the ambient benzene levels ($rs = 0.795$, $P<0.01$).

CONCLUSIONS: The results suggest that the turnaround process increases the exposure to benzene for all workers, even in the case of clerical workers, in petrochemical company handling benzene. And urinary tt-MA seems to be suitable as a biomarker for the exposure to low-level benzene.

DERMAL ABSORPTION OF AROMATIC AMINES AT THE WORKPLACE – IMPACT OF IMPAIRED SKIN AND SKIN BARRIER CREAMS

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[ID 1046] - *No. 75 in Poster Area*

In the present study we determined whether skin lesions and the use of skin barrier creams have an impact on the internal exposure in workers exposed to aromatic amines.

The skin of 51 workers was examined for lesions. The workers were asked for their exposure conditions and the use of personal protective equipment. Occupational exposure of workers to the aromatic amines aniline and o-toluidine was assessed by the relative internal exposure (RIE) index (Drexler et al. 1995). RIE was calculated from the concentration of aromatic amines in urine divided by the corresponding air levels. The cumulative internal exposure to aniline and o-toluidine was evaluated by the determination of their haemoglobin adducts.

The RIE index for workers with impaired epidermal barrier showed a higher internal exposure to aromatic amines as workers with healthy skin (Mean values for aniline 4.6 vs. 4.0, for o-toluidine 2.3 vs. 1.6). Significant differences ($p \leq 0.05$) were observed when the cumulative internal exposure was considered. A frequent washing of hands led to a higher incidence of erythema ($p<0.02$) and consequently to an increased internal exposure ($p<0.015$). Skin barrier creams do not improve the skin status but enhance the dermal absorption of aromatic amines ($p<0.03$). These findings were found also in in-vitro experiments using diffusion cells with two skin barrier creams. The dermal penetration was enhanced by a factor of 2–10 using excised human skin treated with barrier creams compared to untreated skin. The use of skin care creams at the workplace was associated with a reduced internal exposure ($p<0.03$), probably due to regenerative effects.

The study demonstrated that the dermal uptake of aromatic amines is enhanced by impaired skin and especially by the use of skin barrier creams in workers and in vitro. Skin care creams, however, are able to improve the regenerative effects of the skin.

THE EVALUATION OF URINARY 1HYDROXYPIRENE AS A MARKER OF EXPOSURE TO AROMATIC POLYCYCLIC HYDROCARBONS IN A POPULATION OF 3573 INDUSTRIAL WORKERS

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[ID 1213] - *No. 76 in Poster Area*

Introduction

The study of urinary 1hydroxypirene as a marker of aromatic polycyclic hydrocarbons (P.A.H.) exposure is commonly carried out in groups of workers.

Every single result has to be evaluated considering the possible presence of different misleading factors as relevant tobacco smoke, some specific diets or urban residence.

Methods

To verify the use of 1hydroxypirene as a valid index of exposure to P.A.H., we tested 3573 workers exposed to mineral oils in 137 firms.

The exams were carried out at the end of one working week.

We evaluated possible misleading factors, especially in the last 15 days before sample collection.

We analyzed the safety sheet of every oil used, to check possible presence of P.A.H..

Results

In 196 workers (5.5%) we found a level of 1hydroxypirene higher than 2.7 mcg/creat. gr..

Among these workers, 45 had possible misleading factors in personal anamnesis (tobacco smoke, specific diets or urban residence), which could be the cause of the abnormal values registered.

The other 151 workers had high level of 1hydroxypirene but no referred extra professional exposure to P.A.H.. Among these 151 workers, only 75 had a warning about the presence of P.A.H. in safety sheets of mineral oils used.

For the other 76 workers we carried out further research on oils, acquiring chemical data from producers or directly measuring possible presence of P.A.H. in samples of oils, before and after use. We found unpredicted presence of P.A.H. in the oils used by 65 of them.

Discussion

The results confirm that urinary 1hydroxypirene can be a useful marker of exposure to P.A.H. if misleading factors are considered.

Positive exams can emerge in workers not officially exposed according to information available from oil safety sheets, which are frequently not exhaustive.

We think urinary 1hydroxypirene should be used in occupational medicine to verify possible exposure to P.A.H., in workers known as exposed, but also as valid marker of possible unknown exposure to P.A.H..

QUANTIFICATION OF INFLAMMATORY MARKERS IN EXHALED BREATH CONDENSATE - IMPLICATIONS FOR FURTHER CONSIDERATIONS

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[ID 1245] - *No. 77 in Poster Area*

In occupational medicine biomarkers of exposure and effect in exhaled breath condensate (EBC) might be useful for exposure control and early detection of subclinical effects at workplace. Numerous studies reported differences in the concentration of inflammatory markers in pulmonary diseases like asthma, COPD or also upon occupational exposures. However, some results are contradictory. The most applied analytical method are commercially available enzyme immunoassays (EIA).

This study was initiated to assess the validity of eicosanoid determina-

tion in EBC by EIA compared to liquid chromatography method with mass spectrometric detection (LC/MS/MS). Three most often analysed parameters in EBC (leukotriene B4, prostaglandin E2, and 8-isoprostane-prostaglandin F2α) reported in literature were selected for this validity assessment. A total of twelve blinded samples with three concentrations of spiked and non-spiked breath condensate matrices were examined by both methods.
Leukotriene B4, analysed by EIA technique, revealed an overestimation of 600 to 830%, compared to the theoretical spiked amount. Prostaglandin E2 quantification by EIA caused an overestimation ranging from 160 to 270%. For 8-isoprostane-prostaglandin F2α the overestimation ranged from 670 to 880%. Determinations by LC/MS/MS were good in line with the theoretical spiked amount for leukotriene B4 and prostaglandin E2 but a slight overestimation up to 149% should be pointed out for for quantification of 8-isoprostane-prostaglandin F2α.
We concluded, that studies dealing with inflammatory parameters obtained by immunoassays should be reconsidered and interpreted more carefully. A further perspective will focus on a collaborative work applying EIA and LC/MS/MS improving the accuracy of EIA technique to exploit the advantages of this method and to elucidate possible new biomarkers in exhaled breath condensate.

S-ACETAMIDOMETHYL-MERCAPTURIC ACID (AMMA) FOR THE BIOLOGICAL MONITORING OF OCCUPATIONAL EXPOSURE TO N,N-DIMETHYLACETAMIDE.

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[ID 1305] - *No. 78 in Poster Area*

Professional exposure to N,N-dimethylacetamide (DMA) was investigated in a group of workers employed in an acrylic fiber manufacturing facility, whose job was to start up machinery. In the first phase of our study, concentrations of metabolites N-methylacetamide (NMA) and AMMA were measured in urine samples from 35 workers. Biological samples were collected before starting the work-shift, nearly halfway through the shift and at the end of the shift. Median concentrations of NMA and AMMA were respectively 2 and 8,6 mg/g creat. in the pre-shift, and 10,2 and 9,95 mg/g creatinine at the end of shift. In the second or third day at work, median urinary concentrations of NMA and AMMA were 9,8 and 35 mg/g creat. in the pre-shift and 14,4 and 27,8 mg/g creat. at the end of shift. Both metabolites increased during all the work-shifts ($p<0,001$). Concentrations of NMA and AMMA in urine at pre-shift were higher in the second or third day of collection than that in the first day of work (after to day at rest) ($p<0,001$). The efficacy of personal devices like gloves or active charcoal masks to reduce the intake of DMA were also investigated. In the second stage of the study we measured urinary concentration of NMA and AMMA from 17 workers who had a shower and a change of clothing at the end of shift. Median levels of metabolites increased during the work shift and during the three following workdays, but the reported preventive expedients cut down the dermal absorption of DMA. AMMA, with its quite slow urinary half-life (28 hours) seems a good marker for measuring weekly occupational exposure to DMA.

BIOLOGICAL MONITORING OF THE RECOVERY PHASE AFTER ACUTE LUNG DAMAGE DUE TO ACCIDENTAL EXPOSURE TO CHLORINE GAS IN A SWIMMING POOL

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[ID 1498] - *No. 79 in Poster Area*

Introduction: Acute chlorine inhalation has been documented in occupational and domestic environments. Exposure to chlorine gas results in a variety of dose-related lung effects ranging from respiratory mucous membrane irritation to pulmonary edema with acute respiratory failure, but few data are available on the pathobiology of lung damage underlying this intoxication. There have been no reports on application of non-invasive techniques in a real clinical scenario following acute exposure and poisoning to pneumotoxic substances.
Objectives: To assess lung function and potential lung damage pathways in the acute phase and longitudinally over a 15-month follow-up after chlorine exposure.
Methods: Ten previously-healthy subjects were accidentally exposed to chlorine gas at a swimming pool due an erroneous servicing procedure. Exhaled nitric oxide (FENO), exhaled breath condensate (EBC) compounds and serum Clara cell protein (CC16) were repeatedly measured.
Main results: In the acute phase, all patients had respiratory distress (one subject required mechanical ventilation) and reduced lung volumes (median and IQR: FVC 51% pred. [43-60], FEV1 51% pred. [46-60]). This was accompanied by low FENO (4.7 [3.9-7.9] ppb), high EBC leukotriene B4 (LTB-4) levels (24.4 [22.5-24.9] pg/mL) and increased CC16 (mean±SE 23.4±2.5 µg/L). Lung function returned to normal in 15 days (FVC 97% pred. [82-108] and FEV1 92% pred. [77-102]). FENO reached normal values after 2 months (12.6 ppb [11.4-15]), while LTB-4 levels were still increased (12 pg/mL [9.3-17.1]).
Conclusions: The severe pulmonary function derangement observed was associated with biochemical alterations consistent with the loss of epithelial integrity and an active neutrophilic inflammation. While lung function and FENO improved within a few weeks, the increased levels of exhaled LTB-4 persisted for several months. These findings shed new light on the pathobiology of chlorine-induced lung damage and may suggest new therapeutic implications for these patients.

URINARY BENZENE AND T,T, MUCONIC ACID EXCRETION AS BIOMARKERS OF LOW LEVEL OCCUPATIONAL EXPOSURE TO BENZENE

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[ID 1583] - *No. 80 in Poster Area*

Object. Measurement of urinary trans, trans muconic acid (T,t-MA) excretion is considered a reliable biomarker of occupational exposure to benzene, although diet might be an important contributor at low level occupational exposure. Monitoring urinary benzene requires technical precautions, and numerous non occupational sources of exposure might make it difficult using it as an indicator of low level occupational exposure. We measured pre-shift and end-shift urinary excretion of benzene and t,t-MA in two groups of workers with different levels of exposure to benzene. Methods. We monitored benzene exposure in 33 petrochemical workers and 26 military and civil personnel of the Italian Air Force, employed in refuelling helicopters and ground motorvehicles. All subjects provided an urine samples at the beginning and at the end of a workshift, during which benzene exposure was monitored with a passive personal sampler (Radiello). Urinary cotinine has been also assessed as a biomarker of tobacco smoking. Results. The median benzene exposure in petrochemical workers was 22.5 microg/m3 (interquartile (I.Q.) range: 11.9-47.5 microg/m3), while it was almost 4-fold lower among the Air Force personnel (median: 6.0 microg/m3; I.Q. range: 5.6-7.0 microg/m3). Compared to subjects with undetectable cotinine levels, both pre-shift urinary benzene and T,t-MA were increased among subjects with detectable urinary cotinine levels (cotinine lower than detection limit: urinary benzene median 129.5 ng/l, I.Q.range 103.7 – 242.2; T,t-MA: median 16.4 microg/gC I.Q. range 9.7 – 27.3; cotinine greater than detection limit: urinary benzene median 724.5 ng/l, I.Q.range 370.2 – 1550.7; T,t-MA: median 49.6 microg/gC, I.Q. range 19.1 – 74.1). Post shift benzene and T,t-MA were not related to workplace benzene exposure in the overall population, while urinary benzene ($r = 0.622$; $p <0.05$) but not T,t-MA showed a correlation among non smokers. Conclusion. Our results suggest that, once taking into account smoking effect, post shift urinary benzene is a more reliable biomarker of low level occupational exposure to benzene than T,t-MA excretion.

BIOLOGICAL MONITORING OF EXPOSURE TO N-HEXANE: URINARY FREE 2.5-HEXANEDIONE AS BIOMARKER OF LOW OCCUPATIONAL EXPOSURES

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[ID 1797] - *No. 81 in Poster Area*

For many years the biomarker utilized for biological monitoring of n-hexane occupational exposure has been total 2.5-hexanedione in urine samples at the end of the shift. Many studies in the literature confirm the relation between environmental and biological monitoring levels. In recent years (2003) the measurement of free 2.5-hexanedione as a biomarker of n-hexane has been adopted by ACGIH (BEI: 0.4 mg/l). In this study we investigated male workers exposed to low levels of n-hexane (exposure values ranged from 21,72 µg/m^3 to 497, 89 µg/m^3). In particular, we measured total 2.5-hexanedione in the urine of 374 workers and free 2.5-hexanedione in the urine of 64 workers. Urinary samples were collected at the end of the work shift. Determination of both biomarkers, total and free 2.5 hexanedione, has been performed by High Performance Liquid Chromatography (HPLC). The mean urinary excretion of total 2.5 hexanedione was similar to the one measured in general population. This result is likely to be due to low occupational exposure to n-hexane. Oppositely, the mean urinary excretion of free 2.5-hexanedione (0.28 mg/l) was higher than 50% of the current biological exposure index proposed by ACGIH, which corresponds to 47% of the mean value of total 2.5-hexanedione (0.60 mg/g creatinine). These data could not be explained by the low occupational exposure levels. The values ranged from 0.14 to 0.39 mg/l. In conclusion our data suggest that there is still a need to assess the stability of the free amount of urinary 2.5-hexanedione, which in the literature is known to be between 8 and 14% of the total amount. On the other side we observed that the utilized analytical method seems to be not adequately sensitive for the low occupational exposures to n-hexane. New methods of analysis of free amount of 2.5-hexanedione should be investigated (in particular LC-MS method).

FREQUENCIES OF CYP3A4*1B AND CYP3A5*1 VARIANT ALLELES IN AMERINDIAN POPULATION. IMPLICATIONS IN A MORE EFFICIENT BIOACTIVATION OF ENVIRONMENTAL AND OCCUPATIONAL XENOBIOTICS.

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[ID 1828] - *No. 82 in Poster Area*

The human CYP3A subfamily plays a dominant role in the metabolism of xenobiotics and most clinically used drugs. CYP3A expression is highly variable among individuals due to several factors, among which genetic polymorphisms seem to account for about 90% of the interindividual differences in hepatic CYP3A activity. In this regard, some allelic variants of the *CYP3A4* and *CYP3A5* genes have been associated to altered CYP3A enzyme activity. The most relevant include an SNP in the 5' promoter region of the gene, designated as *CYP3A4*1B*, and an SNP in the *CYP3A5* gene that consists of an A6986G transition within intron 3 (*CYP3A5*3*). This mutation creates alternative mRNA splicing. Our aim was to determine the frequencies of the allelic variants *CYP3A4*1B* and *CYP3A5*1* in an Amerindian population. Sixty individuals were analyzed for the presence of alleles *CYP3A4*1B*, *CYP3A4*1A*, *CYP3A5*1* and *CYP3A5*3*. The observed frequencies were 14.0% for *CYP3A4*1B* and 28.0% for *CYP3A5*1*, with a higher than expected frequency for haplotype *CYP3A4*1B/ CYP3A5*1* (23.33%) (p<0.001). The data suggest that, on average, the Ameridian population is subject to a higher risk of toxicity due to more efficient bioactivation of many environmental and occupational xenobiotics. An additional increased risk could also be related to drug consumption at doses that are standard for Caucasians. Occupational Physicians and Hygienists must be aware of these peculiarities, which could make individuals from certain population groups more prone to toxicity.

ENVIRONMENTAL AND BIOLOGICAL MONITORING OF EXPOSURE, EFFECT AND SUSCEPTIBILITY TO LOW CONCENTRATIONS OF BENZENE: PRELIMINARY RESULTS

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[ID 1905] - *No. 83 in Poster Area*

Benzene is an ubiquitous environmental pollutant and a genotoxic human carcinogen, causing aplastic anemia and myeloid leukemia in highly exposed workers. Exposure currently occurs both in the general environment, due to its presence in gasoline, and in several industrial processes. Myelotoxicity and carcinogenicity are due to bioactivation by liver cytochrome P450 (CYP 2E1) and glutathione transferases (GST) and by bone marrow myeloperoxidases. Concern for genotoxic/carcinogenic effects in humans from low level exposure is increasing. The present study investigated the effects of current occupational exposure to benzene by inhalation in three groups of workers: petrochemical industry operators (PIO), service stations attendants (SSA) and maintenance workers (SSM).A total of 248 subjects were examined, 174 PIO, 55 SSA, 19 SSM and 45 non exposed controls. Personal exposure to benzene was measured by personal diffusive samplers (Radiello®) worn at the breathing zone for the entire work shift. After desorption with CS2, samples were analyzed by FID-GC. End of shift t,t-muconic acid (MA) and S-phenylmercapturic acid (PMA) were measured in urine by HPLC/diode-array and immunochemical techniques, respectively. Comet test (CT), chromosomal aberrations (CA), proliferation index (PI) and GSH levels were measured in lymphocytes. Pheno- and genotyping of drug metabolizing enzymes in still underway.Exposure to benzene (SSA > SSM > PIO) was about ten fold higher in exposed workers (mean 44.7, range <3-593.5 µg/m3) than in controls (mean 6.6, range <3-16.3 µg/m3). A low but statistically significant correlation was observed between individual exposure to benzene and MA concentration in urine (r=0.31, p<0.001), the correlation slightly improving in non smokers (r=0.39, p<0.001). No statistically significant difference was observed between exposed and non exposed subjects as to MA or PMA urinary concentrations. These metabolites were higher in smokers. PMA and MA in urine were significantly correlated with each other. DNA damage was significantly higher in PIO and in SSA than in controls. A positive, statistically significant correlation was found, in all three groups, between benzene exposure and genotoxicity by CT (r=0.71, 0.51, and 0.52 in PIO, SSA and SSM, respectively), whereas a negative correlation was observed between DNA damage and either GSH in lymphocytes, or PMA in urine for SSA and PIO, but not for controls. As to CA or PI, no statistically significant exposure-dependent difference was found, whereas CA frequency was significantly correlated with the number of cigarettes smoked (r=0.39, p<0.02).In summary, the low occupational exposure to benzene observed in all groups showed some but no clear-cut correlation with a number of genotoxicity biomarkers, partly due to the confounding effect of smoking. Interestingly, DNA damage was inversely correlated with glutathione metabolism, suggesting that poor GST metabolizers may be at a higher risk. We are currently investigating this hypothesis.

OXIDATIVE STRESS IN SUBJECTS WITH SILICOSIS

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[ID 1930] - *No. 84 in Poster Area*

Objective: The aim of this study was to determine the oxidative stress and airways inflammation markers in subjects with silicosis. The formation of oxidants in macrophages and lung epithelial cells is supposed to be the key issue in the toxic effect of silica. Oxidative stress is probably a crucial event in the initiation of functional changes in fibroblasts contributing to pulmonary fibrosis. F2-isoprostanes are produced by the radical-catalyzed

lipid peroxidation of arachidonic acid and the measurement of the concentration of 8-isoprostane is valuable in quantification of oxidant stress in vivo. On the other hand, leukotrien B4 reflects the inflammation in the airways. Exhaled breath condensate is supposed to reflect the composition of bronchoalveolar extra cellular lining fluid. It enables to study non-invasively several parameters directly in the environment of the airways.
Methods: Thirty-two persons with silicosis were examined, mean age 67 years, previous exposure to silica 22 years on average. Control group was represented by 30 age-matched controls, without occupational history of silica exposure . Lung functions were measured; 8-isoprostane was analyzed by HPLC/MS, and leukotriene B4 by SPE . Student t-test and correlation coefficient were used for statistical comparison of the groups.
Results: Mean level of 8-isoprostane in silicotics and controls was 79±13 vs. 51±8 pg/ml ($p<0.01$). Mean level of leukotriene B4 was 31±4, v.s. 34±6 pg/ml. No influence of gender and age was seen. Increased levels of 8-isoprostane were seen also in subjects with simple silicosis, without pronounced compact fibrosis.
Conclusion: This is the first study to determine 8-isoprostane and leukotriene B4 in subjects in silicotics. The level of 8-isoprostane in exhaled breath condensate seems to be a sensitive marker of oxidative stress in silica-exposed subjects; it was elevated also in patients with simple silicosis. This finding is biologically plausible as silica particles persist in the lungs for decades. Normal level of leukotrien B4, which is usually increased in chronic bronchitis and in smokers, excludes the interference of airways inflammation in the patients.
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MONITORING PAH EXCRETION IN HUMANS BY SWEAT, SKIN AD URINE TESTING

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[ID 1691] - *No. 85 in Poster Area*

For many years, toxicologists have assessed the exposure to of Polycyclic Aromatic Hydrocarbons (PAHs) by determination of PAH metabolites in urine. In recent years, remarkable advances in sensitive analytical techniques have enabled the analysis of the urinary excretion of some unmetabolized PAHs in occupationally exposed workers. However, there are no references at all about the presence of PAHs in unconventional samples such as sweat or skin and very little is known about the excretion of unmodified PAHs in urine of environmentally exposed individuals. Here we describe the application of a simple device suitable for the collection of PAHs excreted at ultratrace levels in skin, sweat and in urine, for the monitoring of global exposure to PAHs. The device, consisting in a polyurethane foam chip (2-cm3 volume), was either worn in direct contact with the skin to get PAHs excreted in perspiration, or used to wipe the skin to collect the PAHs present onto its surface, or dipped into urine to extract PAHs. The collected PAHs were then determined by high-pressure liquid chromatography with fluorimetric detection, by means of a analytical method, previously proposed for quantitative analysis of unmetabolized PAHs in urine, that was adapted to suit also for PAHs in sweat and skin. The developed protocol was used to study the PAH content in sweat, skin, and urine samples of human volunteers (n=3). Observed urinary concentrations of different PAHs were: Phenanthrene, 20-40 ng/l; fluoranthene and pyrene, 4-15 ng/l; anthracene, Benzo[a]anthracene, chrysene, benzo[k]fluorene, 0.4-4 ng/l; benzo[a]pyrene, <0.1-0.6 ng/l. Wiping of neck skin gave: Phenanthrene, 20-95 pg/cm2; fluoranthene and pyrene, 10-15 pg/cm2; benzo[a]anthracene, chrysene, benzo[k]fluorene, 6-10 pg/cm2; benzo[a]pyrene, 1-4 pg/cm2.

TOXICOLOGY OF METALS

COMBINED TREATMENT WITH SUCCIMER AND VITAMIN C IN LEAD EXPOSURE – EXPERIMENTAL MODEL

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[ID 260] - *No. 86 in Poster Area*

Exposure to lead is still one of the important professional toxic exposures. Several chelating drugs are today available for treatment of lead intoxication, and methods for improving their efficacy and safety of application are current and interesting research topic.
The aim of this study was to evaluate whether vitamin C supplementation enhances the effectiveness of lead chelator succimer (meso-DMSA) in experimental rodent model. It has been suggested that ascorbic acid is a natural chelating agent capable of complexing lead, and role of ascorbic acid has been investigated in both lead-exposed humans and animals with contradictory results.
Forty female Wistar rats (6 weeks old) were orally (by gavage) exposed to lead as acetate at daily dose of 10 mg Pb/kg body weight during eight consecutive days. During lead exposure animals were by gavage receiving succimer at daily dose of 91 mg/kg body weight or/and vitamin C (L-ascorbic acid) at daily dose of 25 mg/kg body weight. There were four groups of ten animals: untreated (control), treated with vitamin C, treated with succimer, or treated with succimer and vitamin C. On the 9th experimental day animals were exsanguinated by cardiac puncture in ether narcosis. Concentrations of lead in the femur, liver, kidneys, brain and blood were analyzed by atomic absorption spectrometry (Varian AA-375, Australia). Results were analyzed by one-way ANOVA followed by planned comparisons (F test, level of significance of $P<0.05$).
Vitamin C did not reduce tissue lead in lead-exposed rats. Succimer treatment efficiently reduced lead in all analyzed tissues (by 33 to 70%) compared to untreated controls. Combined treatment with succimer and vitamin C, however, was not more efficient than treatment with succimer alone.
It is concluded that vitamin C supplementation has no beneficial effect on lead toxicokinetics and does not improve chelating properties of succimer in this experimental model.

REFERENCE VALUES FOR TRACE ELEMENTS IN HUMAN BLOOD AND URINE IN A NON-OCCUPATIONALLY EXPOSED POPULATION SOUTH AFRICA

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[ID 558] - *No. 87 in Poster Area*

Introduction: Elevated levels of occupational exposure to metals can lead to adverse health effects, it is therefore vital to estimate recent exposure at the workplace by measuring the metal levels in exposed patients. However, reference values of environmental exposure in the general, non-occupationally exposed population are needed for comparison with these occupationally exposed individuals. The NIOH in South Africa is currently using reference values established by the Health and Safety laboratory of the United Kingdom, yet it is widely accepted that trace element levels can vary greatly between countries, possibly reflecting the differences in environmental pollution and abundance of the elements in the earth's crust. It is therefore the responsibility of clinical laboratories to identify reliable reference values for the population in the region. No reference values exist for the Witwatersrand area or anywhere else in South Africa.
Aim: The aim of this study was to establish reference values for trace elements in a non-occupationally exposed population consisting of volunteers residing in the Witwatersrand. The following trace metals were measured: aluminium, antimony, arsenic, beryllium, cadmium, chromium, cobalt, copper, iron, lead, manganese, mercury, molybdenum, nickel, platinum group, selenium, silver, thallium, tin, tungsten, vanadium and zinc.
Methods: A cross-sectional survey was conducted on 200 office workers, employed in a electricity supplying company, who would not have had any known occupational exposure to metals Blood and urine samples were collected and a questionnaire was administered to collect informa-

tion concerning characteristics and habits that might influence the background dose of the stipulated metals.
Results: Reference ranges were defined for each trace element, using appropriate methods, and compared to the UK values currently used by the NIOH. The results will be presented at the conference.
Conclusion: South Africa developed their local reference values for assessment of occupationally exposed individuals.

ASSOCIATION BETWEEN BLOOD LEAD LEVEL AND BLOOD PRESSURE AMONG ABORIGINALS AND NON-ABORIGINALS IN CENTRAL TAIWAN

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[ID 583] - *No. 88 in Poster Area*

Objective: The causal relationship between blood lead level (BLL) and blood pressure is not clear. The purpose of this study was to measure BLL and blood pressure among aboriginals and non-aboriginals in Hsin-yi County in central Taiwan.
Methods: A community-based survey which included demographic data, life habits, medical history, and blood chemistry analyses was conducted among 2565 adults during an annual health examination. BLLs were analyzed using a graphite furnace atomic absorption spectrometer. Aboriginals comprised 51.4% of the population, of whom 97.5% were from the Bunnun tribe.
Results: The mean of the BLL was 5.38 (range =2.7-15.6 μg/dl). BLL was significantly higher among aboriginals compared to non-aboriginals for males and females. BLLs were classified into high, medium and low levels. There was a dose response among non-aboriginals (high BLL odds ratio = 2.97, compared to low BLL). Multiple linear regression model was used to determine the factors affecting systolic and diastolic pressures after adjustment for age, gender, ethnic group, alcohol consumption and body mass index (BMI). BLL positively correlated with both systolic (0.85mmHg/μg/dl) and diastolic (0.48mmHg/μg/dl) pressures.
Conclusion: BLL was higher among aboriginals compared to non-aboriginals. BLL was significantly correlated with blood pressure, particularly systolic pressure. The authors postulate that the mechanism may involve renal dysfunction. Further research is needed to elucidate the causal relationships between BLL and blood pressure.

BLOOD LEAD LEVELS: A CORRELATION WITH RENAL DYSFUNCTION AND HYPERURICEMIA

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[ID 584] - *No. 89 in Poster Area*

The objective of this study was to assess the correlation between blood lead levels (BLL) with both renal dysfunction and hyperuricemia in both ethnic groups. 1318 aboriginals and 1247 non-aboriginals over 40 years of age (45.8% of the county residents) volunteered for this study. During routine health examinations at a health station, blood samples were taken and a questionnaire was administered. Male blood uric acid (BUA) concentration (7.2mg/dl) was higher than for females (5.9mg/dl). BUA concentration among aboriginals was higher (6.9mg/dl) than among non-aboriginals (5.9mg/dl). A test for trend of odds ratio (OR) for renal dysfunction and hyperuricemia indicated a significant correlation with BLL for both ethnic groups. Multiple logistic regression showed BLLs exceeding 7.5 ug/dl were at higher risk for renal dysfunction (OR=1.92) and hyperuricemia (OR=2.72). We concluded that BLL was significantly correlated with renal dysfunction and hyperuricemia in both ethnic groups. Further research is needed to investigate the exact mechanism causing a higher incidence of related disease among aboriginal Taiwanese.

LEAD CONTAMINATED WATER INDUCES ON WISTAR RATS KIDNEY DAMAGE

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[ID 1113] - *No. 90 in Poster Area*

Lead is the most abundant toxic heavy metal, which is found naturally in the environment as well as in manufactured products, such as waste oil and solid waste incineration, iron and steel production, battery and lead alkyl manufacturing. Exposure occurs from lead's presence in air, food, water, soil, dust fall, paint, and other materials. Lead is readily absorbed by the body via the primary routes of entry, inhalation and ingestion. Some drinking water pipes, taps, solder and other plumbing components contain lead. Lead in the plumbing may leach into water and pose a health risk when consumed.
The aim of our study is to evaluate the effects of chronic lead intoxication on kidney. To perform the study we used 20 Wistar rats housed in groups of ten, they were fed with ad libitum with standard feed and had free access to water. They also maintained under standard conditions of humidity, temperature and 12 hours light/darkness cycle. The animals were acclimatized for a week before the commencement of the study. The principles of laboratory animal care were also followed in this study. Group one was the control group, and group two was submitted to 25mg of lead acetate in drinking water.
After two months the animals were sacrificed and the kidney collected to histology studies. The kidney show tubular necrosis and a discrete interstitial fibrosis. We believe that more studies should be performed but that lead in short quantities and for long time will cause kidney damage.

BIOMARKERS IN EXHALED BREATH CONDENSATE OF CHROME-PLATING WORKERS

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[ID 1257] - *No. 91 in Poster Area*

Hexavalent chromium [Cr(VI)] is corrosive, cytotoxic, carcinogenic and can induce acute and chronic pulmonary toxic effects. The present study was aimed at measuring total and hexavalent chromium levels in exhaled breath condensate (EBC) of chrome-plating workers, and to assess their relationship with EBC biomarkers of inflammation.
EBC and urine were collected in 24 chrome-plating workers before and after the work shift on Friday and before the shift of the following Monday. Total Cr was determined by ETAAS. Cr(VI) levels were measured in EBC in a subgroup of subjects (n =10), whose exposure levels were assessed using personal samplers. Hydrogen peroxide (H_2O_2) and malondialdehyde (MDA) were measured by luminescence and tandem LC-MS/MS, respectively.
In exposed workers, EBC Cr levels increased from the pre-shift [5.3 μg/l] to the post-shift sample [6.4 μg/l]. On Monday morning pre-exposure levels were the lowest [2.8 μg/l]. A similar trend was observed for EBC H_2O_2 levels which on Friday rose from 0.36 μM to 0.59 μM after exposure, and was reduced to 0.19 μM on Monday morning. EBC MDA levels were also higher on Friday afternoon (9.7 nM) compared to pre-shift levels (8.2 nM) and Monday morning levels (6.6 nM). EBC Cr correlated both with EBC H_2O_2 ($r=0.54$, $p<0.01$) and EBC MDA ($r=0.59$, $p<0.01$). EBC Cr was correlated with urinary Cr ($r=0.25$, $p<0.05$).
Kinetic data showed that airborne Cr(VI) were reduced by 50% in epithelial lining fluid sampled at the end of exposure and that a further reduction by 50% required about 15 h.
This study demonstrates that EBC is a suitable matrix to assess target tissue dose and early effects of pneumotoxic elements. Novel insights can be obtained about kinetics and dynamics of Cr and can contribute to open new approaches to the study of toxicology of transition elements.

LEAD INTOXICATION IN A SECOND MELTING FACILITY

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[ID 1405] - *No. 92 in Poster Area*

Lead intoxication remains a significant occupational health concern in our environment, being primarily caused by the processes of assembly, restoration, and recycling of automotive batteries. This paper presents preliminary research data collected from an automotive battery board recycling facility in greater Belo Horizonte, Minas Gerais, Brazil, and points out inappropriate workplace conditions, the large number of intoxicated workers, and the difficulty in providing proper healthcare to ill workers.

The facility was initially visited for researching workplace processes and identifying all risks posed to workers' health. A bibliographical review was conducted, followed by examination of the facility's workers' medical records from their visits to the Worker Health State Reference Center, CREST/MG, division of the clinical hospital of the Federal University of Minas Gerais.

In the facility under review, lead is recycled from the automotive battery boards, which are melted to produce lead slabs. Practically all workers performed the same activities. Between 1987 and 2005, 17 workers from this facility visited the CREST/MG. All facility workers were subject to a clinical occupational anamnesis, physical examinations, and complementary examinations from a specific protocol.

This paper also analyzes the precarious workplace conditions in a second lead melting facility, causing the intoxication of all facility workers. Intoxicated workers are still under medical review. Using the maximum biological value for seric lead, according to the brazilian law, is not appropriate for all workers, and this value must be revised, since all symptoms that characterize lead intoxication were also observed in patients with seric lead values within biologic tolerance.

ALTERED SERUM CYTOKINE LEVELS IN MICE CHRONICALLY EXPOSED TO LEAD ACETATE

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[ID 1437] - *No. 93 in Poster Area*

Lead (Pb), a widely toxicant, has been shown to exert toxic effects during early development. Furthermore a number of studies documented that the Pb exerts immunotoxic effects on T lymphocytes.

One day after mating 6 female Swiss mice were administered six different diets containing Pb acetate (0.02, 0.06, 0.11, 0.2, 40 and 400 ppm). During lactation the mothers received the same feed given during pregnancy and the same diets were given to the offsprings (n=72; 12 for each group) after weaning for nine months. During the experiment, air Pb level was determined in the environment where the mice were caged. At the end of exposure, blood Pb level was determined in all the animals to provide a biological exposure index, and possible changes in two type-1 cytokines (IL-2, INF-γ) and one type-2 cytokine (IL-4) in the serum were measured.

At higher levels (40 and 400 ppm) a significant increase in IL-4 production was associated with a decrease in IFN-g production, while at lower level (0.02 ppm) we observed an increased IFN-g production with a significant decrease in IL-4 production.

The results we obtained by exposing Swiss mice to lead acetate enable us to claim that the nature of dose-response relationships for the parameters taken into consideration in this study is of the non threshold linear type.

Our results not only challenge current investigations about the nature of the dose-response relationship in the low dose zone, but also indicate the need to assess the entire dose-response continuum in order to conduct a more definitive risk assessment as well as to derive an improved evolutionary understanding of the role of background levels of Pb in organismal biology.

THE ROLE OF CELL CYCLE CONTROL CORRELATIVE GENE PROTEIN IN ARSENISM CAUSED BY BURNING COAL CONTAIN ARSENIC

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[ID 1648] - *No. 94 in Poster Area*

Arsenism has been all over the world and also become one of the urgent public health problem. Since an animal model for the carcinogenicity of arsenic has never been developed, its mechanism related to chronic poisoning and especially to carcinoma is not clear. The purpose of this study was to study the mechanisms of arsenism especially resulting in skin carcinoma caused by burning coal contain arsenic. 70 skin samples from arsenism patients caused by burning coal contain arsenic were included and according to the pathological diagnosis, they were divided into carcinoma group (A group), precancerous lesions group (B group), hyperkeratosis group (C group) and general pathological changes group (D group). The expressions of cell cycle control correlative gene P16、P21 and cyclinD1 proteins in skins from arsenism patient were detected by immunohistochemistry assay. Following the increasing pathologic change in skin, the positive cell density and percentage of P16 were gradually decreased, but these of P21 and cyclinD1 were gradually increased. Expressions of P16 protein in A, B and C groups were lower than D and the control groups ($P<0.05$,$P<0.01$). Expressions of P21 protein in all pathological groups were higher than the control ($P<0.05$,$P<0.01$), expressions of cyclinD1 protein in A、B and C groups were higher the D group and the control ($P<0.05$,$P<0.01$). It has been demonstrated that P16、P21 and cyclinD1 may related to cause skin carcinoma and may play a significant role in the development of arsenism and skin hyperkeratosis may be earlier stage of carcinoma. Dynamic monitoring of expressions of P16、P21 and cyclinD1 proteins may be useful for early detecting and treatment and prognostic judgment of skin carcinoma caused by arsenic.

CATALYTIC OR STOICHIOMETRIC OXIDATIVE STRESS: THE DIFFERENT BEHAVIOUR OF THIOL-BINDING HEAVY METALS UNVEILED BY MASS SPECTROMETRY.

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[ID 1668] - *No. 95 in Poster Area*

Chronic overexposure to heavy metals through occupational, environmental and alimentary sources is able to exert toxic effects on several bodily systems and organs. In particular, metal-induced oxidative stress is a key process in metal toxicity, ultimately leading to impairment of crucial cellular processes and to cell death. Recent evidence shows the critical role of the conjugates of some heavy metals with bio-thiols in the transport of the metals across cellular boundaries.

We have recently performed systematic mass spectrometric studies on several compounds of structure R_1S-M-SR_2 (M= mercury, cadmium, lead; R_1 and R_2 = glutathione and other biological thiols) and were able to relate the differences in the gas-phase fragmentation behaviour of the metal conjugates to those of the chemical properties of the metals, which latter determine their biochemical or toxic behaviour. Fragmentation across the metal-sulfur and sulfur-carbon bonds yields key fragments which do not only allow to characterize molecular structure, but also to highlight the potential of the individual metals to induce oxidative stress by catalytic or stoichiometric mechanism. Easy formation of RS-M^+ fragments, which in turn release the metal in the neutral oxidation state yielding the RS^+ sulfenium cations, is only observed for mercury, but not for cadmium and lead, due to their higher electrochemical reduction potential. This gas-phase process corresponds to a solution-phase cycling of mercury from the 2+ oxidation state to the elemental one, coupled to catalytic oxidation of glutathione to glutathione disulfide. On the contrary, cadmium and lead can only react with stoichiometric amounts of glutathione.

The presented results stress the value of mass spectrometry not only as a microanalytical technique for environmental and biological monitoring, but mainly as a powerful tool to investigate the toxic mechanism of the different metals from the point of view of their transport forms within biological systems.

LEAD IN BLOOD AND CHROMIUM IN URINE LEVELS IN ACTIVE WORKING NON OCCUPATIONALLY EXPOSED POPULATION IN MONTEVIDEO – URUGUAY

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[ID 1832] - *No. 96 in Poster Area*

Introduction

Lead and chromium are metals widely used in different industry processes.

Their emissions as well as those from combustion of lead-containing automobile exhausts are important sources of environmental contamination.
Montevideo harbors several lead emitting industries and has antecedents of chromium in industrial effluents, some of them within or bordering residential neighborhoods or heavily populated areas. The research team hypothesis is that blood lead levels (B-Pb) found in its population and chromium urine levels (U-Cr) might be originated by this metals environmental pollution.
Recent changes of additives in fuels used in Uruguay – 2004 – from leaded to unleaded gasoline made us to carry out this study simultaneously with this changeover.

Aims

The aim of this study is to assess B-Pb and U-Cr levels of active working non occupationally exposed population living in Montevideo and their relationships with the different associated parameters studied. Additionally, we analyzed gasoline samples taken during the period before and after unleaded gasoline has been commercialized.

Materials & Methods

Study population consists of 700 subjects of working age between 20-64 years, living in Montevideo and non occupationally exposed to lead neither to chromium. The home addresses were included in 5 zones previously divided according to population density, traffic intensity, industrial areas processing the studied metals, climate factors among others.
Exclusion-inclusion factors where established together with sampling conditions and analytical methods to be utilized.
All samples were analyzed by Atomic Absorption Spectrometry in the Laboratory at Faculty of Chemistry with the suitable QA/QC.

Results

The lead contents in our gasoline samples has been decreasing since it was phase out from 193 ppm in 2003 to less than 10 ppm in 2005.
The active working population, showed an average of B-Pb of 5.45 µg/dL, range 1.0-24 µg/dL and we found no significant differences among the selected 5 zones of Montevideo
In the case of U-Cr, the preliminary results showed an average value of 0,6 µg/gr creatine (range 0,3-3,7 µg/g creatine

Discussion

The background values in late 90' for lead in blood in Uruguayan general population was B-Pb 10 mg/dL and there were not background levels for general population U-Cr levels

Preliminary Conclusions

The obtained results to both metals are within the acceptable range in reference with international acceptable levels.
The changes of additives in fuels could be the reason of decreasing the B-Pb reference values for non occupationally exposed population in Uruguay

TOXICOLOGY OF SOLVENTS

OXIDATIVE DAMAGE TO RAT TESTES DNA BY 2-BROMOPROPANE

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[ID 135] - *No. 97 in Poster Area*

Bromopropane induced DNA damage in rat primary spermatogenic cells according to a comet assay (single cell gel electrophoresis). However, the cause of such DNA damage as observed in the comet assay remains unknown. We investigated whether the damage induced by 2-boromopropane is due to oxidative stress or apoptosis. Either 5 or 12 day-old Wistar rat were subcutaneously injected with 2-bromopropane at a dose of 1, 5, 10g/kg body weight for 5 continuous days. As a negative control, the rats were injected with olive oil, and as a positive control, zearalenone 5mg/kg, a known apoptosis inducer, was injected once at 12hr before sacrifice. The testes and liver were then excised on the day after the last injection, and then the DNA was extracted using phenol method. For evaluating oxidative stress, DNA was hydrolyzed and 8-hydroxydeoxyguanosine (8-OHdG) was measured with ELISA (8-OHdG Check, Japan Institute of the Control of Aging). DNA fragmentation was checked as a ladder pattern using electrophoresis. In either 5 or 12 day-old rats, the 8-OHdG in the testes DNA was found to increase due to bromopropane exposure. In the rats exposed with 10g/kg bromopropane, the 8-OHdG levels were 4-5 times more than that in the controls. However, no oxidative damage was seen in the liver DNA. The fragmentation of DNA after undergoing electrophoresis was only seen in the rats treated with zearalenone, but it was not seen in the bromopropane treated rats. In this study, 2-bromopropane was found to induce oxidative stress damage in the testes. However, we could not rule out the possibility that apoptosis occurred in the rat testes due to the administration of 2-bromopropane.

COMPARISON OF BENZENE EXPOSURE IN DRIVERS AND PETROL STATION WORKERS BY URINARY TRANS,TRANS-MUCONIC ACID IN WEST OF IRAN

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[ID 499] - *No. 98 in Poster Area*

Motor vehicle traffic is the main emission sources of benzene. In order to compare the benzene exposure and urinary levels of trans,trans-muconic acid (t,t-MA) in taxi drivers and petrol stations workers.
The benzene in air was analyzed with a gas chromatography equipped with a Flame Ionization Detector. t,t-MA was extracted from urine and analyzed with high performance liquid chromatography. Separation of the compounds was achieved with glass packing column with highly resolution and no interferences were happen.
The mean concentration of benzene in breathing zone of drivers and petrol station workers were 0.31 and 1.40 respectively and mean value of urinary t,t-MA in the group of drivers, petrol station workers and control group were 0.31, 2.64 and 0.17 mg/g creatinine. The significant differences in the levels of urinary t,t-MA were found in drivers and petrol station workers compared to the control group ($p<0.005$). The correlation coefficients between benzene in air and t,t-MA for petrol station workers and drivers were 0.65, 0.30 respectively. The concentration of benzene in breathing zone of petrol station workers was 2-3 times higher than drivers and also 3 times greater than the threshold level (0.5 ppm) recommended by the American Conference of Governmental Industrial Hygienists (ACGIH). The lowest benzene concentration at which urinary t,t-MA increased to a measurable level was approximately 0.2 ppm.
In conclusion our results was showed high hydrocarbons levels emitted in petrol stations at Iran. t,t-MA could separate the exposed to benzene from the non-exposed when benzene in breathing zone of subjects was greater than 0.2 ppm.

MASS POISONING WITH CREOSOTE

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[ID 1378] - *No. 99 in Poster Area*

The creosote is a mixture of many chemicals such as polycyclic aromatic hydrocarbons (known as PAHs), phenol, and cresols wich it is utilized in preservation of wood and particularly for wooden railroad ties treatment to confer more resistance to the migration of humidity.
We report a mass poisoning involving 34 dockworkers among 57 loaded for dumping of wooden railroad treated with creosote and belonging to the morning and past midday teams saving the members of the night team.
The mean age of these victims is 26,1 years with furthest ranging from 19 years to 38 years and oldness furthest ranging from 3 to 20 years.
Through the medical interview, we deduct that is the first episode and the clinical manifestations were characterized by the appearance 12 to 24 hours later in whole workers of digestive troubles such us stomach pain, diarrhoea and nausea followed by skin damage in 90% of them with erythema, pruritus and burns localized essentially on uncovered areas but also on tunk and associated with oculary, ORL and bronchial irritating manifestations in less than a half of workers.
Among the 34 victims, 6 had complementary investigations because of the severity of their clinical manifestations.
Also, the poisoning by creosote vapors was promoted by the climate (high temperature) and non adequate occupational clothes.
The evolution after discharge (4 days) and symptomatic treatment was favourable with decrease of clinical manifestations.
The post office study had confirm that signs and symptoms of toxicity were in relation with inhalation of creosote vapours.
The greasy look of railroad ties and the creosote depot in the bottom of the tank bring to mind that railroad ties were recently treated by this substance.

OCCUPATIONAL AND ENVIRONMENTAL SKIN DISEASE

MATRIX METALLOPROTEINASES AND THEIR INHIBITORS: NEW BIOMARKERS FOR RISK ASSESSMENT OF OCCUPATIONAL EXPOSURE TO METALS.

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[ID 329] - *No. 100 in Poster Area*

The identification of potential damage due to chemical exposure in the workplace is a major health and regulatory concern. An alternative to the widespread use of experimental animals could have a crucial impact on risk assessment, especially for the preliminary screening of new molecules.
We developed an in vitro model for the screening of potential toxic compounds.
Human keratinocytes (HaCat) were used as target cells while matrix metalloproteinases (MMPs) were selected as responders, developing in vitro model of contact dermatitis. Chemical exposure was performed using potassium dichromate and nickel sulphate as positive testers, main etiological agents of contact dermatitis. Nickel contact induced upregulation of MMP-2 and IL-8 mRNA production. Low nickel concentrations still exherted molecular alterations without evident cellular phenotypic changes. MMP-9 accumulation was found in the medium of treated cells with respect to controls. When using chromium as sensitizer, we observed quite different results. Chromium exposure at sub-lethal concentrations (10-5 and 10-7 M) down-regulated MMP-2 mRNA production. This unexpected result could be correlated to the precocious (6h) over-expression of TIMP-1 mRNA. Both metals, even at the lowest employed concentration (10-7 M), raised TIMP-1 showing a molecular activation even without apparent phenotypic changes after a prolonged exposure time. These results could be explained as a survival response of cells that escape metal induced apoptosis through the anti-apoptotic effects of TIMP-1.
In conclusion, the use of MMPs and their inhibitors as biomarkers, can help to predict cellular behaviour with potential contact allergens and it could be useful for defining new threshold limits for risk assessment in the occupational exposure to toxic chemicals.

ANAPHYLAXIS AND ALLERGIC CONTACT URTICARIA FROM OCCUPATIONAL AIRBORNE EXPOSURE TO HBTU

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[ID 475] - *No. 101 in Poster Area*

Background: HBTU (*o*-(benzotriazol-1-yl)-N,N,N',N'-tetramethyluronium hexafluorophosphate) is a widely used chemical for solid and solution phase peptide synthesis. Previously, two cases of immediate allergic reactions and one case of allergic contact dermatitis have been reported from exposure to HBTU.
Case report: A 28-year-old man worked at a university laboratory which synthetized peptides. His work tasks included weighing the substances which were in the powder form. He did neither use respiratory mask nor protective gloves.
He had had atopic dermatitis in his childhood and had allergic rhinitis to birch pollen. Two years earlier, exercise-induced asthma had been diagnosed.
One year earlier, when weighing HBTU, he experienced redness and burning sensation on his face associated with dyspnoea and faintness. He contacted immediately the occupational health centre (OHC), and one minute later, the physician observed the skin symptoms; lung auscultation was normal. He received antihistamine medication orally. After six months, when weighing large amounts of HBTU, the patient experienced again redness on his face, cough, and dyspnoea. A few minutes later, he also felt dizziness. At the OHC, the physician observed superficial respiration, and urticaria on his face and on the flexures of his extremities; the palms of his hands were also swollen. There was no laryngeal oedema, but the patient felt faint. He received intramuscular corticosteroid and peroral antihistamine medication.
Investigations at FIOH: Skin prick tests (SPT) showed allergic reactions to common environmental allergens. SPT with HBTU at concentration 0.1% in a water solution gave a positive reaction. A skin provocation test with a concentration 1% showed during 20 min observation time one urticaria wheal.
Conclusions: HBTU should be handled with precaution, using proper protective devices.

IMMEDIATE ALLERGY TO CHLORHEXIDINE

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[ID 483] - *No. 102 in Poster Area*

Background: Chlorhexidine is a widely used antiseptic and preservative in medical care and cosmetic products. There are numerous reports of anaphylaxis in surgical operations and other medical procedures, usually due to the application of chlorhexidine to wounds or mucous membranes. We wanted to clarify the clinical relevance of a positive skin prick test (SPT) reaction to chlorhexidine.
Methods: We studied the case records of the patients with a positive chlorhexidine SPT, and performed an open application test and tests for specific IgE.
Results: We found 33 patients with a positive SPT to chlorhexidine. 10 of them had had generalized or severe symptoms from chlorhexidine, and 10 had had milder local symptoms. 13 patients had not had any symptoms consistent with immediate chlorhexidine allergy. The size of the SPT reaction was mainly in line with the strength of the symptoms. Small 3-4 mm reactions were often without obvious clinical relevance. Open application of 5% chlorhexidine was negative in all 13 of our patients who were tested. Specific IgE could be demonstrated in 6 patients out of 14 tested by the ImmunoCAP™ method.
Conclusions: Besides anaphylaxis and other generalized attacks, the clinical spectrum of immediate chlorhexidine hypersensitivity includes many patients with relatively mild local symptoms. These patients are not extremely rare and possibly at risk for more serious events. We recommend a SPT to be routinely performed when symptoms during medical interventional procedures, e.g. local and general anaesthesia, are investigated. Skin irritation from chlorhexidine-containing products may be due to immediate allergy.

INTRODUCTION OF AN OCCUPATIONAL SKIN-CARE MANAGMENT STUDY

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[ID 1248] - *No. 103 in Poster Area*

Background:
With regard to the increasing number of occupational skin diseases in Austria and the high amount of protective creams used to prevent occupational skin diseases, the efficacy of the suggested prevention measures still needs to be proved. The presently used occupational skin protection plan is based on laboratory data. Thus, we started an occupational skin protection plan project in May 2004 in order to investigate whether current suggested prevention measures are useful. It is a controlled clinical study in terms of a field test.
Methods:
1000 dermatological inconspicuous subjects from two different occupational industries (building structure and wood industry) are were randomised into four groups (A, B, C, D. each group: n = 250 subjects). The following interventions are planned for the groups: Group A, B and C obtains a skin cleaning agent. Group D gets no other treatment. Group C obtains additionally a skin care crème, group B obtains additionally a skin protection crème. Group A additionally obtainsed additionally both: skin care and skin protection crème.
In addition to an occupational and dermatological history we test the transepidermal waterloos (TEWL) and an experienced dermatologist examines the skin. All subjects will be examined subsequently after 3 months, in 6 months and in 1 year. Any skin changes will be documented thereby and with the occurrence of an eczema the subject will be excluded from this the present study.
Aim:
There are two aims of the present study. The aim of this study is to investigate whether current suggestedFirstly we investigate whether occupational skin management measures are preventively effective; secondly and

if whether there is any need for this plan.
Oder einfach nur: The objective of the present study is to examine, which group is the best effective measurement in terms of skin protection.
Temporary results:
Finally we included 1033 subjects (n = 517 from the building structure and n = 516 from the wood industry). First analysis give interesting results. In the building structure group we analysed in the first follow up the average TEWL results withwas 37,38 g/hm2 at survey 1, and decreased significantly to which was less in the next follow up with 34,45 g/hm2.at the second followp-up survey. This result shows a significant difference between the 2 follow ups. Same Significance was shown in the wood area. The average TEWL results improveddreceased also from 42,8 g/hm2 at survey 1 to 32,7 g/hm2 at survey 2.. More detailed results will be presented in Milan, especially the differences in between Groups A-D.

PERIPHERAL BLOOD LYMPHOCYTE APOPTOSIS IN OCCUPATIONAL CONTACT DERMATITIS

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[ID 1355] - *No. 104 in Poster Area*

Several lines of evidence suggest the contribution of dysregulated T cells apoptosis in pathogenesis of allergic contact dermatitis.
In this study we demonstrate the changes in T cells apoptosis in Cr, Ni, Co-related occupational allergic contact dermatitis (ACD).
For the current study 30 ACD patients and 20 healthy donors were selected.
For the assesment of T cells apoptosis flow cytometric Annexin-V/7-AAD assay with simultaneous CD3 immunofenotyping was performed. Number of T cells undergoing spontaneous apoptosis after 5 hours of incubation in PBS at 37C was determined. Obtained data was analyzed with statistcal methods including Mann-Whitney nonparametric test to check the difference between groups compared.
Significant difference in levels of T cell apoptosis (on average 3,96% in ACD group compared to 2,93% in control) were found (confidence interval 0,05).
This study demonstates the increase of spontaneous T cell apoptosis levels in patients with occupational ACD.
The apoptosis increase may be related to activated state of T cells in ACD, and reflect their involvement in ACD development and persistence.

CUTTING FLUIDS AND OCCUPATIONAL ALLERGIC CONTACT DERMATITIS (ACD): NICKEL AND CHROMIUM CONTENT DETERMINATION AS POSSIBLE CAUSE.

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[ID 1807] - *No. 105 in Poster Area*

OBJECT: to evaluate if, in metalworkers with cutting-fluid ACD, the concentration of nickel and chromium into the cutting fluids reaches such levels normally expected for sensitisation to occur.
MATERIALS AND METHODS: 45 subjects with cutting-fluid ACD underwent patch-test with Italian standardized SIDAPA 2005 series, cutting fluid series and with own oils. Metals in oil samples, both original clean and used, of patients who showed positive test to nickel and chromium were determined by graphite furnace atomic absorption spectrophotometry.
RESULTS: among the patients who demonstrated relevant positive results, nickel and chromium, the most common sensitizers, were positive in 7/16 workers (43.7%). In 12 oil samples, the concentration of nickel and chromium was always below 1 ppm, which is considered to be the threshold for allergic reactivity to these transition metals.
CONCLUSIONS: these results revealed that the concentrations of nickel and chromium in oil samples of metalworkers sensitised to these metals and with cutting-fluid ACD were below the estimated sensitization and eliciting threshold levels. The data seem to confirm the hypothesis that the irritant effect of the cutting fluid not only damages the skin but also allows for easier percutaneous absorption of allergens, with sensitization subsequently occurring. Our preliminary findings suggest great caution in evaluating the relevance of the allergic patch-test reactions to metals, such as nickel, in patients with cutting-fluid ACD.

EVOLUTION OF THE CLINICAL PICTURES OF OCCUPATIONAL DERMATITIS DIAGNOSED BY THE INSTITUTE OF OCCUPATIONAL HEALTH OF THE UNIVERSITY OF BRESCIA IN THE PERIOD 2000-2004

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[ID 1822] - *No. 106 in Poster Area*

Introduction
Recent data show that the occupational dermatitis (OD) represent a high proportion (about 25%) of the occupational diseases.
Aim
In this study, 192 patients with OD, observed in the period 2000-2004, have been considered evaluating the evolution of the clinical pictures, in the relation to atopy, etiology, pathogenesis, therapy and removal (or persistence) from exposure to the etiological agents and use of individual prevention devices.
Methods
All the subjects were examined in our Institute and after a period of at least one year they were contacted and telephonic interviews were made by occupational physicians. For this purpose a specific questionnaire was prepared.
Results and conclusion
Among the 192 subjects affected by OD, the clinical picture more frequently observed was allergic contact dermatitis/ACD (112 subjects, 59,4%); atopy was present in 12,5% of workers with OD.
The working areas at higher risk were: metal working (65 cases); health service (27 cases); hairdressing (23 cases); building trade (23 cases); use and production of resins such as glues, paints, plastics (18 cases).
The main ACD etiological agents were metals, typical components of hair dyes, rubber additives and essences.
130 patients on 192 (62,7%) answered the telephonic interview.
Excluding 21 subjects having ceased every type of job, only 27% of workers with OD changed their tasks after the diagnosis of OD, while 56% of them was still exposed. Among these workers, 56% declared a complete recovery after the use of protective personal devices generally in association with environmental prevention measures and/or therapy.
Among the 36 workers not anymore exposed to the etiological agents, but still working, 6 declared a persistence, or only an improvement, of the clinical picture.
21,9% of workers still exposed and symptomatic declared periods of sick leave due to worsening or relapses of the dermatitis having an average duration of 50 days in the last 12 months and 28% of the workers was forced to change type of activity.

HEALTHY LIVING AND HEALTHY WORKING: HEALTH PROTECTION AND PROMOTION

RESPIRATORY AND HEARING PROBLEMS AMONG WET AND DRY MILL WORKERS IN A MARKET IN IBADAN ,NIGERIA

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[ID 133] - *No. 107 in Poster Area*

Introduction
Workers in small scale industries constitute about 70% of the working population in Nigeria. Mill workers are engaged in wet milling of vegetables or dry milling of grains. The study sought to describe the health problems of these workers.
Method
Mill workers in a large market in Ibadan were recruited for this study after securing the consent of their trade union. Workers were informed about the procedures of the study and participation was voluntary upon verbal consent. Each worker was interviewed using a questionnaire to provide information about work conditions and health problems associated with work. Noise level measurements were carried out and audiograms were done on all participants.
Results
A total of 120 mill workers participated in the study; 65 males and 55 females with a mean age of 41years. Eighty-four respondents (70%) were operators of dry mills and 32 (27%) operated wet mills. Health problems reported were headaches (73%), low back pain (53%) and other musculo skeletal pain (83%). Rhinitis (63%), cough (37%) and wheezing (13%) were also reported.

Noise levels in the mills ranged from 88-105dbB. Twenty eight percent of the population reported hearing difficulty and 20% had tinnitus. These findings were compared to the reports of the audiograms.

Conclusion

The preponderance of respiratory symptoms is probably due to irritants like pepper and onions in wet milling and allergens in grain in dry milling. Hearing protection is recommended for these workers. The provision of occupational health services to these groups of workers continues to be a challenge in the practice of Occupational Health in Nigeria.

EFFECT OF LIFESTYLE MODIFICATION ON FEELING OF FATIGUE: INVOLVEMENT OF OXIDATIVE STRESS IN REDUCTION OF FATIGUE

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[ID 137] - *No. 108 in Poster Area*

Introduction

It is suggested that oxidative stress has a role in the generation of chronic fatigue syndrome. There are many reports that oxidative stress is reduced by lifestyle modification consisting of aerobic exercise and/or diet, and it is generally thought that feeling of fatigue is relieved by exercise. However, relationship between fatigue and oxidative stress remains unknown. The aim of this study is to evaluate the effect of lifestyle modification on feeling of fatigue and oxidative stress, and to analyze the involvement of oxidative stress in the reduction of feeling of fatigue.

Methods

Lifestyle modification program consisting of exercise and diet was conducted for 12 weeks. The data before and after the intervention from 247 workers were obtained. The subjects were asked to fill out questionnaires about recovery from fatigue by sleep, General Health Questionnaires (GHQ) or the index for mental health, subjective symptoms, and lifestyle. Plasma TBARS, an index of oxidative stress, was measured by fluorescence method. To evaluate the effect of lifestyle modification, Wilcoxon's test was used. For analyzing whether change in oxidative stress contributed to the reduction of feeling of fatigue, logistic regression analysis was employed.

Results

1. Effect of lifestyle modification on feeling of fatigue and oxidative stress

In addition to the ameliorations of total cholesterol, blood pressure, body mass index (BMI), maximum oxygen consumption, GHQ, lifestyle, and subjective symptoms, the reductions of feeling of fatigue and plasma TBARS were shown by the participation in this program.

2.Relationship between oxidative stress and feeling of fatigue

The decrease in plasma TBARS independently contributed to the reduction of feeling of fatigue even after adjusted for the other variables, which might contribute to fatiguability.

Conclusion

Reduction of feeling of fatigue by lifestyle modification program consisting of aerobic exercise and diet was probably attained by the decrease in oxidative stress.

OBSTRACLES IN MANAGEMENT HEALTH AND SAFETY AT WORK

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[ID 228] - *No. 109 in Poster Area*

Aim: To assess the effect of modernization of the aluminium production on physical and chemical health hazards at work environment in aluminium production. The modernization included introduction of automatic equipment, computerized management, and rationalized coke manipulation in Anoda, Electrolysis, and Cast House plants.

Methods: Periodical measurements of chemical (gas concentrations and aerosols) and physical (microclimatic factors, noise, and illumination) agents were performed in the work environment at the same workplaces by using the same methods of measurement before (1982-1988) and after the modernization (2004). The measured values were compared with the recommended Occupational Safety and Health Standards.

Results: The number of workplaces with a high noise level was reduced from 65.0% (89/137) in 1982-1988 to 28.7% (51/178) in 2004. The best results were achieved in Cast House plant. The illumination of the workplace was partially improved. Values of microclimatic factors did not considerably change; they deviated from the recommended values at nearly all the workplaces in the factory. The concentrations of chemical agents were above the recommended standards in 56.3% (196/348) of the samples in 1982-1988, and in only 15.4% (99/645) of the samples tested in 2004. High concentrations of hydrogen fluoride have remained the primary pollutant in Electrolysis plant.

Conclusion The modernization of the factory has considerably reduced the amount of harmful chemical agents that workers are exposed to. However, the exposure to unfavorable physical factors has been only partially reduced.

FOCUS GROUPS ON ANAEMIA IN WOMEN WORKERS: IMPLICATIONS FOR PRACTICE

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[ID 282] - *No. 110 in Poster Area*

OBJECTIVE: Determine women workers' perceptions about Iron deficiency anaemia (IDA) prevention and behaviour change.

METHODS: A discussion guide was developed from the BASNEF Model (Theory of Reasoned Action and enabling factors). The Data was analysed inductively looking at relationships from the theoretical models. Fourteen groups consisting of 6 to 9 women workers participated in this focus group discussion study.

RESULTS: First the women workers believe that anaemia prevention is important because it would influence their ability to perform their double functions. Second, they mentioned that by eating nutritious food, anaemia can be prevented, and they linked it to leafy green vegetables, since obtaining haem iron from meat and its products was economically difficult. The problems of increasing iron food intake are also related to the subjective norm of the Indonesian community and enabling factors. Since their family incomes are low, the availability of food at home is limited. As a wife and mother, the women workers prioritise their children and husband regarding food at home. In addition, the factory canteen service fell far short of compensating for the family food shortage, because of the low quality and quantity of the food provided.

CONCLUSIONS: Efforts need to be directed towards providing education and skill building for IDA prevention, based on better understanding of women's cultural beliefs and life style. The factory canteen service seems to be a key point towards the adoption and maintenance of iron rich food eating project.

HEALTH PROMOTION IN THE WORKPLACE: EFFECTS OF A LOW SATURATED FAT CONTENT DIET ON PLASMA CHOLESTEROL IN OIL REFINERY WORKERS

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[ID 441] - *No. 111 in Poster Area*

Worksites are considered to be a key channel for the delivery of interventions to reduce chronic disease, like cardiovascular disorders. Saturated and trans-fatty acids raise total cholesterol and LDL-cholesterol and are known to increase the risk of ischemic heart disease, while dietary unsaturated fatty acids play important roles in maintaining cardiovascular health. Replacing saturated fats with unsaturated fats in the diet often involves many complex dietary changes.

In 2003-2004, the Occupational Medicine Service of an oil refinery in Marche, in agreement with the Company Mass Service, promoted the introduction of a low-fat, low saturated fat content, rich in fruit, vegetable and fish. Analysis of the meals consumed showed that each worker took on average 12 meals monthly at the mass (range 1-18). The diet was illustrated to all workers in a series of meetings; the new dishes were always highlighted in the mass room.

The eating habits of all workers were seen to be broadly based on the Mediterranean diet. Total cholesterol measured in 339 male workers (age range 25-60 years; body mass index 25-28) before and after the introduction of the diet were not significantly different (203.56 ±43.37 *vs.* 202.33 ±44.73 mg/dl). Subdivision according to the number of meals consumed at the mass showed a non-significant reduction in plasma cholesterol in workers who had taken > 9 mass meals. There were 197 (58%) workers with hypercholesterolemia (231.32 ±33.96 mg/dl) before the introduction of the new diet (cut-off: 200 mg/dl). Assessment at one year demonstrated a significant ($P<0.001$) reduction in values in all 197 workers (220.11

±41.43 mg/dl). A negative correlation (r=-0.55) was also observed between number of monthly meals consumed at the mass and plasma cholesterol measured in 2004.
The introduction of a diet with these characteristics appears to be able to reduce plasma cholesterol.

EFFECTS OF DIETARY EXTRA-VIRGIN OLIVE OIL SUPPLEMENTATION AT TWO LOW DIFFERENT DOSES ON THE LIPIDIC PROFILE IN A GROUP OF HYPERCHOLESTEROLEMIC HEALTH CARE WORKERS

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[ID 529] - *No. 112 in Poster Area*

A randomized single blind trial was conducted to compare the effects of daily addition to the standard diet of two different amounts of extra-virgin olive oil on the blood lipid profile in 34 health care workers with mildly hypercholesterolemia (mean ± SD: 235 ± 28 mg/dl). Subjects were randomly assigned to receive 2 grams (group A - 17 subjects) or 4 grams (group B – 17 subjects) of extra-virgin olive oil for three months. Plasmatic concentrations of total cholesterol, triglycerides, LDL cholesterol, HDL cholesterol, apoproteins A1 and B were assessed at baseline and after three months. In the group B, but not in the group A, a significant reduction of Apo B values (7%, $p<0.05$) was observed; triglycerides concentrations showed a trend to be reduced ($p<0.07$) and Apo A1 values a trend to increase ($p<0.08$). Moreover group B was divided into a subgroup of 9 subjects over 45 years of age and in a subgroup of 8 subjects under 45 years. In this latter group tryglicerides ($p<0.05$) and Apo B ($p<0.07$) levels were found to be reduced while concentration of Apo A1 levels was significantly ($p<0.05$)increased. Furthermore, in 10 subjects of the group B with BMI values under 25, LDL and Apo B decreased significantly (8% and 10%, respectively, $p<0.05$), while Apo A1 increased (16%, $p<0.06$) compared to the baseline values. The present study suggests that daily intake of at least 4 grams of extra-virgin olive oil in moderately hypercholesterolemic health care workers is associated to favourable changes on the plasmatic apolipoprotein profile. These changes are more evident in younger subjects with normal BMI values.

CURRENT STATE AND PROBLEM OF ELDERLY PERSON'S LIFE STYLE

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[ID 636] - *No. 113 in Poster Area*

Aim: This study aimed to make it clear the relationship between life style and carotid atherosclerosis detected by high-resolution ultrasonography, resulting in being useful for health promotion. Subjects & Method: The subjects in this study were 22 men and 54 women aged 50 to 70 years sampled from the residents of Niimi, a rural city located in the north of Okayama prefecture in Japan, whose population over 65 years old accounts for about 30% and main industry is agriculture and forestry, which might cause high incidence of hypertension or cardiovascular diseases in this area. There mean age was 63.09(SD5.37) for men 62.20(SD5.92) years for women. Asymptomatic carotid lesions were detected by high-resolution ultrasonography. In addition to the measurement of height, weight, body fat ratio, waist circumference and hip circumference, questionnaire with respect to life style were performed. The extent of carotid atherosclerosis was divided into 4 categories, as follows; normal, slight, mild, severe. In analysis, the 2 categories of normal and slight were defined as "normal group" and those of mild and severe were defined as "abnormal group". Results: Among the subjects, 69 subjects (90.8%) belong to normal group and 7 subjects (9.2%) belong to abnormal group. There were significant difference in the 2 groups for the items of questionnaire. One contents of the item was "a greasy thing not being caught too much". Another one was everyday life activities (going out is used as the walk or the bicycle – if you walk and it is the distance for 15 minutes, he or she is walking). Conclusions: There were significant relationships between carotid atherosclerosis and some life style items in questionnaire. These items might be potential key item for health promotion.

TIME USE AND INTERRUPTIONS IN THE WORK OF SHELTER COUNSELLORS

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[ID 654] - *No. 114 in Poster Area*

Multitasking can be a problem in the helping professions. Responding to a request from women's shelters, we examined interruptions to the work of counsellors, during over 150 hours of observation in 11 shelters. Counsellors were also interviewed, and 130 completed a short questionnaire on time use.
Counsellors spent 48% of their time talking with victims of violence or with colleagues, 14% record keeping, 13% other communications, 8% administration; 6% housekeeping, 5% rest breaks, 4% safety. Only 5% of total time was spent in structured interviews, and counsellors found this insufficient. Rest breaks were fewer than the legal requirement.
The median duration of all activities was about two minutes, due to interruptions. If more than one counsellor was present, there were fewer interruptions from residents or their children, but just as many total interruptions since other counsellors interrupted in order to share experiences, to ask for advice, and to give information. This created a circular situation where the counsellors felt overloaded and unable to wait to share information, for fear of forgetting it, so they interrupted, helping to create that feeling of overload.
We compared the percentage of total time occupied by an activity with the percentage of interruptions occurring during that activity. Record-keeping was most disproportionately interrupted (14% of total time cf. 29% of interruptions). Some proposals for limiting interruptions were not perceived as helpful, because they conflicted with ideals of empowerment, solidarity and equality. Counsellors resisted the idea of limiting their availability to respond to residents or each other. We conclude that interruptions arise from the nature of women's service work in responding to human needs in real time. Solutions proposed include re-designing the daily log, rethinking records, structuring oral transmission of information, changes to office design and staffing procedures, more training and regular rest breaks.

IS SMOKING A RISK OF DEVELOPMENT OF HYPERTENSION? : A LONGITUDINAL STUDY

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[ID 660] - *No. 115 in Poster Area*

Chronic influence of smoking on blood pressure is still controversial, although smoking acutely raises blood pressure. Cross-sectional studies on the incidence of hypertension and smoking were reported, but there are a few reports on the longitudinal study on the influence of smoking on development of hypertension. In the present study, we investigated the chronic influence of smoking on development of hypertension. We analyzed a risk of high blood pressure development of smoking for 7-years. Among 4,222 subjects who underwent a regular health checkup in 1996 in the health care center, we followed 1,443 men over 30 years-old until 2004; Hypertensive subjects or receiving treatment for hypertension were excluded. We measured blood pressure, BMI and checked a family history of hypertension, habits of drinking, exercise, and smoking. We also checked smoking status including quitting smoking at the end of the observation during a follow-up period. We analyzed the influence of smoking on development of hypertension by logistic regression and adjusted for age, SBP, a drinking habit, an exercise habit, and a family history of hypertension at baseline and change of BMI. Among 837 men in the smoking group, 319 men in the nonsmoking group, and 215 men in the ex-smoking group, the incidence of hypertension was 22.5%, 24.8%, 24.7%, respectively. The risk of the development of high blood pressure of a smoking group against a non-smoking group was not statistically different (Odds ratio: 0.81, 95% CI: 0.49-1.32). The risk of the development of hypertension of the ex-smoking group against the nonsmoking group was not statistically different (Odds ratio: 0.89, 95% CI: 0.55-1.42). Multivariate analysis results suggest that age, change of BMI, and SBP were the risk factor of the onset of hypertension, but the smoking was not a significant risk factor of development of hypertension.

EFFECTS OF FOOTBATH ON AUTONOMIC NERVOUS SYSTEM, LEUKOCYTE SUBSETS AND NATURAL KILLER CELL CYTOTOXICITY

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[ID 665] - *No. 116 in Poster Area*

Objectives: Footbath has long been used for the relief of fatigue, common cold and minor symptoms and it has been known that footbath can influence human body and the mind. This study was designed to investigate the effect of footbath on autonomic nerve and immune functions.
Methods: Ten healthy female subjects (21-24 years of age) volunteered to participate in the present study. They experienced three different tests on the three different days; only sitting without soaking their feet (Control), a footbath with soaking their feet in hot water at 42°C(FB), and a footbath with soaking their feet in hot water at 42°C with air-bubble and vibration given to the sole of the feet (B+V) for 10 min. Autonomic functions were evaluated by measuring electrocardiogram (ECG) and skin blood flow (BF) of sural region and spectral analysis of heart rate variability. As immune function, leukocytes subsets and lymphocytes subsets were measured three times; before, immediately and at 60 min after footbath, using flow cytometric analysis. Cytotoxicity of natural killer (NK) cells against K562 was determined by europium-release assay.
Results and Discussion: BF increased significantly during B+V, but returned to the before level immediately after the end of the footbath. In spectral analysis, high frequency component (HFC) increased and a ratio of low frequency component/HFC decreased following usual footbath or B+V, indicating increased parasympathetic and decreased sympathetic nervous systems. A number of lymphocytes and NK cells cytotoxicity increased significantly after B+V. These results suggested that footbath might induce physiological relaxed condition in autonomic nervous system. Furthermore, footbath with air-bubble and vibration increased NK cells cytotoxicity according to an increase in parasympathetic nervous system. We thought that footbath with mechanical stimulation would be an efficacious method in physical improvement.

THE IMPORTANCE OF FASTING BLOOD GLUCOSE ANALYSES IN RAILROAD WORKERS

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[ID 805] - *No. 117 in Poster Area*

The fasting blood glucose (FBG) estimation plays a significant role in diagnosis of incipient phases of diabetes mellitus.
The aim of the study was to analyze FBG in railroad workers who directly participate in railroad traffic, to register impaired fasting glucose (IFG) and clinical diabetes mellitus (DM) and to offer further steps of DM prevention.
Examination included 265 workers (average age of 40.9 ± 8.4 years) which participated in periodical check up. According to two glycaemia values in two different days and National guide of clinical practice for DM, the values of glycaemia ≥ 6.1 mmol/l - < 7.0 mmol/l was considered as IFG, while diagnosis of DM was established for the values of glycaemia ≥ 7.0 mmol/l associated with typical symptoms of diabetes, or oral glucose tolerance test (OGTT) was recommended.
The values of FBG ≥ 6.1 mmol/l were registered in 94 (35.5%) workers, from which 57 (21.5%) with IFG and 16 (6.04%) with DM. OGTT was recommended in 21 (7.93%) workers. The largest number of examinees with FBG ≥ 6.1 mmol/l were engineer 16 (6.04%, IFG 4.91%), then operators of a switching engine 14 (5.28%, IFG 4.53%) and train dispatchers 12 (4.53%, IFG 3.77%). According to age the most common was group of 40 - 49 years, 46 (17.4%).
The results showed impaired fasting glucose and diabetes mellitus in a significant percent of railroad workers who directly participate in railway traffic. These facts require further research and monitoring as well as intensive effort on health education and promottion.

MEASURES FOR MENTAL HEALTH IN JAPANESE ENTERPRISES

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[ID 832] - *No. 118 in Poster Area*

In Japan patients with depression are increasing. Mental health of workers, especially for employees with depression, becomes more and more important. We surveyed efforts of companies for mental health.
(Methods)
A questionnaire asking about mental health was sent to all enterprises with over 50 employees. In these enterprises, at least one registered industry physician works for employees' health.
(Results)
361 out of 3433 enterprises replied to the questionnaire. 49.3% of them had no mental health education. 54.6% had windows for consultation. 10.5% of them were performed by psychiatrists and 15.0% of them were performed by counselors. 15.2% of them thought troubles on mental issues were individual problems. 16.1% of them had no measures on stresses in cases of lay off. 19.7% of them did not consider superiors had some responsibility to employees' mental troubles.
In a company, workers recovered from mental troubles were working as advisors for mental health. In another case, a card was used to inform recovering from mental trouble.
(Discussion)
Even now mental troubles are thought to be quite different from other diseases in Japan. Many people thought that mental troubles are very difficult to recover. It makes difficult to discuss about mental health. This is one of reasons for too small number of replies. In spite of increasing necessity for mental health, measures against it have not yet been developed. Also they are thought to be mainly by individual problems and supporting system has not yet been improved. Disclosing their status of mental troubles is difficult considering protection of personal data.
(Conclusion)
Effective mental health system should be developed.

POTENTIALITY OF "BODY –TALK" AS A METHOD OF RELAXATION

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[ID 890] - *No. 119 in Poster Area*

Introduction: Relaxation is one of basically stress management. In the present study, we adopted, the "Body-Talk" ("B-T") as a relaxation method. The method was established by Akira Masuda in 1985 and consists of 4 components: vocalization and breathing (as a main role), natural posture, human relations, and free expression, and is carried out by gently shaking inside a body and voicing simultaneously. It is said that any body is able to practice anytime and anywhere. Some people who have experienced the "B-T" say that the "B-T" can definitely make them relaxed. However there are few evidences. Therefore, we will examine the "B-T" effects. Subjects and method: the 20 workers who were participating the sessions and agreed the survey. And we measured their blood pressure, pulse rates and subjective symptoms by self-administrated questionnaires. And compared those data before and after the session in 2001.6. Results and conclusion: Blood pressure did not change. There were significant differences in these pulse rates. Average of pulse rate was come down. (Before: 80.4/min, after: 71.8/min) Also, three symptoms were improved. : Stiff shoulder, neck and backache. These findings that vocalization by shaking were concerned the autonomic nerve system. The "B-T" may be an effective way to promote relaxation. Then, we will explore the substantiation of the "Body-Talk" continue.

STOP SMOKING AT WORK - A STOP SMOKING PROGRAM ON THE WEB

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[ID 921] - *No. 120 in Poster Area*

Background: Much effort is provided in our society to reduce the number of tobacco smokers. This is also an issue for the working life, to reduce morbidity and sickness absence in the companies. Different types of stop smoking programs are used. Often major resources are needed to run these. In Norway every 3rd employee between 25 and 66 years has access to e-mail and web pages at work. This creates new possibilities.
Aim: The aim was to introduce an alternative way to stop smoking, by use of personal computers at work, and to test it out in three different companies.
Methods and results: The Norwegian Cancer Society developed a web-based stop smoking program in cooperation with the Swedish equivalent "Pepp"(made by Dr. H.Giljam). As a pilot study, the program is now being tested out for a one year period in three companies; an oil-company (land based workers), an assurance company and a hospital, totally 6900 employees. The employers allowed smoking employees to use a part of their working time to use the stop smoking program. The program was introduced in the companies by e-mail, in cooperation with the managing director, the Working Environment Committee and the Occupational Health Service. When entering the program the participants are asked questions about their background, and their answers are used for a "tailored" day-to-day guidance during the program, in addition to general recommendations. Further, the program consists of e-mail contacts and additional questionnaires for improving the individual advises given. The participants can quit the program whenever they want. After six months, 296 participants had joined the program, from all the three companies, with both sexes and all age groups represented. Success in smoke cessation will be evaluated after one year.
Conclusion: It is possible to create and use a web-based stop smoking program in different companies.

THE ROLES OF NURSES OF THE ON-SITE HEALTHCARE UNITS IN HEALTH EDUCATION AND PROMOTION ACTIVITIES IN THE WORKPLACE IN TAIWAN

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[ID 1083] - *No. 121 in Poster Area*

According to the regulations in Taiwan, business establishments with 300 employees or more or 100 employees or more engaged in hazardous tasks should have on-site healthcare unit. Each such unit is required to have at least one nurse, and health education and promotion is one of the main functions as defined by the regulations. We conducted a nationwide survey to evaluate the involvement of these nurses in health education and promotion in the workplace. All the nurses are required to register to the Department of Health (DOH) to practice in Taiwan. According to the list provided by the DOH, a questionnaire was mailed to each nurse practicing in on-site health-care unit, and telephone interviews were performed if necessary. The questionnaire included questions of the characteristics of the establishment, the personal data of the nurse, the proposal and decision making on health promotion programs, and health promotion programs in the workplace. Among the 615 nurses listed by DOH, 86 have left the job without replacements. Among the rest, 296 (56%) responded, and most of them (89%) were full-time employees. Whereas many of them were involved in the proposal (70%) and decision making (61%), a substantial proportion were not involved at all. The other key person in health promotion was the safety personnel, with 14% taking full charge of making proposal and 14% taking full charge in making decisions. The most common programs were periodical health check-ups (64% of the establishments), followed by education programs on healthy diet (46%) and weight control (40%). Whereas most nurses were full-time employees, a substantial proportion were not involved in the proposal or decision making of health promotion programs in the workplace. A more active role is encouraged to make a better use of this profession in the health education and promotion activities among workers.

GUIDELINES FOR ALCOHOL AND DRUG ABUSE PREVENTION PROGRAMMES IN FINNISH WORKPLACES

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[ID 1256] - *No. 122 in Poster Area*

The consumption of alcohol amongst the Finnish population has increased during the past 30 years. Only in 2004 the consumption increased by 10 % due to legislative changes.
Finland hasn't had severe problems with drug abuse but especially in the late 1990s it seemed that also the use of drugs were increasing.
Prevention of abuse was set at high priority by the Finnish Health Authorities as well as by the representatives for working life. The high consumption was seen not only as a national health problem but also as a problem for the workplaces in terms of sickness absenteeism, increasing risks for accidents, low production and quality problems.
The Act on Protection of Privacy in Working Life came into force in 2004. The law was prepared in collaboration with the Ministry of Labour and the representatives for the employers and employees. The law lays down provisions on, amongst others, the performance of tests and examinations on employees including drug tests. The law also states that companies performing drug tests should have a programme for abuse prevention.
The group for Work Place Illicit Substance Abuse (representing both employers, employees and OH professionals) at The Centre for Occupational Safety decided to give out guidelines for the programmes.
The main guidelines are:

- The program shall be made in collaboration with the representatives of employers and employees
- Main emphasis is on prevention
- Part of the work ability and well-being policy at the companies
- General information about alcohol and drugs and their impact on health
- Education of key persons
- Instructions on how to manage abuse problems
- Access to care
- Impact on terms of employment

The Centre for Occupational Safety has published a guide for setting up the programmes and is providing courses for all the working life partners.

ANALYSIS OF FACTORS ASSOCIATED WITH SICKNESS ABSENCE IN JAPANESE WORKPLACE

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[ID 1446] - *No. 123 in Poster Area*

Purpose: We conducted a work-site study to elucidate interrelationships between Japanese worker's profiles in both current (1998) and past (1993) and sickness absence (1998). Subjects and Method: Subjects were 9,111 male employees in a large telecommunication telephone company, aged 30 to 59 (the mean age 46.3±6.7 years), who had health check-up in the fiscal year both 1993 and 1998. We assessed proportion of sickness absences of 1 week or longer during the fiscal year 1998, according to age 3 groups (30-39 years, 40-49 years, 50-59 years), by lifestyle, medical findings and present illness surveyed in 1998 and 1993. We used the Structural Equation Modeling (SEM) to elucidate interrelationships in these factors considering the confounding. Results: Among 7 present illnesses, heart disease (coefficient value in SEM: 0.12) significantly associated with sickness absence in 1998 most highly, and followed by respiratory disease, liver disease, diabetes and gastro-duodenal ulcer. In lifestyle, coefficients of sleeping duration, drinking, and meals' regularity were significantly negative. In present illness, all coefficients were found significant. Heart disease (coefficient value in SEM: 0.19) associated significantly with sickness absence in 1998 most highly, and followed by hypertension, respiratory disease, diabetes, liver disease, gastro-duodenal ulcer and hyperuricemia. In lifestyle, coefficients of smoking and physical inactivity were significantly positive. Conclusion: We could quantificate "strength of association (coefficients)" of these profiles, and this may contribute to conduct appropriate primary prevention of sickness absence in Japanese worksite.

EVALUATION OF A WORKPLACE HEALTH PROMOTION PROGRAM FOR IMPROVING CARDIOCASCULAR DISEASE RISK FACTORS

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[ID 1457] - *No. 124 in Poster Area*

Introduction

Health problems related to lifestyle have become prominent and the importance of workplace health promotion (WHP) is becoming recognized. In Japan, WHP has begun to receive attention as a way to prevent karoshi (death due to overwork), which is most likely to occur among workers having cardiovascular disease. This study was conducted to evaluate a health promotion program for improving employees' cardiovascular disease risk factors.

Methods

The subjects were male employees working for a manufacturing company in Tokyo who satisfied the two criteria: (1) At least one abnormality was detected in body mass index (BMI), systolic blood pressure (SBP), diastolic blood pressure (DBP), total cholesterol, HDL cholesterol, triglyceride, or blood glucose. (2) No medication was needed for the abnormality. This study employed quasi-experimental design. The intervention group consisted of 32 employees who agreed to participate in the WHP program, and the control group consisted of 43 employees who did not agree. The main program consisted of education on nutrition, physical activity, and cardiovascular risk factors through individual counseling for 30 minutes by health nurses. The follow-up program consisted of telephone counseling by health nurses, which was conducted 3 months after the main program. Comparison of changes of indicators between the intervention group and the control group was conducted using Student's t test. Evaluation was conducted 3 months after the follow-up.

Results and Discussion

Changes in total cholesterol from baseline were significantly greater in the intervention group than in the control group 3 months after the follow-up (-25.7 mg/de vs. –8.9 mg/dl, $p<0.05$). There were no significant differences between the two groups in the changes in body weight, BMI, SBP, DBP, HDL cholesterol, triglyceride, and blood glucose. This program showed a partial effectiveness, but the improvement of the program is considered to be needed to get more comprehensive effectiveness.

HEALTH PROMOTION IN THE WORKPLACE: EFFECTS OF A LOW SATURATED FAT CONTENT DIET ON PLASMA CHOLESTEROL IN OIL REFINERY WORKERS

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[ID 1571] - *No. 125 in Poster Area*

Worksites are considered to be a key channel for the delivery of interventions to reduce chronic disease, like cardiovascular disorders. Saturated and trans-fatty acids raise total cholesterol and LDL-cholesterol and are known to increase the risk of ischemic heart disease, while dietary unsaturated fatty acids play important roles in maintaining cardiovascular health. Replacing saturated fats with unsaturated fats in the diet often involves many complex dietary changes.

In 2003-2004, the Occupational Medicine Service of an oil refinery in Marche, in agreement with the Company Mass Service, promoted the introduction of a low-fat, low saturated fat content, rich in fruit, vegetable and fish. Analysis of the meals consumed showed that each worker took on average 12 meals monthly at the mass (range 1-18). The diet was illustrated to all workers in a series of meetings; the new dishes were always highlighted in the mass room.

The eating habits of all workers were seen to be broadly based on the Mediterranean diet. Total cholesterol measured in 339 male workers (age range 25-60 years; body mass index 25-28) before and after the introduction of the diet were not significantly different (203.56 ±43.37 *vs.* 202.33 ±44.73 mg/dl). Subdivision according to the number of meals consumed at the mass showed a non-significant reduction in plasma cholesterol in workers who had taken > 9 mass meals. There were 197 (58%) workers with hypercholesterolemia (231.32 ±33.96 mg/dl) before the introduction of the new diet (cut-off: 200 mg/dl). Assessment at one year demonstrated a significant ($P<0.001$) reduction in values in all 197 workers (220.11 ±41.43 mg/dl). A negative correlation ($r=-0.55$) was also observed between number of monthly meals consumed at the mass and plasma cholesterol measured in 2004.

The introduction of a diet with these characteristics appears to be able to reduce plasma cholesterol.

ASPECTS OF HEALTH AT OVERWEIGHT AND OBESE PERSONS IN SOME WORKPLACES

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[ID 1642] - *No. 126 in Poster Area*

Obesity, one of the oldest metabolic dysfunction, it is an important problem of health in our days, especially by cardiovascular risk, but also its associations and psychosocial impact. Obesity is a result of many factors.

In Romania, prevalence of obesity is assess to 20%, and overweight to 53%.

The purpose of this study was to put in evidence the link between the nutrition status (overweight and obesity), its complications and the workplace. The fields of activity which we studied were: the heavy industry, the chemical industry, the food sector and the office activity.

The group which we studied was formed by 700 working people with the medium age 42.65 years. The report in between sexes was females/men: 155/349. We took into consideration: hereditary factor, the nutritional condition through the body mass index (kg/m^2) (WHO), the complications as cardio-vascular diseases, diabetes mellitus, osteoarthritis, gallbladder disorders, the lipid profile, the inflammatory profile, glycaemia, the eating habits, and the workplace. As favoring factors linked with the workplace we find the type and intensity of work, physical and chemical noxious, the program of work. The favoring factor is different for each sector. Obesity and hypertension have a synergic influence upon the cardiac function.

In our study, the occurrence of cardio-vascular diseases (especially, hypertension) is more frequent (58%) follows by the osteoarthritis (27%), gallbladder (8%) and diabetes mellitus (7%). The occurrence of hypertension is more frequent at the obese workers from the food sector (40.12%) and the ones exposed to paints (40%) and lacquers as they eat mire and have less physical activity and less neuropsychological demands.

The hereditary factor is not statistically significant at the above mentioned categories.

We noticed that people consume more bread, pasta and animal lipids and less fruits, vegetables and they drink less water.

Some workplaces through their activity and the presence of noxious have an influence upon the nutrition and cardio-vascular condition of the workers.

RESILIENCE FACTORS AGAINST STRESS: THE SENSE OF COHERENCE

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[ID 1799] - *No. 127 in Poster Area*

From several years our team is performing scientific research in the field of occupational stress. Our focus, specifically, is to identify resilience factors, or 'salutogenic' factors against the pathological effects of stress. These factors can help subjects to face both psychological and physical stressors as they reduce their pathogenic nature. Moreover salutogenic factors may turn sources of stress in agents of health promotion. Several investigations in last decade have outlined that the most relevant factor in the moderation of the effect of stress on psycho-physiological health and broadly on personal well-being is sense dimension (Reker & Chamberlain, 2001).

The present study focuses on the dimension of sense of coherence: a global orientation that expresses the extent to which one has a pervasive enduring though dynamic feeling of confidence that life is comprehensible, manageable and meaningful (Antonovsky,1987).

We will present results from a study performed at the Department of Evaluation and Management of Occupational Stress, at the San Gerardo Hospital, on a population of workers affected by cardiovascular disease. The main aim of the study is to verify the existence of a relationship between the level of sense of coherence – measured with the administration of the sense of coherence questionnaire (Antonovsky, 1993) – and perceived health status – measured with the administration of the GHQ12 questionnaire – and psychological well-being – measured with the administration of MMPI, an inventory of personality –.

First analyses show the existence of a positive relationship between assumed resilience factor – the sense of coherence – and psychological well-being.

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DETECTION OF CARDIOVASCULAR RISK FACTORS FROM THE HEALTH SURVEILLANCE MEDICAL RECORDS OF BANK WORKERS FOR HEALTH PROMOTION PROGRAM PLANNING

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[ID 1808] - ***No. 128 in Poster Area***

Introduction

Cardiovascular diseases are the leading cause of death and disability in the western society, being responsible for a high social and economic cost to the individuals and the community. Health promotion programs at the workplace have proven to be extremely powerful and cost-effective tools for the identification and control of cardiovascular risk factors in the working population. Their planning and execution in bank workers is particularly desirable due to the characteristics of the bank jobs.

Aim

To analyse the possibility of detection of cardiovascular risk-factors from health surveillance medical records of bank employees periodically examined because of their frequent use of video display units.

Methods

Personal health history, lifestyle information and basic medical data were collected from the health records of 1104 employees of an Italian bank who were under periodical health surveillance due to their job as video display unit users for more than 20 hours per week.

Results

The studied population consisted of 659 (60%) males and 445 (40%) females with an overall average age of 43 years. Among all the subjects, 257 (24%) were smokers; 305 (30%) were in overweight (BMI>25), 87 (8%) were obese (BMI>30). Arterial hypertension affected 116 (10%) subjects, dis-lipidemia 30 (3%), diabetes mellitus 19 (2%), cardiac ischemic disease 11 (1%). Some subjects suffered from more than one of the above listed conditions.

The detection of metabolic disorders only based on personal history in the absence of blood chemistry testing resulted to be inaccurate and unreliable. Other important missing data included the physical exercise habits.

Conclusions

Since only anamnestic data were collected, the results showed a lower than expected prevalence of cardiovascular risk factors if compared with the general population. To properly plan cardiovascular health promotion programs, periodical health surveillance, for whatever occupational risk factor established, should also include selective blood tests and specific questionnaire surveys on physical exercise habits.

Such a protocol of medical examination would enable an adequate assessment of the individual risk factors and a proper planning of specific health promotion programmes.

HEALTH PROMOTION IN THE JOINT-STOCK ENERGY COMPANY A.E.M. OF MILAN:INTERVENTION PROGRAM AND PRELIMINARY RESULTS

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[ID 1827] - ***No. 129 in Poster Area***

In December 2002, the occupational physicians of the A.E.M. company, in agreement with the Protection and Prevention Service Responsibles (RSPP), undertook a program aimed at preventing the onset of cardiovascular diseases by promoting lifestyle changes of the approximately 2900 employees. The abolishment of tobacco smoking in the company was complemented with a smoke addiction treatment programme consisting of a number of sensibilization and information sessions addressed to the smokers. Seventy people accepted to participate to the programme at the Antismoke Centre of the Clinica del Lavoro sited in Milan. Among the participants, 61,4% and 53,3% gave up smoking 6 and 12 months after program termination respectively.

In 2003, an investigation was undertaken to evaluate the prevalence inside the company of several cardiovascular risk factors such as smoke, alcohol consumption, obesity, being overweight, arterial hypertension, diabetes and cholesterol and triglycerides increase. For this purpose, health surveillance was extended to several work tasks irrespective of its obligatoriness established on the basis of the national legislation. A total amount of 2727 employees took part to the investigation. Health surveillance procedures consisted in medical examination, smoke anamnesis, alcohol consumption, rates of sedentariness, body mass index, hip circumference, arterial pressure, and blood drawing to assess levels of cholesterol and triglycerides and glicemy. Observed prevalence of cardiovascular risk factors was: 31,3% smoke, 7,8% alcohol consumption (> 2 doses per day), 8,7% obesity, 33,6% being overweight, 6,5% arterial hypertension, 28,4% hypercholesterolemia, 8,6% hypertriglyceridemia and 1,4% diabetes. On the basis of these epidemiological data, a series of initiatives was undertaken in 2005 aimed at modifying those lifestyles possibly related to the onset of cardiovascular risk factors. The program is divided into five stages: 1. Editing and issue of a informative booklet entitled 'Food Education and Health'; 2. Participation by company physicians to safety meetings to illustrate booklet contents and interventions programs promoting employees' health; 3. Recruitment of employees interested in the health surveillance programme; 4. Counselling by the occupational physicians to employees reporting risk factors and, if appropriate, sending of patients to their family doctors who are provided with an accompanying letter including a feedback response form; 5. Follow-up at 12 and 24 months.

At present, 823 employees entered the intervention and among these 114 actively joined the counselling program promoted by the company occupational physicians.

SUPERVISION AND FLEXIBLE LABOR MARKET: OLD FASHIONS AND NEW INCERTAINTIES IN NURSES` LABOR RELATIONS.

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[ID 1847] - ***No. 130 in Poster Area***

The purpose of this study was to analyze the modus operandi and the sense of work in nurses within the framework of the implementation of a specific compensatory policy for this professional cathegory, the "Professionalization Project for workers in the Nursing Area" (Profae). The theoretical and methodological framework of this study, was aimed to show the political, social and economic landscape in which the neo-liberal policies have promoted the use of flexible labor relations, leaving health workers unprotected in terms of social rights. The data collection was done in a set of the main agencies that carry out the monitoring and follow-up of this processes, the Regional Agencies (RA´s) and the supervision was used as a working instrument. The sample (39 nurses) shows that there are professionals with multiple jobs, both formal and informal, working more than 45 hours a week. In the RA´s, public and private, the largest share did not have legal labor relationship, according to labor laws (that require an individual document signed by the employer). Younger nurses were almost all in flexible and informal job relations, without any kind of social protection. This may mean that younger workers are affected by labor de-regulation and that there is no chance-in the foreseeable future - that this protection can be achieved by other means. On the other hand, nurses over 30 years old seem to have some sort of social protection in terms of retirement and other benefits, that result from previous labor contracts. In regard to the supervision process carried on by this nurses, it has training and educational features pedagogical but also control and political facets, being the administrative content the main feature in these workers´ answers.The sense and way of work of these workers encompasses the characteristics of the main axis of the globalization process.

INCIDENCE OF VITAMIN B12 / VITAMIN D DEFICIENCY AMONG COMPANY EXECUTIVES

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[ID 1859] - *No. 131 in Poster Area*

Company Physicians in a leading industry in India encountered unexplained vague complaints of pain in upper and lower limbs among senior executives who worked long hours in offices and were barely exposed to Sunlight. Increasing incidence of executives shifting to vegetarian diet due to health concerns has been noted.

Present study is carried out to assess the incidence of Vitamin B12 / vitamin D deficiency, which may cause Neuropathies. A total of 75 senior executives were surveyed and subjected to analysis of blood levels of Vitamin D (25 Hydroxy Cholecalciferol) in serum by RIA method and Vitamin B12 by CLIA method. The same was performed in a reputed analytical laboratory with NABL accreditation. History of smoking, exposure to sunlight, exercise, dietary habits, consumption of vitamin supplements, medication etc. was obtained.

The results revealed 65% executives with Vitamin B12 deficiency (less than 193 pg/ml) and 28% executives with Vitamin D deficiency (less than 7.6 ng/ml).

The prevalence of low levels of Vitamin B12 is lower (58%) in those who give history of regular exercise than others (100%). The prevalence of Vitamin D deficiency is lower (25%) in those who give history of regular exercise than in others (46.2%). Prevalence of Vitamin D deficiency is higher (47%) in those whose workday day started earlier than in those whose workday started later (12%). The prevalence of Vitamin B12 / vitamin D deficiency was not affected by vegetarian diet in the study group.

These are initial results and the project work is still ongoing. The executives are being offered Vitamin B12/D supplementation along with counseling for life style modification and its effect will be reassessed after treatment. The same will be presented in the conference.

The paper presents the details of methodology, planning and execution of the survey, results and analysis of the findings.

POSSIBLE ROLE OF OCCUPATIONAL PHYSICIAN IN THE PROMOTION OF TOBACCO USE CESSATION

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[ID 1860] - *No. 132 in Poster Area*

Since the 10th of January 2005 all confined public places and places of employment have become smoke-free in Italy. This measure has brought both immediate and long-term positive benefits against second-hand smoke.

A major objective now envisaged in workplaces is to promote cessation of tobacco use by workers, especially those currently or formerly exposed to occupational carcinogens. Synergistic effects of smoke with occupational causes of cancer have been reviewed in IARC Monographs vol. 83 (2004, Tobacco smoke and involuntary smoking). The above study gave evidence of the synergy between tobacco smoking and several occupational carcinogens for lung (arsenic, asbestos, nickel and radon), as well as between smoking habits and alcohol consumption for cancers of the oral cavity, pharynx, larynx, oesophagus and liver.

Limitation of occupational exposures for carcinogens is essential for occupational health purposes, but it is also necessary to make efforts in order to encourage smoking cessation to reduce the excess risk, mainly among young and middle aged workers.

Therefore, it is important that occupational physicians deserve some efforts to this practice, as a component of workers' health care. The specific counselling should be addressed to an abbreviated intervention during worker's clinical examination based on recommended guidelines for smoking cessation (the 5A's: Ask, Advise, Assess, Assist, Arrange).

Occupational physician should focalize on almost former two steps: asking all workers if they are no smokers, current or former smokers and advising them with a clear, strong and personal message about quitting smoking, emphasizing the risks but especially the benefits of cessation.

A review of the current literature regarding smoking cessation supports the use of behavioural counselling and pharmacological methods as the most effective forms of intervention, particularly when combined.

EFFECTIVENESS OF COMPREHENSIVE SMOKING CONTROL IN WORKPLACES

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[ID 1239] - *No. 133 in Poster Area*

Workplaces are the suitable settings for implementation of health promotion program. The effectiveness of smoking control in workplaces was examined in 8 large-scale manufacturing enterprises. Comprehensive smoking control consisting of limitation of smoking in workplaces, education about adverse health effects of smoking through periodical health checkup, smoking cessation program for current smokers was implemented for two years, while minimum countermeasures were implemented in control group. The smoking prevalence of the intervened group and control group decreased from 47.9% to 42.3% and 48.4% to 47.0%, respectively ($p<0.001$). It is considered that comprehensive smoking control in workplaces is significantly effective for decreasing smoking prevalence.

NEPHROTOXICITY AND HEPATOTOXICITY IN LABORATORY SCIENTISTS

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[ID 1696] - *No. 134 in Poster Area*

The wide range of nephrotoxic and hepatotoxic substances commonly used in chemistry research laboratories and the non conformity to laboratory good practices generates a high risk environment for toxic exposure.

Purpose

In the present study we pose to evaluate the exposure to nephrotoxic and hepatotoxic chemicals and to assess their consequences on the health status of scientists.

Materials and Methods

- 18 chemistry laboratories were part of the study and included 112 scientists.
- Our study included 3 stages:

1. Evaluation of organization, work conditions and the level of compliance to the INRS recommendations about manipulations of chemical substances in laboratories.
2. Identification of commonly used nephrotoxic and hepatotoxic chemicals and atmospheric measures of the main identified chemicals.
3. Physical examination and evaluation of nephrotoxicity and hepatotoxicity bio-indicators (B2 microglobulin, microalbuminury, hepatic enzymes, total and conjugated bilirubinemy).

Results

- Laboratories good practice rules were not applied specially storage of chemical products and ventilation.
- 11.8% of all chemicals used in the laboratories were found to have nephrotoxicity and/or hepatotoxicity
- Toluene, hexane and ethylene were detected by chromatography at low levels in air samples.
- Kidney biological parameters were abnormal in 8% of subjects (creatinemea levels were elevated within the normal range in 1 subject and urinary levels of 2 microglobulin were higher than normal in 8 subjects.
- Hepatic biological parameters were abnormal in 14% of all subjects. Blood levels of transaminases were 2.2 folds higher than normal, alkaline phosphatases were elevated within the normal range, blood levels of total bilirubin were 2 folds higher than normal and conjugated bilirubin were 1.2 fold higher than normal.
- These results warrant a particular monitoring of research's laboratories and the creation of follow up commission for the elaborated recommendations.

WORK ORGANIZATION, WORK RELATED STRESS AND PSYCHOSOCIAL FACTORS

QUALITY OF WORK AND GENDER ISSUES

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[ID 928] - *No. 135 in Poster Area*

The new economic backgrounds resulting from globalization require a general rethinking of the old productive system logic, based on the concepts of economic profit and cost effectiveness. A new awareness is needed of the outstanding role that safety and health at work can play in this delicate and complex challenge.
In this context, safety and health at work has to take a qualitative leap modifying the concept itself of work organisation, shifting from the objective of simple cost effectiveness, where workers have to adapt themselves to the work environment, to the objective of quality, where work conditions are fitted on workers' needs, thus obtaining a considerable reduction of work discomfort, as well as a better work effectiveness in terms of competitivity. As a matter of fact, this new vision prevents the cyclic nature of production and development and guarantees competitivity and stability on the long-term. The equation is between cost effectiveness and economic cycles on one hand and quality and competitivity on the other hand.
One of the key elements of this new concept of quality is represented by gender issues, that have to be taken in consideration for an in depth assessment of the risks regarding work organisation: quality is in this case the product of risk gender assessment. The aim of this paper is to suggest how the cited qualitative leap can be taken through an integrated OSH management system that becomes an integral part of the productive system and how a correct and exhaustive gender risk assessment can be performed. Furthermore, an overview of the main consequences deriving from a scarce awareness toward gender dimension will be the object of the paper.

ALLERGOLOGY AND IMMUNOTOXICOLOGY

QUALITY OF LIFE IN PATIENTS WITH LATEX ALLERGY

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[ID 50] - *No. 1 in Poster Area*

Background: Exposure to natural rubber latex (NRL) may lead to a variety of allergic clinical manifestations that may affect the quality of life (QOL).
Objective: aim to assess QOL of patients with different clinical effects of NRL allergy including rhino-conjunctivitis, asthma, anaphylaxis and skin manifestations.
Methods: A questionnaire to assess QOL was mailed to 56 patients who had been assessed and managed for various clinical manifestations of latex allergy at a university affiliated hospital in Toronto, Canada.
Results: Thirty-one questionnaires were completed and returned. Thirty of the respondents were health care workers. Forty-one percent of the respondents had changed their jobs to reduce exposure to latex and 13% had stopped working. However the respondents did not report a great effect on the QOL related to latex allergy.
Conclusion: the results of this study indicate that the various clinical manifestations of latex allergy can be managed so that there is no significant interference with QOL.

OCCUPATIONAL ALLERGY IN DENTISTRY

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[ID 276] - *No. 2 in Poster Area*

Background: Several potential allergens and irritants are commonly used in dentistry and frequently handled with insufficient precautions.
Objectives: The aim of this study was to determine the prevalence of work-related allergies among dentists, dental hygienists, dental nurses and advanced dentistry students in the dental clinics at the School of Dentistry and Public General Hospitals in Uruguay.
Methods: A questionnaire was distributed to all the above mentioned dental clinics, covering demographics, job category, occupational and domestic exposures, latex glove use as well as allergic and atopic symptoms. Patch testing was performed with the International Standard Series, the European Series for acrylates, rubber and antimicrobials-antiseptics. Prick testing was performed with commercial latex and latex glove extract. In addition, latex glove use test and latex specific IgE testing was done in most cases.
Results: Work related dermatologic and/or allergic symtoms were reported by 51 subjects (19%).The prevalence of contact allergy to acrylates was 3,5 % and latex hypersensitivity was confirmed in 6 % of the subjects.
Conclusions: Acrylate and natural rubber latex hypersensitivity represent an increasing occupational problem in dentistry. Specific information about the proper handling of dental chemicals, rigorous prevention measures, recognition and management of contact irritation and allergy, and appropriate skin care are mandatory to reduce the occupational allergic risks in dental practice.

EFFECT OF MERCURY ON NK 1.1 CELLS, FAS EXPRESSION AND METALLOTHIONEINS mRNA IN YOUNG, METALLOTHIONEINS NULL AND TRANSGENIC MICE: ROLE OF L-ARGININE TREATMENT.

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[ID 542] - *No. 3 in Poster Area*

Occupational or environmental exposure to various metals affects human health. In particular, mercury affects the innate immune response [Natural Killer (NK) cytotoxicity] adversely with increased apoptosis of NK cells via Fas. The Metallothioneins (MTs), proteins involved in the detoxification of metals, may play a key role. Indeed, MTs are highly expressed in mercury- exposed mice suggesting a possible role of protection of MT by mercury-induced apoptosis. In order to better clarify the role played by MTs in mercury exposure on innate immunity (NK cell number) and Fas, we have treated n. 6 young mice, n. 6 MTs null and n. 6 MTs transgenic mice with s.c. mercury injections (0.5 mg/Kg b.w.) for 2 months testing NK 1.1 cell numbers, Fas expression on NK cells, liver and thymus MTsmRNA. Concomitantly, n. 6 mice of each experimental group were also treated with mercury plus L-arginine for the same period because of the beneficial effect of L-arginine in restoring innate immunity in mercury-exposed mice. Our preliminary data show a reduction number of NK 1.1 cells in young and MTs null mice more marked than in MTs transgenic mice. Concomitantly, the number of NK 1.1 cells expressing Fas seems more pronounced in MTs null mice respect to young and MTs transgenic mice. This fact is related to more MTsmRNA within the thymus and liver from young and MTs transgenic mice with respect to MTs null mice, which display absence of MTsmRNA. L-Arginine treatment remodels NK 1.1 cells, Fas expression and MTsmRNA especially in MTs transgenic mice. These findings suggest that increments of MTsmRNA are pivotal in preserving the innate immune cells from apoptosis induced by chronic mercury exposure and, at the same time, further confirm the possible useful L-treatment in reducing the toxic effect of mercury on innate immunity, via remodelling MTs homeostasis.

OCCUPATIONAL ALLERGY DUE TO BIOLOGICAL AGENTS: METHODS OF WORKPLACE RISK EVALUATION

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[ID 1026] - *No. 4 in Poster Area*

Biological agents, such as microorganisms, molds and arthropods like mites can cause allergy in several environments, including workplaces.
The lack of identification of causal agent may represent an obstacle to the acknowledgement of the disease as occupational; the Technical Advisory Department for Risk Assessment and Prevention of the Italian Workers' Compensation Authority in 2003 has established internal guidelines for all the territorial Departments for the evaluation of the biological allergens like mites, cockroach and molds, obtained collecting dust samples and analysing them with an immunochemical method.
We applied these guidelines for the evaluation of allergological risk due to biological agents in two work fields: baking industries in Liguria, Tuscany and Umbria, and sawmills in Umbria.
At the same time we tested microbiological air quality with quantitative and qualitative samplings (total bacterial mesophilic and psychrophilic count, molds with Sabouraud plates and selective plates for specific agents). All data are supported by microclimate parameters to verify conditions for microorganisms' growth.
Biological risk assessment and determination often lack reference data obtained directly in the workplaces. Our combined approach fills in part of this gap: knowledge of both allergen and microorganism concentration in air and dust, and characteristics of the workplace such as temperature and humidity, can give a more complete definition of biological risk in the environment where workers, requiring compensation for occupational diseases, operate.
Results from baking industries give us a general view of low/intermediate levels of biological agents. Contamination ranges are 180-300 CFU/m3 for mesophilic bacteria, 100-350 CFU/m3 for psychrophilic bacteria and 200-1.700 CFU/m3 for fungi in summer, less in winter.
In sawmills there were significant differences of bacterial and fungal CFU/m3 values between the outdoor and indoor environments during the normal work activity. Ranges of medium values of mesophilic bacteria were 182-83 CFU/m3, of psychrophilic bacteria were 208-70 CFU/m3, of fungi were 95-32 CFU/m3. In 50 % of microbiological cultures, spring values were higher than winter values. Predominant isolated fungi belonged to Cladosporium, Penicillium, Alternaria and Aspergillus genera.
In both working fields, allergen contamination (Der f1, Asp a1, Alt f1) was very low, despite microclimate parameters showing temperature and air speed conditions very favourable to microorganisms' growth.

SUGAR BEET POLLEN ALLERGY AS AN OCCUPATIONAL ALLERGY

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[ID 1111] - *No. 5 in Poster Area*

Introduction: Sugar beet belongs to the family Chenopodiaceae. It has been suggested that sugar beat pollen is highly antigenic, but hypersensitivity to components of sugar beat pollen is considered to be rare. A certain degree of cross-reactivity has been reported among members of the family Chenopodiaceae.
Aim: To study the prevalence of respiratory symptoms and sensitisation to sugar beet pollen and seed in workers at sugar beet seed nurseries in the County of Halland, Sweden.
Material and method: Thirty workers in seed nursery were examined with:
Interview: symptoms, working conditions and smoking habits.
Spirometry: FEV1, VC, and terbutaline reversibility.
Skin prick test (SPT): extracts of beet pollen and seed (0,1 mg/ml, 1 mg/ml and 10 mg/ml) and 14 other common respiratory allergens.
Specific IgE: Sugar beet pollen and seed and some other Chenopodiaceae.
Sampling of air borne dust in the worker's breathing zone with portable pumps on millipore filters in greenhouse work and during treshing.
Result: Work related symptoms from eyes, respiratory tract, and skin were reported by 21 of 30 subjects. Positive SPT to sugar beet pollen was found in 11, of whom 2 were also positive to sugar beet seed. Seven of the sensitized reported work related symptoms. All 3 reporting obstructive respiratory symptoms were sensitized to sugar beet pollen. Specific IgE to sugar beet pollen were found in 10 persons. Some of these had specific IgE to other Chenopodiaceae: Salsola kali, Atriplex lentiformis and Chenopodium album. Specific IgE to sugar beet seed, betroot and spinach were negative.
Levels of total dust in greenhouses were 1-10 mg/m³ and during treshing 4-7 mg/m³. (The Swedish TLV for organic total dust is 5 mg/m³).
Conclusion: Respiratory symptoms are common among workers nursing sugar beet seed. Allergy to sugar beet pollen was observed in 30%. Cross reactivity may occur to other Chenopodiaceae. Levels of organic dust exceeded the Swedish TLV in greenhouses and during treshing.

EFFECTS OF THE FISH OIL ON THE IMMUNE AND OXIDATIVE RESPONSE IN ASBESTOS AND MAN-MADE-MINERAL FIBERS (MMMF) INSTILLED RATS.

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[ID 1814] - *No. 6 in Poster Area*

The prolonged inhalation of asbestos is associated with alteration of the cellular immune functions and with oxidative stress. Exposure to the MMMF is possibly associated to respiratory effects in the exposed workers. Recently, there has been shown considerable interest on the fish oil regarding the diseases in which immune and oxidative reactions have been involved.
The aim of this study was to investigate the effects of the fish oil on asbestos and MMMF - induced reactions, that could be involved in developing pulmonary diseases. In vivo experiment was carried out on the Wistar rats, divided into 6 groups as following: 1. Control-group; 2. Fish oil (FO) - group; 3.Asbestos– group; 4. MMMF-group; 5. Asbestos + Fish oil –group; 6. MMMF+FO – group. The animals belonging to 2, 5, and 6- groups were given FO; the animals belonging to 3-group were intratracheally (it) instilled with crysotile asbestos; the animals belonging to the 4 and 6-groups were it.instilled with MMMF. The animals were sacrificed at 9 months and bronchoalveolar lavage was carried out. The following parameters were assessed: 1. 3HTdR incorporation test; 2. IL1- assay; 3. TNF- assay; 4. Chemiluminiscence assay; 5. Lipid peroxides. The 3HTdR incorporation was increased in the asbestos + fish oil group as compared with asbestos group, but without statistically significant difference (ssd). Reduced values of the cytokines (IL-1 and TNF) were found in Asbestos + fish oil – group as compared to the Asbestos group, without ssd for IL-1 and with ssd for TNF. In this group, Chemiluminescence assay and lipid peroxides were parameters with reduced values as compared with asbestos group, the differences being with statistically signification. These effects have also been found in the MMMF + FO and as compared with MMMF– group, the most important differences were found in ROS. The investigated parameters in the MMMF- group, pointed out the increased values / with ssd/ of the cytokines and ROS, in comparison with control –group and decreased values witout ssd in comparison with asbestos- group. Based on these data we conclude: 1.Asbestos and MMMF interfere with immune and oxidative reactions; 2 Fish oil may have a protective effect in asbestos and MMMF exposure by its immunomodulatory and antioxidant effects.

IMMUNE RESPONSE, FREE RADICALS AND LIPID PEROXIDATION IN EXPERIMENTAL EXPOSURE TO MIXTURES OF ORGANIC SOLVENTS, INCLUDING BENZENE

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[ID 1830] - *No. 7 in Poster Area*

Suppression of the immune response in occupational exposure to organic solvents is a controversial issue in immunotoxicology. In chronic exposure to benzene, macrophages may play an important role in the development of the immunotoxicity by releasing various mediators. Among them, interleukin-1 (IL-1), tumor necrosis factor (TNF), radical oxygen species (ROS) and lipid peroxides (LP) possess a variety of proinflammatory activities and are involved in various toxicological processes.
The aim of this study was to show the effects of the chronic exposure to benzene and to mixtures
of the benzene and toluene on the immune and oxidative response.
In vivo experiment was carried out on Wistar rats that were divided in 8 groups as following: 1. Control 1 -group, without exposure; 2. Control 2 - group; 3. Benzene1 – exposed group (500 ppm);
4. Benzene 2 –group; 5.Toluene 1 – exposed group (800 ppm); 6.Toluene 2 –group. 7. Benzene + toluene 1 -exposed group; 8. Benzene + toluene 2 - exposed group. The animals belonging to 3,4, 7 and 8- groups were given benzene 500ppm; The animals belonging to 5,6,7 and 8- groups were given toluene (800 ppm). The animals beloging to 1,3,5,7 groups were sacrificed at 3 months, and animals belonging to 2,4,6,8 groups were sacrificated at 9 months. The following parameters were assessed: 1. 3HTdR incorporation test; 2. IL1- assay; 3. TNF- assay; 4. Chemiluminiscence assay; 5. Lipid peroxides. The following parameters were assessed : a) 3HTdR incorporation test; b) IL -1 assay;
c) TNF- assay; d) Chemiluminiscence assay ; e) Lipid peroxides.
Our results point out an important suppression of the 3HTdR incorporation and highly activity of the cytokines, in all the organic solvents exposed groups. The most important modifications of the investigated parameters have been found in the benzene- group: 3HTdR incorporation was decreased, with ssd as compared to controls; the cytokines (IL-1, TNF) and ROS have been increased with ssd as compared to controls and toluene-exposed groups.
The attenuated values of the investigated parameters in the benzene + toluene - exposed group suggest a protective role of the toluene in association with benzene.

RISK MANAGEMENT OF LATEX SENSITISATION IN HEALTH CARE WORKERS OF A LARGE UNIVERSITY HOSPITAL

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[ID 1843] - *No. 8 in Poster Area*

Objective
To assess the prevalence of latex hypersensitivity in a large University hospital and to provide a proper risk management protocol.
Materials and methods
The prevalence of latex hypersensitivity was assessed in health care workers of a large University hospital, according to the information contained in medical surveillance records. Latex hypersensitivity was evaluated among health care workers, according to sex, departments (surgical, non-surgical, laboratories), and jobs. The frequency of different clinical manifestations was assessed among hypersensitive workers. Data provided by the allergologic ascertainment routinely performed in subjects with latex hypersensitivity (prick tests and total/specific IgE) were also analysed.
Results
Hospital L. Sacco has 1761 workers totally, of which 1470 are health care workers. The prevalence of latex hypersensitivity in health care personnel was 3.1% (1.0% among males, and 4.2% among females). According to departments, the prevalences of latex hypersensitivity were the follow-

ing: 2.1% in surgical departments, 4.0% in non-surgical departments, and 2.9% in laboratories. As for jobs, the following prevalences were found: 1.9% among physicians, 3.4% among non-physicians (nurses, laboratory and radiology technicians, assistants, etc.),
Workers with latex hypersensitivity showed these symptoms: 70.27% had contact dermatitis, 29.73% respiratory and/or ocular symptoms, and 10.77% dermatitis together with another symptom. The ascertainment performed showed that 11.4% of subjects with latex hypersensitivity resulted positive to prick tests, while 31.2% showed abnormal total IgE, and 25.8% had high IgE specific for latex.
Discussion
Our data are similar to the others reported in the literature. They also confirm the low sensibility of prick tests and total/specific IgE detection. These tests should hence be performed together in order to increase the positive predictive value of the ascertainment.
After the identification of a case of latex hypersensitivity, preventive measures should be immediately adopted. Workers diagnosed with dermatitis should avoid the use of latex gloves and wear vinyl gloves. To our experience, this simple measure allows to control latex-induced dermatites with subsequent complete resolution of the symptoms. As to workers with respiratory and/or ocular symptoms, they should work in a latex-free workplace, in order to complete avoid exposure to latex.
In the future, the use of powder-free natural rubber latex or vinyl gloves should be adopted in hospitals as a wide preventive measure to lower the onset of new cases of latex hypersensitivity in health care personnel.

A CASE OF «DISEASE OF DAIRY-WORKERS»: PATHOGENETIC AND PROGNOSTIC CONSIDERATIONS

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[ID 1791] - *No. 9 in Poster Area*

The article illustrates a noteworthy case, once diagnosed (1985) as "Broncho-pneumopathy from mycobacteria sensitization", due to the previous and repeated exposure to "Penicillium" fungal spores in the place of work.
This case can be seen as a "sentry event" of the problems caused by these fungal spores fluctuating in the air; problems that, in the following years (1996-1998), and in some dairy where "Gorgonzola cheese" is produced, affected dozens of workers.
As regards this case, all the clinic-objective trials regarding the three hospitalizations of the patient in the years '84-'85 have been re-examined. On the other hand, the worker has undergone new diagnostic trials (on summer 2005) with the aim of underlining any respiratory problems related to the previous pneumo-allergenic anamnesis that are still taking place.
From the critical revision of the case emerges that this type of pathology is more similar to the Extrinsic Allergic Alveolitis than to the mediated allergic IgE asthma.
The presence of circulating immune complexes, the constant increase (even if not so relevant) in the C3 fraction of the complement and, most of all, the presence we noticed *in vitro* of precipitating antibodies of the "Penicillium notatum" and "Aspergillus sp." fungal spores (together with a slight discrease of the capillary vessel alveo diffusion capacity) gives rise to a diagnosis of "Disease of dairy-workers". This one is related to the stock of the Extrinsic Allergic Alveolitis.
CONCLUSIONS: the study of this case makes us think of an *acute case of E.A.A.* due to the exposition to high-rate concentrations of specific fungal spores in the place of work.
Away from the contaminated area (where the allergic sensitization shows its effects), we have obtained the complete resolution of the pneumopathologic anamnesis and negative tests (breathing-function, X-ray of the thorax and the latest allergologic tests).

RESPIRATORY DISEASES

CHRONIC OBSTRUCTIVE PULMONARY DISEASE (COPD) IN ACTIVE ASPHALT WORKERS

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[ID 49] - *No. 10 in Poster Area*

Asphalt workers are exposed to bitumen fumes, polycyclic aromatic hydrocarbons and vehicle exhaust. The aim of the study was to assess the occurrence of respiratory symptoms and airflow limitation in asphalt workers and to relate these findings to exposure.
104 active asphalt workers and a reference group of 162 other highway maintenance workers participated in a cross sectional investigation carried out before and at the end of the asphalt season, 2005. Exposure measurements were done during the season. The workers were examined with spirometric tests and a questionnaire on respiratory symptoms, smoking habits and allergy. Lung function and respiratory symptoms measured before the asphalt season started were studied in relation to exposure group and adjusted for smoking habits. COPD was diagnosed in those with a history of chronic cough, phlegm when coughing, breathlessness and/or wheezing, and a ratio of forced expiratory volume in one second (FEV1) to forced vital capacity (FVC) of less than 0.7.
Compared to the reference subjects the asphalt workers had a significant decrease in FVC % of predicted and FEV1 % of predicted. The prevalence of COPD was 9.6 in the asphalt workers compared with 3.7 in the reference subjects, OR=2.2 (95% CI 1.08, 4.32).
Exposure through asphalt work enhance the risk of accelerated decline in FEV1 and development of COPD in asphalt workers. End of-season results will also be presented.

PREVALENCE OF BYSSINOSIS IN TEXTILE WORKERS IN KARACHI

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[ID 223] - *No. 11 in Poster Area*

Background: Byssinosis is an occupation-related, reversible lung disease that becomes disabling in chronic case, occurs exclusively in people working with unprocessed cotton, flax and hemp. It is characterized by tightness in chest and wheezing due to the narrowing of airway passages. This disease is diagnosed on the history of exposure to cotton dust and respiratory symptoms (chest tightness or difficulty in breathing) on first day of the working week. The diagnosis is strengthened by lung function test.
Rationale: Pakistan is an agro-based country, where cotton is cultivated on 3,012,000 hectors with production of 13,200,000 tons of raw cotton. Karachi is the biggest industrial city of Pakistan with more than 5,000 industrial units, out of which more than 1,000 units are related to textile. In Pakistan generally and in Karachi particularly, no significant and comprehensive work has been done on the epidemiology and characterization of Byssinosis.
Objectives: To measure the prevalence of Byssinosis in the textile workers of Karachi.
Material and Methods: This is a cross sectional study. The sample size of 95% confidence with 5% bound on error of estimation, a sample of 323 workers is required. All workers who have been working in the textile mills for a minimum period of ten years are included and workers with history of any other lung diseases are excluded from the study. A comprehensive questionnaire has been administered to the workers which contains detailed history, functional pattern and severity of the disease. This is followed by their spirometry.
Preliminary Results: Data collected from 130 workers shows that 32 workers (24.6%) are suffering from Byssinosis. The prevalence is higher in spinning as compared to weaving sections.
Conclusions: Our preliminary results show that the Byssinosis is very common in textile workers in Karachi. We suggest for providing occupational health education and using personal protective equipments during work.

OCCUPATIONAL PARAFFIN-INDUCED PULMONARY FIBROSIS: A 25-YEAR FOLLOW-UP

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[ID 854] - *No. 12 in Poster Area*

Exogenous lipid pneumonia is an uncommon condition, mainly related to aspiration of liquid paraffin ingested for the treatment of constipation. We report a case of severe interstitial pulmonary disease induced by occupational exposure to paraffin.

Case report. A 35-year old non-smoking woman was admitted in a Paris hospital in 1979 for exertional dyspnea, purulent sputum and weight loss. She was an unskilled worker in a manufacture of cardboard crockery since 1971. Her task consisted in looking after and refilling a machine destined to cover plates and cups with paraffin for waterproofing. Solid blocks of paraffin were introduced in the machine and heated with subsequent release of fumes and projection paraffin droplets. The diagnosis of occupational exogenous lipid pneumonia was based on clinical findings (bilateral crepitations), functional testing (restrictive pattern and decreased diffusion capacity for CO) and bronchoalveolar lavage findings (oil laden vacuoles in alveolar macrophages).The posteroanterior chest radiograph was initially normal. There were also similar cases in the same factory. Since, exposure to paraffin was discontinued and steroid therapy was initiated, leading to temporary functional improvement.

In the course of a 25-year follow-up, our patient developed a delayed fibrosis with progressive deterioration of pulmonary function tests and blood gases, despite cessation of exposure.

Conclusion. Repeated inhalation of paraffin in an occupational setting may lead to severe pulmonary fibrosis. In the absence of curative treatment, primary prevention in the workplace remains essential.

VARIATIONS IN INCIDENCE AND AGE DIAGNOSIS OF COBD IN DIFFERENT WORK ACTIVITIES

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[ID 1139] - *No. 13 in Poster Area*

By itself, prevalence of respiratory diseases is not sufficient to prove the risk intensity in work activities. Aim of this study has been to evaluate morbidity of respiratory apparatus in different work activities by incidence and variations in diagnosis age of chronic obstructive broncopulmonary diseases, COBD, by interaction between individual risk factors (smoke habit and other life styles, anthropometric parameters) and job risk factors (environmental pollutants, work organization).

At first prevalence of COBD has been calculated on 1835 workers employed in different work activities, then incidence and age diagnosis in five years and ten years follow-up have been calculated. All data have been adjusted by individual factors (age, BMI, smoke habit) and working factors.

Results showed higher incidence of COBD among truck drivers (8.3%), compared to with collars (2.0%), industrial workers (5.9%) and civil service (7.5%).

In 1st check, diagnosis age of COBD has been lower in civil servants (mean 43.7 vs. 48.2 in white collars), while in 3rd check no difference in diagnosis age are found among industrial, civil service and drive activities. Adjustment by smoke habit showed significant correlation between age and COBD only in no smokers white collars ($p<0.05$).

In ten years follow-up, a relative risk has measured in no smokers industrial workers (O.R. 5.5 – 95% C.I. 1.2-25.6), while no relative risk has been found between no smokers and smokers in other work activities.

In conclusion, data showed that life styles, over all smoke habit, increase incidence of COBD, but with different significance in different work activities, while specific job risks are efficient in industrial sector. Probably, high incidence of COBD in civil service and drive activities caused by negative interaction between work characteristics and life styles, over all smoke habit.

PREVALENCE OF SILICOSIS IN ROMANIAN PORCELAIN WORKERS

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[ID 1396] - *No. 14 in Poster Area*

Introduction:

Workers in porcelain manufactories are exposed to quartz containing respirable dust, leading to fibrosis of the lung even after a short exposition time in dependence to the degree of exposure. Reduction of severe occupational pneumoconiosis in the western countries could be achieved in the past years by adequate prevention. However, especially in the eastern countries of Europe such occupational prevention is still missing. The aim of this study was to analyze the extent of radiographic abnormalities among porcelain manufactory workers, primarily exposed to quartz in Romania.

Materials and methods:

Chest radiographs from one hundred twenty Romanian workers of five manufactories were analyzed according to the international labour organization (ILO) classification by two dedicated chest radiologists, "b-readers". Questionnaires were used for the assessment of occupational history, smoking habits, respiratory diseases, etc. Cumulative respirable dust exposure (CDE) was assessed as well.

Results:

The overall presence of acute silicosis was high (65%). A significant association was seen with increasing CDE among current workers. CDE lead to a significant decline (0.25% vs. 0.12%) in the percent predicted 1-second forced expiration volume and forced vital capacity among workers with silicosis compared to workers without.

Conclusion:

The prevalence of silicosis in Romania is significantly higher compared to Germany. The presence of pneumoconiosis is associated with meaningful health effects, including deteoriation of lung function. Intervention measures controlling exposure are indicated to reduce those functional effects.

COPD AND PHYSIOLOGICAL LIMITS FOR WORK CAPACITY

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[ID 1514] - *No. 15 in Poster Area*

COPD patients usually have a decreased work capacity due to their limitation in pulmonary function. COPD results in an obstruction with limitation preferably in expiration and ventila-tion. COPD also decreases pulmonary gas exchange, which can result in a respiratory failure.

It is therefore of interest to study pulmonary function to find out what part of the pulmonary function that mostly limit the work capacity in COPD patients.

Subjects:

80 patients with moderate to severe COPD due to tobacco smoking were investigated at the pulmonary function laboratory at Uppsala University Hospital. All patients had a pulmonary limited work capacity and no patients were limited by cardiological reasons.

Method:

Exercise test and pulmonary function were measured in all COPD patients. Pulmonary func-tion tests included measurements of static lung volumes, FEV1, flow-volume registrations, measurements of maximal ventilation and diffusion capacity with carbon monoxide. Exercise test was performed as a symptom-limited incremental cycle ergometer test starting at 20 W and with an increase of 10 W every minute until exhaustion.

Results:

All values from the pulmonary function test and maximal work capacity were expressed in actual values and in percent of predicted values according to Swedish reference values depending on age, height and weight.

Regression analysis was computed for all values against work capacity expressed in watt. Best correlation to predict work capacity was found for a combination of maximal ventilation capacity and diffusion capacity. Maximal Work capacity could therefore be estimated by a regression equation including maximal ventilation and diffusion capacity.

Conclusions:

COPD patients have a decreased work capacity that partly disables

the patients. The reason is mostly due to limitation in pulmonary function. The limitation is a combination of decreased ventilation and pulmonary gasexchange and in pulmonary limited patients the work capacity can be predicted from measurement of ventilation capacity and diffusion capacity.

DECLINE IN LUNG FUNCTION AND MARKERS OF SYSTEMIC INFLAMMATION IN ASPHALT PAVERS

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[ID 1611] - *No. 16 in Poster Area*

Asphalt workers are exposed to bitumen fumes, polycyclic aromatic hydrocarbones and vehicle exhaust.In a parallel study presented at the ICOH conference we report lung function decline in the group of asphalt workers studied. The objectives of this study was to determine if exposure during the asphalt paving season influences blood concentration of the inflammatory markers interleukin-6 (IL-6), fibrinogen and micro-CRP in the workers.

Material and methods: Blood samples from all the asphalt workers and asphalt and bitumen lorry drivers (n=140)of Norway's largest road construction and road maintenance company, were taken in Aril/May 2005, before the paving season started. New blood samples were taken in September/ October 2005, just before the paving season ended. Exposure to total dust, oil mist, PAHs and gases was measured by personal samplers. According to exposure levels, the study group was divided into asphalt pavers (n=81)and a control group of lorry drivers and asphalt plant operators (n=54).

Results:There was an increase in the geometric mean serum concentration of IL-6 in the asphalt pavers, from 1.55 ng/l before season to 2.67ng/l at the end of the season (p=0.04, adjusted for current smoking). There was no significant change in the IL-6 level of the control group.

The concentrations of micro-CRP and fibrinogen are under analysis at the moment and results will be presented at the conference.

PULMONARY ALVEOLAR PROTEINOSIS AND OCCUPATIONAL EXPOSURE – A RETROSPECTIVE ANALYSIS OF CASES IN A MEDICAL CENTER

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[ID 810] - *No. 17 in Poster Area*

Pulmonary alveolar proteinosis (PAP) is an extremely rare disease, only a few cases have been reported in Taiwan. To evaluate the possibility of an occupational causality, possible cases of PAP in a medical center between 1994 and 2003 were identified by a review of medical records using ICD-9 codes. There were four cases of PAP confirmed with pathologic examinations. We summarize their clinical characteristics and courses, focusing in particular on their occupational history, and trying to evaluate whether the work exposure had contributed to the PAP.

Three male and one female were affected. Dyspnea on exertion and cough were the main symptoms. Whole lung lavage was performed in all cases and proved to be an effective treatment. Two men were exposed to silica during their work. One man was a sandblaster. He developed symptoms within 3 months of work. The other man was a foundry worker and developed his symptoms after 20 years of work. Two of his colleagues also had similar symptoms. No adequate respiratory protection and ventilation system had been used in their workplace. A lot of silica-like birefringent substances were found in their lung tissue by pathologic examinations. Their PAP was highly suspected of being caused by work exposure. Therefore, removal from work was suggested. Patients keep stable condition thereafter. For the other two persons, no particularly relevant exposure could be found either at work or at home, the cause of their PAP remained idiopathic.

Overall, the occupational exposure is one of the important causes of PAP. Careful occupational history might identify the occupational causality and as a consequence, patients could be prevented from further damage by work removal.

CASES	*I*	*II*	*III*	*IV*
1. Occupation	*Foundry worker*	*Sandblaster*	*Operator for wine filling machine*	*Housewife*
2. Possible offending agents from work	*Silica dust*	*Silica dust*	*Cork dust*	—
3. Sufficient occupational exposure (dosage* time)?	+	+	+	—
4. Temporal sequence?	+	+	+	—
5. Histopathological / mineralogical evidence in lung tissue?	*A large amount of birefringent substances* *	*A large amount of birefringent substances* *	—	*Few birefringent substances*
6. Is the disease improved following removal from work exposure?	+	+	—	—
7. Has any existing evidence proved that this exposure could cause the development of PAP?	+	+	—	—
8. Does any co-worker have similar symptoms or disease?	***Unknown***	+	—	—

* No quantitative or qualitative analysis was performed. However, the birefringent substances had similar pictures with silica in microscopic field and their amount was abnormally high.

RISK ASSESSMENT FOR SILICOSIS AND EXPOSURE TO VOLCANIC ASH ON MONTSERRAT

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[ID 1045] - *No. 18 in Poster Area*

Background: Volcanic eruptions on the island of Montserrat since July 1995 have resulted in dust deposits throughout the island, containing 5% to 20% cristobalite. Possible health risks include non-specific respiratory effects of particles, and silicosis. We assessed the potential silicosis risks associated with continuing volcanic activity.

Methods: Risks of silicosis were calculated for different population groups and locations on the island, and for volcanic activity continuing for 5 to 20 years. Future volcanic activity, and resulting personal exposures to ash, were estimated by linking mathematical modelling methods with occupation- and location-specific measured dust concentrations on the island. Silicosis risks were estimated using exposure-response functions derived from diatomaceous clay workers, chosen as reference population following earlier toxicology and epidemiology studies of Montserrat volcanic dusts.

Results: Estimated risks of mild silicosis in the general adult population were less than 1/1000 after five years of volcanic activity, rising to around 7/1000 after 20 years. For the dustiest occupations (gardeners, outdoor workers), estimated risks were around 2/1000 after 5 years and 2-3% after 20 years activity. Risks for children were difficult to estimate but conservative estimates (overestimates) suggest risks of less than 5/1000 after five years of activity and up to 4% after 20 years.

Conclusions and recommendations: The estimates, though approximate, suggest that risks of serious disease are low. The findings show the advisability of taking measures to minimise exposure to ash, particularly among outdoor workers and children. These could include a continuing education programme, plentiful supply of free dust masks, register of outdoor workers and advice not to play in the ash. It would also be prudent to carry out an x-ray survey of the most exposed residents 10 years after first exposure to volcanic ash and a health survey (including x-rays) of workers on the island is currently in progress.

THE ETHICAL ASPECTS OF THE BERYLLIUM LYMPHOCYTES PROLIFERATION TEST: THE STAKEHOLDER'S POINT OF VIEW

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[ID 1144] - *No. 19 in Poster Area*

It is now well understood that inhalation of beryllium (Be) particles can induce an immune response (beryllium sensitization) and cause chronic beryllium disease. The beryllium lymphocyte proliferation test (BeLPT) is used to identify sensitivity to beryllium and to prevent the ultimate development of advanced beryllium disease. In Quebec, Canada, this test is offered to workers. Occupational health professionals provide information to the workers who can either accept or refuse the BeLPT. However,

numerous ethical questions regarding the BeLPT in occupational health arise from its use in the workplace. These questions, pertaining to issues such as understanding of the test by workers, impact of the test and its follow-up, deserve examination. To address these questions, the ethical aspects of BeLPT are assessed qualitatively by interviewing workers who tested BeLPT positive (sensitized), workers who tested BeLPT negative, workers who refused the BeLPT and various stakeholders involved in the implantation of the BeLPT and its follow-up (occupational health physicians, occupational health nurses, employers and union representatives). Their answers are analyzed through a continuous comparison technique. The preliminary results demonstrate that the majority of stakeholders perceive many ethical problems related to the use of the BeLPT in the workplace. The problems mentioned pertain to: scientific aspects of BeLPT (e.g.: validity, sensibility, specificity and predictive value), the privacy of information, the consent of the workers and their stigmatization should they test positive. Further analysis focussing on these aspects is currently underway.

THE RELATIONSHIP BETWEEN THE BIOLOGICAL MARKERS TO EVALUATE THE HEALTH EFFECT OF INHALATING MATTERS

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[ID 1194] - *No. 20 in Poster Area*

We assessed the effects of long-termed exposure of certain dusts on allergic reactions, inflammatory responses. The aims of this study are to evaluate the relationship among general blood tests, which indicates inflammatory responses, and biological markers which were related indices for evaluating health effect of occupational chemical exposure.
Subjects & Method: We investigated 715 workers (smoking (n=304, average age: 33.0 y.o.) and non-smoking (n=411, average age: 32.8 y.o.)) who were engaged in a manufacturer producing office machines. The grade of occupational exposure was classified by job categories on the basis of periodical routine measurement. Examination of markers in blood test such as complete blood count, blood biochemistry, interluekin-4,6,8, interferon gamma, immunoglobulin E and in urine: 8-hydroxy-2'-deoxyguanosine were performed on all the subjects. We used self-entry questionnaires and checked items on respiratory subjective symptoms, smoking habit, and current medications. These workers were divided by smoking habit, and statistical evaluation was performed for smokers and non-smokers, respectively.
Results & Discussion: In the non-smoking group, there was a significant correlation between indicators for the level of inflammatory reaction, WBC and IL-6 (correlation coefficient (|R|) is 0.275, $p<0.0001$), but in the smoking group there was no significant correlation. On the other hand, in the non-smoking group, there were significant correlations between C-Reactive Protein (CRP) and IL-4,6 (IL-4: |R|=0.328, $p<0.0001$, IL-6: |R|=0.660, $p<0.0001$). But, in the smoking group, there were significant correlations between CRP and IL-6,8 (IL-6: |R|=0.500, $p<0.0001$, IL-8: |R|=0.120, $p=0.0367$). Selected markers can be sensitive enough for assessing the effect of respirable toxic substances.
Conclusion: These results showed that IL-6 was a more reliable index of inflammatory responses, which were caused by inhalation, than IL-4, IL-8 or other items.

DESIGN OF COHORT STUDY FOR THE ASSESSMENT OF THE RELATIONSHIP BETWEEN OCCUPATIONAL EXPOSURE TO TONER AND LUNG DISORDER

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[ID 1207] - *No. 21 in Poster Area*

The amount of toner product has increased in association with the popularization of photocopy machines and laser printers, and thus the chance of occupational exposure to toner in offices has become more frequent. There are some case report of patients with exposure to toner who have granulomatous pneumonitis and siderosilicosis. Therefore, it is necessary to confirm whether or not the toner is safe for human beings by epidemiological analyses of rationally and scientifically collected data.
Some manufactures have decided to perform a cohort study to clarify the health effect of the toner on the workers who handle it (manufacturing, research and development, and service). Since 2004 they have been examining the relationship between exposure to toner and lung disorders.
In order to avoid incompatible differences in data between corporations and to maintain data reliability, we draw up an assessment method guideline for this cohort study. We outline the contents of the guideline in this paper.
Selected assessments include the following: yearly measurements of blood (WBC, CRP, AST, ALT, r-GTP, T-cho, HDL, TG) urine (8-hydroxydeoxyguanosine), pulmonary function (VC, FVC, FEV1.0, FEV1.0%, V25, V50), chest X-ray. A self-administered questionnaire on potential COPD and its risk factors, and job history, and special-year measurements (minimum 1,3,5,8,10 years) of specific , KL-6 and surfactant protein as a biomarker for serum IL-4, 6, 8, interferon- lung disorder. Toner dust/ toner particle is to be determined by personal and workplace monitoring twice a year. Taken together, these assessments create an original method for evaluating risk estimates associated with exposure to toner.

NON-INVASIVE ASSESSMENT OF AIRWAY INFLAMMATION AFTER OZONE EXPOSURE

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[ID 1490] - *No. 22 in Poster Area*

Ozone (O_3) is the main component of photochemical smog. As a strong oxidant, it reacts with the respiratory tract inducing inflammation associated with increased production of reactive oxygen species (ROS). Recent studies have demonstrated that a particular haplotype (GSTM1*null* and NQO1*wt*) is associated with higher susceptibility to O_3 exposure.
In this study, we evaluated whether experimental exposure to ozone (150 ppb) is associated with changes in biomarkers of inflammation (8-isoprostane) and oxidative stress (hydrogen peroxide (H_2O_2) and malondialdehyde (MDA) in exhaled breath condensate (EBC). In addition, blood samples were collected to characterise GSTM1 and NQO1*C609T* genes polymorphism, neutrophils count (PMNs) and 8-isoprostane levels.
Fifteen non-smoking healthy subjects were exposed to 0.15 ppm of O_3 for 2h while performing intermittent mild exercise. EBC and blood samples were collected before (T_0), 6h (T_1) and 18h (T_2) after exposure and at the same time-points after exercise without exposure to ozone. No significant alterations of lung function tests were recorded. Biomarkers in EBC (H_2O_2 and MDA) were significantly increased after exposure to O_3 at T_1 returning to baseline levels at T_2, *i.e.*, 12h later (table 1).
Table 1: biomarkers measured in EBC before (T_0), 6h (T_1) and 18h (T_2) after exposure to ozone.

EBC markers	T_0 median (*range*)	T_1 median (*range*)	T_2 median (*range*)
H_2O_2 (μM)	0.04 (0.016-0.14)	0.13 (0.035-0.37)	0.035 (0.01-0.9)
MDA (nM)	4.4 (3.4-4.7)	5.4 (3.9-6.0)	4.5 (2.9-7.0)

The GSTM1*null*/NQO1*wt* haplotype was associated with a prolonged increase in H_2O_2 levels, which remained elevated also 18 h after exposure to O_3, indicating a greater susceptibility of these subjects to this oxidant. Contrary to what observed in field studies, these biochemical changes in EBC were not associated with altered lung function.

DO WE ASSESS THE OBSTRUCTIVE IMPAIRMENT OF THE SPIROMETRIC VALUES IN SMOKERS?

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[ID 1812] - *No. 23 in Poster Area*

AIMS: To assess the obstructive impairment observed in spirometries performed in smokers without diagnosis of pulmonary obstructive pulmonary disease (COPD).

METHODS: Cross-sectional descriptive survey carried out. Subjects: consecutive sampling of smokers >15 yr. without a diagnosis of COPD. Variables: age, gender, number of cigarretes/day (≤20, 21-30, >30 c/d), smoking status length, score of Fagerström test (moderate dependence if 4-7 and high if it was higher than 7), FEV_1 value (normal 80%, mild obstructive 79-70%, moderate-severe < 70%). Descriptive statistics was performed.
RESULTATS: 62 smokers (63% male). Mean age of 45 yr. 37.7% with an obstructive pattern in the spirometry (26.3% mild, 11.4% moderate-severe). 9% of spirometries were impaired in subjects < 40 yr., 56% in patients aged 40-60 yr. (36% mild, 20% moderate-severe), and 72% in subjects elder than 60 yr. (45% mild, 27% moderate-severe) (p<0.01). 25% of spirometries were impaired in subjects who smoked ≤ 20 c/d, 44% in patients with smokers of 21-30 c/d, 81% in smokers of >30 c/d (p<0.01). No impairments were observed in smokers of less than 15 yr of smoking status, 33% (3.7% moderate-severe) in 15-30 years of smoking, 73% (36% moderate-severe) in patients of >30 yr. Of smoking status (p<0.01). 33% of spirometries were impaired if mild dependence, 37% in moderate and 50% in patients with high dependence.
CONCLUSIONS: A significant relationship between obstructive impairment of spirometries was observed with age, years of smoking, and the number of cigarettes per day, but not with dependence and gender.

HARDLY SOLUBLE EXPOSURE TO INDIUM COMPOUNDS IS A NEW AND POTENT RISK OF INTERSTITIAL LUNG DAMAGE
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[ID 1825] - *No. 24 in Poster Area*
Aim: To identify the effects of indium on the lung and to assess exposure-effect and exposure-response relationships between indium exposure and its effects on the lungs.
Methods: A cross-sectional study was performed on 93 male indium-exposed and 104 male non-exposed workers. Indium in serum (In-S) was determined as a biological exposure index. Geometric means (GSD) of In-S were 8.3 ng/mL (4.6) in the exposed workers and 0.3 (3.0) in the non-exposed workers. The maximum concentration was 116.9. A questionnaire for respiratory symptoms, spirometry, lung HRCT, KL-6, and SP-D were examined as the effect indices.
Results: Spirometry showed no differences. In ex-/never-smoking workers, prevalence of pulmonary complaints was higher in the exposed workers and the difference was significant in “Phlegm in winter”. Geometric mean (GSD) of KL-6 in the exposed and non-exposed workers was 495.4 U/mL (2.26) and 239.6 (1.45), and that of SP-D was 85.2 ng/mL (2.02) and 51.5 (1.71). Prevalence (%) of the exposed and non-exposed workers exceeding reference values of KL-6 was 41.9 and 2.9, and that of SP-D was 39.8 and 7.7. These differences in mean and prevalence were statistically significant. Very sharp exposure-effect and exposure-response relationships were discovered between In-S and KL-6 and between In-S and SP-D when the study subjects were classified into 7 groups by In-S. Prevalence of HRCT changes showed no differences between the two groups, but 6 exposed workers with interstitial changes showed significantly higher In-S, KL-6, and SP-D compared to exposed workers with no interstitial changes.
Conclusions: The study outcomes indicate that exposure to indium dust represents a potent risk for interstitial changes in the lungs.

STUDY ABOUT THE EFFECTS ON THE RESPIRATORY SYSTEM OF MINE WORKERS IN GREECE
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[ID 1871] - *No. 25 in Poster Area*
MATERIAL – METHODS
In order to evaluate the consequences in the respiratory system of mine workers spirometric values (such as VCIN, FVC, FEV1, FEF and VC) were investigated in 140 male workers with sampling resulting from the randomization based on age, but stratified according to the occupational exposure category.
Occupational differentiation was classified based on the intensity of the occupational and environmental exposure in the workplace; and the following groups were observed: (1) office workers and people working at the administrative and financial services in proximity with the production sites (2) maintenance workers (3) people working on ground production procedures (4) people working underground.
RESULTS
During the study period there was no difference of the age model concerning professional exposure, between employees, and the mean value (and standard deviation) was 44.7 (6.4) years. Among the sub-groups presenting occupational aggravation, no statistical significant differences in the investigated spirometric parameters were observed.
Despite these optimistic observations, descriptively, it is evident that especially the FEF and FEV1 values, of underground workers, are comparatively lower than the corresponding values of people working in other areas, even thought smoking habits were similar regardless of the occupational category. When all workers were compared diachronically (current values, compared to values a decade ago), differences were noticeable and statistically significant (p<0.001), with the exception of the FEF value. For office workers, the same observations apply, while for maintenance workers, no statistically significant changes are documented for the FEF value or for the FEV1 value. For ground workers statistically significant differences are observed for the FVC and the VC value, while for underground workers, no statistically significant difference is documented for the FEF value only.
CONCLUSION
The results of this study show us that the spirometric parameter values remain constant in time and this may be attributed to the technical methods and the medical prevention methods implemented in the mine industry.

VALIDATION OF THE VALUES OF INDICATORS USED FOR FOLLOW UP STUDY ON WORKERS EXPOSED TO FINE DUST
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[ID 1897] - *No. 26 in Poster Area*
Introduction: The health effects of particulate matter produced by office machines has been reported in recent years. Beginning in April 2004, we commenced a 10-year cohort study to investigate the health effects on workers exposed to these fine dusts.
Objectives: To detect the possible early effects on the human respiratory tract, we evaluated the 2-year trend (2004-2005) of selected indicators and their inter-relationships in order to access their stability and validity.
Subjects and methods: The subjects were 280 male workers (age 38.1 +/- 5.7 y.o.) engaged in office machine manufacturing plants, who had the possibility of exposure to cigarette smoke and/or particulate matter from office machines. The subjects comprised 140 dust-exposed workers and 140 referents matched in age and smoking habit. With the informed consent of all the participants, we carried out a questionnaire on respiratory and allergic symptoms, conducted pulmonary function tests, chest XP and measured levels of inflammatory cytokines such as interferon and interleukins to determine minimal change of health effect according to the guideline issued by the Japan Business Machine and Information Association (JBMIA). We conducted a comparison of each indicator by the t-test and Fisher’s exact t-test and analyzed the relationship among the indicators by multiple regression analysis.
Results: A high correlation among cytokines was observed. However, inner-personal changes and the difference in indicator values between the 2 years were not observed. At the present time, there were no significant relationship among the health indicators and exposure history including the exposure level, length hours and years.
Conclusions: There were no effects of information bias in the results of questionnaire between the exposed workers and the referents due to our gaining informed consent in advance of the study. The past history of respiratory diseases and cigarette smoking could be major environmental factors affecting the values of selected indicators, however it is not thought to be confounding factors in the present study.
Acknowledgement: The present study has been performed the support of Dr Takeshi Matsuo and the staff of Sharp Corporation.

PNEUMOCONIOSIS

DIGITAL RADIOGRAPHY AND PNEUMOCONIOSES - THE NEW VIEW ON THE PROBLEMS

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[ID 58] - *No. 27 in Poster Area*

X-ray receivers used in digital X-ray diagnostic equipment differ in chemistry and engineering arrangement. A suggestion is made that X-ray sensitive semi-conductor linear detectors (SCLD), depending on their arrangement, may give images different in quality and comprehension thus affecting the reliability of pneumoconiosises (P) diagnostics.

The authors have conducted digital radiography of thorax on 87 workers subjected to effect of SiO2–containing aerosols. At first, a SCLD was used based on 1152-unit matrix of silicon photodiodes coated with cesium (Cs) compounds having maximum image format of 1152x1152 pixels. Then the SCLD receiver was replaced by a 1536-unit linear matrix of silicon photodiodes coated with gadolinium (Gd) compounds, and with maximum image format of 1536x1536 pixels. With this, a repeated radiography has been done to the same workers. The interval between inspections was 4 months.

The comparison of images had shown clear-cut distinction in quality of displaying parenchymal and pleural abnormalities, namely, in image sharpness, brightness, intensity, possibility to view and recognize the details of thorax pattern more definitely, etc. In all cases, the better quality of image on these criteria was obtained using the second SCLD.

The study has shown that this problem required further coordinated investigation. The authors consider it necessary to (1) work out unified requirements for technical parameters of the digital X-ray diagnostic equipment used for P diagnostics (in particular, for detectors); (2) agree about standard conditions of X-ray diagnostics in digital format; (3) agree and legalize electronic standards of P fit for computerized comparison.

Implementation of the named directions of study, together with upgrading the ILO Interna-tional Classification of Radiographs of Pneumoconioses (Revised Edition, 2000) with their re-sults, would bring the named Classification in line with the modern digital technologies and also result in unification in X-ray studies.

SIDEROSIS AMONG TOSA BLACKSMITH

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[ID 1429] - *No. 28 in Poster Area*

Tosa blacksmith has over four hundred-year history. The main products are kitchen knife, sickle, ax, hatchet, hoe, helm, saw, etc. The procedures of these products do not change until nowadays besides two processes, heating and forging with heavy oil furnace and automatic hammer, and rough grinding with grinder.

In this paper, we would like to report pnumoconiosis exposed heavy metal dust in rough grinding. We evaluated respiratory dust exposures among Tosa blacksmith (n=32) in rough grinding. The level of dust exposure was 0.26-8.89 mg/m3. We analyzed the parcentage of silica by X-ray diffraction method, and conducted the qualitative and quantitative analyses of heavy metal in exposed dust. The contaminating level of silica was 0.7-2.9%, and iron oxide III was 6.4-55.0%. The health examination of pnumoconiosis (n=41) was conducted, twenty five (61.0%) had pnumoconiosis signs in chest X-ray, and thirteen (31.7%) were slightly decreased in thier lung functions. Two were severe pnumoconiosis. Their X-ray finding was numerous small fairly denses opacities (sized p) throughout the lung fields. Pnumoconiosis among Tasa blacksmith was diagnosed as siderosis.

The number of siderosis patients is limited, and expsoure limit has not been proposed yet. We could get information that a couple of workers had died of siderosis in this study. The mean of dust exposures among severe and died siderosis workers (4.07 mg/m3) was higher than one among slight siderosis and heathy workers (0.86 mg/m3). This result provided us important data for setting exposure limit of siderosis. And now, several workers have introduced low cost improvements in rough grinding process. The mean of dust exposures of imoproved workplaces (0.57 mg/m3) was lower than one of unimproved workplaces (2.39 mg/m3), and those were evaluated as effective and practical ones. As most of Tosa blacksmith are small-scaled and self-employed, it is very important to provide low cost improvements for preventing siderosis.

CHANGES IN THE RADIOLOGIC AND SPIROMETRIC PROFILE IN SUBJECTS WITH PULMONARY SILICOSIS

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[ID 1482] - *No. 29 in Poster Area*

INTRODUCTION: Some studies show a relation between occupational exposure to silica and radiological and functional deterioration, but the results are not satisfactory because of the variety of clinical patterns and the interference of many risk factors.

OBJECTIVES: The aim of our study was to investigate silicosis evolution in relation to symptoms, therapy and different occupational exposure.

METHODS: Spirometric (FVC, FEV1) and chest radiographs patterns from 106 consecutive male patients with diagnosis of silicosis were examined (age at first admission 51.7 +/- 8.3 years, occupational exposure at second admission 23.8 +/- 9.1 yr). Data about smoking history, symptoms and therapy were collected through questionnaire. A multiple logistic regression analysis was conducted.

RESULTS: Symptoms more frequently reported were cough and dyspnea. Chest radiographs showed mostly p,q nodular pattern, and on a 4,7 + 3,3 yr follow up period they appeared largely unchanged, although 8 radiographs showed confluent areas, 18 subjects showed pleural thickening, 10 calcified opacities. Respiratory functions were mainly stationary and changes in exercise tolerance presented an improvement in subjects who underwent individualized pulmonary rehabilitation programs.

CONCLUSIONS: Multiple logistic regression analysis of main risk factors showed that subjects with presence of radiographic opacities having a greatest diameter greater than 10 mm or conglomerate shadows at the time of diagnosis seem to have a lower risk of progression of the disease after a relatively short period of follow up, even in mining related exposure. The stationary results of chest X-rays and the light declines of respiratory functions confirm the slow evolution in time of this pneumoconiosis.

SILICOSIS PREVALENCE AND THE EFFECTS OF WORKING CONDITION ON SILICOSIS IN QUARTZ MINES& MILLS IN AYDIN-ÇINE REGION IN TURKEY

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[ID 1704] - *No. 30 in Poster Area*

Introduction: A preventible occupational disease, silicosis that is often widespread on to a very kind of quartz-silica exposed work place. There have limited knowledge on silicosis among the workers in this industry and there are a lot of quartz mines and mills enterprises in Aydın/Çine region.

Objectives:The objectives of this study were to determine silicosis prevalance and to explore working conditions risk factors in relation to silicosis in quartrz mines &mills in Aydın-Çine Turkey.

Materials and Methods: A cross-sectional design was used. Workplaces were determined from a list which were obtained from Ministry of Labour and Social Security Department of Labour Inspectorate Directorate. There were 519 workers in 10 enterprices. 509 workers were completed a questionnaire (85.9%), 519 workers's x-ray films (87.6%) were examined independently by blind one occupational health specialist and one chest disease specialist two readers, who can read according to the ILO classification of pneumoconiosis. 1/0 or greater opacities were accepted as positive for silicosis. Dust measurement was done at 38 places.

Results: Silicosis prevalence was 23.0 % among the study group. The mean age of the subjects was 31.8 ± 8.26 years. The mean duration of exposure was 3.31 ± 3.88 years(min 0.5 -30 years). The mean TWA respirable quartz concentrations were 1.24 mg/m3 (range 0.35–11.50). There was association with age and silicosis but there were no assosiation with working duration at the same enterpireces, total worked years in dusty places , working department and silicosis.

Conclusions :

In this study the association between working duration ,working department and silicosis could not shown.This could be partly explained by worked years was ≤ 5 years for 80.5 % of the workers. On the other hand there was a clear association between age and silicosis.

This results support rapid workers circulation in enterprices(young workers and short working duration) and risk for silicosis in workplaces (because of silicotic chancing).

PULMONARY ALVEOLAR PROTEINOSIS INDUCED BY SILICA DUST—A CASE REPORT

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[ID 1838] - *No. 31 in Poster Area*

Because of the rareness of pulmonary alveolar proteinosis, it has not been studied in depth with epidemiologic methods, and no dose-response estimates are available in relation to, for example, silica exposure. It has been suggested that silicoproteinosis is related to heavy exposure to silica over a relatively short period of time. This study reports the first Finnish case of pulmonary alveolar proteinosis induced by silica dust.

The patient was a 58-year-old man who had worked as a drilling machine technician in the test mines for 35 years. He had never smoked or had earlier had any lung disease. According to worksite measurements over the years, his cumulative exposure to silica dust was approximated to be about 10 mg/m^3 × year.

In the spring of 2005 he experienced shortness of breath on exertion. His lung function indicated mild restriction, and his diffusing capacity was significantly reduced. A blood gas analysis showed hypoxia. High-resolution computed tomography of his lungs showed both ground glass opacification and fibrosis with a reticular pattern. Brochoalveolar lavage was performed through bronchoscopy. The microscopic and macroscopic appearance of the lavation fluid indicated alveolar proteinosis. A therapeutic lavage was performed for both lungs; thereafter the symptoms improved to some extent.

This patient had a documented history of heavy exposure to silica dust over a long period, but he did not have any signs of silicosis. However, he developed classical symptoms and signs of alveolar proteinosis. It seems possible that silica not only induces acute silicoproteinosis, but also chronic pulmonary alveolar proteinosis without silicosis.

SILICOSIS AND RENAL DISEASE: INSIGHTS FROM A CASE OF IG-A NEPHROPATHY

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[ID 1915] - *No. 32 in Poster Area*

Introduction. Research about silicosis suspects the pathological activation of immune system as a cornerstone of silica-related diseases. We report a case, with previous silica-dust exposure and no history of lung disease, where silicosis and IgA nephropathy were simultaneously diagnosed.

Case report. A 68-year-old male, smoker, was admitted to our hospital in October 2005 for proteinuria (2800 mg/24h) and reduced renal function (serum creatinine 2 mg/dL, GFR 35 ml/min). Actually renter, he started working 20-year-old as a miner in a sandstone cave. Despite high levels of silica dusts in the work environment, he reported no mandatory use of airways protection devices during the first 25 years of activity. He had annual medical examinations, stating no clinical or radiological signs of silicosis or pneumoconiosis until the year of retirement (1997). Lung function tests were unavailable.

Urinalysis on admission confirmed nephrotic-range proteinuria, microematuria, RBC casts and granular casts. Determination of sedimentation rate (91 mm/h), C reactive protein (35 mg/L) showed a pro-inflammatory status. High serum IgA was found (465 mg/dL). A renal biopsy identified mild glomerular sclerosis with IgA deposition, signs of diffuse vasculitis and tubular atrophy, all suggesting a diagnosis of IgA nephropathy.

Chest X-Rays at admission showed emphysema and diffuse nodularity, mainly in the upper right fields, suggesting active silicosis. Chest tomography was positive for mild signs of silicosis without honeycombing, and recognized suspected silicotic nodules.

Discussion. IgA nephropathy is the most common type of glomerulonephritis worldwide. Several clues suggest a genetic or acquired abnormality of immune system as a trigger of the increased production of IgA. Actually, also silicosis progression is suspected as an “immune disease”. The simultaneous kidney and pulmonary involvement could suggests the same pathogenetic cascade, following exposure to virus, bacteria or environmental agents able to induce IgA synthesis and pulmonary immune system activation.

OCCUPATIONAL ASTHMA

A PROPOSAL FOR GUIDELINE FOR PREVENTION OF ALLERGIC OCCUPATIONAL ASTHMA-IN CONFORMITY WITH THE GLOBALLY HARMONIZED SYSTEM OF CLASSIFICATION AND LABELING OF CHEMICALS(GHS)-

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[ID 41] - *No. 33 in Poster Area*

The use of chemical products to enhance and improve life is a widespread worldwide practice. Alongside the benefits of these products, there is also the potential of chemicals for adverse effects to people or the environment. As a result, a number of countries or organizations have developed laws or regulations over the years that require information to be prepared and transmitted to those using chemicals, through labels or Safety Data Sheets (SDS). Their differences are significant enough to result in different labels or SDS for the same product in different countries.

In July 2003, United Nations (UN) recommended ‘Globally Harmonized System of classification and labeling of chemicals (GHS)’. However, GHS document does not list sensitizers in conformity with GHS respiratory and skin sensitization criteria.

We reviewed the chemicals including sensitizers proposed by ACGIH in USA, MAK in Germany, OEL in Japan, the association of Contact Dermatitis, several papers and so on. We, Special Committee of Japanese Society of Occupational and Environmental Allergy proposed ‘Guideline for prevention (primary, secondary and tertiary prevention) of allergic occupational asthma’ and ‘Sensitizers (n=60) causing occupational allergy in conformity with respiratory and skin sensitization criteria of GHS. We would present guideline in detail. Among the guideline, primary prevention might be most critical.

We should propose these 60 sensitizers to the chemical industry associations and government to control, regulate and label them in each country. We organized the new special committee of classifying sensitizers in Japan Society for Occupational Health this year and would revise sensitizers and expand them.

ASTHMA DUE TO PERSULPHATE SALTS USED BY HAIRDRESSERS

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[ID 303] - *No. 34 in Poster Area*

INTRODUCTION: Persulphate salts are standard constituents of hair bleach. In literature they have been reported to cause occupational asthma in hairdressers.

The aim of this study was to single out which persulphate salt is the main cause of occupational asthma in a group of hairdressers.

METHODS: A group of 26 hairdressers with respiratory symptoms exposed to various hair products was studied. The mean age of the studied population was 27.7 ± 8.40 years and the mean seniority of workers doing specific tasks was 9.6 ± 6.65 years. All subjects were assessed by means of a physical examination, skin prick tests and lung x-rays, pulmonary function test, non-specific and specific bronchial provocation tests with hair bleach. The different persulphates (ammonium, sodium and potassium persulphate, sodium laurilsulphate) were tested in some cases when the bronchial provocation tests with hair bleach was positive.

RESULTS: All hairdressers reported respiratory symptoms. Persulphate prick tests tested in 21 subjects showed a skin sensitivity in 6 subjects (28.5%) (4 sodium, potassium and ammonium; 1 ammonium and potassium; 1 sodium and potassium). The pulmonary function test was normal in 24 subjects.

Non specific bronchial tests with methacholine and specific bronchial provocation tests using hair bleach showed a positive response in 9 subjects (34.6%): in 5 cases was an immediate response and in 4 cases was a late one.

In 7 out of 9 subjects who had positive response to specific bronchial provocation tests reactivity to different persulphates was studied. The specific bronchial provocation test with ammonium persulphate showed a positive response in all subjects, while the specific bronchial provocation test with potassium persulphate was positive in only 5 cases.

In 4 cases an immediate response was observed (3 positive to ammonium and potassium persulphate; 1 only positive to ammonium persulphate) and a late response resulted in 3 cases (2 positive to ammonium and po-

tassium persulphate; 1 only positive to ammonium persulphate).
All cases showed a negative response to sodium persulphate and to sodium laurilsulphate.
DISCUSSION: In the studied group asthmatic haidressers were all sensitized to ammonium persulphate. In some cases a sensitization to potassium persulphate was associated while sodium persulphate and sodium laurilsulphate seem less important in inducing causing occupational asthma in haidressers. Results confirm that the specific bronchial provocation test with hair bleach or with single persulphate salts is the gold standard for the diagnosis of occupational asthma in hairdressers. Prick tests often showed a negative response in subjects with persulphate bronchial reactivity too. In our group of hairdressers the positiveness of persulphate prick tests was associated with an immediate response to specific bronchial provocation test, while when a late response occurred the prick tests was negative.

MORPHOLOGICAL AND BIOCHEMICAL CHANGES (CYTOKINES: IL-5, IL-4 AND IL-18) IN INDUCED SPUTUM OF PATIENTS WITH OCCUPATIONAL ASTHMA DUE TO GRAINS AND FLOURS EXPOSURE.

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[ID 517] - *No. 35 in Poster Area*

Background: the aim of the study was to determine the levels of cytokines, such as: IL-4, IL-5 and IL-18 and to analyse the proportion of cells in induced sputum before and after the provocation with occupational allergens (grains and flours).
Methods: 30 subjects (farmers and bakers) with work-related symptoms participated in the study. All subjects had physical examination, skin prick tests (SPTs) with common and occupational allergens, total serum IgE level, specific anti-allergens IgE, spirometry before and after the inhalation challenge test with allergens. Cytokines levels were measured before and after the specific challenge test.
Results: All allergic patients reported respiratory symptoms induced by contact with occupational allergens after the specific provocation. The significant increase in the proportion of eosinophils in the induced sputum of occupational allergic subjects was observed after the specific challenge test from 3.28% before to 11.0% -at 24 hr after ($p < 0.05$). The provocation with allergens induced remarkable changes in bronchial reactivity to histamine (PC20) in all the asthmatic patients ($p < 0.05$).
There were significant increases in the levels of IL-5 and IL-4 during the late phase of allergic reaction after the specific provocation test [(Mean)–9.05 vs 3.2 and 0.12 vs 0.004 pg/mL, respectively]. IL-18 level was lower after the challenge: 104.7 before to 54.4 pg/mL. The levels of IL-4 and IL-5 correlated with the proportion of eosinophils estimated at the same time point.
Conclusions: The results indicate the involvement of cytokines 4 and 5 in the development of occupational asthma due to flours and grains exposure. Our results confirm the important role of eosinophils in the pathogenesis of occupational airway allergy due to high-molecular-weight allergens.

ALLERGY TO LABORATORY ANIMALS AMONG POLISH VETERINARY STAFF.

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[ID 518] - *No. 36 in Poster Area*

Background: this study determine the prevalence of work related symptoms and immediate hypersensitivity to fur allergens among polish veterinary staff occupationally exposed to laboratory animals, such as; rats, mice, hamsters, rabbits and guinea pig.
Methods: 132 veterinarians working in local veterinary clinics participated in the study. All subjects had physical examination, skin prick tests (SPTs) with common and occupational allergens (dander of rats, mice, rabbits, guinea pigs, hamsters) and dander of dog and cat; total serum IgE level, specific anti-allergens IgE to laboratory animals. The symptoms were considered to be work-related, if they appeared in a sensitized worker in connection with any special laboratory animal and improved during weekends.
Results work-related symptoms, such as: nasal and ocular were reported most frequently:38 subjects (28.7 %) vs 32 (24.2 %); respiratory symptoms such as cough were presented by 12,8 % of subjects and dyspnoea by 6 %. The mean duration of occupational exposure was 13.2 + 8.4 years. Eighty one subjects (61,3 %) revealed positive SPTs with any inhalant common allergens, and 58 participants (43.9%) reacted to animal fur extracts. IgE specific for occupational laboratory animal allergens were seen in the serum of 43 subjects (32,5 %). Active smoking was reported by 28 % of subjects, smoking in the past by 27,9 % respectively. Step-wise logistic regression analysis confirmed the protective role of female gender against the development of sensitivity to occupational allergens. The same analysis performed for occupational sensitivity did not confirm a significant role of positive SPTs to common allergens (0R 0.94; 95 % CL 0.43-2.04) and to cat and dog allergens (0R 1.18; 95 % CL 0.39-3.61 and OR 1.37, 95 % CL 0.29-7.30). Occupational asthma was diagnosed in 16 subjects (8,3%), rhinitis and conjunctivitis in 16 and 18% of persons, respectively.
Conclusions: veterinarians are exposed to a variety of allergens from animals, occupational rhinoconjunctivitis was reported by Polish veterinarians more often than occupational asthma.

MANAGEMENT OF WORK-RELATED ASTHMA

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[ID 925] - *No. 37 in Poster Area*

Asthma is now the leading respiratory occupational disease in industrialised nations. Aproximately 15% of asthma in adults is assumed to be of occupational origin and almost 90% of this is claimed to be caused by allergy. The term occupational astma (OA) comprises cases of new-onset asthma induced by occupational factors. The term work-related asthma (WRA) in addition encompass cases of previous asthma aggravated by occupational factors.
In a community study in 2004, in the middle part of Norway (popul. approx. 650 000) of workers aged <55y who had been on doctors' notified sick leave >16days due to asthma, 70% of the 591 respondents to a questionnaire (responserate 72%) fulfilled our criteria for wra. The criteria were positive aswers to the questions: "Have you ever had (specified) respiratory symptoms in relation to your work? Did the symptoms improve on absence form work?", These questions have previously been used in epidemiological studies both in Norway and elsewhere.
Women were more at risk than men, whereas both current and ex-smokers had reduced risk. 39% of the respondents had changed their job due to asthma.
Exposure
Among the cases the most prevalent trades for women were health and social workers (22%), cleaners (11%), workers out of doors (10%) and teachers (10%) and for men: building and construction workers (16%), workers out of doors (15%), various industry (14%) and welders (13%). The most common provoking factors (first choice) in women were indoor climate (26%), strain (physical and psychological) (11%), organic dust (10%), inorganic dust (8%), and fumes and gasses (8%) and in men: inorganic dust (25%), welding fumes (12%), indoor climate (10%), and organis dust (10%).
Current evidence based guidelines for management of OA advice early avoidance of further (specific) exposure for cases with allergic astma and avoidance of further peak exposure for cases with RADS.
Our results indicat that for workers with WRA other than OA ans RADS, a reduction of unspecific factors like dust, fume, and strain are also indicated as well as improvement of indoor climate in buildings where asthmatics work.

MOULD-INDUCED ASTHMA

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[ID 962] - *No. 38 in Poster Area*

Introduction: Epidemiological studies show an association between exposure to indoor-air moulds and the risk of new-onset asthma. Except for uncommon IgE-mediated sensitization, the possible mechanisms behind mould-induced asthma are not well understood. We describe three cases of mould-induced asthma.
Methods: Patients were referred to the Finnish Institute of Occupational Health because of work-related asthma-like symptoms with evidence of moisture-damage and microbial growth in the work-place. Investigations included assessment of the work-place with identification and quantitative analyses of fungal species.

Diagnostics comprised evaluation of occupational and medical history, lung function tests, serial peak-flow measurements, and specific inhalation challenge testing (SICT). For SIC-testing, the species predominantly present at the work-place were chosen. Only three mould extracts were available: Aspergillus fumigatus, Cladosporium cladosporioides and Acremonium kiliense.
Results: A dental hygienist exposed to A. fumigatus with normal histamine reactivity, positive bronchodilatation test and positive serial PEF-measurements, showed a delayed FEV1-decrease of 23% in SICT. A flight-traffic-monitor was exposed to C. cladosporioides for six months. She displayed a slight bronchial hyperreactivity, serial PEF-measurements were indicative only, but in SICT there was an immediate drop in FEV1 of 27%. A school-assistant was exposed to various moulds including A. versicolor and Acremonium. Serial PEF-measurements showed marked variations at working days with a slight hyperreactivity. SICT with Cladosporium and A. fumigatus were negative. With Acremonium there was a delayed decrease in FEV1 of 25% and in PEF-values of 29%.
Conclusions: Exposure to microbes in water-damaged buildings may induce occupational asthma. The paucity of well-documented cases in the literature may indicate that workers with work-related respiratory symptoms in water damaged buildings rarely become thoroughly investigated and the possibility of occupational asthma is probably over-looked. Although SICT seems to be a reliable diagnostic tool, a major constraint is that mould extracts are commercially available for a few species only.

EFFECT OF CLOTH DUST EXPOSURE TO RESPIRATORY SYMPTOM AMONG WORKERS IN SEWING UNIT, PRINCE OF SONGKLANAGARIND UNIVERSITY HOSPITAL, THAILAND

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[ID 1271] - *No. 39 in Poster Area*

This comparative cross-sectional study is based on 22 cases of workers in cloth-sewing unit and 22 controls who worked as housekeepers and cleaners at Prince of Songklanagarind university hospital. The aim of the study was to describe the concentration of cloth dust in working environment and the prevalence of respiratory symptoms among cloth-sewing workers in comparison with those among control group. All 44 subjects underwent the following test -interviewed questionnaire, chest X-ray, lung function testing, skin prick test with cloth dust extract, methacholine challenge test. After walk through survey, the cloth dust were measured with vertical elutriator using consecutive samples for partial period method.
The concentration of total and respiratory dust analyzed gravimetrically were 0.68±0.04 mg/m^3 and 0.52±0.06 mg/m^3 consecutively which were within safe-limited value while cloth dust assessed by elutriator showed a higher exposure level than standard level of 0.34±0.09 mg/m^3. Among the workers in sewing unit, two (9.1%, 95%CI –2.9, 21.1) have been diagnosed occupational asthma and two (9.1%, 95%CI –2.9, 21.1) had positive skin prick test. The high prevalence of mucous membrane irritation of 81.8% (95%CI 65.7, 97.9) among study group and 59.1% (95%CI 38.6, 79.6) among control group was reported. No irritant bronchitis cases were diagnosed. We also follow-up the workers who resigned from sewing unit were also assessed in order to avoid healthy worker effect.
The specificity of diagnosis criteria under study and the above limited level of cotton dust may allow to conclude with clinical confidence at some extent that exposure to cloth dust may cause occupational asthma and MMI in sewing unit workers, though not statistically significant.

EFFECT OF AMMONIUM PERSULPHATE EXPOSURE ON NON-ADRENERGIC, NON-CHOLINERGIC (NANC) INHIBITORY CONTROL IN THE GUINEA PIG AIRWAYS.

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[ID 1657] - *No. 40 in Poster Area*

We aimed to evaluate the effect of repeated exposure to ammonium persulphate, a well known causative agent of occupational asthma, on NANC inhibitory innervation of guinea pig airways. Male guinea pigs were exposed to ammonium persulphate, by inhaling aerosols of an aqueous solution at a concentration of 1 mg/m^3 for 30 minutes for 5 days for three weeks. Control animals inhaled saline aerosol. Twelve hours after the last exposure, the animals were killed and the trachea removed, cleaned, cannulated at each extremity and horizontally mounted in an organ bath containing Tyrode solution, and maintained at 37 °C. The lumen of the isolated trachea was filled with the same solution and the intraluminal pressure variations were measured by means of a pressure transducer connected to an extremity of the tracheal segment. The nerve-mediated inhibitory NANC responses to electrical field stimulation (EFS) were evaluated in the presence of hyoscine to block contractions. Frequency-response curves (3 to 10 Hz) were obtained. In order to evaluate both the amplitude and the duration of the responses, the area under the curve (AUC) was measured as Pa · seconds. Statistical analysis, was performed by analysis of variance. The data are reported as mean ± SE residual percent relaxant response in exposed individuals, as compared to controls. In the exposed individuals, the in vitro NANC relaxations to EFS at 3, 5 and 10 Hz were significantly reduced ($P < 0.01$). In particular, the AUC was 45.9 ± 12.1%, as compared to control at 3 Hz, 47.2 ± 12.4% at 5 Hz and 52.7 ± 14.1% at 10 Hz. Our data show that exposure to ammonium persulphate at high concentrations impairs the nervous NANC inhibitory control in the guinea pig airways. A reduced NANC relaxation may represent one of the mechanisms subserving airway hyperreactivity due to occupational agents.

EVOLUTION OF THE CLINICAL PICTURES OF OCCUPATIONAL ASTHMA DIAGNOSED BY THE INSTITUTE OF OCCUPATIONAL HEALTH OF THE UNIVERSITY OF BRESCIA IN THE PERIOD 1993-2004

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[ID 1684] - *No. 41 in Poster Area*

Introduction
Data of the literature show that the prognosis of Occupational Asthma (OA), either allergic or irritant, after removal of the workers from exposure frequently is not favourable regarding the complete recovery of symptoms.
Aim
In this study 75 patients with OA (64 allergic and 11 irritant asthma), visited in the period 1993-2004, have been considered, evaluating the evolution of the clinical pictures, in the relation to atopy, etiology, pathogenesis, therapy and preventive measures adopted. For the diagnosis of occupational asthma we referred to the Guidelines of the Subcommittee on Occupational Allergy of the European Academy of Allergology and Clinical Immunology (1992)and memorandum SIAIC (Italian Society of Allergology and Clinical Immunology) on “Diagnosis of occupational asthma” (2000). Objectives of this study were also to determine whether patients with OA have their quality of life affected (and if so, to evaluate the extent of this) and to verify the number of case recognised and compensated as occupational diseases by INAIL (the National Insurance Institute).
Methods
Every patient was contacted by phone and invited to join our Institute for a free of charge medical examination and lung function tests.
Using a questionnaire the following data have been collected: job history, gravity of respiratory symptoms including concomitant or past rhinitis, current therapy, smoking habits, eventual INAIL compensation. The possible effects on quality of life have been evaluated by means of a specific questionnaire (Asthma Life Quality questionnaire by American College of Allergy, Asthma and Immunology, modified).
The results of clinical examination and lung function tests have been given to the patients and, if necessary, a specific therapy was prescribed.
Results and conclusion
Complete information about the follow-up examination will be available at the time of the presentation. About 70% of the contacted workers intended to join the programme; the main part of those who refused the control

declared to be asymptomatic or to have changed their job.
Preliminary results of this investigation show that the adoption of preventive measures such as removing from exposure or substantial environmental interventions, generally allow a complete recovery of the clinical picture. However, the only adoption of individual preventive devices does not permit any health improvement for those workers who are still exposed. INAIL compensation was given to about 20% of subjects controlled up to the present and quality of life was only weakly compromised in most cases still sympthomatic.
N.B. Complete information about the follow-up examination will be available at the time of the presentation

SENSITISATION TO ENZYMES IN FLOUR IMPROVER

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[ID 1844] - *No. 42 in Poster Area*

Enzymes are now widely used in the baking industry for their ability to effect chemical changes in a range of substrates. However, these proteins have also been reported to be potent respiratory sensitisers in the workplace. There are few reports in the scientific literature, which highlight the potential of commonly used enzymes to induce sensitisation other than fungal alpha amylase. The objective of this study was to investigate any association between work-related respiratory symptoms in bakers and sensitisation to enzymes.
225 workers were randomly selected from 20 craft bakeries and completed a respiratory questionnaire. 182/225 workers provided serum for RAST testing to bakery allergens including wheat flour and enzymes (fungal alpha amylase, bacterial amylase [amylase], hemicellulase, cellulase, xylanase [mix 1], glucose oxidase and amyloglucosidase [mix 2]) and to common inhaled allergens (atopy/IgE).
20/165 (12%) bakers had specific (sp) IgE to wheat flour and 51/182 (28%) atopy. 12/162 (7%) had sp.IgE to one or more enzyme, and of these 8/12 (66%) had sp.IgE to fungal or bacterial amylase, 1/12 to amylase and mix 1 and mix 2, and 3/12 (25%) to mix 2 only. Furthermore there was a significant relationship between the appearance of upper work related symptoms (specifically eye or nasal symptoms) and the presence of sp.IgE to mixed enzymes (p=0.006 and p=0.011 respectively).
In the last few decades, enzymes have been introduced in the baking industry. Although many studies have focused on the potential of fungal alpha-amylase as a causative agent of respiratory problems, there is little information about other enzymes used. In this study, we have demonstrated that 7% of the bakers studied had sp. IgE antibodies to one or more of the enzymes studied, and that the presence of work related eye and nasal symptoms was associated with the presence of specific IgE to enzymes.

COBALT ASTHMA—A CASE SERIES FROM A COBALT PLAN

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[ID 1912] - *No. 43 in Poster Area*

Between 1967 and 2003, altogether 22 cases of cobalt asthma were diagnosed among workers in the Kokkola cobalt plant in Finland and confirmed with specific provocation tests (CoCl, CoSO4 or cobalt dust). The incidence correlated with the exposure levels of cobalt in the workplace. The mean exposure time before the diagnosis averaged 5.9 (range 1–20) years. The 22 employees with asthma worked in departments where SO2, H2S and NH3 were present in the ambient air. Therefore, it seems that an irritating effect on the airways enhances sensitization to cobalt.
The mean age of the patients at the time of diagnosis was 45.8 years, the mean latency before diagnosis being 7.4 years. About one-third of the patients were non-smokers. Only a few of the patients were atopic. Altogether 12 of the 22 patients were administered skin prick tests to cobalt, and all of the tests were negative. All of the patients complained of shortness of breath; wheezing, cough, and rhinitis were also common. Half of the patients had symptoms at work or after the workshift, and about one-third had symptoms at night. Most of the patients had only a mild degree of airflow obstruction, and hyperreactivity of the airways was present in about 77%. Mostly late or dual asthmatic reactions were encountered in the specific bronchial provocation tests.
Of the 22 patients, 10 underwent a control examination 6 months after their diagnosis. None of them were still exposed to cobalt, two-thirds reported feeling better, and one-third felt the same. The hyperreactivity of the airways was generally still the same, as was the mild obstruction of the airways.

INDOOR AIR QUALITY AND HEALTH

SICK BUILDING SYNDROME AMONG OFFICE WORKERS IN BANGKOK, THAILAND

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[ID 218] - *No. 44 in Poster Area*

Introduction: As the indoor environmental problems seemed to increase and adversely affect the well-being of office workers, this study aimed at determining the prevalence, associated factors and impact of sick building syndrome among office workers in Bangkok, Thailand.
Methods: Study samples were 1,417 office workers in 21 offices, selected by cluster random sampling from 5 air–conditioned of government / state enterprise healthy buildings. The data were collected by a self-administered questionnaire. Associated factors were analyzed by logistic regression models comparing sick building syndrome cases and healthy office workers.
Results: 1,064 out of 1417 (75.1 %) questionnaires were returned. The overall prevalence of sick building syndrome was 20.6 % of the respondents. Most symptoms were mucous membrane irritation (16.2%). Base on multiple logistic regression analysis, it was found that the following factors: female, having underlying diseases such as atopy, working with office equipment, using computer more than 4 hours per day, unhealthy psychosocial work climate, sitting near office machine, and ergonomic problems, were statistical significantly associated with sick building syndrome. In addition, three-fourths of the cases reported work disruption.
Conclusion: Sick building syndrome is a common problem among office workers in Bangkok. The prevention of this problem should be holistic which related to personal factors, work characteristics, and work environment.

PREVENTION OF ILL-HEALTH EFFECTS OF STRESS AND LIFESTYLE (PART 26) RELATIONSHIP AMONG SICK BUILDING SYNDROME, VOLATILE ORGANIC COMPOUNDS, AND LIFESTYLE

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[ID 580] - *No. 45 in Poster Area*

Objectives
To examine the association among symptom of sick building syndrome (SBS), volatile organic compounds (VOC), and lifestyle in newly built dwellings in Japan.
Materials and Methods
A self-reported questionnaire for SBS and indoor environment survey was conducted among 78 newly built dwellings in Japan at 2003. The questionnaire consisted of 31 items for symptom of SBS and lifestyle. VOC in air of family room were collected by passive sampler, and measured using gas chromatography-mas-spectrometry. Means and standard deviations (SD) of concentration of VOC by symptom of SBS (symptom positive / symptom negative) were analyzed using Mann-Whitney-U test. Odds ratio (OR) and 95% confidence interval (CI) for symptom of SBS were calculated using qui-squared test and logistic regression analysis.
Results:
Mean concentration of TVOC, Limonene, and n-Heptane of symptom positive was significantly higher than that of symptom negative in females. Mean concentration of o,m-Tolualdehyde, 2-Pentanone, Tetrachloroethylene and n-Decane of symptom positive was significantly higher in males. Though, that of n-Heptane, Acetaldehyde, and Acetone of symptom positive was significantly lower in males. The OR and 95% CI for symptom of SBS by total VOC (400 µg/m3 or more / less than 400) were 3.66 (1.12 - 11.92) in female. The OR for symptom of SBS by logistic regression analysis is not significant after controlling for age, gender, and significantly associated lifestyle factors (feeling of sufficient sleeping hours, alcohol consumption, and working hours)
Conclusion
TVOC, Limonene, and n-Heptane might positively associated with symptom of SBS in female, and o,m-Tolualdehyde, 2-Pentanone, Tetrachloroethylene, and n-Decane might positively associated in male.

SICK HOUSE SYNDROME OCCURRING AT WORKPLACE: CLASSIFICATION AND PLACES OF ONSET

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[ID 611] - *No. 46 in Poster Area*

[Objective] In Japan, sick house syndrome includes sickness induced by environmental factors at not only residences but also workplaces. The medical definition of sick house syndrome (SHS) has not been clearly established. For the first step to establish the definition of SHS, we proposed the classification based on clinical records.
[Methods] Clinical records describe demographic variables and places of onset. A total of 222 cases of SHS are classified into 4 categories: type 1 (onset of symptoms after intoxication by chemicals), type 2 (onset of symptoms after exposure to chemicals), type 3 (onset of symptoms without exposure to chemicals), type 4 (onset of symptoms due to other disease such as allergies). Three clinical ecologists and three general physicians independently classified the cases suspected to have SHS using this new criteria for classification. In addition, we combined types 1 and 2 patients as 'SHS caused by chemicals', and types 3 and 4 as 'others'. The relations between 'SHS caused by chemicals' and possibility of multiple chemical sensitivities (MCS) evaluated by Quick Environment Exposure Sensitivity Inventory score were examined.
[Results/Discussion] The percentage of cases that developed SHS at workplaces was 15.8%, following that which occurred at residences (37.4%). The most prevalent workplace where cases of SHS were observed was office. Under the classification of SHS, we did not have many unanimous cases. If the majority decision is adopted as the confirmed diagnosis for patients by clinical ecologists or general physicians, there was a 73.7% consensus for the classification of patients by clinical ecologists and general physicians. It is suggested that we can classify patients having SHS into 4 categories. For male patients, 'SHS caused by chemicals' and possible MCS were significantly related, but not for female patients.
[Conclusion] The proportion of SHS cases occurring at workplaces ranked second to that developing at residences.

A QUALITATIVE APPROACH TO OCCUPATIONAL BIOAREOSOL MONITORING: MOLECULAR IDENTIFICATION OF MYCETES

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[ID 1181] - *No. 47 in Poster Area*

Qualitative studies aimed to characterize both environmental and occupational airborne microrganisms are very scarce, while the taxonomic identification of bacteria and mycetes is more and more frequently performed in clinic microbiology, when specific infective agents must be detected in human or animal biological matrices.
Nevertheless, eco-microbiological characterizations of occupational contexts might be fundamental for biohazard knowledge and risk assessment. Airborne mycetes identification is traditionally achieved by means of morphological description of spores and colonies on agarized plates, since physiological plasticity of many species makes frequently unreliable biochemical identification assays.
Moreover, identifications based on morphology analysis may be also influenced by subjective interpretation of data.
Molecular taxonomy of organisms, often based on PCR amplification and sequencing of partions of genes, can partly overcome the above mentioned limits. Despite this, recombinant DNA technology (largely used nowadays in clinical field) is still scarcely applied to investigate occupational biocontamination.
In order to characterize biohazard in different workplaces, we performed a combined approach to mycetes identification, here preliminarly discussed. This approach is based on combination of morphological description of colonies grown on agarized plates, microscopic description of the fungal structure using LPCB and partial nucleotidic sequencing of ribosomal LSU.

HIGH LEVEL OF INDOOR 2-ETHY-1-HEXANOL REMAINED IN BUILDING FOR MORE THAN FIVE YEARS

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[ID 1553] - *No. 48 in Poster Area*

Objective
A female professor developed chemical hypersensitivity after suffering from sick building syndrome due to high concentration of volatile organic compounds (VOCs) in the meeting room of her university building. The main VOC of the building was 2-ethyl-1-hexanol (2E1H) suspected to be emitted through hydrolysis of plasticizer, mainly 2-diethylhexyl-futarate (2DF) in the backing of floor materials. Because of several complaints from stuffs and students, the university made an attempt to decrease the 2E1H concentration by removing the surface concrete bed and floor materials and replacing with new concrete and plasticizer free floor. We aimed at demonstrating the changes in the concentration of 2E1H before and after the replacement of the floor materials.
Materials and Methods
We sampled indoor air 41 VOCs and carbonyl compounds with active and diffusion samplers, extracted VOCs and carbonyls derivatized with dintrophenylhydrides in the samplers respectively. Quantification of VOCs and aldehydes was carried out with GCMS and HPLC respectively. We observed the changes of the several rooms of the university.
Results and Discussion
We have measured indoor air concentrations of 2E1H in the meeting room of the building for three years. The concentration of the meeting room and one of the seminar rooms have been 400 - 1900 ug/m3 in summers and 200 - 400 ug/m3 in winters. The building was completed three years before the first measurement so the concentration has been in similar level for several years. After the replacement of the floor, the concentration of the indoor air in the meeting room decreased. The replacement of the floor improved the indoor air by removing the plasticizer, the source of 2E1H.

ASSESSMENT OF LUNG CANCER RISK ASSOCIATED WITH OCCUPATIONAL EXPOSURE TO RADON IN BANK WORKERS.

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[ID 1796] - *No. 49 in Poster Area*

Background: Bank buildings are characterised by an elevated number of underground floors and spaces, generally used as strong-rooms or as strong-box and safe-deposit rooms, that can be easily infiltrated by radon present in the soil. Since radon is a well known carcinogenic agent for human lungs, radon exposure may represent an important potential risk factor for bank workers.
Aim: to assess lifetime lung cancer risk due to occupational radon exposure in bank workers.
Methods: Radon concentration was measured with Cr-39 dosimeters at annual and quarterly intervals in ground and underground floors of 134 bank buildings distributed among 7 regions in the North, Centre and South of Italy. Regional mean concentrations obtained in the National Residential Survey conducted by the National Institute of Health (Bochicchio et al.) were considered as reference for residential exposure. Taking into account the daily average time of permanence of the workers in ground and underground floors, cumulative annual occupational doses of radiation were calculated and compared to the corresponding residential values of the area. Lifetime risk of lung cancer was then evaluated with a risk model that involves (based on WHO standardization) a population life expectancy of 70 years, a lifetime working period between 18 and 65 years of age and a total of 2,000 working hours per year.
Results: The annual cumulative time typically spent by bank workers in underground levels and in the ground level of the buildings was estimated to be 120 hrs and 1880 hrs, respectively.
Without considering occupational exposure, maximum and minimum values of average lifetime risk were reached in the regions with respective-

ly maximum and minimum average residential concentrations (119 Bq/m^3 corresponding to 14.7 · 10^{-3} unit risk, 35 Bq/m^3 corresponding to 4.4 · 10^{-3} unit risk). The relative contribution of occupational exposure to overall lifetime risk was found to be proportionally high in regions where residential concentrations are low, while occupational exposure may determine even a decreased overall lifetime risk in the areas where residential concentrations are high.
Significant absolute lifetime risk increase due to occupational exposure was only observed when very high concentrations were present at the underground levels (peak level observed = 2,564 Bq/m^3). Consequently, as prescribed by the Italian law, organisational and technical interventions were adopted to reduce levels in every workplaces to a maximum level of 500 Bq/m^3.
Conclusions: the study confirmed that key determinants of occupational radon exposure for bank workers are represented by radon concentration in the premises and the work time spent in underground floors. The contribution of occupational exposure to individual lifetime cancer risk is also strictly dependent on the residential concentrations present in the area where the building is located.

CARDIOVASCULAR EFFECTS OF SHORT-TERM EXPOSURE TO URBAN PARTICULATE MATTER – THE PM-CARE STUDY

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[ID 1801] - *No. 50 in Poster Area*

Introduction: Increase in daily exposure to airborne particulate matter (PM) in urban settings has been found to be quickly paralleled by an increased cardio-respiratory morbidity and mortality, particularly in certain subsets of the population. Several plausible mechanistic pathways have been postulated to be responsible for the action of PM, including an increased propensity for arrhythmias, acute arterial vasoconstriction, decreased lung-function, enhanced coagulation/thrombosis, and systemic inflammation.
Aim: to investigate the pathogenetic mechanisms of cardiovascular and respiratory effects induced by changing personal daily exposure to urban particulate pollution (PM-CARE study).
Methods: Three panels of non-smoking adult subjects (mean-age=63; N=79), 34 with cardiovascular disease (heart group), 18 with chronic lung disease (COPD or asthma) (lung group) and 27 healthy subjects matched by age (control group) were recruited from the patients community of L. Sacco and S. Gerardo hospitals. Each subject was investigated at home for one day during and after its habitual activities in summer 2005 and subsequently will repeat the same protocol in winter 2005/2006. Investigations consist of daily symptom/activity recording; continuous 24h-monitoring of cardiovascular, respiratory and environmental parameters [including 24h-Holter-ECG monitoring and repeated assessment of blood pressure (BP)]; respiratory function evaluation; and measurement of blood biomarkers of inflammation and cardio-respiratory injury.
Results: Being the study in progress, only partial results are so far available. Provisional findings include:
- abnormal Holter-ECG: 14% low mean-HR in the heart panel; reduced RR-variability: 28% in heart panel, 33% in lung panel, 12% in control; both low mean-HR and reduced RR-variability: 14% in heart panel;
- increased BP: elevated systolic BP: 13% in hearth panel– 22% in lung panel– 18% in control; elevated systolic and diastolic BP: 4% in control.

The collection and analysis of results will be completed in the next months. The clinical results will be complemented with data of lung function, inflammation and blood tests and compared with those of the Winter session for each subject. Moreover, correlation will be examined between clinical parameters and individual PM monitoring results.

FACTORS DETERMINING RADON CONCENTRATION IN UNDERGROUND BANK WORKPLACES.

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[ID 1820] - *No. 51 in Poster Area*

Aim: Recent legislation requires the assessment of workers' exposure to radon for all underground working places. Bank buildings are characterised by an elevated number of underground floors and spaces, generally used as strong-rooms or as strong-box and safe-deposit rooms.
This study was carried out in a representative sample of 134 buildings of the Banca Intesa Group in Italy to develop a reliable and cost-effective method of assessment of radon exposure of the workers.
Methods: Radon concentration was measured annually and quarterly in underground and ground working rooms of a sample of 134 bank buildings with different dosimeters. A technical card was compiled for each measured room recording geographic location, dimension, use destination, air exchange, use destination, and constructions features (windows, holes, doors, roof and walls). These parameters were utilized in a multiple regression analysis to identify the environmental variables significantly determining radon concentrations indoors. The reproducibility of measurements and the comparison of performance among different dosimeters were also tested.
Results: More than 1,800 radon measurements were performed and analysed. Reproducibility of the measurement was good with the same dosimeter, but scarce when changing type of dosimeter or time of sampling. Seasonal variability of radon concentrations determined higher values in Winter versus Autumn (+15%) and in Spring versus Summer (+35%), while Winter and Spring were similar (3%). Ground floor concentrations showed a fair relation with underground concentrations (R^2=55%). Among environmental determinants of radon concentration, the most important factor was found to be the geographical location. Absence of openings, bordering walls in direct contact with earth, and small dimension of the rooms were other factors positively associated with radon concentrations.
Conclusions: The study showed that a reliable radon exposure assessment of workers in bank buildings requires a standardised measurement protocol. Determinant comparability factors of measurements include the type of dosimeter and the time and season of sampling. Buildings with worst case radon concentrations in underground rooms can be predicted on the basis of geographic location and building construction features.

HAEMATOLOGICAL AND LUNG INFLAMMATORY EFFECTS OF SHORT-TERM EXPOSURE TO URBAN PARTICULATE MATTER – THE PM-CARE STUDY

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[ID 1824] - *No. 52 in Poster Area*

Background

Increase in daily exposure to particulate matter (PM) in urban settings contributes to increase acute cardio-respiratory morbidity and mortality, particularly in compromised subjects. Several biological mechanisms have been postulated, including direct effects on cardiovascular system, blood, lung and indirect effects mediated through pulmonary release of oxidative stress agents.

Aim
To understand the mechanisms through which urban air particulate matter causes harmful effects on cardiovascular and respiratory systems.
Method
Three panels of non-smoking adult subjects (mean-age=63; N=79), 34 with cardiovascular disease (heart group), 18 with chronic lung disease (COPD or asthma) (lung group) and 27 healthy subjects matched by age (control group) were recruited from the patients community of L. Sacco and S. Gerardo hospitals. Each subject was investigated at home for one day during and after his/her habitual activities in Summer 2005 and subsequently will repeat the same protocol in Winter 2005/2006. Summer and Winter data will be compared at the end of the survey.
Investigation consisted in daily symptom/activity recording, measurement of heart and lung functions, analysis of biomarkers of cardio-respiratory injury in blood, sputum samples and monitoring of environmental parameters.
Biological samples were collected at the end of 24-h investigation. Blood cells count, Hb-concentration, fibrinogen, PT, aPTT, PF100 and cytological analysis of sputum were measured within a day of sampling; while F1+2, vWF, t-PAI, D-dimer, inflammatory/anti-inflammatory parameters (TNF-α, sR-I and II of TNF-α, IL-8, IL-10), hs-CRP, s-Nt-proBNP in blood and IL-8, TNF-α in sputum will be measured in a large batch at the end of the survey.
Results
Preliminary results of the Summer session showed no significant alterations in blood cell count; mean white blood cells was 5.86 10^3/µl (SD 1.11) for control, 6.63 10^3/µl (SD 1.15) for heart group and 7.11 10^3/µl (SD 1.79) for lung group. Mean plasma fibrinogen concentration (normal value < 400 mg/dl) was 415 mg/dl (SD 89) for control, 437 mg/dl (SD 100) for heart and 500 mg/dl (SD 122) for lung group.
The collection and analysis of results will be completed in the next months. The clinical results will be complemented with data on heart and cardiovascular function and compared with those of the Winter session for each subject. Moreover, correlation will be examined between clinical parameters and individual PM monitoring results.

RESPIRATORY EFFECTS OF SHORT TERM EXPOSURE TO URBAN PARTICULATE MATTER – THE PM-CARE PROJECT
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Introduction: Short-term variation of exposure to particulate air pollution is associated with increased morbidity and mortality in susceptible subjects (COPD, asthma, cardiovascular patients) and onset of respiratory symptoms in healthy subjects.
Several studies have found association between exposure to PM and alterations of ventilatory parameters (e.g. FEV1, FVC, FEF25-75, PEF). Other sources have shown a decrease in haemoglobin 0_2 saturation possibly due to alveolar inflammatory process.
Aim: to investigate the pathogenetic mechanisms of cardiovascular and respiratory effects induced by changing personal daily exposure to urban particulate pollution (PM-CARE study).
Methods: Three panels of non-smoking adult subjects (mean-age=63; N=79), 34 with cardiovascular disease (heart group), 18 with chronic lung disease (COPD or asthma) (lung group) and 27 healthy subjects matched by age (control group) were recruited from the patients community of L. Sacco and S. Gerardo hospitals. Each subject was investigated at home for one day during and after its habitual activities in summer 2005 and subsequently will repeat the same protocol in winter 2005/2006. Investigations consist of daily symptom/activity recording; continuous 24h-monitoring of cardiovascular, respiratory and environmental parameters; respiratory function evaluation; and measurement of blood biomarkers of inflammation and cardio-respiratory injury.
In particular, the respiratory investigations consisted of 24h O_2-Hb-saturation monitoring, final spirometric evaluation (FEV1, FVC, FEV1/FVC), DLCO and blood gas analysis.
Results: Being the study in progress, only partial results are so far available. Provisional findings include:
Overall 18% abnormal spirometry results (19% heart group; 44% lung group). In particular: reduced FVC only: 19% heart, 0% lung; reduced FEV1: 0% heart, 6% lung; reduced FEV1/FVC: 0% heart, 6% lung; FVC&FEV1 both decreased: 0% heart, 6% lung; FEV1&FEV1/FVC both decreased: 0% heart, 17% lung; all parameters reduced: 0% heart, 6% lung; overall 38% desaturation (50% heart, 39% lung; 31% control).
The collection and analysis of results will be completed in the next months. The clinical results will be complemented with data on heart and cardiovascular function, haematology and lung inflammation and compared with those of the Winter session for each subject. Moreover, correlation will be examined between clinical parameters and individual PM monitoring results.

MONITORING PORTABLE STATION FOR THE MEASUREMENT OF FINE AND ULTRAFINE PARTICLE EXPOSURE IN THE PM-CARE PROJECT
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Background: The PM-CARE project aims at investigating the association between variation of urban-air particulate personal exposure and acute cardio-respiratory effects in cardiac and pulmonary patients, focusing on seasonal and activity-related PM exposure variations.
Aim: To set up a mobile air-monitoring unit suitable for personal exposure assessment in the PM-CARE project.
Materials and Methods: Three identical measuring units were constructed, consisting of a 0.12m3 transportable packaged trolley equipped with selected low-weight monitoring devices. The particle number concentrations of PM ranging from 0.02 to 1µm and from 0.3 to 25µm in aerodynamic diameter are continuously detected by two optical counters, whereas the 24h-averaged mass concentrations of PM0.5, PM1, PM2.5 and PM10 are measured through a multistage cascade impactor for gravimetric determination. CO and O_3 levels are monitored by continuous recording instruments, while the mean concentration of NO_2 is measured by passive sampling. Microclimatic probes for temperature and relative humidity complete the equipment.
Results and Discussion: One of the main problems in personal fine and ultrafine PM exposure assessment is to construct a portable monitoring station including complex instruments without excessive burden to the investigated subjects. The instrumental set assembled in the trolleys reached the goal of providing a complete measuring station that can be easily moved by the patients at home and during outdoor displacements without performance failures. The developed station offers a good compromise between accuracy in the PM exposure measurement and portability and reliability of the instrumental set.
Conclusions: The data obtained so far confirmed that the monitoring station fulfils the requirement of the PM-CARE project, since all the subjects under investigations made a proper use of it with a limited technical assistance and the station provided a detailed and reliable picture of personal PM exposure experienced by people in their daily activities at home and during outdoor displacements.

INDUSTRIAL HYGIENE

INDUSTRIAL EMISSION ASSESSMENT AND CONTROL TECHNOLOGY
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[ID 25] - *No. 55 in Poster Area*
1) Objectives: To establish risk assessment for organic solvents in a printing industry; and to come up with control measures for possible environmental pollution disaster from industrial emissions.
2) Methods: The study was conducted in a printing industry with about 400 employees and in a highly populated community. Monitoring of ambient air for various organic solvents was done using detector tubes, sampling pumps and charcoal tubes.
3) Results: The industry as the target area uses solvents such as Ethyl Acetate(EAC), Methyl Ethyl Ketone (MEK), Ethanol, and Isopropyl

Alcohol (IPA) for printing and lamination of plastics. The consumption of solvents is categorized as high with 40-60 tons of mixed solvents per month. Ambient concentration in the work area indicated the following measurements which were all above the thresholds limit value (TLV) set by OSHA:
Workstation Chemical TLV (mg/ m^3) Reading (mg/m^3) Analysis
Workarea 1 EAC 1,400 295,644.6 Exceeded LTV
MEK 590 295,644.6 Exceeded TLV
Workarea 2 EAC 1,400 12,622.8 Exceeded TLV
MEK 590 12,622.2 Exceeded TLV
The results showed that workers were exposed to high concentrations of solvents that may cause disaster such as cancer and reproductive health problems. There is a need therefore to come up with a control device to clean the ambient air- both indoor and outdoor. To do this, an experiment was done using adsorbents- activated alumna and activated carbon were inserted in the ducting system. Measurements were done ourdoor near the exhaust system where air from indoor is emitted. The results were as follows:
Experimental Area
Chemical TLV(mg/M^3) Reaidng (mg/m^3) Analysis % Effectivity
Before Activated Carbon MEK
590 4224.73 Exceeded LTV
PI 1880 31.97 Not Exceeded
EAC 1400 4224.73 Exceeded TLV
After Activated Carbon MEK 590 0.7 Not Exceeded 99.98%
IPA 1880 0.13 Not Exceeded 99.6%
EAC 1400 341.61 Not Exceeded 91.9%
Before Activated Alumina MEK 590 2791.15 Exceeded TLV
IPA 1880 31.97 Not Exceeded
EAC 1400 2791.15 Exceeded TLV
After Activated Alumina MEK 590 188.48 Not Exceeded 93.25%
IPA 1880 2.54 Not Exceeded 92.06%
EAC 1400 188.48 Not Exceeded 93.25%
Results showed that both adsorbent tubes were effective in reducing concentrations of solvent fumes and that the activated alumna was more effective for both MEK and IPA.
4.) Conclusion: The study showed that environmental disaster from solvents in factories can be reduced by using adsorbents in the ducting system as an air control device, This is a significant contribution in preventing disasters both in factories and the surrounding communities.

EXPOSURE OF TANKER DRIVERS TO DIESEL FUEL VAPOURS

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[ID 60] - *No. 56 in Poster Area*

Aim. The pilot study aimed to evaluate tanker drivers' exposure to diesel and motor fuel vapours in various situations in distribution work.

Methods. The occupational hygiene measurements covered all working conditions during 8-10 h work shifts. The loading phase at the depot was equipped with a Stage 1 vapour recovery system. There were no vapour recovery system for diesel and motor fuel vapours at places where offloading took place (i.e. automatic D stations, automatic service stations, private small tanks at farms and firms). The volume of the delivered loads varied from 1-25 m^3.

Breathing zone samples were collected into Tenax TA tubes (Perkin-Elmer ATD-400).

Short term-exposure was measured with active samples (three loadings, nine offloadings). The shift long samples were collected on passive samplers. The hydrocarbons of middle distillates (i.e. diesel and motor fuel) were analyzed using thermodesorption and gas chromatography with ion-specific detection.

Results

Short-term exposure during loading and offloading took on average 24 min (range 5-45 min).

1. Exposure during loading at the depot (n=3, average 27 min) 0.2 - 0.5 mg/m^3.
2. Exposure during offloading at service stations (n=6, average 29 min) 0.1 - 1 mg/m^3.
3. The exposure during offloading into small private tanks (n=3, on average 6 min) 0.9 - 11 mg/m^3.
4. Long-term exposure during work shifts (n=4) <0.2 - 0.3 mg/m^3.

Conclusions

The exposure of tanker drivers to diesel and motor fuel vapours was low compared to the recommended TLV-TWA of 100 mg/m^3 (ACGIH 2002).

The profile of the drivers' exposure to diesel and motor fuel vapours was the same as that in gasoline distribution work but, the concentrations were only a fraction of that, i.e. 0.003 part.

WORK ENVIRONMENT PROFILE (WEP) – A NEW ELECTRIC RISK ASSESSMENT METHOD FOR THE OCCUPATIONAL HEALTH CARE PROFESSIONALS

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[ID 532] - *No. 57 in Poster Area*

Many existing risk assessment methods are time consuming requiring hand-writing of data first on the block and then typing and saving it on the computer system. The Work Environment Profile (WEP) risk assessment method benefits new information technology. The programme covers all known health and safety stressors from accidents, and physical and mental load to chemical, biological and physical factors. The data are collected according to the structured interviews and observation at the workplace and saved in a handheld computer for further processing in the office by the Excel-programme.

The results of the workplace survey are described by the bar charts, which give a general overview and also detailed information of each health and safety risk level at different work tasks for prioritisation preventive measures. The follow-up form includes suggestions for revisions, persons in response, and the time schedule.

The development of modern technology enables the real time data saving at the workplace when observing different working conditions and interviewing workers. Advantages of the WEP process are simple and easy usability when moving from one unit to another at the enterprise, small-size of the computer, immediate data storage, and rapid data transfer between computers.

STUDIO PRELIMINARE SULL'ESPOSIZIONE PROFESSIONALE AD AGENTI CHIMICI NEI LABORATORI DI VERNICIATURA

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The objective of the report is to evaluate the risk of indoor air pollution into the varnishing cabin of vehicle repair workshops.

A complete analysis of the characteristics of this field illustrates the possible risks and the health effects upon workers exposed to indoor air pollution.

The aim of our study has been that to analyse the exposure of operators to volatile organic compounds (VOCs) emitted during varnishing operations, either during the preparation of the varnish or while spray varnishing or during the cleaning of the spray gun. All these tasks were monitored using the same sampling method due to their short term.

A preliminary survey was conducted in different vehicle repair workshops within the Calabria territory area. The criteria used to choose these plants were the followings: those that better can represent the working field of the study and the availability either of the employers and employees.

The employers of the above companies provided more than twenty security sheets which indicate that the more frequently used substances, divided according to their category use, were: benzene, toluene, miscela di xileni, 1-butanolo.

The operators of the plants surveyed have been examined, after exposure to solvents vapours, through their own personal monitors.

At the same time a static sampler placed indoor has been used. The static sampler has been placed inside the varnishing cabin next to the vehicle.

The study carried out, showed that the values occupational exposure to the volatile organic compounds, during the varnishing operations, comply with the TLV proposed by ACGIH.

The results of the study, indicate, however, that personal monitors show higher values compared to static monitors.

Even if the results of this survey show numbers are below the standard values provided, it is absolutely necessary to adopt a series of preventive measures according to the D.Lgs. 626/1994, in order to contain the high level of occupational exposure to the solvent during the varnishing operations.

OCCUPATIONAL RISK FACTORS EFFECTED TO HEALTH OF WORKERS IN DISCOTHEQUES, THAILAND

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[ID 710] - *No. 59 in Poster Area*

Background: Many provinces in Thailand have been known for tourism purpose. Discotheque is one of places established for entertaining the tourists. However, workers in these places may encounter to occupational risk factors more often than their customers. Objective of this study was to evaluate occupational risk factors that might effect to workers' health.

Methodology: Working environment and health assessment had been conducted by occupational health staff who had been trained on using of sound level meter, noise dosimeter, Lux meter, audiometer, visual tester, and spiro-meter. Interview of workers concerning their health and injuries due to their works had been conducted.

Results: From workplace monitoring in 9 discotheques located in Bangkok and other regions of the country, it was found that overall noise level during work ranged from 90 dB(A) to 120 dB(A). Workplaces illumination ranged from 0 to 50 lux. Results of total 373 workers' health screening test were found that, by using AAO-HNS criteria, there were 76.76 % and 55.63 % of workers having abnormal hearing ability when using cut-off category of 25^{+} dB and 26 –35 dB respectively. There were 34.34 % of workers having sub-standard lung function capacity and 30.38 % having inappropriate visual test results. Interviewed data showed that most workers worked for 6-9 hours per day. The workers reported that smoke, illumination, and noise level were their occupational risk factors. This was consistent with their health screening results. There was report of minor injuries in these workers.

Summary: Occupational risk factors of this group of workers may be overlooked in some circumstances. Promotion of tourism and entertainment industry should be in concern with health of workers as well as those young patrons of those relevant concern bodies.

STUDIO PRELIMINARE SULL'ESPOSIZIONE PROFESSIONALE AD IDROCARBURI POLICICLICI AROMATICI DURANTE PAVIMENTAZIONE STRADALE

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[ID 712] - *No. 60 in Poster Area*

Asphalt paving workers, dealing with various paving mix, are exposed to a lot of chemical agents during paving operations.

The characterization and the quantification of IPA it has been useful to obtain a more detailed study of the paving operations and had the aim to link the hydrocarbons emitted during some paving activities like working with the road finishing machine, with shovels and rakes, with roller. The activities were monitored with personal monitor during paving operations.

Results indicate that paving manual operation has the most acute health effects. Workers are exposed, among the IPA monitored, to those with low and medium molecular weight.

Moreover, during the some monitoring of the workers with the same paving operations , different exposure results were obtained.

It is important to consider that the results of IPA measurement within the bitumen fumes depend on the sampling, desorption and analysis methodology adopted, and that there is not a specific methodology system internationally used neither just one method to compare data.

According to the TLV-TWA of 0,5 mg/m3 of ACGIH, the studies indicate that the exposure values of personnel to polycyclic aromatic hydrocarbons, during paving operations, are within threshold limit values.

Although the findings, prevention to fume exposures has to lead, according to the D.Lgs. 626/1994, to the most possible lower exposure.

If, during paving operations, it is not possible temperatures to be reduced to limit fume emissions

(at this stage it has to be highlighted that indoor and outdoor exposures has different results) it will be necessary make aeration systems and personnel protections highly efficient.

REDUCTION OF PARTICLES AND NITROGEN DIOXIDE LEVELS FROM A LORRY BY USING SWEDISH ENVIRONMENTALLY CLASSIFIED DIESEL FUEL

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[ID 725] - *No. 61 in Poster Area*

Background: A new diesel fuel will be introduced in Europe with less sulphur, giving cleaner exhausts. This type of diesel has been used in Sweden since about 1994/95 ("Swedish environmentally classified diesel fuel" (MK1)). Comparisons between "European commercial diesel" and MK1 have been performed on exhaust emission but there is a lack of comparable exposure data.

Method: A full scale test with area exposure measurement, was performed in a non-ventilated garage with two lorries using "European commercial diesel" respectively MK1. One old lorry (Scania 112A from 1987) and one new (Volvo FM12(420) from 2004) were used and the engines were running with 1500 rpm, 5 minutes/hour, 8 hours/test.

Particles with an aerodynamic diameter < 1 µm and < 2.5 µm (PM1, PM2.5) respectively, were measured with gravimetric methods and cyclones. A logging particle instrument (dataRAM) was used for momentary registration of particles (0.1 – 10 µm in size) and we also sampled particles for analyze of elemental carbon (EC). For NO_2 we used diffusive samplers.

Results and discussion: Particle levels were strongly correlated to fuel. The "European commercial diesel" gave four to seven times higher levels than MK1, using the same lorry. For EC the differences were even larger. Surprisingly, we found some higher particle levels for the newer car, compared to the older one, when using MK1 in both.

The nitrogen dioxide levels were more similar between the fuels and cars, with ~30 % higher levels for "European commercial diesel" compared to MK1 in the same lorry. Comparing the old and new lorry, levels were about 30 % higher for the new lorry, when using MK1.

Conclusion: This full scale pilot study indicates lower particles levels using "Swedish environmentally classified diesel fuel" compared to "European commercial diesel". For nitrogen dioxide there was less difference between exhaust from the fuels.

THE EFFECTIVENESS OF A SPECIAL PROTECTIVE IN TRASH WORKERS

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[ID 813] - *No. 62 in Poster Area*

Among a group of 112 trash workers of the Fernwärme Wien the effectiveness of a special protective (DPI Prima Derm®) was tested during 12 months. For comprehensible reasons a controlled group design was rejected by the enterprise.The epidermal water content, the transepidermal water loss, the colour of the skin (through approximative measurements for Melanin and Erythocyte content) and the ph-value were tested with a MPA-tester (Multiprobe Adapter System).

The questions were: 1)Are the expected improvememnts correlated to the skin typoplgy (colour of the skin, hair, eyes) ? 2)Are there different outcomes in case of systemic diseases (diabetes, allergic and chronic skin diseases)?

Methods: At the end of the treatment 34 workers reported not to have used the protective regularly. The other 78 workers were subjected to a cluster analysis as a result of which a three cluster solution was striking: Cluster I (n=23): dark hair and skin; Cluster II (n= 37): fair–skinned with brown hair; Cluster III (n= 18): fair–skinned, blond, blue eyes. In the sense of modern pragmatic staistics we calculated the efficiency especially to avoid the sampling error of the variance of samples.

Results: The epidermal water content was very high (group mean value 83), obviously because of the use of an acidic hand wash with cosmetic care products throughout several years whereas the transepidermal water loss was neighbouring the range of "strained skin". The measurements of Melanin showed an increase in the whole group (+22%) and the initial erythema returned to normal (-16%). Systemic effects could be seen when splitting the group into allergic people and persons of different skin types. In both splittings the initial differences between affected and non-affected happened to be balanced out after treatment.

Consequences: The tested protective can be recommended especially for fair – skinned and allergic people, but its effect can also be seen with people who were already well protected because of the regular use of gloves and an acidic hand wash with cosmetic care products throughout several years.

A METHODOLOGICAL ASPECT WHEN SAMPLING AND ANALYSING FOR HYDROCHLORIC ACID AT PICKLING BATHS.

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[ID 861] - *No. 63 in Poster Area*

Introduction. Dental erosions may occur in occupational settings with exposure to acid vapour and mist. A study was performed to study airway symptoms and dental erosions in metal finishing work. Medical and odontological examinations were done in 31 workers in metal finishing and 37 workers manufacturing tools in a mechanical workshop. Examinations included lung function and a questionnaire about working conditions, symptoms, smoking and food habits. This presentation concentrates on the results of the air measurements and methodological questions.
Aim. To investigate exposure to air borne acid vapour and mist in the study group.
Material and methods. Three metal finishing plants (one hot dip galvanizing, two nickel/chromium plating) were investigated by air sampling of acid vapor/mist on absorbent tubes containing washed silica gel and a glass fiber filter plug(for mist). In addition particulate chloride, ammonium, and zinc were captured on mixed cellulose ester filters. Samples were taken in the breathing zone using personal equipment and were analyzed using ion chromatography, inductive coupled plasma mass spectrometry and FIA.
Results. The average concentration of hydrochloric acid in the air around the pickling bath at the hot dip galvanization plant did not exceed 1 mg/m3. (Swedish TLV 8 mg/m3). More than 50% of the acid was collected as mist, which was an unexpected finding as one normally consider hydrochloric acid as vapor. The other plants were more automatized and used sulphuric acid. The concentration was very low, 1/20 of the TLV. At the galvanization plant the exposure to zinc chloride at the zinc kettle was equivalent to ½ of the Swedish TLV.
Conclusion It is crucial to analyse the glass fiber filter plug in the silica gel tube also for hydrochloric acid despite its low boiling point. The impact of stirring of the pickling bath and condensation because of high air humidity needs to be further investigated.

SILICA AND ENAMELLING, MULTIDISCIPLINARY RISK ASSESSMENT APPROACH IN ENTREPRISE

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[ID 895] - *No. 64 in Poster Area*

Objectives: Case reporting of silicosis concerning a 39 year old ex device enameller. Identification of this case has helped to set up a multidisciplinary « silica » risk assessment approach.
Method:
- Research on different types of enamel used, composition, mode of preparation, identification of hazardous products and work places in entreprise, analysis of different types of process and efficiency of individual as well as collective devices used.
- Atmospheric measurement using individual dust sampling at work place. 24 samples with CIP 10 pumps were taken.
- Medical assessment with lung function test and chest X ray of all exposed workers by plant occupational health physician.

Results: Only one case of silica confirmed histologically on one staff member having worked at this same place before important technical improvements were achieved during the last years at this work shop. The most important risks are found in hand brushing cleaning operations (silica concentrations equal to 2,1 Threshold Limit Value TLV). 2 hand enamelling device work places are over the threshold limit (1,3 times the TLV). Components brushing is also improved, silica concentrations showing values between 0,85 and 1,45 times the TLV. Other work places are all under a third of legal TLV in particular enamel preparation having benefited from recent technical improvements as well as mechanised enamel work places.
Conclusions and propositions: This assessment has highlighted risk persistence on cleaning operations regarding some hand enamelling work places. Technical improvement measures, workers' training and medical follow up have been proposed.

HIGH FREQUENCY HEARING THRESHOLDS: EFFECTS OF AGE, OCCUPATIONAL ULTRASOUND AND NOISE EXPOSURE

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[ID 912] - *No. 65 in Poster Area*

The aim was to investigate the effects of age, ultrasound and noise on high frequency hearing thresholds. We tested 24 industrial-ultrasound exposed subjects, 56 industrial noise-exposed subjects and 101 non exposed subjects. Each subject was tested with both conventional frequency (0.125-8 kHz) and high frequency (9-18 kHz) audiometry (HFA). The presence of subjective effects of "ultrasonic sickness" was also investigated in the ultrasound exposed subjects.
The hearing threshold at high frequency deteriorated as a function of age, expecially in subjects more than 30 years old.
The ultrasound exposed subjects had significantly higher hearing thresholds than the non exposed at the high frequencies from 10 to 14 kHz, being greatest at 12, 13 e 14 kHz. This hearing loss was already significantly evident in subjects with exposure less than 5 years and increased with exposure years and advancing age. The subjective effects as asthenia and vertigo were significantly more reported by the exposed group.
The noise exposure group had significantly higher hearing tresholds than the non exposed group at the conventional frequencies 4 and 6 kHz and at the high frequency 14 kHz. To investigate the role of HFA in the early detection of noise induced hearing loss, 28 workers with hearing thresholds at or below 25 dBHTL in the conventional frequencies range were selected and compared with 28 counterparts from the non exposed group. After stratification for age, there was significant difference between the two groups from 15 to 18 kHz only for those aged less than 30 years. Multivariate analysis indicated that age was the primary predictor and noise and ultrasound exposure the secondary predictors of hearing thresholds in high frequency range.
The results suggest that HFA might be used as an early indicator for noise induced hearing loss only for younger group.

BIOLOGICAL RISK ASSESSMENT IN WORKPLACES: THE ITALIAN WORKERS' COMPENSATION AUTHORITY APPROACH

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[ID 1024] - *No. 66 in Poster Area*

Differently from chemical and physical agents, risk assessment for biological agents is more difficult because of the lack of Occupational Exposure Limit (OEL), the shortage of reference values and the availability of different sampling methodologies. In 2003 the Technical Advisory Department for Risk Assessment and Prevention (CONTARP) of the Italian Workers' Compensation Authority (INAIL) undertook a national project that led to the elaboration of INAIL guidelines "Monitoraggio microbiologico negli ambienti di lavoro. Campionamento e analisi". These guidelines were produced in order that all CONTARP technicians might adopt standard methodologies of sampling and samples' analysis to study biocontamination in workplaces, to improve preventive measures and to implement a national homogeneous database related to qualitative and quantitative collected data. Moreover, the technical performances of two different biosamplers were compared in order to set proper and uniform sampling conditions and to improve the repeatability of analytical results. Additionally, a photographic atlas was realized to adopt a standard criterion of colonies' enumeration in case of particular microrganisms' growth conditions on agarized plates.

BIOSENSORS IN OCCUPATIONAL EXPOSURE MONITORING: ISPESL'S PROJECTS AND DEVELOPMENTAL STRATEGIES

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[ID 1028] - *No. 67 in Poster Area*

Introduction. Biosensors are devices able to detect and quantify, by the use of a sensor element of biological origin, specific analytes. Analytical advantages of biosensors are: high specificity, good sensitivity, reproducibility of measures. Moreover, these devices require little time expenditure, are of small dimensions and easy to handle and allow the remote data transmission and control. Since now, the use of biosensors in monitoring occupational exposure to chemical agents is essentially unexplored. Methods. A research project co-ordinated by the Institute for Occupational Safety and Prevention (ISPESL) and funded by the Italian Ministry of Health entitled: "The use of biosensors in occupational exposure assessment to chemical and biological agents" is recently concluded and one important outcome is the availability of a biosensor for formaldehyde detection in the ambient air (Italian Patent n RM2004A000558). Results. This prototype is based on formaldehyde dehydrogenase from Pseudomonas putida and may detect environmental formaldehyde at concentrations lower than the ACGIH TLV (0,3 ppm). Other relevant characteristics are: continuous air sampling (air flow < 0,5 L/min.); range of linear response: 0 – 1.000 ppb HCHO air concentration; limit of detection: (S/N < 3): 50 ppb HCHO air concentration; specificity: very high; precision (SD at 300 ppb, i.e. ACGIH TLV): ± 5-6%; duration of one measure: < 20 mins.; enzymatic sensor lifetime: > 30 working days; lifetime of the immobilized enzyme stored: > 3 months; total cost (calculated on 30 working days): < 7 €/day. It resulted competitive with conventional methods of formaldehyde detection and measurement. Conclusions. A new research project co-ordinated by ISPESL and funded by the Italian Ministry of Health is in progress and includes, among the objectives, the achievement of a more advanced version of the formaldehyde biosensor, which may be serially produced and commercialized. The present contribution provides insight into this research field, with particular reference to the development of ISPESL's projects, pointing out critical features and perspectives.

DENTAL FINDINGS AND RESPIRATORY SYMPTOMS IN METAL FINISHING WORKERS.

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[ID 1092] - *No. 68 in Poster Area*

Introduction. Dental erosions may occur in occupational settings with exposure to acid vapour and mist but may also be caused by consumption of acid foods and drinks. A strategy for an integrated odontological and medical investigation in these settings has been elaborated.
Aim. To study the prevalence of airway symptoms and dental erosions in metal finishing work and estimate exposure to hydrochloric and sulphuric acid vapour and mist.
Material and methods Dental examination was performed on 31 workers from three metal finishing plants (one hot dip galvanizing, two nickel/chromium plating) and 37 workers manufacturing tools in a mechanical workshop. A medical examination included lung function and a questionnaire about working conditions, symptoms, smoking and food habits. Personal air sampling of hydrochloric and sulphuric acid, particulate chloride, ammonium and zinc were carried out. These results are presented separately. Statistical analyses were performed by chi2 test.
Results. Dental erosions were found in 7 cases in each group. There was no correlation with occupational exposure, consumption of acid fruits and drinks or pharmaceutical preparations. Respiratory symptoms were more prevalent in the control group and might be due to exposure to mist from metal working fluids. There was a nonsignificant tendency towards interaction between mouth breathing and dental erosions in the study group, which also had a higher rate of dental plaques, mucosal bleeding index and lesions and less salvia buffer capacity. Average levels of hydrochloric and sulfuric acid were 1/8 and 1/20 of the Swedish TLV respectively.
Conclusion. The results indicate that the risk for dental erosions is low in modern Swedish metal finishing plants. Mouth breathing may be a risk factor in exposed subjects, which points at the necessity of an integrated medical and odontological view. The higher rates of dental plaques, mucosal bleeding index and lesions in the study group need further explanation.

PARTICLE SIZE DISTRIBUTION, MASS CONCENTRATION, CHEMISTRY AND TOXICITY OF FINE AND ULTRAFINE PARTICLES IN THE FURNACE TOWER AND THE RECEIVING HALL OF A WASTE RECYCLING BIOFUEL ENERGY PLANT

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[ID 1364] - *No. 69 in Poster Area*

Epidemiology has shown increased mortality and hospitalization rates in the population with increased levels of urban air-pollution. The risk has been linked especially to the fine and ultrafine particles emitted from combustion of fossil fuels. However, solid fine and ultrafine particles are not only generated in highly trafficked streets. In this study we investigate the particle concentrations of $PM_{2.5}$, the particle size distribution (0.01 – 19.81 μm) and in vitro toxicity of particles sampled in the waste receiving hall and the furnace hall of a waste recycling biofuel energy plant. The results are compared with similar analysis of samples collected in a high-traffic street and in the urban background in Copenhagen, Denmark. The results showed that the average $PM_{2.5}$ concentrations was almost the double (110±17 μg/m^3) in the furnace hall of that observed in the waste receiving hall (59±8 μg/m^3) and five to six times higher than the concentrations in a high-traffic street (20±8 μg/m^3). The particle size distribution, varied with location owing to different sources. In the furnace hall, the size distribution usually had a maximum at 147 nm and almost all particles were smaller than 1 μm. In the waste receiving hall, which is episodically is highly influenced by diesel truck emissions, the particle size distribution had a maximum at 26 nm and again almost all the particles were smaller than 1 μm. In the street, the particles showed comparable distribution as observed in the receiving hall. However, the particle number concentrations were significantly higher in the street where also more coarse particles occurred. Samples collected using an electrostatic high-volume sampler, showed that all samples induced DNA-damage in vitro. Converted to mass-dose per m^3, the air in the furnace hall was found to be more toxic than in a high-traffic street. Further analysis includes studies of the inflammatory potential of the samples and potential relationships between physicochemical parameters and toxic response.

CHEMICAL RISK IN WOOD MANIFACTURE IN MARCHE REGION (ITALY)

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[ID 1466] - *No. 70 in Poster Area*

The aim of this work, conducted from SPSAL-ASUR- Z.T. 9 of Macerata and INAIL-CONTARP Marche, is to value exposition to wood dust and chemicals in wood industry: in particular we monitored 13 factories in Marche Region (ITALY) including sawmills and furniture manufacturing.
About dust wood we sampled inhalable fraction in 70 workers using IOM sampler and gravimetric analysis. Sanding machines workers, panel saws workers and double-end profilers worker showed the highest levels of dust wood exposure. In the sawmills we found mean wood dust concentration lower than those measured in furniture and cabinet-making industries.
About chemicals we monitored the exposition to isocyanates and some organic solvent (as toluene, MEK, xylene, styrene, butyl-acetate, ethyl-acetate...ecc) during painting (spray and automatic) and gluing. We monitored formaldehyde during the cut on the plywood veneers finding low concentrations. During spray-painting inside box we found low level of 2,6-TDI, HDI, toluene and styrene. About automatic-painting associated to drying in line (tunnel UV or oven) we measured low solvents concentra-

tion; on the contrary about automatic-painting associated to conventional drying (environmental temperature air) we found high presence of toluene, xylene and butyl-acetate.

EVALUATION OF OCCUPATIONAL EXPOSURE TO PERSULFATES IN HAIRDRESSER'S SALOONS

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[ID 1819] - *No. 71 in Poster Area*

Hair bleaches containing persulfates have been identified as a cause of work related disease as allergic rhinitis and bronchial asthma.
There are few works about quantification of occupational exposure to persulfates.
Purpose of the study was development and field evaluation of a sampling and analytical method for the assessment of professional exposure to persulfates in hairdresser's saloons.
Inhalable and respirable fractions of airborne dust were collected according to ISO and UNI-CEN standards, on cellulose acetate filters, monitoring both long term and peak concentrations. Samples analysis was performed by ion chromatography with chemical suppression and conductivity detection.
The method was fully validated by a detection limit of 0,1 μg of persulfate on the filter and overall uncertainty of ± 0,9 μg on sample spiked with 4 μg of persulfate.
Field evaluation demonstrated adequacy of the method for the occupational exposure assessment in hairdresser's saloons.
First results showed mean long term concentration of airborne persulfates of 4,0 $\mu g/m^3$ and peak of 10,7 $\mu g/m^3$, far below TLV TWA of ACGIH (0,1mg/m^3).

MULTIPLE CHEMICAL EXPOSURES

THE EVALUATION OF PATIENTS WITH SUSPECTED MULTIPLE CHEMICAL SENSITIVITY (MCS): A CASE STUDY

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[ID 758] - *No. 72 in Poster Area*

Objective: The Multiple Chemical Sensitivity (MCS) has been defined as a chronic disorder that is characterized by recurring symptoms in various organs, as reaction to exposure to various chemically unrelated substances, often in very low doses. Herewith we sum up our experience with such patients at the Institute of Occupational Health, University of Brescia.
Methods: 17 suspected MCS patients were studied in the period from 1994 to 2005. Our diagnostic evaluation included (i) occupational and non occupational history, (ii) the administration of the questionnaire Quick Environmental Exposure and Sensitivity Inventory (QEESI) to assess the nature of symptoms and chemical substances responsible for the symptoms (iii) the physical examination (iiii) additional consultation by allergologists, psychiatrists, psychologists and any specific competence when needed. The diagnosis was expressed as compatible with the Consensus Document criteria (Multiple Chemical Sensitivity: a 1999 Consensus), after exclusion of other illnesses, namely allergological or psychiatric.
Results: 15 patients were male and 2 female, age ranged 28 and 60 years. They all worked in different fields, most of them were cleaners, office workers, and teachers. For 11 patients the diagnosis was compatible with the criteria for MCS, while 6 patients resulted affected by other illnesses (anxiety and depression disorders, allergies, upper airway disease, anaemia, bronchial asthma). The most common complaints were neuropsyichological, respiratory, gastric, dermatological, musculo-skeletal; the most common triggers of symptoms were perfumes, cosmetics, exhaust gases, cleaning products, tobacco smoke.
Conclusion: our clinical experience has shown the need to proceed with an accurate anamnesis which should point out the symptoms in relationship with the exposure (on-off test) so as to exclude any other illnesses that may mimic the same symptoms but with negative results at recognized diagnostic tests. Allergogical, respiratory, and psychiatric illnesses should be particulary ruled out, since they may benefit of specific medical treatment.

OCCUPATIONAL DISEASES: DIAGNOSTIC PROCEDURES, SURVEILLANCE SYSTEMS, AND COMPENSATION ISSUES

HYPERTENTION PREVALENCE IN EMPLOYEES OF COTTON MILLS FACTORIES OF NORTHERN GREECE: INSURANCE ASPECTS (NAOUSSA STUDY).

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The objective of this study was to examine the hypertension prevalence in workers, technicians and clerks, of cotton mills factories of the city of Naoussa and compared with the noise levels of the various departments in which they were working.
A total of 1976 employees in 19 units were examined, from these 1937 (1045 men and 892 women), 18-73 years of age (m 35+/-3) were included in the analysis (duration of the employment 13 +/-2 years). The employees were divided in two subgroups (A = exposed and B = non exposed in noisy areas). Every employee was examined twice with 1 week's interval between the two examinations. All employees were performed audiogram examination every 3 years. Analysis was performed using the 140/90 mmHg hypertension threshold. In the analysis only the average BP of the second clinic visit was used (In the second visit the medical group was more familiar to the employees). The noisy environments, in which the employees were exposed, were measured with appropriate equipment. The noise levels were 80-96 dB (A).
In total, hypertension prevalence was 30.5% (32.1% for men and 28.7% for women respectively, p=0.10). Differentiations of this prevalence were observed in the various departments and were depended upon each noise levels. 45% of the participants had abnormal audiograms, hypertensive participants had 95%.
In conclusion, the prevalence of hypertension in our study's population was higher probably of the its exposure to higher noise levels in comparison with the subgroup B. The non occupational causes of hypertension were the same with the general population. The question is if their hearing loss with their hypertention levels contributes to obtain any social payment?

HEARING LOSS INDUCED BY NOISE IN ELECTRIC POWER GENERATION IN THE SOUTH OF PERU

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Objective. The auditory damage induced by the noise (DAIR) is a disease irreversible, at the moment continues being one of the main causes of occupational disease. The objective is to determine the related prevalence of DAIR and factors related. Materials and methods. It was made a retrospective study of 170 occupational clinical histories and audiograms, only 129 they were correct with histories and bone conductance audiograms obtained, according to the Scale of modified Klockhoff, of Electric Power Generation in the South of Peru, has two thermal plants, which operate with Oil-Fuel/Diesel and Coal respectively, of period 2004. Result. 129 workers exposed to noise levels between 80-94.5 dB (A) were evaluated of which 11% correspond DAIR, according the Valuation and classification of the audiograms by the method of modified Klockhoff (71,4% to Acoustic Trauma and 29% to hearing loss by Noise). Of the workers with DAIR the average of age is of 52,5 years, the occupation predominant was operators of power plant and cauldrons, compared to office workers without hearing loss. The time that works with exposition to noise is 27.4 years. The 36% present diagnose of arterial hypertension (HTA) and DAIR; also the 44% with hearing loss were smokers. Discussion. The prevalence of DAIR was smaller to the one from other workplaces. Occupational exposure to noise, as well as its relationship with HTA and the effect additional of the tobacco in the DAIR generation is suggested. One sets out to intensify the prevention of DAIR in the workplaces, to implement a tobacco policy in the company, to diminish the risks to the health and security in the work places.

HEALTH EFFECTS FROM WORKING WITH VANADIUMPENTAOXID?

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Aim:
In a vanadium processing industrial plant (three shifts) the vanadium exposed workers showed an increased number of sick persons in comparison to unexposed workers of the same plant. The question arose, if there is a special accumulation of health disturbances and if certain health effects more frequently appear in this production area, indicating that this accumulation declines to the vanadium exposure. In addition which consequences arise from the connection between particular health disturbances, working ability and the vanadium exposure found? Another Question was if vanadiumpentoxide has genotoxic effects.
Method:
59 vanadium exposed and 43 non exposed employees became medical checkup consisting of a physical examinations, lung function and ECG as well as a work specific psychological investigation. Blood analyses including blood count, clinical chemistry, CRP, sedimentation of the blood and the cortisol level were carried out. The days of illness per person, the disease and the number of sick persons were analysed for the years 2001-2004.
The genotoxic effects on lymphocytes were tested with the Comet-Assay Test.
Statistical analysis was done with SPSS (12.0).
Results:
The examinations showed no influence of vanadium on infectious diseases ($p > 0.05$). All parameters like blood picture, sedimentation of the blood, CRP and clinical chemistry were almost identical in the two groups. In addition, no genotoxic effect ($p = 0.158$) could be seen. The increased number of sick persons in the exposed group could be explained by accidents unrelated to work mainly. Altogether 159 accidents happened within the years 2001-2004; 139 accidents unrelated to work and only 20 in the field of work. The evaluation of the work ability index (wai) no significant higher values for the control group (mean 42) and vanadium exposed workers (mean 38). One single employee had a value of < 28. According to international habits the work ability index describe levels of 44 - 49 as very good, a value between 37 and 43 as good, and between 28 - 36 as moderate. The statistical evaluation corrected for the age, yielded a significant difference ($p < 0.05$between the vanadium- and the control group.
Conclusion:
The examinations showed no influence of vanadium on sensitivity to infections. Altogether, there was no correlation between higher vanadium values and genotoxic effects. The most sick leaves by the employees could be explained by accidents unrelated to work. The evaluation of the subjective working ability showed poor working ability for the exposed persons. Therefore the medical care and the motivation of the worker should be improved to get a better working ability.

MONITORING OF ASBESTOS-EXPOSED FORMER HARBOUR WORKERS: PRELIMINARY DATA

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Asbestos-related diseases exhibit a long latency from exposure to symptom onset. A peak in their incidence is expected over the next 10 years. The sole currently available preventive strategy is early diagnosis with screening programmes, which however have not yet been standardized.
A letter was sent to 1000 workers who had held jobs in Ancona harbour and have been recognized by the Italian National Insurance Institute for Occupational Accidents (INAIL) to have sustained job-related asbestos exposure. Two hundred (mean age 61 years; mean asbestos exposure 28 years) were willing to be examined. Exposure data like type of materials used, tasks performed, etc were collected using a questionnaire. Two levels of examination were envisaged: 1) physical examination, sputum evaluation and spirometry, and 2) CO alveolo-capillary diffusion, chest X rays and high-resolution computed tomography (HRCT).
Of these subjects, 71% had been shipyard workers, 17% employees of a cereals firm, 7% of a shipping agent, and 5% dockers. Their tasks had been: onboard welder (16%); naval rigger (15%); naval carpenter (15%); onboard pipe-fitter (12%); loader/unloader (11%); naval fitter (10%); maintenance worker (8%); mechanic (7%); onboard electrician (4%); driver of mechanical vehicles (2%).
Mean cumulative fibre exposure was 8.43 ± 7.59 ff/ml.
The physical examination was positive in 106 subjects, dyspnea (20%) and cough (28%) being the main findings; 76 subjects underwent X ray examination and 42 required HRCT. Examinations were negative in 35% of cases, whereas 31% had thickened broncho-interstitial tissue, pleural thickening (10%), pleural plaques (9%), and malignant pleural mesothelioma (MPM; 2).
All subjects with plaques were shipyard workers (cumulative dose range: 0.24-20.14 ff/ml), whereas thickened broncho-interstitial tissue was detected in shipyard workers, dockers and shipping agents employees. Both patients with MPM were shipyard workers.
Detection of two cases of MPM advises continuation of the health monitoring of workers with previous asbestos exposure.

A USEFUL COMPUTERIZED MULTILINGUAL INSTRUMENT TO IMPROVE MEDICAL SURVEILLANCE AND EPIDEMIOLOGICAL SURVEYS IN THE FIELD OF OCCUPATIONAL MEDICINE

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[ID 1105] - *No. 77 in Poster Area*

According to the European regulation on safety and accident prevention in the workplace, occupational physicians have had to implement and maintain medical records for each employee. This has implied the storing of a considerably high number of personal and medical data with the sole finality of single workers' job ability evaluation, often with poor optimization for any epidemiological application. In order to make storing, consulting and updating of personal data from medical surveillance easier and statistically more useful, we developed a software, named Asped2000, which fully accomplishes law requirements about the secure managing of personal medical data. Asped2000 has two main sections of information. The "employee section" allows the entry of personal data, work and medical histories, the results of medical, instrumental and laboratory tests. Each field can be entered by either free typing or choosing from a multilingual library. This second option makes data entry more homogenous and statistical analysis more affordable. The "company section" is also made up of various parts basically concerning type of production, risk evaluation, and types of jobs. It is possible to create a job-specific protocol which can be recalled in the "current work section" of each worker. Asped2000 is an ongoing project which is continuously updated and improved. Most recently the software has been improved with two new main features. It is now possible to create selection of workers based on personal details, physiological, pathological, work history, and other selection criteria. These selections can be exported in a common database format (MsAcces, Ecxel, ect.). This function provide the user an unlimited possibility of statistical calculations and vast scale epidemiological surveys. The second recent innovation is the possibility, with a single command, to translate into five different languages (Italian, English, Spanish, German and French) all the field names as well as the entries chosen from the menu. We think that Asped2000 can be a very useful instrument to improve the exchanging of data and, therefore, the collaboration of international centres carrying out epidemiological research in occupational medicine.

VOLATILE ORGANIC COMPOUNDS IN ALVEOLAR AIR FOR THE DIAGNOSIS OF CANCER.

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[ID 1303] - *No. 78 in Poster Area*

The Volatile organic compounds (VOC) profile in alveolar air samples from 30 patients with primary lung cancer and 30 with pancreas cancer were compared to alveolar air samples collected from 60 healthy volunteers. VOCs were about 100 different molecules, including C3-C20 compounds, alkanes and monomethylated alkanes, aldehydes, some methylamines, some aromatic, NO, NO_2. Alkanes are of particular interest, as being oxidative stress products excreted in the exhaled air, which catabolism may be accelerated by polymorphic cytochrome P450-mixed oxidase enzymes that are induced in cancer patients. For each patient, a single end tidal expiration, that represents the air becoming from alveoli, was collected in 20 ml vials, hermetically sealed with a rubber-Teflon septum and an aluminium ring. VOCs in the alveolar air were detected by ion-molecular reaction and quadrupole mass spectrometry. Significant differences in alveolar air concentration of ten molecules, including ethylene, methylamine, acetonitrile, acetic acid, and other molecules, currently identified only by their molecular weight = 60, 66,73, were observed between cancer patients and controls, with specificVOCs allowing to differentiate lung cancer patients from pancreatic cancer patients. For instance, the concentration of the formyl radical was significantly higher in pancreatic cancer patients compared to lung cancer patients or controls. Pattern recognition category classification models using these specific compounds identified patients with good sensitivity and specificity.

DISEASES AMONG SEAFARERS AND FISHERMEN – THE DANISH SEAFARER, FISHERMEN AND LONG- DISTANCE DRIVERS´ HEALTH AND EARLY RETIREMENT STUDY.

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[ID 1389] - *No. 79 in Poster Area*

Introduction: Seafarers and fishermen have a high morbidity. This study aimed to investigate the occurrence of diseases of the heart (stress, noise), lung (diesel exhaust, tobacco, infections), ear (noise), gastrointestinal canal and diabetes (dietary and life style exposures), skin (oil or water), loco-motor system and veins (vibrations, physical demanding work, accidents), and mental (loneliness, stress), infectious, as well as notified occupational diseases among Danish seafarers and fishermen. Methods: Cohorts of all Danish seafarers and fishermen with active employment in 1989-1998 and 1999-2002 were linked with the nationwide hospitalisation registry, and with a registry from the Danish National board of industrial injuries where all occupational diseases and injuries causing compensation are legally treated. Data for all gainfully employed were extracted from Statistics Denmark. Preliminary results: A total of 178 and 125 notified approved occupational diseases were identified among seafarers and fishermen, respectively, yielding incidence rates of 3.8 and 5.0 per 1000 employed per year. In all 143 and 100 of these resulted in permanent disability on 5% or more. The overall estimated incidence of occupational diseases was 3 and 4 times higher than among the total Danish working force. Age and job type were risk factors for diseases causing permanent disability. Conclusions: This study reports a high occurrence of diseases among Danish seafarers and fishermen.

LUNG CANCER CAUSED BY ENVIRONMENTAL TOBACCO SMOKE AT WORK - AN OCCUPATIONAL DISEASE

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[ID 1435] - *No. 80 in Poster Area*

Doctors Against Tobacco (DAT) in Finland is a 10-year-old network of 400 physicians and dentists. The goal of the network is to counteract the damage to health caused by tobacco and to diminish smoking. In June 2004 DAT made a proposition to The Minister of Social Affairs and Health that lung cancer caused by occupational exposure to environmental tobacco smoke (ETS) should be defined as an occupational disease.

In Finland according to the register of workers at risk of being exposed to carcinogenic substances and processes in 2003, 11 711 were exposed to ETS in their work out of a total amount of 27 266 exposures. The number of women exposed to smoke at work is twice as many as the number of men. Waiters and other restaurant or pub workers are the largest group subject to such exposure.

ETS increases the risk of lung cancer by 20-40% if the exposure is of long duration and regular. This risk resembles that of lung cancer caused by asbestos in non-smoking employees.

It has been estimated that in the next 10-15 years ETS at work will cause 20-50 new lung cancers per year. Later on the cases will decrease to 1-3 lung cancers per year because of the benefits deriving from the Tobacco Control Act in 1995 according to which exposure to smoke restricted in workplaces.

Although the causality of such occupational disease as ETS induced lung cancer are generally known there remains the challenge of proving connection in terms of the individuals affected. Proving that such cancers are occupational nevertheless can be difficult since cancer occur with delays up to 20 years or more.

It is our hope that the most lethal exposure to smoke in the workplaces be forbidden and every one of us will be able to work in fresh air in not too distant future.

FEASABILITY AND ACCEPTABILITY OF THE SCREENING OF SINONASAL CANCER IN WOOD DUST EXPOSED WORKERS WITH HELICAL COMPUTERIZED TOMOGRAPHY SCANNERS.

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[ID 1451] - *No. 81 in Poster Area*

Background: No consensus about methods used for screening of sinonasal cancer in wood dust exposed workers is established. Nevertheless, such a screening could improve survival of patients. The practice of standard radiography is not sensitive, the acceptability of nasopharyngeal fibroscopy as screening examination is not good; the possibility to use of new techniques of imagery as low dose helical computerized tomography (CT) scanner should be evaluated. In Lille area, northern France, a screening program of sinonasal cancer has been conducted in 135 firms (798 wood dust exposed workers). The objective of our study was to analyse the feasibility and the acceptability of such a screening.

Methods: A helical CT scanner was proposed to all workers of the selected firms whose first wood dust exposure dates 20 years ago and cumulated duration of exposure was longer than 4 years. The ionizing radiation dose of this examination was about 500 mGy.cm (spiral of 120 kV and 240mAs). A questionnaire has been proposed to each worker, after CT scanner, in order to evaluate the acceptability of this examination.

Results: A proposition of CT scanner was made to 298 workers. Finally, 253 CT scanners were realized (85%). Causes of denial were: recent screening with scanner, or refusal of knowing their health status. Nine percents have judged CT scanner as distressing (22/248), however 98% agreed to make, if proposed, the same examination two or three years later.

Conclusion: This screening program confirms the feasibility and the very good acceptability of CT scanner. However, the use of CT scanners for sinonasal cancer screening requires effectiveness evaluations.

INCIDENCE OF OCCUPATIONAL NOISE-INDUCED HEARING LOSS (ONIHL) IN POLAND

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[ID 1508] - *No. 82 in Poster Area*

Noise-induced hearing loss is a major health risk worldwide. In Europe about 35 million people are exposed to detrimental noise levels (>85 dB-A) in industrial plants, and occupational deafness is a leading occupational compensable disease in the all countries; it is an insidious slow process that develops over a period of approximately 10 to 20 years.

Accordingly to the latest estimations, more than 650 000 workers (of a to-

tal 5 million employed in industry) are put at risk in Poland. Despite progress in engineering approaches for reducing noise in the work environment and in improving hearing conservations programs (both the technical and medical) the ONIHL still remains a common and costly disability.
The aim of this study is presentation of the most recent data on the incidence of ONIHL in Poland in the years 1992-2004, considered to be a base for implementing the effective prophylactic activities.
The analysed data were derived from the central state register which collects all cases of occupational diseases recognized in the country.
The highest incidence was found in such key industrial branches as coal mining, iron and steel, metallurgical and transport equipment; majority of cases were recognized in southern and western provinces, mainly in the Silesian district, known from the significant concentration of noisy enterprises.
The most affected were those workers aged 50-59 years and exposed to noise for over 20 years.
More than 36 new cases of ONIHL were identified in the years 1992-1998 annually per 100 000 employees, and with beginning 1999 the rate was significantly decreased to 20 cases per year. One may presume that it results form the set up of national program of hearing preservation introduced in 1999 with obligatory pre-employment and follow-up pure-tone audiometry, as well as with hearing screening by means of the otoacoustic emissions.

MEDICAL IMAGING STUDY OF DYSBARIC OSTEONECROSIS IN DIVERS

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[ID 1638] - *No. 83 in Poster Area*

Objective: To explore an ideal tool for the early diagnosis of dysbaric osteonecrosis (DON) through comparison of three different medical imaging methods, namely X-ray, computer tomography (CT) and magnetic resonance imaging (MRI). Method: The same examinations (X-ray, CT and MRI) of both shoulder, hip and knee joints were carried out in a study group including 140 divers, whose length of service in the diving industry was more than one year and a control group including 156 members, who were not divers. Results: The incidence rates of DON in X-ray, CT and MRI were 35.7%, 70.7% and 60.3% respectively with statistical significance in X2 test. Wilcoxon Signed Ranks Test showed that the founded focal lesions in CT and MRI examinations were more than that in X-ray examination, with P values of 0.000 and 0.004 respectively. Logistic Regression-Ordinal analysis showed that the diagnostic level in CT matched that in X-ray (p=0.065). Meanwhile, all the observed markers such as observed rate, founded focal lesions and diagnostic level in the study group were significantly more than that in the control group. Conclusion: the result suggested that CT and MRI diagnosed the focal lesions earlier. CT will become an ideal medical imaging method to diagnose DON instead of X-ray.

THE ULTRASONIC IMAGE CHARACTERISTICS OF LIVERS IN ACUTE ARSENIC, METHANOL AND DIMETHYFORMAMIDE POISONING

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[ID 1647] - *No. 84 in Poster Area*

Object: To observe the ultrasonic image characteristics of the livers of the patients with acute arsenic, methanol and dimethylformamide (DMF) poisoning.
Methods: Urinary arsenic and DMF levels, methanol concentrations in the blood were monitored; serum ALT levels were also measured. HDI3000 enhanced ultrasound made in ATL company of USA was used to examine the livers and kidneys of all patients. Detectors with 2-4 MHz ultra-wide frequency convex array were applied to observed echogram in livers.
Results: (1) There were 5 patients with arsenic (aged from 27-42 yrs), 77 patients with DMF (29 F, aged from 18-25 yrs) and 42 patients with methanol poisoning (1 F, aged from 28-80 yrs). (2) Arsenic and DMF levels in urine and methanol levels in the blood were increased, respectively 1.9~15.6 umol/L, 1.39~2.03 umol/L and 0.03~23.60 mmol/L. (3) Serum ALT levels were increased in 3 patients with arsenic (60%), 19 patients with DMF (24.7%) and 11 patients with methanol poisoning (26.2%). (4) 4 cases with arsenic (80.0%), 20 cases with DMF (26.0%) and 26 cases with methanol poisoning (61.9%) were together found livers enlargement, thickened density of light spots with diffusive changed and echo Increased or localized echo reduced in the livers(F1). Some patients showed double lines on the gallbladder wall and fluid underdrain in the recess between liver and kidney(F2). In the meanwhile, It was showed kidneys enlarged, echo boosted up in aggregate system of the kidney and echo of kidney cone became lower or enlarged(F3) in the patients with acute arsenic and methanol poison but not in those with DMF poisoning.
Conclusion: Ultrasonic image characteristics of the livers and kidneys of the patients with chemical poison is quite difference from other liver diseases. It can apply to diagnosis of occupational diseases, to observe the clinical therapeutic effect and evaluate prognosis.

MESOTHELIOMA OCCURENCE IN A NON-TRADITIONALLY EXPOSING SECTOR: THE NON-ASBESTOS-TEXTILE INDUSTRY

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[ID 1658] - *No. 85 in Poster Area*

Mesothelioma, as an asbestos-induced disease, is well known and widely described in literature. The Lombardy Mesothelioma Registry, activated in 2000, receives more than 300 cases per year of suspected mesothelioma (pleural, peritoneal, pericardial and vaginal tunica of the testis); the average incidence rate of mesothelioma is 2.4/100,000/year [CI 95% 2.0 – 2.7].
The finding of an increasing number of cases among workers of the textile industry, classified as "unknown exposure to asbestos", upheld the suspect of presence of asbestos in that compartment. Therefore the research was based on specific information collected by technicians, maintenance personnel and other experts, moreover the industrial machinery utilized in the past was thoroughly examined; direct inspections were carried out in several workplaces that had not yet undergone significant changes with respect to the past. A large amount of asbestos had been regularly used applied to the ceilings and also to the walls of factories in order to avoid both condensation of steam and reflection of noise. In addition, asbestos had also been widely used to insulate water and steam pipes. The braking systems of most of machines also had asbestos gaskets, and on several looms some brakes operated continuously. The population in study was composed of 72 subjects, 18 males and 54 females, median age of 70.5 years. Asbestos exposure was ascribed to work in 69 cases (95.8%), 8 of whole cases had also pleural plaques. The relative legal actions were taken. The Italian National Institute of Insurance against accidents on the Workplace (INAIL) refunded 16 of the 31 closed cases (51.6%).

THE EVALUATION OF PSYCHOLOGICAL STRESS IN THE ASSESSMENT OF ABILITY FOR WORKING

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[ID 1706] - *No. 86 in Poster Area*

By asking for a change of his working conditions, a stressed worker first manifests his disease to the occupational physician. However physicians don't normally have the tools to assess stress as this is a disease of psychological nature. It is therefore essential to adopt an integrative approach to evaluate both the physical and psychological stress correlates.
The present study shows results collected from 1999 till now at the Department of Evaluation and Management of Occupational Stress at the San Gerardo Hospital, near Milan. Here it is active a protocol of joined physical and psychological evaluation of stress.
For now, around 100 workers have been assessesed through (i) an occupational medicine visit to collect data related to physical well-being; (ii) an anamnestic questionnaires to collect data related to occupational and health anamnesis; (iii) a preliminary psychological interview to collect data related to the perceived sources of stress and (iv) the personality inventory MMPI-2 to collect data related to psychological well-being.
Preliminary analyses show a tendency to express a psychological disease through a physical symptom (malaise), i.e. a tendency to medicalization. In the 70% of cases psychological diseases are compatible with stress. We indeed find a neurotic disease with a moderate severity.
As for the perceived sources of stress, most workers report bad relationships at work, either with collegues, bosses or customers and problems of organizational nature as shift, long working hours and work overload.
Our study and its application confirms the need of an integrative approach of both physical and psychological nature in the evaluation of occupational stress.

A CLUSTER OF 12 MESOTHELIOMA AND 9 ASBESTOSIS CASES IN A BOILER-MAKING FOUNDRY IN NORTHERN ITALY

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[ID 1719] - *No. 87 in Poster Area*

Introduction. The authors were asked by the Prosecuting Attorney of the Court of Milan in 2002 to investigate 21 worker cases, all employed in the past at the same boiler-making factory, who had been reported to be affected with asbestos-related diseases. Of these workers, 12 had died from 1993 to 2001, while 9 were still alive at the time of the investigation. The questions to be answered included the nature of the diseases and their possible relation with occupational exposure to asbestos.
Materials and Methods. For the deceased workers, a thorough review was made of the available medical records obtained from hospitals. The workers alive were invited to the L. Sacco Hospital for a complete medical examination. Past occupational exposure to asbestos was graded in four levels of intensity (0=very low; 1=low; 2=medium; 3=high; corresponding to a presumed estimated average exposure respectively of <2 f/L, <20f/L, <50f/L and >50f/L).
Results. The survey led to diagnose 12 cases of pleural mesothelioma among the deceased workers (summarised below), 7 cases of pleuro-pulmonary asbestosis and 2 cases of pleural plaques. All the cases were considered to be of occupational nature.
Clinical and exposure features of the 12 cases of mesothelioma are below reported according to the following sequence of information:Case no.-Job-ExpStart-ExpEnd-ExpLevel-Onset,m/y-Death,m/y-Diagnosis-Histology

1 Carpenter-1960-1981-2/3-11/1999-1/2000-Pleural Mesothelioma - y
2 Welder/Carpenter-1969-1980-3-9/2000-3/2001-Pleural Mesothelioma - y
3 Carpenter-1957-1980-3-9/2000-9/2001-Pleural Mesothelioma - y
4 Thermic treatment-1949-1980-3-7/1998-4/1999-Pleural Mesothelioma - y
5 Technical drawer-1958-1980-1-8/1990-6/1993-Pleural+peritoneal Mesothelioma - y**
6 Welder-1956-1980-3-3/2000-6/2001-Pleural Mesothelioma - y
7 Welder-1957-1980-3-1/1998-12/1999-Pleural Mesothelioma - y
8 Laboratory head-1966-1980-1/2-3/1998-3/2001-Pleural Mesothelioma - y
9 Welder-1974-1980-3-7/1999-4/2000-Pleural Mesothelioma* - y
10 Maintenance-1968-1980-1/2-1/2000-9/2000-Pleural Mesothelioma - y
11 Founder/welder-1951-1980-2/3-5/1993-7/1995-Pleural Mesothelioma - y
12 Carpenter-1968-1980-1/2-7/1999-11/2000-Pleural Mesothelioma - y

Notes:*pulmonary fibrosis **histochemical positivity but incomplete histological confirmation
Discussion. The latency of occurrence of the mesothelioma cases varied from 25 to 49 yr (average 37.1).The mean survival after the onset was 12 months, with a range from 3 to 36 months. Past job exposure level was high in 8 cases, medium in 3 cases and low in 1 case.
The cluster of asbestos-related diseases discovered in this factory, where asbestos was largely used for many years, indicates the inadequacy of the preventive measures adopted at the workplace.
Key words: asbestos, asbestosis, mesothelioma

ACTIVITIES OF THE OCCUPATIONAL MEDICINE WORKING GROUP OF THE TRADE UNION CGIL OF LOMBARDY (ITALY).

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[ID 1794] - *No. 88 in Poster Area*

According to the evolution of industrial productions and the improvement of working conditions (at least in western countries), work-related degenerative diseases represent main occupational diseases daily observed. Thus, diagnostic procedures to evaluate causative relationship among occupational and/or personal factors and the disease under investigation are far more difficult and often univocal conclusions are not reached.
The Occupational Medicine Working Group (OMWG) of CGIL Lombardy consisting of occupational physicians who assist workers in compensation activities after occupational injuries or diseases; they are supported by INCA, the welfare organization of CGIL.
OMWG was created at the end of 2002 and focused its first activities in discussing selected cases of not-recognized occupational diseases to evaluate evidences for supporting workers in legal actions. In a near future an information system will be available and will permit to collect and analyse data on clinical and legal aspects of all the cases assisted by INCA, thus increasing the possibility for positive results.
At the same time, OMWG created a network among the occupational physicians mainly involved in this activity and joints with Universities and Organizations of family doctors.
Through these collaborations OMWG organized in 2004/2005 five seminars (accredited to the Italian Continuing Medical Educational program) aimed to update information on clinical and legal aspects of occupational diseases. Hundreds occupational health professionals attended these events that discuss the following topics: evaluation of causative relationship of occupational diseases according to the information contained in the "risk document" of factories: mobbing syndrome; occupational diseases of spine; occupational disease report; occupational diseases of building workers.
Monographs of these seminars have been published in "*Quaderni di Medicina Legale del Lavoro"* (Italian language) and may be requested to INCALombardia@cgil.lombardia.it. In 2006 OMWG will organize other events: information on OMWG activities are reported on the web site www.inca.lombardia.it.

INVESTIGATION OF OCCUPATIONAL HAZARDS OF ANTIMONY TRIOXIDE

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Objective: To study occupational hazards of antimony trioxide (Sb2O3) dust.
Methods: Exposed workers underwent chest X-ray and pulmonary function examination. Transbronchial lung biopsy (TBLB) samples were taken in two workers who, according to the Chinese diagnostic criteria, showed pneumoconiosis on X-ray. Lung biopsies were observed by light and electron microscopy. Biological samples were analyzed by atomic fluorescence spectrophotometer. 6 Air samples (75L) for Sb were obtained on micro-porous mixed cellulose esters membrane filters and analyzed by flame AAS. Dust size was determined by laser technique.
Results: Airborne Sb was 0.958-2.454 mg/m3 (TWA), with a Sb2O3 concentration over 99.5%, and particle size below 1.4μm.
28 male workers were employed, 18 of which were currently exposed whilst 10 were no longer exposed. 3 cases worked for 4.5 years, and the others less than 4 years (6 months to 3 years). All 28 workers showed itching and antimony spots (red papules) on chest, belly, back, limbs and hips, appearing in 1-2 weeks after contact with Sb2O3 dust. All dermatitis reversed within 6 months after cessation of exposure. Only the 3 workers exposed for 4.5 years showed X-ray opacities (type p/s; 1/0-1/2 profusion), still observable more than 2 years after cessation of exposure. Two workers' TBLB (with 1/2 and 1/0 profusion, respectively) showed interstitial fibrosis in the alveolar septa and around small airways and microarteries, with presence of Sb dust focuses. Their Sb in blood was 2 μg/l, and 9 μg/l; in morning urine it was 39 μg/l and 47 μg/l respectively. Conclusions: Exposure to Sb2O3 dust at these conditions can induce dermatitis and pneumoconiosis. Sb2O3 dust is classified as A2 and has no ACGIH TLV but the TLV-TWA for Sb (0.5 mg/m3) could be applied by analogy. Preventive measures to reduce exposure below this level are necessary.

THE ITALIAN SYSTEM FOR OCCUPATIONAL CANCER MONITORING (OCCAM)

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The Italian Occupation and Safety Act (d.lgs 626/94) foresee the establishment of a nationwide occupational cancer registry, under the National

Institute for Occupational Health (ISPESL), with the aim of estimating the burden of occupational exposures in cancer causation and to determine priorities for prevention. The OCCAM (OCcupational CAncer Monitoring) system has been set up to assess the burden of occupational cancer and to identify subjects suffering of cancers attributable to occupational exposure mainly for compensation purposes and to promote improvement of safety and prevention in the work environment.
This system consist of several sub-projects aimed at estimating the occupational cancer risk by geographical area, industry and site of cancer onset. Cancer cases are drawn from population-based cancer registries, region-wide mortality archives, region-wide hospital discharge archives. A population-based case-control epidemiological approach has been used to assess occupational cancer risk in each area by site and by economic branch in the private sector. Population controls where randomly extracted from National Health Service files using the resident population at the centre of incidence period of each study or project. Information on past occupations were obtained by a linkage with electronic archives of the National Institute for Social Security (INPS) which provides for each year, the name and the economic branch of the firm activity for employees of private firms.
In this poster we present the results of recent surveys first based on a pooled analysis of incidence data provided by six cancer registries and then based on Lombardy region hospital discharge records used as a source of cancer cases.
Furthermore OCCAM provides a knowledge ground based on more than 600 scientific papers classified by cancer site and industry or job to help health practitioners to evaluate OCCAM surveys results and eventually use it as a tool for occupational cancer recognition and compensation.

MEDICAL SURVEILLANCE OF RETIRED DOCKERS IN THE PORT OF VENICE WITH PAST EXPOSURE TO ASBESTOS

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During the last decades huge amounts of asbestos have been imported by many industrialized countries. Asbestos transport has mostly been made by sea, with ports being heavily involved. Until the 1970s, the mineral was transported in jute or paper sacks. These containers often broke, resulting in severe pollution. In the present we choose to examine the dockers assigned to load and unload of the goods in the Port of Venice with past exposure to asbestos. The subjects were invited by a letter to collaborate into the study.
We used a structured questionnaire offering a life-long and all-sources estimate of asbestos exposure, based on a semiquantitative approach to intensity (concentration) and a quantitative approach to frequency and lenght of exposure.1
Low dose CT, the screening test for early diagnose of lung cancer, was executed following the tecnique described by Henschke.2
We examined 84 retired workers. All the subjects were men, aged between 51 and 79 years. In 75 cases exposure to asbestos had occurred only in the ports. 9 cases had been exposed also in other branches. The duration of the exposure 5.42) standard deviation) was 58.82 (ranged between 17 and 39 years. Mean (years for age. Out of 84 examined subjects, 38 (45,2%) showed bilateral pleural plaques; 17 (20,3%) showed monolateral pleural plaques or flogistic lesions; lung nodules were found in 9 subjects (10.7%) and they were repeatedly examined with CT in order to detect a progression of suspected lung images. 20 (23,8%) subjects were negative. No lung and pleura cancer cases were reported during the screening and the follow-up. Pulmonary function testing was impaired in smokers and former smokers. Radiological findings of pleural plaques were related to elevated previous asbestos exposure.
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THE OCCUPATIONAL PHYSICIAN AND THE GENERAL PRACTITIONER

JOB MAINTENANCE FOR PERSONS WITH MUSCULOSKELETAL COMPLAINTS.

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[ID 621] - *No. 92 in Poster Area*

Concept and aims: A model for cooperation between the general practitioners and the occupational health service in Denmark was developed and tested. The general practitioner was given the opportunity of requesting an evaluation of the individual workplace, including an action plan with regard to the health problems.
In order to measure the effect on early return to work and maintenance of employment the method was tested within a randomised controlled study of persons with musculoskeletal complaints recruited by their general practitioner.
Materials and methods: The participants were sampled through their general practitioner by a set of criteria describing former treatment and work disability. They were randomised to either intervention or control and both groups were followed for 18 months. The intervention was a systematic evaluation of the actual work processes leading to an action plan, which was followed and adjusted during 6 months.
The process was evaluated by interviews with the participating general practitioners, social workers, companies and patients.
Results: Eighty-one participants were included, less than expected due to problems with both the method and patients' unwillingness to participate.
Thirty-four were randomised to intervention. For 19 persons evaluation of the work and action plans were fulfilled. The recommendations ranged from simple accessories to major changes in the organisation of the work, transfer to other job tasks, or establishing contact to the municipal social welfare department. Fifteen persons did not receive a visit at the work place and were advised individually.
Supported by the interviews with general practitioners and social workers a number of barriers to an early intervention were found.
Conclusions and recommendations: In many instance expertise from professional occupational health professionals is important in the maintenance of work. A number of barriers in the cooperation have to be overcome and the long term effects are still uncertain.

A COMPARISON OF OCCUPATIONAL ILL HEALTH AS REPORTED BY OCCUPATIONAL PHYSICIANS AND GENERAL PRACTITIONERS

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[ID 1792] - *No. 93 in Poster Area*

Aims
To compare the distribution of occupational ill health reported by general practitioners (GPs) with those reported by occupational physicians (OHPs) in the UK.
Method
OPRA is a surveillance scheme that has been collecting data reported by occupational physicians since 1996. THOR-GP is a new surveillance scheme, which started collecting GP data on occupational ill health in June 2005.The data collected in the first 3 months of THOR-GP, and in 2004 in OPRA, was analysed. Comparisons were made in patient demographics, diagnoses and industry.
www.coeh.man.ac.uk/thor
Results
A total of 172 cases of occupational ill health were reported to THOR-GP and 11402 estimated cases reported to OPRA. Female cases made up just under half the cases in OPRA and only a third in THOR-GP. OHPs saw more cases between the ages of 35 and 55 whereas GPs reported a higher proportion of younger patients (16 to 35).
Musculoskeletal disorders were responsible for the majority of cases (OPRA 43%, THOR-GP 50%) reported in both schemes followed by mental ill health (OPRA 42%, THOR-GP 29%). Both groups of physicians re-

ported more musculoskeletal cases in males, and more mental ill health in females.
OHPs reported the largest proportion of cases in the health care sector (26%) and public administration & defence (11%). GPs reported cases most frequently from public administration & defence (22%) and construction (10%).
Conclusions
All the population has access to a GP and therefore the information reported to THOR-GP will help provide a better picture of the burden of occupational ill health in the UK, especially in industries such as construction with poor access to OHPs.

OLD AND NEW OCCUPATIONAL INFECTIOUS DISEASES

INFECTIOUS RISK EVALUATION AND PREVENTION METHODOLOGIES FOR OCCUPATIONAL EXPOSURE TO PATHOGENIC MICROORGANISMS LIVING IN AQUATIC ENVIRONMENTS

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[ID 588] - *No. 94 in Poster Area*
Background
Literature studies show a potential occupational risk as the consequence of a contagion with microorganisms, such as Vibrio (Vulnificus, Parahemolyticus, Alginolyticus) and Aeromonas, not included in the inquired parameters for water quality evaluation. These microorganisms live near algal blooms and mucilage exerting their pathogenetic effects, which can sometimes be fatal (ex. for immunodepressed, diabetic, hepatopathic subjects), not only by ingestion, but also through direct contact with water, fish or contaminated clams.
Objectives
This study examined biological risk problematic of water pathogenetic microorganisms for workers and fishermen employed in an Adriatic sea fish cultivation to collecting data for the many pathologies (abscesses, ulcers, otitis etc.) correlated to aquatic microorganisms.
Methods
We get in touch with 350 family doctors of the Adriatic sea coast, to which a self-distributed questionnaire had previously been sent; a not self-distributed questionnaire, made up of fifteen items, had been distributed, during summer time, to five cooperatives' workers (Cesenatico, Rimini) fishing in the open sea and in fish cultivation.
Results
Data collected from doctors questionnaires showed not only several cases of infection from vibrionacae, confirmed by laboratory diagnosis, but also an almost global disinformation of the medical class concerning the pathogenicity of the aquatic bacteria. Data from workers questionnaires marked the occurrence of skin diseases (dermatitis, pruritus) mostly during summer due to algae and mucilage presence and to an improper use of specific personal protective equipment. For the protection and the security of workers exposed to water pathogenetic microorganisms, it urges the necessity of an in-depth survey to collect epidemiologic data and to achieve insights for reducing potential occupational risk (i.e. through the use of suitable Personal Protective Equipment), for planning a proper information and formation with a consequent opportune obligatory sanitary surveillance when the risk is present.

TUBERCULAR INFECTION IN HEALTH CARE WORKERS OF "L. SACCO" HOSPITAL AFTER EXPOSURE TO PATIENTS WITH TUBERCULOSIS

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[ID 1855] - *No. 95 in Poster Area*
Background: Tubercular cutaneous reaction rate (diameter ≥ 10 mm) is always more elevated in health care workers exposed to TBC patients, compared to workers without exposure. Inadequate protocols for hospital admission of the patients affected with tuberculosis are the principal causal factor of health care worker infection and TBC spread in the hospital. Half of all TBC patients seeking hospital admission in Milan are diagnosed and treated at "L. Sacco" Hospital.
Aim: to define the risk of tubercular infection in health care workers of the L. Sacco Hospital, by determining the infection rate observed after exposure to patients with tubercular pulmonary disease.
Methods: The studied subjects included all the workers who had been in contact before the diagnosis was made with TBC patients admitted to hospital in 2002-2004. The TBC cases considered were only those resulting potentially infectious for the health care workers by contact (active pulmonary TBC cases). The exposed workers were submitted to tuberculin skin test (ID Mantoux) to identify the subjects showing an increase in positive tubercular skin response (change of infiltrate of at least 10 mm) when compared with the previous reactivity status.
Results: A total of 89 TBC patients were admitted in the studied period. For 8 of them, a possibility of inadvertent exposure by the workers was recognised and such exposure concerned 257 health care workers. Of them, 8 workers (3.1%) showed a significant increase in tubercular skin response, a frequency lower than in hospitals comparable in terms of admission of TBC patients (cutaneous reaction about 10%-50%). Positive reactivity varied from 0% to 10% in the different hospital units. The highest rates were observed among the nursing staff and, in particular, in the units where admission of TBC patients seldom occurs, such as Post-surgical Intensive Care and General Intensive Care.
Conclusions: To avoid TBC spread to health care workers and patients, it is essential to set up a specific prevention program providing for: proper triage of potential TBC patients on admission, early diagnosis and isolation of TBC cases, adoption of precautionary measures in patient contacts until a firm diagnosis is established, and proper information and training of health care workers. In addition, the program should provide for: testing of exposed workers, proper clinical management with prophylactic treatment and health surveillance of skin test positive workers.

SMALL-SCALE ENTERPRISES AND INFORMAL SECTOR

HEALTH RISK ASSESSMENT IN SMALL-SCALE ENTERPRISES IN EASTERN FINLAND

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[ID 533] - *No. 96 in Poster Area*
This study describes health risks in small-scale enterprises in eastern Finland assessed by themselves. A pre-tested questionnaire with structured questions were sent to 320 small-scale enterprises from the fields such as joinery, metal industry, timber felling and transportation, cleaning, health care, hairdresser's, service stations, bakery, and typography. Altogether 153 (48%) enterprises returned questionnaire. Statistical analyses were performed using frequencies and means.
Accidents (64%), physical load (68%), noise (57%), stress (54%) were the most general risks at small-scale enterprises. The workers were also exposed to dust (45%), chemicals (39%), temperature problems (39%), threat of violence (19%), and trembling (21%). Less general risks were biological factors (12%), radiation (4%), and climate problems (7%).
Occupational health professionals or health and safety professionals had surveyed 70% of enterprises in a traditional way. Enterprises had minimized risks linked to chemicals, noise, dust, lightning, accidents, ergonomic problems, individual protection and clothing. Nearly all enterprises (99%) had organised occupational health care services. About 30% of enterprises had trained and qualified staff for health and safety issues.

This study confirms the high number of risks and the need for co-operation between occupational health care units and health and safety staff in small-scale enterprises. The management has to take a positive attitude to preventive measures and participate more effectively in the development of working conditions.

THE HEALTH OF INFORMAL SECTOR WORKERS: CASE OF TAXI MOTORS DRIVERS IN COTONU

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[ID 1279] - *No. 97 in Poster Area*

Background: Air pollution is a major problem in Cotonu, the capital of Benin. There are big fogs at traffic jam time over the crossroads. The increased number of second hand cars, the use of bad quality petrol, and the large number of taxis are the main sources of the air pollution.
Objective:
The aim of this study was to explore the potential differences in respiratory symptoms and function between the urban, suburban and rural populations related to the level of the atmospheric particles.
Methodology
We measured the particle level by a stationary sampling. Only the particles with a diameter of 2,5 µm in size were measured; the sampling places were at the crossroads, residential areas in the suburbs, and at one place in the village. We performed clinical exams and Peak Expiratory Flow exams at 50 male drivers, 50 men from the suburban population and 50 male villagers. All were volunteers and not sampled randomly.
Results:
The mean particle level in Cotonu was 10 times higher (196.000 ± 77.250 particles/cubic centimetres) than the levels found in the suburban areas (19.000 ± 18.000), with particularly high levels of particles in the mornings and at the end of the workday.
The mean ages were similar in the three subgroups, around 37 years of age.
The respiratory disorders: The taxi drivers had 10 times more acute respiratory symptoms in a questionnaire (cold, acute laryngitis, pharyngitis, bronchitis, flu and pneumonia :) compared to the villagers, OR= 10,03 CI[3,67-28,21]; about) , There were no statistically significant differences between taxi drivers and villagers in asthma symptoms (dyspnoea, wheezing); OR= 2,03 CI[0,31-17,36].
- The PEF examinations show that 68% of the taxi drivers have their respiratory function reduced from morning until evening -versus 25% and 20% for the suburban and rural populations, respectively
Conclusion: Those results indicate the importance and the emergency of preventive strategy measures to avoid disorders related to the air pollution in our urban cities.

DEVELOPMENT OF INFORMATION-FOCUSED TOOL FOR ACTIVATING WORKPLACE HEALTH PROMOTION IN SMALL AND MEDIUM-SIZED ENTERPRISES IN JAPAN

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[ID 1300] - *No. 98 in Poster Area*

[Introduction] It has been indicated that the lack of information for workplace health promotion (WHP) resulted in the lack of motivation in employers and workers in small and medium-sized enterprises (SMEs). Although external facilities, such as 347 regional occupational health centers for small companies with less than 50 employees, have been established in Japan, those are not fully utilized probably due to the lack of appropriate information and motivation. Intelligible information tools are needed for empowering them to utilize those external facilities and to activate WHP in SMEs. The objective of this study is to develop an effective tool focused on providing information for WHP to SMEs.
[Methods] The structure and content of the new tool was discussed by several rounds of focus group meetings with occupational health nurses and physicians based on the result of our previous semi-structured interviews to employers and workers in SMEs. To assure the practicality and validity of this new tool, opinions by employers, workers, health care providers, and researchers were collected and repeated modifications were made.
[Results and Discussions] We developed the new information guide book consisted of 6 areas for simple aims which were extracted by the previous interviews: 1) How to set health examination, 2) How to set health counseling, 3) How to activate workplace mental health promotion, 4) How to improve work situation and workplace environment, 5) How to start organizational workplace health promotion, 6) List of available occupational health service facilities. Approximately 40 items were included providing the basic knowledge, action plans and available external facilities, which were listed at the end of the book systematically. Columns of Q&A were also inserted for easy usage. These kinds of understandable information-focused tools will help people get integrated knowledge and motivation for WHP with activated utilization of external facilities.

EMPOWERMENT PROCESSES BY OCCUPATIONAL HEALTH NURSES FOR PARTICIPATORY AND ORGANIZATIONAL WORKPLACE HEALTH PROMOTION IN SMALL AND MEDIUM-SIZED ENTERPRISES

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[ID 1311] - *No. 99 in Poster Area*

Introduction and Objectives
Recently, the lack of workplace health promotion (WHP) in small and medium-sized enterprises (SMEs) has been issued worldwide. Appropriate facilitators are needed for empowering employers and workers in SMEs to promote participatory WHP activities. Occupational health nurses (OHNs) from health service providers including health insurance societies may play an important role because of their wide range of expertise and intimate communication skills. The objective of this study is to elucidate the empowerment processes by OHNs for promoting participatory and organizational WHP in SMEs.
Subjects and Methods
Eighteen OHNs from one of the social insurance societies participated in this research project in which newly developed support model was applied to SMEs. OHNs were trained during 4 days to refine their skills for empowering employers and workers to promote WHP by using originally developed tools, such as an action checklist and information guidebook. Support processes in the model practices were recorded by the OHNs. Semi-structured interviews were additionally conducted for 4 OHNs who reported distinguished successful support processes. Content analysis was conducted using the phrases extracted from the process records and interview transcriptions.
Results and Discussion
Establishing reliable relations with key persons was shown essential as a base for workplace empowerment by OHNs. Understanding company's work situations and assessing the competences of the key persons enabled appropriate supports. Showing hints for WHP actions by introducing the action checklist and coordinating available resources outside the company using the information guidebook seemed to be effective for promoting WHP in SMEs. Appreciating improvements made by company's WHP actions including even small steps was essential to increase company member's self-efficacy and to extend their WHP activities. This study as well as further clarification on empowerment processes by OHNs will be useful for the effective promotion of healthy workplaces in SMEs.

HEALTH HAZARD COGNITION AND AT-RISK BEHAVIOURS: EXPLORING THE RELATIONSHIP BETWEEN CULTURE AND OCCUPATIONAL HEALTH CLIMATE IN SMALL AND MEDIUM SIZE ENTERPRISES IN DEVELOPING COUNTRIES

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[ID 1332] - *No. 100 in Poster Area*

The neglected dimension of culture is gradually regaining a centre place in the management of people and health care systems at work. Although personality dispositions have generally been perceived as moderator variables, environmental and cultural factors could also be perceived as having powerful influences on cognitions, at-risk behaviors and occupational health. This work was designed to investigate psychosocial and cultural correlates of occupational health systems in Small and Medium Size Enterprises (SMEs)in developing nations. 90 technicians (n=24 panel beaters and 66 mechanics) were selected in the North West and Western Regions of Cameroon with a response rate of 72%. Questionnaire administration and observation constituted the main instruments of information gathering and descriptive statistics was used. Analysis indicated that organizational culture has a significant influence on organizational health climate and health behaviors of respondents. With regards to health hazard cognition, unhealthy environmental properties (40.49%) were perceived as having the greatest weight, while cough (31.14%) was identified as the most serious health problem of the workers. The existence of occupational health values in their organizations was also acknowledged although they were neither respected nor enforced by the authority. Jacking vehicles without wedging (45.16%) and sucking fuel with the mouth (38.50%) were ranked the greatest at-risk behaviors. The study illustrates broader implications of the strength of work culture in the prediction of health and safety behaviors of workers. The study also examines a Behavioral and Socio-Cultural Model (BSCM) of health and safety management that will ensure small scale but highly intensive control of critical health behaviours in SMEs that will minimize hazard exposure well below the threshold level.

DECENT LIVING AND WORKING CONDITIONS IN INFORMAL RURAL SECTOR – CASE: WIND IN KYRGYZSTAN

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[ID 1373] - *No. 101 in Poster Area*

The International Labour Organisation ILO is running a programme for self-improvement of living and working conditions in Kyrgyzstan, the WIND programme. The project, initiated by the agro-industry trade unions and labour inspection, is supporting small scale farming in the informal rural sector to improve working and living conditions, health and safety using social dialogue, neighbourhood assistance and self-development.

Agriculture in Kyrgyzstan

Kyrgyzstan has transformed its agriculture from big farms into small private farmers. The country of 5 million people has 244.000 small farmers. Agriculture produces 80 % of the GDP. The huge disparity between successful farmers and subsistence farming is obvious. The majority of farmers own or rent 3 hectares of land, has no machines and barely earns a living for their families.

WIND

ILO and partners produced the first WIND manual in Vietnam, as a tool for Work Improvement in Neighbourhood Development (WIND) providing practical responses to the safety and health problems in agriculture. The manual is targeted directly to the rural population, with a very practical approach, clear and simple language, what-to-do checklists, drawings with practical solution and pictures of best practices. The Kyrgyz tradition of "aschar", neighbour assistance, makes it easy to promote cooperatives and the WIND spirit of cooperation and self-improvement.

National ownership – adaptation by local experts

ILO Moscow started in 2004, using a participatory approach, to work with a Kyrgyz work group with representatives from the Agro-industrial TU, Ministries of Labour, Agriculture, Health and Education, local administration (Aiyl Okmotu), Micro credit fund and NGOs on rural, women support and gender issues. The group adapted and revised the manual into a Russian and Kyrgyz version.

Around 120 trainers, trade unions activists, labour inspectors, agricultural specialists, etc. in the North and South of the country organise one day of training for 30 farmers, providing them with WIND manuals. Approx 240 units out of 460 units were covered in 2004-06. 14.000 WIND manuals and 6000 brochures have been printed in Russian and Kyrgyz to support the training. Dramatised seminars and promotional posters are used in the training process.

Impact of WIND – safety and health higher on the political agenda

Kyrgyzstan approved in 2003 a new OSH law and ratified the ILO Convention 184 on OSH in agriculture in 2004. Kyrgyzstan is now revising its national OSH programme with a plan of action. A high-level seminar on OSH in 2004 decided that working conditions and social dialogue in agriculture need improvement. A year after Kyrgyzstan started the WIND project a tri-partite working group has prepared a national agriculture OSH programme.

This process also led to the creation of the first agro-employers union. Employers and trade unions are now actively promoting the creation of tri-partite commissions in every local administration (and including WIND and social issues into the work of these commissions) in order to prevent a new "revolution".

Additionally, the Minister of Local Administration accepted the WIND process. The newly elected heads of the local administration units "Ayil Okmotus" have received training in WIND in 2006. The WIND manual and other OSH material is used in university and collage education.

Improved working and living conditions

The individual farmers have taken the WIND training and practical manuals to their hearts. "This is the first book I have seen written about my problems in a language I understand". The dramatised training sessions showing unsafe practices cause loud comments from the farmers and, when given the chance, the farmers present excellent sketches on safe practices.

The farmers report multiple improvements in their daily work and life, from improved housekeeping to joint improvement projects. Some farmers have taken the pictures (for ex safe horse shoeing) from the manual and designed their own innovations. Others have taken ideas from the manuals and used them to set up their own small businesses, thus improving safety and income. "The WIND manual should be on every farmers table". The manuals have also been given to the libraries in the Ayil Okmotus. The collected anecdotal evidence will be structured in a coherent evaluation of the effect of the programme in 2006.

Future prospects

WIND and Local Economic Development (LED) were combined in one pilot region to create jobs, but decent and safe working places. This approach will be broadened in 2006 in Kyrgyzstan.

The valuable experience gained from Kyrgyzstan is multiplied in other Central Asian republics and the Caucasus. Uzbekistan has prepared a localized WIND manual for mechanized agriculture and started training trainers, which Kazakhstan and some regions in Russia are interested to adapt. Armenia and Azerbaijan are interested in improved safety among small farmers. A Russian language version is disseminated though the Virtual Academy of Safework (www.safework.ru) and on CD-ROMs.

LEAD RISKS IN SMALL SECONDARY LEAD SMELTERS - A CHALLENGE TO OVERCOME AND ACHIEVE A SUSTAINABLE PRODUCTION

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[ID 1461] - *No. 102 in Poster Area*

Since 1995 the two main sources of lead in Brazil are importing the lead metal and recycling used lead-acid batteries (ULAB). Because the efforts to reduce lead risks in the 1980s and 1990s many secondary lead smelters were closed and a great number of small enterprises were opened in other regions. The aim of this study was to characterize the lead risks and management practices in these small smelters and to explain the unsustainable conditions in order to develop new risk reduction options. The research approach was qualitative and exploratory. It was analyzed a sample of 12 enterprises of different regions and four cases of governmental interventions. The techniques used for data gathering included visits to the enterprises, interviews with different social actors and document analysis. It was observed poor risk prevention and control practices in all enterprises. In some extension they have systems to prevent particulate emissions from the furnaces but no controls to prevent dust emissions from handling lead materials or fugitive emissions. In all of them it was observed worker overexposure to lead and inadequate disposal of lead wastes. As

consequence the blood lead levels exceeded the occupational permitted value and some workers presented adverse health effects. It was found families living in the neighborhood of two smelters and their children presented high blood lead values. The health authorities were communicated and the children were removed. The unsustainable conditions observed were explained by the following factors – these smelters are supplied by the informal or "black" scrap lead dealers or contracted by the great lead-acid batteries manufacturers to recycle ULABs; they are located in places with poor options of employment and higher turnover rates and the local government is less demanding. The governmental interventions were based on the traditional command-and-control approach but the enterprises presented low capacity to be in compliance with legal requirements. If the government closes an enterprise, another one is open elsewhere. This situation is similar to those found in other developing countries, but Brazil has a large and developed industrial park too. The models used for lead risk reduction in the developed countries do not apply to this context. The challenge for lead risk reduction is to develop an approach customized to the Brazilian context.

THE OSH PERFORMANCE OF SMALL AND MEDIUM SIZE ENTERPRISES (SMES): A CASE STUDY IN THREE ELECTROPLATING COMPANIES IN THE METROPOLITAN AREA OF BELO HORIZONTE, BRAZIL

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[ID 1465] - *No. 103 in Poster Area*

Small and medium size enterprises (SMEs) usually have hazardous working conditions than larger companies and they have too more difficulties to be in compliance with legal requirements and to control their risks effectively. These difficulties are mainly consequences of lack of enough resources and cultural aspects. But some of them can overcome these obstacles as consequence of client demands. The objective of the study was to identify and to explain the responsible factors for the OSH performance in SMEs with different client demands. It was carried out by the Regional Office of Minas Gerais State of FUNDACENTRO (Brazilian Institute for Occupational Safety and Health), as a consulting service with no costs for the enterprises. It was selected three SMEs with less than 100 employees of the electroplating sector located in the metropolitan area of Belo Horizonte. The first one was a plant of zinc electroplating of metal pieces for the productive chain of automotive industry; the second was a plant of aluminum anodizing for building industry and the third was a small shop using different types of electroplating techniques and a variety of work pieces and clients. All the enterprises had contracted OSH consulting services. The gathering information process includes: occupational risk assessment, verification of the compliance with legal OHS standards and risk perception study. It was developed a specific indicator of the work environment quality. The first enterprise – zinc electroplating – presented the best performance and the main reasons for that were the demands of the automotive production chain and the commitment of the employer with good work conditions. In the aluminum anodizing enterprise, despite of employer commitment with OHS, the performance was not as good as the first because the lack of enough financial resources and pressure of clients. The third presented the poorest performance and the main reasons were because the employer and the employees do not see the bad work conditions as a problem and the lack of financial resources. In all enterprises the OSH consulting services did not help the improvement of the work environment. The results of this study showed the limits of the command-control paradigm and the necessity of a specific public policy to help SMEs with no client's demands for good OSH performance.

CONSTRUCTION INDUSTRY

STATISTICALLY VERIFIED NOISE EXPOSURE OF CONSTRUCTION WORKERS

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[ID 728] - *No. 104 in Poster Area*

Workers' exposure to noise on construction sites is often subject to large fluctuations according to time and place. The use of machines and equipment designed to save time and labour is a major factor in this. But machines frequently cause high noise exposure. Discrete high peak values and daily exposure to noise with an average sound level of 85 dB(A) or more over a period of several years are equally hazardous to the human hearing. To determine the noise exposure for this group of persons, stationary workplace measurements are usually unsuitable. Frequent changes of location, strong variations in posture and poorly accessible workplaces are the reasons for this. To determine the average noise exposure on construction sites for different trades, a suitable method has been developed at the BGIA that makes use of person-related measurements and simultaneous recording of the activities to obtain informative assessments levels for the various trades.
Over a period of about 20 years, more than 1,000 noise exposure levels have been determined for over 30 different trades. Due to the great bandwidth of different daily activities, and of machines and equipment employed this large number of measurements was necessary to reach a sufficient statistical reliability of the results. 80% of the found noise exposure levels are equal or greater than 85 dB(A).
Last measured trades were tiler, parquet recliner and floorer as well as concrete drilling and cutting. Due to the number and type of used machines a great bandwidth of exposure levels was found. While a typical floorer (textile, PVC) has to bear less than 84 dB(A) the large machines to cut concrete lead to exposure levels of 97 dB(A).

ACCIDENTS RELATED TO BUILDING IN BULGARIA FOR THE PERIOD 2000-2004. HEALTH AND SAFETY PROTECTION

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[ID 766] - *No. 105 in Poster Area*

Introduction and objective: The building-installing works are with the high incidences of occupational accidents in the build in Bulgaria. The small and medium-sized buildings enterprises employ more than half of the community labor force. The total number of buildings firms in Bulgaria is about 11000 in the end of the 2002 year (73% are the private firms ltd. and 26% are state firms). The total number of construction workers is about 89 000. The objective of this study was to survey the survey and analysed the incidenses of accidents related to building work in Bulgaria for the period 2000-2004y.
Material and methods:To find the frequency of accidents related to building work was conducted a retrospective statistical study combined with a cross section survey to causes and analyzed of descriptive data on the appearance of work.
Results: The study must be made of the parts of the body lively exposed to risk in the building. The distribution of the incidents of dead and disability accidents (in %) caused by physical injury in building in Bulgaria (mean data to the period 2000-2004) was the follows: falls of the height- 46%; cuts, crushing, stubs, slipping- 21%; thermal, heat, fire- 3%; electrical- 9%; flows- 9%; others- 12%. The distribution by appearance of the work of the building accidents was follows: electric installations- 6%; work with building machines- 19%; work at handing stage, platform, step ladder- 6%; work at shuttering and cover with concrete- 15%; fitter's work- 6%; roof work- 3%; isolation work- 3%; house painting- 6%; work with woodturning lathe- 6%; destroying house- 3%; installing assembly- 6%; mechanical installations- 6%; pipeline installations- 6%; others- 9%. The distribution of accidents in building according to age of workers was: 16-20y- 2%; 21-30y- 9%; 31-40y- 22%; 41-50y- 38%; 51-60y- 27%; 61-70y- 2%. The value of frequency coefficient in building accidents was kf=4,8 ; the average value of the kf for all accidents in Bulgaria was 3,38.
Discussion and conclusion: This study, the product of collaboration between the occupational health physicians and the medical physicists, was undertaken with the aim of determining the incidence of such accidents at building in Bulgaria. The ultimate goal is to provide information that will contribute to accident prevention on the construction. The process of the low harmonization with EU in occupational health and safety areas goes in Bulgaria in this moment (the Directive 89/391/EEC of 12 July 1989, 1993, 1996). The community policy in Bulgaria aims to establish a solid foundation of minimum requirements necessary for protecting the health and safety of workers, through the adoption of directives applicable to a maximum number of workers exposed to risk. In Bulgaria was publicized the recommendation and guides for small and medium-sized enterprises for health and safety protection at work, including the enterprises in the construction.

EXTENDED WORK HOURS AND WORKWEEKS IN THE CONSTRUCTION SECTOR: REAL-TIME ASSESSMENT OF SELF-REPORTED DAYTIME SLEEPINESS, PHYSICAL EXERTION AND FATIGUE.

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[ID 939] - *No. 106 in Poster Area*

Objectives: This study investigated whether working 12-hour days during extended workweeks while living in temporary housing led to elevated subjective complaints of sleepiness, physical exertion and fatigue compared to working an ordinary 37-hour workweek and living at home.
Participants: Two groups of construction workers were examined. The first group (n = 19) of participants (camp group) lived in building site camps and worked extended hours (i.e. between 0600 and 1800) and extended workweeks (6 days in a row, 1 day off, 5 days in a row, 9 days off). The mean age was 42 years (SD 11).The second group (n = 19) of participants (non-camp group) worked ordinary hours between 0700 and 1500 and returned home after each workday. The mean age was 40 years (SD 9). The mean daily commuting time for non-campers was 80 minutes (both directions).
Approach and Methods: During two workweeks, the participants in both groups made daily self-ratings of daytime sleepiness (KSS; 7 times on each workday) and physical exertion (CR-10; 6 times on each workday). Fatigue ratings were obtained once in the evening of every workday. Data were evaluated in a repeated measures design.
Results: The camp group reported higher sleepiness ($p<0.001$), physical exertion ($p<0.001$) and fatigue scores ($p=0.012$) and had a markedly different pattern of sleepiness and physical exertion ratings (interaction: group by time of day; p's <0.001) compared to the non-camp group. As expected, both KSS and CR-10 ratings were sensitive to time of day (p's <0.001), but there were no time related development (trend) in sleepiness, physical exertion or fatigue scores across the two workweeks.
Conclusion: There was no sign of accumulated fatigue build-up during the two workweeks. However, the camp-group's generally higher ratings of sleepiness and physical exertion suggest that they might have insufficient recuperation between work-shifts.

CONSTRUCTION INDUSTRY IN BRAZIL: RETIREMENT FOR WORKPLACE ACCIDENTS AND WORK-RELATED DISEASES ON THE PERIOD OF 2000-2003

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[ID 1803] - *No. 107 in Poster Area*

This assignment presents an exploratory analysis of data's regarding retirements by workplace accidents and work-related diseases on the field of construction industry in Brazil, concerning, yet, groups and classes of this brand of activity present on CNAE – National Classification of Economics Activities – classification. For that, it begins using information from the administrative register RAIS – Annual Relation of Social Information – from the Ministry of Labor and Employment, corresponding to the years between 2000 and 2003. After extract the data's of ARSI about retirements by workplace accidents and work-related disease, problems applies to data's utilization are discussed, especially about the appropriation of those while trustable information to make technique and scientific studies, or while source to decision makers. Among demographic, socioeconomic and epidemiologic variables selected, the assignment seeks to measure differentials, according to age, gender and instruction degree. Sequentially, on the perspective to increase knowledge, some ARSI data's are compared with another equivalent administrative sources – in this case the CAT/SUB system, from the Ministry of Welfare State and Social Security, regarding, for that, the refereed period above, in other words, the years of 2000 to 2003.
In short, following the observe of retirements for workplace accidents and work-related diseases on the civil construction, the present assignment, handing those data's, search as well a critic assessment of all information about workplace accidents on this country. In this meaning, facing the potential of the sources and data's explored here, new studies and cognitive possibilities are suggest in a way which better profiles about the labor accidental reality can be achieved, as well as their consequences, like, for example, related to the object of study approached here, in other words, the retirements for workplace accidents and work-related diseases.

DIGESTIVE DISEASE IN OCCUPATIONAL HEALTH

INTERACTION BETWEEN H. PYLORI INFECTION, OCCUPATION AND PEPTIC ULCER DISEASE.

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[ID 1653] - *No. 108 in Poster Area*

Background. Previous reports have shown a relationship between low socio-economic status and peptic ulcer disease. Furthermore, shift working has been considered by several studies as a strong risk factor for the development of the disease. These studies, however, did not consider the role of H. pylori infection, which is the main causal agent of peptic ulcer disease, and is associated with low socio-economic status, thus representing a strong potential confounding factor.
Aim. Aim of the present study was to evaluate whether the reported association between manual work and peptic ulcer disease is entirely due to H. pylori, or whether work conditions may play an independent role.
Material and Methods. 500 consecutive dyspeptic patients performing upper gastrointestinal endoscopy for dyspepsia were included in the study. According to their occupation, they were divided in two groups: manual and non manual workers on the basis of a widely accepted classification (Lancet 1996; 348:1259-1263). Furthermore, information on shifting was also acquired. Presence of lesions was diagnosed according to standard endoscopic criteria. At endoscopy, 3 biopsies were taken from gastric antrum and corpus for diagnosis of H. pylori infection (colture, histology and rapid urease testing).
Results. 312 patients were classified as manual workers, and 188 as non manual workers. A duodenal ulcer was found in 136 patients. The prevalence of duodenal ulcer was significantly higher in manual workers (32%) than in non-manual workers (19%) ($p<0.001$). 94 patients were shift workers, and showed the highest prevalence of duodenal ulcer (50%). When grouping patients according to their H. pylori status, it was found that infection was present in 75% manual workers vs 43% non manual workers ($p<0.05$). Both in manual and non manual workers, duodenal ulcer was strongly associated with infection: among manual workers, 90% (181) duodenal ulcers were H. pylori positive and 80 % (29) among non manual workers (p=NS). However, the probability of developing a duodenal ulcer in the presence of H. pylori infection was much higher in manual workers than in non manual ones (181/234: 0.77 vs 29/81:0.36; $p<0.0001$).
Conclusions. Our data show that H. pylori infection should be taken into account when assessing the possible relationship between working and peptic ulcer disease. Furthermore, this study show also that the propensity to develop a duodenal ulcer in the presence of H. pylori infection is much higher in manual workers than in non manual ones. Environmental factors, possibly related to work are therefore important in these patients. Further studies are needed.

REPRODUCTIVE HAZARDS IN THE WORKPLACE

PREGNANT PAINTERS AT WORK

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[ID 480] - *No. 109 in Poster Area*

In Denmark, approximately 30 % of the construction painters are female. Every second newly educated painter is female, so the percentage is expected to rise in the future.
This paper describes how to evaluate the occupational health and safety for pregnant construction painters. The purpose of the evaluation is to make it possible for pregnant painters to continue working during pregnancy with no excessive risk to the unborn child.
The departments of Occupational Medicine in Denmark and Danish Painters Occupational Health Service (ARBEJDSMILJØHUSET) have defined specified criteria to classify the paints into three risk groups, to indicate whether the paints can either be used under specific conditions by pregnant painters, or prohibited.

The paint industry is obliged to give detailed information, especially on the content of volatile substances of their products, but also on e.g. plasticizers.
The evaluation of the paints is based upon knowledge of how much the painters will be exposed to the chemical substances in connection with their work with waterbased paints, and the risk of reproductive damage. The criteria have been used since year 2000, and a revision of the first sets of criteria has recently been introduced.
We are helping approximately 150 pregnant painters each year with personal lists of accepted products.
We inform pregnant painters and their employers about the classification of the actual paints they use. Together with a pamphlet about other issues (concerning ergonomic topics for example) this will establish safe working conditions during pregnancies.
The paper will describe the evaluation of paints and the contents of the pamphlet as well as the experiences made with the system during the last 5 years.

THE FEASIBILITY OF STUDYING AN ASSOCIATION BETWEEN WORKING IN A DRY-CLEANING SHOP AND RISK FOR SPONTANEOUS ABORTION

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[ID 647] - *No. 110 in Poster Area*

Perchloroethylene has been used as a dry-cleaning agent for many years. As many of the workers in dry-cleaning shops are women of childbearing age, reproductive health effects have been studied. Potential risk factors for spontaneous abortions in dry-cleaning shops include heavy weight lifting, heat, standing long hours and exposure to perchloroethylene. 17 epidemiological papers have been published on reproductive health effects in workers in dry-cleaning shops, 12 of these look at risk for spontaneous abortions. No review on these studies has been published. The findings are inconsistent in the different studies; some suggest an increase in risk for spontaneous abortions for machine operators or for workers exposed to perchloroethylene, while other studies do not show an increased risk. Several limitations, such as lack of specific information on the risk factors of interest, together with the difficulty of studying reproductive health effects make these studies a too weak basis to come to a definitive conclusion. This was also the position of the EU Scientific Expert Committee in 2001.
To effectively study a possible association between working in dry-cleaner shops, or specifically exposure to perchloroethylene, and spontaneous abortion, a prospective study-design is the most appropriate. The study should include the exposure ranges seen in previous studies. New technology allowing for easy quantification of hormone levels to indicate ovulation and pregnancy could be applied.
The current epidemiological database on spontaneous abortions in dry-cleaners will be presented and critically assessed and recent developments on study design to study spontaneous abortions in dry-cleaning shops will be presented.

GENOTOXICITY ENDPOINTS IN SOMATIC AND GERM CELLS OF WORKERS OCCUPATIONALLY EXPOSED TO STYRENE

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[ID 1515] - *No. 111 in Poster Area*

Introduction: Although occupational exposure to styrene, a genotoxic chemical, has been investigated for detrimental effects on male reproductive capacity, scarce efforts have been aimed to evaluate genotoxic effects in human germ cells.
Objectives: To assess chromosome and DNA damage in somatic and germ cells of a group of 42 male workers occupationally exposed to styrene and of 25 healthy subjects.
Methods: Somatic cell genotoxicity was assessed by analyzing the frequency of micronucleated binucleated cells (MNBN) in blood lymphocytes. The micronucleus assay was coupled with centromeric fluorescence in situ hybridisation (FISH) analysis. Primary DNA damage in germ cells was evaluated by alkaline single-cell gel electrophoresis (Comet assay); the tail moment (TM) was used as parameter of Comet evaluation. Mandelic and phenylglioxylic acids (MAPGA) in end of shift samples were determined as biomar¬kers of internal dose.
Results: MAPGA excretion was consistent with an exposure to styrene above the Threshold Limit Value (TLV-TWA) of 20 ppm. Styrene workers showed significantly higher frequency of MNBN as compared to controls (13.65 ± 4.97 vs. 5.95 ± 4.77; $P<0.001$), due to higher proportions of both MN arising from chromosomal breakage (C-MN) and harboring whole chromosomes (C+MN). DNA damage in sperm cells was also higher among styrene-exposed, the TM being 11.01 ± 2.99 vs 7.42 ± 2.30 in controls ($P<0.001$). On the whole group, a positive correlation was found between genotoxic damage detected in somatic and in germ cells, after removing the effect of age ($r= 0.475$; $P<0.001$). Although cytogenetic biomarkers detected both in somatic and germ cells were interrelated, no relationships were apparent with MAPGA or exposure duration.
Conclusions: Exposure to styrene is associated with both chromosome and DNA damage in somatic and germ cells. The above finding is consistent with the suspected interference on reproductive capacity among styrene exposed workers.

OCCUPATIONAL EXPOSURE TO LEAD CAUSED STRUCTURAL AND FUNCTIONAL IMPAIRMENT OF SPERM

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[ID 1879] - *No. 112 in Poster Area*

Structural alteration of sperm along with functional activity was assessed among battery and pigment factory workers (n=80) who were exposed to lead for a period of 7-15 years with 8 hours daily. The consent form was signed by the subjects before filling up the pre-set questionnaire. Married male subjects of active reproductive age group (31-45 yrs) with average height of 160±5cm and body weight of 55±5kg were selected randomly from the factory. The control subjects (n=40) were selected from the same socio-economic status, age, height, weight and similar lifestyle without any occupational lead exposure. Blood and semen samples were collected voluntarily from both exposed and control subjects. Blood and whole semen lead were analysed by Atomic Absorption Spectrophotometer. Sperm morphology was examined by Scanning Electron Microscopy (SEM). Sperm count, motility, morphological abnormalities, hypoosmotic swelling test (HOST) and lipid peroxidation were assessed. Seminal plasma acid phosphatase and sperm adenosine triphosphatase activities were measured in all subjects. The concentration of lead in blood and whole semen were increased correspondingly with the increase in duration of exposure. Decrease in sperm count and increase in acid phosphatase activity were observed among workers. The above results indicated the degenerative activity of lead in sperm cell. SEM study exhibited sharp depression, membrane folding and granularity at sperm head surface. This morphological alteration was strongly supported by low percentage of HOST+ sperm cell and increase in sperm membrane lipid peroxidation. Reduction in sperm motility along with decrease in sperm ATPase activity revealed the decrease in functional competence of sperm cell after lead exposure. Thus the structural and functional changes observed after lead exposure may be due to the generation of excessive oxidative stress induced by lead.

CHEMICAL INDUSTRY

DESIGNING A CHROMIUM MIST GENERATOR FOR EVALUATION OF SOME FACTORS INFLUENCING EXPOSURE ASSESSMENT

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[ID 221] - *No. 113 in Poster Area*

Introduction: Having a homogenous chromium mist generator is an essential approach for conducting researches and making science-based recommendations to evaluate air pollution and air pollution control systems to prevent chromium–related hazard and illnesses. The purpose of this project was to design and construct a chromium mist generator and the study of some effective factors (sampling height and distances between sampling heads in side-by-side sampling) on chromium mist sampling. Method: For producing a homogenous mist generation, a chromium electroplating bath in pilot scale equipped with a sampling chamber was constructed with special characteristics. Concentration of CrO3 and sulfuric acid in plating solution were 125 g/L and 1.25 g/L, respectively. Anodes consisted of lead plate and DC electric current (3-7 volts) was passed through the chromic acid solution. In order to create permanent sampling locations, a Plexiglas cylindrical chamber (75 cm height, 55 cm id) was made and installed as the bath overhead. Sixty holes were produced on the chamber in 3 rows (20 in each row). The distance between rows and holes were 15 cm and 7.5 cm, respectively. For study of homogeneity and study of effective factors, 48 clusters side-by-side samples were collected on polyvinyl chloride (PVC) filters housed in closed-face cassette, connected to personal samplers, at 35 ,50 and 65 cm above the solution surface, with <7.5 and 7.5-15 cm distance between sampling heads, and analyzed according to NIOSH method 7600. Results: Based on analysis of variance (ANOVA) results, no significant differences were observed between different sampling locations (P=0.82 for original data and P= 0.86 for logarithmically transformed data). Results also show that there were not significant difference between different sampling height and different samplers distances (P= 0.86 and 0.86 respectively). However there were notable differences between mean of coefficient of variance (CV) in different heights and distances. Conclusion: Based on the results, it is concluded that the highest homogeneity could be obtained at the following sampling conditions. Height= 50 cm from the solution surface and sampling head distances ≤ 7.5 cm.

EVALUATION OF PRECOCIOUS MARKERS OF RENAL DAMAGE FROM TOLUENE EXPOSURE IN A GROUP OF WORKERS ON GUMMED TEXTURE

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[ID 465] - *No. 114 in Poster Area*

Introduction
Evaluation of precocious renal damage in workers exposed to toxic substances is not commonly carried out in practical Occupational Medicine.
In fact possible renal damage is frequently evaluated only using old indicators of exposure/absorbed dose which are not useful at the usual low exposure levels actually present in Italian industrial firms.
Methods
To verify the possible presence of renal damage in a group of workers in a firm specialized in the production of gummed texture, we evaluated the exposure of 187 workers to different levels of toluene using personal and environmental samplers.
We measured the urinary hippuric acid (at the beginning and at the end of the working day) and the haematic toluene in all the workers.
We evaluated azotaemia and creatininaemia and a urine sample.
We also evaluated the glutathione S transferases (alfa and pi) as precocious tubular damage markers and Cystatin C as a marker of glomerular filtration.
Results
The results showed that the toluene exposure was under the T.L.V. value in every personal and environmental sample.
The haematic toluene values showed strong correlation with the environmental exposure and were all below B.E.I..
In all samples collected at the end of the working day hippuric acid was under the value of 1.0 gr./creat. gr. (using high pressure liquid chromatography).
The traditional parameters of renal function were altered in 3.5% of the workers.
The markers of precocious renal damage were found altered in 11.0% of the workers.
A direct correlation between the presence of alterations of precocious renal damage markers and a higher environmental exposure to toluene has been verified.
Discussion
Results showed that usual exams carried out in practical occupational medicine can't find out a relevant number of light renal damage caused by low exposure to renal toxic substances
We think that precocious renal damage markers should be regularly used in medical surveillance of workers exposed to renal toxic substances.

CHEMICAL RISK ASSESSMENT IN MANUFACTURING

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[ID 514] - *No. 115 in Poster Area*

The work environment in three Estonian enterprises (a wood-processing company - 1,000 workers, a textile industry company - 260 workers and a printing company - 180 workers) was analysed. The main attention was approached to the chemical hazards existing in the work environment which in manufacturing industrial area include dust, chemicals (formaldehyde, isopropyl alcohol) and welding gases in work environment air.
The measurements of the chemical hazards were carried out by the express method (Dragger tubes). The following results were obtained:
1) wood processing industry: concentration of formaldehyde (as a component of phenol-formaldehyde varnish), 8-hr mean – 0.5 mg/m3.
The phenol-formaldehyde varnish is a source for allergic reactions of workers. The risk phrases for this compound are: R 23/24/25 (toxic by inhalation, in skin contact or if swallowed); R34 (causes burns); R40 (limited evidence of a carcinogenic effect); R43 (may cause sensitization by skin contact). The exposure limits (0.6 mg/m3) were not exceeded.
2) textile industry: dust concentration - overall in the department ~ 0.4 mg/m3; near the machines – 1.0 mg/m3. The exposure limits for total dust: 10 mg/m3 and for textile dust: 1 mg/m3. The risk phrase for dust is: R42 (may cause sensitization by inhalation).
3) printing industry: concentration of isopropyl alcohol - 100 ppm. The exposure limit for isopropyl alcohol is 150 ppm. The risk phrase for isopropyl alcohol is: R17 (spontaneously flammable in air).
The working conditions in Estonian enterprises vary a lot – they are often good in commerce and banking area, but in manufacturing the conditions may be rather bad. In general, the work environment is getting better year by year.
Economically successful companies (mostly in car service and banking area) are able to provide relaxing facilities with sauna, solarium, training possibilities etc. for workers, but in the others (especially small manufacturing companies) the conditions are extreme - for example workers have to work in difficult microclimate conditions (temperature of the air inside the room can be 0 0C in winter) or workers' home clothes are hold in the same room with smelling chemicals.
The working conditions at the investigated textile and wood processing firms were satisfactory, but there is a place for improvement in microclimate of workrooms, ergonomics and in work organization to guarantee the workers' satisfaction from the job. The most successful attempts to improve the working conditions can be observed in printing industry.
The new Estonian legislation in occupational health and safety considering the EU directives usually helps to improve the working conditions.

CONDITIONS, BANS OR RESTRICTIONS OF PRODUCTION, PLACING ON THE MARKET AND USE OF CHEMICALS IN POLAND

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[ID 617] - *No. 116 in Poster Area*

The Polish Act of 11 January 2001 on Chemical Substances and Preparations lays down conditions, bans and/or restrictions for manufacturing, placing on the market and/or use of chemical substances and preparations in order to protect against the harmful impact of these substances and preparations on human health and/or the environment.
The person placing a dangerous substance or a dangerous preparation on the market on the territory of Poland is obliged to provide the safety data

sheet to the recipient of this substance or preparation free of charge not later than on the day of the first supply. A safety data sheet for a dangerous product is addressed primarily to the professional users in order to enable them to take the necessary measures in the workplace to ensure safety and to protect human health and the environment. The sheet must be in Polish and must comply to the national laws and any other national measures on the protection of human and environmental health if such laws and measures are applicable to the product, for example: limitations on sale and use, classification of waste, specific control parameters, regulations on handling of dangerous materials.
Before a dangerous preparation may be marketed in the territory of Poland, the Inspector must receive a relevant information comprising: name, address and telephone number of the person marketing the dangerous preparation, commercial name of the dangerous preparation, safety data sheet.
Labeling of a packaging of a dangerous substance and a dangerous preparation shall show a name allowing for unequivocal identification of a substance or a preparation, identification of a person who places a substance or a preparation on the market and appropriate warning symbols and inscriptions and information on the procedure to be followed in relation to empty containers if required by separate provisions.

INTERNATIONAL COOPERATION IN OCCUPATIONAL HEALTH

A SURVEY ON NEEDS AND EXPECTATIONS OF YOUNG OCCUPATIONAL PROFESSIONALS TOWARDS INTERNATIONAL ASSOCIATIONS

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[ID 610] - *No. 117 in Poster Area*
In 2003, ICOH (International Commission on Occupational Health) established a specific Task Group on Membership to meet the needs of potential members, particularly among young professionals.
In this perspective a multinational working group developed a questionnaire to be administered to a group of trainees attending graduate university program in Occupational Health in developing and industrialized countries with the purpose of monitoring the interest and expectancies of young people towards ICOH.
The questionnaire consisted of questions about personal data (nationality, occupation, age, etc.) and questions focused to investigate and assess the level of interest towards ICOH.
A total of 117 questionnaires was received from different countries (Italy, USA, Japan, South Africa, Turkey). However only 89 of them were analysed, after removing from the sample people aged over forty years and current ICOH members.
The mean age of sample (n=89) was 31 (25-40) years and it included 51.7% of Europeans (mean age=29.7), 40.4% of Asians (mean age=32.8) and 7.9% of Americans (mean age 32.9). 97.8% of the sample were physicians, the remaining 2.2% were academicians and other professionals.
About 70% of the sample never thought to become member even if 71.9% reveal a medium-high level of interest towards ICOH.
Data analysis revealed that respondents do not intend to become members because they do not know enough about ICOH (68/89), they cannot identify membership benefits (32/89), especially among Asians (p-value <0.05), membership fee is too expensive (17/89), especially for European respondents (p-value <0.05).
In order to increase interest towards ICOH, respondents believe that it is important to get information about membership benefits (68/89) especially among Asians (p-value <0.05), ICOH policy and activities (58/89), membership process and fee (38/89).
The results of the preliminary survey show a general interest of respondents towards scientific and professional associations in OSH. Participation model and requirement identification are essential to address the action of an international scientific and professional association like ICOH.

THE IMPACT OF RATIFYING ILO CONVENTIONS ON OCCUPATIONAL HEALTH AND SAFETY IN LEBANON

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[ID 1088] - *No. 118 in Poster Area*
Background: ILO conventions are international agreements that have legal force in countries when ratified by their parliament. More than half of the 185 ILO conventions have links to health and safety issues. They have been advocated as tools to promote Occupational Health and Safety (OHS) in developing countries. Between 1962 and 2005, Lebanon ratified 49 ILO conventions, 12 of which addressed OHS issues.
Objectives: To explore the impact of the ratification of health and safety-related ILO conventions on the state of OHS in Lebanon.
Methods: A review of relevant documentation relating to the ratification of ILO conventions in Lebanon was done. Interviews were carried out with key people and stakeholders on OHS-related issues in Lebanon.
Results: The impact of such ratifications has been very minimal. Several challenges face the enforcement of OHS laws in Lebanon. These challenges have rendered the application of the ratified conventions less effective. They include: lack of organized institutional or administrative frameworks, unavailability of necessary resources, and limited education and research. Moreover, the Lebanese authorities in charge of OHS issues, have not been actively seeking assistance and help from international professional organizations like ILO to develop an effective OHS program.
Discussion: The role of ILO in promoting OHS at the workplace and in guiding on the proper management of an OHS program has not been effective through the mere ratification of ILO conventions. Any recommendations for the adequate implementation of ILO conventions in Lebanon should endorse the development of OHS policies and regulations, which constitute a pre-requisite for a successful national OHS program. A proper legal structure, along with a strong political backing, is essential in this process. In addition, the ILO may have to be more persistent in scrutinizing the process followed in the implementation of ratified conventions, and in providing technical assistance where needed.

IMPROVING OCCUPATIONAL HEALTH SERVICES BY EUROPEAN COLLABORATION

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[ID 1268] - *No. 119 in Poster Area*
Introduction and objectives.
The Federation of Occupational Health Nurses within the European Union (FOHNEU) was founded in March 1993. The aims of FONEU are
- To contribute to the total health, safety and well-being of the European working population
- To promote training, education and standards of professional qualifications
- To encourage research into areas of occupational health practice, education and management with publication of the results
- To raise the profile of Occupational Health Nursing within the European Union
- To maintain an open dialogue with EU organisations responsible for the health and safety, public health and EU nursing authorities

Material and methods. National Occupational Health Nursing Associations were invited and encouraged to join FOHNEU. At the moment 12 out of the previous 15 EU member states are represented at the board of FOHNEU and taking actively part in the work of FOHNEU. Approaches have been made to get OHN Associations from the new 10 EU countries to join FOHNEU as well.
The Executive Board is responsible for the overall management of the Federation. The Executive Officers (4 persons) has two meetings a year. The FOHNEU Board has meetings twice a year; between the meetings the working groups are operating according to the decisions and guidelines agreed on at the board meetings. Main emphasis so far has been in the education system, networking, public relations and good practises.
Results. FOHNEU is recognised by the European Commission (CEC), the Standing Committee of Nurses of the European Community (PCN) and WHO Europe. A Core Curriculum for OHN education has been prepared and it has been successfully implemented in the education in some of the member states. Three Congresses have been arranged providing OHNs

opportunities to share knowledge and good practises. FOHNEU has also published three (3) journals with valuable information about European OH nursing.
A joint (5 countries) OHN education project will start in the near future in collaboration with the University of Sheffield. The project, conducted by FOHNEU, has received Leonardo funding.

WORK AND HEALTH IN SOUTHERN AFRICA - WAHSA
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[ID 1620] - *No. 120 in Poster Area*
Work and Health in Southern Africa - WAHSA
When the planning started seven years ago the idea was to have a triregional OSH programme including Central America. During the planning, it was agreed on two biregional programmes but with extensive exchange of experiences. WAHSA was launched in October 2004 in Gaborone, where SADC (Southern African Development Community) has its headquarter, and SALTRA (Salud y Trabajo en Centroamérica) was started in November 2003.
WAHSA is a cooperation between the SADC-region (14 countries) and Sweden and aims at poverty reduction and promotion of human rights through support for regional capacity building in occupational and public health by development projects, training and research. The long-term objective is to
- promote OSH
- create sustainable systems for OSH and public health promotion.
The 12-years programme is university based, sponsored by Sida (Swedish International Development Cooperation Agency). Sida has provided 20 million SEK for the first of three 4-year phases. Cooperating Swedish institutions are the National Institutes for Working Life (NIWL) and of Public Health (NIPH). Many institutions in southern Africa participate. The programme cooperates with WHO, ILO and the Fogerty program. Regional expertise shall be used but when needed the Swedish agencies will provide experts.
The first action oriented phase consists of ten projects, aiming at strengthening the OSH capacity, increasing awareness about healthy work and improving OSH in three areas: silica, pesticides and SMEs. For these projects, twinned resource complexes are established, between institutions in South Africa and in other countries.
Another project is the planning for future interventions through inventories for high risk enterprises, construction sites, mining SMEs, agricultural sites and enterprises in free trade zones. Other projects cover profiling training of OSH professionals, access to information and advocacy.

WOMEN, WORK AND HEALTH

OCCUPATIONAL ACCIDENTS AMONG WOMEN IN BRAZIL
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[ID 236] - *No. 121 in Poster Area*
Women are increasingly inserted in the labor market; double and triple work days, low wages and dangerous and unhealthy conditions have entailed negative implications for their health, especially in terms of Occupational Accidents (OA) and work-related illnesses. The quantity and frequency of OA have increased and reveal the violence and lack of respect for workers in today's labor world. Female accident victims and women with occupational injuries are sent to and/or seek health care. In many of these cases, the accidents are strongly related to work. This study aimed to identify the occurrence of OA among women attended in an emergency situation at a teaching hospital in Ribeirão Preto, São Paulo, characterizing them in terms of personal and professional data; The following OA characteristics were identified: quantity, type, causes, affected body parts, medical diagnoses reached during care and follow-up by the health team. The study covered two years (2002-2003), attended to recommended ethical procedures and was authorized by the Board of the institution. Patient file notes were consulted to identify OA among women. 82 women were victims of 117 OA, 61 (74.39%) of whom suffered an accident during the study period, while others were victims of various accidents. Most of the 82 female OA victims were between 25 and 40 years (52.78%) old; 47.56% were married and 89.02% came from Ribeirão Preto. Most of the women performed domestic services or were nursing technicians and aides (23.17% each). The largest part of OA was typical (60.98%) and occurred in the morning (41.46%). 52.44% of the accident records in the patient files were realized by more than one health team member. Most of the OA (32.93%) were caused by "Falls", followed by "Exposure to Inanimate Mechanical Forces" (19.51%). The most frequent medical diagnosis was Traumas (78.62%). The lower limbs were the most affected body parts in 35.37% of the cases. 39.02% of follow-up records referred to the patient's discharge. Suggestions are presented to minimize these events, in terms of protecting women's work and train health professionals to enable them to offer better care to these accident victims.

THE STATUS OF WORKING WOMEN IN TURKIYE
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[ID 265] - *No. 122 in Poster Area*
Aims: The aim of this study is to display the status of working women and factors affecting this in Türkiye.
Material and methods: The data of Household Labour Survey of State Institute of Statistics, May 2005, and 2004 Statistics of Labour and Social Security Ministry were used in this descriptive study.
Findings: In Türkiye, the labour force participation rate at age 15+ in women is 26,2 % while it is 72,8 % in men. This rate is 60.7 % in the world, and 64 % in Europe. The unemployment rate in women in Türkiye has increased during the last fifteen years and risen from 2.8 to 8.8 % in 2005, as it has risen from 4.7 to 9.3 % in men.
The employment of women in Türkiye has been affected mostly by education level and place of residency. The labour force participation rate of women living in rural area is 37 % and 69 % of them is unpaid family worker. In urban, this rate is 19.4 % and 77 % of working women are employees.
The labour force participation rate is higher in women who graduated from university or college than uneducated women. Those rates are 69 % and 19 % in both groups, respectively.
While 62.1 % of women living in urban area are employed in services and 24,2 % in industry, 85.8 % of women living in rural area are employed in agriculture and only 9.3 % in services.
Also women's earnings are considerably lower than men's, although women are similarly or better educated and have similar work experience as men.
As 40 % of working women have jobs with lowest salaries, this rate is % 36 in men. Finally, the unionization rate is 55 % in women.
Conclusion: Women in Türkiye face with several problems such unemployment, working in unpaid or low-paid jobs, ununionization in working life.

OCCUPATONAL HEALTH OF WOMEN WORKERS IN TURKIYE
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[ID 267] - *No. 123 in Poster Area*
Aims: The aim of the study is to display the level of occupational health and safety of women in Türkiye.
Material and methods: In this descriptive study, the statistical data of Ministry of Labour and Social Security, and Social Insurance Institution, 2004 were used.
Findings: The number of insured women employees is 1255000 in Türkiye in mid 2004. The mean age of this population is 29 and 52 % of them is between 20-29 of age.
The incidence of occupational injuries in women is only 0.3 % annually. Incidence of occupational diseases, nonetheless, is much more lower, which was 0,0003 % in 2004. Permanent disability occurred in 1 % of women who were injured. 0.2 % of injured women have died because of the injury.
Among the injured women 25 % is employed in textile, 17 % is in clothing and 10 % is in food sectore.
The morbidity rate in woman was 13 % in women in 2004 and in sectoral basis the highest rates were from textile and clothing sectores as it was by occupational injuries.
Additionally, 33852 of working women bore a child and stillbirth rate 0.9 % of them. 90 % of women had 8 weeks off after the delivery.
Conclusion: The reportings of occupational diseases and injuries are low by women in Türkiye. Most of the problems women face with are from textile and clothing sector.

INFLUENCE OF OVERTIME WORK ON MENSTRUAL DISORDERS AMONG IT COMPANY WORKERS

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[ID 891] - *No. 124 in Poster Area*

This study investigated the impact of overtime work on the health related menstruation in working women. We assessed gynecological problems, health behaviors related gynecological problems, and work characteristics in Japanese IT company workers using self-rating questionnaires. Overtime work data for the preceding six-months were obtained from employees' computerized work records, and the overtime work group was determined based on the guidelines of the Japan Ministry of Health, Lobour and Welfare. In the 120 participants (median age: 29 years old), 30 (25%) had experienced menstrual cycle disorders during the last six months; 87 (73%) had experienced dysmenorrheal syndromes, 63 (54%) had taken pain-relief medications for gynecological problems. The overtime work was significantly longer (median: 40 hours/month) in menstrual cycle disorder (+) group than the disorder (-) group (34 hours/month). Participants with dysmenorrheal syndrome took pain-relief medications significantly and more frequently (67%) than those without the syndrome (19%). In multiple logistic regression models, after controlling for age and smoking status, the odds ratio (OR) of menstrual cycle disorder was comparable between overtime work and non-overtime work groups (OR 1.1, 95% C.I. 0.4 to 2.8). When analyzing among participants reported no dysmenorrheal syndrome to assess whether the gynecological symptoms involving any pain or unpleasant feeling influenced the risk of menstrual cycle disorder, the adjusted OR was 12.4 (95% C.I. 1.0 to 154.2) for those with overtime work compared to those without it. Among participants with dysmenorrheal syndromes, the adjusted OR was comparable between them (OR 0.5, 95% C.I. 0.2 to 1.7). It was suggested that working women control their working time according to their subjective health status. However they might ignore the effect of overtime work on menstrual cycle disorder, because the disorder dose not necessary involve any pain or unpleasant symptoms.

INLUENCE FACTORS ON WORK ABILITY IN PSYCHOLOGICAL STRAINED PROFESSIONS

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[ID 1150] - *No. 125 in Poster Area*

Aim: Work-related diseases have reached a concerning level in psychological strained professions. Therefore, it should be studied which risk factors as well as resources of health and work influence the work ability in teachers (TE) and office workers (OW).

Methods: This question was examined for 100 female TE and 60 OW with a mean age of 45±8 and 43±9 years, respectively. The work ability was evaluated by the question-naire Work Ability Index (WAI) ranged from 7 (poor) to 49 (excellent) points. The health status was studied with the station of vitality® which consists of 45 indicators from the physiological, psychological and social functions and condition. In addition, cardiac risk factors, physiological and mental fitness, diagnosed diseases, complaints, inability to recover, burnout risk and effort-reward-ratio were taken into account.

Results: The work ability of TE was significantly lower (38±6 points) than of OW (41±5 points). Reduced work ability can be found in both TE and OW and it is espe-cially related to cardiovascular risk factors. But, more TE than OW have reduced work ability (37% vs. 18%). Excellent work ability can be identified in TE who have high mental resources and physiological fitness, and in OW who have a young functional age. There are twice as much OW with excellent work ability than TE (13 vs. 28%). Compared to OW, TE showed a 1.6 times higher risk of reduced work ability. As the strongest influence factor of reduced work ability the actual complaints were revealed (TE: r=.65; OW: r=.73).

Conclusions: There is a preventive influence of higher education and demanding work on good work ability. TE are a profession with a potentially high endangered health. To find the causes of reduced work ability, an integrated occupational medical and psycho-logical research method has proved useful, as risks and resources at work are multidi-mensional. Beside the health status personality and work related influence factors have to evaluate.

OCCUPATIONAL HEALTH AND FEMALE WORKERS IN SOUTH AFRICA

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[ID 1922] - *No. 126 in Poster Area*

Occupational health initiatives do exist in developing countries but they tend to lag behind safety initiatives. Adherence to regulations is less than adequate and the special needs of women in the workplace have been largely ignored in research, legislation, preventive action and enforcement. This is changing as women increasingly gain employment in traditionally male dominated occupations such as mining, the armed forces and heavy industry. In South Africa, the entry of women into the workforce is being accelerated by empowerment and equity targets.

Women face a number of defined and unrecognised chemical, physical and biological hazards in the workplace. Identification, assessment and management of risk pose unique challenges for management to provide a safe, gender sensitive environment and to protect reproductive health. Gender differences in anthropometry, body composition, physiology and physical strength render women more susceptible than men to adverse effects from the working environment.

The National Institute for Occupational Health has been involved in occupational gender and reproductive research initiatives to investigate the risks and health problems of health care workers and other sentinel groups. South Africa has a unique combination of developed and developing country technology and workplaces with very little gender focus and occupational health programmes directed mainly towards disease management and compensation rather than prevention.

Ethylene oxide exposure of women in sterilizing units in hospitals shown increased risk for spontaneous abortion and pregnancy loss despite modern equipment used. In garment study, social and working conditions and musculoskeletal disorders (MSDs) were studied. Machinists were twice more likely to suffer from MSDs then other workers. Microelectronic assembly workers were evaluated for MSDs, psychological, repetitious and monotonous work. Hazards such as solvent and solder exposure were identified and cases of occupational asthma found previously overlooked. Based on a situation analysis and research evidence, the need for a national programme to ensure protection of reproductive rights of female workers will be justified.

Special Sessions

Some abstracts are missing since the authors did not
send them in time to be published in the Book of Abstracts

THE CHANGING FACE OF OCCUPATIONAL SAFETY AND HEALTH - PEROSH

PEROSH – PARTNERSHIP FOR EUROPEAN RESEARCH IN OCCUPATIONAL SAFETY AND HEALTH

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[ID 2017]

The desire to strengthen the European research in occupational safety and health (OSH) by establishing and intensifying scientific cooperation, different European OSH institutes created the Partnership for European Research in Occupational Safety and Health (abbreviation: PEROSH) in 2003.

Currently 15 institutes in 14 European countries participate in PEROSH. These institutes are: HSL / UK, STAMI / Norway, AMI / Denmark, NIWL / Sweden, FIOH / Finland, CIOP / Poland, VUBP / Czech Republic, MKK / Hungary, ISPESL / Italy, INSHT / Spain, INRS / France, PREVENT / Belgium, TNO / the Netherlands, BGIA / Germany and BAuA / Germany (11/2005).

The PEROSH members agreed to cooperate in order to create an appropriate EU network of OSH institutes to facilitate:

- collaboration in EU research and development projects and programmes,
- promotion of knowledge transfer between institutes,
- to avoid inappropriate and expensive duplication of efforts by the sharing of results and
- to act as an expert forum in the development of ideas in support of EU and national policies.

IS OSH FORECASTING POSSIBLE?

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[ID 2064]

Efficient prevention technologies are few and far between, and rarely infallible. Account taken of this context, the question that arises, if total resignation is excluded, is one seeking solutions, ways of sharing and mutualisation and, in short , finding ways forward that allow a degree of confidence to be restored between all the actors of work.

In this respect, we need to anticipate more and more on the ways of preservating health and safety of workers: this demand linked to the mission of OSH institutes leads to the development of forecasting activities in order to “think the future” or to project the long term into the present, the rule being to imagine “all” the hypotheses.

Several groups at EU level are involved in this general activity (French National expertises, PEROSH members, Topic Centre “Risk Observatory” acting for the Bilbao Agency,...).The aims of such projects are encouraging initiative ahead of its time, a carrier of collective changes at work accepted (able) by the social body. This means making the experiment “visible”, routing them in professional practices and recreating the vision that they carry.

First results will be presented linked to the analysis of “heavy trends” which can modify the workers environment and which lead to a more holistic approach of the OSH system. But, the author will also present some constraints induced by the nature of the methodology in use (to a critical retrospective of the prospective!), interdiscipliary and quality of the expertises, weakness of the connections with innovators, return to practices and the work reality,....

OSH AND PRODUCTIVITY

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[ID 2111]

Health is a value in itself. That is why the prevention of occupational diseases and work-related complaints is important and why the linked costs are justifiable.

However, companies and governments would much more effectively be convinced of the need for prevention, if the OSH-community could calculate what the costs of sickness absenteeism and work-related disability are for companies and society. Such calculations, if done on systems level, reveal the buttons in the system to be pushed in order to diminish these costs.

Furthermore models have been developed to assess costs and benefits of specific interventions on company level.

Preventive measures and back-to-work programmes often appear to be profitable, not only concerning health but also from a financial point of view.

In many cases an extended OSH-approach will enhance labour productivity by improving individual and organisational performance. Productivity is back on the political agenda in Europe and the social partners are negotiating new agreements on this. A higher rate of participation in the labour market (including lower absenteeism) improves the productivity outcome. A better work organisation to reduce the risks of stress and better ergonomic working conditions to prevent musculoskeletal problems are conducive to a better individual and organisational performance as well. These are often 2 sides of the same coin. The concept that covers this approach and is gaining popularity, is: ‘working smarter’, which means healthier and more productive at the same time.

For the OSH community this implies collaboration with other scientific disciplines (organisation, business, technology) and fitting OSH into general management policies.

OSH PRIORITIES IN A 2010 PERSPECTIVE, PROCESS, GOALS AND SUCCESS CRITERIA. THE DANISH NATIONAL AGREEMENT BETWEEN GOVERNMENT AND SOCIAL PARTNERS

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[ID 2158]

For the last 10 years Denmark has had the national action programme ‘A clean working environment by year 2005’. A new Work Environment Act was instituted by January 2005, and at the same time the Minister of Employment decided that the action programme should be renewed by the end of 2005.

The Danish Working Environment Authority, the National Board of Industrial Injuries, and National Institute of Occupational Health (AMI) prepared the report ”Working Environment in the future – Evidence based background for decision making concerning which working environmental problems should be in focus of the coming working environment action programme until 2010”. The report comprised chapters on the state and trends in the Danish labour market and working conditions. The possible future was described from a risk factor perspective and a health consequence perspective. Nine risk factors were identified as focus candidates in the future action programme: Psychosocial factors - Physically inactive work, Computer work - Risk of Accidents - Skin damaging exposures - Noise above OEL - Patient handling - Indoor air. Seven health effects were lined up: Cardiovascular diseases - Stress - Occupational accidents - Musculoskeletal troubles - Skin diseases - Hearing impairment - Non-specific health complaints.

The Social Partners in the Working Environment Council were asked to suggest the 3-4 most important focus candidates and to propose goals for measurable improvements by the year 2010.

By the end of 2005 the Minister of Employment presents his proposals to the Danish parliament. Thus, by January 2006 there will be a new Danish national agreement between the government and the social partners about an OSH action programme comprising 4-5 topics with specified targets for improvements by 2010 and specified methods for measuring the development. The final action programme, its measurement methods and goals will be presented.

NANOTECHNOLOGY AND OCCUPATIONAL SAFETY AND HEALTH - NEED FOR INTEGRATED RESEARCH

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[ID 2202]

Nanotechnology is widely perceived as a revolutionary wave of innovation for the 21st century. Nanotechnology has applications in most industries. It will benefit in fields such as computing and electronics, medicine, materials and engineering, and the environment. Several products containing manufactured nanomaterials have already reached the marketplace, such as many sun block creams, tooth pastes, food products, tennis balls, tennis rackets and paints. The enormous interest in nanotechnology is reflected in the worldwide investments in nanotechnology research and development, which was estimated to be US$ 8.6 billion in 2004. In EU FP7, nanosciences and nanotechnology is one of the nine thematic areas.

The budding nanotechnology community is keen not to make the mistakes of asbestos or repeat the mistakes of genetically modified organ-

isms. International health and safety community needs to be vigilant in assuring that enough public sector resources are made available for making adequate analysis of risks as well as benefits of the use of nanotechnology and nanoproducts. European Commission has published a communication Towards a European Strategy for Nanotechnology. This report considers that there is a need to carry out research e.g. on effects of nanoparticles in the environment and on health effects of nanoparticles.
Much work remains to be done before we can fully harness the advantages of nanotechnology and nanoproducts and ensure that there are no potential adverse consequences. Some nanoparticles are known to possess remarkable toxic potential, and they can cause morphological changes and induce inflammation in the lungs and the skin in some animal models. Because of the size and characteristics of nanoparticles they can easily enter the body via several routes and have several target organs in the body.
In the US alone, an estimated two million workers are exposed to nanometer-diameter particles on a regular basis, and an additional two million workers will be required globally within nanotechnology-based industries in order to meet predicted demand for products over the next decade. Nanotechnology and nanoproducts have an enormous growth potential, and therefore, the safety of their use should be an urgent priority for the occupational safety and health community. PEROSH has taken 'nanotechnology' as one of the thematic areas where coordinated action is planned.

COMPARATIVE STUDY OF THE SUBJECTIVE AND OBJECTIVE ASSESSMENT OF WORKING CONDITIONS

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[ID 2233]

The aim of this study was to assess the principles of monitoring exposure to harmful and strenuous agents in the working environment. In order to do that we gathered and compared data on occupational exposure in Poland using a representative sample of enterprises in especially dangerous sectors (cast iron founding, copper and zinc works, the furniture industry, the rubber industry, city transportation and construction). The data compared came from (a) questionnaire surveys on workers' subjective perception of working conditions, (b) the results of field measurements and (c) statistical data submitted by the enterprises in question to national statistics databases.
An analysis of direct relations between subjective perception of risk and their objective measurements, estimated with Spearman's rank-order correlation coefficient revealed that those relations were statistically significant for vibration, optical radiation, arising from electric current, mechanical factors, physical load and repetitive tasks.
There was no relation between subjective and objective measurements of noise, chemical substances and dust. Further analyses showed an influence on the subjective assessment of the following factors: workers' individual characteristics (e.g., age, gender, years on the job), time load, psychosocial and organizational properties of work (demands, control, social support), health risk and job satisfaction. The risk of health impairment, and not objective hazards, is – in the case of chemical substances, dust and noise – the most important predictor of a subjective assessment. So, the fact that workers' individual characteristics, the psychosocial conditions of their work and the perception of occupational risk influence subjective assessment proves that it is necessary to assess hazards in the working environment with both objective and subjective methods.
An analysis of the working conditions that the enterprises submitted to national statistics databases indicated a much lower percentage of workers employed in hazardous environmental conditions, when compared to the actual hazard shown by studies and, in particular, their subjective perception. This fact can mean that the system of collecting data at the level of the enterprises and reporting it at the level of the state is not correct.
The developed suggestions for a change in the Polish system of monitoring occupational exposure primarily cover (a) supplementing the current system of questionnaire surveys and (b) introducing corrections into the system of collecting data. They also include (c) implementing computer tools (STER) to support both enterprises and control and supervision bodies in occupational risk assessment.

EXTENDING THE WORKING LIFE: WORK AFTER 60?

WORKING BEYOND 60: THE KEY IMPORTANCE OF REDUCING WORKING TIME

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[ID 2010]

Over recent years policymakers and the European Commission realized that increasing the participation rate of 'older' workers is crucial to implementing pension reforms and to finding real solutions to the demographic challenge. While the answer to why working beyond 60 has now become obvious, the how and for whom questions require more subtle responses and are the topic of this contribution.
In the context of its Four Pillars Programme, research was carried out by the author in the framework of the Geneva Association's research programme on social security, insurance and employment on the potential and conditions of a flexible extension of work life (a 'fourth' pillar) as one of the *key* solutions for the future financing of pensions. Our recent research has shown that extension of work life, if it is to be feasible and sufficiently widespread, has to be on a part-time basis to meet the wishes and needs of workers and companies. Indeed part-time and flexible work corresponds to recent changes affecting labour markets, service employment and emerging social patterns in the life cycle. Part-time and flexible work after 60, accompanied by other age management measures (e.g., continuing training and lifelong education), must go hand in hand with a diversity of end-of-career patterns, allowing some categories of worker to leave earlier than most other workers employed in mental abilities-based employment.
The contribution will provide an in-depth analysis of the importance of adapting working time to workers beyond 60 in European countries and a comparative discussion of new policies and measures adopted both by policymakers and by some companies in several countries (Finland, Denmark, the Netherlands, the United Kingdom, Germany, France) as well as of examples of best practice. It will summarize key policy recommendations.

LENGTHENING THE WORKING LIFE IN THE USA: PROMOTIONAL ACTIVITIES AND IMPEDIMENTS; BENEFITS FROM THE AGE DISCRIMINATION IN EMPLOYMENT ACT

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[ID 2057]

This presentation deals with factors that both promote and impede the length of time that workers in the U.S. stay in the work force. Proposed structural changes in Social Security (SSI) will, if Chilean and British experiences hold, result in workers remaining in the workforce longer since payouts will be substantially reduced, limiting its effectiveness as either a retirement supplement or sole source retirement income. These changes could easily reverse the trend toward earlier retirement resulting in the median retirement age returning to or exceeding age 70. This could be viewed as an impediment by those who wish to retire or as a factor promoting continued work by those wishing to stay employed.
Structural factors resulting in a longer work life include a switch from defined benefit to defined contribution retirement programs, elimination of employer subsidized health insurance, and employer termination of retiree health care benefits. Further encouraging the lengthening of working life – for most lower to middle income workers – has been the effective drop in real wages, as globalization of economies and inflation have resulted in a switch from high wage production to lower wage service oriented employment. This drop in real wages already has extended well into the middle class, where wages have stagnated if not declined, while increases in gross-national product have primarily benefited workers in the highest income brackets. Retirement planning also has been complicated by the fall in both stock performance and related savings instruments. This has resulted in many recent retirees finding that they lack the personal resources necessary to enter the Third Age. These and other factors have placed both work and retirement decisions in flux. The end result, regardless of the decisions made, will be a shortening of the Third Age in the U.S.

WORK ABILITY EVALUATION METHODS IN RESPONSE TO INTRODUCING A NEW SYSTEM FOR RETIREMENT AT AGE 65: HOW TO MANAGE THE AGING WORKER IN JAPAN

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[ID 2104]

The Japanese government will introduce a system for retirement at age 65 in April 2006, in order to deal with issues such as the increase in pension payments to the elderly. It is estimated that by 2015, unless all those aged 60-64 and 10% of those aged 65 and over (a total of 6.3 million elderly workers) are added to the productive population, it will no longer be possible to secure the labor force population of 1998. Japanese companies are exploring a Japanese-style performance-based system based on seniority, differing from western ideas. Meanwhile, the source of work incentives among the elderly is changing, from reasons like self-realization and social contribution to economic reasons and health management and promotion. Taking these circumstances into consideration, this report discusses what factors significantly affect workability among Japan's elderly, and proposes a framework for developing a workability evaluation method.

The employment pattern in Japan is based on lifetime employment, with the seniority system being used consistently. It is likely this system will continue in the future. To modify a European-style employability evaluation into a Japanese Work ability evaluation the abilities to predict and handle changes must be added. Further, it is necessary to add the aspect of cognitive functions in light of the triangular relationship among aging effects, human physical and mental characteristics, and the attributes of work in the 21st century.

THE PARADOX OF EARLY RETIREMENT AND INCREASED LONGEVITY: AGE-MANAGEMENT POLICIES IN SOME MEDITERRANEAN COUNTRIES

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[ID 1595]

The aging of working population is a crucial issue in modern society: In Europe, the percentage of people aged 15-64 is foreseen to decrease progressively from the present 67.2% to 56.7% in 2050, whereas people over 65 will increase from 19.2% to 36.3%., thus posing big problems in terms of economic resources for paying pensions and supporting social security and health of aged people. According to UE Commission's provisions, the ratio between people over 65 and those in working age (20-65) will increase to 39.1% in 2030 and to 69.7% in 2050; according to OECD, it is expected that, by 2050, for every person in retirement there will be only one person in employment.

Nowadays, the item "ageing" is at the first rank of social expenses of the European Union, covering 33.4% of the total costs, in Italy being 41.6%. Hence one the most important issues is now to maintain good health conditions of ageing workers in order to promote their work ability, autonomy and social integration, despite the increasing social and work discrimination of aged workers, which is evident both in their recruitment and career perspectives, as well as professional recognition.

The EU has set the objective of raising the employment rate of older people at a rate of 50% employment for workers aged 55 to 64 by 2010 whereas, in most Mediterranean countries more than 50% of workers go to pension before 57 years of age, while the life expectancy is now above 75 for men and 82 for women. This is mainly connected with early retirement policies related to industrial and financial restructuring of enterprises. Moreover, retirement conditions vary greatly according to work sector, company size, financial situation, unions' power in negotiations, socio-economic status and professional qualification.

On the other hand, some recent laws encourage employees to retire later, through financial incentives for part-time pension, career extension by partial accumulation of pension and salary, partial exemptions from social contributions for companies that employ people aged over 60 years, training and skills programmes, flexible arrangements of working time.

AGE MANAGEMENT: CONCEPTS AND RESULTS TO EXTEND THE WORKING LIFE

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[ID 383]

Extending the working life is an acute goal in most developed countries. Management of the challenges of democraphic changes need new evidence based concepts and models. Age management concept provides a new approach to integrate individual, enterprise and society level activities aiming to better and longer working lifes.The concepts of work ability and employability integrate the role of different actors. The 3-level integrated approach, however, emphasize the role of the enterprises. A better and longer working life will be created in enterprises and work organisations. The key players in enterprises are the managers and supervisors. An Age Management Training Programme for managers will be introduced.

The recent survey in the 15 European member states showed that close to 70 % of men and more than 60 % of women aged 45-59 years reported that they believe beiing able to do the same job at the age of 60 as they do today.Some results of logistic regression analyses will be introduced.

OCCUPATIONAL GERONTOLOGY: PREVENTION STRATEGIES DURING THE WORKING LIFE

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[ID 2228]

Some important challenges regarding aging workers are: (1) maintenance of employability and work ability of older workers and (2) prevention of diseases and disability.

The relationships of aging and work require studies which are grafted upon different branches of occupational gerontology. Primary and secondary prevention strategies are key elements in this approach.

Maintenance of work ability of older workers has become an important topic. Studies with the Work Ability Index have shown that WAI scores decrease significantly with age. In most studies the mean explained variance of WAI in relation to age was between 5 and 10%. The level of work ability must therefore be associated with several other variables. An increased rate of aging and the development of chronic diseases are mechanisms through which work ability can be negatively affected.

Prevention strategies applied during the working life are important to maintain health and work ability of older workers. Optimal occupational health care should therefore be recommended for all older employees. Such activities should be based on thorough knowledge of the effects of work exposures like job stress and physical work loads on the aging processes of the human organism. The benefits will be:

1. improved health during aging
2. postponement of expression of chronic diseases
3. maintenance of work ability to a higher age than 60.

Instead of being redundant, people can remain active and productive after the age of 60. Disablement during the working life and loss of independency after retirement should be minimized in a civilized society.

PSYCHOSOCIAL RISK MANAGEMENT: PRIORITIES AND ACTION

THE RISK MANAGEMENT APPROACH TO WORK-RELATED STRESS: LESSONS LEARNT

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Over the years, a need has been identified through the work of the WHO's Network of Collaborating Centres (CCs) in Occupational Health for practical procedures and tools for the management of occupational health and safety at work. Ideally, these should be capable of dealing with the differences that exist between countries, sectors and enterprises. It is clear that such procedures and tools should be suitable for use in developing countries and also in countries in transition as well as in small and medium-sized enterprises (SMEs). It is widely acknowledged that their conditions and needs differ markedly from those of developed countries or larger organisations.

In addition, emphasis has been placed on the changing nature of work and new forms of risk that could negatively affect employee health and safety (Cox, 2003; Cox et al., 2004). Issues such as work-related stress, bullying and harassment are now receiving attention on a global basis and efforts have been made to address them at the workplace level (Cassitto et al., 2003). Task Force 7 on Psychosocial Factors at Work of the WHO's Network of CCs in Occupational Health has been particularly active in this respect (WHO, 2003). However, the complexity of the aetiology of such issues and their context-specificity have made it difficult until now for practical, prevention-oriented tools to be developed that could be adaptable and usable to a wide range of enterprises, sectors and countries.

This symposium aims to highlight key issues in relation to psychosocial risk management, identifying shortcomings and priorities for action. It will also present a framework for action to address challenges: the development of a Psychosocial Risk Management Toolkit (PRIMAT). The basic rationale for the development of such a toolkit will be presented and progress made in the first phase of work since January 2005 will be described.

STAKEHOLDER PERCEPTIONS IN RELATION TO STRESS AT WORK

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[ID 2065]

Awareness of stress is growing, with the will to extend theoretical knowledge and put it into practice so as to improve workers' safety and health. This encouraging attitude, however, has to battle against the lack of recognition of the problem by some of the parties concerned – especially employers – who are obviously the first who should take steps to prevent and manage stress. It still remains, therefore, to analyze more closely the workers' and other parties' viewpoints on the perception of stress, and to see what causes the differences.

The scientific literature provides a broad view of research on stress, its consequences on workers' health, the organization within which it arises, and the causes that can make it more likely. However, not much has focused on the "perception of stress", and even less on the different points of view held by the various parties in the world of work.

This paper will present and discuss the preliminary findings of two studies on a group of workers and a group of stakeholders, with the aim of illustrating the gap in perception between these two groups even when faced with the same phenomenon. The first study was done in 2000 by the European Foundation for the Improvement of Living and Working Conditions, and the second in 2004 by the National Institute for Occupational Safety and Prevention (Istituto Superiore per la Prevenzione E la Sicurezza del Lavoro -ISPESL). In addition, the paper will highlight shortcomings and avenues for further research and practice initiatives in relation to stress at work.

THE BUSINESS CASE FOR (MENTAL) HEALTH MANAGEMENT

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It is often proclaimed by occupational health people that (investments in) good (mental occupational) health is often worthwhile, and will create better quality products, more efficient production processes, greater ability for innovation, greater attractiveness at the labour market, etc. However, managers think often differently. They do not believe these benefits because they are not very tangible (in contrast with the concrete investments that are needed), and they often perceive the situation in their company as substantially different from the examples described in literature. They are simply not convinced that investment in (mental) health is good for their organisation. On the other hand, if there is more of less conviction among managers about the value of investments in (mental) health, it is often difficult to make decisions about the kind of initiatives that best can be made. As a consequence they may hesitate or refuse to invest in (mental) health management.

The concept of the "business case" is to identify or communicate convincing arguments for making such investments or to facilitate the decision making process of what kind of investments in (mental) health can be made. A business case is the justification for being active on (mental) health, or if you like, for a company's investment in reducing or controlling mental health risks. The reasons to invest in (mental) health management may differ per company, or even per department in one company. As a result there might be several business cases for a certain type of investment. This paper will present how a business case in relation to mental health promotion and psychosocial risk management can be best formulated and can have maximum impact on the investment of healthy people in health organisations.

TOWARDS THE DEVELOPMENT OF A PSYCHOSOCIAL RISK MANAGEMENT TOOLKIT (PRIMAT)

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This paper will present progress made in the first phase of work towards the development of a psychosocial risk management toolkit. This project has been funded by SALTSA that is a joint undertaking by three Swedish confederations of employees and the Swedish National Institute for Working Life. It is led by I-WHO and involves the WHO and partners from Sweden (National Institute for Working Life), Finland (FIOH), Italy (ISPESL), the Netherlands (TNO) and Germany (BAuA).

The main objectives to be met at this first stage of PRIMAT development were:

- To provide a review of the current situation in relation to the changing nature of work and psychosocial risks
- To agree on the guiding principles that will drive the review of psychosocial risk management approaches throughout Europe
- To review existing practical approaches and tools to psychosocial risk management in Europe
- To develop a European inventory of best practice examples, underpinned by sound theory and a business case, that have proven effective in addressing the needs of organisations of different sizes and employment sectors
- To recognise experts in psychosocial risk management in different European countries
- To develop best practice principles that will serve as the basis for the development of PRIMAT

A report including the outcomes of this first phase of the project will be presented formally and key issues will be outlined and discussed. Priorities for action in psychosocial risk management will be identified and the way forward will be presented.

VIOLENCE AND HARASSMENT AT WORK

DEFANGING SEXUAL HARASSMENT – NEW APPROACHES

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[ID 1672]

Sexual harassment is a vile form of attention which the oppressor bestows on his chosen recipient, in a manner defined by the supreme court of India as unwelcome sexually-determined behaviour including physical contacts or advances demands or requests for sexual favors , sexually coloured remarks …and any other unwelcome physical , verbal or non-verbal conduct of a sexual nature.

In the context of Indian society, this issue is examined within the social and cultural mores prevalent here. These extol a patriarchal superiority which automatically presumes women as 'belonging to a man'. When women challenge this, it stokes insecurities, which gives rise to a rabid manifestation of masculinity. Other factors such as rapid industrialization, increased migration to the cities, breakdown of joint family systems and a traditional environment, are bringing women and men into proximity both at the work place and at home, for which they have been traditionally unprepared. This problem is further aggravated by the prevalence of sexual repression, which finds few opportunities for natural expressions of sexuality and a lack of gender sensitization which equates such unwanted attention as showing appreciation towards the opposite sex. Rising statistics of sexual harassment and rape sensationalized by the media, have an adverse fallout for these are used as tools to curb women's freedom of movement and choices, and to push them back into patriarchally defined strictured lives.

Yet this bleak scenario is relieved by instances where women have pooled their resourcefulness and courage to defeat such unwanted behaviour patterns. This paper will present such positive examples of women's resistance through case studies in Manipur, Rajasthan and some other places. Here women fought fear, diffidence and other such 'womanly' deemed behaviour, and instead used a collective form of bargaining and innovativeness to put the oppressor, often in a position of power, on the back foot.

Positive examples quoted here are empowering tools, which defang the ogre of sexual harassment by encouraging potential victims to display their inherent strengths and defeat the oppressor.

DETERMINATION OF VIOLENCE EXPOSURE TO PRE HOSPITAL EMERGENCY HEALTH CARE PROVIDERS

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[ID 284]

Objectives : 1. Determination of being exposed to verbal abuse, verbal threat and physical assault and anxiety of exposure to violence for 12 months among pre hospital emergency health care providers who work in the metropolitan area of Izmir.

2. To improve preventive strategies.

Methods : It is cross sectional and analytical study. Population consists of 192 health care providers of 14 metropolitan pre hospital emergency health care stations and one command and control centre. Sample consist whole population. Dependent variables are; being exposed to verbal abuse, verbal threat and physical assault and anxiety of exposure to violence. Independent variables are; age, sex, working group, level of education, working duration, number of cases, team harmony and administrator support. A questionnaire developed to determine violence, but before fulfilling it everybody read a note about definitions. Data collected by the questionnaire and annual case reports.

Results : 93.2 % of the sample reached (179 health care providers). 124 (63.9 %) were males. Minimum age was 23, maximum 44, mean 33.1, standard deviation 4.9.

81 % found to have anxiety to expose to violence. 67.6 % has been found to be exposed to violence, 48.5 % to verbal threat and 16.8 % to physical assault. The relations of level of education, number of cases, team harmony and administrator's support with anxiety of expose to violence were statistically significant. The relations of level of education, number of cases, working group and administrator's support with being exposed to verbal abuse were statistically significant. The relations of level of education and number of cases with being exposed to verbal threat were statistically significant. The relation of number of cases with being exposed to physical assault was statistically significant.

Conclusion : The relations of being exposed to violence and anxiety of exposure to violence with some 'easy to change' risk factors have been found meaningful. These results have shown the need for improving the working conditions, administrative support besides the basic preventive strategies.

MENTAL HEALTH AND MORAL HARASSMENT IN BRAZIL

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[ID 82]

Considerations about moral harassment are recent. The growing number of cases as well as their seriousness and amplitude brought forth the debates that have been held by government representatives and workers. The basic legislation that governs this topic comes from the Civil Code, Penal Code and from the CLT (Consolidation of Labor Laws), which allow the indemnity suits for the victims.While some countries already have specific legislation pertaining to this, in Brazil people are starting to notice that the depression resulting from moral harassment constitute high costs in mental health and work. Several programs to integrate work-family-life and reduction of stress have been implemented.The culture of promoting mental health for the development of a healthy work environment with social responsibility as a duty by all is in an evolving phase.Some research projects have been developed, regarding the incidence, range and consequences of moral harassment. The government, whose area of competence covers he labor relations and health-disease process, has undertaken several projects promoting the sensitivity of this area.The main tasks undertaken will be described with the objective of obtaining criticism and indicating effective ways reducing the occurrence of this type of labor related accidents.

BULLYING, HARASSMENT, INTIMIDATION AND MOBBING: A QUESTION OF DEFINITION BUT ALSO HEALTH AT WORK

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[ID 589]

It is known that bullying, intimidation and psychological harassment between employees can substantially compromise the well-being of workers. These terms do not have exactly the same meaning but they all refer to forms of interpersonal conflict, where one person or a group try to psychologically terrorise another. This is termed "mobbing" in some countries and scientific literature. A study on unresolved tensions and conflicts between employees was conducted over the whole of Switzerland by the State Secretariat for Economic Affairs. For the study 3220 employees, representative of the Swiss workforce, were interviewed in a telephone survey.

The study revealed that marked differences in the frequency of "mobbing" could be found according to how the problem was defined. According to the definition used, between 4.4% and 7.6% of employees report suffering some form of psychological terror at work. A comparison was made between an "objective" definition according to the scientific literature and self-reporting of "mobbing", which is the term that has often been used by the Swiss press.

Regardless of the definition, affected people show significantly more health problems than people who do not report any form of prolonged interpersonal conflict at work. The study revealed that the frequency of illness, medical consultations and absences increased proportionally to the degree of social tension reported. Almost 50% of the persons who fulfilled all the criteria of the scientific definition reported suffering from listlessness and depression and they were twice as often likely to report stomach problems than non-affected persons. They also visit doctors much more frequently and have significantly more absences from work. The study indicates that there is little consistency in the definition of this problem and little correlation between self-reporting and the scientific definition, however interpersonal relations substantially affect health at work and therefore are a serious occupational health issue.

CHANGES AT THE WORKPLACE AS ANTECEDENTS OF BULLYING

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Bullying is a complex and multi-causal phenomenon that cannot be explained by one single factor, but rather by an interaction of different factors; it is a process that typically begins with indirect actions and degenerate in direct and aggressive behaviours (Einarsen et al., 2003). Usually the victims are not immediately aware of the real nature of the situation but, after a variable amount of time, the very moment of the onset is recognised.

The aim of the study, currently in progress, is to identify the main antecedents of bullying as reported by a sample of patients victims of bullying examined at the Medical Centre for Occupational Stress and Harassment of "Clinica del Lavoro Luigi Devoto" (Milan) for work-related psychiatric disorders. The patients (N=77) were subjected to a three-day protocol. Qualitative analysis of occupational history, as collected by an occupational physician and a psychologist, was conducted.

The results show that the most frequent antecedents of bullying are restructuring (23.4%) (new management, new bosses, new colleagues and proprietor) and the change of one or more superiors (23.4%), without restructuring. 14.3% of the subjects stated that problems began when they requested the respect for their rights or posed other demands (a promotion, a transfer etc.). 10.4% of the subjects reported that their problem began soon after their employment in a new workplace. 9.1% said that problems occurred when they were moved to a new office. Only 5.2% affirmed having been discriminated after refusing sexual proposals or when they reported being affected by a disease.

These results show that the change, of different type, at the workplace is a critical factor and that, although per se insufficient, can trigger the bullying process. This is the reason why the management of change seems to be a very important intervention for preventing bullying.

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MOBBING IN THE EDUCATIONAL WORKERS OF A UNIVERSITY CENTER

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[ID 1533]

In the Occupational Health field, Mobbing is defined as the continuous and deliberate verbal worker mistreat, this cruel behave finally leads to the individual psychological destruction in order to get benefits to the organization through different procedures.

The type of study was observational and cross-sectional, related to Mobbing prevalence in educational workers coming from an University Center. The number of participants was 144 and the Leyman Inventory Psychoterror test was performed in its version of sixty items.

Taking into account the presence of at least one strategy of harassment such as Mobbing, 79.7 % of workers had "psychological harassment at work".

Only variables such as the work position, age and schooling showed association with some of "harassment strategies"

According to previous works, professional groups are specially affected by labor harassment the same as its relationship with age and schooling.

VIOLENCE IN WORKPLACE: A STUDY ABOUT PRIMARY HEALTHCARE STRUCTURES IN TUNISIA

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[ID 1780]

Violence is a social growing hazard, especially at workplace. It should be differentiated from aggression which is a negative attitude not related to the occupational environment.

Violence occurs when somebody is threatened or manhandled related to the workplace factors or conditions.

Recent researches including those conducted by WHO indicates that violence in the health care workplace is actually a global phenomenon in all societies. In developing and transition countries like Tunisia, data on this subject was previously either unavailable or scarce.

In this context, we conduct this study with theses objectives:

1-Analyse the frequency, the nature and the causes of acts of violence occurred during the year 2004 in health care workers of first health-care structures.

2-Evaluate the health state of those who where victims of violence.

It is a retrospective study conducted in 10 healthcare first line structures of Tunis.

All of the 115 health care workers were included in the study. It was based on an interview with a questionnaire about:

- Environmental work
- Occupational, social and personal data
- GHQ 28 which concerned only health care workers how had been victim of violence.

From The 115 subjects, 45 (39%) had at least one violence incident during the year of the study. Nurses and auxiliary workers were the most exposure, with high prevalence of psychological violence. The impact of violence was small and the prevalence of depression and other symptoms were similar to the general population.

Despite some limits, this study highlighted the necessity of the initiation of workplace policies to prevent the negative consequences of such widespread violence both on the health state of healthcare workers and on the quality of healthcare services.

INTERNATIONAL DISTANCE LEARNING PROGRAM FOR OCCUPATIONAL SAFETY AND HEALTH

CASE-BASED E-LEARNING FOR OM – THE NetWoRM PROJECT

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Occupational Medicine (OM) is an obligatory subject in medical training in Germany. Since the opportunity of bed-side-teaching in occupational medicine (OM) is limited and it is therefore difficult to teach clinical aspects of OM, we started implementing e-learning with a case-based approach in 1999. Several cases from didactically edited real patient histories were created and illustrated by multimedia material. In order to ensure a high quality of the e-learning tool each case is evaluated by two experts and user evaluated.

The cases are now implemented in a distance learning course via internet. This opens the possibility to share cases with other universities. Overall, ten university departments for OM in Germany are currently using the cases and are partner in the German NetWoRM-project (Net-based Training in Work-Related Medicine). In Bavaria, the cases have been implemented into the Virtual University of Bavaria (vhb) and can be used by all students at the five Bavarian medical schools.

In summer term 2005 539 students worked on the cases via the vhb. Of these, 372 (69%) participated in the user evaluation. The results indicated that even users who never worked with case-based e-learning before did not face major technical difficulties with the e-learning tool and rated the use of the programme easy. Students liked cases focusing on occupational problems in the healthcare setting most.

In order to guarantee the sustainability of the programme a critical mass of participating institutions and available cases is crucial. New cases will be developed and implemented into postgraduate training. In addition we currently are developing special cases for new target groups like high school students to raise awareness for occupational safety and health problems.

THE INTERNATIONAL NetWoRM PROJECT (NETBASED TEACHING FOR WORK-RELATED MEDICINE)

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Background: In order to prevent and recognize occupational diseases, medical students and physicians should learn the potentially causal relationships between job and disease in an interesting, motivating and patient oriented way. However, the opportunity of bedside teaching in occupational medicine (OM) is limited. At the same time, interest in OM of medical students is often low. Therefore, the aim of the NetWoRM is to improve teaching in OM on an international base using case-based e-learning.

Methods: In the past, seventeen virtual patient cases have been created in Munich using the web-authoring system “CASUS” (by INSTRUCT AG). After expert and user evaluation, they were successfully implemented into the medical curriculum at several German universities. Within the framework of an international project new cases are being created by each partner. In addition these cases are currently translated and adapted to other languages and medico-legal systems.

Results: Up to now, 10 cases were translated into English and 5 into Spanish. In February and April 2005, 13 case-authors from 12 centres were trained in the basics of case creation during a three week programme in Munich. The overall evaluation of the participants indicated that this way of teaching case creation is very efficient. The first four cases have already been implemented into teaching in Spain. The user evaluation indicated a good acceptance of the cases.

Conclusion: Exchange of case-based e-learning in occupational medicine is possible on an international base.

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LESSONS LEARNED IN THE DEVELOPMENT AND IMPLEMENTATION OF DISTANCE LEARNING PROGRAMS THE U.S. EXPERIENCE

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It is estimated that there are 2.9 billion workers worldwide including 170 million children aged 5-17 in hazardous work.1 In addition, there are about 2 million fatalities from work-related diseases and illnesses each year.2 This is considered the tip of the iceberg. There are another 160 million nonfatal diseases and 270 million nonfatal injuries annually. It is evident from these statistics that training in occupational health and safety is desperately needed to address growing worker-health problems in all countries. Unfortunately, courses addressing these issues are not readily available. As a result, online distance learning programs in occupational safety and health have emerged. They are based in several countries including the U.S. The advantages of online computer courses include the fact that training is self-paced, learning is concentrated, students may interact with mentors, the course can reach a large number of students, and students do not have to leave their home countries. The disadvantages include the difficulties in connecting to the Internet, the costs of course materials and to develop the technical infrastructure necessary, the ability of students to use computers, the student comfort level with computer-based training, the student motivation, the potential lack of communication with other students and instructors, and the fact that some programs are not in the student’s native language. The lessons learned from distance learning programs will be highlighted in this presentation and the future expansion of distance learning programs will be explored.

1 ILO, Global Estimate of Fatalities, 2002
2 ILO, A Future Without Child Labor, 2002

IMPLEMENTATION OF THE NETWORM FOR POSTGRADUATES IN FINLAND

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Objectives

The objective is to set-up a European network to improve medical training in occupational medicine.

Methods

All participating institutes / universities create at least one new case on an interesting issue of occupational health and/or medicine in their own langue. These cases are then expert validated before their translation into English and further to other languages.

In FIOH, a case of workplace survey was created and the student evaluation is going on. Physicians and occupational health nurses, who are participating qualification training, serve as persons to validate the case. These persons have been given an access to the case and they are asked to go through it as if they were studying it. The validation has been started in September 2005 and will be finished in the end of the year 2005. So far 33% of the persons given access to the case have gone through it.

Results

Preliminary results show that average handling time of the case is 35 minutes and the rate of completed cards is 76%. Final results will be ready in the end of January 2006.

NETWORM TEACHING IMPLEMENTATION FOR OH NURSES : CASUS' USE & EVALUATION

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Introduction: Occupational Health nurses' contribution to prevention, health promotion and risks' assessment programmes in enterprises is really needed considering occupational health needs presently. However, complementary competencies are neeeded. Further more, only few specific occupational health training courses for nurses exist ; they are usually quite expensive, and entail heavy strains on students due to regular absenteeism and travelling. This explains why the possibility of applying e-learning by casus' NetWorm to Occupational Health Nurses is of great interest.

Objectives: Adapt casus NetWorm to specific occupational health nurses' needs. Allow training access to greater number of occupational health nurses, and in particular to those in developing countries through e-learning. Help physicians appreciate occupational health nurses' competencies as well as benefits of team working..

Means and Results: In order to demonstrate application to practice, some examples particularly targeted to either occupational health nurses or occupational health physicians illustrating the occupational health nurse's intervention will be considered. Results of casus evaluation study regarding occupational health nurses and occupational health physicians trainees will be presented.

Conclusion: Casus learning and teaching method, implementation of real case study is an excellent tool to illustrate efficient occupational health nurse's contribution to health problems at the work place within the multidisciplinary team.

THE CASE OF PSYCHOSOCIAL CONSEQUENCES OF WORK: TOWARDS A SYSTEMIC APPROACH OF OHS

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The development of case-based learning using e-Learning technologies is at the core of the NetWoRM research project. The current development and future integration of such case within the Master of Advanced Studies (MAS) in Health at Work held at both the IST and ETHZ (Switzerland) opens new perspectives on the whole teaching and learning programs of occupational-related scientific fields, while underlining the remaining challenges linked to the understanding of psychodynamics within OHS. What does it mean to tackle psychosocial consequences of work? Why our psychosocial-oriented case helps bridging the gap between individual psychology and collective dynamics? What are the consequences of such systemic-oriented vision of worker's private, public and professional behavior? Finally, we would like to acknowledge that the NetWoRM project has more implications than just providing new Internet-based material for OHS education : (1) It paves the way for a re-definition of each OH specialist's activities and their limitations, as part of an integrative approach of OHS; (2) It draws a common understanding of work-related knowledge and competencies, needed for the development of a unified and systemic approach of Occupational Sciences; (3) To conclude, it forces OH teachers to integrate Information and Communication Technologies (ICT) into their program, heading towards the development of blended learning and richer learning environments.

THE INTERNATIONAL NETWORM PROJECT IN SPAIN. THE EXPERIENCE IN TWO DIFFERENT UNIVERSITIES

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The international Networm Project developed in Germany with the idea of creating a case-based e-learning tool for Occupational Medicine. The aim of our study was to transfer and adapt cases to the Spanish system and regulations. The issues addressed were baker's asthma, hospital needle stick, asbestos-induced bronchial carcinoma and acute lead poisoning. They were subsequently used by Medical students from the Universities of Castilla La Mancha (Faculty of Albacete) and Zaragoza. At these universities no web-based training has been used before.

Overall, 233 evaluation forms were filled-in by the students. Students indicated that they had fun while working on the cases. They also thought that the cases are important for their future professional life. The overall rating of the cases on a scale from 0 (=did not like the case at all) to 15 (=the case was excellent) was in the upper range (mean 10.6; SD 2.8). Many students gave positive feedback in the free text entry at the end of the questionnaire. However, the students considered the cases as difficult (3.6; 1.1 on a scale from 1=too easy to 6=too difficult).

The comparison of the results obtained is very interesting, since one of the Universities has implemented a medical student teaching system which is considered complete unique in Spain. This is a case-based learning system that was designed trying as an approach to Bolonia postulates.

In conclusion, it is feasible to transfer and adapt an e-learning tool to a different legal frame and different systems. The cases can be used successfully by students who are not used to this form of learning. However, the students' level of knowledge and experience in case-based learning must be taken into account when the cases are being adapted.

NET-BASED TRAINING OF WORK-RELATED MEDICINE IN LATIN AMERICA: CHANCES AND CHALLENGES OF LONG-DISTANCE TRAINING VIA THE INTERNET

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It is estimated that Latin America is a region that holds a workforce of 250 million workers distributed in our developing countries. The number of accidents, diseases and deaths at the workplace have increased significantly in the past decades. Consequently, there is an increasing need to provide Occupational Health comprehensive services for preventing work-related injuries and diseases.

Latin America has several in-house OH graduate programs, and some distance education training programs. But there is still a big lack of competent OH Professionals to provide the Basic and clinical OH services, and for covering needs of the regions' workforce.

The Net-based training of Work-related Medicine (NetWoRM) is an innovative program composed of tools and procedures with an educational approach of distance learning. The countries of the EU jointly with India and Colombia designed a series of cases for teaching medical graduate an undergraduate students, in such a way that the interactive experience of solving them has become a very interesting method for teaching.

The University El Bosque trained a group of professors and OH graduate students, with which validation of the Spanish versions of the case was completed. They were used as part of the Occupational disease course delivered within the Graduate OH Program.

The overall usage of the cases became an excellent teaching tool, and a the same time provided the opportunity for exchanging clinical experiences, knowledge and technology transfer from the European and North American countries involved in the project. The adaptation to Colombia was also an interesting input for having the industrialized countries understand the cultural, economical, labour and social differences between countries/regions.

NetWoRM is a solution that provides OH professionals access to training, minimizing education costs through the usage of virtual channels, and avoiding students to travel and have higher expenses to access higher levels of education.

WORKSHOP ON THE STATE OF THE ART IN WORK DISABILITY PREVENTION

INTRODUCTION

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[ID 2023]

[Abstract not delivered]

IMPROVING RETURN TO WORK RESEARCH: AN OVERVIEW

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Background: Despite considerable multidisciplinary research on return to work (RTW), there has been only modest progress in implementation of study results, and little change in overall rates of work disability in developed countries.
Methods: Thirty RTW researchers, representing over 20 institutions, assembled to review the current state of the art in RTW research, to identify promising areas for further development, and to provide direction for future investigations.
Results and Conclusion: Six major themes were selected as priority areas: early risk prediction; psychosocial, behavioral and cognitive interventions; physical treatments; the challenge of implementing evidence in the workplace context; effective methods to engage multiple stakeholders; and identification of outcomes that are relevant to both RTW stakeholders and different phases of the RTW process. Understanding and preventing delayed RTW will require application of new concepts and study designs, better measures of determinants and outcomes, and more translational research. Greater stakeholder involvement and commitment, and methods to address the unique challenges of each situation are required.

PROGNOSIS AND THE IDENTIFICATION OF WORKERS RISKING DISABILITY: RESEARCH ISSUES AND DIRECTIONS FOR FUTURE RESEARCH

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[ID 631]

Introduction: Screening procedures based on prognostic data are an important prerequisite for prevention of disability due to low back pain. This paper reviews the research on prognosis to delineate the most pertinent research challenges, and outlines directions for future research to improve the scientific quality and screening accuracy of prognostic efforts. Methods: Reviews of prognosis research were examined to identify key methodological and research issues. Results: Certain issues such as sampling procedures, research designs, data analyses, prognostic indicators, and follow-up procedures limit the value of prior studies. Absence of a clear conceptual framework hampers interpretation of findings and moving research questions forward. The recurrent nature of back pain and the need to effectively include the impact of employer actions and the job market were also identified as significant issues. Conclusions: Future research will be enhanced by addressing conceptual and definitional issues, applying tested and sensible measures, and careful follow-up of the study population.

INTEGRATING PSYCHOSOCIAL AND BEHAVIORAL INTERVENTIONS TO ACHIEVE OPTIMAL REHABILITATION OUTCOMES

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[ID 452]

Introduction: Psychosocial factors are important contributors to work disability associated with musculoskeletal conditions. The primary objectives of this paper were 1) to describe different psychosocial interventions that have been developed to prevent prolonged work disability, and 2) to identify future research directions that might enhance the impact of programs targeting psychosocial risk factors for work disability. Methods: Selective review of scientific literature on psychosocial and behavioral interventions and work disability Results: Most prior interventions focused on psychosocial risk factors that exist primarily within the individual (e.g., pain catastrophizing, beliefs, expectancies). Successful disability prevention will require methods to assess and target psychosocial risk factors 'outside' of the individual (e.g., interpersonal conflict in the workplace, job stress, etc.) using cost-effective, multi-pronged approaches. Research to explore interactions among different domains of psychosocial risk factors in relation to RTW outcomes is needed. Challenges to effective secondary prevention of work disability include developing competencies to enable a range of providers to deliver interventions, standardization of psychosocial interventions, and maximizing adherence to intervention protocols. Conclusion: Effective secondary prevention of work disability will require research to develop cost-effective, multi-pronged approaches that concurrently target both worker-related and workplace psychosocial risk factors.

PHYSICAL EXERCISE INTERVENTIONS TO IMPROVE DISABILITY AND RETURN-TO-WORK IN LOW BACK PAIN: CURRENT INSIGHTS AND OPPORTUNITIES FOR IMPROVEMENT

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Introduction: There is a body of literature which indicates that physical exercise interventions, with a primary focus on improvement of functioning instead of pain relief, might be effective to stimulate return to work and improve function in workers who are absent from work due to low back pain. Successful application and implementation of these interventions however, depends on multiple factors which need to be addressed carefully in clinical practice as well as research. Methods: Descriptive literature review, to identify an overview of current knowledge with respect to the safety, content- and context-related aspects of physical exercise interventions, issues relating to timing, the influence of treatment confidence and patient expectations, and the process of changing provider and employer behavior. Results: Physical exercises are not associated with an increased risk for recurrences. The effects of interventions may vary depending on content-related factors (i.e. type of exercises, dosage, frequency, skills of the health care providers etc.) and contextual factors (i.e. treatment setting, compensation system etc.). Treatment confidence and patients' expectations also significantly influence outcomes of physical exercise interventions. Timing is also important; interventions targeting return to work, applied during the acute phase of work absenteeism, compete with a high rate of spontaneous recovery and may therefore be inefficient. Conclusions: Despite numerous studies, more quantitative and qualitative investigations are needed to further clarify the requirements for a successful application and implementation of physical exercise interventions for disabled workers with low back pain.
Topic codes: Handicap and work (T22), low back disorders (T33), return to work intervention (T57)

PREVENTION OF WORK DISABILITY DUE TO MUSCULOSKELETAL DISORDERS: THE CHALLENGE OF IMPLEMENTING EVIDENCE

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[ID 487]

Background: The process of returning disabled workers to work presents numerous challenges. In spite of the growing evidence regarding work disability prevention, little uptake of this evidence has been observed. One reason for limited dissemination of evidence is the complexity of the problem, as it is subject to multiple legal, administrative, social, political, and cultural challenges. Purpose and methods: A literature review and collection of experts' opinion is presented, on the current evidence for work disability prevention, and barriers to evidence implementation. Recommendations are presented for enhancing implementation of research results. Conclusion: The current evidence regarding work disability prevention shows that some clinical interventions (advice to return to modified work and graded activity programs) and some non-clinical interventions (at a service and policy/community level but not at a practice level) are effective in reducing work absenteeism. Implementation of evidence in work disability is a major challenge because intervention recommendations are often imprecise and not yet practical for immediate use, many barriers exist, and many stakeholders are involved. Future studies should involve all relevant stakeholders and aim at developing new strategies that are effective, efficient, and have a potential for successful implementation. These studies should be based upon a clearer conceptualization of the broader context and inter-relationships that determine return to work outcomes.

WORKPLACE-BASED RETURN-TO-WORK INTERVENTIONS: OPTIMIZING THE ROLE OF STAKEHOLDERS IN IMPLEMENTATION AND RESEARCH

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[ID 637]

Introduction: The challenges of engaging and involving stakeholders in return-to-work (RTW) intervention and research have not been well documented. Methods: This article contrasts the diverse paradigms of workers, employers, insurers, labor representatives, and healthcare providers when implementing and studying workplace-based RTW interventions. Results: Analysis of RTW stakeholder interests suggests that friction is inevitable; however, it is possible to encourage stakeholders to tolerate paradigm dissonance while engaging in collaborative problem-solving to meet common goals. We review how specific aspects of RTW interventions can be instrumental in resolving conflicts arising from differing paradigms: calibration of stakeholders' involvement, the role of supervisors and of insurance case managers, and procedural aspects of RTW interventions. The role of the researcher in engaging stakeholders, and ethical aspects associated with that process are discussed. Conclusions: Recommendations for future research include developing methods for engaging stakeholders, determining the optimal level and timing of stakeholder involvement, expanding RTW research to more diverse work settings, and developing RTW interventions reflecting all stakeholders' interests.

A DEVELOPMENTAL CONCEPTUALIZATION OF RETURN TO WORK

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[ID 408]

Although return to work (RTW) is a phenomenon that has been researched for many years, our ability to understand and improve outcomes is still limited. As an avenue for advancing the field, this paper presents an alternative way of thinking about RTW. The conceptualization was constructed based on a review of the literature and the comments of RTW and workers' compensation researchers. RTW is presented as an evolving process, comprising four key phases: i.e., 'off work', 'work re-entry', 'retention' and 'advancement'. In addition, multiple phase-specific outcomes that may be used to evaluate RTW success are advanced. Broadening thinking about RTW to take into consideration the complexities of its developmental nature holds promise for understanding and improving RTW, as it not only clarifies the importance of incremental milestones, but also facilitates intervention choice and evaluation.

RETURN-TO-WORK OUTCOMES FOLLOWING WORK DISABILITY: STAKEHOLDER MOTIVATIONS, INTERESTS AND CONCERNS

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[ID 430]

Introduction: Satisfaction with return-to-work (RTW) outcomes is dependent on many factors, including a clear exposition of what people define as a "good outcome" and the information they use to determine if such an outcome has been achieved. This paper defines the key stakeholders involved in the RTW process and discusses the need to understand their motivations, interests, and concerns. Methods: A review of the literature and discussions with RTW researchers conducted by a multidisciplinary group of academic researchers. Results: Our analysis suggests that RTW stakeholders can share the goal of a successful RTW; however, this consensus has to be viewed in light of other, sometimes competing, goals and the environments in which stakeholders operate. Conclusions: It is suggested that articulating and operationalizing stakeholders' perspectives will allow researchers to advance the understanding of RTW interventions and outcomes.

OCCUPATIONAL PHYSICAL ACTIVITY, WORK POSTURE, AND THE RISK OF CARDIOVASCULAR DISEASES

WORK INTENSITY, ENERGY EXPENDITURE, RELATIVE AEROBIC STRAIN, AND 11-YEAR PROGRESSION OF CAROTID ATHEROSCLEROSIS

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Background: Healthy worker bias may be responsible for an inconsistent literature on the relation between occupational physical activity and CVD. Studying asymptomatic atherosclerotic changes prospectively in a representative population helps address this issue.
Objective: This study estimates the effects of work postures on 11-year progression of carotid atherosclerosis among 591 middle-aged men participating in the prospective population-based Kuopio Ischemic Heart Disease Risk Factor Study.
Methods: Ultrasound measurements of maximum intima media thickness (IMT) of the common carotid artery were taken at baseline and 11-year follow-up. Duration of different occupational activities was ascertained in detailed interviews at baseline, 4-year, and 11-year follow-up. Work intensity was measured based on work time (e.g.,hours/week) and based on energy expenditure (e.g., kcal/day) or energy expenditure relative to cardiorespiratory fitness (relative aerobic strain). Average work intensity during the total follow-up was calculated. The association of work intensity with 11-year change in ln(IMT) was studied in multiple linear regression models controlling for 20 covariates. Log transformed IMT was used to improve model fit.
Results: Increase in IMT was positively associated with, number of days worked/week (p=0.008), hours/week (p=0.048), baseline kcal/day (p=0.014), and average kcal per standard 8-hour workday during follow-up (p=0.011). Relative aerobic strain exceeded recommended levels (30% of Vo2max) for 47% of the population and was positively associated with IMT (p=0.004). Strong interactions were found with CVD at baseline: men with IHD or carotid stenosis experienced an accelerated progression of atherosclerosis associated with work intensity compared to healthy men. Conditioning leisure time physical activity was not related to IMT change.
Conclusions: Nearly half of the study population was exposed to exceedingly high levels of relative aerobic strain. Work hours and days per week, energy expenditure, and relative aerobic strain are significantly associated with progression of atherosclerosis, especially in men with CVD.

WORKING POSTURE AND 11-YEAR PROGRESSION OF CAROTID ATHEROSCLEROSIS

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[ID 1142]

Background: Recent epidemiological research has shown a strong association of prolonged standing at work with varicose veins, progression of carotid atherosclerosis, and all cause mortality. Hemodynamic theory predicts accelerated progression of atherosclerosis in standing subjects with pre-existing artery stenosis (Krause et al. 2000).
Objective: To study the association between work posture and 11-year progression of carotid atherosclerosis among 591 middle-aged men participating in the prospective population-based Kuopio Ischemic Heart Disease Risk Factor Study.
Methods: Ultrasound measurements of maximum intima media thickness (IMT) of the common carotid artery were taken at baseline and 11-year follow-up. Exposure to sitting, standing, and walking was assessed by questionnaire at baseline, 4-year, and 11-year follow-up using a 4 point ordinal scale ranging from “not at all” to “very much.” The associations of average exposure with 11-year change in ln(IMT) was studied in multiple linear regression models controlling for 20 covariates. Log transformed IMT was used to improve model fit. Analysis of log transformed change leads to estimates of relative change = RC = Final/Initial. Also %change = 100(RC –1).
Results: IMT increased 39.2% among men standing very much compared to 29.7% for men not standing at all (p=0.015). IMT increased 40.7% in men walking very much compared to 28.6% for those not walking at all (p=0.010). IMT increased 41.7% in men working in an upright position (standing and/or walking) compared to 28.0% in men not working in an upright position (p=0.004). Among those with carotid stenosis at baseline corresponding values were 53.8% and 37.1% (p=0.002, p interaction = 0.069).
Conclusions: These results support an atherogenic effect of standing work as predicted by hemodynamic theory. The effects of walking appear to have similar effects, indicating that an upright work posture is a risk factor for atherosclerosis regardless of whether it constitutes mostly standing or walking.

THE IMPACT OF PROLONGED STANDING AT WORK ON HOSPITALISATION FOR VARICOSE VEINS OF THE LOWER EXTREMITIES IN QUEBEC COMPARED TO DENMARK

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[ID 1781]

Background **–** Shops and financial institutions in Quebec and other North American jurisdictions require employees to stand at work in many situations where European firms give employees a choice or expect employees to sit. In Québec, a 1998 population-based survey has shown that 58% of full-time or part-time remunerated workers with at least six months’ seniority “usually” work standing. In Denmark 32% of all gainfully employed adults work standing at least 75% of the time according to the representative Danish Work Environment Cohort Study. Prolonged standing has been shown to be a significant risk factor for hospital treatment for varicose veins of the lower extremities (VV) (Tüchsen et al 2005).
Objective **–** The aim of the present study is to estimate the fraction of all hospitalizations among gainfully employed in Quebec who would not have been hospitalized due to VV had the proportion standing at work and the risk of varicose vein hospitalisation associated with standing been the same in Québec as in Denmark.
Methods **–** We used estimates of the relative risk for VV in Denmark together with prevalence data for prolonged standing from the 2000 Danish Work Environment Cohort Study and the 1998 Quebec Health and Social Survey to calculate preventable fractions. We adjusted these figures to take account of pregnancy-related VV.
Results **--** The preventable fraction of hospital admissions due to VV was calculated to be 16% among men and 19% among women. These data are being used to calculate the number of extra hospital cases in Québec due to preventable VV.
Conclusion **--** We estimate that the higher proportion standing at work in Quebec compared to Denmark may account for almost one fifth of all hospitalizations due to varicose veins of the lower extremities.

SELF-REPORTED STANDING AT WORK 1990 AND RISK OF HOSPITALIZATION DUE TO VARICOSE VEINS 1991-2003 AMONG 5,647 EMPLOYEES

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[ID 759]

Background: Recent studies suggest that prolonged standing at work is associated with the development of diseases of varicose veins (VV).
Objective: This study assesses the risk of hospitalization due to VV in the lower extremities prospectively in workers standing or walking at least 75 percent of their time at work.
Methods: A representative random sample of 9,653 working age adults was drawn from the Central Population Register of Denmark in 1990. Of these, 8 664 accepted to be interviewed by telephone (response rate 90%). Respondents (2,939 men and 2,708 women) were 20 to 59 years old and employed in 1990. Risk ratios for VV were estimated by log-linear

poisson regression models separately for men and women with adjustment for smoking status, body mass index (BMI), heavy lifting, and, for females only, number of children at baseline.
Results: During 12 years of follow-up 40 hospitalizations due to VV were observed among the men and 71 among the women. For employees exposed to prolonged standing or walking compared to all other employees, the relative risk was 1.75 (95% CI: 0.92-3.34) for men and 1.82 (95% CI: 1.12-2.95) for women. The pooled estimate of the relative risk was 1.78 (95% CI: 1.19-2.68). The etiologic fraction of prolonged standing or walking at work was estimated as 22.5% for men and 22.6% for women.
Conclusions: This prospective study confirms that prolonged standing at work constitutes an excess risk of hospital treatment due to varicose veins and account for more than one fifth of all cases in working age.

WORKING POSTURES OVER AN OBSERVED WORK DAY AND ORTHOSTATIC INTOLERANCE

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[ID 655]

Background: Epidemiological research has associated prolonged standing at work with cardiovascular problems, but has not usually considered mobility.
Objective: This study estimates the effects of less mobile standing on: (Study 1) symptoms of orthostatic intolerance (OI) and arterial blood pressure (BP) among 11 men and 23 women in health care; (Study 2) BP among 30 men and 35 women in various factory and service professions. No subjects engaged in heavy lifting.
Methods: Study 1 subjects were 34 workers in a long-term care center; average age was 44y and BMI was 27.2. Their OI symptoms (headache, nausea, excessive fatigue, dizziness, palpitations and/or breathlessness) were recorded on a questionnaire administered at the end of the work day. Study 2 subjects' average age was 32y; average BMI was 24.3. For both studies, BP and heart rate were recorded at the beginning and end of the work day, after a period of 10 minutes lying down, with an Omron HEM-637 apparatus on the left wrist held at heart level. During an entire workday, postures were scored as walking, standing or pacing in place by observers using a handheld computer.
Results: Study 1: On average, workers stood for 84% of working time, of which 28% was spent walking (less among women). Mean BP dropped over the work day by an average of 6% (more for women). Heart rate was constant over the work day on average. 65% (more women) manifested symptoms of OI. In a logistic regression, presence of at least one symptom was associated with static postures and female sex (p. = 0.001). In Study 2, less walking (p=0.04) or fewer steps (p=0.01) were associated with a decrease in mean BP.
Conclusions: These results suggest that more static standing postures are associated with OI and with a drop in BP over the workday.

ABSENCE FROM WORK AND STRESS: WHAT CAN BE DONE TO RETURN PEOPLE TO WORK

INTRODUCTION TO THE STRESS IMPACT STUDY

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This workshop addresses the issue of stress and long term absence from work. It reports on the findings from the Stress Impact study, a 6 country, 3 year study of absence from work undertaken in Ireland, the UK, Finland, The Netherlands, Austria and Italy. The study undertook a survey of 2000 sickness benefits recipients, a set of 250 in-depth interviews with absentees and their families and a set of interviews with more than 200 professionals involved in dealing with sickness absence from work.

The workshop will present some of the main findings from the study together with a practical analysis of what can be done to improve return to work practices by occupational health services. Some of the main findings from the study included:

- Stress at work and outside of work account for about a third of long term absentees
- People with mental health problems take far longer to return to work
- People often contemplate absence for a long period before becoming absent
- The effectiveness of occupational and other services varies considerably
- Workplaces are generally poorly prepared to reintegrate absentees
- Long-term absentees are often effectively abandoned by workplaces and services
- There are significant differences between national return to work rates

These and other findings pose significant challenges to the professions and the systems involved in reintegrating long-term absentees, especially those with stress related problems.

The presenters at the workshop will be drawn from both research and practice and there will be an opportunity for participants to share experiences in relation to stress and absence management and to draw lessons from research in relation to current practice in managing stress and absence.

NATIONAL SYSTEMS AND LOCAL SERVICES - THE FINDINGS

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The Stress Impact study described and investigated the policy basis and institutional structure of the services available to people who are absent from work. (Services here refer to the range of treatment oriented, rehabilitation, financial, labour market and training services available to the individual who becomes absent). In addition, a set of 250 interviews were undertaken with professionals who are potentially involved in the process of returning to work. In-depth interviews were also carried out with about 250 absentees and their families. These studies were carried out in 6 EU member states.

These investigations revealed considerable national differences in relation to the issue. At a policy level these differences related to:

- The qualification time for eligibility for services and benefits
- The level of organisation of services
- The strength of the relationship between services and workplaces
- The role of occupational health services
- The aims of services
- The availability and comprehensiveness of services

The studies of the professionals involved (both workplace based and non-workplace based) revealed some notable contrasts:

- Appropriate services were often not available.
- Professionals often shared a view of the nature of stress and its outcomes, but rarely provided what they regarded as the most appropriate treatment
- Psychological interventions were rarely applied and were difficult to obtain
- The role of the workplace was generally weak
- Absentees often felt that services had failed them

Even where services had made interventions, absentees often felt that they were of limited value

These and other findings point to a number of areas where service provision can be improved and made more effective. In particular, there is much scope for improving occupational health services, and the paper concludes with a set of recommendations in this regard.

INDIVIDUAL, ORGANIZATIONAL AND CONTEXTUAL FACTORS CONTRIBUTING TO A CLIMATE FACILITATING RETURN TO WORK FOR LONG TERM ABSENTEES

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Societal changes in Western countries have led to changes in demands on people. Statistics indicate that across Europe the number of people who experience pressures at work have increased by approx. 20 % (Paoli & Merlie 2001). This suggests intensification of work.

The incidence of stress accounts for over 30% of absence from work in Europe (Paoli 2001). Recent studies indicate that mental or emotional disturbances are increasing among the working population. And 'mental and behavioural disorders' are currently the largest group among the Incapacity Benefit recipients in many European countries. The longer people are absent from work, the lower the changes to return to work.

Sickness absence is conceptualised as a decision making process in which people need to pass a threshold (Alegro, Veerman, 1998). The threshold is believed to be dependent upon an individual's health, job, social, financial and legal situation. Similarly work resumption is also conceptualised as a decision making process as well. The aim of the research is contributing to further understanding of the factors that facilitate or inhibit the decision to return to work.

A longitudinal study (N = 1974) has been conducted with the aim to gain insight in the role of stress on long-term sickness absence from work. A distinction has been made between LTA's with mental- and physical-health problems.

Data analyses (Hierarchical regression and logistic regression) indicate that psychological, job-related, social and financial factors have a differential impact on the decision making process leading to work resumption.

The study findings suggest that a differential approach to return to work is needed for LTA's with physical and mental health problems.

Furthermore organizational policies and procedures with respect to return to work determine whether there is an adequate organizational climate for return to work.

The practical implications will be discussed.

PRACTICAL WORKPLACE BASED STRATEGIES TO PROMOTE RETURN TO WORK

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[ID 2143]

The process of returning and reintegrating an absent worker to the workplace can be complex. It involves elements of workplace policy, continuous interaction with the absentee, liaison with external services and organising a return to work strategy with a range of stakeholders internal to the company.

The process of return to work is influenced by a range of factors such as the nature of the health problems of the individual, the nature of the work to be undertaken, the fitness to work of the employee and the length of absence period. Other factors of importance include the suitability and availability of work for the returnee, the attitudes and knowledge of management and fellow workers and any assistive technology needs which the returnee may have.

This paper describes the current practice in relation to return to work following illness of Cloetta-Fazer Chocolates at a multi-site confectionery plant in Finland. It does so by describing the key role of the occupational health physician in organising and contributing to the process with special reference to people suffering mental health or stress related difficulties, in keeping with the theme of this workshop. The paper points to the importance of having a range of return to work strategies such as partial return to work, job design and work organisation, and temporal work reorganisation. It also points to the importance of adopting a proactive monitoring approach to return to work and to the need to prepare workplace stakeholders to be receptive to having the individual return.

The paper concludes with an analysis of the main differences in the return to work process for people with mental health or stress related difficulties compared to people with physical problems.

CORPORATE DISASTER PREPAREDNESS AND RESPONSE TO PANDEMIC ILLNESS

COMMUNITY AND PUBLIC RESPONSE

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[ID 2566]

In the event of a pandemic or major national catastrophe the primary decision maker is the federal government. The decisions must be informed and rely on the advice of the public health experts and public health agencies. In addition decisions must be made at the state and local levels to support national efforts and address local issues. This lecture and discussion session will address the United States response to recent natural disasters and review lessons learned. The public health planning for future natural disasters and terrorism as well as recent governmental preparation for pandemics in the U.S. will be presented. Also, potential scenarios will be discussed.

A panel discussion on disaster planning globally will follow the session.

A panel of five experts from American College of Occupational and Environmental Medicine (ACOEM) will address public health and MNC plans, programs, and procedures. Comparison of planning approaches in several countries will be discussed as well as national and international coordination of disaster preparedness.

MULTINATIONAL CORPORATE RESPONSE

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[ID 2567]

In the event of national catastrophe or pandemic multinational corporations must be able to take rapid and decisive steps. Internal disaster planning teams should be developed that include medical, safety, and security professionals with operating and senior management involvement.

An ongoing relationship should be established with local and national public health authorities. In addition to the protection of the safety and health of employees and their families, business continuation plans should be developed that minimize health risk and maximize productivity. A template for multinational corporations (MNC) corporate response will be presented and the needed actions for levels of risk reviewed. Communication for health and safety risks as well as mitigating strategies will be presented for each level of risk.

A reaction and commentary panel discussion on disaster planning globally will follow this session. A panel of five experts from American College of Occupational and Environmental Medicine (ACOEM) will address public health and MNC plans, programs, and procedures. Comparison of planning approaches in several countries will be discussed as well as national and international coordination of disaster preparedness.

UNEMPLOYMENT AND HEALTH

PSYCHOLOGICAL WELL-BEING AND WORK ATTITUDES ACROSS A RANGE OF EMPLOYMENT STATUS CATEGORIES

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[ID 2262]

Social and economic changes over recent decades, have produced different work arrangements. Employment status is no longer restricted to those in and out of work but is spread over a continuum of work arrangements including unemployment, underemployment, part-time, and full-time employment. Unfortunately, little is known about the psychological and health effects of these increasingly common forms of non-standard employment. This study aimed to shed light on possible causal links between different types of employment status and psychological well-being, physical health, and work-attitudes, as well as potential moderating and mediating variables. This was achieved by conducting a four-year longitudinal investigation that followed school-leavers into the workforce. The sample comprised 1289 adolescents (mean age of 15 years at baseline) drawn from single sex and co-educational schools in rural and metropolitan regions. Participants completed questionnaires on an annual basis over four years (T1, T2, T3, T4). On the basis of their work status at T4, participants were divided into four employment status groups (employed, unemployed, underemployed, full-time students) for comparison.. Analyses included an examination of how employment category affects psychological well-being and work attitudes; the predictors of employment status; and factors moderating how well individuals cope with inadequate employment. These findings provide key information about how non-standard employment can affect the individual, how to identify those at most risk of inadequate employment, and which factors protect against the negative outcomes of work status.

NEGOTIATING WORKFORCE REDUCTION: OPENING UP THE BLACK BOX OF SOCIAL DIALOGUE IN SWEDEN

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[ID 2554]

The “Swedish Model” is frequently mentioned when it comes to social dialogue in the context of workforce restructuring. The model alludes to the widespread understanding of consensus orientation as a “typical” aspect of Swedish culture.

This article seeks to further the understanding of the significance and impact of social dialogue as a practice in the negotiation of socially responsible workforce reduction. Arguing against the tendency of researchers as well as practitioners to explain the outcome of negotiations as a result of stable, cultural specific features, such as consensus-orientation, in the local context, the article claims that social dialogue is a practice in which procedures, routines and techniques are employed by actors in order to achieve a desired outcome, a process often described by sociologists of science and technology as “translation”. We offer support of this claim with field data collected in a large Swedish firm, which has undergone considerable restructuring since 2001, by means of interviews and document analysis. The implications of the paper concern the need for researchers to take into account the situatedness of negotiations between social partners in defining how workforce reduction should take place in their local context and the tension between such practices and the requirements of institutionalised rules and regulations.

Opening up the “black box” of social dialogue provides an opportunity to understand the nitty-gritty, everyday work of actors negotiating workforce restructuring without subsuming to reductionist cultural explanations.

JOB INSECURITY IN SELF-EMPLOYED: BUSINESS DIFFICULTIES ARE RELATED TO HEALTH. PERCEIVED WORK STRESS

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[ID 2555]

Workers who are exposed to job insecurity are at a higher risk of physical and mental disorders. Most respective studies are focused on populations with employment contract whereas only a few studies are concerned with self-employed persons. Here we concentrate on the latter, because economic pressure and insecurity seems to be frequent in this group (especially for owners of small businesses). We explore whether economic difficulties including risk of business closure is related to poorer self reported health and higher level of work stress.

Data stem from a population based survey of the German workforce including 2567 self-employed men and women. Perceived health was measured by a sum score based on a 20-item checklist of work related symptoms. Proxy measures were applied to measure work stress in terms of the effort-reward imbalance model. Job insecurity in self-employed was operationalized by two questions: 1. How would you rate the economic status of your business (very good or good vs. very bad or bad) 2. Did your risk of business cessation change in the last two years (increased vs. decreased).

Analyses showed that the mean number of symptoms and the level of work stress was significantly higher in self-employed who reported economic problems or an increased risk of business closure. Associations were confirmed by multivariate modelling adjusting for relevant covariates.

Results indicate that self-employed people experiencing economic problems exhibit higher levels of work related stress and symptoms. More research is needed on this particular group, which is until today hardly reached by any workplace health promotion measures.

ENTERPRISE RESTRUCTURING AND NEW TASKS OF HUMAN RESOURCES MANAGEMENT AND OCCUPATIONAL HEALTH: CONSIDERATIONS FROM A EUROPEAN PROJECT

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[ID 2556]

The paper presents considerations derived from the EU research project *„Social convoy and sustainable employability: Innovative outplacement / replacement strategies“* (SOCOSE, 2000-2004): the analysis of subjective experiences and expectations of employees who are at the onset of a job transition period or who have recently passed one. This research was performed jointly in five European countries and supported by the European Commission.

The results of psychological unemployment research demonstrate that job loss and the experience of unemployment may lead on different levels to processes of victimization with resulting considerable psychosocial strain. Precarisation of the labour markets and the increased need for restructuring leads to a normalization of occupational transitions. Transitions are potentially stressful for the individual affected and for those in insecure jobs.

The SOCOSE project carried out empirical investigations in five EU countries on insecurely employed, successfully re-employed after having received outplacement counselling, analyzed models of good practice in outplacement counselling and conducted interviews with experts involved in the dismissal process. It formulates a new European framework model of a social convoy for the accompanying of occupational transitions with ten recommendations directed at the European and the national level as well as at different social actors.

These recommendations may be capable to influence the role of HRM and Occupational Health in the process of Enterprise Restructuring in the direction of smoothening the process and preventing psycho-social damages that may result for those being dismissed and for those remaining in the company after downsizing (survivors-of-layoffs).

One additional example of health promotion in restructuring will be presented taken from a case study of a European Social Fund project (MIRE) on innovative enterprise restructuring in which the author is actually involved.

STABILISING AND MULTIMEDIAL BASED WORK AND SOCIAL ASSISTANCE (SUMAS) - CONCEPT AND FIRST RESULTS

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[ID 2557]

The project “Stabilising and Multimedia Based Work and Social Assistance (SUMAS)” is a Development Partnership in the EQUAL Round 2 (2005 – 2006) with 11 partners in different regions of West- and East Germany. It focuses on the target groups that have hardly any chance of job placement, e.g. low qualified people, disabled people, elderly long-term unemployed over 50 years and unemployed with poor resources and multi-layered problems. The belonging to these target groups plus the combination of risk factors multiplies the risk probability of remaining in unemployment social exclusion and bad health status quickly.

The main goals of SUMAS are: first, to raise the employability of disadvantaged participants and second, by doing so (re)integrate these disadvantaged groups into sustainable employment.
"Social assistance" means stabilization of the target groups in so-called stabilizing groups (SG) to such an extent that they can efficiently realize and use shown ways of solutions to an employment as well as health promotion. Our technical "work assistance" named MULTAS (partner is the Robotic Research Institute at the University of Dortmund) helps to reduce work-related transfer problems.
While MULTAS allows an easy use, SG tackles primary psychosocial problems like low self-esteem, anxieties and diseases and secondary problems like debts, broken homes and lack of social support. SG will empower participants to cope with problematic circumstances in a better way.
We present the concept of SUMAS including first results of the evaluated projects of our partners (e.g. from questionnaires and interviews with experts and participants).

INFORMAL EMPLOYMENT AND HEALTH EFFECTS?

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[ID 2558]

Informal employment is a phenomenon bridging the interest in the living conditions of some social subgroups in developed countries - such as immigrants - and the social situation of a large share of the world population in the countries of transition and developing countries. There is, however, little research into the health impact of this situation. There are also conceptual differences between approaches: informal employment is different from informal economy as seen by the analytical work done by the ILO. The lack of research is understandable, since it is difficult to separate the impact of informal labour from that of poverty and deprivation, which often accompany informal employment. A negative health impact of informal labour is not, though, self-evident: informal labour may be a voluntary choice, the health risks incurred and health damage potentially caused must be weighed against the potential health gains. Finally, in a family risks and gains are pooled: a family member may take health damage to promote the health of other members.
The paper attempts to compare the advantages and disadvantages of informal employment from the point of view of health. Very often informal employment is the only employment choice available and superior to having no work at all. We can study informal employment as risk taking, but we must distinguish between various types of it: some forms of informal employment are low-risk low-gain choices and do not show those engaged in them a way out of poverty, while some other forms entail a possibility of higher gains. The paper proposed will draft a classification of various types of informal employment and also describe the standard systems of measuring it.
Health risks of informal employment and their materialisation will be discussed in the paper to the extent there is relevant research available. The risks can be classified into four groups:
- risks related to insecurity of labour market status and income
- risks related to work load
- risk related to inadequate or lacking occupational safety and health
- risks related to culturally induced behavioural factors
- general risks related to poverty and deprivation and indirectly linked with informal labour

The health impact of informal labour can be constituted both directly and indirectly. This distinction refers to the difference between risk and perceived risk: all risks are socially constituted and the health impact may also depend on the perception or non-perception of a risk.

UNEMPLOYMENT AND MENTAL HEALTH - ANALYSIS BASED ON NATIONAL STRESS AND MENTAL HEALTH SURVEY IN JAPAN

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[ID 2559]

After the collapse of so-called 'bubble economy' and the following enduring recession in 1990s, the unemployment rate in Japan has been rising drastically from 2.2% in 1992 to 5.4% in 2002. The rate of increase in the first half of 90s was slower than that in the second half. One of the main reasons for the difference of the rates would have been the increasing restructuring and lay-offs which happened often late 1990s and early 2000s.
In 1998 the number of suicide rose dramatically, over 30% up compared to the previous years. The strong correlation was observed between the unemployment rate and the suicide numbers. Accordingly, it is plausible that one of the main reasons for the drastic increase of suicide victims is the increase of ex-employees with job loss which would contribute to ill mental health and in some cases suicide attempts.
The present study is based on a national stress and mental health survey conducted in 2000. The subjects of this survey were random samples of about 32,000 residences across Japan. Among the whole samples, 2,296 men and 1,665 women were unemployed. As an indicator of mental health, The Center for Epidemiological Studies-Depression Scale (CES-D) was utilized. The reliability and validity of CES-D were confirmed in a previous study. The unemployed showed the higher CES-D total scores compared with the employed. Among the unemployed, the mean total scores of CES-D were high in the age group of 15-19 and 45-54. The highest mean CES-D scores were found in the age group of 45-49 for the unemployed male and in the age group of 15-19 for the unemployed female.
As the main population of increasing suicide is among the middle aged males, and the finding obtained from the present study points out the same problematic segment of population. This finding implies that it is needed to focus on depression especially among middle aged male unemployed population to tackle the contemporary tragedy of increasing suicide.

MEASURING THE ACCESS TO THE MANIFEST AND LATENT FUNCTIONS OF EMPLOYMENT IN MIDDLE-AGED PORTUGUESE UNEMPLOYED: PRELIMINARY RESULTS

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[ID 286]

Poorer psychological and physical wellbeing among the unemployed when compared to employed have been demonstrated both in cross-sectional and longitudinal studies (McKee-Ryan et al., 2005) and have also been shown to be mainly consequential to unemployment, and not the result of those with poorer health losing their jobs (Creed, 1999). Individuals' age is one of the variables that influence the severity of the unemployment outcomes, and empirical evidence has demonstrated that young people show significantly less psychological distress than the middle-aged (e.g., Rowley & Feather, 1987; Warr & Jackson, 1984). The distress following job loss experienced by this group might be strictly related to how they perceive their chances of obtaining another comparable job, or even any other job (Broomhall & Winefield, 1990), given the present downsizing policies and recruitment practices of many companies that are pushing out older individuals from the labour market, and difficulting their reemployment opportunities. The current paper will present the results of a preliminary study with 180 unemployed and 180 employed Portuguese adults, aged between 40 and 65 years old. The main purpose of this study is to develop a Portuguese version of the Latent and Manifest Benefits Scale (Muller, Creed, Waters & Machin, 2002) which measures the access to the manifest and latent functions of employment as defined by Jahoda (1982) in her latent deprivation model. Additionally, the role that variables such as gender, educational status, employment status, occupational status and perceived age discrimination play in the relation between subjective wellbeing (measured with a Portuguese version (Neto,1997) of the Satisfaction with Life Scale (Dienner et allii., 1985)), psychological distress (assessed with the 12-version of the General Health Questionnaire (Goldberg, 1972)) and the access to each of the manifest and latent functions of employment is studied. To conclude, implications for future research are discussed.

ETHICS OF OCCUPATIONAL HEALTH PROFESSIONALS – CORE ELEMENTS

ETHICS AND EVIDENCE-BASED OCCUPATIONAL HEALTH

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[ID 1014]

Background

Evidence-based medicine (EBM) is defined as the integration of best research evidence with clinical expertise and patient values. Later this was extended to public health problems as well. To some extent these principles have been taken over by occupational health practitioners. Intuitively, it seems to be almost an ethical imperative to practice Evidence-based Occupational Health. However, it is unclear if this intuition holds on further examination.

Methods

We will analyse what is meant with evidence, clinical expertise and patient values and contrast them with the ethical principles of beneficence, autonomy and equity.

Results

The nature of the best evidence to be used is not clear. It is often restricted to randomised controlled trials which are often not feasible in the area of occupational health. Therefore, large parts of medicine and health care would be left out of the best way to practice medicine and public health

In general, the current professional expertise is not sufficient to be able to practice EBM. It requires a considerable amount of time and training. It would be unfair to impose something that can not be carried out.

Professional autonomy will be restricted by the obligation to use the best evidence. However, autonomy can not be absolute and the restriction will be to the benefit of patients.

Best evidence can be at odds with highly regarded occupational health principles such as the hierarchy of controls when workplace changes are less effective than protective equipment.

Conclusion

To make the intuitive beneficence of evidence-based occupational health come true, it is needed to be clear about the nature of the evidence, to make available sufficient resources for physicians and to accept that this will restrict their autonomy. In addition, the principles of occupational health need to be brought in line with the best available evidence.

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ETHICS AND PRACTICE GUIDELINES IN OCCUPATIONAL HEALTH

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[ID 1736]

Practice guidelines are 'systematically developed statements designed to assist practitioner decisions about appropriate health care for specific clinical circumstances'. Based on scientific evidence, professional experience, ethical principles, and consensus in a peer group practice guidelines are developed to improve the quality of care. Ethical values can, however, be at stake in the development stage as well as in the application in daily practice.

Ethical considerations start by defining the purpose of the guideline. The primary goal should be to promote the health and well-being of workers but they are increasingly used for non-clinical purposes by 'third parties' in quality assurance, managed care, or medical legal matters. To avoid conflicts of interest, guideline organisations often have codes of conduct where guideline group members are obliged to confirm their professional independence.

When developing evidence-based guidelines, one could argue that the principle of *beneficence* (doing good an no harm) will seldom be violated if the scientific evidence is clearly in favour of a certain treatment or policy. In general this may be true but exceptions exist: genetic screening can be very effective for specific purposes but in some cases regarded as 'unethical'. Moreover, in the field of occupational health, other stakeholders are involved (e.g. employers or colleague-workers) who can benefit or harmed by the decision of the patient and physician.

Practice guidelines may enhance patient *autonomy* by identifying useful options. This is the basis of evidence-based medicine: the integration of best research evidence with clinical expertise and patient values. However, in daily practice, uncritical application of guidelines may lead to 'cookbook medicine' or to a mismatch between effectiveness on a certain outcome (return to work) and patient satisfaction[1].

The principle of *justice*, implying non-discrimination and solidarity, may particularly be in danger when non-medical values combined with intense pressures on health care provision create an environment for guideline misuse[2].

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ETHICS AND COMPETENCIES OF OCCUPATIONAL HEALTH PROFESSIONALS

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[ID 2561]

The competent occupational health (OH) professional is expected to make decisions which are perceived as fair and equitable by both the employee and employer. While patients of other health professionals increasingly have autonomy over their choice of which health care professional they consult, in OH practice the employee and worker rarely has this choice. Although evidence based guidelines have been developed in OH, these have lagged behind some other areas of medical, nursing and safety practice. Scientific uncertainty creates ethical challenges and OH professionals regularly have to make judgements on extremely complex situations.

In the training of OH professionals, one of the more important competencies is that of competence in Law and Ethics and for occupational physicians in Europe, this was developed in the WHO publication on "The training of occupational physicians in Europe: Scope and Competencies" and endorsed by the Occupational Medicine section of the Union of European Medical Specialists in their Annex describing the common core competencies required in training occupational physicians. Similar emphases have developed in the training of OH nursing, safety, hygiene, ergonomic and other professionals.

The importance of the occupational physicians knowledge and competence in law and ethics to the customers of occupational physicians was revealed in a recent large UK survey of employees, employers and trade union representatives (Occupational and Environmental Medicine 62: 406-413). This provides evidence of the need to strengthen the training of occupational health professionals in the competency areas of Law and Ethics.

ETHICAL IMPLICATIONS OF MULTIPLE LOYALTIES OF OCCUPATIONAL HEALTH PROFESSIONALS

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[ID 2562]

The principal objective of occupational health professionals (OHP) is to protect and promote workers' health through actions aiming at the primary prevention. In doing this, occupational health professionals must enjoy full professional independence. However, simultaneous roles and obligations of OHPs, and interests of third parties can effect professional autonomy and independent decision making.

The trust vested to occupational health professionals by the state and the stakeholders in work life in matters concerning health and safety has a connotation of having a say on how and for whose benefit is this trust executed. In the democratic societies the balancing of rights and duties usually produces just and fair decisions expressed e.g. in the collective agreements and legislation. The failure to recognise and respond appropriately to conflict of interests can lead to unethical practices and infringe on the fundamental human rights of workers, such as right to work, right to health, right to know and right to privacy.

In the following table, an outline of the roles and loyalties of OHPs is given. These roles and loyalties are either implicitly or explicitly present when for example an occupational physician assesses worker's fitness for work or gives an advice to the employer on working conditions. The general assumption is that his or her evaluation is impartial and based on true understanding of the working conditions or worker's health vis a vis the best scientific and professional knowledge available. However, the weight he or she puts on issues indicated in the table in conjunction with different

contexts can influence the evaluation directly or indirectly. As a citizen he/she wants to save the tax-payers money, as a professional he/she wants to use best scientific evidence in clinical practice, as an administrator he/she wants to use cost-effective methods and as a business person he/she wants to please the client and make profit.

Table. The Roles and Loyalties of OHPs

Role	Loyalty	Context	Issues considered
Professional	Patient/Peers	Practice/Science	Professional conduct, good practices, scientific evidence
Citizen	Society	Politics	Distribution of power and resources
Administrator	Owner	Health and safety systems	Management, cost-effectiveness
Business person	Oneself	Business	Market shares, profits

Occupational health professionals must recognise the role they are playing in different contexts, make this clear to the others, understand the implications of their actions, base decisions on the best scientific and other professional data, acknowledge workers' rights, and oppose and strive to correct unethical conduct individually and collectively.

An international working group composed of medical ethicists, human rights experts, and health practitioners released guidelines on dual loyalty and human rights in health practice in 2003. The report includes guidelines for health professionals in the workplace (http://www.phrusa.org/health-rights/dual_loyalty.html).

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ETHICS OF OCCUPATIONAL HEALTH PROFESSIONALS - THE LATIN AMERICAN PERSPECTIVE

RODRIGUEZ-GUZMAN J.

[ID 2563]

The occurrence of social security reforms, the reinforcement of free trade agreements, and the opening of free markets caused many changes in the working world in most countries of Latin America. Occupational Health (OH) professionals have needed to adapt to all these changes, and at the same time, interact with different groups of interested parties. Governmental agencies, employers and their associations, workers and their organizations, workers' compensation and healthcare insurancers, clinical care providers, and scientific organizations, within others, are some of the interested parties interacting. Prevention, screening, diagnosis and treatment of occupational injuries and diseases have become a core issue where all of these stakeholders have interest, for either protecting and improving workers' health, or compensating the injured or ill worker.

OH professionals must try to maintain a fair and objective judgment to provide the services and the benefits required by the workers. Many times having to confront or contain some of the forces implicated in the legitimate act of defining the occupational origin of the accident, the disease or the death of a worker. Ethical dilemmas arise when conflicts of interest put pressure on their decisions, making it very difficult to be solved. Even some times, healthcare organizations have developed incentive programs for accelerating the compensation processes that run under the responsibility of the OH professionals.

Laws and regulations on medical ethics have not yet been updated to solve this type of dilemma. In most countries of the region the ICOH code of ethics is the guideline for solving this conflicts of interest. Yet, many cases are invisible to the law, finally being unfavorable for the worker.

Strict follow up should be done, to avoid corruption and other unethical practices. Undergraduate and graduate education levels about the ethical practices dealing with workers' compensation should be reinforced.

CONCLUDING REMARKS AND CLOSE

WESTERHOLM P.

[ID 2565]

The close of the minisymposium will follow on discussion within panel members and between panel and audience on basis of preceding contributions (each 12 minutes) by

- J.VERBEEK (Netherlands)
- C.HULSHOF (Netherlands)
- E.B.MACDONALD (Scotland, UK)
- T.LEINO (Finland)
- J.RODRIGUEZ-GUZMAN (Colombia)

First, overview reflections based on previous interventions and own experiences from a long professional life in occupational health and in politics will be given by

- G.BERLINGUER (Italy) (15 minutes) (1)

The chair´s (PETER WESTERHOLM) close of minisymposium will refer to the question of the existence of universality (2) with regard to value criteria of professional health ethics such as beneficence, autonomy and justice/equity. (3)

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Martinus Nijhoff Publishers, The Hague 2002.
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OCCUPATIONAL HEALTH & DEVELOPMENT IN ASIA AND LATIN AMERICA - SCOHDev SYMPOSIUM

OSH PROGRAMS -PRACTICAL EXPERIENCES IN COLOMBIA - THE THREATS AND CHALLENGES OF GLOBALIZATION

CANNEY P.
Colombia

[ID 2548]

Globalization brings to our Countries Opportunities and threats, it is important for us Occupational Health and Safety Professionals to recognize the former in order to counter the latter. Problems can be addressed by well-defined strategies and compromise from all the actors; employers, employees, unions, insurance companies and the Government. The globalized economy brings new economic opportunities, but also impose new challenges for the health and safety of workers, especially in those countries without the appropriate structure regarding education, technology and commitment towards the Social welfare of the population.

The solutions to some of the problems require a strong commitment, education, a technological base and the definition of new regulatory policies regarding some issues for example the exposure to chemical substances like asbestos and other carcinogenic agents, ergonomic aspects, work shifts, risks from the use of old machinery and equipment, child labour and all the others recognized as a priority in our Countries.

Some adverse or negative effects to be considered are for example that globalization is more profit oriented than people oriented (UNDP 1999), new forms of employment and changes in global labour policies, corporate restructuring, the easier transfer of hazards in the form of materials, products, and production processes to less protective and regulated jurisdictions in less developed countries. And one of the worse threats is the suspension of occupational health and safety regulations as an incentive to investors.

Far more than describing the problems associated what we have to answer is the question: what needs to be done? All levels international, national and local must work out solutions based on priorities that will be translated in meaningful actions. All the Social Security actors must work together searching for solutions concerned with promoting occupational health and safety. This effort needs to include the private sector, as well as the governmental and non-governmental sectors.

CHALLENGES POSED BY GLOBALISATION TO OSH

HERRERA V.
Chile

[ID 2549]

"The fast globalization of the world economy and specially the movement of companies around the planet looking for better locations for their factories, has brought new challenges on the occupational health and safety activities. On one hand workers are being exposed to new organizational cultures as well as new production habits when new companies arrive in their countries, and on the other hand workers from big transnational companies are being compelled to move and adapt to new life styles and different working and geographical environments. new languages, cultures, time schedules and legal definitions.

For people in charge of occupational health in the different countries, part of the challenge lies in making these differences meet when evaluating work environments and promoting safe workplaces. At times mother-companies will have stronger OS&H requirements that will need to be addressed with local workers and local occupational health care providers, and on the opposite situation local countries will apply their own legal requirements demanding for better OS&H standards, if needed.

Some examples of these situation are found for instance in preplacement and occupational evaluations, when for one hazard different countries and companies demand for different exams, p.e. formaldehyde in one workers compensation company in Chile requires only a respiratory symptoms questionnaire for surveillance, while other countries in South America require spirometry, in the same company. This has triggered studies to produce evidence on either practice in order to homogenize health evaluation practices.

SUSTAINABLE WORKPLACE IMPROVEMENT THROUGH TRAINING AND BENCHMARKING

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Reliance Industries Ltd, Mumbai, India [1]
Reliance Industries Ltd, Patalganga, India [2]

[ID 2550]

Though great care is taken by most managements to design and ensure safe and healthy workplace, deterioration of industrial hygiene standards takes place over time and the workplace may pose various occupational risks for the employees such as noise, dust, heat stress, cold, humidity, working with VDUs, exposure to chemicals etc. Probable causes of the deterioration include lack of knowledge/awareness, lack of proper work supervision resulting in unsafe acts / conditions, unsafe material handling etc. Employee attitude towards occupational safety and health also plays an important part in the process.

The OHS of a large private sector enterprise in India with multiple manufacturing sites launched the initiative titled 'Project CASH (Change Agents for Safety and Health)' to bring about a positive change and continual improvement in occupational health practices at the enterprise through participatory approach.

Innovative methods and tools such as training and benchmarking were used for this purpose. Training was used to create / enhance the OSH awareness of the employees and to motivate them. Internal benchmarking helped to raise the overall standard of the efforts made by various units to improve the OSH at respective workplace. The emphasis has also been on training the employees to identify occupational health risks, evaluate work environment and plan improvement actions, on an ongoing basis.

What cannot be measured cannot be improved. Therefore, quantification was an important aspect of the process. This was done through spreading awareness and giving training about various aspects of Industrial Hygiene. The results showed significant reduction in exposure to hazardous agents, improved awareness of all stakeholders and creation of a resource pool on occupational safety and health and workplace improvement at all sites of the enterprise. Though savings were not an objective, they surpassed the initial investment.

The program was extended to more and more sites with similar positive results every year, during last three years, validating the efficacy as well as sustainability of the Project CASH model. The presentation discusses the use of main tools, viz; training and benchmarking with suitable examples of improvement action.

THE PROGRESS OF PARTICIPATORY ACTIONORIENTED TRAINING ACTIVITIES IN THE MEKONG DELTA, VIETNAM

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[ID 2551]

Participatory action-oriented training method is a typical training activity that relies totally on local self-help initiatives and acknowledgement of the participatory step for improvement actions. Various practical training tools and training packages are gradually developed with the aim of promoting the full participation of local people. The action checklist, photo sheets with good examples and group discussion provide people with concrete assistance in improving OSH by using available local resources. This method composes of three main principles: (1) Support for local initiatives to empower people starting the changes in a creative way, (2) Acceptance for multifaceted improvement actions, (3) Step-by-step progress in realization of improvements.

Recent experiences through networking of partner agencies and institutions in developing countries in Asia are reviewed this method and arrived to realize that the development of inter-countries, regional networking as well as grass root networking is necessary to encourage local people taking responsibility for safety and well being at the workplace. The WIND program (Work Improvement in Neighborhood Development) aimed at joint improvement of farmers' working conditions by applying the participatory action-oriented methods is one typical example. More than 239,271 good solutions in the community have been collected within five years (2001-2005) based on the development of community WIND network. Some of the improvements can be carried out without high investment costs or great efforts.

It has been shown that good local examples reveal local needs and what the local people can do. Focusing on existing local good examples, we have been able to strengthen and accelerate the local people's improve-

ment efforts. Problems of poverty and the risks of work related accidents and diseases could gradually be removed from the working life of people by applying a participatory action oriented approach that fully relies on the local initiatives.

SALTRA EXPERIENCE IN CENTRAL AMERICA

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[ID 2552]

A long-term collaborative program between Central American and Swedish institutions, SALTRA (Salud y Trabajo) is running year 3 of the first 4-year Phase, aiming to build sustainable national and regional capacity in Central America (Belize, Costa Rica, el Salvador, Honduras, Guatemala, Nicaragua and Panama) to prevent occupational health risks, with public health and labor market perspectives, equity as a crosscutting principle, and poverty alleviation a long-term goal. SALTRA is funded by the Swedish International Development Agency (Sida). SISCA/SICA functions as political facilitator. Two regional resource centers, CISTA/UNAN-León in Nicaragua and IRET/UNA in Costa Rica, both with a history of long term collaboration with Sweden, support and supervise project execution. NIWL is SALTRA's overall coordinator and provides together with NIPH technical and organizational support. SALTRA aims at action and interventions. SALTRA is university based, enhancing the role of state universities to promote evidence based policy making. Simultaneously, intersectorial links are established with national governmental, worker, employer and community organizations, and with regional and international organizations.

Projects are carried out in 2-7 countries: a) *risk prevention and health promotion*: in construction, sugarcane, rural and urban informal sectors, and hospitals; b) *improvement of monitoring capacity*: national and regional OSH profiles and development of OSH indicators, feasibility assessment or improvement of registers for exposures and effects, and workers' training in self-monitoring of OSH conditions; c) *professional capacity building*: an interdisciplinary network and training for OSH professionals, twinning between university centers, and a series of outbreak and intervention studies; d) *communication*: website, yearly bulletin, publications, technical and popular reports, seminars and (inter)national conferences; e) establishment of national and regional structures; and f) preparation of 4-year Phase II. The projects have progressed in different degrees. Process and impact evaluations are carried out. Achievements, obstacles, and lessons learned for project management will be presented.

OCCUPATIONAL HEALTH AND SAFETY IN MINING SECTOR IN CHINA

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[ID 2553]

Economic development and occupational safety/health is always a conflict problem specially in developing countries. Since the reform and opening-up policy implemented in China about two decades ago, various ownership economic enterprises have been growing up and a huge number of migrant workers effused from countryside to cities. It was estimated there is about 1.7 hundred million migrant workers who are mainly engaged in the dangerous jobs. With the rapid economic development, it also brings a severe and inevitable problem to occupational safety and health and coal industry is an example. Coal is the main energy source for industrial production and also for living in China and the total output has been reached up to 19 hundred million tons in 2005. The demand of coal is almost immensity leading to the price going up and coin money quickly. Therefore, a numberless as the sand of small and private coal mines are constantly emerging during the recent years. It was reported there are about 6 million workers in coal industries, about one million worked in state-owner coal mines, 3 millions in local state-owner coal mines and 2 millions in town-village or private mines. There is no correct statistical data about how many small coal mines in the country, but for example, there are 3800 coal mines in Shanxi province, only 90 belong to state or local state-ownership coal mines and the rest is small coal mines. The high interest tempts the employers taking a risk in desperation leading to two problems of safety and health. As the report, accidents in coal mines frequently occurred during the years and it causes the death about 7000 each year. Coal worker's pneumoconiosis is also a big problem. There are 606047 cases of pneumoconiosis and about half is CWP. More importance is the outbreak of CWP in migrant workers during the recent years and it would be the main source of CWP in the near future.

Faced with the severe situation of occupational safety and health, where we go and what we can do?

1. At the first, the central government policy of regard people as a criterion has been considered as a priority in developing economy and we are glad to see it has become in practice.
2. To strengthen the building of the legal system of work safety and occupational health and a set of regulations and guidelines were published.
3. The state council has taken strict measures: ask to stop production and improve work safeguarding for potential accident coal mines; close the mines and withdraw the productive licences for mines which lack of the basic safety work competence facilities; no allowance of official as a shareholder or employer in coal mining and so on. By the end of January of 2006, about 5300 coal mines were compelled to close.
4. To conduct a pilot study on basic occupational health service in 20 counties of 10 provinces by combining the primary health care and occupational health service in town-village medical clinic and community medical service center. The main purpose of the study is to approach the model and mechanism to provide occupational health service for migrant workers and small enterprises.
5. To intensify awareness of work safety and health, education and training program for employers are carried out by SARS and the Ministry of Health; National Work Safety Month and A Week Propaganda for the Law of Prevention and Treatment for Occupational Disease have been launched annually.

We are aware that there is still a long way to go for us about occupational safety and health and to resolve the contradiction of economic development and OSH is not easy.

NANOTECHNOLOGIES AND OCCUPATIONAL HEALTH

AN INTRODUCTION AND FRAMEWORK FOR ASSESSING OCCUPATIONAL EXPOSURES TO NANOTECHNOLOGIES

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[ID 2015]

Nanotechnology refers to particles, engineered structures, devices and/or systems measuring approximately 1 – 100 nanometers (nm), in the size range of components of basic biological systems. The properties of nanometer scale particles (nanoparticles) can be quite different from those of the same material in either single molecule or bulk form. Nanoparticles are not completely new to occupational and environmental settings: they are produced as byproducts of combustion, in air pollution (ultrafine particles), and in workplace processes such as welding, handling of flour in bakeries, and glass production. However, the manufacturing of nanomaterials emerged only during the last decade, as many disciplines in science and engineering converged to enable the fabrication and manipulation of conventional materials or entirely new structures at the molecular level. Nanotechnologies concern occupational health professionals because of the opportunities for a very wide range of workplace applications and because small and medium sized enterprises in many industrial sectors will use them. In 2005, there were approximately 1645 U.S. nanotechnology companies and roughly half were small businesses. The potential benefits of nanotechnologies are great, especially in the sectors of health care, energy, and information technologies. Yet because nanotechnologies are on the same size scale as components of biological systems, they may be able to interrupt basic biological functions. Thus there is growing concern that nanotechnologies may be hazardous to health and environment. Preliminary toxicologic evidence regarding some types of nanoparticles supports this concern. This paper presents an introduction to the production and use of nanotechnologies and a framework for assessing occupational exposures. It establishes the context for additional papers in this session, which will address the assessment of exposures to nanoscale workplace aerosols; carbon nanotube (a common nanoparticle) biomedical applications and cellular toxicity; strategies for the ecotoxicology testing of new nanomaterials; and worker protection strategies and programs.

BIOMEDICAL APPLICATIONS OF CARBON NANOTUBES AND THE RELATED CELLULAR TOXICITY

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[ID 2062]

Carbon nanotubes, a form of carbon that did not exist in our environment before being manufactured possess unique chemical, physical, optical, and magnetic properties, which make them suitable for many uses in industrial products and in the field of nanotechnology, including nanomedicine. Hence, it is of the uttermost importance to explore the yet almost unknown issue of the toxicity of this new material. We begin with illustrating the potential use of Carbon nanotubes-Silica Nanoparticles Composites in Biomedicine. Silica nanoparticles have been widely used for biosensing and catalytic applications due to their large surface area-to-volume ratio, straightforward manufacture, and the compatibility of silica chemistry with covalent coupling of biomolecules. Carbon nanotubes–composite materials, such as those based on Carbon nanotubes bound to nanoparticles, are suitable, in *order to tailor Carbon nanotubes properties for specific applications.* Here, we present a tunable synthesis of Multi Walled Carbon nanotubes–Silica nanoparticles. The control of the nanotube morphology and the bead size, coupled with the versatility of silica chemistry, makes these structures an excellent *platform for the development of biosensors* (optical, magnetic and catalytic applications). Then, we compare the toxicity of pristine and oxidized Multi Walled Carbon nanotubes on human T cells - which would be among the first exposed cell types upon intravenous administration of Carbon nanotubes in therapeutic and diagnostic nanodevices. Our results suggest that carbon nanotubes indeed can be very toxic and induce massive loss of cell viability through programmed cell death at sufficiently high concentrations (>1ng/cell). The cytotoxicity of Carbon nanotubes does depend on many other factors than concentration, including their physical form, diameter, length, and the nature of attached molecules or nanomaterials: carbon black, for instance, is less toxic than pristine CNTs (which shows the relevance of structure and topology); oxidized CNTs are more toxic than pristine CNTs. We conclude that careful toxicity studies need to be undertaken particularly in conjunction with nanomedical applications of Carbon nanotubes.

OVERVIEW OF NANOTOXICOLOGY AND UK NANOTECHNOLOGY AND OCCUPATIONAL HEALTH PROGRAMS

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[ID 2109]

Nanotechnology is a rapidly advancing field of research that has already yielded a variety of commercial products including cosmetics, suntan lotions, paints, self cleaning windows and stain resistant clothing. The Royal Society and the Royal Academy of Engineering in their report 'Nanotechnology and nanoscience: opportunities and uncertainties' (http://www.nanotec.org.uk/finalReport.htm) concluded that nanotechnology is likely to have 'huge potential', but it also recognised that the health, safety and environmental hazards of nanoparticles (diameter less than 100nm) and nanotubes requires investigation.

A significant body of data exists regarding the toxicological effects in mammalian and rodent systems of inorganic, low solubility nanoparticles (also termed ultrafine particles), such as carbon black and TiO_2. These studies focuse on delivery via inhalation and subsequent effects on the lungs and cardiovascular system. Such studies suggest that smaller particles, with a larger surface area per unit mass, are more potent at inducing oxidative stress and inflammation leading to adverse health effects. Very few papers have been published regarding the effects of nanoparticles on other organs such as the brain, gastrointestinal tract and liver. In addition, very few studies have investigated the effects of nanoparticles delivered via different routes such as the skin, ingestion or injection. Furthermore, very little is known regarding the toxicity of more recently developed engineered nanoparticles such as C_{60}, carbon nanotubes and quantum dots. Finally, the widespread use of nanoparticles is likely to lead to the release of nanoparticles into the environment leading to potential impact on other species in terrestrial and aquatic habitats.

This presentation will aim to discuss how existing knowledge regarding the mammalian toxicology of bulk nanoparticles such as carbon black and TiO_2 could be used to generate strategy for testing the toxicology and ecotoxicolgy of engineered nanoparticles.

ULTRAFINE AEROSOLS AT DIVERSE WORKPLACES

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[ID 2156]

There appears to be a particular health risk from ultrafine dust particles in respiratory air. Ultrafine aerosol particles are for the most part the product of condensation in thermal and chemical reactions. BGIA (BG-institute for occupational safety and health), in conjunction with the German institutions for statutory accident insurance and prevention (Berufsgenossenschaften - BG), carried out a measurement programme at selected workplaces. The aim was to gather and catalogue information on ultrafine particles occurring at different work processes. They comprise workplaces in metal processing like melting, casting, welding, soldering, cutting, laser beam processes, workplaces in glass production, vulcanization of rubber, processes in food industry like bakery or meat smokery, or wokplaces on an airport field. The particle size distribution between approximately 10nm and 700nm and the number concentration of these particles were determined. BGIA was equipped with a suitable measurement device (scanning mobility particle sizer – SMPS) for these particular measurements, added with instruments like a cascade impactor or aerosol samplers for the inhalable and respirable dust fraction. The number concentrations in the measurement range varied between approximately 10 000 particles per cm^3 in clean areas up to 40 000 000 particles per cm^3 in welding plumes. Peaks in particle size varied between a few ten nanometers up to a few hundred nanometers, depending on the degree of aggregation and agglomeration.

Additionally tests on the penetration of ultrafine particles through breathing masks were performed. The institutions for statutory accident insur-

ance and prevention contribute to a helpful discussion on this topic, and the exposure data will be the basis for future toxicological and epidemiological studies. Common measurement and assessment methods have to be defined. The possible methods of prevention will be improved.

OCCUPATIONAL SAFETY AND HEALTH ISSUES IN NANOTECHNOLOGY

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CDC/NIOSH - Washington D.C. - United States [3]

[ID 1518]

Nanotechnology, the creation and manipulation of materials in the range 1 to 100 nanometers, will have applications across most economic sectors. One challenge will be to assure that workers are protected as the products of this technology evolve and are applied. The unique physical and chemical properties of nanoscale materials are the basis for the promise of nanotechnology and also for the concern. Already many companies and research laboratories worldwide are conducting nanotechnology research and introducing nanoscale materials into product development and manufacturing. The NIOSH Nanotechnology Research Center has identified critical occupational safety and health issues arising from nanotechnology. These include exposure and dose, toxicity, epidemiology and surveillance, risk assessment, measurement methods, controls, safety, communication and education, recommendations, and applications in the near term. There is need for risk management and control guidance for workers and employers currently using nanomaterials. NIOSH has developed a web dialogue (www.cdc.gov/niosh/topics/nanotech) that describes what are safe approaches to nanotechnology based on current understanding, past experience with ultrafine data, and professional judgement. This dialogue is a public document designed to allow input of state-of-the-art ideas and comment at various places in the document. There is need for a global occupational safety and health strategy to address potential risks and controls of nanotechnology.

WHAT WORKS: EVALUATING EDUCATIONAL PROGRAMS IN OCCUPATIONAL HEALTH AND SAFETY

DOES PARTICIPANTS' SATISFACTION REFLECT THE OUTCOME OF A LEARNING PROCESS?

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[ID 879]

Introduction

Participants' level of satisfaction is widely used as a variable for evaluation in education. If participants are satisfied it is concluded that the course has been effective. However, little is known about the exact meaning of 'satisfaction' of participants of educational programmes. The relation between satisfaction and the cognitive outcome of an educational programme is not straightforward. Therefore, we studied the relation between satisfaction and cognitive outcome in a trial on the effectiveness of a course on management of mental health problems for occupational physicians

Methods

Satisfaction is defined as a positive feeling from the participants towards the learning situation and towards what has been learned. It can be measured by a simple rating on a rating scale from 0 to 10. In our study we compared problem-based learning (N=59) with lecture-based learning (N=59). We used participants' satisfaction, knowledge tests and performance in practice as outcome measures.

Results

The problem-based programme was statistically significant more effective in improving performance, but had less favorable satisfaction evaluations.

Discussion and Conclusion

Apparently, in this study, participants' satisfaction did not reflect the outcome of the learning process. The results of our study are compared with other studies on outcome of educational programmes. The lack of a relation between outcome and satisfaction is also apparent in health care. There, satisfaction is predominantly brought about by humanness of the care provider. An answer to the question is significant for critical appraisal of evaluation studies of educational programmes.

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EVALUATION OF AN OCCUPATIONAL HEALTH NURSING PROGRAM: ON CAMPUS AND DISTANCE EDUCATION

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[ID 663]

Distance learning or web-based instruction (WBI) is an innovative approach for delivering instruction to a remote audience using the Internet. Since 1991, when the World Wide Web was first released onto the Internet at large, more and more institutions are starting to use the Web to provide instruction and training. In 1999, the faculty of the Occupational Health Nursing (OHN) Program at the University of North Carolina at Chapel Hill, School of Public Health developed a distance education program as an option format for nurses to obtain a MPH (master of public health) degree with a concentration in occupational health nursing. This distance education format met an identified student need as it is convenient, interactive, cost-effective, and available worldwide. Four students were admitted the first year. While the program has terminal objectives which are expected to be achieved, in 2004, faculty developed 12 competencies that OHN graduates should be able to demonstrate upon completion of the program. Each area has three levels of competency, which is demonstrated by being competent, proficient, or expert. Indicators are identified for each competency.

To evaluate achievement of these 12 competencies, students who graduated from the OHN Program from 1997 to 2005 were surveyed to determine their level of competency. While each graduate is not expected to be currently performing all of these activities depending on their scope of current job responsibilities, we wanted to know at what level graduates believed they were prepared to perform these activities. The results of the survey will be shared, with comparisons between residential and distance education prepared graduates. Other characteristics will be examined, including occupational health nursing experience, employment changes, certification, as well as professional development. Implications for education and practice will be discussed.

IS OCCUPATIONAL HEALTH NURSES EDUCATION EQUAL IN FRANCE AND IN FINLAND?

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[ID 2275]

Introduction : Both countries, France and Finland seem to have a similar approach and perception of the Occupational Health Nurse's role. In addition there are regulations regarding either the presence of the Occupation Health Nurses in enterprises (France) or the training of Occupational Health Nurses (Finland). As far as we know there are only few countries regulating OHN's role.

While the training programmes are under active development in both countries concerning both the content and the length of training as well as multiprofessional working habits, it was interesting to go through a comparative study of the training of OHNs now. For the comparison two programmes were chosen The 'DIUST', Inter University Diploma course in France and the training programme for OHNs in the Finnish Institute of Occupational Health. We hope that our experience can be of benefit to others as well.

Objective:

To identify and to assess the education programmes of Occupational Health Nurses in France and in Finland and to clarify the existing situation for the development of the education.

Methods: Assess Occupational Health Nurses' curricula in France and in Finland and define the accepted levels of exams by collecting the existing information regarding curricula, length of training, regulations and prerequisite education.

After that we compare the syllabus, the contents of training, the pedagogical tools and the training methods.

Results: The study is in progress and results will be presented at the Congress.

PREVENTION OF MSD IN PROBLEMATIC SECTORS

WORK RELATED MSD$_s$ MANAGEMENT IN FISHING: INTERNATIONAL VIEW AND ITALIAN SITUATION. THE ISPESL PROJECT.

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[ID 346]

From the seventies, the work-related musculokeletal disease (WMDSs) have been analysed using epidemiologic systems. The relation between related work factors and MDSs is being currently discussed in the scientific community. The NIOSH study (1997) had determined that, especially when exposition is high, there is a large number of epidemiologic researches showing evidence of a correlation between MDSs and some factors inducing physical stress such as wrong postures, manual handling of loads and repetitive movements. These factors can be found in several working stages of a number of production sectors, especially where manual processing still plays an important role. Among these sectors, professional fishing is characterised by a high level of accidents, that can be related both to the sea environment and to the high incidence of manual processing performed in small spaces and in a short time. Statistical evidence shows that MSDs are among the main causes of permanent disability in fishermen.

ISPESL, via its Documentation, Information and Training Department, has examined the Fisheries sector within the maritime sector and started work on a specific project having the following three aims:

1) Research for and analysis of data sources on occupational accidents and diseases, in part through cognitive surveys, e.g. questionnaires;
2) Design and creation of documentary tools (texts and multimedia) to help with the risks evaluation (risks profile) and management (good practice);
3) Drawing up of a methodology, planning of courses and teaching tools, including multimedia materials, suitable for an "adult" target, for the various actors involved in the health and safety management system.

Right from the outset of the project ISPESL has sought to create a broad group of collaborators, consisting of researchers from other institutes (IPSEMA, INAIL, ISMAR-CNR Offshore Fisheries Section, CIRM, University Institutes, LHAs), representatives of supervisory bodies (Harbour Authorities, Maritime Health and Prevention Departments, Harbour LHAs) and worker and employee representatives. The content developed by the various areas of the ISPESL project can be viewed at the website dedicated to the Offshore Fisheries sector (http://www.ispesl.it/profili_di_risk/sitopesca/index.htm)

On the subject of applied technology and work organisation aspects, it was decided to create inside the website a "Good Practice" section.. This section describes the initial results of a study on the risks of manual handling of loads, wrong body posture and repetitive movements of the upper extremity. These solutions are to be implemented, as technical and organizational solutions, . This research was promoted by ISPESL in co-operation with the Servizio PSAL ASUR Zona Territoriale 7 (PSAL Service, Geographic area 7).

ANALYSIS OF INJURIES AND MEDICAL REPORTS IN THE FISHING SECTOR AS A TOOL FOR PLANNING PREVENTIVE ACTIONS

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[ID 1529]

The "Workgroup on Fishing" of the Documentation Department of ISPESL (Italian Institute for Prevention and Safety at Work) has been searching for sources of data on injuries and professional diseases in the fishing sector besides the ones coming from the institutional databases. That is in order to get and provide other information suitable for prevention even on specific issues such as MSDs. The research has identified and designed three specific ways to collect data, to be integrated in the existing systems. The first is based on paper forms for injury notification collected by each Harbour Authorities, following an agreement made with the Headquarters of Harbour Authorities, providing ISPESL with locally gathered paper forms. The second system is based on monitoring the work and health condition of fishermen, using a specific questionnaire to be completed directly by fishermen. The third one is the regular collection of medical reports for the Maritime Health Offices; these reports specify the diagnosis for maritime workers who reported disorders. Analysis on data coming from these three sources (and from other sources too) can give useful indications for preventive actions.

IMPROVEMENT TECHNIQUE OF SALMON FILLETED BY OCRA AND EMG

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[ID 2231]

The industry of the salmon culture located in the X region of Chile, corresponds to the heading of greater relevance in terms of volume of production and national fishing export, with a high muscle skeletal exigency for the performance of its daily tasks. It is to say potentially are exposed to undergo an increase of skeletal upheavals muscle with the consequent labor absenteeism.

It is an excellent sector at level of the Chilean Association of Security. During the year the 2002 and first trimester of year 2004, the load of labor diseases measured in days of absenteeism was of 18,815 days, of which the 1.5% (3,676 days) corresponded to MSD. Bond to say, one of every five days of rest and treatment by diseases of workers of these companies of the X Region, corresponds to pathologies associated to MSD.

Considering the continuous increase of muscle skeletal disorders of superior extremities in workers who evolve in plants of process of salmons, in the filleted task of, where they require maintained positions, repetitive work with effort and movements, was established a study of the frequently used techniques, with the purpose of determining the muscular demand of the task and of knowing the time appearance fatigue, by means of the application of check list OCRA and electromyography of surface. The objectives were, to know the selective and quantitative muscular demand in the filleted task of, to determine the most suitable technique, to compare the present techniques of spine bone out with the propose technique, to optimize muscular yield and recovery of the condition of work by means of the restoration of pauses and for diminishing the incidence of muscle skeletal disorder . As result obtained a validation of the appropriate technique for the filleted task of, the recommendable time was determined time of appearance of physical fatigue and to establish method of operating - rest.

RISK ANALYSIS AND RESEARCH FOR THE BEST PRACTICES IN THE FISHING SECTOR

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[ID 2061]

The objective of the research, promoted and financed by ISPESL in Rome and carried out by ASUR healthcare district no. 7 in Ancona in collaboration with healthcare district no. 4 of Senigallia, was to identify, evaluate and analyse some working risks implied in the fisherman's profession such as :

manual movements of loads, incongruous positions, and repetitive movements of the upper limbs; these are relapse risks affecting the fishing workers' health according to NIOSH, OCRA, Snook and Ciriello models. The results of the research showed the presence of risks in all typologies of fishing studied, even though not in a homogeneous way.

The research on best practices focused its attention on operations without added value, on basic organisational matters (work macro-organisation) and specific organisational matters (micro-organisation of tasks).

A time method analysis with the MTM method has been used when studying the selection operations. We have reached some hypotheses concerning ergonomic solutions which consist in a first phase of redesigning and a second phase of experimentation up to the moment when all modifications will be finally validated.

In 2004 one of the hypotheses was tested by setting up on board the "Destriero" motor trawler, a raisable and inclinable platform to elevate the working deck in the screening phase carried out in the stern units during a fishing's wisecrack.

In 2005 the shipyard which modified the "Destriero" was committed to build complex equipment for a new fishing boat ("Dragut") practising trawling fishing. The new equipment includes the following elements:

a reclining plane actioned by a pneumatic device and positioned on the

stern, aimed at hosting the fish taken from the net, a tapis roulant, a system of canals and holes positioned in such a way to facilitate the elimination of the waste, a washing device jet of water positioned over the selection area.

REDUCTION OF WORK-RELATED MUSCULOSKELETAL SYMPTOMS IN AGRICULTURE THROUGH JOB MODIFICATION

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[ID 158]

AIMS. Agriculture is the third most dangerous industry in the US, with an overall injury and illness rate of 13%. Annually in California agriculture, 3000 farm workers sustain back injuries, typically related to ergonomic risk factors in their work sites. Research conducted by the UC Agricultural Ergonomics Research Center (AERC) aims to reduce musculoskeletal disorders and injuries (WRMSDs) using detailed job analysis and field trials of worksite modifications. We report on an ongoing intervention trial to modify harvest operations for citrus, pomes, and stone fruit.
METHODS. Using a modified participatory action research model, AERC collaborates with farm workers and growers to design and evaluate modifications of tools and work processes to reduce WRMSDs. Detailed analyses include videotaped job observations, the NIOSH lifting equation, and computerized data collection (e.g. the Lumbar Motion Monitor). Symptom data are collected pre- and post-intervention using an interview survey that is consistent with the language and culture of the sample, developed and tested by AERC. Using baseline data, AERC designs engineering and administrative solutions.
RESULTS. Half way through the study, we have complied detailed information comparing 12 fruit harvest operations. With workers and growers, we have identified crops for intervention, and have begun to test prototype interventions such as smaller carrying bags, alternative ladders, machine assisted harvest, and modified rest and recovery periods. Full trials will take place at worksites focused on oranges, apples/pears, and peach operations.
CONCLUSIONS. Previous studies have demonstrated that reduction of musculoskeletal symptoms associated with ergonomic hazards can be accomplished through interaction with workers and their employers, detailed analyses of jobs and working conditions, and careful trials of engineering and administrative interventions. Work site or industry adoptability is enhanced for interventions that are effective in reducing workers' symptoms and fatigue, low cost, easy to mass produce, and have low impact on productivity.

BRIEF REST BREAKS TO REDUCE MUSCULOSKELETAL SYMPTOMS IN STOOP LABOR

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[ID 160]

AIMS: Research conducted by the UC Agricultural Ergonomics Research Center (AERC) aims to reduce work-related musculoskeletal disorders and injuries (WRMSDs) using detailed job analysis techniques and field trials of worksite modifications. For stoop labor tasks in agriculture, it is often difficult to find engineering solutions to address ergonomic risk factors. In this study, we tested an experimental work-rest pattern for its effects on musculoskeletal symptoms, fatigue and productivity during two types of stoop task: harvesting strawberries and budding/tying fruit trees.
METHODS: Legal/traditional systems of work organization in California agriculture allow two 10 minute breaks and one 30 minute break over an eight hour shift for hired workers. The intervention consisted of adding a 5 minute break to every hour in which there was no other scheduled break (e.g., lunchtime). We tested the intervention in two randomized, controlled trials: Trial One compared groups of workers (n=66) during harvest of commercial strawberries. Trial Two utilized a cross-over design to compare workers (n=16 pairs) while they inserted bud grafts into 18" high citrus trees.
RESULTS: For Trial One, significant differences between intervention and control groups were obtained for changes in musculoskeletal symptoms, but not for fatigue or productivity. For Trial Two, musculoskeletal symptoms and fatigue were significantly better during the intervention condition. Productivity did not vary significantly by condition, although this test was underpowered and there may have been competition between groups.
CONCLUSIONS: The introduction of frequent, brief breaks every hour resulted in improved symptoms for workers performing stoop labor. Effects on worker productivity appeared to be related more to trial conditions than the intervention, and possibly to work crew competition. For farm tasks that are difficult to modify using engineering interventions, modification of work-rest breaks may result in better symptom profiles among workers.

TASK ANALYSIS AND RISK ASSESSMENT OF WORK RELATED MUSCULOSKELETAL DISORDERS IN FARMING: VINE AND OLIVE GROWING

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[ID 302]

INTRODUCTION: Risks of musculoskeletal disorders of the upper extremities and of manual material handling are not well investigated in farmers. This study carried out an evaluation of risk in some farms in Italy (Tuscany, Piedmont and Marches) characterized by different growing systems, in order to point out the most dangerous activities for biomechanical overload.
METHODS: To obtain an exposure index in vine and olive-growing previously, we analysed work organization (number of workers, working tasks and hours/months for each task) and we video recorded all working tasks. Then we performed ergonomic analysis using OCRA check-lists (Occupational Repetitive Actions by EPM Research Unit in Milan) for repetitive movements of the upper extremities and NIOSH method for manual material handling.
RESULTS: In vine-growing each tasks analysed (production of grafts, vine plantations, pruning, grape-harvest) showed an high risk of biomechanical overload of the upper extremities (values upper of 14.5, red band of OCRA check-list). Moreover some tasks, which "tirafili" (particularly task to maintain the frame of vineyard) and pruning, showed a very high risk (values upper of 22.6, violet band of OCRA check-list).
As regard the manual material handling in the grape-harvest, reds of risk changed from yellow red for farmers (male and female) which worked on farm tractor (I.S.C. respectively 0.82 and 0.99) to green red for farmers on land (I.S. 0.73).
In olive-growing we identified two tasks for the risk of musculoskeletal disorders: pruning and olive harvesting.
DISCUSSION: The agricultural work is certainly a work which the risk of musculoskeletal disorders is much remarkable as confirmed by our study.
For this reason it will be necessary to extend the risk assessment at all tasks (for example fruit-growing and horticulture).
The results of vine and olive growing will be used for evaluate the risk of each worker on the ground of the task and the hours worked.

A PROSPECTIVE STUDY OF THE RELATIONSHIP BETWEEN THE USE OF ERGONOMIC MEASURES AND MUSCULOSKELETAL DISORDERS AMONG BRICKLAYERS

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[ID 323]

The aim of this prospective study was to evaluate 1) the increase in frequency of using ergonomic measures, 2) the decrease in musculoskeletal complaints and 3) the hypothesised relationship between the increased use of ergonomic measures and the decrease in musculoskeletal complaints during a 4.5 year period.
A questionnaire was repeatedly sent to a cohort of 574 employees who worked as bricklayer (assistant) in 2000 and 2005. Questions were asked

about individual characteristics, the use of fourteen ergonomic measures and the prevalence of regularly or sustained complaints in nine body regions over the last 12 months. The relative frequencies of using 17 ergonomic measures and the 12 months prevalence of regularly or sustained musculoskeletal complaints of nine body regions were calculated for the years 2000 and 2005. Differences between the two years were statistically tested with the paired McNemar test. Relative risks were calculated for decreased lower back and shoulder complaints on the use of four a-priori selected ergonomic measures among bricklayers with regularly or sustained back or shoulder complaints during the year 2000.
In total, 443 bricklayers out of 574 bricklayers responded to send in the questionnaire again in 2005 (response rate: 77%). Using ergonomic measures has been increased in 4 out of 17 (24%) ergonomic measures: transport of bricks with mechanical devices, adjusting working height of bricks, adjusting working height of mortar, and the use of blocks with lower mass (≤14 kg). Regularly or sustained complaints of both the lower and the upper back were significantly decreased from 40 to 33% and 14 to 9% respectively. The relationship of the ergonomic measures with shoulder or low back complaints revealed one significant relationship. Increasing the working height of mortar reduced the chance of low back complaints among bricklayers with 1.6 (63%).

ANALYTICAL AND BIOLOGICAL VARIABILITY: IMPACT ON INTERPRETATION OF BIOMONITORING RESULTS

EVALUATING THE ACCURACY AND VARIABILITY OF LABORATORY DATA FOR OCCUPATIONAL AND ENVIRONMENTAL HEALTH PURPOSES: THE ROLE OF EXTERNAL QUALITY ASSESSMENT SCHEMES

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[ID 2052]

The evaluation of human exposure to occupational and environmental contaminants relies upon laboratory measurement of relevant biomarkers in blood and urine. It is thus essential that the analytical results generated be sufficiently accurate and reproducible in order to avoid errors in clinical interpretation. This implies that the permissible analytical uncertainty must be significantly less than the expected biological variability. To ensure that these requirements are met, laboratories are expected to use adequate methods and practice appropriate internal quality control. However these measures by themselves cannot ensure the accuracy of data. To do so requires objective evaluation by a third party. External quality assessment schemes (EQAS) provide an efficient mechanism for this purpose. In these schemes, a central organizing laboratory periodically provides participating laboratories with appropriate test samples containing unknown levels of the sought-for analytes. Participants report back to the organizer within a given period of time. Results are then compared with the expected value to determine whether they meet preset quality specifications, based upon fitness-for-purpose criteria. We have operated EQAS for heavy metals in human blood and urine for the past 30 years, and more recently for persistent organic pollutants in blood serum. Using the data gathered from these programs we will illustrate performance trends for various analytes in human matrices, examine the effect of methodology on analytical proficiency and show what level of performance, including accuracy and analytical variability, can currently be achieved by proficient laboratories in the field of biomarker measurements.

SOURCES OF BIOLOGICAL VARIABILITY IN BIOMONITORING

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[ID 2099]

Variability of biomonitoring results is regarded, sometimes, by the occupational physician and the industrial hygienist as a disturbing and limiting factor. In fact, intra- and interindividual variability is intrinsic to any biological test and, providing its sources are known or suspected, it can help effectively to assess exposure to, effect from or susceptibility to industrial chemicals. Sources of biomarkers' variability may be classified as toxicokinetic or toxicodynamic in nature. The former include factors modifying the absorption, distribution, biotransformation and excretion of xenobiotics, the latter those affecting their mechanism of action, repair or damage at the organ, tissue, cellular, and molecular target level. Besides, causes of variability may be genetic or environmental, may underestimate or overestimate risk and may be beneficial or detrimental to the individual. As a result predictions are difficult. Differences, for instance, in cardiorespiratory rate, physical activity, body size and tissue composition (fat) are known to modulate absorption, but also excretion, of volatile chemicals. Enzymatic induction and inhibition, together with polymorphism of metabolic enzymes (CYP, GST, etc.) may affect biotransformation, *i.e*. activation or detoxication, both qualitatively and quantitatively, in some cases decreasing, in others increasing occupational risk. In addition to enzyme polymorphism and induction/inhibition, other factors in people's environment may also impact on the yield of metabolites found either in blood or in urine. Co-exposure to other chemicals, medication, ethanol, and diet modulate CYP and other enzyme activities. For example, it was shown that the ingestion of dietary fibres may cause a partial shunt in the enterohepatic cycling of 1-hydroxypyrene, a popular biomarker of exposure to polycyclic aromatic hydrocarbons. In the rat, the urinary excretion of the metabolite was reduced by 40-50% in high fibre diets compared to low fibre diets. Interestingly, this effect was comparable in size to that caused by CYP1A1 and GSTM1 polymorphism. New tools, such as mRNA in lymphocytes, CYP phenotyping *in vivo* or *ex vivo*, toxicogenomics and proteomics, are currently being investigated, as potential biomarkers. It is hoped that these tests, once scientifically and ethically validated, would enable us not only to better explain variability of the existing more traditional exposure and effect biomarkers, but also to make more accurate predictions on individual susceptibility to chemicals.

STATISTICAL APPROACHES FOR MODELING INTRA- AND INTER-INDIVIDUAL SOURCES OF VARIATION IN BIOLOGICAL MEASURES OF EXPOSURE

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[ID 1625]

Two major components of exposure variability are the variation in true mean exposure levels among workers (inter-individual source of variation) and the variation that occurs in exposures received from day-to-day (intra-individual variation). Random- and mixed-effects models yield quantitative estimates of these (and other) sources of variability and thereby provide invaluable information to accurately assess exposure for hazard control and in epidemiological studies. In health effects studies, intra-individual variability can induce error in exposure assessment and thereby bias measures of effect and diminish the power to detect significant exposure-response relationships. If exposures are estimated with little error, relatively few monitoring data are necessary to make meaningful statements about exposure with minimal effects on study results. On the other hand, effects may be substantial for measures of exposure subject to considerable error, as would be the case for exposures that vary greatly over time relative to inter-individual differences in exposure levels. Studies that have been carried out, thus far, to assess measurement error indicate that the attenuation effects of imperfectly measured exposure can be quite substantial. However, few have had the requisite data to make comparisons between different measures of exposure collected in parallel on the same population of workers and even fewer investigations have focused on measurement error inherent in biological measures. Relying on a recently-compiled database of biological monitoring data, which contains multiple measures of exposure on groups of workers from myriad industries world-wide, we quantified the inter- and intra-individual sources of variation in each biomarker and used this information to predict the attenuation of an exposure-response relationship. Overall, this study illustrates the utility of a statistical approach for evaluating variability in biological measures of exposure and provides a basis for selecting optimal measures of exposure when evaluating health risks associated with occupational exposure.

TOXICOKINETIC MODELING: A TOOL TO BETTER UNDERSTAND BIOMARKER VARIABILITY

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[ID 2191]

Physiological characteristics related to workers, tasks or workplaces may result in important variations in biological exposure indicator (EI) values representing a challenge in terms of exposure and/or risk assessment. Toxicokinetic modeling represents an interesting tool for the study of the impact of biological (e.g., human) variability on the practice of biological monitoring of exposure (BME) to occupational toxicants. To that end, two approaches are available involving compartmental toxicokinetic models (CTK) or physiologically-based toxicokinetic models (PBTK) coupled with 1) Monte Carlo methods, assuming prior parameter distributions or, 2) a Bayesian analysis which allows combining prior knowledge and experimental data to produce plausible parameter values with posterior parameter distributions. Based on appropriate parameter values and distributions, a population comprising of thousands of virtual workers corresponding to as many physiological profiles is created and used to investigate the impact of several exposure conditions on the range which is likely to characterize the values of a given EI (e.g., blood concentration, urinary me-

tabolites) in this population of workers. Recently, we have estimated the variability which might affect 34 EIs corresponding to 23 industrial chemicals. The extent of variability was assessed using an approach based on either CTK or PBPK modeling with Monte Carlo simulations. A population comprising of 1000 workers was exposed to the current permissible levels (Québec, Canada) of each chemical. Results showed a large diversity in the expected range of values (from 1 to 10) for the different EI expressed as an index of extent of variability [IEV = ratio of the upper limit and lower limit (95% population interval confidence)]. We believe that a large IEV does not necessarily limit the usefulness of a given EI which mainly depends on its toxicological significance, i.e., whether or not this IEV reflects the difference in the risk associated with exposure (Supported by IRSST, Québec).

IMPACT OF VARIABILITY ON INTERPRETATION OF OCCUPATIONAL AND ENVIRONMENTAL BIOMONITORING RESULTS

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[ID 1655]

Several biological and analytical sources of variability may influence biomarker levels, thus making the interpretation of biomonitoring data a difficult task, certainly more difficult than the simple comparison between recorded data and limit values. Exposure biomarkers for chemicals with short half-life show a greater variability as compared to environmental monitoring. However, we should recognize that the main aim of biological monitoring is not to reduce, but to explain variance, which is always expected to occur in populations at risk. Inter-individual differences in uptake, biotransformation, susceptibility to damage, and repair capacity can result in different dose-response relationships for different groups of individuals. For example, we observed significant differences in the metabolization of styrene into specific mercapturic acids between subjects with different glutathione-*S*-transferase M1-1 (*GSTM1*) status. Moreover, styrene-induced DNA damage, as assesed by the micronucleus (MN) assay, was related to urinary 4-vinylphenol and influenced by the quinone oxidoreductase (*NQO1*) polymorphism in the subgroup of females only. Conversely, the main styrene metabolites, mandelic acid (MA) and phenylglyoxylic acid (PGA), seem not to be affected by host characteristics. This is why MA and PGA are the most reliable biomarkers for styrene biomonitoring, even at low exposure levels, provided that they are measured relying on sufficiently sensitive techniques. Additional issues to be considered include the scope of biomonitoring, which can be aimed at (i) defining the existence of an occupational exposure; (ii) quantifying the level of exposure or dose (with its various facets); (iii) verifying that exposure limits (BEI, BAT, BLV) are respected. Depending on the scope and context (research, routine, legal litigation) different requirements of biomarkers can be envisaged in terms of validation and acceptable variability. Practical issues, including cost, should be dealt with when planning a biomonitoring program for specific purposes.

ORGANIC DUSTS SYMPOSIUM: CURRENT OPINION

RECEPTORS FOR MICRO ORGANISMS ON THE CELLULAR LEVEL

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[ID 2016]

Organic dusts cause inflammatory reactions in the tissues exposed. The primary target is the lung and the cells lining the surface of the respiratory tract. Many receptors have been shown to react specifically on the presence of micro organisms that are ubiquitous elements in organic dusts.
There is a great variability in the individual response to organic dusts. Almost 50% of Caucasians are hypo responders to LPS exposure, and people with alfa-1-antitrypsin deficiency are hyper responsive to organic dust exposure.
The diseases found after organic dust exposures are asthma, allergy, hypersensitivity pneumonitis and toxic pneumonitis (organic dust toxic syndrome).
This paper deals with the mechanisms of disease and inflammation as it is encountered in industries with these exposures.
Toxicological studies including human experimental exposures and ex vivo studies of cells will be described. Cellular reactions are mediated through the attachment of e.g. LPS and beta(1,3)-D-Glucan to lipopolysaccharide binding protein, CD14 and Toll Like receptors. The difference between protein release and the gene activation will be described. Furthermore studies of the individual susceptibility will be reviewed.
Finally studies of the possible relation of these receptors to the protective effect suggested by some research groups to be related to LPS exposure will be discussed.

ACUTE EFFECTS OF ORGANIC DUST EXPOSURE

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[ID 2063]

Exposure in swine confinement houses induces an intense airway inflammation in previously non-exposed subjects. The cellular pattern in bronchoalveolar lavage (BAL) fluid following exposure is dominated by neutrophils increasing 75 – 100 fold but there is also a 2 – 3 fold increase in the number of alveolar macrophages and lymphocytes. The lymphocyte reaction following exposure is characterised by activated T-cells and T-cell activation is presumably mediated by IL-12 from neutrophils. Dust exposure also increases the levels of pro-inflammatory cytokines (IL-1, IL-6, TNF, IL-8) in BAL and nasal lavage fluid, IL-6 and TNF -levels in peripheral blood, leukotriene E_4 and $9\alpha,11\beta$-PGF_2 (a prostaglandin D_2 metabolite characteristic for mast cells) concentration in urine and NO in exhaled air. In addition, the exposure induces a multifold increase in bronchial responsiveness to methacholine (on average three doubling dose steps) whereas no effect is observed on bronchial response to dry air hyperventilation.
In a number of experiments we have shown that exposure of epithelial cells and alveolar macrophages to dust from swine houses *in vitro* induces cytokine release. It has been shown that the mRNA expression of IL-6 precedes that of TNF in alveolar epithelial cells stimulated by pig house dust and that dust induces TNFR2 in alveolar epithelium. Endotoxin may be one of the responsible agents but we have good reasons to believe that other agents than endotoxin are of greater importance as pro-inflammatory stimuli in organic dust from swine houses. There is a tolerance towards some of the effects of swine house exposure. Thus, the cytokine response and the increase in bronchial responsiveness are attenuated in swine farmers compared to naïve subject following acute exposure.
Glucocorticoids inhibit the dust-induced release of IL-6, TNF, and IL-8 from human epithelial cells (A549 cells) in a dose-response manner. Thus fluticasone almost totally inhibited cytokine release at a concentration of 10^{-8} M. The dust-induced cytokine release from epithelial cells is related to activation of NF-κB and the inhibition by steroids is mediated by inhibition of this transcription factor.
The reaction to exposure in a swine house is only to a minor extent influenced by anti-asthmatic drugs *in vivo*. Álthough cromoglycate attenuate airway cellular influx and the cytokine response (IL-6, TNF) there was no alteration of the increase in bronchial responsiveness following exposure. Inhaled steroids, antileukotrienes and β-agonists exhibit small effects on the inflammatory response and have almost no effect on the exposure-induced increase in bronchial responsiveness.

THE HYGIENE HYPOTHESIS – IMPLICATIONS FROM CRADLE TO WORKPLACE

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[ID 2110]

Recent studies suggest that the development of atopy and asthma might be influenced by exposure to pathogen associated molecular patterns (PAMP's), including endotoxin. Information on adverse effects mainly comes from studies among adults exposed in farming environments to high levels of endotoxins. Potentially protective effects of endotoxin exposure with regard to the development of allergy and asthma have mainly been observed among children, some raised in farming environments. The adverse and potentially protective effects of microbial exposures in the farm environment are discussed. Recent findings indicate that it is very likely that the protective effect of exposure to PAMP's such as endotoxin is not limited to childhood age. The protective effects that probably developed during childhood can still be observed at adult age. Furthermore, it even seems likely that exposures at adult age (in occupational environments), which stimulate the innate immune system, have an effect on allergy, independently of childhood exposure. It is hypothesized that reversal of atopy might occur as a result of high exposure to endotoxins and other PAMP's.

THE OTHER SIDE OF THE COIN – DECLINE IN LUNG FUNCTION IN EXPOSED WORKERS

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[ID 2157]

In many industries exposure to organic dust represent a health hazard. Organic dust can cause inflammatory reactions to tissues exposed, and the lungs and the respiratory tract are the target organs. The organic dust exposure is not a well defined entity but contains most often substantial amounts of microbial cell wall components, like endotoxin (gram-negative bacteria), peptidoglycan (all bacteria), and β-glucans (fungi, some bacteria and plants) and exposure to these components have been linked to respiratory diseases.
Occupational exposures from dust from cotton, thyme, wood, flax, grain- and potato processing, animal confinement buildings, and animal feed industry have been associated with decline in lung function. This has been shown in both cross-sectional and longitudinal studies. Depending on the intensity and length of the exposure the occupational dependent yearly decline in lung function added to that due to aging might be large enough to be of clinical significance and lead to respiratory invalidity, especially in smokers.
Review of the literature focusing on organic dust exposure and lung function decline will be presented.

THE PREVALENCE OF BYSSINOSIS AMONG COTTON WORKERS IN BENIN

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[ID 992]

Background*:* Cotton dust is present in the air during the handling and processing of cotton. This dust contains a mixture of substances including ground up plant matter, fibres, bacteria, fungi, soil, pesticides, non-cotton matter, and other contaminants. Cotton processing may cause byssinosis, particularly in the early processes of spinning. Byssinosis is characterized by chest tightness and breathlessness, most severe on the first days of the working week after days of absence from work. While cotton processing is decreasing in industrialised countries, it's increasing in developing countries.
Objective: The aim was to determine the effects of cotton dust exposure on respiratory health among cotton mill workers in Benin.
Methods*:* A total of 161 persons working in a cotton mill and 55 non-textile workers were included. The OSHA questionnaire was used to collect informations about respiratory symptoms. Pulmonary function was tested with a dry spirometer for each worker before entering the workshop. Lung function test was repeated after work.

Results: The age (mean (SD)) for textile workers and non-textile workers respectively was 46.7(7.9) and 37.0(8.3). FEV1 (liter, mean (SD)) was 2.4(0.6) and 2.8(0.6). The prevalence of smoking was 5.7% for textile workers vs. 5.2% for non-textile workers. On Mondays, textile workers had significantly more respiratory symptoms than non-textile workers. 10% of textile worker vs. 0% of non-textile workers have to stop for breath when they are walking (p=0,004). In general, the prevalence of byssinosis among textile workers was 13.7 % vs. 1.9% for non-textile worker (p=0.047). For the third Grade byssinosis based on Shilling's criteria it was 8.9% in cotton-processing workers and 0.9% in non-textile workers (p=0.62).
Discussion*:* Bysssinosis and other respiratory diseases are prevalent in Benin, and in line with earlier studies throughout the world. We are currently investigating the relation between respiratory impairment and the actual dust concentration.

PREVALENCE OF BYSSINOSIS IN TEXTILE WORKERS IN KARACHI

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[ID 224]

Background: Byssinosis is an occupation-related, reversible lung disease that becomes disabling in chronic cases. This disease is characterized by wheezing and tightness in chest due to the narrowing of airway passages. Byssinosis occurs exclusively in people working with unprocessed cotton, flax and hemp.
Rationale: Pakistan is a textile-oriented country, where cotton is cultivated on 3,012,000 hectors with production of 13,200,000 tons /year of raw cotton. Karachi is the biggest industrial city of Pakistan with more than 5,000 industrial units, out of which more than 1,000 units are related to textile. In Pakistan generally and in Karachi particularly, no significant and comprehensive work has been done on the epidemiology and characterization of byssinosis.
Objectives: We intend to measure the prevalence of byssinosis in the textile workers of Karachi. The data will be disseminated to public sector, employers and workers' federations in order to create the awareness and suggest preventive measures.
Material and Methods: This is a cross sectional study measuring the burden of byssinosis among the textile workers of Karachi. The sampling units are the ten textile mills in Karachi, from where 500 workers have been included in this study. A questionnaire has been administered to the workers followed by their spirometry.
Preliminary Results: Data collected from 130 workers showed that 32 workers (24.6%) suffered from the byssinosis. The prevalence was higher in spinning as compared to weaving sections. Most of the workers had very poor knowledge about Occupational Health.
Conclusions: Our preliminary results show that the byssinosis is very common in textile workers in Karachi. We suggest for providing health education and using personal protective equipments during work. Further more the disease should be recognized by the Employees State Insurance Scheme and textile mill workers be compensated.

PROTECTION OF THE OUTDOOR WORKER FROM ULTRAVIOLET RADIATION

SUNLIGHT AND SKIN CANCER RISKS

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[ID 2604]

All forms of skin cancer are steadily increasing - including the fatal melanoma - with a significant fatality rate in light-skinned populations. Most of these deaths could have been prevented by appropriate protection, following simple rules of sun safety. There is undisputable medical evidence that almost all skin cancers are related to solar ultraviolet (UV) exposure, and, specifically for melanoma - over-exposure during childhood of those having a familial genetic predisposition. Two or more members with melanoma, 50 or more nevi over the body are recognized risk factors.

Recent research clearly demonstrates that all forms of skin cancer are linked to the impairment of the molecular mechanisms that control cell division by mutation of the controlling genes. The mutations are specific for UV damage (the "UV signature") and cannot be caused by other environmental mutagens. One pathway relates to excessive childhood exposure in coincidence with early development of melanomas (in the 40s/50s). The other pathway is linked to over-exposure throughout a lifetime, leading to a late-appearance of all forms of skin cancers (in the 60s/80s). This observation has important implications for primary protection and secondary prevention (early diagnosis associated with excellent prognosis). Ideally, a carefully conducted physical examination should take place by the age of 20 to identify those individuals having a high risk of skin cancer later in their life. Such an examination would - detect signs of skin sensitivity to UV, i.e. freckling on the face and arms, sun-induced star-like large freckles, and number of nevi on arms, legs and trunk – completed by an historic record of severe sunburns, travels in sunny countries, practice of outdoor sports and works. Then, susceptible individuals should be counseled to seek assignments with minimal sun exposure and the necessity to adopt strict photoprotective measures.

HUMAN EXPOSURES OF THE OUTDOOR WORKER TO SOLAR RADIATION

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[ID 2605]

Humans have evolved under natural sunlight and possess many natural protection factors against solar ultraviolet radiation for both the eye and skin that are not all obvious. The geometry of human exposure outdoors limits dangerous UV-B exposure to the top of the head and shoulders. The eyes are greatly protected by the upper lids and brow-ridge. Overcast skies actually redistribute UV-B energy toward the horizon and may actually increase exposure to less-exposed areas of the eyes and skin.

Traditionally, there has been only a limited effort to reduce unnecessary occupational exposures to solar radiation, despite the fact that IARC classifies sunlight as a Group I carcinogen. Workers and the general public willingly expose themselves routinely to levels of ultraviolet radiation exceeding health exposure guidelines. Occupational health and safety advisors are constantly challenged on how to cope with exposure of the outdoor worker to the ultraviolet radiation in sunlight that can exceed health guidelines. It is interesting to note the differences in the perception of risk between solar radiation and ionizing radiation. The International Commission on Non-Ionizing Radiation Protection (ICNIRP) and a number of organizations have provided guidelines for worker protection and education. A very effective and simple method for the worker to know when protection is important is known as the "Shadow Rule," which will be explained.

THE PROTECTION OF WORKERS AGAINST OPTICAL RADIATION

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[ID 2606]

Sources of optical radiation are widely used in industrial, scientific and medical applications. Exposure of workers to optical radiation from artificial sources and the sun may cause different acute and long-term biological effects, which may be hazardous. Many intense broad-band sources (arc and incandescent lamps and welding arcs) emit significant amount of ultraviolet radiation in addition to visible and infrared radiation.

The mechanism of interaction with biological systems, the type and nature of effects and the damage thresholds changes significantly with wavelength. Photochemical interactions and photochemical effects predominate in the UV band while damages of thermal nature are produced by infrared radiation.

The visible region is the transition spectral band where the photochemical and thermal interactions overlap and fade.

Among the acute thermal damages to the eye and skin, the infrared photoretinitis and thermal injury of the lens are particularly relevant.

Exposure to UV radiation and to part of the visible may induce photochemical damages: erythema, photo-kerato conjunctivitis, skin cancer, immunological reactions and blue-light photoretinitis.

Safely guidelines, standards and legal regulations to protect workers from potentially hazardous exposures to optical radiation have been issued by professional societies, standardization bodies and Governments.

Recently the EU has approved the last Directive for protecting workers from risks associated with exposure to optical radiation emitted by artificial sources.

The philosophy generally adopted for protecting workers is based on two main principles: the exposure which is not necessary should be avoided, and be kept as low as possible, considering societal values and economical factors.

The limitation of the individual risk is obtained by implementing a set of restrictions and recommendations whose purpose is: a) preventing the occurrence of acute health effects with known thresholds and b) reducing long-term stochastic effects whose probability of occurrence depend on the radiant exposure cumulated by each worker.

POTENTIAL EFFECTS IN THE EYE OF OCCUPATIONAL EXPOSURE TO UVR

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[ID 2607]

The human eye is occupationally exposed to ultraviolet radiation (UVR) mainly from broadband sources, such as black body radiators and electric discharges but also exposure to pure UVR sources occurs. The quantitatively most important black body UVR source is the sun. The surrounding has a key impact on the exposure of the eye to UVR. The orbit and the upper eyelid shield the eye from external exposure to UVR from above and from the nasal side. The dose of UVR accumulated during a day at different depths into the eye depends on the spectral transmittances of the eye tissues. Ski resort workers with unprotected eyes receive in a sunny day in newly fallen snow a high enough dose of UVR to suffer from photokeratokonjuncivitis. The dose is approximately, one tenth of that causing acute cataract development and acute uveitis. Chronic occupational exposure of the eye to high doses of UVR from the sun is a risk factor for tumors in the eyelid, pathologies in the conjunctiva and cornea and cataract. It is therefore important to protect the eye from excessive occupational exposure to UVR.

INDICATORS AND PROFILES FOR MONITORING OCCUPATIONAL SAFETY AND HEALTH

CONCEPTS AND USES OF INDICATORS AND PROFILES

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[ID 2012]

Indicators are bits of information that reflect the status of larger systems. An indicator can be a number, a fact, an opinion or a perception that measures changes over time. An indicator is an administrative tool, not a scientific instrument. The connection of indicators with policy objectives is explicit.

Indicators can be quantitative or qualitative. A quantitative indicator is expressed by numbers, such as a change of rates of occupational diseases. A qualitative indicator draws on perceptions and judgments. It can be a clear statement such as "the workers awareness about risks has improved". Although the numbers give a quantitative indicator an air of certainty, it is not by itself more valid than a qualitative indicator of the same system.

Lagging indicators represent the consequences of earlier conditions. The incidence of mesothelioma is a lagging indicator of the use of asbestos forty years ago. Leading indicators change in advance of consequences and can be used in prediction. An improvement in a leading indicator ('exposure level') will eventually reflect as an improvement of a lagging indicator ('occupational disease').

Data on changes over time says little about the significance of such changes without reference to context. Indicators must be related to other items of information in a conceptual system.

A profile is a written summary of a subject about which it provides understanding. A profile gives a landscape view over an issue and provides a context. A profile is like a map, and indicators like spots on that map. Rather than simply communicating factual information a profile reveals meanings and relationships through interpretation. Interpretation attempts to expose a larger truth that lies behind a statement of fact.

EXPERIENCES ON COLLECTION OF OCCUPATIONAL HEALTH AND SAFETY INDICATORS FROM TWENTY-TWO EUROPEAN COUNTRIES

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[ID 2059]

Based on the initiative of the European Office of WHO, the Finnish Institute of Occupational Health prepared in 2001 a working document on country profiles (CPs) and indicators in occupational health and safety (OH&S). The document introduced a set of indicators (altogether 109, among them 16 key indicators) covering the prerequisites of OH&S, working conditions and OH&S outcomes. In 2002, CPs including both descriptive parts and quantitative data on 109 indicators, whenever available, were collected by European contact persons of WHO Collaborating Centers in OH&S in 22 countries. Data (comparable or incomparable) were available on 52% (range 9-100%) of the indicators. The best situation was for indicators on ILO ratifications and on fatal work accidents. The member states of the EU had better availability of comparable data (48-50%) than the other European countries (2-11%), because the source of data for rather many indicators was a EU survey (European Survey of Working Conditions, CAREX project on occupational exposure to carcinogens). Because the availability and comparability of indicator data are often poor, comparing and ranking of countries should be considered with caution. Trend analyses and risk assessments are more valid and useful at the national level where data are usually more comparable. Because the priorities in industrialized and developing countries differ significantly, different key indicator sets are needed. In addition to quantitative indicators, it is informative to include structured descriptions and qualitative indicators in CPs. CPs and OH&S indicators can be considered useful tools in promoting OH&S and information steering strategy both nationally and internationally

OCCUPATIONAL HEALTH AND SAFETY COMMUNITY PROFILE - AN EXAMPLE FROM TANZANIA

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The Arusha Chini Ward is located in the Kilimanjaro Region within the Northern Zone of Tanzania. There are seven villages with a population between 364 and 2,076 and a total population of 8,175. The economy is based on sugar cane plantations where most of the villagers are employed.

An occupational health and safety (OH&S) profile was developed by using qualitative rapid assessment methods such as perusal of secondary data sources, discussions with local experts, authorities and stakeholders, and walk-through observations.

The profile summarises contextual information on geography, local economy, population characteristics, and education. The profile reviews community characteristics and functions such as primary health care, important public health problems of the population, vaccination programs, health education, and health inspections. Qualitative indicators address poverty, unemployment, gender equality, crime, violence, alcohol abuse, and hazardous child labour.

Indicators of OH&S include management, services, awareness of hazards, attitudes, results of walk-through observations, and results of medical check-ups carried out recently by an OH&S industrial officer.

A number of problems and risks at work were detected in the process of writing the profile many of which can be corrected with proper advice and counselling with no-cost or low-cost solutions. Such issues included prevalent ergonomic problems of various nature, worksite housekeeping, unsafe use of pesticides, others. It also turned out that most villagers have not understood that measures taken against hazards at work also increase productivity and decrease costs and loss. Programmes are now underway to see to it that the villagers understand the obvious hazards and can take steps for correction of many problems by themselves.

INDICATORS OF NATIONAL OCCUPATIONAL SAFETY AND HEALTH SYSTEMS: CASE - RUSSIA AND THE CIS COUNTRIES

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The new ILO methodology on a systematic approach to improvement of occupational safety and health (OSH) systems is important for the newly independent states in former Soviet Union, which are re-building their national OSH systems.

The ILO methodology starts with a situational analysis, the national OSH profile, establishing the baseline, agreed with the three constituents Government, Trade Unions and Employers. This profile is used to develop a national OSH programme, defining priorities, national resources and realistic needs for donor funding. The programme will function as a blue print for technical collaboration.

Azerbaijan, Georgia, Kyrgyzstan and Uzbekistan prepared their OSH profiles 2-3 years ago in the pilot phase of the methodology. Kazakhstan has also prepared its profile and national programme.

The overall objective of the ILO process is the creation of a safety culture at work places and improving working conditions with a systematic national approach by utilising all national resources.

The specific objective in the CIS countries is to design and implement a national system to improve working conditions in Armenia, Georgia, Kyrgyzstan, Tajikistan and Uzbekistan. The implementation of OSH management systems is going on in selected regions of Russia.

Progress indicators are:
- a national tri-partite OSH working group able to plan and implement a national OSH system
- a national OSH profile
- an equipped and operational national OSH information and training centre
- a national OSH programme, with a work plan, approved at ministerial level
- mini-project to improve working conditions in selected enterprises
- a monitoring system in place evaluating impact of practical improvements
- promotional events organised.

The ILO methodology needs to be streamlined with the WHO methodology on country indicators to increase effectiveness and combine resources.

OCCUPATIONAL HEALTH INDICATORS FROM PUBLIC HEALTH PERSPECTIVE - THE EU PROJECT WORKHEALTH

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[ID 2197]

Since the 1990s, considerable efforts have been undertaken in the European Community to establish a health monitoring system at European level. In traditional public health monitoring schemes, the world of work has played only a minor role. On the other hand, monitoring systems from the occupational health and safety perspective usually focus on "traditional" aspects such as occupational diseases and work accidents. However, there is an increasing awareness that work does have a major impact on public health and that bad working conditions can create considerable costs to society.

Against this background, the WORKHEALTH project ("Establishment of indicators for work-related health monitoring in Europe from a public health perspective") was launched in the year 2002. The aim of the project was to establish indicators which can be used in a future work-related health monitoring system that adequately reflects the impact of work on public health. One of the major concerns in this project was to stress the importance of taking an inter-sectoral approach, which is why in addition to the experts from public health science, there were also experts in the group representing the fields of occupational health and safety, labour inspectorates and social insurance institutions. Results are available at (http://www.enwhp.org/news/workhealth.php?news=4)

Meanwhile the project is carried further to the compilation of an European work-related public health report which reflects the impact of work on public health in Europe. An emphasis is placed on the interpretation of these data from the perspective of the different Member States; on this basis, recommendations on policy priorities shall be derived which can contribute to future practice in workplace health promotion.

WORK-RELATEDNESS OF HEALTH PROBLEMS: A BLIND SPOT IN CURATIVE CARE?

RAMAZZINI REVISITED: HAVE DOCTORS LEARNT THE LESSON?

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[ID 2227]

The Blind Spot for work among attending physicians seems to be spread all over the world. But that was not always the case, at least not in Italy.

Observations of the relation between occupational hazards and poor health date back several centuries, but a systematic description of diseases according to occupational causes was made at the end of the seventeenth century as a result of the work of Bernardino Ramazzini (Carpi of Modena, 1633 – Padua, 1714)(1).

It was unusual for a physician of that time (he was the personal doctor of the Duke of Modena, who appointed him Chair of Theory of Medicine of the University) to devote himself to investigating workers' illnesses. In fact, health problems were more threatening than work-related ones and physicians paid attention mainly to the illnesses of the rich (2). In spite of this, for nearly 20 years Ramazzini visited workplaces, observed workers' activities, and discussed with workers their illnesses.

His extensive investigation resulted in a treatise ("De Morbis Artificum Diatriba", Modena, 1700) describing the work related disorders of more than 50 occupations. Ramazzini knew that dangerous materials could be inhaled through the lungs or penetrate the skin and identified a variety of related disorders. He reported excess noise and other physical agents as potential cause of illnesses. Furthermore, he realized that it was not possible to ascribe all disorders directly to the chemical and physical characteristics of the environment and understood the relationship between posture, repetition of movements, lifting weights, and particular disorders (3, 4).

The diseases were directly observed by the author, who did not mind questioning workers about their complaints to correlate them with the known disorder. Hence, in addition to the question recommended by Hippocrates about the kind of pain or illness, about the cause, and about the duration, Ramazzini also recommended to ask patients the nature of their occupation: "liceat quoque interrogationem hanc adiicere, et quam artem exerceat?" (I may venture to add one more question: what occupation does he follows?). A message still very much up to date.

BLIND SPOT AND WHO GLOBAL BURDEN OF DISEASES

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[ID 2053]

Throughout the world, most adults, and many children, spend much of their waking hours at work. Many of the 2.9 billion workers across the world are exposed to hazards and risks at their workplaces. The World Health Organization carried out a Comparative Risk Assessment (CRA) exercise; an approach to estimate the global burden of disease (GBD) from a starting point of estimates of the risks experienced by exposed populations for twenty-six risk factors. The key questions were how much disease is attributable to exposure to specific risk factors, and which fraction does this represent of the total disease burden, and 2) How much of that burden can be avoided by reducing exposures to those risk factors[3].

For all 26 risk factors that were studied, it was necessary to estimate an exposed population and exposure levels for age, sex, and 14 country groups in the WHO geographic regions of the world. The resulting burden was described as the attributable fraction of disease or injury, using both mortality and also disability-adjusted life years (DALYs), with one DALY being equal to the loss of one healthy life year) — a measure that includes both mortality and morbidity.

Because of the stringent requirements for global data, only five occupational risk factors could be included: risks for injuries, carcinogens, airborne particulates, ergonomic risks for back pain, noise and selected diseases they would cause. Also HIV and Hepatitis in health care workers was studied.

One of the important limitations for carrying out the occupational global burden studies was the lack of reliable data. Under-reporting in existing systems in all countries leads to substantial under-counting of occupational injuries and diseases and shows an inadequate picture of the true magnitude of the problem. Occupational risks for reproductive disorders, dermatitis, infectious disease, coronary heart disease, intentional injuries, musculoskeletal disorders of the upper extremities, most cancers and others, were excluded.

Most workers in the world are working under informal arrangements, without access to any type of occupational health service (particularly prevention). Even enterprises and sectors of economy where workers are insured or covered by a compensation system report occupational diseases very poorly.

However, most workers that are injured or suffer a disease will eventually come to a health care facility. The primary health care system would be the most logical place to pick up the medical outcomes of exposure in the workplace. Frequently, however, the lack of training on occupational health for general health care workers and limited knowledge on how risks at work produce disease or injuries leads to the systematic underdiagnosis.

The magnitude of the occupational health burden in the world is overwhelming, and the causes and mechanisms behind it are multiple and complex. The magnitude calls for an integrated, coordinated and strategic response, including raising the awareness of health care workers and making them think and ask, like Hypocrates already said; what kind of work are you doing, and how does this affect your health.

The full results of the CRA exercise can be found in the 2002 WHO Report (WHO, 2002) and the WHO Comparative Quantification of Health Risks (Ezzati et al,2004).

3 The full results of the CRA exercise can be found in the 2002 WHO Report (WHO, 2002) and the WHO Comparative Quantification of Health Risks (Ezzati et al,2004).

BLIND SPOT AND INDUSTRIALIZING COUNTRIES: A BRAZILIAN ONGOING EXPERIENCE IN REVITALIZING RAMAZZINI´S LEGACY

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[ID 2100]

Introduction

The "blind spot" issue (i.e. information about occupations of patients is not properly applied in curative practice) is basically the same all over the world. In industrializing countries its nature is more complex, because of problems with equity, access and availability of health care. "Blind spot" must be dealt with as one of the faces of poor quality of health care. We will discuss five complementary approaches for improvement in Brazil.

a) **Progress in Medical Education**. At present more than 50% of Brazilian medical schools have included elements of "Occupational Medicine" or "Workers´ Health" of 20-60 hours in their course. The significance of "occupation" has been introduced in clinical disciplines. Effects of these trainings have not yet been assessed, but an increase of teaching and learning about Ramazzini´s message has been observed.

b) **Introduction of Basic Workers´ Health Concerns in the "Family Health" Approach of Primary Health Care**. Brazil is adopting the "Family Health" approach for comprehensive health care to underserved populations. More than 40 million people (out of 180 million) are now covered by this strategy. Increasingly elements of "workers health" have been introduced into health care, like occupational history.

c) Update, Large-Dissemination and Training on Work-Related Diseases. In 1999, an extensive revision of the national list of work-related diseases was carried out. The new list, together with a *Manual for Diagnosis and Management of Work-related Diseases* (more than 100,000 copies of 700 pages) were sent to physicians all over the country.

d) **Development of a National Reporting System of Work-Related Diseases.** the Ministry of Health has recently developed regulations to oblige all physicians to report some selected work-related disorders. Moreover, the concept of "worker" is expanded beyond the boundaries of the "formal sector".

e) **Resolution of the Medical Council on Doctors´ Duties Related to Workers.** this advanced resolution (1998) contains a list of obligations (a.o. occupational history) for all physicians providing medical care to workers. Its implementation is a long-term process of behavior change. Work-relatedness must be explored at the entrance of the health care system.

BLIND SPOT FOR WORK: DIAGNOSIS AND THERAPY - THE DUTCH CASE

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[ID 2192]

Introduction

The lack of attention in curative health care for the possible influence of work factors on health aspects is considered to be a major cause of sickness absence and disability for work in The Netherlands. If treating physicians do not relate their patients' health complaints to work factors, they risk an inadequate diagnosis or an improper therapy, too long sickness absence periods and even permanent disability for work.

Background/Diagnosis

Dutch workers with health complaints often consult their GP first. Research shows that GPs mostly have little attention for work-relatedness, be it *causal* (work as cause for complaints) or *conditional* (work as external condition to be adjusted, to enable employees to resume/continue their work). Moreover, they realise too little that work resumption also can promote medical recovery, and that their therapy may interfere that resumption. Also they seldom coordinate with occupational physicians (OPs), risking contradictory advices to patients.

Objective: how to reduce the *Blind Spot*

Methods: searching for projects aiming to reduce the *Blind Spot*

Results/Therapy

Recently *blind spot* has induced several improvement projects. We will describe them and their possible effects, a.o. an occupational history, to be taken by medical specialists; a guideline for GPs and Ops to coordinate, with an active contribution of employees; OP-GP-coordination models for CME's and the regular medical education and GP-guidelines being screened for work aspects.

International aspects

For decades Blind Spot has been thought to be typical Dutch, because our GPs do not have to certify sickness absence, unlike their colleagues abroad. But a recent TNO project shows, that many OHS-experts abroad recognise it as a serious problem in their countries too, not yet been described in scientific literature.

Conclusion*:* The Netherlands have produced several methods, aiming to cure the Blind Spot, that can be helpful abroad.

OCCUPATIONAL HEALTH AND GENERAL PRACTICE: FROM OPPORTUNITIES LOST TO OPPORTUNITIES CAPITALISED?

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[ID 2147]

Background and aim. Western populations are in the middle of the epidemiological transition of chronic diseases. Care of patients with chronic disease is directed at optimising life expectancy and quality of life. Daily and social functioning, including the workplace are part of the treatment objectives. Yet, advice for and support in work related coping with chronic diseases, and collaboration with occupational health are virtually absent in routine curative medical care. This is also the case in general practice, where most patients with chronic conditions are treated. This 'blind spot' signals a generic lost opportunity in the care of patients with chronic disease.

This paper analyses from empirical data the importance of integrating work-related advice and support in general practice and evidence of the benefits this provides for patients: the opportunities that can be capitalised through better interaction between occupational health officers and general practitioners (GP).

Methods. The presentation is based on a review of three sources:

(1) The epidemiology of chronic diseases in general practice, from the Nijmegen Continuous Morbidity Registration [1]

(2) The guidelines of the Dutch College of General Practitioners [2]

(3) Three Nijmegen studies of management of asthma and COPD in general practice that looked at work-related implications [3, 4, 5]

Results. Cardiovascular disease, diabetes mellitus, COPD and asthma dominate general practice and lead annually to a large number of consultations. Although a majority of patients are 65 years or older – in particular for the first three diseases – GPs also care for a substantial number of under-65 years old, for whom salaried work can be expected to be part of their daily life. General practice guidelines for these disorders advocate care directed at normal functioning but do not systematically address functioning in the working place. Analysis of work related functioning in case of chronic respiratory diseases, however, highlight that work-related factors and circumstances play an important role in patients' coping strategies. Patients tend to ignore negative effects of their workplace on their physical condition and as a consequence suffer undue limitations. Interestingly, a programme of patients' self-management of asthma resulted, in comparison to GP-supervised treatment in a substantial and lasting reduction of health related absence from work.

Conclusions and discussion. All consultations with this group can be considered as many opportunities to supervise work-related implications of the disease. Patients value their ability to work but apply inefficient coping through ignoring the implications of their circumstances for their disease. A more efficient coping can probably be achieved through a more active involvement of patients in managing their own disease. Guidelines – like the Dutch College of General Practitioners' – have developed into a sophisticated and generally respected system of guidance of patient care. Explicit emphasis of management in relation to the work place may present a logical opportunity to capitalise on.

HEALTH AND SAFETY SURVEILLANCE IN LARGE CIVIL ENGINEERING PROJECTS IN ITALY

THE WORKERS AT "GREAT WORKS": AN HISTORICAL APPROACH

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All the construction and mining enterprises from the antiquity to the modern era, known as great or greater works or like "wonders" of the man's creation, were made from labourers in regimen of slavery with various organizational characteristics. Among them, two emerge as prevalent: when the army of slaves was abundant, in excess of needs and the opposite, when there was a shortage of it.- In this second case tendency was to consider even this manpower as a value and therefore to feed it and to save it, in contrast with the former situation when the exploitation was brutal and unlimited. The construction of the American Transcontinental railroad, completed in 1869, saw to the job approximately 10.000 Chinese labourers of whom, as individuals, it can be hardly said what was their fate. The jobs of the Transiberian railroad ended in 1901 involving the sacrifice of 200.000 Chinese labourers and of a multitude of tzarian prisoners. Technical innovations, as the pneumatic drills and new explosive (i.e. dynamite instead of black power), adopted in the Alpine tunnels since the Frejus tunnelling, increased the productivity of badly lodged migrants labourers but increased also the risk of accidents and typical occupational diseases. A particular protective engagement at least avoided to the workers of the Sempione (completed in 1906), the outbreak of anchylostomiasis epidemics, twenty years before experienced by the employees of the St.Gottardo tunnelling. In Italy the works of the railroad Florence-Bologna, so-called "Direttissima", across the Appennini chain of mountains, in the 30's of last century and those for the construction of the great hydroelectric and street galleries in the years after the Second World War were carried out according to a not written bargain, making an original trade-off between the mitigation of extreme health hazards on one side, and the acceptance of insurance compensation as individual and social way to cope with the residual health risks on the other. Implicitly a consensus was reached on the acceptability of occupational diseases in those works as a stigmata of the job. Only in the years '90 of the 1900's (great jobs for the world-wide soccer championship, work for the Holy See Giubilee) in Italy this social compromise appeared no longer acceptable. As a consequence, the companies and institutions involved in the construction of the "High Speed" railroad since the mid-nineties on, adopted special initiatives of control and recording with a substantially safer standards in place. Notwithstanding these positive developments in our country, it must not be forgotten that, according to the International Labour Office, job in regimen of slavery remains today also in great works, mostly in underdeveloped nations.

THE USE OF MULTIPLE DATA SOURCES TO DEVELOP INJURY PREVENTION RECOMMENDATIONS: THE CASE OF DENVER INTERNATIONAL AIRPORT

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Background: Construction of Denver International Airport was characterized by several unique conditions supporting large-scale injury analysis: size--31 million hours of work by 32,000 workers; a single workers' compensation (WC) insurance plan covering all workers; comprehensive payroll data; standard wages for workers; an on-site medical clinic that insured that all injured workers complete reports. WC and payroll data were stored in a computerized database. Injury reports were paper documents. Data on lost-work-time injuries were available on paper at a state agency as were company size and industry data. All analyses were retrospective, using existing data.
Purposes: To determine injury and payment rates for the entire construction project and for factors contributing to injury, and to describe risk factors according to company characteristics and categories of work.
Methods: To calculate injury and payment rates, we linked two electronic databases, WC claims and payroll, using contract number. For work hours, we applied the standard construction wage (national wage rate for each trade), adjusted for overtime, to payroll. To identify disability status and payments for injuries causing lost work time, we searched paper records at the state Department of Labor. For company size, we used tax identification numbers from the payroll database to search state unemployment insurance files. To determine type of work, we used a national standard job classification taxonomy and linked it to the WC and payroll databases. All information collected in these disparate ways was entered into a SAS database, from which all rate and risk estimates were calculated. To estimate injury and payment rates according to factors contributing to injury, we categorized contributing factors from over 4,000 injury reports, placing them into a version of Haddon's matrix adapted to construction injury. This identified 108 factors within 4 general categories: Human, Object, Environment, and Organization. These data were entered into the SAS database and tied to complete descriptions of each injury that had been entered into a qualitative software program.
Results: We were able to calculate injury and payment rates for the project and for subclasses of work types, company size, work domain; estimate injury risk factors for the same subclasses and others; and calculate rates at which numerous factors contributed to injury. We observed a project-wide injury rate of 29.8/200,000 work hours and a payment rate of $7.06/$100 of payroll. Companies with the highest injury risk had 20-49 workers and worked more than 20% overtime. The most dangerous work types were elevator construction and metal/steel installation. Factors contributing to injuries at the highest rate were objects, especially building materials and equipment, followed by victim actions. These varied substantially among different types of work.
Discussion: Analyzing DIA construction injuries was greatly facilitated by the centralized WC insurance plan and database and an electronic payroll database. But, until these databases were supplemented with data from injury reports, it was not possible to support the design of prevention programs specifically targeted at the contributors to injury. Quantification of those factors and examination of injury narratives can be used to pinpoint areas for prevention or intervention.
Development of systematic, prospective data collection on the construction process and construction injury, however, would greatly facilitate prevention program design and, ultimately, improved construction safety.

AN INTEGRATED INFORMATION SYSTEM FOR MONITORING WORKING CONDITIONS IN HIGH-SPEED RAIL TRACK CONSTRUCTIONS

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Construction of Florence-Bologna High-Speed Rail Track has forced the two regions and their respective organizations into designing an innovative specific informative context oriented to work accidents surveillance and prevention: *MONITOR.*. Recognition of this objective specific complexity has led to designing an information system in support to daily surveillance operations, for monitoring working procedures, for learning from experience and ensuring job safety.
Recent system applications have demonstrated potentialities in measuring work accidents economic costs and to act as a support in companies quality improvement strategies.
The information system comes from the integration of administrative data generated by Public Occupational Health Services (surveillance and sanitary operations) and by current construction companies activities.
Concepts standardization has been done: the system is fully relational and non redundant: accordingly the system has shown adaptive and evolutionary capabilities, and it has been actually adopted in several different construction contexts: (Bologna-Milan High Speed Rail Track, Piedmont Track, motorways tracks). A specific web-based evolution has been implemented to monitor 2006 Turin Winter Olimpic Games building yards.
The system works at individual, nominative level for surveillance operations, and in a statistical context. In this case the data have been anonymazed and severe privacy control procedures have been set up: in the statistical benchmark data can be accessed at micro and macro level.
Regard to the Bologna-Firenze high speed rail track the system manages biographical data of 3,700 workers employed in 22 industrial construction

sites with up to 40 sites at the same time. About 20 companies (contractors, subcontractors) are involved in the project, for a total of 17,246,515 hours worked.
In the period 1998 to 2004. have been observed: 2,470 injuries (with more than three days of prognosis), 2,572 sanctions, 7,097 surveys activity of Public Occupational Health Services
At present a system re-engineering internet oriented is on going.

ACCIDENT SURVEILLANCE AND PREVENTION IN THE CONSTRUCTION OF THE HIGH SPEED TRAIN TRACKS IN ITALY

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INTRODUCTION The construction of the "high speed train track" is the largest civil engineering project undertaken in Italy in the last years. In the track Bologna-Firenze, 93 Km (91% of the total track) have been dug. The track Torino-Novara (83 Km) employed about 600 companies and 10.000 workers in 2003-2004.
AIMS A surveillance system have been realised with the aim of monitoring accidents and improve preventive measures.
METHODS Databases were realised in order to link information for the different tracks. Sixteen companies that employed about 3700 workers (1800 each year on average) - that is the 70% of the total workforce in the track Bologna-Firenze- provided information on hours monthly worked by specific work phase. One company (about 2000 workers) provided information on individual covariates. Accidents were collected by the company's injury registers. Incidence and severity rates were calculated. For the 2000 workers the probability of injury was estimated with a Poisson regression model taking into account age, nationality, job, work phase.
RESULTS A total of 2470 injuries (>three days of prognosis) were observed from 1998 to 2004 in the 3700 workers in the track Bologna-Firenze. The incidence density rates were 155, and 108 per 1 million of worked hours in 1998-1999 and 2003-4. The multivariate analysis showed that workers employed in the phase "inverted arc" showed a twofold risk (IRR= 2.0; 95% CI: 1.6-2.5) and that miner and bricklayer were jobs at increased risk (IRR=1.6; 95% CI:1.2-2.0 and 1.7; 95% CI 1.2-2.1 respectively). The incidence rate (number of injuries per 100 workers) was 21.0 (11,4-30,8) in the period 1998-2004 and 13.7 (12,0-15,4) in 2003-2004. In the Torino-Novara track, a total of 1528 accidents were collected during 2003-2004 with an incidence rate of 14.6 (95% CI: 13.5-15.6) and 15.3 (95% CI: 14.3-16.3) in the 2003 and 2004 respectively.
Conclusions
Linking administrative data with injury reports provides a tool to analyse critical tasks to be targeted for preventive measures.

ACCIDENT RISK AND RISK PERCEPTION IN FOREIGN WORKERS EMPLOYED IN LARGE CIVIL ENGINEERING PROJECTS IN ITALY

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[ID 1569]

Background. Foreign construction workers in Italy has dramatically increased, yet published data on occupational risk is lacking. Surveillance systems were realised to monitor the largest civil engineering project undertaken in Italy. They provided a unique opportunity to describe the relationship between citizenship and accident in the construction industry.
Aims. Compare immigrants and natives according to work injuries in Italy. Specifically:
- describe the immigrants population in terms of sex, age, country of birth, participation in safety training, occupation, company size;
- describe relative risk by job title, age class and the effects of specific safety training;
- detect if there is any difference in risk perception.

Materiali e metodi. The study was realised on workers employed in high-speed train and Winter Olimpics building yards during 2003-04. Information was collected directly from companies operating in the yards. Crude and adjusted relative risk (RR) (by occupation, age and participation in safety training) were calculated using a Poisson regression model. Information about risk perception were collected by means of questionnaires and thematic focus groups.
Results. A total of 1,672 (17%) foreign workers were employed in the high speed train building yards (9,662 on total). Immigrants from North Africa and East Europe were by far the most numerous (70%). Foreign workers were younger and employed in lower manual occupations (masons, joiners, labourers) than native. 233 injuries were reported among immigrants; average injury severity was lower than among Italians (24 vs 29 days). RR's were: age < 25 1.81; masons 1,24; joiners 1,22; labourers 1,26; not trained 1,24. The adjusted RR was 1,11 (95% CI: 0,95-1,29). No difference was found between foreign and Italian workers in risk perception in Winter Olimpics building yards.
Conclusions. The study offers no support for the view that immigrants are at greater risk than natives for occupational injuries. High RR's were detected in young workers and in specific occupations. Additional analysis will be performed to better understand the role of participation in safety training.

HEAVY CONSTRUCTION WORKS:AN APPROACH TO EXPOSURE ASSESSMENT FOR CHEMICAL AGENTS

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Objectives: definition of a strategy for the characterization of exposure to chemical agents for workers involved in heavy construction works.
Methods: the execution of great long lasting construction works which is often associated with tunnel excavation presents a critical situation towards potential exposure to chemical substances. The complexity of the chemical risk assessment needs a combined approach between the companies appointed for the works and the public Health and Safety Units involved in surveillance and control. Starting with the examination of data from literature, the most critical agents are identified for the main tasks depending on the work cycle: airborne inhalable and respirable dust with free crystalline silica and asbestos for excavation works; gases(such as NO_2, NO SO_2) and particulate matter components (PAH) coming from diesel machinery and paving works; other substances produced or used in particular phases such as surface waterproofing. A plan for sampling and analysis was arranged**;** most companies performed the exposure monitoring in every site with a defined frequency (generally half-yearly) while the Health and Safety Unit evaluated the exposure levels randomly and for particular critical situations. In some circumstances it was necessary to organize monitoring in absence of prior evaluations.
Results: The concordance of the results obtained in the evaluations during the period 1996-2005 (400 samples) confirmed critical exposure levels to silica dust for underground works(30% above TLV exposure limit of 0.05mg/mc). For diesel emissions the compared values allowed to identify dangerous situations in work cycle and ventilation system.
Conclusions: the arrangement of a strategy of sampling and analysis for chemical exposure levels allows to optimize the available resources. The risk assessment carried out by the companies is a good instrument for the quick identification of risk sources and development of a scheme of prevention measures (work organization and/or technical changes) and for the control of the improvements applied.

SAFETY TRAINING OF WORKERS EMPLOYED IN LARGE CIVIL ENGINEERING PROJECTS IN ITALY : METHODOLOGICAL APPROACH AND EFFECTIVENESS EVIDENCE

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Background.
In Italian large civil engineering projects framework, two experiences (both ending in December 2005) were carried out about the effectiveness evaluation of workers safety training: in Emilia (High way bypass track- about 700 workers involved) and in Piemonte (high speed train track – about 4000).
Aims.
- to assess quality and effectiveness of training in terms of learning, behaviour change, workplace safety improvement
- to detect ineffectiveness factors
- to make recommendations for suitable training standards.

Methods
Both projects evaluated:
- process fluency,
- workers' satisfaction,
- comprehension,
- learning,
- performance,
- impact on accidents and hazard situations

using different but comparable tool set:
Emilia: individual questionnaires, group discussions, direct observation, emergency simulations, before-after tests
Piemonte: accident trend, satisfaction and learning questionnaires, , focus groups or structured interviews to workers, focus groups with teaching teams, self-efficacy questionnaire to teachers, interviews to company safety team.
Results.
Emilia:
- Good satisfaction but disappointing comprehension,
- short term learning fairly good but only on practical issues,
- lack of systemic view ,
- poor knowledge of safety organisational levels and emergency management

Piemonte:
- Little compliance of subcontractors to training offer,
- training oriented to specific needs,
- production of exportable tools and methods,
- methodological and organizational adjustment to context changes,
- good satisfaction of training methodology (active learning, answer to learning needs)

Conclusions.
Both experiences are focusing on some recommendations for an effective safety training:
- improve preliminary information and motivation
- obtain the commitment both of top management and intermediate levels
- pay attention to timetable and length of classes
- use interactive methods
- improve the comprehension of safety system
- provide unambiguous guidelines about hazard and emergency situations

WHAT'S THE USE AND SCIENTIFIC QUALITY OF FUNCTIONAL CAPACITY EVALUATION (FCE) IN OCCUPATIONAL HEALTH?

VALIDATION OF A SHORT-FORM FUNCTIONAL CAPACITY EVALUATION: EARLY RESULTS FROM A CLUSTER RANDOMIZED CONTROLLED TRIAL

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[ID 1069]

Introduction

Functional Capacity Evaluations (FCE) are used for making return-to-work decisions. FCE is a burdensome clinical tool in terms of time and cost, yet predictive validity is modest. A short-form FCE with comparable predictive accuracy would be beneficial. Our objective was to validate a short-form FCE.

Methods

A short-form FCE was created using a series of databases developed for testing the predictive validity of the Isernhagen Work Systems' FCE in claimants receiving compensation for back and upper extremity problems. Three FCE items from the full protocol were retained, as they were consistently predictive of return-to-work readiness determinations. Further validation of the abbreviated FCE is ongoing in the form of a cluster randomized controlled trial being conducted at a workers' compensation rehabilitation facility. Cluster randomization was used with experienced FCE clinicians being allocated to either an intervention or control group. Clinicians in the intervention group were trained to conduct the short-form FCE and used this protocol through the trial's duration. Clinicians in the control group continued routine FCE procedures. Analysis will include examining differences between groups on indicators of return-to-work, efficiency, and claimant and clinician satisfaction. Multivariable regression will be used to evaluate differences in outcomes between groups while controlling for potential confounders.

Results

Enrollment is complete and 559 subjects are in follow-up (264 tested with short-form FCE). No adverse consequences or compilations from FCE testing were observed. Focus groups with participating clinicians indicated adequate satisfaction with the short-form FCE's clinical utility. The short-form FCE also did not appear to significantly alter return-to-work decisions, as the distribution of decisions between groups was similar.

Discussion

A short-form FCE appears to have adequate clinical utility while not affecting clinician return-to-work decisions when compared to routine FCE administration. Further evaluation of return-to-work outcomes and claimant satisfaction is underway.

WORK INJURY REDUCTION THROUGH ADVANCED FUNCTIONAL CAPACITY EVALUATION

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[ID 983]

This presentation summarizes the results of the development, research and practical outcome of a specialty FCE program. The FCE program consists of 21 upper/lower extremity fitness, isometric and isoinertial tests developed and tested by our clinic (protocol described in AJIM 47:296-307:2005). The tests are specifically sequenced to improve test data consistency and decrease the testing time to less than 30 minutes in order to provide reliable functional capacity data in a cost effective manner. The time frame of the studies is from 1990 to 2005. The use of the FCE has been modified from the traditional return to work evaluation into a testing program designed specifically for use in hiring practices for industry. The primary industrial FCE study consisted of 2482 employees tested over a 3 year period by the occupational branch of our orthopaedic clinic. All participants were new hires and enrolled in the study on a nonrandom basis as they were accepted for their jobs. The study demonstrated that when physical capacity was coupled to physical job requirements injury incidence was predictable. The incidence of low back injuries in those workers with the physical capabilities to perform the required functions of their job was 3 percent. However, among those workers who did not demonstrate the strength or physical abilities to perform their job, there was a 33 percent incidence of low back injuries. The post-offer program applied in two industries and a metropolitan public school district. The testing program in private industries tested demonstrated that for every 1 dollar spent in testing there was an 8-dollar savings in medical costs for work related injuries. The metropolitan public school district employees were studied from 2002 through 2005. Only the custodial staff in the school district was studied, with specific emphasis on shoulder injuries. There were 32 shoulder injuries in 807 non-tested custodians, while there were 0 shoulder injuries in 249 tested employees. The total cost of testing for 3 years was $28,630.00 while the total savings for 3 years in shoulder injuries on a claims incurred basis was $600,000 for a $570,000 net savings for the school district. The traditional FCE can be modified into a Specialty FCE program that is time efficient, cost effective and provides information that can reduce the incidence of injury in the workplace.

THE UTILITY OF FUNCTIONAL CAPACITY EVALUATION: THE OPINION OF PHYSICIANS AND OTHER EXPERTS IN THE FIELD OF RETURN TO WORK AND DISABILITY CLAIMS

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[ID 878]

Objectives: This study explored how Dutch experts perceive the utility of FCE (Functional Capacity Evaluation) for return to work (RTW) and disability claim (DC) assessment purposes.

Methods: Twenty-one RTW case managers and 29 DC experts were interviewed by telephone using a semi-structured interview schedule.

Results: The RTW case managers valued the utility of FCE on a scale of 0-10. Their mean valuation was 6.5 (SD 1.5). The average valuation for DC experts was 4.8 (SD 2.2). Arguments in favor of FCE were (1) its ability to confirm own opinions and (2) the objectivity of its measurement method. Arguments against FCE were (1) the redundancy of the information it provides and (2) the lack of objectivity. Indications for FCE were musculoskeletal disorders, a positive patient self-perception of ability to work, and the presence of an actual job. Contraindications for FCE were medically unexplained disorders, a negative patient self-perception of ability to work, and the existence of disputes and legal procedures.

Conclusions: The responding RTW case managers perceived FCE to be more useful than the responding DC experts. The question of whether the arguments presented for and against the utility of FCE are valid is one that should be addressed in a future study.

RESEARCH AGENDA FOR A FUNCTIONAL CAPACITY EVALUATION

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[ID 2205]

Since 2000, several studies have been published about the psychometric properties of the Isernhagen Work Systems functional Capacity Evaluation (IWS FCE). A brief overview of the research status (per mid 2006) of the IWS FCE will be presented. The research has provided insight in the strengths and weaknesses of this FCE. These strengths and weaknesses will be presented.

Additionally, many relevant questions remain unanswered because they have not been researched yet. These knowledge gaps, the identified weaknesses, and clinician input have formed the basis upon which an FCE research agenda was developed. This research agenda will be presented.

The audience will be asked to respond to this proposed research agenda and to provide input. To facilitate this discussion, the audience is asked to respond to the following questions: did we forget relevant topics, were interpretations performed correctly, how should we deal with differences between FCEs, et cetera.

APPLICATION OF MOLECULAR EPIDEMIOLOGY IN OCCUPATIONAL, ENVIRONMENTAL HEALTH

OVERVIEW OF MOLECULAR EPIDEMIOLOGY IN OCCUPATIONAL HEALTH

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[ID 2569]

The term "molecular epidemiology" came into use in the late 1980s to encompass biological markers in epidemiologic research, practice, surveillance, and intervention. It is useful to take stock of the contribution of molecular epidemiology in the last 20 years and what might be expected in the future. This presentation will pursue those objectives and provide an overview of the past and future use of molecular epidemiology in occupational health.

Since the 1980s, with notable exceptions, most of molecular epidemiologic research in occupational health has focused on validating biomarkers, that is, determining their relationship to exposure, disease, or susceptibility. Of particular note are studies of biologically effective doses of electrophilic occupational carcinogens, studies to validate biomarkers of disease risk, such as chromosomal aberrations, and studies to identify genetic biomarkers as modifiers of occupational exposure and disease associations. Recent advances in mapping the human genome and in identifying gene expression products promises to provide highly powerful tools for the future. For occupational health, the utility of theses tools will depend on applying them with equal attention to issues of exposure. For the future, molecular epidemiology should contribute to the use of biomarkers as early warning indicators of harmful exposure, and as indicators in risk assessments and regulations. As the focus of occupational health broadens to include not only disease caused by hazards at work, but also other risk factors that affect workers, molecular epidemiology should be useful for identifying and preventing health problems in workers.

GENE-ENVIRONMENT INTERACTION IN TUMOR CAUSATION: THE EXAMPLE OF CUTANEOUS MELANOMA

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[ID 2570]

In the era of big science, large scale whole genome scans of several tumors are ongoing to evaluate interactions of genes and the environment, and to precisely measure the magnitude of small associations. In this context, it is essential that epidemiology will continue to rely on carefully defined phenotypes to minimize the possibility of misclassification of disease. An excellent paradigm of gene-gene, gene-environment interaction in human carcinogenesis can be found in cutaneous melanoma. The major environmental risk factor for melanoma is solar ultraviolet radiation (UVR), which is also critically important for the maintenance of human health. The association between UVR and melanoma risk is modified by several host factors, such as skin pigmentation and genetic susceptibility. Two high penetrance susceptibility genes, CDKN2A and CDK4, have so far been identified and mapping is ongoing to identify others. Moreover, a highly polymorphic pigmentation gene, MC1R, is associated with increased melanoma risk and melanoma progression. Both MC1R and UVR act as genetic modifiers of melanoma risk in individuals carrying CDKN2A mutations, and appear to modify the molecular characteristics of melanoma lesions. Two types of sun-induced melanoma have been distinguished based on their somatic genetic aberrations. One occurs on skin with little evidence of chronic sun damage (non-CSD melanoma) and has frequent mutations in the BRAF oncogene, while the other occurs on skin with significant CSD (CSD melanoma) and has infrequent BRAF mutations. These links among genetic variation, somatic mutations and specific environmental exposures may be paradigmatic for other cancers, and underscore the necessity of an integrative approach based on well-designed population studies with careful exposure assessment and disease characterization to unravel complex pathways of tumor causation.

EPIGENETIC EPIDEMIOLOGY AND OCCUPATIONAL AND ENVIRONMENTAL HEALTH

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[ID 2571]

Epigenetics focuses on molecular processes that control gene expression and contribute to variation in gene function unrelated to changes in DNA sequence. The best studied mechanism of epigenetic regulation involves the methylation of DNA at cytosines, to form 5-methyl cytosine (5-mC). 5-mC represents 2-5% of all cytosines in mammalian genomes and is found primarily on CpG dinucleotides. The methylation status of a gene is usually inversely correlated with gene expression.

DNA methylation is known to be modified by environmental factors and may contribute to determine normal physiological responses to certain environmental stimuli, as well as to the development of abnormal phenotypes. Evidence from in vitro and animal studies indicates that several occupational and environmental agents alter DNA methylation patterns. Results from recently completed, ongoing and future studies on human subjects are expected to determine what is the contribution of epigenetic toxicity to human disease etiology.

Environmental and occupational pollutants may cause dramatic changes in DNA methylation in diseased tissues, e.g. in cancer tissues. However, because such changes are observed after the disease phenotype has fully developed, it is hard to determine whether the observed alterations are involved in the causation of the disease or are rather non-causally associated with it. Epigenetic changes in non-diseased tissues may be involved in the initial stages of disease etiology and are likely to be captured only by means of sensitive methods for DNA methylation analysis in large epidemiology studies. The Milan Epigenetic Benzene Project will be used to illustrate methodological and substantive issues faced in developing epigenetic epidemiology studies and to point out the potential contributions of Epigenetic Epidemiology to the understanding and prevention of human diseases.

ESTIMATING THE BURDEN OF OCCUPATIONAL CANCER: THE ROLE OF MOLECULAR EPIDEMIOLOGY

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[ID 2572]

In 1981 Doll and Peto published estimates of the effects of various factors on the burden of cancer in the US. They attributed about 4% of all US cancer deaths to occupation (uncertainty range 2% to 8%). Applying this to current mortality data for Great Britain equates to approximately 6000 (3000 to 12000) deaths per year. Doll and Peto concluded that there was good evidence that cancer is largely an avoidable disease, but with some important exceptions, there was great uncertainty regarding the most effective ways of avoiding a large proportion of cancers. Their work is now being re-estimated for the UK, using up-to-date available information and scientific methodology.

This presentation will give an overview of the methodology being used for the project, a key component of which is the estimation of the attributable fraction, the proportion of disease that could be prevented in the absence of exposure. Methodological issues and data limitations will be highlighted. These include confounding and latency, multiple risk factors and exposures, both independent and non-independent, portability of information from data sources to the UK population and the difficulty of deciding which potential occupations and exposures are causally related and should be included in the estimation. Although there are an increasing number of molecular epidemiological studies incorporating biomarkers relevant to exposure (dose), preclinical effects or susceptibility, this aspect has yet to be incorporated into estimation of cancer burden and poses many challenges. Illustrative examples will be presented, including estimation of the burden of cancer of the nasal cavities and sinuses and cancer of the lung that is due to occupational causes.

MOLECULAR METHODS IN PRE-EMPLOYMENT SCREENING

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[ID 2573]

Pre-employment health screening is carried out to assess the fitness of prospective employees to perform a job, and to check that they or others will not be placed at unreasonable risk if they are appointed. In theory, molecular methods might be applied to this purpose in several ways. For example, they could be used to identify individuals genetically predisposed to disabling disorders such as Huntingdon's disease or breast cancer, who as a consequence had lower than average potential for productive work in the longer term; or to distinguish people with a genetic variant of a metabolic enzyme that rendered them more susceptible to the toxic effects of a chemical to which they would be exposed in their work. Before any such screening could be put into practice, however, it would have to be legally and ethically acceptable, and offer benefits to the employer, employee or public that justified its costs. Some countries have laws restricting the use of genetic testing in the selection of workers for employment. And even where there was no legal bar, it would normally be considered ethically preferable to control risks from a chemical by reducing exposures to a level that protected even the most vulnerable workers, rather than by excluding the more vulnerable workers from employment. The benefits of a screening test will depend on its predictive value for adverse outcomes, and unless that is sufficiently high, the test will not be economically viable. When these practical constraints are taken into account, there seems little if any scope at present for applying molecular methods as part of pre-employment health screening.

IMPACT OF MOLECULAR EPIDEMIOLOGY ON WORKERS, EMPLOYERS AND REGULATORS

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[ID 2574]

The incorporation of molecular and cellular markers, in addition to other biological and environmental measurements, in occupational health epidemiology was deemed capable of producing dramatic advancements in four core areas: providing evidence that specific environmental agents pose human hazards (hazard identification); establishing their causal role (mechanistic insight, e.g., D-R relation and inter-individual variability); identifying subsets of the population who are at special risk (exposure assessment, i.e. type, level and mode of exposure; genetically determined or acquired individual susceptibility); using the information to suggest or to develop new and more effective strategies to reduce risk (exposure monitoring, health surveillance and risk characterization to establish health based limits).

Indeed, research is accumulating knowledge in these fields at an exponential rate, but the actual relevance to health protection and disease prevention results still needs rigorous validation. There is consensus about the need to incorporate a mode of action into compound evaluation and standard settings, but not on how to apply it: the ongoing debate on a standard setting for genotoxic and non-genotoxic carcinogens is an example in point.

Genetic susceptibility testing at the workplace raises serious concerns about a significant threat to workers' privacy, autonomy and dignity. This is particularly true for pre-employment screening. Instead, testing done later in health surveillance programs is considered more acceptable since it appears to aim directly at protecting the worker exposed in particular circumstances.

To sum up, the passage from the study of molecular targets to applying the results in public health still seems lengthy and difficult, but there are strong reasons and sufficient data that urge traveling that path.

OCCUPATIONAL HEALTH IN WHO AND THE WHO COLLABORATING CENTRES; CHALLENGES AND SUCCESS STORIES

WHO AND OCCUPATIONAL HEALTH FOR ALL; AN ONGOING CHALLENGE

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[ID 1699]

The global economy has expanded apace over the past decades, yet the majority of the world's 2.6 billion workers remain employed in conditions that fail to meet international health and safety standards and guidelines. Workers are exposed to the hazards that have been around for a long time, and that have not been controlled, and at the same time new hazards are such as psychological and physical overload, indoor air problems, work-relatedness of common diseases and continuous change and insecurity of working people This double burden will need to be addressed more effectively by the public health and occupational health community.

Fragmentation of enterprises and other organizations, downsizing and outsourcing are typical trends of our time. At the same time, the employment contracts of workers become shorter and precarious and the turnover and mobility of working people increases. Such trends make the contacts between occupational health and enterprises and workers looser than ever before. In some parts of the world high unemployment rates, co-existing with a boost in irregular labour migration, unmet social protection demands, a rise in xenophobia, a massive brain drain and a general deterioration of local working conditions are potential threats that need to be addressed.

Particularly the coverage of workers by occupational health services is very limited. Overall at global level we estimate that less than 15% of workers is covered, with even the bare minimum like information on the hazards they are exposed and the potential health consequences.

In 1996 the Global Strategy on Occupational Health for All was adopted by the World Health Assembly (WHA). Currently WHO is evaluating the impact of the Global Strategy, and developing a Global Plan of Action that will strengthen and intensify the key areas of the Global Strategy. In 2007 the Global Plan of Action will be presented to the WHA for adaptation through a resolution.

In order to implement the strategy, WHO focuses on three main programmatic areas; supporting occupational health policy development; improving access to information and practical solutions for workplace problems, and improving and expanding delivery of occupational health services so as to achieve universal access for all workers.

WHO does not work in isolation, but with a large number of collaborators. ILO is a key partner, and there are several important areas of work that are pursued jointly, such as the development of national profiles and programmes on occupational health, the implementation of concrete actions for the elimination of silicosis, the African Joint Effort, activities on HIV/AIDS, and the provision of basic occupational health services.

The network of WHO Collaborating Centres in Occupational health consists of over 60 centres of excellence from all over the world. Back to back with the ICOH meeting the Global Network will come together to adopt the 06-10 workplan of the Network, focusing on global key issues.

ICOH, IOHA and IEA are the NGO's in Official relations with WHO in the area of occupational health, and they are key partners in implementing the global strategy and the WHO CC Workplan.

ROLE OF THE NATIONAL INSTITUTE FOR OCCUPATIONAL HEALTH IN THE PREVIOUS WHO COLLABORATING CENTRES IN OCCUPATIONAL HEALTH WORK PLAN, 2001 - 2005

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[ID 2136]

The National Institute for Occupational Health (NIOH) is the largest occupational health institute in sub-Saharan Africa, focusing on developing and supporting effective occupational health services in South Africa. The NIOH has recently started participating formally in regional programmes which build occupational and environmental capacity in the Southern African Development Community (SADC). These regional programmes include the ILO/WHO Joint Effort on Occupational Health & Safety in Africa in Africa (AJE), the Fogarty International Center / University of Michigan Programme in International Training and Research in Environmental and Occupational Health (ITREOH) in Southern Africa, and more recently, the Sida-sponsored Work and Health in Southern Africa (WAHSA) Programme. The NIOH became an official WHO Collaborating Centre in Occupational Health in January 2005, after a long-standing association with the WHO, during which the Institute was involved in a number of activities that were part of the previous Network of Collaborating Centres Work Plan, 2001 – 2005. The following activities were part of the previous Work Plan, which consisted of a total of 15 Task Forces; one of the Task Forces being dedicated to "Intensive Partnership in Africa":

- Fogarty/Michigan ITREOH
- Training of occupational health & safety experts in Africa
- Preparation of community profiles in OH&S in Africa
- Clearing House for the SADC Region
- Webpages on the SHEAfrica site
- Organisation of an international meeting to review the relationship between TB and silicosis
- Contribution to the programme on the elimination of silicosis in South and Southern Africa

CONTRIBUTING TO THE 2001-2005 WORK PLAN OF THE NETWORK OF WHO COLLABORATING CENTRES - THE SINGAPORE EXPERIENCE

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[ID 2183]

As part of the Network of WHO Collaborating Centres (CC) in Occupational Health, Singapore's Ministry of Manpower participated in the work of four of the 15 Task Forces under the 2001-2005 Work Plan of the Network of WHO Collaborating Centres. Our involvement has been very meaningful and has provided Singapore with unique opportunities for collaboration, learning and sharing with partners worldwide. We believe the products from this important effort in support of the WHO Global Strategy on Occupational Health for All will be useful for developing as well as developed countries. We have been able to contribute in Task Forces 10, 11, 12 and 13.

For Task Force 10 on Preventive Technology, we are investigating the issues involved in applying the ILO Toolkit that uses the control banding approach, and hope to evaluate its usefulness for small and medium enterprises in the Singapore context.

In the project completed under Task Force 11 on Training of Occupational Health and Safety Personnel, we have been able to leverage on the internet as a useful vehicle for OSH promotion and information sharing. The Ministry's OSH Alert System, a free subscription service, helps update companies and OSH professionals on upcoming events and training programmes, as well as share learning points from case studies. We also contributed to other internet resources, such as the ASEAN OSHNET website that provides information on OSH in the 10 ASEAN countries, of which Singapore is a member; and the Supercourse or Library of Lectures coordinated by the WHO Collaborating Centre at the University of Pittsburgh. The open source virtual library of presentation material covers a wide range of topics contributed by a global faculty of experts and receives some 75 million hits a year.

For Task Force 12 on Internet Resources and Networks, we established under the guidance of the Canadian Centre for Occupational Health and Safety (CCOHS), a link to the WHO Global Web Portal aimed at complementing the Programme of the WHO CC Network. Through this link, we are now able to share case studies from our compilation of successful cases of noise and chemical hazards control, as well as ergonomic solutions.

Under Task force 13 on National and Local Profiles and Indicators, we had excellent collaborations with WHO Collaborating Centres from the Finnish Institute of Occupational Health and University of Michigan-Ann Arbor, respectively, on the development of national and sectoral profiles, as well as an OSH Performance Measurement Tool. The latter is based on the principles of the Universal Assessment Instrument (UAI), some of which have been adopted in the ILO-OSH 2001 Guidelines on Occupational Safety and Health Management Systems.

Overall, the progress of our various projects has been satisfactory. We look forward to the opportunity to contribute in the WHO CC Network's 2006-2010 Work Plan and even more fruitful collaborations ahead.

CHEMICAL HAZARDS IN HEALTHCARE: INTERVENTION STRATEGIES FOR A HIGH HAZARD, HIGH RISK INDUSTRY

METRICS OF HEALTHCARE AS A HIGH HAZARD INDUSTRY

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[ID 1499]

Characterized as a service sector member of the economy, the healthcare (HC) industry is one of the largest employers in both the U.S. and the EU, employing about 10% of each of their respective work forces. Forecasts for employment growth in this sector in the U.S. is expected to top 30% by 2012 due to increased need for health services by an aging and longer living population. Increases in need for healthcare workers (HCW) in the developing world too, suggest this 'supersector' will employ a growing number of workers at risk of potential health harm. The healthcare sector consistently demonstrates poor injury and illness statistics, among the highest in the U.S. and in the EU, 34% higher than the average work-related accident rate. This performance is counter-intuitive for an industry whose mission is the care of the sick. Driving these high illness and injury rates are the traditional hazards of healthcare, such as infectious agents and those related to patient lifting causing musculoskeletal disorders. Chemical hazards, including pharmaceuticals, anesthetics, sterilants and germicidal agents, although historically present in healthcare, have been more slowly recognized as contributing to any risk to worker safety. Hazardous anti-cancer drugs and other pharmaceutical products have been especially under-recognized as healthcare hazards despite their carcinogenicity and reproductive toxicity. Innovation on two technology fronts, biopharmaceuticals and nanotechnology, both having a significant, if not principal focus on healthcare applications must also be addressed by HC safety programs. Globally, the biotechnology sector, made up predominantly of biopharmaceuticals is expanding four times faster than the average economic growth of the G-7 countries. This 'metric' suggests the need for a parallel 'stepped-up' safety and health program in healthcare to monitor and protect workers exposed to these innovative products.

REGULATION, GUIDANCE AND GOOD PRACTICE FOR CHEMICAL HAZARDS IN THE HEALTHCARE CARE SECTOR

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[ID 1631]

The health care sector is most likely the largest single employment sector in Europe, and the third-largest sector of the U.S. economy. It provides work for an estimated 35 million health care workers (HCW) worldwide, among them ca. 18.5 million physicians and nurses. In industrialized countries the sector often outranks such established sectors as agriculture, mining, electricity and gas, transport and communication. Work-related injuries and absence from work due to ill-health remain high among HCW and even seem to rise.

HCW can be classified on the basis of their qualifications and their actual roles in the provision of health and medical services; they include physicians, laboratory technicians, pharmacists, nurses, midwives, therapists, social workers as well as other personnel such as cleaners, adminis-trative staff, dietary staff, laundry workers and maintenance workers. The sector is a labor-intensive industry and covers a highly diversified range of activities. While some risks and haz-ards are common to the whole sector, others are rather specific to certain categories of HCW or to certain work practices of the industry. Generally, HCW are exposed to a great variety, combina-tion and concentration of hazards at the workplace, which could be broadly classified as biologi-cal, chemical and physical hazards, ergonomic factors, organizational problems and psychosocial hazards. Chemical agents used in hospitals and other health facilities, include anesthetic agents, disinfec-tants, chemical sterilizing agents, drugs and cytostatic or laboratory reagents. Some of these sub-stances are known irritants or allergens to the skin and respiratory tract, while others, such as eth-ylene oxide, formaldehyde, hexachlorophene, are known mutagens, teratogens and human car-cinogens. Exposure control is largely possible. Escalating health expenditures of the past several decades have brought on profound structural and organizational changes within the health care sector. These changes, also reflected in the growing number of nursing homes, day care centers, domiciliary and home care services are all influencing the traditional way of hospital-based health service delivery. Privatizations of health services and managed health care have far-reaching impacts on the safety and health as well as the working conditions of the HCW. With a view to the current demographic trend a growing demand for health care and hence a steady increase of the sector seem very likely. The importance of the health care industry in the national economy emphasizes clearly the need for systematic action at national and enterprise level, including preventive OSH policy, statistics, risk management, and good praxis transfer and guidance. First responses are emerging and will be reported.

STRATEGIES FOR SAFE HANDLING OF HAZARDOUS DRUGS

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[ID 2270]

Occupational exposure of health care workers to hazardous drugs was first recognized as a safety concern in the 1970s. The U.S. Occupational Safety and Health Administration issued guidelines in 1986 (updated in1995) for the safe handling of antineoplastic and other hazardous agents. However, workplace contamination and worker exposure have been well documented in the U.S. and many other countries, indicating that previous guidelines are not completely effective in protecting workers or are not being followed as closely as they should be. Because of this, other organizations, including the National Institute for Occupational Safety and Health and the International Society of Oncology Pharmacy Practitioners, have published updated guidelines for the safe handling of hazardous drugs. Although specific recommendations may vary, there is agreement in which elements should be included in safe handling practices. All prescribe to a hierarchy of controls that include: Substitution; Engineering Controls; Administrative Controls; and Personal Protective Equipment. Methods are now available to assess workplace contamination via surface and air sampling and worker exposure by measuring specific marker drugs in the urine of workers. An exposure assessment of the workplace can be carried out and it is possible to identify sources of contamination, such as contaminated drug vials, faulty equipment, improper techniques and other activities that can ultimately result in worker exposure to hazardous drugs. By determining which workers have the potential to be exposed to hazardous drugs, in addition to identifying sources of contamination, steps can be taken to reduce or eliminate sources of contamination in the workplace. The findings and conclusions in this abstract have not been formally disseminated by the National Institute for Occupational Safety and Health and should not be construed to represent any agency determination or policy.

EU REGULATIONS ON MATERNITY PROTECTION AND THE PRATICES IN A MEMBER STATE ON HOSPITAL PERSONEL REASSIGNMENT AND LEAVE.

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[ID 2271]

The EU maternity protection Directive is a clear illustration of how minimal requirements on health and safety protection at the workplace on the one hand, and on social provisions on the other –related to maternity leave, reassignment, temporary leave – are as it should be, regulated together in order to prevent adverse health outcomes. The transposition of the Directive into national law is an obligation for all Member States. Still, the national practices in this field may differ considerably in many respects: maternity leave, temporary leave and reassignment. These differences may be related to existing traditions previous to the editing of the maternity protection Directive, which on their turn may be explained through differences in existing organisational frameworks for occupational health surveillance and protection, and for compensation in case of temporary workplace leave. The Belgian regulations and organisational context will be explained and the practices illustrated using hospital workers as an example. An assessment will be made of the consistency and possible weaknesses and drawbacks of current regulations and practices, including temporary leave and protective reassignment, also using elements of comparison issuing from alternative contexts and practices in some other EU Member States.

ACTION OF THE WHO TO PROTECT HEALTH CARE WORKERS

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[ID 2272]

Health care workers daily face exposure to biological, chemical, psychological and physical hazards, The WHO World Health Report(WHR) of 2000 states that "Human resources…are the most important of the health system's inputs. The performance of health care systems depends ultimately on the knowledge, skills and motivation of the people responsible for delivering services." The 2005 WHR was entirely dedicated to health care workers. Some major human resource issues for health care workers are staff shortage, HIV/AIDS, and working conditions. Maldistribution of staff is widespread. For example in Ghana, 87% of the generalists are in urban areas while 66% of the population lives in rural areas. Brain drain is affecting many developing countries, which see health personnel move to the private sector and to other countries. Workplace health and safety issues such as infections, injuries, ergonomics, risks of violence from patients and co-workers, stress, too little control over work, and inadequate nurse to patient ratios are among the factors that contribute to the leaving of health care workers from poor to richer countries. A key health and safety issue is needlesticks. The 2002 WHO World Health Report discusses the risks of Hepatitis B, Hepatitis C and HIV/AIDS due to needlesticks in health care workers. WHO found that among the 35 million health workers worldwide there were 3 million percutaneous exposures to bloodborne pathogens in 2000. This is equivalent to between 0.1 and 4.7 sharps injuries per year per health worker. WHO found that 40% of all the Hepatitis B and of Hepatitis C and 4.4 % of HIV present in health care workers was due to sharps injuries. Clearly, there are solutions to these problems. Needle handling and waste management procedures can be improved, and consideration can be given to immunizing health care workers against Hepatitis B. WHO, in collaboration with ICN, has started a program to prevent needlestick injuries in health care settings in South Africa, Tanzania and Vietnam. A toolkit with training materials, guidance documents and surveillance tools has been produced, and has been translated into Spanish. WHO recommends that the prevention is based on the hierarchy of interventions. Some approaches needed for safe and appropriate use of injections: national policy, policies at the health care setting, appropriate availability of supplies behavior change among patients and health care workers (less injections), and management of sharps wastes.

Health care workers also face other hazards such as chemical (Latex allergies occur in some users of latex gloves, and health risks arise from exposures to chemicals such as ethylene oxide used in sterilization and nitrous oxide used in anesthesia), physical and ergonomic (bending and lifting). Violence is another risk faced by health care workers, including physical and psychological assaults by patients and others. PAHO and WHO have prepared materials to guide workers, employers and government in this area. Joint work between WHO, ILO and ICN is addressing violence, post exposure prophylaxis and HIV in the workplace. It is important that the health sector recognizes that the provision of health services can only be effective if its workforce is healthy and motivated.

MAKING IT HAPPEN: HANDLING HAZARDS WITHIN A HEALTH PROMOTION FRAMEWORK

SANTOS-BURGOA C.

[ID 2273]

The hospital is the only "manufacturing industry" where the client and his/her family are inside for a rather long time. It is an exceptional industry, since it has quite variable ergonomic, chemical, radiological, biological and physical hazards in addition the usual personal, food and water risks. "Workers", management and "clients" all are submitted to similar risks. Furthermore, the hospital represents a unique situation, given the spare time that patients and their families spend within its walls and requires and especially sensitive approach, given the vulnerability of confronting disease and the challenges that the structure represents. This vision encompasses a community where an integrated approach is possible, going beyond the usual repairing of infectious and chemical exposures in the hospital. Under Mexico's current health reform, a major change in financing health care is taking place, aimed towards universal health insurance by the year 2010. Such financing is being further supported by a major infrastructure Master Plan where health centers, clinics and hospitals are being built. This is a one time chance to design the medical units and organize them so they may be friendlier to workers, patients, families and the environment. Also, it is a chance for organizing care aimed towards the transformation of the medical unit from a curative setting to a "health production" location. We will present the Health Promoting Hospital Model being currently proposed in Mexico's new hospitals, with a strategic map including progress indicators and building capacity. This policy could produce important benefits for the future of health care in Mexico.

OCCUPATIONAL RURAL HEALTH PERSPECTIVES IN THE GLOBALIZED WORLD - THE PERSPECTIVES

ECONOMIC BENEFITS IN HEALTH CARE COSTS FOR FARMERS PARTICIPATING IN THE CERTIFIED SAFE FARM PROGRAM

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[ID 2033]

Context: Agriculture has long been recognized as one of the most hazardous occupations in which to work. Furthermore, health insurance is extremely costly for most rural agricultural residents, and in some cases not affordable. The Certified Safe Farm (CSF) is an intervention program aimed to incorporate economic incentives to facilitate risk reduction through removal of hazards, and behavior change.
Purpose: The CSF program aims to create a safer environment for the farm, and reduce medical, disability, and workman's compensation insurance costs.
Methods: The CSF intervention is an integration of several prevention components: 1) Farmer specific clinical screening, 2) One-on-one occupational health prevention and wellness education based on results of the clinical screening, 3) assistance of selection and fitting of appropriate personal protective equipment, 4) On farm safety audit by trained inspectors, and scoring the farm to set standards as "certified safe". Evaluation of the intervention is measured as health outcomes or economic savings of health care expenses.
Findings: The intervention group paid 8% less out of pocket for health care connected to occupational exposures. Their insurance companies paid 47% less for occupational injuries and illnesses. The amount of savings was directly and statistically significantly related to the safety rating of the farm.
Conclusions: The Certified Safe Farm program appears to have sufficient economic savings that warrant support from insurance companies and provide direct incentives to participants.

EXPOSURE ASSESSMENT OF COTTON FARMERS TO CALISULFAN INSECTICIDE IN THE GAMBIA

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[ID 2080]

Calisulfan is a chlorinated hydrocarbon insecticide commonly used in developing countries on cotton, and a variety of other products. This insecticide has been responsible for a number of accidental deaths in Africa and other developing countries around the world. There have been no occupational exposure studies reported with use of this product. This study was conduced on randomly selected cotton farmers in the North Bank District of The Gambia. Farmers were administered a questionnaire to determine their knowledge and methods of handling and application of pesticides on their crops. Dermal patches were applied to the skin and clothing of the farmers during their mixing, loading and application processes. The patches were analyzed for content of Calisulfan and estimates of total dermal exposure were calculated based on this approach. It was found that the farmers had little knowledge of the toxicity of the chemical they were applying. They also used no personal protective clothing while they applied the chemicals with batter powered rotary sprayers. It was found that the mixture they were applying was highly variable in content of active ingredient from farm to farm, indicating that the chemicals were often mixed in excessive concentration. Exposure assessment as analyzed by the dermal patches was also quite varied from farm to farm. In the more highly exposure persons, the estimated total dermal dose, approached the chronic dermal toxicity level for test animals. This study revealed there is a risk for occupational toxicity with use of Calisufan in cotton production. Extensive education, and availability and use of personal protective equipment are necessary. Furthermore, strong consideration should be used find less toxic chemicals, and use of integrated pest management.

PESTICIDES AND PROTECTED AGRICULTURE: EXPOSURE AND RISK PROFILES

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[ID 1604]

Background
In protected floriculture, several year-round crops take place and the number of pesticide applications is usually higher than in open field; in these conditions, operator exposure to pesticides can reach high levels, even exceeding the exposure limits, with a significant health risk for the exposed subjects.
In greenhouses different crops are grown, and chemical treatments vary depending on agronomic and climatic factors. Also levels and routes of exposure can vary depending on the job: during mixing and loading, exposure takes place mainly through the respiratory tract, while during application also dermal exposure can reach considerable levels. In addition, floriculture requires several re-entry operations and exposure from dermal contact with foliage is often high. In these conditions, it is very complicated to collect representative environmental and biological measurements, and exposure levels can be assessed, when possible, only doing several measurements.
Aims
This study has been addressed at the creation, in the frame of a project of the Region of Lombardy, of model for the definition of exposure and risk profiles in greenhouses, addressed at doing risk assessment also when biological and environmental measures are lacking.
Materials and methods
To this aim, greenhouse work has been analysed and the following variables affecting pesticide exposure levels have been selected: task (mixing & loading/ application/re-entry), pesticide use rate, concentration of active ingredient, type of formulation (wettable powder, soluble granules, liquid…), number of application/year, size of the treated area, application machinery, operator's skills, use of personal protective equipment. Different conditions have been ranked through the attribution of scores. Based on previous field studies on operator exposure, possible exposure patterns have been categorised (high, intermediate, low). As a surrogate of toxicological properties of the plant protection products, we have used the risk phrases present in the labels of the different products
Conclusions
This study has pointed out exposure/risk profiles for pesticide exposure in agriculture. These profiles can be used as a useful tool for pesticide risk assessment.

CRITERIA FOR DIAGNOSING OCCUPATIONAL DISEASES - RELEVANCE TO AGRICULTURE

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[ID 2212]

The prevention of ill-health resulting from over-exposure to chemical, biological and physical agents in the workplace is aided by the ability to recognise such effects, and by the early identification of the causative agent. This applies to agricultural workers, where acute and chronic health effects have been documented from exposure to chemicals such as pesticides and veterinary products, infectious agents causing zoonotic disease, and physical hazards such as noise, vibration, and non-ionising radiation. In 1990, the European Commission produced a schedule of occupational diseases to be applied in the member states in Europe. Two annexes were published – Annex 1 as a recognised list of occupational diseases, and Annex 2 as an additional list of diseases suspected to be occupational in origin. An expert panel was convened to determine the criteria for recognising these occupational diseases, which included several conditions relevant to agriculture. A guidance document was completed in 1994, and published several years later. Following amendments to the list, and recognising the need to update the criteria produced more than 10 years ago, the European commission convened a new panel of experts to update the document. The new panel had its first meeting in late 2004, and is currently working through both Annexes. The structured approach used to analyse the causal relationship between exposure and effect was retained. Information on definition of the causal agents and sources of exposure was produced, together with a description of the acute and chronic local and systemic effects. For each condition, the following criteria were also defined

a) Minimum intensity of exposure required to produce disease
b) Minimum duration of exposure necessary
c) Maximum latent period, beyond which a causal relationship is unlikely (applies primarily to acute effects)
d) Induction period – the minimum time required between initial exposure and the development of signs and/or symptoms (applies primarily to chronic or delayed effects)

Several occupational diseases relevant to agriculture will be presented to illustrate the process involved in defining these criteria, and the limitations encountered.

MSD IN THE HEALTH CARE SECTOR: PATIENTS HANDLING

EUROPEAN PANEL ON PATIENT HANDLING ERGONOMICS - IMPACT OF THE EC DIRECTIVE

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In 1992 the European Union introduced legislation that aimed to protect workers against the risks involved in the handling of heavy loads. Nurses have been identified as one of the highest risk occupations with respect to low back problems and surveys from the 1980s, 1990s and 2000s showed no reduction even a possible increase in the prevalence. In 2004 a new European Panel on Patient Handling Ergonomics (EPPHE) was formed to share information on, and collaborate in, research on patient handling. This paper reports on the implementation of the EC Directive on Manual Handling in nine countries in the European Union (Finland, France, Germany, Greece, Ireland, Italy, Portugal, Sweden and the United Kingdom). A survey was conducted through the EPPHE network to collect baseline data about health and social care systems, funding; implementation of the European Union Manual Handling directive and patient handling guidance from government and professional organisations. Additionally participants were asked to identify the outstanding problems, in their opinion, about patient handling. The results found that all the countries had both public and private healthcare provision, with funding ranging from 6.2% GDP (Italy) to 11% GDP (Germany). The EC directive mostly was implemented by 1995, with a range from 1992 (UK) to 1998 (Sweden). Only 3 countries had official national guidance on patient handling (Finland, Greece and UK) although most had regional or programme-specific information. Residual problems included a lack of staff and equipment and a paucity of research evidence on patient handling methods and equipment, standards for educational programmes, guidance based on ergonomic standards, the development of technical aids, and the postural load of nursing aides and physicians. This first EPPHE collaboration has identified a major challenge for the nursing profession in Europe to address the continued risk of back injury to nurses.

PREVENTION OF INJURIES TO HEALTHCARE WORKERS

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[ID 2047]

The primary objective of this study was to reduce injuries to health care workers resulting from manual lifting and transferring of patients. The "zero-lift programs", using employee-management advisory teams (participatory-team approach), were implemented in seven nursing homes and one hospital. The eight facilities varied in number of beds (mean = 145, range = 85-253) and number of nursing personnel (mean = 94, range = 57-136). All eight facilities had a large number of acute care patients. The "zero-lift programs" were implemented by replacing manual lifting and transferring of patients with modern, battery operated, portable hoists and other patient transfer assistive devices. Ergonomics committees with nearly equal representation from management and employees selected the equipment and implemented the "zero-lift programs." Injury statistics were collected during post-intervention for 51 months (range = 36 – 60 months) and were compared with pre-intervention data for 37 months (range = 30 – 54 months). The number of injuries from patient transfers decreased by 62% (range = 39% - 79%), lost workdays by 86% (range = 50% - 99%), restricted workdays by 64% (96% decrease to 17% increase), and workers' compensation costs by 84% (range = 53% - 99%). Overall, the eight facilities experienced decreases of 32% in all injuries, 62% in all lost workdays, 6% in all restricted workdays, and 55% in total workers' compensation costs. The program produced many intangible benefits including improvements in patient comfort and safety during transfers and patient care. The nursing personnel perceived their backs were less sore and they were less tired at the end of their shifts. More pregnant and older workers were able to perform their regular duties and stay on the job longer.

OPERATING THEATRE: A PROPOSAL FOR MANUAL HANDLING RISK ASSESSMENT

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[ID 545]

There are no scientific publications in the literature specifically treating load/patient manual handling risk assessment in operating theatres. Some international guidelines addressed to prevention of MSDs of health care workers can be used with this purpose but are not specifically targeted to this health area. To help understanding of this risk in operating theatres, the EPM Research Unit set up a simple and practical method allowing to evidence the main risk determinants: patient manual handling, handled objects and pull/push activities are considered. A series of questions were prepared for each one of the three variables allowing to identify action specific frequencies and disergonomic factors contributing to increase risk. On the basis of this observation protocol, EPM coordinated a multicentre study in the 2001-2002 period, aimed at assessing load/patient manual handling risk. Risk was assessed in no 67 operating theatres involving no. 1182 workers. The study evidenced first of all quite different work organization systems for the staff committed in the different tasks and for patient access and exit from the operating theatre. Over 60% of handling was carried out without equipment , 27% of push/pull operations were disergonomic and education and training to specific risk are practically absent. In approx two thirds of operating theatres objects exceeding 20ks are not handled but in general object handling is not supported by equipment. The study allowed to profitably test the described method, by accurately identifying criticality factors and as a consequence effectively activate targeted improvement projects.

OPERATING THEATRE: RESULTS OF CLINICAL SURVEYS

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[ID 548]

So far there are only few clinical studies investigating prevalence of MSDs in nurses working in operating theatres involving patient and load manual handling as well as maintenance of fixed postures for long periods of time. Actually the operating theatre is a peculiar workplace for patient, job and location characteristics. That is why the Research Unit of Posture and Movement (EPM), coordinating a multicentre study, set up a health protocol specifically addressed to collection of personal and clinical data, in particular regarding MSDs affecting nurses working in operating theatres. This standardized protocol allowed occupational health physicians involved in the study to homogenously collect data, diagnostic path and result classification modalities being set a priori. An ad hoc education and training course was implemented before the study and later it was checked, via a tutoring activity, that all participants fully agreed with proposed methodologies. The study involved no. 1182 operators present in no. 67 operating theatres and was conducted in the 2001-2002 period. Many of the outcoming results are of interest: first of all different professions (nurses, auxiliaries) frequently have different jobs and therefore are differently exposed to the specific risk The sample as a whole showed prevalence of acute low back pain (with sick leave) equal to 8% that are much higher than those found in non exposed general population (2.3%). There was also high prevalence of spine degenerative diseases (regressive discopathies, discal protrusions, hernias) equal to 6.9%, negatively affecting job fitness judgements and posing serious problems of personnel re-employment. Instead, there was no evidence in the analysed sample of the assumed high prevalence of cervico-dorsal spine diseases (ascrivable to disergonomic static postures).

MANUAL HANDLING IN PHISIOTHERAPHY: RISK ASSESMENT AND RESULTS OF CLINICAL SURVEYS

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[ID 1380]

Several studies carried out in different Countries, have unequivocally demonstrated that health workers are among workers at a high exposure to the risk of lumbar spine diseases. Moreover it has been confirmed that high prevalence of musculaskeletal disorders is correlated with the handling of non able bodied patients. The relation between work, and especially the manual handling of patient activity, and the onset of back diseases in physical therapists have been investigated by a few studies. The aim of the study has been both to verify the occurrence of spine diseases in a physical therapists sample and demonstrating correlation between damage and risk.

The risk assessment, carried out in 15 services with 102 therapists in all, was conducted through the analysis of risk factors: activity intensity, measured through the number of treatments effected on disabled patients or partially disabled patients, structure of the working environment, equipment and aids for moving patients, training of workers according to the specific risk. For the damage analysis, that is spine disease, the method proposed was adopted and validated by the EPM Research Unit of Milan: the clinical/functional examination of the spine. The results confirmed the thesis of a correlation between the activity of patients manual handling and the onset of spine diseases, also in the physical therapists group. The risk assessment evidenced the necessity of acting with the usual tools of training and aiding helpers for reducing exposition level, of course without overlooking the projecting phase of work environments.

INDICATORS FOR EFFECTIVENESS VALIDATION OF MANUAL HANDLING PREVENTIVE STRATEGIES

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[ID 851]

Over the past 10 years in Italy, the MAPO Index (Movement and Assistance Patients in hOspital) has become a common method for manual handling risk assessment in wards. Starting from the MAPO criteria, a research project was developed to establish a set of effectiveness indicators. This 5-year longitudinal study, was aimed at providing management and institutional bodies involved in Health Plans with a set of synthetic indicators able to supply objective decisional elements, as well as some economic parameters to better allocate economic resources on the basis of evidence-based prevention. 26 hospital health boards participated in the study: 18 completed the study, involving 64 wards and more than 1200 nurses. The total investments made in readdressing the specific risk were € 814.000 (for aids) and € 26.000 (for training of 300 operators). On the whole, the average MAPO indexes were reduced from 7.6 to 2.1 (height risk level = MAPO > 5). Assessment of ratio injury/sickness lost days for LBP was 1:7.

Several interesting elements emerged from the study.

- Diminished interest in investment in prevention to reduce manual handling risk: some health boards did not finish the study. From the 270 wards assessed in 2000, 170 were deemed to be at risk and in 2005, 117 still required action in the field.
- Significant reduction in terms of risk and damage and major economic advantages were obtained by the few Hospital implementing a clear and effective intervention action.
- While in the Anglosaxon world it is possible to obtain a good cost estimate through frequency and seriousness of LBP injuries, in Italy the only possible strategy, company by company, appears to be recording of sick leaves from LBP.

AN ERGONOMIC EVALUATION OF THREE PATIENT TRANSFER METHODS.

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[ID 344]

The aim of the study was to investigate if the Durewall and Kinaesthetics transfer methods were less strenuous than the traditionally used method. In addition, the aim was to find the least strenuous method for the nurses which would simultaneously be safe and comfortable for the patient. The study included 12 female nurses and 18 elderly patients with low functional capacity. The nurses were assigned to two groups, which received training in both methods in different order. In the test, a nurse assisted a patient from the wheelchair to the bed and vice versa. The nurses' skill in assisting the patient to move was evaluated with new 5-level observation taxonomy. The shoulder and lower back muscle activity of the nurses was measured by electromyography. The nurses rated their perceived physical exertion on Borg's CR-10 scale. The patients rated their feeling of security, control and comfort on a bipolar rating scale ranging from -4 to +4. The nurses' skills developed from the lowest level to the second highest level after the first training session. The group that received the Kinaesthetics training after the Durewall training reached the highest skill level. Applying both new methods, the perceived and measured physical strain was significantly lower than when using the traditional method. The patients' feeling of control in the transfer situation was higher when the new methods were applied and the patients rated the new methods as safer and more comfortable than the traditional ones. The better the nurse's skill, the greater comfort, safety and control patients experienced when being transferred. As to perceived and measured physical exertion, no significant difference between the new methods was found.

EXPERIENCE OF LOW BACK PAIN REDUCTION ACTIONS IN A LARGE HOSPITAL

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[ID 2258]

Pursuant to national law, particularly regarding the manual move of patients in the hospital ward, we have deemed necessary to evaluate the efficacy of the precautionary interventions enacted to reduce the muscle skeletal illnesses among the health operators who provide assistance, inclusive of a first assessment of the results achieved as compared to the expected results, following a cost-benefit analysis as carried out at the stage of planning the interventions. The Hospital has 300 beds, 900 health operators and about 250 working in the hospital ward. The research was developed in different stages: evaluation of the risk of manual move obtained in the year 2000 with the use of the MAPO methodology; analysis of the accidents trend deriving from manual move of patients, with particular attention to the forms of such occurrences, to the days of prognosis, to the duties and the departments involved; the monitoring of the work absences due to low back pain; the analysis of the foreseeable costs and benefits. The course of the research proceeded with identifying the interventions to apply; the purchase and the introduction in the departments at higher risks of greater aids (person lifter) and of minor ones (draw, sliding sheet, adjustable height trolley, transfer disk), informative interventions, formation and training of all of the interested personnel, insertion of mechanisms of verification and warning. Such working methodology promotes effective routine checking of the process of risk management connected to the safety and hygiene policies of the job, increases the level of "education" of the personnel, and ultimately gains a reduction in insurance premiums of the National Institute for the industrial accident of 15% for our Agency, (+/- € 90.000,00), allowing the savings to be reinvested in other projects of preventions.

STRATEGY AND EXPERIENCES OF MUSCULO-SKELETAL DISORDERS PREVENTION IN LARGE MANUFACTURING COMPANIES

THE ELECTROLUX, FORLÌ FACTORY EXPERIENCE IN MANAGING WDMS (YEAR 1989- 2005)

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[ID 2002]

Electrolux attention on WDMS began early in 1989 in several productive unites, mainly in Italy, with different approaches. We are going now to explain Electrolux experiences made in Forlì Factory, that was one of the "pioneers" in this kind of problems. As first approach, in 1991 our internal healthcare activities were reorganized in order to improve the service and to met both law requests, in term of work-related illness due for example to noisy, and the internal need of understanding illness due to repetitive works, not required by law but present in the plants (WDMS). In that period no objective criteria could help to evaluate workplaces risks, and there were not yet guidelines to help managing people with WDMS problems. The aim was to make the production departments aware of their blue collars conformity to health requirements in case of repetitive movements damages. Due to that it was possible to manage this peapole in workstations considered "not so heavy". The OCRA method was published in 1996 for the first time. Using this method it was possible to batter estimate the risk level of specific workplaces excluding either subjective or wrong evaluation. The application of this method turned out to be very expansive because requiring a huge amount of resources. Due to this reason the implementation of the method proceeded rather slow. From 1996 to 1998 we dedicated our main interests to vibration due to the pneumatic tools use.

In order to minimize the vibrations for hand-arm system, we decided to substitute the existing tools with a new concept one that brake air flow at screwing ending. Thanks to a review of the OCRA method, since 2000 it was possible to massively apply it in any Electolux production areas, using Check list Ocra. Since end 2000 all the workstations with repetitive movements have been judged in compliance with the new check list Ocra guidelines. This evaluation is periodically updated taking into account method principles and workstations reviews. In the meanwhile, any time the workstation is changed or the production lay-out is modified ergonomic requirements are always taken as references in order to minimize repetitive movements risks. Recently we have been working on the "reemployment of people with pathological illness" in green areas for repetitive works.

RISK ASSESSMENT OF THE UPPER LIMB OVERLOAD AND HEALTH SURVEILLANCE IN POULTRY SLAUGHTERING

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[ID 2048]

In the last years also in slaughtering and processing poultry meat Companies an increase of WMSDs (work related musculo-skeletal disorders) has been recorded. Moreover during the periodic sanitary controls the number of workers having disorders related to ergonomic risks from repetitiveness of movements is increasing. The improved sensitiveness in work prevention and health led Amadori Company to adopt OCRA check-list method to evaluate arms ergonomic risk. In the main Amadori plant, more than 500 different workplaces about slaughtering or cutting or processing meat, have been analysed. Extremely short throughput times (less than 4 seconds) and fixed to working line rhythm are characteristic of the most part of workplaces analysed. A deep technical knowledge on the different factors which contribute to ergonomic risk for arms and the adoption of some actions reported below are derived from the studies carried on.

Main actions:

- enforce a procedure for the reintegration of most high risk workers and who have just showed symptoms. Limiting the risk exposure, particularly for anatomic critical areas it's possible to continue the working activity avoiding/containing the pathology evolution;
- redesign with structural and technological modifications. Furthermore introduction of new technology with particular attention to automation replacing heavy muscular effort or limiting inadequate postures;
- ergonomic standards improvement in existing workstations to limit inadequate postures (i.e. changing working surface height and working equipment);
- improvement in work organisation, i.e. the length pause and its position in shift and job rotation;
- training in way of working, avoiding unnecessary movements pattern or changing them when inadequate.

The action plan is still in act and it's definition is not completed. Some example of relevant actions adopted are explained in detail.

It's not yet possible to evaluate the disorders reduction but we can adopt the OCRA model prediction, based on the risk index and the number of exposed workers. It's also a good tool to choose the priorities of the action plan. The work carried out, together with know-how reached and the availability of prediction data represent an instrument to direct the company development plans not only to make a profit, but also to make an adequate management of safety and ergonomic aspects.

WORK-RELATED UPPER LIMB MUSCULOSKELETAL DISORDERS IN A PRODUCTION DISTRICT (UPHOLSTERED FURNITURE INDUSTRY)

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[ID 2142]

This survey was conducted to investigate UL-WMSDs occurrence in 30 plants of the upholstered manufacturing industry (sofa production district) located in a large geographical area of Southern Italy (Bari, Taranto, Matera). A total of 5791 individuals (M=4121, F=1670, exposed n=3183 and controls n=2608, total mean age and seniority in plant respectively 32.9 +/- 6.7 and 7,7 +/- 5.2 years) were examined over a 4-year period (2000-2003). More than 65 percent of total workforce studied was within large size (>500 employees) companies. Exposed groups included: frame outfitters, leather-cutting operators, sewing and upholstery-assembly workers. Case-definition was assessed through standardized procedures: symptoms by questionnaire plus physical and laboratory/imaging findings. Annual incidence rates of WMSDs ranged 1-6% and cumulative prevalence rates of upper extremity disorders at December 2003 reached values of 30% in high risk groups such as assembly workers. Exposure assessment to repetitive strain and movements of the upper limb was performed in a representative sample of the plants using the OCRA index and showed average values ranging 5.3-13.2 for different exposed groups. In the total population the OCRA method showed good correlation both with the case-prevalence (r = .55) and incidence (r = .56) rates. Most frequently occurring disorders were tendon-related cysts and wrist tendinitis. The shoulder disorders were most represented in male and female leather-cutting operators. It does not seem confirmed, in this study, the greater female susceptibility to the UL-WMSDs with the exception of the carpal tunnel syndrome: gender difference seems to be less relevant at increasing levels of occupational exposure to repetitive movements and exertions of upper extremity. (Supported by grant BS11-03 from Italian Ministry of Health).

BREAD, WORK AND HEALTH

CRITICAL ASPECTS OF AN "INEVITABLE" DISEASE

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[ID 2582]

Baker's asthma was described by Ramazzini (1713); flour and its additives are also currently among the principle causes of occupational asthma in many countries.

In the last 30 years the principle allergenic components have been identified, along with a quantification of allergen exposure and the epidemiologic correlation between exposure and effect. This has produced a set of environmental limit values for use in primary prevention.

This report presents the contribution of various groups in Italy that studied this pathology and the numerous critical aspects that characterise it.

Currently only ad hoc studies can be used to estimate the prevalence and incidence of respiratory disease caused by flour because official data are strongly underestimated.

The sensitivity of the diagnostic extracts is still inadequate when compared with the challenge test and even the results of the latter suffers from a lack of standardisation. Again it is only field studies that can provide adequate information for understanding whether, in small bakeries the limit values proposed are applied/applicable in practice and, above all, if they are totally protective. It should also be noted that there remarkable differences between the proposed limit values and also that the powder levels do not necessarily correlate to the allergenic level. Moreover, allergy to the component parts of flour is not necessarily the only cause of the disease, there are other components in the workplace that can influence the immune response or cause airway inflammation.

A concerted action on the part the occupational allergy centres, the local bodies and the bakers' associations, needs to be launched so that primary and secondary prevention can be organised. As in other countries, these organisations must provide this structure and take the responsibility of implementing, sustaining and promoting the application of the guidelines.

THE DIMENSION OF THE PROBLEM: AN AD HOC INVESTIGATION IN BERGAMO

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[ID 2583]

While it is well-known from the literature that exposure to wheat flour dust causes diseases of the respiratory tract and of the skin, actual risks present in bakeries are less well-known. Aim of our study was to analyse the risk factors in small-scale and semi-industrial bakeries, and the prevalence of occupational disease in bakers, with the goal of proposing preventive programmes and appropriate health surveillance and care plans.

The study involved 438 subjects (30% of Bergamo's bakery workers) comprising 232 bakers and 186 sales staff. Questionnaires were distributed to obtain information about manufacturing process, exposure characteristics (type and quantity of flour, use of additives, etc.), cigarette smoking, presence of work-related and non work-related allergenic and non-allergenic health problems.

Subjects "positive" at the questionnaire underwent medical examination. The commonest health problems found in this sector were those involving the respiratory tract (13.4% of the bakers). In particular, 7.5% were affected by rhinitis, 3.2% by allergic bronchial asthma and 2.7% by both. Skin disease affected 1.9% of the workers and musculo-skeletal disorders 1%.

SPECIFIC INHALATION CHALLENGE TESTS IN THE DIAGNOSIS OF BAKER'S

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[ID 2584]

The diagnosis of Occupational Asthma (OA) should be confirmed by objective testing for asthma and then by establishing the relation between asthma and work. Specific inhalation challenges (SIC) are considered the "gold standard" test for the diagnosis of OA, but they are not routine diagnostic tests.

In the case of baker's asthma, this standardisation may be possible if the amount and size of the flour powder directly inhaled by patients is carefully measured. Standardised SIC require engineers and occupational hygienists to generate and monitor exposure levels of the flour powder in the challenge chamber and an expert physician to monitor the respiratory response of a patient to the exposure. Unfortunately, this requires expensive apparatus, available only in a few very specialized laboratories.

The most common way of performing SIC, is to have the patient mimic work exposure by pouring the flour dust from one tray to another; in other cases, dust generators deliver the flour into the exposure chamber in a more controlled way. There is a great variability in the length and schedule of exposure: maximum exposure time ranges from 30 minutes to even 3 hours. Obviously, the resulting exposure levels will vary greatly and in most cases exposure levels are very high, as we found in a multicentric Italian study (De Zotti Int Arch Occup Environ Health,1999).

In conclusion, SIC are time consuming and may produce false positive or false negative responses. They should be performed only in particular circumstances when the highest level of accuracy is required to demonstrate a casual relationship between asthma and occupational exposure. More precise standardization of laboratory methods is needed to obtain exposure levels.

WORKPLACE: THE DETECTION OF DUST AND MOULDS. ENVIRONMENTAL LIMITS VALUES

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[ID 2585]

The Laboratory of Public Health of Milan studied some bakeries in Milan district in order to detect the exposure to yeast, moulds and flour dust. Sample of indoor air in 15 bakeries were performed either by means of SAS in fixed positions at the centre of the room for biological monitoring or by Tecora Bravo (environmental sampler) and SKC pump (personal sampler) at established flows for flour dust. Inhalable and respirable fractions of flour dust were collected, evaluating both the most critical operations and the type of flour and its own size. A blank sample was obtained for every monitoring of yeast and moulds to evaluate the contamination during the activity of bread making in comparison with the ground contamination.

The resulting data can be resumed in the following points:

a) No increase of moulds was observed before and during the bread production; the concentrations of moulds were in the same range 15 - 1105 UFC/m^3.
b) *C. albicans* was found at very low concentrations (< 10 UFC/m^3), excluding a role as sensitizing agent.
c) In the workplace there is a strong presence of moulds (yeast/moulds: 1/100).
d) Environmental moulds like *Aspergillus*, *Penicillium*, *Alternaria*, *Geotrichum*, *Cladosporium*, *Fusarium*, *Epicoccum*, *Heotricum* were found.
e) We detected inhalable flour dust in a range between 0.4 e 3 mg/m^3; the majority of the workers were exposed to values over the ACGIH TLV–TWA (0.5 mg/m^3).
f) The respirable fraction resulted under 0.5 mg/m^3 in all the sites.

In conclusion we evidenced different concentrations of flour dust, related to the kind of production and the size of the bakery. Environmental concentrations for flour dust resulted over the TLV values in some workplaces, showing the opportunity of primary preventive measures. No relevant observation emerged from the biological monitoring, although the moulds may play an indirect role in developing respiratory diseases.

TECHNIQUES FOR THE IN VITRO DETECTION OF AIRBORNE ALLERGENS

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[ID 2586]

In many circumstances it is worthwhile to detect the environmental charge of an offending allergen. The pollen calendars are common worldwide, and ELISA techniques for the detection of house dust mite's allergen in dwellings have been developed. Often the offending allergens are related to workplaces, and in these cases their detection is useful to guide the decontamination procedures. A relevant example is latex allergen in sanitary workplaces, and the establishment of latex-free areas for the safety of allergic patients. In many cases the allergens are airborne, therefore the first step is their capture with a pump (with a known air flow) connected with a filter, from which the suspected allergens are eluted with buffered solutions. For the detection of the allergen in the sample two different techniques have been developed, the RAST/EAST-inhibition and the 2-sites-ELISA. The RAST/EAST-inhibition consists in evaluating the capacity of the sample to inhibit the binding of human IgE antibodies (from allergic sera) to a reference extract bound to a solid phase. The inhibition is based on the competition between the free allergen in the sample and the bound reference allergen. The test is performed in dose-response way, in order to calculate the 50%-inhibiting dose, which is in inverse relation to the allergenic potency of the sample. The 2-sites-ELISA is a "capture" test were the analyte (the allergen) is bound by a 1st antiboby adsorbed on a solid phase (usually a microplate) and by a 2nd antibody which carries the enzymatic signal. The two antibodies are usually monoclonal, but also polyclonal antibodies from rabbits or goats can be used, alone, or in combination with monoclonals. When available, a standard allergen is run in parallel to create a standard curve in order to calculate the results as weight/volume units (e.g. ng/mL of major allergen).

AIRBORNE MOULDS IN BAKERIES

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[ID 2587]

The preliminary results of an aeromycological monitoring carried on in some small sized bakeries located in Milan province (Northern Italy) are reported. Airborne and culturable mould spores were collected using an orthogonal impact sampler which aspires air at a fixed speed onto a contact plate filled with appropriate for fungi agar media. Sampling was followed by incubation at 20°C up to 14 days. The resultant colonies were counted, microscopically observed and characterized. The monitoring clearly revealed a high sporal density and a mould richness in the different environments studied. Moreover, it showed a variation of the fungal population according to the different characteristics or the microclimatic conditions of each bakery. Among the dominant *taxa* it was detected: ubiquitous and predominant in the atmosphere fungi, such as *Cladosporium, Epicoccum nigrum* and *Alternaria*, thus confirming that often indoor air is influenced by the outdoor air; the genera *Penicillium* and *Aspergillus* (mainly represented by the species *A. niger* and, with minor frequency, *A. flavus* and *A. fumigatus*), whose indoor presence should be controlled and constantly monitored; *Monilia sitophila*, already isolated in similar studies and reported in literature as a typical bakeries fungus, whose proliferation is favoured by some nutritious substrates present in these peculiar indoors. Even if not dominant, the unexpected isolation of some species, still under investigation, will deserve to be mentioned.

It's known that the consequences of continued exposure of man to airborne fungal particles should not be underestimated. Since among the detected *taxa* some species are reported as potential causal agents of allergic respiratory dysfunction in bakery workers, these data will be evaluated especially in relation to their concentration. Results show that the information obtained from the analysis of airborne moulds can be a useful tool in the control of indoor air quality, thereby assuring occupational health safety.

BAKER'S ASTHMA AND FLOUR DUST ALLERGENS: TRUTH, MYTH AND LEGEND

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[ID 2588]

Baker's rhinitis and asthma are one of the most common forms of occupational disease. Generally, the definition of baker's rhinitis/asthma in the clinical setting include the presence of flour. Many allergens have been identified such as other cereal flours, baking additives like soybean flour, moulds, several enzymes (i.e. hemicellulase, protease, papain, glucoamylase, alpha - amylase), foods, and storage mite. The occupational - clinical history of these patients must be fully recorded as well as the workplace conditions and the products in use. Environmental measurements of aeroallergens are recommended, including not only the flour allergens and alpha – amylase, but also the most common indoor allergens: cockroach, house dust mite, *alternaria alternata*, cat, dog and rat urine. In fact, bakery environment must be considered in its complexity and related to the clinical cases which are observed. Moreover, endotoxin is also one of the primary agents in organic dust that cause acute changes in airway-physiology and airway-inflammation. Recruitment of Th2 cells in to the lung associated with endotoxin exposure can occur independent of a specific allergenic antigen. Indeed, there is evidence of a role of endotoxin versus other allergens as house dust mite and latex allergens, that modulated and developed allergic responses. Differently, there are no recent observations about baker's asthma and rhinitis related to moulds, although β-glucans, structural constituents of some bacteria and fungi cell walls, showed effects similar to those of endotoxin.

The knowledge of different offending agents present in the workplace and their mechanism of action on airways remain key for the prevention of occupational allergy.

In conclusion, bakery environment results complex due to the presence of various risk factors, however there are all the elements for setting off an analysis, and correctly evaluating the employees and their work allocation.

INSTRUCTIONS AND STANDARDS OF THE LOMBARDY REGION RELATING TO SAFETY IN BAKERIES.

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[ID 2589]

In June 2002, in line with the regional programs aiming at improving workplace health and safety together with food safety, the Safety and Health Department of the Lombardy Region issued guidelines intended to prevent the risks related to the small-scale bakery sector.

Studies conducted in Lombardy showed, as it emerged also in the rest of Italy, that wheat flour causes allergic sensitization, on average, in 12% of the people exposed to risk factors, and provokes respiratory ailments at work in 14-25% of cases, as well as a 5% evolution of asthma.

These guidelines refer to this epidemiological analysis, delivering both a protocol and some improving technologies. The regional decree conceives both safety in workplaces and food safety as integrated topics, on the principle that product care means to take safety measures for workers as well.

These guidelines supply practical examples of working procedures aimed at protecting employees and consumers health; moreover, they offer methodological norms relating to the estimation of work-related risks and to sanitary inspection which could be used by both employers and company doctors.

A FIELD STUDY ON THE EXPOSURE-ALLERGY RELATIONSHIP IN BAKERS. MEDICAL TREATMENT AND RELOCATION

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[ID 2590]

The wheat flour is the main occupational agent in the etiology of rhinitis and asthma. The environmental risk, personal previous exposure, symptoms and occupational wheat flour allergy were investigated through an epidemiological study executed on both 100 bakers and pastry makers working in 22 bakery shops in Cremona. We used a questionnaire by interview, which were experimentally added to the usual symptoms registration. Airborne concentrations of wheat flour dust were measured in 5 bakery shops, selected on the basis of scarcity or absence of symptoms in allergic workers. A ternary outline for medical screening was adopted in terms of work-related symptoms, skin prick tests and specific serum IgE. A relocation program supported by specific immonotherapy was planed. The prevalence of work-related respiratory complaints was 46%, and the prevalence of wheat allergy (as presence of specific IgE) resulted 28%. Only half a group of these allergics workers (15%) showed a significant atopy index. The mean environmental concentration of flour dust was 1,4 mg/m^3 with a respirable rate of 40%. The cumulative exposure index was higher for allergic workers. The predictive value of skin prick tests was the same of the questionnaire in selecting and suspecting allergic subjects. In conclusion an epidemiological survey of baker's allergy may be planned using those indicators which are related to risk and symptoms questionnaires. The collection of these data in terms of occupationally oriented detection of specific IgE is strongly recommended. Allergy to flour dust is an important problem despite the intermittent symptoms that we can detect at the actual low environmental risk conditions. For these reasons screening methods and medical surveillance must be periodically planned for preventive purposes, but also for a medical and immunological treatment aimed to relocate the allergic subjects at worksites of bakeries with low environmental exposure, without changing their skilled activity.

RECENT FINDINGS ON NEUROTOXIC EFFECTS OF METALS

PHARMACOLOGICAL TREATMENT OF OCCUPATIONAL MANGANESE-INDUCED PARKINSONISM: EXPERIENCE IN ITALY AND CHINA

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[ID 1762]

The steel industry requires manganese (Mn) and has recently reached one billion tons production per year. Therefore, occupational manganism is a severe occupational health problem deserving attention in many countries. Chelating drugs are useful in metal poisoning treatment and CaNa2EDTA has proved to be effective in experimental (Tandon & Khandelwal, 1982) and human manganism (Peñalver, 1957; Ky et al., 1992; Discalzi et al., 2000; Ono et al., 2002; Herrero Hernandez et al., 2003). The drug is fairly safe if properly administered. Mn excretion can be assessed in basal conditions and after challenge with the chelator. To date, 5 welders and 2 foundry workers affected by Mn-induced parkinsonism came to our attention in Italy and were studied by: occupational history collection, neurological examination with UPDRS (I-II-III), blood Mn and Fe, daily urinary Mn, plasma Fe, transferrin, ferritin, AST, ALT, GGT, HBV and HCV-Ab, plasma proteins, prolactin, brain MRI with Pallidal Index, aiming test and MMSE. Intravenous treatment with CaNa2EDTA was administered in all cases and succeeded in reverting the symptoms in 4 of them (Herrero Hernandez et al., 2005). Normalization of MRI was also concurrently observed. The clinical amelioration of patients is documented also by videorecordings, obtained upon informed consent.

We present also the longest follow-up, to our knowledge, of a manganism-affected patient (1982-2004), whose clinical conditions have been videorecorded before and after successful chelating treatment, demonstrating the persistence of its beneficial effects.

Clinical improvement after CaNa2EDTA administration (Peñalver, 1957) or after a combined therapy with para-aminosalycilic acid (PAS) and CaNa2EDTA (Ky et al., 1992) was reported in occupational exposed workers but received little attention from the scientific community. Our results in Italy strongly support the previous findings in China and should stimulate hope and further research on manganism treatment, possibly with new chelators able to pass the blood-brain barrier.

Herrero Hernandez E, Discalzi G, Valentini C, Venturi F, Chio A, Carmellino C, Rossi L, Sacchetti A, Pira E. Follow-up of patients affected by manganese-induced Parkinsonism after treatment with CaNa(2)EDTA. Neurotoxicology, 2005 Nov 2; [Epub ahead of print]

MANGANESE: TRANSPORT AND MECHANISMS OF NEUROTOXICITY

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[ID 365]

Manganese (Mn) plays an important role in many biological processes. Though essential, Mn is neurotoxic has been associated with the Parkinson's disease. The mechanisms responsible for transporting Mn across the blood-brain barrier (BBB) are largely unknown. Using rat brain endothelial 4 (RBE4) cell monolayers cultured plus/minus astrocyte conditioned media (ACM) we examined the effects of temperature-, energy-, proton (pH)-, iron (Fe) - and sodium (Na+)-dependence on Mn transport. We showed that Mn transport is temperature-, energy- and pH-dependent, but not Fe- or Na+-dependent. Additional studies examined the effect of dietary iron (Fe) and Mn levels on the concentrations Mn in various brain regions. There was a significant effect of Fe deficiency ($P<0.05$) on decreasing Fe concentrations and increasing Mn concentrations throughout the brain. Rats were also weekly injected with 3 mg Mn/kg intravenously during the course of 14 weeks. Animals were imaged by means of magnetic resonance imaging (MRI) every two weeks to determine the temporal pattern of brain Mn deposition. MRI data indicated that treated animals have a significant accumulation of Mn throughout the brain. Finally, we investigated the mechanisms underlying Mn neurotoxicity. We studied the effects of Mn on reactive oxygen species (ROS) formation and changes in high-energy phosphates (HEP) in neonatal rat primary astrocytes. Cells were exposed to 100 µM or 500 µM MnCl2 and biomarkers of oxidative damage, F2-isoprostanes (F2-IsoPs) were quantified. Both concentrations of Mn induced increase ($p<0.05$) in F2-IsoPs formation with the highest increase (169%) found with 500 µM at 2h after exposure. Also, after 30 min of exposure, values for ATP and energy charge potential were markedly declined to 37% and 84% of control, respectively. Our results are consistent with reports indicating that oxidative stress and mitochondrial dysfunction play major roles in Mn-induced neurotoxicity.

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ANALYSIS OF THE NEUROPSYCHOLOGICAL TESTS USED FOR THE ASSESSMENT OF THE MANGANESE NEUROTOXICITY

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Objective. Chronic exposure to Manganese (Mn) is associated with increased neurological and neurobehavioural signs and symptoms.

To assess these outcomes, a literature review of occupational and environmental studies on Mn was carried out. This study aims at: (i) investigating the studies which have used neuro-psychological tests, summarizing their findings and discussing the test method adopted; (ii) pointing out the instruments with a good sensitivity and predictivity to detect Mn-related neurobehavioral and neurological impairment; (iii) suggesting an ideal test battery useful for the measurement of subclinical effects of Mn exposure in the general population.

Methods. Studies on Mn exposed subjects, published during the past 20 years and performed using neuropsychological tests, were retrieved using Medline. These study were reviewed focusing on the test methods adopted, functions examined and observed outcomes.

Results. Depending on which neuropsychological tests have been used, different neuropsychological effects are suggested as early signs of Mn toxicity. Some instruments, in particular tests of motor functions, have thus been applied in almost all studies to investigate Mn effect on motor performance. Other psychological functions assessed were memory, reaction time, mood and more complex cognitive functions. The outcomes observed in the reviewed studies indicate that the neurobehavioral effects associated to Mn exposure are on motor functions, response speed, and memory.

Conclusion. Many different tests have been used in studies of Mn neurotoxicity to detect and quantify Mn effects. Based on the studies reviewed here, it is possible to suggest a battery of test for the monitoring and assessment of performance in groups of subjects exposed to low level of Mn. The battery, sensitive to the effects from Mn exposure, should include tests of motor functions, response speed, cognitive and neurological functions, mood, subjective symptom and, although not reviewed here, also intellectual abilities.

THE INFLUENCE OF COGNITIVE RESERVE ON THE RELATIONSHIP OF LEAD EXPOSURE AND NEUROBEHAVIORAL PERFORMANCE

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[ID 1175]

Aims: To determine if cognitive reserve - ability to compensate for diminished brain function - alters the relationship between lead exposure and neurobehavioral performance.

Methods: A neurobehavioral test battery covering many domains - executive/attention, visual and verbal memory, visuoperception/psychomotor, and motor speed/ dexterity - was administered to 256 English speaking lead smelter workers who had a mean (SD) age 41 (9.4) years and mean years of education 11 (2.9) and mean current blood lead (PbB) 28 (8.8). Based on up to 25 years of prior blood lead data, mean working lifetime time weighted average blood lead (TWA) was 39 (12.4). Neurobehavioral

performance was modeled using multiple linear regression. After adjusting for age and educational achievement (Wide Range Achievement Test-R) we assessed the strength of the relationship between lead exposure and the outcomes. After dichotomizing the participants on educational achievement at reading grade level 11, we repeated the multiple linear regression analyses in each group separately.
Results: In the entire group TWA contributed significantly to the explanation of variance of measures in 7/22 tests. When workers were dichotomized by educational achievement, TWA was not significantly different between the two educational groups. For cognitive tests we observed a significant dose-effect relationship only in the low educational achievement group (11/18 tests). On tests of motor speed the dose-effect relationship was present in the high education group for 3/4 tests.
Conclusions: Workers with different levels of educational achievement but having similar chronic lead exposure had dose-effect relationships between TWA and cognitive performance only in the group with lower educational achievement. We attribute the inability to detect a dose-effect relationship in the group with higher educational achievement to cognitive reserve that allows performance to be maintained in spite of lead exposure.

DEVELOPMENTAL EFFECTS OF NEUROTOXIC METALS: CONSEQUENCES OF OCCUPATIONAL EXPOSURES BEYOND THE WORKPLACE

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[ID 1543]

The brain is particularly vulnerable to toxic damage during development, because its growth and maturation involve many steps that need to take place in a particular order and within a limited time span. Deviations from this schedule can result in functional deficits that may be lasting. Poisoning with inorganic lead demonstrates that a pregnant mother may be minimally affected herself by toxicant exposure, while her child may suffer irreversible brain damage. Epidemiologic research has identified adverse neurobehavioural effects at lower and lower exposures. Some data even suggest that there may not be a threshold for such toxic effects.
This evidence has now been extended to other metal compounds. The lessons from these studies emphasize that developmental neurotoxicity tends to be underestimated. The main obstacles in epidemiological research in this field are that adverse effects may not be apparent until several years after the causative exposure, and that exposure assessment is inherently imprecise, thereby biasing the results toward the null hypothesis.
This underestimation may also mean that developmental neurotoxicity risks from occupational exposures are ignored. Clinical toxicity data on adult poisonings reveals that almost 200 industrial chemicals can cause neurotoxic effects. However, only a small number have been studied in regard to their effects on the developing brain.
Neurodevelopmental disorders are important for several reasons. Optimal brain function relies on the integrated functions of the complete organ, and the integrity of the brain is therefore crucial. Even small decrements, incurred in utero or early postnatally, can have severe implications in regard to subsequent academic achievements, economic success, and quality of life. Neurotoxic damage in children therefore leads to lasting functional deficits and impaired health. At the same time, such adverse effects represent a serious challenge to public health professionals, because they are not reflected in routine health statistics. Because we have only one chance to develop a brain, every effort should be made to protect this process against hazards from the workplace and elsewhere.

ALUMINUM - WHICH EVIDENCE IS AVAILABLE FOR ITS NEUROBEHAVIORAL IMPACT?

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Due to its characteristics aluminum is a material of rising importance, especially for the construction of vehicles. During the last years the impact of aluminum on the development of Alzheimer's disease was of main concern. As there are also several studies on neurobehavioral effects of aluminum exposure, it seems reasonable to summarize the current evidence about effects of aluminum and to find out which questions should be focused in future.
Due to the published data a meta-analysis based on effect sizes proved to be appropriate. Mean standardized differences between results for the exposed and the control groups are the basis for the calculation of mean effect sizes. The fixed as well as the random effects model was applied to summarize effect sizes.
Eight of 22 publications ascertained for the period 1985-2005 could be used for the meta-analysis that also allowed the estimation of exposure-effect relationships. The excluded studies examined e. g. pre-selected groups, did not provide necessary data or were reported in different publications. The included studies investigated 429 exposed and 305 control subjects. The mean exposure concentrations ranged from 12.6 to 136.6 µg Al/l urine. Ten psychological tests could be analysed as they were applied in at least 3 studies.
Five significant effect sizes between -0.20 and -0.45 were calculated by the application of a fixed effects model. The mean exposure for these effects ranged from 40 to 85 µg Al/l urine. Applying the random effects model only the effect size for the test Digit Symbol was significant. As not in all studies the control for confounders is sufficient it seems reasonable to adopt the results of the random effects model.
The findings will be discussed with special reference to two recently published long-term studies that did not find neurobehavioral effects. The results will also be related to alterations within the brain as well as to the unclear relationship between internal and external exposure concentrations.

NEURODEGENERATION AND METAL EXPOSURE. CASE-CONTROL STUDIES ON ALZHEIMER AND PARKINSON'S DISEASE

ALZHEIMER DISEASE. AN EPIDEMIOLOGICAL STUDY ON THE ROLE PLAYED BY OCCUPATIONAL EXPOSURE

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Objective: To examine the role played by occupational risk factors in Alzheimer Disease (AD), a multi-centre case-control study was planned by four Italian research Centres, the Chair of Occupational Health, University of Brescia, the Chair of Preventive Medicine, University of Siena, the Department of Neuroscience, University of Turin, and the AFaR – Associazione Fatebenefratelli per la Ricerca of Rome. These Centres were coordinated by the National Institute of Occupational Safety and Prevention of Rome.

Methods: The study was conducted on alive patients affected by AD, included following an accurate diagnostic evaluation, according to the NINCDS-ADRDA criteria (National Institute of Neurological and Communicative Diseases and Stroke/Alzheimer's Disease and Related Disorders Association). The AD patients and their care-takers were interviewed using an ad-hoc questionnaire for the evaluation of clinical and occupational history, specifically regarding work sector, job title and exposure to neurotoxic agents, such as alluminum, lead, mercury and manganese. The Mini-Mental State was also assessed before the questionnaire. Age and sex-matched health controls were examined using the same protocol.

Results: Preliminary results based on the data collected by the two Centres of Brescia and Siena include a total number of 239 cases and 239 controls (66% women and 34% men). A higher prevalence of AD was observed for blue collar workers, craftsmen, office workers. More in detailes, teachers, housekeepers, farmers, wood workers and workers of taylor industry were more affected. Living in a rural area resulted at higher risk compared to living in an urban area. Familiarity factors increased the risk of AD for about 7 times folds.

Conclusion: Preliminary results of our study show higher prevalence for AD in different job categories. Further analysis is needed to examine possible association with exposure to neurotoxic agents in these occupations.

A WEB APPLICATION FOR DATA GATHERING AND STORAGE: A STRATEGIC TOOL FOR A LARGE SURVEY ON THE RELATIONSHIP BETWEEN WORKING ACTIVITY AND ALZHEIMER DISEASE.

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[ID 1654]

The objective of this presentation is to describe a web application and the related factory system named SiRD, in particular, how they was been a strategic tool for gathering and analysing a large amount of information derived by a research on the correlation between type of job and insorgence of Alzheimer disease. The research was a case-control, multicentre study including a total number of 1000 subjects (planned sample) interviewed by means of a detailed and delved questionnaire, exploring several domains, such as working activity, life style, environment. For such a purpose, AFaR Information Technology Group has developed SiRD, i.e. a system able to produce automatically (given the structure of the questionnaire) a software application with a web front-end (php based) connected to a relational database (i.e. MySQL database with 64 tables inside), in order to permit data gathering and storage for the project scope. Users from each Centre have limited permissions, i.e. they can only read and write their own data. Coordinators can read (but cannot write) all users' data. Classifiers can only tag users' data with a standardized code corresponding to the job activity. Statisticians ("with just one click") can export data in a format compatible with software like Excel, SPSS, etc. Our solution permit to decrease the uncertainty about temporal and money costs related to the data gathering project requisites; in particular:

- the builing of the (web) application for data gathering and storage by our engineers requires only 5 days (that is also the time necessary "to rebuild all" if the structure questionnaire change);
- data "input" by each user requires about 20 minutes for each questionnaire;
- data backup by the system administrator requires 5 minutes and zero cost with PhpMyAdmin software application.
- data transformation and exportation from database by statisticians requires only 5 minutes.

All used third-part software application are open source (except for Zend, i.e. a php Integrated Development Environment used to develop SiRD).

PARKINSONIAN DISTURBANCES AND EXPOSURE TO METALS. GENERAL DESCRIPTION OF AN ITALIAN CASE-CONTROL STUDY

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[ID 2128]

Objective: To assess a possible role played by the exposure to neurotoxic agents such as metals and manganese in particular, in the etiology of extrapyramidal disturbances.

Methods: A case-control study was planned in an area of northern Italy where previous epidemiological work had shown increased prevalence of Parkinsonian Syndromes (PS) in the vicinities of ferroalloy plants. This research was planned by four research Units, the planned by the was planned by four Italian research Centres, the Chair of Occupational Health, University of Brescia, the Chair of Industrial Hygiene, University of Brescia, the IRCCS of Brescia, Italy, and the AFAR, Rome. These Centres were coordinated by the National Institute of Occupational Safety and Prevention of Rome. The study design was based on the examination of a group of patients affected by PS living in the vicinities of former ferroalloy plants and a group of patients living at a greater distance from the point sources. Patients were compared to age and sex-matched healthy controls, living in the same areas of the exposed and the not-exposed PS patients respectively. The assessment included ad-hoc questionnaires for residential and occupational history, life style and average diet information, clinical neurological and neuropsicological examination. Biological samples were collected for the measurement of hematological parameters, liver and kidney function, iron metabolism, prolactin, oxidative stress, genetic polymorphism, concentration of neurotoxic metals such as manganese and lead. Challenge chelation test was administered to assess the metals body burden. Instrumental assessment included tremor analysis with the Catsys-Tremor device and brain MRI scan to detect T1-weighted abnormalities.

Results: The general preliminary results will be reported in this presentation, whereas the specific results of the different type of assessment will be separately presented by each research Unit.

PARKINSONIAN DISTURBANCES AND EXPOSURE TO METALS. PRELIMINARY RESULTS FROM NEUROCHEMICAL, TREMORIMETRY AND BRAIN MRI ASSESSMENT

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[ID 1863]

Objective: To assess a possible rule played by the exposure to neurotoxic agents in the etiology of Parkinsonian Syndromes (PS).

Methods: A population based study was conducted on a group of patients affected by PS living in the vicinities of former ferroalloy plants and a group of patients living at a greater distance from the point sources.

Patients were compared to age and sex-matched healthy controls, living in the same areas of the exposed and not-exposed PS patients. The assessment included ad-hoc questionnaires for residential and occupational history, life style and average diet information, biological samples to measure hematological parameters, liver and kidney function, iron metabolism and prolactin, tremor analysis with the Catsys-Tremor device, brain MRI scan to detect T1-weighted abnormalities.
Results: A preliminary analysis of the dataset, reports the results from a sample of 64 exposed patients (51% males and 49% females, mean age70,0 years males and 74,2 years females) 21 not-exposed patients (76% males and 24% females, mean age 67,4 years males and 72,2 females), and 28 controls (18% males and 82% females, mean age73,2 males and 72,0 females). The tremorimetric measurements showed a significant increase of tremor intensity compared to controls and in males compared to women of both exposed and not-exposed patients, an increased central frequency with a narrow dispersion, and a lower harmonic index, compared to controls.
Conclusion: Further analysis of the dataset will examine biochemical parameters and brain MRI scan in all groups of subjects to assess possible differences between exposed and not-exposed patients and between patients of the two groups and controls.

METALS AND OXIDATIVE STRESS IN PARKINSON'S DISEASE

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[ID 1624]

Background: Parkinson's disease (PD) is characterized by a progressive degeneration of the nigrostriatal dopaminergic pathway resulting in movement disorders. Although its etiology remains unknown, PD may be the final outcome of interactions among multiple factors, including oxidative stress and exposure to environmental toxins. Evidence is accumulating to suggest that transition metals are involved in the neurodegenerative processes at the bases of such PD.
Objective: To assess if serum metals, biological variables of their metabolism as well as total peroxides and antioxidants are abnormal in PD, in relation with clinical status and with function of environmental exposure.
Methods: We compared levels of serum copper, iron, zinc, ceruloplasmin and transferrin, as well as total peroxides, antioxidants in 18 PD patients coming from an Industrial zone highly exposed to metal pollution (Valcamonica) with measures from 16 PD patients from no metal pollution areas of central Italy, 47 patients with Alzheimer's disease, 18 healthy controls coming from north and 39 from the centre of Italy. Copper measurements were carried out both with Abe method applied to Cobas Mira Plus (Horiba Abx, Italy) and and by an A Aanalyst 300 Perkin Elmer atomic absorption spectrophotometer equipped with a graphite furnace with platform HGA 800.
Results: PD patients coming Valcamonica had copper ($p= 0.04$) and transferrin ($p= 0.03$) higher and zinc lower ($p< 0.001$) in comparison with PD patients and healthy controls coming from not Industrial zone exposed to metal pollution. No differences were evaluated in the other biological variables investigated. In patients with PD from Valcamonica levels of transferrin inversely correlated with MMSE scores ($r = -0.5$; $p = 0.04$), while outcomes from UPDRSIII scale positively correlated with copper measurements ($r = 0.3$; $p = 0.008$) and iron content ($r = 0,34$; $p = 0.03$).
Conclusions: although data need confirmation, a dysfunction of trace metal, representative of major clinical deficits of the disease, seems to occur in the serum of PD patients coming from Industrial zone highly exposed to metal pollution.

RISK OF HEARING LOSS FROM NOISE AND CHEMICALS

MULTIPLE RISK FACTORS AND WORK-RELATED HEARING LOSS

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[ID 214]

ISO 1999 risk assessment provides a prediction method displaying percentile curves for various risk levels. A large variation, over 60 dB, is observed at 4 kHz after 20 years of exposure to 100 dB noise.
The variation can be explained by evaluating the role of other risk factors as other exposure to noise and ototoxic chemicals, smoking, use of pain killers and elevated blood pressure and cholesterol. The study on the role of these risk factors was conducted among 685 workers in forestry, shipyards, and paper mills exposed to various types of noise and among male professional fiberglass reinforced plastic boat workers (N=286) exposed styrene and low noise levels (82 dB(A)). In addition military pilots (N= 274) and music players (N= 383) were included in the study. Occupational histories, health and noise exposures of each worker were retrieved from our expert program on hearing NoiseScan.
For industrial workers the mean hearing level at 4 kHz was 21.2 dB It correlated significantly with age, noise emission level and noise exposure level explaining only 2 dB of the variation in hearing level. Impulse noise in the shipyard caused increase in hearing loss of 12 dB. Systolic blood pressure, smoking, cholesterol level and painkillers explained 36 % of the variation in hearing level whereas noise exposure alone explained 25 % of the variation. For styrene exposed workers the hearing was in accordance with the ISO 1999 model. Hearing among Finnish military pilots turned out to be better than ISO 1999 prediction. Owing to the smaller number of risk factors, the hearing of pilots corresponded to the 80th percentile being 9-13 dB better than the 50th percentile obtained for industrial workers. Similar result was obtained also for music players. Their hearing was 9 dB better than ISO model would predict corresponding 77th percentile.

AUDIOLOGICAL FINDINGS AMONG STYRENE EXPOSED WORKERS

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[ID 743]

The objective of this cross-sectional epidemiological study from Sweden was to examine styrene-exposed workers with an extensive audiological test-battery. Audiological testing, interviews and exposure measurements were conducted on workers from fiberglass manufacturing plants, noise exposed controls were collected from metal products manufacturing plants and non-exposed controls from a mail terminal. The audiological battery were chosen to cover both peripheral and central auditory functions and included pure-tone audiometry, distortion product otoacoustic emission (DPOE), psychoacoustical modulation transfer function (PMTF), interrupted speech, speech recognition in noise, and cortical response audiometry.
Workers exposed to noise and styrene had significantly worse pure-tone thresholds in the high-frequency range (3 to 8 kHz) compared to non-exposed workers, noise-exposed workers and also compared to a Swedish age specific database. Among the other tests abnormalities were noted on DPOAEs and CRA testing. Significant changes between groups were found in the interrupted speech test as well as in speech recognition in noise. Thus, pure tone audiometry and sensitized speech tests seemed to be the most sensitive tests to the effects of styrene. The findings in this study suggests that occupational exposure to styrene at levels below recommended values have an ototoxic effect on the auditory function.

SOLVENTS AND THEIR EFFECTS ON WORKERS' AUDITORY SYSTEM – SITE OF THE LESION

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[ID 930]

Occupational exposures to several organic solvents are associated with increased probability of developing hearing loss and hearing threshold shift. However, the site of the lesion in the auditory pathway is not known.
The aim of the study was to evaluate the effects of occupational exposure to styrene and to a mixture of organic solvents on the auditory organ using extensive hearing test battery that included pure tone audiometry (PTA), immittance audiometry, distortion product otoacoustic emission (DPOAE), auditory brainstem evoked potentials (ABR), cognitive-related wave P-300 and interrupted speech.
The study groups consisted of workers exposed to styrene-only (114 subjects), solvent mixture –only (87 subjects), noise-only (154 subjects), noise and solvents (129 subjects), and 110 controls.
PTA revealed that occupational exposures to solvents are related to hearing impairment at the degree comparable to occupational noise-induced hearing loss. Increased prevalence of recruitment at 4 kHz was observed in all exposed groups. DPOAE was significantly weaker at high frequencies, and the ABR latencies of wave III and V and interwave I-III and I-V were significantly shorter in styrene-exposed groups as compared to the controls. On the other hand, in the solvent mixture group an increase in DPOAE signal was seen at around-threshold intensities of stimulus. The latency of P-300 wave was not changed in none of solvent exposed groups. The highest percent of subject with pathological results of interrupted speech was observed in group exposed to both - noise and solvents and it was followed by the group exposed to noise-only, and the groups exposed to solvents-only.
In conclusion, the results of the study show that organic solvents could exert their action to the human cochlea as it has been earlier proven in animals. Also, central auditory effect, but not retrocochlear, seems to be related to moderate occupational exposures to solvents.

HEARING LOSS AND INTERACTIONS BY COMBINED EXPOSURE TO TOLUENE, CARBON MONOXIDE, AND IMPULSIVE NOISE.

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[ID 1051]

The effects of interactions of different patterns of combined exposures of noise, toluene and carbon monoxide were investigated in the rat model. Prolonged exposures to steady state, wide band noise and toluene did not increase the risk of synergetic interactions, unless the exposure concentration of toluene was close to LOAEL. An exposure schedule including short periods of higher noise levels of did not increase the interactions between noise and toluene exposures. Impulsive noise induced considerable more impairment to hearing than wide band noise, but the effects of interaction were found to proportional to the greater auditory impairment of the impulse noise without exposure to toluene. Considerable hearing loss was found from exposure to impulsive noise at 84 dB SPL, having 75% of the energy as noise impulses. No direct synergetic interaction with toluene exposures was noted at this level of noise exposure, but a potentiation of the effects of exposure to carbon monoxide (CO) was evident, even at the lowest exposure levels of toluene exposure. Above the LOAEL of CO, combined exposure did increase the LOAEL of toluene effects of noise exposure by 50%. Extrapolation from these studies to the human working environment would imply, that combined exposure to noise and organic solvents do increase the risk of auditory hearing impairment of tobacco smokers significantly. Further, if these results can be generalized to other risk factors, a major part of the hearing impairment by occupational exposures may be caused by interactions of low to medium levels noise exposure in combination with the individual risk factors of hearing loss.

USE OF AN AUDIOMETRY TEST BATTERY TO DETECT CHEMICAL OTOTOXICITY

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[ID 1143]

Background:
A growing body of scientific literature suggests that chemicals found in many workplaces, including organic solvents and heavy metals, may cause clinically significant ototoxicity and can cause hearing loss independent of noise exposure, or may act to potentiate the damaging effect of noise on hearing. Recent scientific consensus documents have called for the development of a comprehensive audiological test battery to detect such ototoxicity in workers exposed to potentially ototoxic chemicals.
Objective:
The objective of this pilot study was to test whether an audiological battery could detect differences in hearing function between workers exposed or not exposed to chemicals.

Methods:
Pure tone audiometry, high frequency audiometry, distortion product otoacoustic emission (DPOAE) testing and tests of central auditory functioning were performed in combination on a group of factory workers with varying levels and duration of organic solvent and noise exposure. A comprehensive questionnaire was used to assess past exposures to chemicals and noise. The control group was a group of administrative workers in the same facility. Using a multivariate model constructed for each of the primary outcomes of different components of the testing battery, solvent and noise exposures were correlated with abnormal results of audiometric testing.
Results:
Results of the multivariate analysis will be presented. Additional findings regarding the practicality and reliability of testing procedures will also be discussed.

EFFECTS EXPOSURE TO NOISE AND ORGANIC SOLVENTS ON BODY SWAY OF WORKERS

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[ID 1289]

Substances damaging hearing and/or balance organ are called ototoxics. Nowadays ca 850 substances are recognised or suspected to be ototoxic. Knowledge on the effects of exposure to chemical sand noise on hearing and balance is limited
Aim of this study was assessment of postural sway in workers exposed to organic solvents and/or noise
The study group consisted of workers exposed to organic solvents (toluene, benzene, ethylbenzene, styrene, and mixture) and/or noise and controls, altogether 299 persons.
Programme of examination included: postural stability assessment by body sway platform. Postural stability was recorded in four test conditions: open eyes, closed eyes, open eyes standing on foam pad, closed eyes standing on foam pad. Duration of each was 30 seconds. Each person filled a questionnaire on potential factors impact hearing and balance. Status of hearing was monitored too.
Exposure has been determined by combining environmental sampling and biological monitoring of solvent exposure. Noise measurements were performed.
The sway are for workers was larger than for the controls. Also the sway frequency was on the increase. The parameters of sway area and sway frequency were correlated with the variables of styrene and acetone exposure, the level of exposition to noise, urine concentration of mandelic acid, BMI and lifetime doses of noise, styrene and acetone. The pattern of changes indicates that exposure affects in the balance system following parts: vision, vestibular organ., and cereberallar part. Prioprioceptors seems to be intact by exposure.

NOISECHEM: A MULTI-CENTRE STUDY ON THE EFFECT OF EXPOSURE TO A COMBINATION OF NOISE AND INDUSTRIAL CHEMICALS ON HEARING

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[ID 1468]

Approximately 30 million workers in Europe are exposed to hazardous noise in the workplace. In addition, 10 million workers are exposed to industrial chemicals considered to be oto-toxic such as solvents, heavy metals, and asphyxiants. Although the effects of noise exposure on hearing are well established, knowledge on the risk from exposure to industrial chemicals is limited and occupational safety criteria for combined exposures are just emerging. NoiseChem, a European Commission research project with partners from, Finland, France, Denmark, Poland, Sweden, UK and USA examined the effects of exposure to noise and chemicals on hearing and balance functions. Several chemicals agents were investigated, including: styrene, toluene, carbon disulphide, mixture of solvents.
The objectives of this multi-centre study were to: 1) Develop standardized procedures for effective field evaluation of hearing and balance functions; 2) Determine the auditory and vestibular effect of exposure to solvents at levels commonly found in industry; 3) Determine the mechanisms for damage to hearing from solvents and their interaction with noise.
The results from animal studies indicated a risk of potentiation of noise induced hearing loss by solvents such as styrene and toluene. The exposure level necessary to cause an effect seem to be lowered when additional stressors are included in the experiments. Aged rats were found to be more vulnerable to noise than young rats whereas the opposite was the case for styrene. The implication is that age may be a significant factor in the risk assessment for oto-toxicity.
The Human studies conducted also indicated increased risk of hearing loss associated with chemical exposures. It is clear that there is a potential risk of chemically induced hearing loss in workers not exposed to noise and evidence of potentiation of hearing loss when combined exposures occur.

NEUROTOXIC AUDITORY EFFECTS OF SOLVENTS IN THE RAT

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[ID 1506]

Because aromatic solvents can cause severe cellular and functional impairments to the auditory system, they should be considered as ototoxic agents. Solvent-induced hearing loss is an example of a highly selective organ-directed toxicity. The fact that the organ of Corti and more specifically the outer hair cells are more sensitive to solvents than the inner hair cells can be considered as a major characteristic of the solvent ototoxicity. Nevertheless, the potentiation of the noise effects by a solvent exposure is also a characteristic which is of critical importance in terms of occupational safety. For this latter reason, the present experiment was designed to study the risks encountered by subjects exposed to both hearing stressors : solvent and noise. Anaesthetised adult rats were equipped with an electrode placed on the round window of the cochlea to record the cochlear microphonic potential (CMP) which is a reliable electrical indicator of the outer hair cells function, whereas aromatic solvent emboles (vehicle: intralipid) were directly injected into the carotid to avoid the likely ototoxic action of the metabolites. Contrary to our expectations, the amplitude of the CMP increased following the solvent injections and the increase in the amplitude was correlated to the noise intensity. Moreover, the increase in the amplitude of the CMP was also reproduced by the injection of acetylcholinergic antagonists: atropine and α-bungarotoxin for instance. The results of this study let think that the aromatic solvents could play a major role at the level of the cerebral trunk by inhibiting the auditory efferent system and more specifically the olivo-cochlear efferent system. Finally, the hypothesis that solvents may target ligand -gated ion channels will be discussed in the presentation.

OCCUPATIONAL MEDICINE IN EUROPE - PROFESSIONAL INITIATIVES

THE SECTION OF OCCUPATIONAL MEDICINE OF THE EUROPEAN UNION OF MEDICAL SPECIALISTS (UEMS)

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The European Union of Medical Specialists (UEMS, Brussels 1958) is an influencing organisation whose purpose is the harmonisation and improvement of the quality of specialist medical practice throughout the EU. It has produced standards for specialist training, continuing medical education and on quality assurance and has been active in defending medical specialities and their professional role in society.
The UEMS is organised in Sections. The Section of Occupational Medicine (OM) was created in 1996 and it is composed of national representatives nominated by each national medical organisation. Each country is entitled to nominate two representatives, one practitioner and one academic. Non EU countries may nominate observers. The UEMS Section of OM has members from nineteen countries, of which the majority are EU member states. Its mission is to promote the development of the speciality of OM in Europe and to improve workers health using its influencing capacity on EU legislators, collaborating with appropriate institutions, promoting the harmonisation of the quality of professional practice and training, and identifying common areas of the discipline. The Section has regular meetings of its members, participates in meetings with EU politicians, produces consensus documents and organises open activities.
The development of the EU has provided challenges and opportunities for the speciality of OM. The principle of free movement of specialists throughout Europe requires agreement on the core competencies training and harmonisation of quality assurance systems to ensure that the speciality is respected for its expertise and contribution to the improvement of workers health across Europe.

CURRENT OCCUPATIONAL HEALTH COMPETENCIES OF OCCUPATIONAL PHYSICIANS

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The Healthy Working Lives Research Group has been heavily involved in the development of common core competencies for Occupational Physicians across Europe. In 1997 a modified Delphi survey was conducted among members of the European Association of Schools of Occupational Medicine (EASOM), the Occupational Medicine section of the Union of European Medical Specialties (UEMS), and of the European Network of Societies of Occupational Physicians (ENSOP). The results were discussed at a conference organised in the UK which helped to describe and assess the training needs and models of training of OPs across Europe. This study identified that respondents had traditional disease focused views of the competencies required of occupational physicians and that competencies were lagging behind the evolving definition of occupational health. Following this study, the WHO commissioned the group to develop a document on the scopes and competencies of occupational medicine in Europe which has been has been adopted by the UEMS and used as a guideline for defining the curriculum used in the training of OPs across Europe. It has been used by many of the accession countries seeking to harmonise their training. Having identified the views of OPs on their competencies internationally, the HWL research group has surveyed the potential customers of OPs in the UK. This study has succeeded in establishing the priorities amongst employers and employee representatives of the competencies required of OPs. All the established competency areas of OPs were regarded as important by their customers, thus validating training in the UK, but it was observed that the customers' priorities were not the same as those of the physicians.

THE OCCUPATIONAL MEDICINE AGENDA: ROUTES AND STANDARDS OF SPECIALISATION IN OCCUPATIONAL MEDICINE IN EUROPE.

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INTRODUCTION-This paper reports on the nature of training as a specialist in occupational medicine (OM) in Europe from a survey of representatives from the European Union of Medical Specialists OM section.
AIMS-To analyse current differences existing in the education and training requirements to specialise in OM among representative UEMS countries.
METHODS-At the UEMS OM specialist section meeting in Barcelona (10/2003) 14 representative UEMS countries were surveyed.
RESULTS- There is variation in postgraduate training for OM in UEMS participant countries. Those surveyed outlined current concerns for the funding of training, research requirements, recruitment to the specialty and the impact this will have on the future. Postgraduate OM specialisation in five countries does not meet the basic UEMS Board criterion of a four-year training programme. Exit examinations are required in most but not all countries .
CONCLUSION-The discussion highlights the responsibilities of representative organisations to reflect on important principles, strength and points of weakness of variation in postgraduate training in occupational medicine. Identifying these points allows specialists to develop a consensus approach to translating professional competency for stakeholders in line with EU directives for the future.

DEVELOPING A COMMON ASSESSMENT OF SKILLS AND COMPETENCIES OF SPECIALIST OCCUPATIONAL PHYSICIANS ACROSS EUROPE-THE ATOME PROJECT

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The Healthy Working Lives Research group at the University of Glasgow is leading a new project which aims to develop common assessment methodologies, which countries across the EU could choose to use, as part of the summative assessment of doctors completing the four-year training programme, in order to become recognised specialists in Occupational Medicine.
This project will work with collaborating partners and organisations (from 14 EU countries), to identify the types of assessment methodology already in place, explore the opportunities to establish a common element of assessment, establish a collaborative network to develop and pilot a European common assessment instrument and create the foundation of a self sustaining co-operation between the professional organisations responsible for the standard setting of assessment in their countries.
The development of a common element will facilitate the development of quality assurance of assessment of specialists in occupational medicine and will improve the consistency of occupational medical advice available to workers, employers and trade unions across Europe.
We plan to conduct a survey of European Union (EU) standard setting/examining bodies to identify assessment methodologies used, organise a workshop conference to invite standard setting/examining bodies, and trainees and consumers of Occupational Medicine services from across Europe –to explore similarities, differences and opportunities for collaboration, identify standard setting/examining bodies willing to collaborate in identifying and developing a common assessment instrument and standards.

QUALITY ASSURANCE OF OCCUPATIONAL HEALTH SERVICES: TEN YEARS EXPERIENCE USING A WORK QUESTIONNAIRE TESTING ABOUT 74 DIFFERENT OCCUPATIONAL HEALTH SERVICES.

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[ID 2211]

Beginning at the middle of the 90th we developed tools to objective the quality in different kinds of occupational health services. For this purpose the well known methods for industrial quality management were adapted into the specifities of occupational health. During to the development of the tools we looked for a wide political acceptance. Represents of employer and employee accompanied the work as well as politicians and members of different chambers. Meanwhile we have experience using an op-

timized questionnaire for the two steps of self-audit and external quality audit over a period of nearly ten years. Within this presentation we want to demonstrate the actual used tools and give a overview about the results: 74 different occupational health services were examined; at all we performed 113 audits containing 39 repeats. The complete audit contains the following steps: Initial meeting, inspection, peer group dialogs, review of the documents and the final meeting. The proven health services employ 393 physicians and more than 700 assistants. Our report includes audits of health services dominantly taking care about small enterprises as well as services of worldwide operating companies. Additionally we performed audits in Austria and Switzerland. Application within globally acting companies shows the international practicability.
The advantages overall were: high practicability within the full range of different kinds of health services, inexpensive, peer review (i.e. occupational physicians proof occupational physicians) and high compatible with health services of different countries.
After this long term experience we think that we have now a powerful tool for proofing the quality of the different kinds of occupational heath services. Our current activities is to define the crosslink

THE FUTURE OF OCCUPATIONAL MEDICINE: A PERSPECTIVE FROM EASTERN COUNTRIES

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[ID 680]

The future of health in world lies in the future of occupational health. There are more than 400 million workers in the European Region and all of them have the right to just and favorable working conditions, and equal access to occupational health services. The world of work is changing, and complexities are many and huge. Stress at work is one of the most important work –related health problems. But traditional problems, like injuries, noise and chemical risks remain or even are getting worse: unhealthy work organization and equipment represent threats to human health and add to the burden of disease. However, the levels of health risks at many workplaces in the Region are still unacceptable. We do not pay sufficient attention to wellness programs and especially not to leadership.
The countries from Eastern Europe face an increasing need to adapt their policies, systems and services to the new political and socioeconomic conditions. The changes in the structure of the economy, the fragmentation of the industry, the flexible forms of work organization and the establishment of small and medium size enterprises in Eastern Europe countries require new approach and new models for provision of occupational health services.
Occupational health physicians' leading role in maintaining healthy organizations and healthy workplaces, should be further developed. The changes in technology, work organization and globalization mean that nations are interdependent, and that the national perspective is no longer enough.

THE FUTURE OF OCCUPATIONAL MEDICINE: CONCLUSIONS FROM A EUROPEAN WORKSHOP.

FOSS O.T.

[ID 2254]

A workshop was held in Barcelona in September 2002 to draw together the experience of specialists from across Europe to see whether a common vision for the future of Occupational Medicine in Europe could be articulated. The workshop was organised by the Union of European Medical Specialists (UEMS) - Section of Occupational Medicine, which is the official body of this speciality in the European Community
The objectives of the workshop were: 1) to understand our common views and the different perspectives in leading professional organisations; 2) to review the processes of specialist training across Europe and discuss harmonisation and equivalence of the varied training programmes; 3) to produce a common vision for the speciality in Europe; and 4) to produce an action plan to take forward the professional and social agendas of the speciality.
The proceedings with the summary of each of the 8 workshops that were organised, with a total of 53 participants from 19 different countries, are available at the UEMS website.
In the attempt to identify common values and a common platform for future action for the speciality of Occupational Medicine, some specific barriers did become apparent. However, the commonality of most of the vision and the unanimity of purpose were much the stronger themes. There was agreement that it is vital to improve training, Quality Assurance and responsiveness to stakeholders. Occupational health physicians' leading role in maintaining healthy organisations and healthy workplaces, should be further developed. This does indeed give us a common view and a common platform, and one where any barriers become challenges to overcome.

ASSESSMENT OF OCCUPATIONAL EXPOSURE TO EMF

ASSESSMENT OF OCCUPATIONAL EXPOSURE TO EMF

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[ID 2500]

Objective

Occupational use of various types of electrical devices producing electromagnetic fields (EMF) causes significant exposure, mainly among health care staff and industrial workers. The typical characteristic of conditions of significant exposure mainly consist of: short distance of worker's body from the EMF source, exposure to EMF of high level, long durations per day (up to whole shift), high complexity of frequency and modulation pattern. Very common is simultaneous exposure to EMF and various chemical and physical agents.

Method

MT2 (Main Task-2)-WORKEN is a part of the European FP6 co-ordination activity EMF-NET. The main topics of MT2 are the analysis of the results of on-going and completed studies worked out in various European countries in the area of methods for measurements and computer simulations applicable for EMF exposure assessment for occupational risk evaluation.

Results

Available measurement's methods and standardised protocols for EMF exposure assessment were analysed, as well as available measurement's devices, numerical calculations procedures and software. Exposure assessment protocols were analysed on practical examples from real workplace and experience of MT-2 experts.

Conclusions

Obtained data concerning problems and gaps of knowledge or standardisation concerning practical EMF occupational exposure assessment will be presented on examples from very common real occupational situations, to show very significant role of reasonably detailed exposure assessment protocols to obtained real occupational risk assessment (e.g. for EC Directive 2004/40/EC implementation) or exposure assessment for epidemiological study. Such exposure assessment should consider among others frequency components and spatial distribution of EMF in the workplace. Very crucial is the role of well identification of the most important components of EMF, what can be not trivial.

HIGH EXPOSURES IN OCCUPATIONAL SETTINGS

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[ID 2501]

In 2004 an EC directive was issued on occupational exposure to electromagnetic fields (EMF) calling for occupational risk assessment and implementation in the EC states national occupational safety and health regulations before 2008. Sources of EMF exist at almost all workplaces and they should be assesed with regard this exposure. Examples of the most important occupational exposure places is presented in this review, and a few are given below.

At electrolytic processes static magnetic field levels at operator's locations can be about 8-15 mT, AC rectification's component of the level up to app. 30 % of it and basic frequency of 50-300 Hz is also possible. Magnetic resonance imaging systems use magnets typically from 0.05 T to about 3 T. Also static magnetic fields, RF fields (10-100 MHz) and rapidly changing gradient magnetic fields occur in pulse sequences within MRI equipment. The maximum level is about 1 T in front of the magnet, and nurses/technicians staying with patients can be exposed to up to 0.2 T, approaching the protection guideline.

Operators of induction furnaces and heaters are highly exposed; at 1 meter from a 1-10 kHz heating equipment, flux densities typically range from 0.03 to 0.5 mT, and may reach 5 mT at 10 cm. Similarly, devices working at a frequency of 50 Hz, may produce 5 mT fields at 20 cm, and over 0.1 mT at a distance of several meters, and the guidelines (30.7 μT for 1-10 kHz and 500 μT for 50 Hz) are exceeded manifold during work procedures close to furnaces.

In arc welding, electric current up to 1 kA can be used. The cable carrying welding current can touch the welder or even be wrapped around a shoulder of the welder. Magnetic flux densities are about 1-2 mT at the surface of the welding cable and power supply, exposing the welders to strong ELF fields.

Dielectric heaters and sealers are used to heat wood (glue dryers) or weld plastics (plastic sealers) by applying a strong RF current between metal electrodes. The output powers range from 1 to 200 kW. Most sealers are operated manually and require the presence of the operator close to the RF electrodes. In some applications, pieces of plastic materials to be heated must be held by hand, and the operator's hands will be highly exposed to RF fields. Electric field strengths range in areas of operators typically from 1 to 300 Vm^{-1}, and magnetic fields from 0.1 to 20 Am^{-1}, respectively.

THE NEW EU DIRECTIVE 2004/40/CE ON EMF OCCUPATIONAL RISK

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[ID 881]

The directive 2004/40/CE, on the minimum health and safety requirements regarding the exposure of workers to the risks arising from electromagnetic fields, has been issued in the European Official Journal on May 25, 2004, as the 18th individual directive within the meaning of framework directive on health and safety at work (391/89/EEC). The EMF directive follows the publication of directives on other physical agents, namely 2002/44/CE on vibration and 2003/10/CE on noise. The aim of the directive is the protection from established adverse effects caused by induced currents and by energy absorption, as well as by contact currents. Suggested long-term effects are not addressed, due to the lack of conclusive scientific evidence. The directive, however, lays down minimum requirements giving EU member states the option of maintaining or adopting more favourable provisions for the protection of workers. Like in the previous directives on physical agents, the framework is based on the definition of "exposure limit values" and "action values". The exposure limit values can never be exceeded, whereas the action values are levels at which the employer must undertake technical or organizational measures to reduce exposure. The numerical definition of such values is based, respectively, on basic restrictions (dosimetric quantities) and reference levels (unperturbed fields) established for the workers in the relevant guidelines of the International Commission on Non-Ionizing Radiation Protection (ICNIRP). Nevertheless, the directive claims the employer to give particular attention to any indirect effects, such as interference with medical devices like cardiac pacemakers, and adapt risk assessment and mitigation measures for workers at particular risk. As far as concerns health surveillance, the only compulsory provision states that where exposure above the limit values is detected, a medical examination shall be made available to the workers concerned, and if health damage is detected a reassessment of the risks shall be carried out. The member states have to transpose the directive into national law within April 2008.

OCCUPATIONAL RISK RELATED TO EXPOSURE TO EMF IN WORKERS: THE RESULTS OF EPIDEMIOLOGICAL RESEARCH

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[ID 1229]

The results of research on adverse effects of occupational exposure to electromagnetic fields (EMF) are still inconclusive. Among main causes are the difficulty in exposure assessment and the lack of convincing mechanisms. A causal relationship between EMF and an increase in cancer incidence in workers is not established. In studies on occupational exposure to Extremely Low Frequency-Magnetic Fields (ELF-MF) an excess of risk, where exist, is modest, and is largely restricted to leukaemia and brain cancer. Conflicting evidence exists for the specific cell type of leukaemia associated with the greatest risk, but acute myeloid leukaemia is the most cited. Evidence for brain cancer is conflicting. ELF most likely are not a significant risk factor for breast tumours or other cancers. More recently, the attention has shifted toward the possible effect of exposure to radio frequency (RF), mainly due to the widespread use of mo-

bile phones. Nevertheless, this technology is recent and constantly changing. Accordingly the quality and quantity of available data are insufficient, and there is a need for continued research on this issue. Considering these limitations, even if an increase in cancer risk due to exposure to RF, mainly brain cancer and leukaemia, was reported, neither the studies of occupational exposure nor the new studies of cellular phones users offer any consistent evidence of an association. Other possible adverse health effects of EMF in workers were suggested by epidemiological results. Some data support an association between occupational ELF exposure and an increased risk of amyotrophic lateral sclerosis. In other studies, an association with Alzheimer's disease was suggested, but the evidence is weaker. Similar conclusion is also valid for the possible association with depression and suicide. Available results are inadequate for other outcomes. Epidemiological data regarding the effects of occupational exposure to static fields are largely insufficient.

WHO'S EMF ACTIVITIES

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[ID 2502]

Electromagnetic fields (EMF) of all frequencies represent one of the most common and fastest growing environmental influences, about which anxiety and speculation are spreading. All populations, particularly in industrialized nations, are now exposed to varying degrees of EMF, and the levels will continue to increase as technology advances.

WHO established the International EMF Project to: (i) assess health and environmental effects of exposure to static and time varying electric and magnetic fields in the frequency range 0 - 300 GHz and (ii) provide a forum for a coordinated international response to EMF health issues. The Project commenced at WHO in 1996 and is scheduled for completion in about 2008. The International EMF Project has been designed to follow a logical progression of activities. Its ultimate objective is to provide sound advice to national authorities on how best to manage EMF issues for both workers and the general public.

Over the last several decades, employees and employers in industrialized countries have become more conscious and conscientious about the hazards associated with personal work environments. However, most available information deals with considerations for the public. There is a need for information and guidance on appropriate occupational interventions and strategies to prevent harm resulting from EMF occupational exposures. In view of this, WHO is currently developing a booklet in collaboration with the US National Institute for Occupational Safety and Health (NIOSH). It is intended for the use of employers, managers and workers involved in the evaluation, management and control of such EMF exposures in all types of workplace environments. This document will provide basic guidance for dealing with occupational exposures to EMF and will be further discussed during the presentation.

THE OCCUPATIONAL MEDICINE FACED BY I.R. AND N.I.R

GUIDELINES OF ITALIAN MEDICAL RADIATION PROTECTION ASSOCIATION ABOUT HEALTH SURVEILLANCE IN EXPOSURE TO NON-IONOZING RADIATION

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[ID 1551]

Directive 2004/40/CE of the European Parliament and Directive concerning protection from optic radiation points out what an occupational physician has to do in case of scientifically evident effects of non-ionizing radiation, meaning for evident effects, those one based on the agreement of the scientific community about their causal agents. The Directive, instead doesn't mention physician's tasks in case of possible effects for the exposure to environmental risks.

Within his interdisciplinary activity for risk evaluation, the occupational physician acts an essential role with the other specialists of the sector. Therefore he has specific duties:

a) during inspections, he must report every changes of employees' positions at work, recording their distance from the source of exposure, the length of exposure and the way they operate;
b) he is to ask the employer to engage expert technicians, who use suitable equipment to measure exposure
c) he has to cooperate with these expert technicians to estimate the risk entity, avoiding to appoint them to his own competence.

What is been said above necessarily implies an adequate training and a good knowledge of parameters of exposure suggested by ACGIH, ICNIRP, ANSI, IEEE, CENELEC and other institutions. These two conditions let the occupational physician to keep the patient under observation if the parameters should be overcome.

Health surveillance is the estimation of the worker's state of health and it is indispensable to elaborate an evaluation of job-fitness. The clinical test must include the anamnesis, the medical examination and some diagnostic checks (diagnostic laboratory outline), which supply the occupational physician with a complete clinical picture showing any latent pathology or any conditions of individual hypersusceptibility.

Anamnestic and clinical data are collected with a standardized system, all the several frequencies of the electromagnetic spectrum are analysed and the diagnostic protocols concerning eyes, skin, hematopoietic system and, on the discretion of the occupational physician, also neuroendocrine and reproductive systems, are established.

Also data of periodical medical examinations and "minimum" complementary checks are established: for ultraviolet radiations a medical check is necessary every six months, while eye and dermatological examinations must be done every year; for laser medical, oculist and dermatological tests are essential every year; for infra-red radiations a six-monthly medical examination and yearly ophthalmologic and dermatological checks are required; for ELF, radio frequencies and microwaves a medical examination with a hematological and biochemical analysis and an eye test are necessary every two years; for static magnetic fields, yearly medical examination with a hematological and biochemical analysis, an electrocardiogram and an oculist check are prescribed.

Every occupational physician engaged in health surveillance has to keep up with the evolution of the scientific knowledge and he must observe the possible health damages for workers exposed to electromagnetic radiations: this is a deontological responsibility of the occupational physician to respect the "precautionary principle".

FITNESS TO WORK CRITERIA IN EXPOSURE TO NON IONIZING RADIATION

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[ID 143]

Medical surveillance is essential to formulate judgement of fitness to work. Its criteria in professional exposure to NIR must distinguish three possible outcomes:

a) Absolutely fit to work, which consists of the absence of biological alterations and no specific intervents are requested; there are not pathologic conditions at risk to make worse owing to that job activities.
b) Partially fit to work, with peculiar precautions and stated prescriptions, in the case of starting biological or clinical alterations, or in high risk cases with exposure levels next or slightly higher to the limit values permitted by ICNIRP Committee, based on low term health effects.
c) Not fit to work, in the case of presence of pathological conditions which are absolutely not compatible with the exposure to NIR. This judgement may have transitory or permanent characteristics according to the presence of environmental situations at high risk with exposure levels finally higher than exposure limits.

To express the judgement of fitness to work we have to consider general health conditions owing to NIR exposition. In addition to this we must mainly consider the conditions of organs which are sure or hipothetical targets. Therefore particulary care will be addressed to the observation of eyes, skin, haematopoietic system, cardiovascular system, neuro-endocrine system and reproductive system.

There will be the "partially fit to work" outcome in the case of opacities of crystalline lens, peripheral blood lymphocytosis, reticulocytosis, spermiogram alterations, endocrine alterations and hypofiseal-cortical axis and hypofiseal-tyroid axis perturbations, low degree individual hipersusceptibility and immunological alterations not at high risk.

In addition to the previous outcome there will be the conditions for a "not fit to work" judgement in the case of cardiovascular alterations, like rhythm perturbations and electrocardiographic alterations, clear cataract, marked arterious hypotension and nervous system perturbations like electroencephalography alterations, increase of reaction time, particular stress conditions and psychophysical strains, neuroasthenic and neurovegetative syndroms, high degree individual hipersusceptibility and serious immunological diseases.

THE 2005 DRAFT ICRP RECOMMENDATIONS: A WORK IN PROGRESS

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The International Commission on Radiological Protection (ICRP) has been issuing radiation protection advice internationally accepted for decades, and is now in the process of revising its 1990-1991 Recommendations set out in Publication 60. With a remarkable spirit of openness the Commission made known the 2005 Draft of its new Recommendations encouraging radiation protection Associations and experts to communicate their views to the Commission. The changes in the protection system proposed by the Commission acknowledge the need of stability in regulatory systems and are a pragmatic and on the whole positive evolution in respect of the 1990 Recommendations. The main features of the new protection system of interest for experts in the medical profession are outlined and briefly commented upon in the paper.

HEALTH SURVEILLANCE OF WORKERS EXPOSED TO IONISING RADIATION IN EU

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This report intends to focus the attention on the analogies and on the differences of formulation and execution of health surveillance of workers exposed to ionising radiations in countries of European Community.

In these realities, in fact, although the national legislation derive from the same general legislation (directive EURATOM 29/96) some differences emerge, for instance, on the criteria of classification and therefore on the obligation of medical control on workers otherwise classified (A or B). It is important to underline that those countries with nuclear plants (almost every European country) show a very different situation in comparison to those where nuclear plants are forbidden by the law (as in Italy). In the first ones, in fact, the medical surveillance pay particular attention to workers of nuclear plants, and a specific professional qualification is required, whereas in other sectors (hospitals for instance) such activity can also be submitted to physicians specialized in occupational medicine, but not specifically trained in radioprotection.

Another analyzed issue takes into account the support (electronic or papery) necessary to the carrying out of the activities of medical control and the obligations that the different national legislations individualize on the matter, also in relationship to the necessity to make homogeneous such

documentation view the mobility of the exposed workers inside the countries of the Community.
We last illustrate the aspects related to the choice of the diagnostic protocol, depending on the risk typology (as said very diversified in relationship to the present sources) and of the evaluation of job-fitness, with some exemplifications.

HEALTH SURVEILLANCE OF WORKERS EXPOSED TO IONISING RADIATION IN ITALY. THE AIRM WORKING GROUP (WG) GUIDELINES

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According to the aims of ICRP publication 60/90, the ad hoc WG of AIRM (Italian Association of Medical Radiation Protection) has carried out a review of the statements and the management of health surveillance, to provide a guide in line with the principles defined by ICRP, especially the restrictions on individual dose. Actually, in these years, the goal of the health surveillance passed from avoiding the deterministic effects to limiting the stochastic ones.
The guidelines are structured in 15 chapters, which consider on all account the scientific and applicative criteria of health surveillance. Starting from the main principles of radiation protection, the guidelines provide an overview on several issues of this matter, explaining its goals and the different conducts of health surveillance to be applied in case of deterministic and stochastic effects. To the last ones the guidelines dedicate one chapter on oncological epidemiology, radioepidemiology and individual susceptibility .
Then follow the main Italian legislative references, together with examples and explanations.
Guidelines also pay particular attention to internal contamination, either for radio toxicology aspects, which allow to understand data of direct and indirect measures and to assess the dose due to the introduction of a radionuclide, or for aspects of control management.
We then find a whole chapter about radon exposure and its possible consequences on health.
An important section deals with diagnostic program and determination of fitness, which takes into account the certainties and doubts linked to this central and delicate aspect.
The following section describes the accidental events and the medical actions to be performed before and after the accident.
The guidelines last deal with the forensic aspects, explaining the PC (probability of causation) methodology, also used in Italy to evaluate the connection between tumours and exposures to ionising radiations.

APPLICATION OF PROBABILITY OF CAUSATION IN PROFESSIONAL EXPOSURE TO RADIATION

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[ID 1486]

The judgment of causation is often a very difficult task when the pathology does not have a specific etiological connotation. That is the case when the causation is dealing with a neoplastic disease in a worker exposed to carcinogens living in a community where 25%-30% of peoples dies because of a cancer. As a matter of fact the litigation is increasing in this particular field of forensic medicine and a new methodology based on criteria more objective and scientific than the “origin presumption” is needed in this field. As far as the ionizing radiation risk is concerned, the approach of Probability of Causation (PC) provides a valid and scientific aid in deciding the question of cause and effect between a malignancy and a specific previous exposure. PC is an epidemiology-based method conceived to evaluate the probability of a linkage between a specified cancer and an exposure. The PC can be expressed in an equation based on the excess relative risk (R) due to radiation exposure:

PC =

The value of R is “tailored” to the particular individual i.e. it is related to the size of the received dose, the sex, the age of exposure, the time between exposure and the disease onset, etc. The PC value is a percentage indicating the likelihood of causative hypothesis, that is: it provides, rather than a proof of causation, a science-based probability related to the “strength” of the casual link between a previous exposure and a current neoplasia.
This methodology is widely used in the U.S. where it was formerly proposed, it is used as a compensation agreement for nuclear industry in the U.K, and it is imported in our Country as a basis in deciding cancer causations in various operative contexts.
This methodology, specific for the radiogenic risk, clearly point out the feasibility of evaluations based on credible and objective grounds when a concrete contentious on a stochastic disease involves the forensic medicine. That for instance, is the case of a child leukaemia attributed to the ELF exposure. As a matter of fact the epidemiology gave sufficient indications to the IARC to classify the ELF as possible carcinogen agent for child leukaemia, probably suggesting a similar, better or lower classification for other carcinogenic effects on human beings.
On the ground of this classification and of the indication of a logistic link between the exposure and relative risk of child leukaemia it would be plausible and possible to evaluate the probability of causation of an oncological disease and the ELF exposure in an occupational exposed worker.

OCCUPATIONAL ASTHMA

OCCUPATIONAL ASTHMA; THE SPECTRUM AND THE DIAGNOSIS

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[ID 2045]

Occupational asthma due to occupational exposure is seen in a range of different occupations from bakers to car painters. The OAcan be divided into at least two types according to the exposure responsible. The list of asthma causing agents is constantly increasing. and there is an emerging consensus on the differentiating between IgE and non-IgE dependent mechanisms responsible for the pathogenesis.
The diagnosis and causality of occupational asthma will be discussed with emphasis on preventive measures that can be taken on individual, company and industry level.
Finally there is an increasing awareness of the shortcomings on some of the procedures used to "prove" the causality of the occupational environment, and new techniques will be discussed.

THE EPIDEMIOLOGY OF OCCUPATIONAL ASTHMA & COPD

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[ID 2092]

Occupational asthma and COPD is now ranging as tha most important occupational respiratory diseases in the western world. Different epidemiological sources indicate that approximately 10% of adult onset asthma is caused by the work environment.
Studies with follow up of workers have indicated that the most important risk factor for new onset asthmaisthe level of exposure, and only to a lesserextent individual factors like atopy and smoking.
Intervention strategies for the prevention of occupational asthma need to be developed to include the new knowledge on causation of OA. Possible surveillance programmes in high-risk workplaces.

PREVENTION OF WORK RELATED ASTHMA AND PNEUMOCONIOSIS IN THE NEW MILLENNIUM

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[ID 2139]

Pneumoconiosis has many different causes, inhalation of silica (SiO2) and asbestos fibres being the prime causative factors. Silicosis is and old disease while asbestosis has been known for about 105 years only. Coal workers lung (CWL) also has a significant impact on workers' health in some countries. As the relationship between exposure and outcome is clear, these diseases are quite easily preventable, and in some countries the diseases are successfully eradicated during the 20ties century. This successful prevention is to a great extent a result from the workers' own participation, empowerment and demands towards the employers.
In other areas and countries, however, the incidence and prevalence of these diseases is still high, due in part to export from rich countries of industries that are associated with these exposure factors. Colleagues in the countries of concern possess the knowledge needed to prevent these diseases. However, for various reasons their knowledge does not reach the workers to the extent that is needed to empower the workers to demand vigorous preventive means. Escalating globalization of the industry of concern result in increased distance between workers and the owners who have the means to implement prevention.
One of the ICOH member's prime tasks in the 21st century must be to find means to ensure prevention of these and other types of pneumoconiosis in countries where workers are still harassed by these diseases. Data on the incidence and prevalence of pneumoconiosis in some countries are presented. Analyses are given of methods and preventive strategies applied in countries that successfully prevented pneumoconiosis and CWL in the 20ties century. Attempts are presented on how those preventive means and strategies may be applied among workers still exposed to high levels of the prime pneumoconiosis causing factors.
Although work related asthma has not been successfully prevented in any country, analyses are given on strategies for prevention of new future cases of cases of asthma resulting from work exposure.

ALLERGEN EXPOSURE AND THE DECLINE IN PULMONARY FUNCTION IN ALLERGIC ASTHMATIC WORKERS

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[ID 2186]

The decline in pulmonary function is a normal gradual feature of aging, but in asthmatics a more rapid progression is observed, likely as a consequence of the remodelling of the airways. There are contrasting data in literature about the effect of pharmacological treatments, first of all steroids, in moderating ventilatory function decline and also few studies have been made on the effects of allergen avoidance on this important aspect of the disease.
This report aims at evaluating the influence of therapeutic intervention and allergen exposure avoidance in the decline of pulmonary function in allergic asthmatic workers. To this purpose 24 patients were recruited and their pulmonary function was monitored along 14 years.
11 (group A) changed their work after the diagnosis of asthma was made, so preventing occupational allergen exposure. 13 (group B) continued with their occupation. All were pharmacologically treated according the international guidelines. Comparing spirometric indices along such period of observation (1991+-6 years until 2005), a significant reduction of Vital Capacity (VC) and FEV1 was observed, in all cases greater than that to be physiologically expected. Further, a significant greater reduction of CV and FEV1 was observed in group B respect to the group A at the end of observation. In particular, VC decreased of -200 +/-60 in group A and -335 +/-40 in group A (the difference reached the statistical significance: $p<0,05$) and FEV1 decreased of -315+/-70 and -485+/-90 respectively in group A and B ($p<0,01$).
The study shows the allergen avoidance is the most effective measure in preventing the decline in pulmonary function in asthmatic and underline the importance of allergic risk assessment and control in the treatment of asthmatic workers.

TRENDS IN WOOD DUST EXPOSURE AND RESPIRATORY SYMPTOMS IN THE DANISH WOOD WORKING INDUSTRY

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[ID 1295]

Introduction**:** In an ongoing study among Danish woodworkers we investigated the relation between wood dust exposure and respiratory symptoms in two cross sectional studies conducted 6 years apart. This abstract presents preliminary data on respiratory symptoms and exposure, comparing the two study populations.
Methods**:** 2.033 workers from 54 plants returned a questionnaire on respiratory symptoms in study one and 1.886 workers from 52 plants in study two. Exposure measurements were in both studies carried out using a personal passive dust monitor resulting in 1.687 personal measurements from 54 plants (study one) and 1.036 measurements from 41 plants (study two). In study two exposure measurements were performed on all "new" plants and a random sample of plants also participating in study one.
Results**:** No difference in smoking (47%) were seen between the two studies. Participants in study two were older (40 versus 36 years) and more women participated, 23 versus 18%. The prevalence of asthma symptoms, self reported asthma and doctor diagnosed asthma were equal in the 2 populations. A decrease in coughing during the day was seen among male non smokers and female smokers. A decrease in nasal symptoms was seen among all, significantly for male smokers and female non smokers. No significant differences were seen in inhalable wood dust levels between study one GM (GSD) 0.94 mg/m3 (2.1) and study two 0.96 mg/m3 (1.7). A significant increase in percentage of measurements being above arithmetic concentration 0.5 mg/m3 (9.8 versus 13.1%) and below 1.0 mg/m3 (50.1 versus 44.7%) was found.
Conclusion**:** The prevalence of nasal symptoms has decreased during the study period. The prevalence of coughing has decreased among male non smokers and female smokers. The overall wood dust concentration in the Danish furniture industry has not changed, but there are fewer subjects exposed.

THE WAY FORWARD; THE FUTURE OF THE WHO CC NETWORK ON OCCUPATIONAL HEALTH

INTRODUCTION TO THE 2006 – 2010 WORK PLAN OF THE WHO COLLABORATING CENTERS IN OCCUPATIONAL HEALTH

FINGERHUT M.

[ID 2575]

The Global Network of WHO Collaborating Centers in Occupational Health consists of about seventy occupational health institutes and organizations that are spread across the five continents. The Network includes the active participation of International Labor Organization (ILO) and of three non-governmental organizations (NGOs) with a formal relationship to the WHO occupational program: the International Commission on Occupational Health (ICOH), the International Occupational Hygiene Association (IOHA), and the International Ergonomics Association (IEA.) The Network brought to a conclusion the first common work plan covering 2001 – 2005 at the Seventh Network Meeting in Stresa, Italy in June 2006, and has developed the 2006 – 2010 Work Plan.

This presentation describes the evaluation of the 2001-2005 Work Plan and the development of the 2006 – 2010 Work Plan. The other speakers in this session will describe the intent and content of each of the six Activity Areas (AAs) that constitute this new Work Plan:

AA1: Global situation analysis
AA 2: Evidence for action, and national policies and action plans
AA 3: Practical approaches to identify and reduce occupational risks
AA 4: Education, training, and technical materials
AA 5: Development and expansion of Occupational Health Services
AA 6: Communication and Networking

The Collaborating Centers and NGOs have contributed multi-center projects that are expected to have substantial global or regional impact. The Activity Areas are led by Managers and Deputy Managers, whose time is contributed by the Collaborating Center.

GLOBAL SITUATION ANALYSIS

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[ID 2576]

One of the six activity areas of WHOs Collaborating Centre Global Workplan for 2006-2010 concerns a global situation analysis. It is summarised here.

Goal

The "Global situation analysis" will give a picture of how the ongoing globalization and changing employment patterns are influencing on the prerequisites for occupational safety and health. The analysis will allow the identification of actions to be taken considering in a creative way these changing prerequisites.

Brief description

The work will have three phases:

1. A description of the ongoing globalization and changing employment patterns.
2. An analysis of how these changes are influencing on the prerequisites for occupational safety and health.
3. The identification of actions to be taken, to consider in a creative way these changing prerquisites. The actions are related to and when possible and feasible integrated with the outcomes of other activity areas of the Global Workplan.

Organisational issues

The activities belonging to the first phase are carried out and terminated before June 2006. The activities are coordinated and supported by a temporary worktask group including Kaj Elgstrand, the Swedish National Institute for Working Life (coordinator); Marisol Concha, Asociación Chilena de Seguridad; Frank Pot, TNO, the Netherlands; and David Rees, the South African National Institute for Occupational Health. P.K.Abeytunga, the Canadian Centre for Occupational Health and Safety, is a consultant to the preliminary workforce group.

The methodology to be used and the projects to be included in the second phase will be drafted during the first phase and hopefully decided upon in June 2006. The "Global situation analysis" is by its nature a multi-centre project. The second and third phases offer possibilities for many WHO Collaborating Centres to participate.

PRACTICAL APPROACHES TO IDENTIFY AND REDUCE OCCUPATIONAL RISKS

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[ID 2578]

Over the years, a need has been identified through the work of the WHO's Network of Collaborating Centres in Occupational Health for practical procedures and tools for the management of occupational health and safety at work. Ideally, these should be capable of dealing with the differences that exist between countries, sectors and enterprises. It is clear that such procedures and tools should be suitable for use in developing countries and also in countries in transition as well as in small and medium-sized enterprises (SMEs). It is widely acknowledged that their conditions and needs differ markedly from those of developed countries or larger organisations.

Through the Network's new work plan for 2006-11, Activity Area 3 has been devoted to the development of 'Practical Approaches to Identify and Reduce Occupational Risks'. It involves a number of Collaborating Centres and NGOs and it is envisaged that its programme of work will feed into the next work plan of the Network. The goal of Activity Area 3 is to improve working conditions through the development and implementation of simplified risk reduction tools and methods.

This Activity Area aims at the development of tools and methods for the management of occupational risks that will be useful globally and especially in contexts where expertise is missing, such as SMEs and developing countries. Projects will address such issues as chemicals, silica, ergonomics, safety and psychosocial hazards, and will focus on sectors such as construction, healthcare and agriculture. It is hoped that through this Activity Area at least four toolkits will be developed and evaluated that will enable the development and dissemination of case studies and success stories.

GEOLIBRARY.ORG: A GLOBAL ELECTRONIC LIBRARY OF EDUCATION, TRAINING AND TECHNICAL MATERIALS IN OCCUPATIONAL AND ENVIRONMENTAL HEALTH

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[ID 1010]

The training of occupational safety and health professionals in the developing world is one of the priority areas under the World Health Organization (WHO) Collaborating Centres' Work Plan to achieve the WHO goal of "Occupational Health for All." The obstacles to training include lack of in-country training programs, lack of training materials, costs of receiving training, and intellectual property protection of many training materials. The internet provides a mechanism for occupational safety and health practitioners to rapidly access and download digitized training materials for self-instruction or training of others. Under the auspices of the WHO Occupational Health program, and with support from the Abbott fund and U.S. government grants, we have developed a global electronic library of training materials in occupational and environmental health. The key features of this library include: 1) access is free; 2) available training materials are in the public domain; 3) the interface is in six languages (English, French, Spanish, Russian, Arabic, and Chinese); 4) it has an easy to follow, branching index; and 5) it is searchable. Training materials are placed in the library through a network of local administrators, which include WHO Collaborating Centres in Occupational Health, national institutes, university programs, and non-governmental organizations working in the fields of occupational and environmental health. The library can be accessed on the internet at www.geolibrary.org.

DEVELOPMENT AND EXPANSION OF OH SERVICES

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[ID 2579]

Only 25 nations have ratified the International Labour Organization's Occupational Safety and Health Convention No. 161 of 1985. The coverage of occupational health services is still low: only about 15% of the world's 2.9 billion workers have access to occupational health services. Does this mean that occupational health services are unnecessary? On the contrary, the need is greater than ever. One third of the workforce in industrialized countries and two thirds in developing countries face physical, chemical, and ergonomic hazards at work. Work related stress, depression, and suicide rates are rising. Each year, two million fatalities take place worldwide due to work related diseases and injuries. The international community is challenged by communicable diseases such as HIV/AIDS, SARS and bird influenza. Unhealthy lifestyles, drug abuse, and excessive use of alcohol and tobacco pose a threat to future generations. Total costs of work accidents and diseases amount to 4% of Gross National Product.

The challenge is huge, but we must intensify our efforts in establishing a strong health and safety culture in the society and workplaces. The biggest gains are achieved by improving the health of people in the poorest countries, lowest social groups, and smallest firms. In order to accomplish this, it is necessary to

- increase social dialogue about health, safety and wellbeing of citizens
- build consistent health policies, regulations, and programs;
- mainstream occupational health and safety into education on all levels;
- provide affordable and accessible occupational health services;
- use economic incentives;
- improve efficiency, quality, follow-up, and evaluation of occupational health services;
- increase the number of educated professionals in occupational health services; and
- provide access to safety and health information and tools.

It is pertinent to strengthen the link between occupational health services and primary health-care. Better results can be expected by increasing collaboration between management and safety organisations within companies, labour and factory inspection, social security, and educational systems. In addition to this systematic top-to-bottom approach, occupational health services can benefit greatly from local and micro-level social innovations.

The problems we are facing are closely intertwined and reach across borders. Well-intentioned global policies and strategies are ineffective if countries fail to implement them on a national level. WHO Collaborating Centers will launch a series of multi-country projects to strengthen the occupational health services, to develop service models and good practices and to double the number of workers who have access to occupational health services by the end of 2015. Decent work, good health, and economic stability are dreams shared by workers young and old. Merely providing economic incentives is never enough if the safety and health of the work place cannot be guaranteed. Money is no compensation for work that takes away a person's health.

OCCUPATIONAL RURAL HEALTH PERSPECTIVES IN THE GLOBALIZED WORLD - THE SITUATION

OCCUPATIONAL HEALTH AND SAFETY IN AGRICULTURE IN SEE

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[ID 2269]

Occupational health and safety (OHS) in agriculture in SEE countries almost did not exist before 1940. After the second world war, in most of SEE countries communist regimes organized agriculture and later OHS. In that period, a huge state owned agricultural enterprises with a number of workers were established. The second way of organization was agricultural collectives (within the local communities) and third one, individual properties, was for people who did not want to join collectives. In period between 1950 and 1990 workers in agricultural enterprises were rather well protected. Almost every agricultural enterprise in SEE had a person responsible occupational safety and all had a contract with a local occupational health service. Workers in agricultural collectives did not have so good protection but still most of them got some occupational safety education and information's, especially on pesticide toxicology, from collective agronomist. The third group, individual agriculture workers did not have any contacts with OHS. After fall of communist regimes in SEE countries, in some countries even before it, the agricultural collectives dissolved, and most of agricultural workers became independent. In the same time, the agricultural enterprises begin to loose their economic power and, as usual, the OHS were first on the list for spare money. Nowadays, the situation is almost the same, but in some countries (Croatia, and gradually in Bulgaria, Serbia and Macedonia) agricultural enterprises after privatization become economically viable and that caused increased investment in OHS. Individual agricultural workers in SEE countries are still without any contacts with OHS. The only improvement is that nowadays they are getting more and more information's on safe work with pesticides from local plant protection experts.

Based on presented situation it is obvious that SEE countries have to make an effort to improve OHS of all agricultural workers with particular attention to individual agricultural workers.

CONTRIBUTION OF THE APROCHE ECOSYSTEMIC TO HUMAN HEALTH FOR THE POVERTY REDUCTION AND THE PREVENTION N URBAN AGRICOLTURE

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The constraints of urban agriculture development have consequences on the life quality and on the urban environment. Therefore it does not constitute a completely satisfactory exit in the campaign against the poverty in urban environment. Our ecohealth team experiments how by THE ECOSYSTEMIC APROCHE TO HUMAN HEALTH, we can prevent occupational risks and by the way contribute to the reduction of the poverty.

Specific objectives:

- To describe the system of market garden production in Cotonou.
- To estimate the quantities of pesticides manipulated by the market gardeners according to their nature, to the period of use and their sources of supply.
- To determine the level of the ground, water, and market garden products contamination, by organochlorides and organophosphorus pesticides.
- To determine the frequency of clinical signs with the market gardeners, the workers and the dealers, and to establish their link with the market gardening (salmonella poisoning, shigellose, taeniasis etc.)

Methodology

This study had for frame the site of market gardening situated along of the airport of Cotonou.

The team led there a descriptive and analytical study which takes into account all the target populations concerned: the market gardeners who are the owners of the cultivated boards, the workers and the dealers.

The data collection was made by discussion of group, by interrogation, clinical exam and biological exams focused on the impact of pesticides. The research of pesticides residues in fruits and produced vegetables were also made.

Results

The majority of owners do not possess an atomizer and they spread their pesticides using watering cans. That technical exposes them more to the inhalation of a big quantity of pesticides.

Sanitary statute of the market gardeners

-Direct exam of the taken saddles with the Kato Katz's technical indicates a relatively high frequency of the intestinal amoebiasis with the market gardeners (20,7 %) and with the workers (23,7 %). These frequencies are due probably to the lack of dietary hygiene of the developers.

Certain risk behaviours expose all the time the market gardeners and the general population: Absence of latrines, absence of drinking water lack of physical hygiene, the rinsing of vegetables with soiled water.

Some residues of organochlorides pesticides were found at limit rates in some market garden products.

Conclusion:

The living conditions and production conditions carried to a cytobacteriological contamination of vegetables rinsing waters and poisoning of the actors. The project already focuses on the search for ways to improve productivity and guarantees the quality of fruits and vegetables sold in Cotonou.

OCCUPATIONAL HEALTH AND SAFETY IN AGRICULTURE IN MALAYSIA

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Malaysia, covering an area of about 330,242 km2 is situated in South East Asia and is made up of Peninsular Malaysia and Sabah and Sarawak on Borneo Island. Land usage for agricultural purposes are about 53,904 square kilometres or about 16% of total area. Agriculture is one of the most hazardous workplaces in the country and had the second highest accident rate of all industry. Along with manufacturing, trading, forestry and fishing, it contributes to approximately 72% of the industrial accidents that are reported to the Social Security Organization. Most of the Malaysian plantation industry such as oil palms and rubber are tree crop based. Each crop has its peculiar hazards. Occupational safety and health standards in the plantation industries are poor compared with other sectors of the economy. Similar situations exist with regard to workers handling pesticides and other field implements. Worker's poor understanding of health and safety aspects of work resulted in the high incidence of accidents in the plantation. Fieldwork involving machinery and implements is also an important risk area in plantations. There is also wide use of pesticides, herbicides and fungicides in all agricultural sub-sector that carry high risks. Employers who engaged workers on a contract basis usually leave the responsibility of occupational safety and health to the contractors. Work in rubber factories, palm oils mills and other agricultural processing plants is relatively better organize, compared to field operations. The Occupational Safety and Health Act and the activities of the Department of Occupational safety and Health have improved standards at these workplaces. However there is still need for further improvements, especially through education programmes and the training of workers to be safety conscious. Efforts for co-operation between different ministries also need to be increased.

EXPOSURE TO PESTICIDES IN A BANANA PLANTATION AND HEALTH EFFECTS IN ECUADOR

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Ecuador is the biggest producer of banana in the world. Around 300.000 people work in those plantations, of different size. To produce banana some organophosphates and carbamates are used with manual equipment (backpack) or application with airplanes. Some of these agrochemical products like chlorpyrifos, carbofuran, ethoprop, are well known for neurological and neurobehavioral effects. This substances are used not only during application, but also in the bags that the producers use to protect the banana fruit from pests or before packing it to be exported.

A survey for 75 workers of one medium size banana plantation was carried out in the Guayas province.

The exposure was assessed using results of the fluorescent tracer technique, an interview, and some observational activities, to establish dif-

ferent levels, and getting a urine sample to look for metabolites of some pesticides.
These workers, with different working time and working in different workplaces was studied with a questionnaire, Erytrocyte Acetylcholinesterase, reaction time, peripheral sensitivity and tremor.
The results of the study showed a permanent contact of this workers with pesticides coming from manual and aereal application. Also water of the channels along the plantation and soil are permanently polluted by applications. Workers have not safety measures, specific personal protection equipment or working clothes.
Many workers and their families also are living around the plantation close to it and they also received the influence of application at home.
A high frequency of neurological symptoms, and signs, changes in the reaction time and different levels of lower peripheral sensitivity was found. Tremor is another important sign.
Results of metabolites in urine are in process.
These findings indicate that exists and important exposure of banana workers and that it is necessary to develop preventive programs to avoid health effects as here are presented.

OCCUPATIONAL HEALTH AND SAFETY IN AGRICULTURE IN JAPAN

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[ID 2225]

Japanese agriculture is facing a turning point both on the aspect of socio-economical and of safety and health situation. Characteristics of occupational health and safety in agricultural sectors in Japan are summarized as follows.

1) Socio-economical situation

The agricultural population is decreasing at less than 10% of total population in Japan. The gross production of agriculture is 3% of total productions in Japan. The agricultural management is strongly influenced by globalization of agriculture.

2) Work and work environment

Japanese agriculture is mainly characterized as to introducing some facilities, such as plastic greenhouse and confinement leading to closed agricultural work environment, highly mechanization, usage of agricultural chemicals, taking urbanization for their lifestyles. Those changes are leading to changes of work mode, environmental work conditions and exposure to harmful substances.

3) Actual state of safety and health conditions in Japanese agricultural workers

Changing agricultural situation as above mentioned develop safety and health problems in agricultural workers such as chronic and static fatigue and stress and stress induced diseases, muscle and skeletal disorders, allergies and respiratory disorders, chemical poisonings, agricultural accidents and lifestyle-induced diseases.

4) Control systems of safety and health for Japanese agricultural workers

Although Japan has some established systems for keeping safety and health of agricultural workers, such as the division of welfare in Federation of Agricultural Cooperative Association (JA) and agricultural extension center in Ministry of Agriculture and Forestry, those organizations don't work completely and effectively to keep agricultural workers' safety and health well. We have no specified Laws and regulations for prevention of agriculture-related diseases and accidents

OCCUPATIONAL HEALTH AND SAFETY IN AGRICULTURE IN THE BALTIC STATES

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Agriculture is a hazardous industry worldwide with above average rates of work injuries and occupational diseases. Since 1990 agriculture of the Baltic states (Estonia, Latvia, Lithuania) has changed from a state controlled economy with collective farms to a market economy. Former occupational health and safety (OH&S) systems were dissolved and new ones are still in a stage of building and restructuring.
In 2002 the rate of fatal work accidents per 100,000 workers were (Finland for comparison); Finland 1.8/0.0 (all industries/agriculture), Estonia 6.0/7.7, Latvia 6.9/65.8, Lithuania 8.1/22.6. The rates of non-fatal work injuries per 1,000 workers were: Finland 27.9/30.0, Estonia 5.3/5.1, Latvia 1.7/8.2, Lithuania 2.5/2.5. It thus appears that non-fatal work injuries are remarkably underreported.
The same is true for occupational diseases. Many workers ask physicians not to report an occupational disease because of fear of loosing job. Much of the work-related morbidity is hidden in the general morbidity statistics.
Rapid assessment of OH&S in Estonian agriculture and discussions about its results with Latvian and Lithuanian experts justify the following statements for OH&S in agriculture in the Baltic states: low interest of politicians, lack of services and other systems, low awareness of hazards, lack of reliable statistics, lack of systematic studies, lack of guidelines, advice and support.
Research has not addressed OH&S in agriculture of the Baltic states. Hence details about the nature and extent of work-related ill-health remain unknown. Perhaps this is why OH&S in agriculture has thus far generally been neglected by politicians and decision makers.

DIOXIN EXPOSURE AND HUMAN HEALTH 30 YEARS AFTER THE SEVESO, ITALY ACCIDENT IN 1976

THE SEVESO ACCIDENT

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[ID 2525]

The accident that occurred near the town of Seveso, Italy in 1976, caused exposure to 2,3,7,8-tetrachlorodibenzo-para-dioxin (TCDD or dioxin) in a large population. The sudden release from a trichlorophenol manufacturing plant of a cloud of chemicals gave immediate signs of hazard: vegetation, birds, courtyard animals and people were seriously affected. The presence of TCDD as the main component of the toxic cloud was made known 10 days after the accident. Fear for the health of local residents was justified by the known high toxicity of TCDD in animals and its ability to cause cancer in experimental conditions. Little was known, instead, at that time, about its effects on human beings, especially after environmental exposure. In the emergency situation following the accident, health authorities and researchers were confronted with three main problems: ascertaining the nature and characteristics of the exposure, the extent of contamination, and the number of people involved; managing the risk with preventive measures for people and the environment; planning and conducting health surveillance programs. The examination of the early and mid-term effects was anything but simple in the complex post-accident situation. Selective participation, lack of reference data, limited standardization of methods and performances were common problems, and therefore many studies yielded inconclusive results. Long term studies were designed later and were less affected by those constraints. The disaster experience with its burden of psychosocial stressors exposure probably interacted with TCDD in determining certain health effects (e.g, ischemic heart disease). The challenge taken 30 years ago is still open: follow-up studies are continuing and a number of molecular epidemiology investigations are under way. These will probably contribute to bridging the existing gap in knowledge about human toxicity of TCDD and about long term effects on human health of chemical accidents.

RISK CHARACTERIZATION OF DIOXINS

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2,3,7,8-Tetrachlorodibenzo-*p*-dioxin (TCDD; "Dioxin") is the most toxic member of a family of structurally related compounds which are ubiquitous environmental pollutants. The most potent of these, the polyhalogenated dibenzo-*p*-dioxins and furans, were never produced intentionally, but are unwanted contaminants of certain industrial and combustion processes. The polyhalogenated biphenyls, napthalenes, and azo- and azoxybenzenes were made commercially, and specific isomers are dioxin-like in their properties. The major new sources of PCDDs and PCDFs today are uncontrolled incineration and other combustion processes. Other sources include metal refining and reservoir sources. Deposition worldwide is associated with atmospheric transport of new emissions as well as environmental recycling of contaminated soils and sediments. Their resistance to physical, chemical, and biological degradation has resulted in extreme persistence and biomaganification up the food chain.

Dioxins induce a broad spectrum of biological effects in multiple species mediated by a highly conserved cellular regulatory protein, the Ah receptor. Adverse effects in reproduction of fish, birds, and mammals in the wild have been linked to exposure to this class of chemicals. Poisoning incidents have led to loss of domestic animals including chickens, cattle, and horses. A plethora of effects have been observed in laboratory animals, ranging from lethality to subtle biochemical responses. Many of the effects are widely distributed, while others are more species, sex, organ, tissue, or age specific. Dioxin has been shown to immunotoxic, neurotoxic, developmentally toxic, hepatotoxic, dermally toxic, a reproductive toxicant, and carcinogenic. Similar effects have been reported in people. Although body burdens are decreasing, there is little margin of exposure. (This is an abstract of a proposed presentation and does not necessarily reflect EPA policy.)

DIOXIN OCCUPATIONAL EXPOSURE AND HEALTH EFFECTS

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[ID 2527]

In 1997, the International Agency for Research on Cancer (IARC) classified TCDD as a group 1 carcinogen based on limited evidence in humans, sufficient evidence in animals and mechanistic data indicating the involvement of the Ah receptor present in both humans and animals. The IARC evaluation was mainly based on four highly exposed industrial cohorts with a well characterized exposure (Fingherut et al 1991, Hooiveld et al 1996, Becher et al 1996, Ott and Zober 1996) along with the Seveso cohort (Bertazzi et al 1996). The strongest evidence was seen for all cancers which showed an increased risk in all four industrial cohorts. A positive exposure-response was observed in two of them. Results by specific cancer sites were less consistent. Noteworthy were the increased risks for lung cancer and Non-Hodgkin's lymphoma in the highly exposed subcohorts. Since the IARC evaluation, new data have been published that seem to strengthen the previous evaluation. In particular, further dose-response analyses have been performed in three industrial cohorts (NIOSH, Dutch and Germany cohorts) showing a positive trend for all cancer and a meta-analysis of these same cohorts confirmed a positive and significant trend. (Crump et al, 2003).

TCDD has been also implicated as a possible cause of heart diseases. An increased risk from ischemic heart disease was showed in most of the industrial cohorts with the evidence of dose-response relationship. Plausible mechanisms exist for an effect of TCCD on cardiovascular disease, mainly by an alteration of lipid metabolism, although other mechanisms such as functional disturbances, atherosclerotic lesions have been suggested. Results on the risk of diabetes in occupationally exposed subjects are still inconsistent.

MORBIDITY FOLLOW-UP AND ENDOCRINE DISRUPTION OF EXPOSED SUBJECTS

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[ID 2528]

We monitored (from 1976 to 2005) thousands of people affected by the fallout of TCDD over Seveso on July 10, 1976. Serum samples have been kept frozen and it has been possible after 1988 to measure the TCDD blood lipid content.

The results indicate that:

- Chloracne was the only clinical alteration which partly correlated to TCDD contamination levels, with differing individual susceptibility;
- Miscarriages, perinatal mortality, low birthweight, or congenital malformations did not significantly increase;

Part of the exposed subjects were controlled from 1992 to 2005. The results showed that:

- No pathological laboratory results were related to TCDD levels
- The half-life of TCDD was longer in women (about 9 years) than in men (about 7.5 years), and much shorter in children.
- A doubled, non-significant risk for endometriosis among women with serum TCDD levels of 100 ppt or higher.
- Among premenarcheal women serum TCDD level was associated with a lengthening of the menstrual cycle by 0.93 days.
- A skewing of the sex ratio at birth with an excess of females ($p<0.001$) from parents exposed to TCDD was observed and it was permanently related only to exposure of the father.
- Developmental dental aberrations were registered associated with childhood exposure.

MORTALITY FOLLOW-UP OF THE EXPOSED POPULATION

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[ID 2529]

On July 10th, 1976 an accident occurred in a plant producing trichlorophenol, with subsequent release of substantial amounts of 2,3,7,8-tetrachloro-dibenzo-p-dioxin (TCDD) and contamination of a vast area in a zone

north-west of Milan, Northern Italy. Three areas were delimited with different soil TCDD pollution levels: A (very high), B (high), R (low). Several epidemiology (mortality, cancer incidence, molecular) studies are in progress to evaluate long-term health consequences. The main finding of the cancer incidence (1977-1991) and mortality (1976-1996) studies was an increase in lymphatic and hematopoietic cancers among both genders in the most polluted zones; other cancer (lung and rectum in males) and non-neoplastic disease risks (diabetes, respiratory, cardiovascular) showed increases. We updated the mortality follow-up through 2001.
The Seveso cohort includes 278,000 subjects of 11 municipalities, resident at the time of the accident (present), or immigrated or born in the decennium after the accident (non-present); the number of inhabitants was 800 in Zone A, 5,900 in Zone B, 38,600 in Zone R, and 232,700 in non-ABR, a surrounding non-contaminated zone chosen as reference. Follow-up was performed using different means including: direct search in the vital statistics offices of the 11 municipalities; record-linkage with population and mortality databases of Lombardy Region and Lombardy Local Health Units; postal follow-up for subjects migrated out of the region. We used Poisson regression to compute rate ratios (RR) adjusted for age, separately for presence at the accident and gender. Follow-up was over 99% complete; as of 2001 the total number of deaths was 47,592 (25,007 males, 22,585 females). Overall mortality in zones A (121 deaths), B (811), and R (6,307) was not elevated in comparison with the reference. Collection and coding of causes of death are in progress; detailed results for selected causes of death will be presented.

SEVESO WOMEN'S HEALTH STUDY: A STUDY OF TCDD AND REPRODUCTIVE HEALTH IN A FEMALE COHORT

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2,3,7,8-Tetrachlorodibenzo-*para*-dioxin (TCDD) is a known carcinogen and endocrine disruptor. Animal studies have reported reproductive health effects following *in utero* or postnatal TCDD exposure, although there are few studies conducted to confirm these findings in humans.
In 1976, a chemical plant explosion in Seveso, Italy exposed the nearby residents to the highest exposure to TCDD known in humans. Twenty years later, we initiated the Seveso Women's Health Study (SWHS), a retrospective cohort study, to determine whether exposure increased risk for reproductive disease. Women eligible for the SWHS were ≤40 years in 1976, had resided in one of the most highly contaminated zones (A or B) and had stored sera collected soon after the explosion. Participation included venipuncture, interview, pelvic examination and ultrasound, and completion of a menstrual diary. Individual serum TCDD exposure was measured by high-resolution/mass spectrometry.
Between 1996-1998, we enrolled 981 women (M=41 years). The median serum TCDD was 55.8 ppt, (range: 2.5 - 56,000). We found no association of $\log_{10}$ TCDD with spontaneous abortion (aOR= 0.8, 95% CI = 0.6, 1.2); birthweight (adjusted beta = -4 grams, 95% CI = -68, 60); or small for gestational age births (aOR = 1.2, 95% CI = 0.8, 1.8), although associations were stronger for pregnancies within the first eight years. For those women who were premenarcheal at explosion, $\log_{10}$ TCDD was associated with a 0.93-day increase (95% CI = -0.01, 1.86) in menstrual cycle length. For those <5 years at explosion, there was a somewhat greater risk for earlier menarche (HR = 1.2, 95% CI = 0.98 – 1.6). We reported a doubled, non-significant, risk for endometriosis among women with TCDD levels≥100 ppt, a doubled risk (HR=2.1, 95% CI =1.0, 4.6) for breast cancer, a non-monotonic dose response relationship for earlier age at menopause, and a decreased risk for fibroids.

T(14;18) TRANSLOCATIONS IN LYMPHOCYTES OF HEALTHY DIOXIN-EXPOSED INDIVIDUALS

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[ID 2531]
The incidence of non-Hodgkin's lymphoma (NHL) has steadily increased over the past two decades in Western countries. The etiology of the most common NHL types remains elusive. Dioxin exposure has been associated with Non-Hodgkin's Lymphoma (NHL) in epidemiological investigations. The NHL-related t(14;18) translocations can be detected at a low copy number in lymphocytes from healthy subjects and exposure to NHL-associated carcinogens, such as dioxin, polychlorinated byphenyls or pesticides, may cause expansion of t(14;18)-positive clones. We investigated prevalence and frequency of circulating t(14;18)-positive lymphocytes in 144 healthy subjects from the population exposed to dioxin after the Seveso, Italy accident of 1976. t(14;18) was measured in DNA from peripheral blood lymphocytes by high-sensitivity Real-Time Quantitative PCR. The amplification products of all t(14;18)-positive samples were analyzed by agarose gel electrophoresis to identify samples with more than one t(14;18)-positive clone. Plasma 2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD) was measured through GC-MS (TCDD range: <1.7-475.0 ppt). We found an increased frequency of t(14;18) translocation-positive cells with increasing plasma TCDD. Among t(14;18)-positive subjects (n=50; 34.7%), the mean number of t(14;18) translocations/10^6 lymphocytes was 4.2 (95%CI 2.9-6.2) in subjects with plasma TCDD<10.0 ppt, 8.1 (95%CI 4.9-13.3) in subjects with plasma TCDD between 10.0-50.0 ppt, and 12.5 (95%CI 7.4-21.1) in subjects with plasma TCDD between 50.0-475.0 ppt (p-trend=0.003). Past history of chloracne was associated with neither t(14;18) prevalence (p=0.77) nor the frequency (p=0.84). As expected, t(14;18) frequency was associated with cigarette smoking and was highest in subjects who smoked for 16 years or more (mean=12.6, 95% CI 7.4-21.3, p=0.01). No significant association between t(14;18) and age was found. Our results show that dioxin exposure is associated with increased numbers of circulating t(14;18) positive cells. Whether this change in t(14;18) frequency is an indicator of elevated lymphoma risk remains speculative and needs further investigation for its potential impact on public health.

NEONATAL THYROID FUNCTION AFTER IN-UTERO EXPOSURE TO DIOXIN IN SEVESO

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Experimental data showed the ability of 2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD) to cross the placenta and cause primary hypothyroidism, with increased TSH levels in newborns. No data are available on human population. The Seveso accident caused TCDD contamination of a large population. Twenty years after the accident, persistently high plasma TCDD levels were observed in subjects from the highest contamination zones (A and B), particularly in women. We conducted a population-based study on 1772 exposed women in fertile age from zone A and B (date of birth between 1948 and 1979) and 1772 age-matched women randomly sampled from the surrounding non-contaminated area. From local Population Registry Offices (PROs) demographic data of children born between January 1994 and June 2005 were obtained for 99.4% of the exposed (n=1,761) and non exposed women (n=1,762). We matched these data with the Lombardy Region TSH Neonatal Screening Laboratory active since 1994 in routinely measuring TSH level in all children born in Lombardy. TSH has been measured using standardized procedures on blood taken between 73-120 hours after birth by means of the 1235 autoDELFIA® automatic immunoassay system. 159 out of 1280 children were excluded because born outside of the Lombardy Region. Preliminary results showed higher TSH levels in children born to exposed women. Mean TSH was 2.27 µU/ml in newborns from zone A (n=45), 2.17 µU/ml from zone B (n=378) and 1.58 µU/ml from the non contaminated area (n=450) (p-trend=0.003). Our preliminary data suggest that in-utero exposure to high TCDD level can impair thyroid function in newborns.

NEW CHALLENGES TO OCCUPATIONAL HEALTH SERVICES:BRIDGING ECONOMIC AND SOCIAL DEVELOPMENT

ROLE AND EXPECTANCIES OF EMPLOYEE RELATION FUNCTIONS

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[ID 2535]

With the Agreement on International Industrial Relations and Corporate Social Responsibility, signed with Icem and Fulc, Eni has created a dialogue with unions at a global level, in line with the international growth process. With the Agreement, a commitment has been made to respect human rights and social rights found in international conventions, achieving a constant exchange of information, in order to improve and promote good labour practices and industrial relations, practices that are emerging more conspicuously at each annual meeting. In addition, for the management and prevention of social conflict, the Agreement has collected reports of sporadic critical cases, mostly related to external factors that are socio-environmental.

ENI'S COMMITMENT

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[ID 2536]

Eni was born 60 years ago from the Italian National Agency for Energy. Now it is an International corporation traded on Milano and NY stock exchange, present in more than seventy countries and with a workforce of more than seventy thousand employees. Its main business and activities are oil and gas exploration, production, refining and marketing, engineering and construction, and petrochemicals. The corporate commitment in protecting health and safety of its workforce, the environment and communities is strong and is dating since the beginning of its life. The goal of the corporate health management system is to guarantee safety and health not only to its staff and dependents at workplaces, but also to local communities, contractors and clients, as well as contributing to the social development of neighboring communities, in respect of good principles of sustainability. In providing health services worldwide, the major issue for a company is to ensure a minimum standard of quality everywhere, mainly when operating in different contexts, where geographical distances are as wide as the cultural ones and it is often difficult to establish common reference models. Business units and operational sites in Italy and overseas develop their own local health plans and programs in compliance with the Corporate guidelines. The application of the Deming circle to the health management system, (in planning, doing, checking and acting), is an effective tool for ensuring a continuous improvement of the quality. A continuous auditing program, carried out by the corporate HSE department over the operational units, is the best way to verify and promote the compliance to the common policies and strategies. The Company's medical and paramedical staff worldwide is from different education, professional experience and culture. New information and communication technologies are a powerful tool to spread common basic knowledge and to get homogeneous, standardized and reliable professional behavior, consistent with the company business needs and objectives, from this variegated population, The aim of Eni's e-medicine project is to spread a corporate reference model and to give support to the remote physician, positively acting on his condition of cultural and professional segregation. Sharing personal medical files and information in convenient form in compliance with individual privacy regulations, is a main operational issue for health management, considering the high mobility of the workforce. Providing the surplus of these same technologies in support of local projects of co-operation in the health sector is possible and will help the Company in its relationship with the community.

CORPORATE MEDICAL DEPARTMENTS: A PERSPECTIVE ON GOING FORWARD

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[ID 2537]

Corporate medical departments face may challenges as they attempt to keep its workers safe. This can be accomplished through strong internal programs which incorporate technology, education and occupational health control programs. The ExxonMobil Medical Department utilizes several tools for meeting this challenge. Strategic Health Management and Health Impact assessments serve as guides in addressing local issues, while the Clinical Center of Excellence (CCOE) addresses more global issues. The CCOE serves as an internal think tank to help meet future organizational needs and a clearinghouse for the globalization and harmonization of new and old programs. The CCOE obtains its direction by evaluating evidence-based medicine strategies, gathering and assessing other pertinent data and analyzing organizational and occupational health trends.

OCCUPATIONAL HEALTH IN THE WORLD'S FRONTIER AREAS

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[ID 2538]

Frontier area: Geographic areas that, due to it's natural and climatic characteristics , inaccessibility, culture, political and/or socio-economical conditions, are difficult to reach and perhaps even more difficult to leave. The growing demand for energy moved the classic frontiers of underground's exploitation towards the emerging countries and boarders always nearer to the limits of liveability, creating new occupational diseases. These least ones have changed the typology of risks linked to the Oil and Gas business "inviting" the Occupational Health toward the world's frontiers. Decades ago, facing medical problems, ENI Group decided to bring direct help to all those working in troubled areas, setting up medical posts, organized mainly for emergency interventions or urgent health related needs, inside the working camps. Than, few years ago, the turning point or, perhaps, the evolution: export to the frontier areas the Occupational Health Model. With determination and swiftness it has been decided to adopt a health model that would consider general principals of best medical practice and all the rules of the Occupational Health. A valuable and difficult job of experiences' and professional competences' migration, that had to regard different levels of risk, was directed towards the frontier areas in order to create an individual's health protection network regardless the race, origin, culture or nationality of the employee.

There were five foundations that have characterised our application program:

1- work risk analysis
2- country risk analysis
3- definition of a tailor-made health protocol for the two risks
4- creation of a software for the health data management and follow up of the employees
5- creation of a teaching method directed towards the training of medical personnel and growth of the "prevention culture" among the employees.

THE CHANGING THREAT OF TROPICAL INFECTIOUS DISEASES

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[ID 2539]

Until the end of the '70s, infectious diseases appeared to be a receding threat. But the events of the 1980s and 1990s have squashed this optimism. The emergence of HIV/AIDS, the spread of drug resistant strains of *Plasmodium falciparum*, *Mycobacterium tuberculosis*, and *Staphylococcus aureus*, and the resurgence of malaria and other vector-borne diseases in once-controlled areas, have created new public health challenges.

At the end of the 20th century, the demographic growing, the political and ethnic conflicts, the trends towards urbanization, higher-density settlements, and mass, rapid intercontinental travel are just some critical issues creating the ground for setting the scene of different patterns of transmission of microbial agents.

Among infectious diseases in Sub-Saharan Africa, the spread of AIDS, malaria and tuberculosis is strictly linked to the poverty of the populations at risk. Projections to 2015 indicate that the burden from those diseases

can only be alleviated if the amount of research and development investment and financial contribution to the control projects by donor countries are significantly increased.

DISTANCE LEARNING AND CONTINUOUS EDUCATION PROGRAMMES

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[ID 2540]

Distance education via the Internet provides opportunities for delivering consistent academic, professional development and workforce training to individuals regardless of their location. These same technological resources provide consistent training and education for all employees, regardless of location will also support collaboration, communication and assistance in transitioning families and dependents. The ROI on such initiatives can achieve enhanced productivity by individuals, cost savings for training delivery and enhance competitive market position. A business case presentation will highlight these multiple uses of distance education resources.

RECENT ADVANCES IN THE TOXICOLOGY AND EPIDEMIOLOGY HEALTH EFFECTS OF NICKEL

RECENT ADVANCES IN THE TOXICOLOGY AND EPIDEMIOLOGY OF NICKEL

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[ID 2028]

The main health effects of concern regarding occupational exposures to nickel substances are respiratory cancer and non-cancer effects, and reproductive effects. Different forms of nickel have different physicochemical and toxicological properties. For this reason, speciation of nickel exposures is critical and health effects associated with exposures to the main groups of nickel substances need to be considered. For each health effect of concern, the latest results from human and animal studies will be reviewed and possible approaches to derive OELs based on these data will be discussed.

Workers employed in the production of nickel from sulfidic ores have shown an association between inhalation exposure to certain levels of nickel compounds (mixed nickel species inherent to the processing of nickel ores) and increased risk of respiratory tumors. No such association was observed for metallic nickel. Likewise, epidemiological studies of workers employed in the smelting and refining of lateritic ores or in nickel-using industries have not shown increased respiratory cancer risks.

Studies in animals have indicated that toxicity effects on the lung and nose can be observed after inhalation of nickel compounds. The potency to induce these effects varies among nickel substances. There are a few reports of asthma cases associated with inhalation exposure to water soluble nickel compounds in the plating industry. At present, there is no nickel data that can be used to set a limit value based on respiratory sensitization.

Adverse reproductive effects (perinatal mortality) have been seen in female rats ingesting a water soluble nickel compound (NOAEL = 2.2 mg Ni/kg bw/day). No impairment of fertility, libido, gestation, or induction of fetal malformations was observed. Some adverse effects on sperm quality have been reported at higher exposure levels. A reproductive study of refinery workers in Russia is ongoing.

NEW CHALLENGES FOR HEALTH SURVEILLANCE AND BIOLOGICAL MONITORING IN NICKEL WORKERS

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[ID 2075]

Occupational physicians are facing new challenges when designing and implementing health surveillance programs for workers occupationally exposed to nickel. Modern workplaces have changed workers exposure scenarios: they often no longer conform to predictable worker routines with typical occupational exposure scenarios that can be related to occupational exposure limits(OELs), as measured using 8 hour time weighted averages. Job rotation, extended work shifts , the influence of personal protective equipment on workplace exposure, a trend to job mobility and career changes, all add new perspectives on working life time occupational exposure scenarios and health risks. Similarly, new data has led to proposed revisions of nickel OELs and in addition a wider range of health end points will need to be assessed. Respiratory cancer, non cancer respiratory end points are the inhalation risks , whilst dermal sensitisation and possible systemic effects such as reproductive toxicity need to be considered. The following questions are raised:

- Who should be in health surveillance programs?
- What tests should be recommended? How often?
- When should biological monitoring be used?
- What reference values should be used in biological monitoring?
- How does the health surveillance data and biological monitoring data help develop foetal protection polices?
- When can workers exit health surveillance programs?
- How best can data be presented from such programs, to ensure adequate workplace controls are put in place and maintained?
- Will predictive tests be available for future programs?
- Will further epidemiology data become available to refine our knowledge and ensure the safe use of nickel?

An evidence based approach, supplemented by practical experience will be presented together with some business consequences and some difficult dilemmas.

AN ASSESSMENT OF DERMAL NICKEL EXPOSURES IN PRIMARY PRODUCTION AND PRIMARY USER INDUSTRIES

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[ID 2122]

The aim of this study was to measure the levels of nickel in the skin contaminant layer of nickel workers, for regulatory risk assessment purposes. Dermal exposure samples were collected using a validated removal method, (moist wipes) to recover nickel compounds from defined areas of skin. The wipe samples were treated with ammonium citrate to simulate human sweat and dissolve any soluble nickel species. The solutions were separated from insoluble material and analysed using Inductively Coupled Plasma-Atomic Emission Spectrometry (ICP-AES). Workplace surveys were carried out in three European nickel refineries, a stainless steel plant and a powder metallurgy process. Nickel refinery workers had low dermal nickel exposures although the proportion of soluble nickel to total nickel content was relatively high. For the electro-winning workers the median soluble nickel exposure was 0.25 µg/cm^2 for hands/arms Packing of nickel compounds in one refinery resulted in low levels of soluble nickel (median 0.39 µg/cm^2 for the hands/arms). The dermal nickel exposures for the stainless steel production workers were the lowest. Workers handling nickel powders had highest exposures (median 2.61 µg/cm^2 soluble nickel for powder packers, 0.24 µg/cm^2 for powder metallurgy workers). For both groups of workers the hands, arms, face and neck all received more surface exposure compared with the other jobs included in this study. Overall, dermal nickel exposures were low, which can be explained by the high level of automation and engineering controls and the use of personal protective equipment. Since exposure to nickel ions is the relevant risk factor for nickel dermatitis, it is important to differentiate between soluble and insoluble forms of nickel when assessing exposures.

NICKEL CONTACT DERMATITIS: EPIDEMIOLOGY AND EUROPEAN DIRECTIVES

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[ID 2169]

Nickel is the most frequent cause of contact allergy in Europe. 10-15% of women and 2-5% of men in the general population are allergic to nickel. The prevalence is even higher among dermatitis patients. A recent survey by ESSCA (European Surveillance System on Contact Allergies) in 9 European countries showed that among the clinical population of patch tested patients the medium frequency of positive reactions to nickel sulphate was 18% with some centres having a proportion of nickel sensitized patients above 30%. To address this problem, i.e. to prevent people from becoming sensitized to nickel and to limit elicitation of nickel dermatitis, the European Community has adopted directive 94/27 EC (the "Nickel Directive"), 2004/96 EC and reference test methods EN 1810, 1811, 12472 for showing compliance with nickel directives. Nickel directives prohibit the supply of any products intended to come into direct and prolonged contact with the skin (including: earrings, necklaces, finger rings, wristwatches, buttons, etc.) which contain nickel or a nickel alloy unless the rate of nickel release from those parts of these products coming into contact with the skin is $\leq$ 0,5 µg/cm^2/week. In post assemblies which are inserted into pierced ears and pierced parts of the human body the nickel release must be less than 0,2 µg/cm^2/week. EN 1811 is the reference test method for measuring release of nickel from products intended to come into direct and prolonged contact with the skin. Objects to be tested are stored in artificial sweat at 30°C for 1 week. Nickel released into the solution is analyzed. EN 12472 is the reference test method for the simulation of wear and corrosion for the detection of nickel release from coated items. Objects are subjected to corrosion and wear by abrasive chips, simulating 2 years of normal use. Nickel release is then tested with EN 1811.

SETTING OCCUPATIONAL EXPOSURE LIMITS FOR METALS AND METALLIC COMPOUNDS WITHIN THE EUROPEAN COMMUNITY

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[ID 2209]

Occupational exposure limits (OELs) for the control of worker exposure to hazardous substances have been one of the main tools by which occupational health workers have been able to limit airborne exposure and hence, reduce ill health, for over a century. Within the occupational health com-

munity, there have been a number of attempts to harmonise the process by which these limits are set, particularly and most standard-setting bodies now use similar procedures and a common paradigm. Within the EU, there a there is the Scientific Committee on Occupational Exposure Limits (SCOEL), which performs this function by advising the Directorate General for Employment and Public Affairs which has the responsibility for setting EU-wide OELs. These EU OELs then have to be incorporated into the national OEL framework of all 25 Member States. One of the most problematical areas for OEL setting for SCOEL and other equivalent bodies has been in setting those for metals and metal compounds. Unlike many organic compounds that are usually unique molecular moieties, metallic compounds may consist of a number of valencies, salts and oxides and solubilities all of which will affect the toxicity of the compound. The metallic component such as lead or manganese may have its own specific toxic propensity such as neurotoxicity, but within a compound, it may be the accompanying cation that may enhance or reduce this neurotoxicity and perhaps add its own particular toxic effect. SCOEL has proposed OELs for a number of metals and metallic compounds over the last few years and has a number of others are on its current work programme. These include lead, chromium, manganese and nickel. In all cases, they have taken into account the special circumstances surrounding the factors which influence the toxicity of metals and their compounds in order to propose health-based OELs. This presentation will thus describe the OEL standard-setting process used by SCOEL and illustrate this with current examples of a number of metals.

WOMEN AT WORK

CONTROVERSY REGARDING THE INTEREST OF ASPECIFIC APPROACH CONCERNING WOMEN'S HEALTH AT WORK

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[ID 2041]

To approach the question of women's health at work demands first of all special interest regarding the image and place of women in our society, as early as childhood, young girls' education and their access to education and professional orientation. These criteria are determinant to feminine employment, and often encircle women in low qualified as well as exposing them to multiple hazards jobs.

The interrogation of a specific women's heath at work approach means sailing between two stumbling blocks. The first : Designate working woman as a vulnerable person who needs to be "over protected", with the risk of provoking discriminations, notably when taking on employment, and thus depriving woman of positive effects of work (acknowledgement and social status, health construction…) .The second: In the name of professional equality and equity, deny all specificity and not taking into account neither physiological aspects nor family and social role of women which is difficult to reconcile with a traditionally "masculine" work organisation. On one hand social and cultural aspects are those which induce education and training leading most often to poor qualification and to choices privileging family life to the detriment of professional life; Poor qualifications obtained lead to hazardous and high risks jobs (MSD risks, organisational constraints, toxic risks..). It is in fact women's preferential access to this type of job and not the kind which makes the difference in term of health at work. On the other hand, anatomic characteristics, (bone structure, muscular body mass) and physiologic (hormonal & metabolic specificities..) are likely to favour the outcome of certain occupational diseases. On the psychological level, family constraints including high qualified jobs for white collar women workers are source of stress and its health consequences. Access by women to certain high responsibility jobs leads them to be constantly more outstanding than their masculine colleagues, and to prove their capacities permanently. This means managing a constant conflict between family and professional life.

THE ARGUMENT FOR EXPLORING MECHANISMS WHEN EXAMINING THE RELATIONSHIPS BETWEEN SEX/GENDER AND OCCUPATIONAL HEALTH

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[ID 2088]

On average, 5% of studies will find statistically significant differences between women and men when examining associations between occupational risk factors and health-related outcomes, even when no such differences really exist. Since the sexual division of labour justifies lower pay for women and exposures to differentiated risks for both women and men, there is an economic and political interest in finding male-female differences - even apart from the media fascination. It is therefore important to situate any putative differences with respect to the scientific body of knowledge, considering carefully the potential mechanisms involved. Mechanisms implicated in sex differences in occupational health could involve gender-specific exposures at work, exposures at work or at home representing different realities for women and men, gender differences in extraprofessional responsibilities, chromosomally-based anatomical or hormonal differences, gendered nutrition- or activity-based physiological specificities, or differences in training, education, and social expectations, to name only a few. We are examining the bases for the significant sex differences found in lower-limb musculoskeletal disorders in Québec. These differences vary by anatomical site (more men have knee pain; more women have lower leg pain), by working posture (more men work standing) and by mobility (women are more static). Physiological responses of women and men to working postures also vary: women show more symptoms of orthostatic intolerance and more effects on blood pressure when exposed to prolonged standing, while men's feet appear to react more negatively to wearing hard shoes. Mechanisms involved in these differences could be: women take more steps to cover the same distance as men; culturally-supported differences in footwear; hormonally-induced differences in heart function. Still, within-sex differences usually far outweigh between-sex differences. Understanding the underlying mechanisms also helps to prevent exaggerating differences, as well as providing potential pathways for prevention.

MUSCULOSKELETAL DISORDERS (MSDS), AGE AND GENDER: THE ROLE OF WORK-RELATED PHYSICAL AND PSYCHOSOCIAL FACTORS.

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[ID 1090]

Aims: analyse MSDs prevalence and multiple complaints in a population of Italian workers; investigate the relationship between MSD and work-related factors.

Methods: 1195 women and men aged 32, 37, 42, 47, 52 years. Three questionnaires were used to investigate working conditions including objective working exposure and subjective perception of one's work. Health data on the musculoskeletal apparatus were collected by the occupational physicians. Only subjects reporting pain for over 6 months, with a functional reduction of movement, were considered. MSDs were associated with exposure to working conditions using three (physical, cognitive, psychosocial) work indices.

Results: the prevalence of subjects with musculoskeletal disorders was 26.7% (35.1% for women, 24.0% for men). A relevant number of workers, 20% of women and 17,5% of men, had MSD already at 32 years of age. a progressive f frequency increase was found in women up to the age of 42: in this cohort the frequency is nearly doubled (45.5%) as compared with the previous one.

For men, MSDs frequency increased, but in a less decisive way, up to the age of 47, then it decreased. Among men and women, 9.6% had 2 or more MSDs, women however showed significantly higher frequency (12.9% vs 8.6%). The frequency of multiple pain was 8.7% at 32 years, it then increased with age and decreased at 52 years. Women are most involved at all ages. For multiple MSDs, the higher frequency was found in 47-year old subjects, both in men and women. The logistic regression showed an increased risk at 47 years for men and 42 years for women. There was a significant association with physical index, both for men and women.

Psychosocial indices proved to be associated with MSDs for men, while cognitive aspect and work organisation seem to play an important role for women.

TUNISIAN WOMAN LIFE QUALITY IN TEXTILE SECTOR

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[ID 1713]

In this study, we try to evaluate the tunisian woman life quality in textile sector. It is a transversal descriptive epidemiological study based on a valid questionnaire (FS-36) in tunisian population presented in arabic dialect.

One hundred twenty feminal employees who worked at least since one year were included in this study.

The heath state of our workers was compared to a representative tunisian general population group.

The check of state health determinants was done with crossing the quality of life score and sociodemographic and occupational variables.

There was a significant decrease of quality of life in the group of study compared to the general population (P<0,05) especially for:

Extra-professional activities and divertissment. Occupationaldaily activitiesby physical pain,perceived health vitality and social activities age, level school,grade and high social load may influence the health state found. Also, the perception of work may influence the woman life quality, bad perception is may be a risk factor of low health state. Finally, general health state low score was found for high load work employees. In conclusion, tunisian womea life quality in textile sector will be improved by management, organization and better perception of work, by implementation of a system for revalorisation and motivation of employees.

THE WORKING WOMAN IN GREECE

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[ID 1870]

OBJECTIVE : Evaluation of present situation of women in the Greek workforce and make adequate propositions concerning further studies or guidelines in the future.

MATERIAL – METHOD

Research of relative Data, mostly originated from the National Statistical Service, the IKA (public insurance fund) and the General Secretariat for Equality.

RESULT

Women represent 38.1% of the total work force. Seventeen point nine percent of them are employed in the primary sector of economy, 11.11% in the secondary sector and 70.9% in the tertiary sector. Unemployment mainly affects young women aged 15-24 years, with a rate of 34.1%. A high percentage of women is either under employed or works at home.

Women are victims to 14.7% of all occupational accidents and 6% of fatal ones. Most accidents (29%) occur at the age of 25 to 34 years.

CONCLUSION

This is a precursor study that will be competed with other data in order to make adequate propositions concerning further studies or guidelines in the future.

GENDER, WORK AND HEALTH: METHODOLOGICAL CHALLENGES FOR NEW ACTION

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[ID 2267]

Despite the remarkable increase in women's participation in the labor market, the consequences at this face on health are still virtually unknown. This study aims to identify theoretical and methodological problems in the relationship between labor and women's health from a gender perspective.

Occupational health studies disrespect gender aspects like: horizontal and vertical segregation, professional x work x housework, social roles, subjectivity, etc.

The studies that have this approach verified that men had more managers functions and women more repetitive tasks without control of the rhythm. In women activities their administrative abilities and abilities of taking care of others are not viewed as qualifications.

Gender studies showed that women spent more time in housekeeping and child-caring than men. As a consequence, they report more musculoskeletal and stress related symptoms and more frequently work dissatisfaction, as well physical and mental fatigue.

The methodological design of gender studies should: compare women and men in relation to activities performed; use different and complementary techniques (questionnaire, interviews, focal groups, etc); be conducted by a multidisciplinary team; use ergonomic work analysis as a tool. In epidemiological studies two models of regression analysis should be elaborated, one for men and one for women.

Gender studies should consider the interface between professional work (paid) and housework, in order to address the complexity of this situation.

All this methodological approach can make visible the differences between men and women related with their work.

MORTALITY FROM NON-MALIGNANT DISEASES IN A COHORT OF FEMALE PULP AND PAPER WORKERS IN NORWAY

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[ID 534]

Introduction: A number of hazardous substances are used in the production of pulp and paper. Respiratory irritants such as paper and wood dust, sulfur and chlorine compounds, have been suspected to cause increased risk of death from respiratory and cardiovascular diseases. However, results are not conclusive and few studies have reported results from female workers. One main exposure among women in the present study is dust, mainly paper dust from cutting and sorting of paper. The aim of this study was to investigate the association between work in the pulp and paper industry in Norway and cause specific death in female employees.

Methods: A total of 4,245 women employed between 1920-1993 were included. Information about each cohort member was obtained from personnel record files in order to identify employment periods, job categories and duration of work. Data of cause and date of death was added by linkage to Statistics Norway. The follow-up period was 1951-2000. Standardized mortality ratios (SMRs) with 95% confidence intervals (95% CI) were calculated using the national female mortality rates as reference. Poisson regression analysis was used to examine internal dose-response relations associated with exposure to paper dust, and the relative risks (RRs) and 95% CI were calculated.

Results: The study showed a significantly increased risk for total mortality (SMR=1.10, 95% CI=1.03-1.18), mainly due to increased mortality from cardiovascular diseases and cancer. Internal analyses showed increased risk of dying from cardiovascular diseases, ischemic heart diseases and respiratory diseases in workers exposed to paper dust.

Conclusion: Women in the Norwegian pulp and paper industry showed increased risk of dying from all causes combined and specifically from cardiovascular diseases. The subgroup ever exposed to paper dust had elevated risk of dying from cardiovascular and respiratory diseases, but no clear trend related to duration of exposure was seen.

GENDER ISSUES IN OCCUPATIONAL HEALTH AND SAFETY POLICY AND REGULATION IN SELECTED LATIN-AMERICAN COUNTRIES: ARE THE MEGA-TENDENCIES FOR WORKING WOMEN BLOSSOMING?

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[ID 993]

During the past decades, governments in most of Latin American countries have organized programs and projects aimed to improve women's living conditions. These initiatives range from small projects up to formal governmental or presidential programs (Costa Rica, Nicaragua, Colombia, El Salvador). Most of these efforts have been oriented to improving women's living conditions, but not necessarily aimed to improve work access and/or working conditions. Thus, the reality of women's working and health conditions still remain difficult in city settings and rural areas.

An overview of general policies and regulations, employment, working and OHS conditions for woman point out that their work is mostly carried out in the informal sector, domestic labors, self-employment and micro enterprises, being the field of services and commerce the most frequented. Labor participation of Latin women persists in an average of 45%, compared with 60% of North American countries. This most probably reflects the invisibility of women's work. Precarious conditions persist at the workplace, due to labor inequities such as non appropriate legal definitions of contracts, work time and salaries; social perception of women, who continue to be victims of sexual or labor harassment.

Universal problems such as occupational segregation, employment instability or lack of opportunities still persist. Hidden or transparent barriers, under-employment, wage gap, low or no salaries in multiple tasks jobs do not allow improvement.

National and regional women's movements promoted by leading organizations, have encouraged active participation of women's and social movements to make problems visible, searching for solutions.

In general, governments have been supportive, established policies, regulations and programs trending to find solutions. As well, national and international organizations have provided orientations, support and funding. Yet, the big need for documenting problems, breaking paradigms and arranging effective actions needed for improving working conditions for women, still need to improve.

WORK ENVIRONMENT AND SICKNESS ABSENCES AMONG WOMEN IN FOOD INDUSTRY

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[ID 973]

Introduction
In Finland, the sickness absences have been the highest in the in food processing industry. We investigated the relationship between sickness absences and work conditions in one food processing enterprise in 2003.
Materials and methods:
The sickness absences in 2003 of the employees (N = 2676) were investigated from the registry of the enterprise. The sick leaves were classified as short (1 to 3 days) and long (4 days or more) spells, and the number of the spells of the sick leaves were calculated per person work year. Also, a questionnaire was distributed, and 1120 responded (56 %). 873 persons gave their permission to combine the questionnaire data with the register data of sickness absences. The questionnaire covered work conditions, work atmosphere, work control, type of work contract, and strain at work and in private life.
Results:
The mean sickness absence percentage of women was 7.5 % and of men 5.5 %. The sickness absence days for blue-collar women were 32.3 days and for white-collar men 7.5 days. For women working in cold environment the number of sickness days per person year was increased, OR 2.12 (1.30-3.45), as well as the number of short (OR 2.79; 1.75-4.43) and long (OR 2.22; 1.43-3.45) spells (adjusted by age and occupational status). Women and men with bad work postures had an increased number of sickness absence days (women OR 2.26, 1.42-3.62; men 2.03, 1.03-3.40). Low and high physical strain associated with short (OR 2.29, 1.53-3.43; and 2.51, 1.57-4.00, respectively) and long spells (OR 1.53, 1.06-2.21; and 2.00, 1.26-3.16, respectively) of sick leaves among women.
Conclusion:
Women had increased OR for sick leaves related to various occupational exposures. The enterprise does not differentiate men's and women's work in recruitment. It seems that work in food industry might be physically too demanding for women.

OCCUPATIONAL DERMATOSES; EXPOSURES, DIAGNOSIS AND PREVENTION

OCCUPATIONAL DERMATOSES - CLINICAL TYPES AND OCCURRENCE

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[ID 1585]

One fifth of all occupational diseases are occupational skin diseases according to the Finnish Register of Occupational Diseases (FROD). In the recent years, about 1000 cases have been reported yearly. A total of 90% of cases are hand dermatitis. After repetitive strain injuries, skin diseases have been the second commonest category reported in 2000-2002. Most common diagnoses have been allergic contact dermatitis/eczema (34%), irritant contact dermatitis/eczema (33%) and contact urticaria or protein contact dermatitis (14%). Allergic contact dermatitis is caused by delayed type (type IV), cell-mediated allergy. The causative agents are low-molecular-weight chemicals. According to the FROD in 2000-2002, the most common causative chemicals have been plastic chemicals (23%), rubber chemicals (19%), metals (17%) and antimicrobials (10%). Irritant contact dermatitis is a reaction of the skin to a chemical or physical trauma. The most common causes reported in 2000-2002 have been wet and dirty work (33%), detergents (19%), oils, greases and cutting fluids (11%) and organic solvents (6%). Contact urticaria and protein contact dermatitis are caused by immediate (IgE-mediated, type I) allergy. The causative agents are usually animal or plant proteins. The most common occupational causes reported in FROD have been cow dander (45%), other organic dusts, e.g. flours, grain, fodder, decorative plants, spices (25%) and natural rubber latex (23%).

RISK OCCUPATIONS - SKIN ALLERGENS AND IRRITANTS

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[ID 1587]

There are large differences between occupations in the risk of developing an occupational skin disease (OSD). According to the data from the cases reported in 2000-2002 to the Finnish Register of Occupational Diseases and the numbers of employed persons in occupations in 2001, the occupations (including only occupations with at least 10 reported OSD) with the highest risks to develop OSD (relative risk compared to the total work force in parenthesis) in women were: cereal- and chocolate-products machine operators (11.1), farmer's locums 8.0), dental assistants (7.7), wood-processing-plant operators (7.7), electronic-equipment assemblers (7.4), tool-makers and related workers (6.9), dentists (6.9), crop and animal producers and workers (6.9), and meat- and fish-processing-machine operators (5.3). Respectively, the risk occupations in men were: farmer's locums (9.8), bakers, pastry-cooks and confectionery makers (7.8), vehicle and other painters (6.8), floor layers and tile setters (6.5), cement and other mineral products machine operators (5.9), machine-tool setters and setter-operators (5.9), and wood-processing-plant operators (5.3). Common causes in occupations with the highest risk of irritant contact dermatis include organic solvents, detergents, oils, lubricants and metal-working fluids, cement-based products, foodstuffs, and plastic chemicals. Respectively, common allergens in occupations with the highest risk of allergic contact dermatitis are rubber chemicals, plastic chemicals (epoxy resin products, acrylates and phenol formaldehyde resins), metals (nickel, chromium compounds and cobalt), formaldehyde and other antimicrobials, and those in occupations with the highest risk of contact urticaria or protein contact dermatitis (PCD) are flours, cow dander, natural rubber latex (NRL) proteins and foodstuffs.

SKIN TESTING IN OCCUPATIONAL ALLERGY

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[ID 1509]

There are two allergic mechanisms that can be investigated by skin tests, the immediate and the delayed-type allergy. The immediate-type allergy is the mechanism in allergic asthma, rhinitis, conjunctivitis, contact urticaria, and protein contact dermatitis. It is studied by skin prick tests, serum tests for specific IgE, and sometimes also intracutaneous tests. The allergens in immediate allergy are generally proteins of zoological or botanic origin, such as animal dander or foodstuffs, and only rarely low-molecular-weight chemicals that act as haptens. The commercial, standardised allergens are used for the standard prick test series. Also fresh foods, e.g. fruits, vegetables, flours and spices, and wood dusts as such are used. Small-molecular-weight substances do not regularly induce positive reactions in prick tests, and human serum albumin complexes can also be used. In immediate allergy the symptoms appear in minutes or a few hours, and the test reaction is read in 15 minutes. The relevance of a positive prick test reaction is evaluated by organ-specific provocation tests, such as nasal and bronchial provocations and open application test on the skin. Positive prick test reactions to common environmental allergens, such as pollens, are also indicators of the atopic disposition, a strong risk factor for occupational respiratory and skin diseases. The only disease mediated by the delayed-type allergy is allergic contact dermatitis, and the respective test method is the patch test. The delayed allergens are usually small chemicals. The most common contact allergens are included in the standard series, and the patients are also tested with additional series in accordance with their exposure, e.g. dental or hair-dresser's series. New occupational allergens can be found by testing the worker's own products. This requires adequate control tests. The symptoms in delayed-type allergy usually appear in one day and last several days, and the patch test takes 4-7 days.

HAND ECZEMA AND WET WORK - NEW GERMAN REGULATIONS

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[ID 2268]

Occupational contact dermatitis (OCD) takes the first rank of all occupational diseases and the true incidence is even underreported. The two most common types are irritant and allergic contact dermatitis, however, irritant contact dermatitis is the most frequent and important cause of occupational skin diseases. Chronic contact dermatitis has a poor prognosis and approaches to the prevention of work-related skin diseases are very important. The highest priority should be given to measures "at the source", such as elimination or replacement of harmful exposures to irritants and allergens. Strategies in the prevention of occupational contact dermatitis include identifying allergens and irritants, substituting chemicals that are less irritating or allergenic, establishing engineering controls to reduce exposure, and organizing the work in a way that all employees are exposed at the same degree. Personal protection, such as gloves or barrier cream are also very important but there are only a few studies demonstrating its efficacy. Additionally, educational aspects have to be considered for an effective skin care programme. During the last 10 years several legislative regulations were established in Germany for the prevention of occupational skin diseases. These legislative regulations were introduced as Technical Rules for Hazardous Substances (TRGS) which are equal with the Approved Code of Practice (ACOP). The TRGS 531 "Endangerment of the skin by work in the wet environment (wet work)" is focusing on the most frequent irritant wet work which causes irritant contact dermatitis. The TRGS 540 "Sensitising substances" describes prevention measures if an exposure to sensitising substances is given at the work place. In the TRGS 531 wet work is defined and strategies are given to reduce occupational dermatoses. In this lecture this regulation will be highlighted and strategies to prevent occupational irritant contact dermatitis discussed.

PROTECTIVE GLOVES

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[ID 1586]

Most protective gloves for chemical protection are made of natural rubber latex, synthetic rubber or plastic materials. Synthetic rubber materials include nitrile, neoprene or chloroprene, butyl and fluororubber. The main plastic glove materials are polyvinylchloride or vinyl, polyethylene, polyvinylalcohol, multilayered laminate of polyethylene and ethylenevinylalcohol. Selection of protective gloves is based on data on skin hazards, work methods and requirements, working conditions and duration, and characteristics of the gloves, such as resistance to chemicals, side effects, cleansing properties, availability and price. Chemicals pass through the glove material by penetration through wholes in glove material or by permeation through undamaged glove material. The glove material may also degrade in contact with a chemical. Permeation of chemical through protective gloves is usually difficult to see by naked eye. Breakthrough time measures how long it took the chemical to permeate through the glove material. The use of organic solvents simultaneously with allergenic chemicals shortens considerably the breakthrough time of the allergen. In handling of skin sensitizers the gloves must not be used longer than a period up to ½ times the breakthrough time after the first exposure. The gloves should then be discarded (no reuse). In handling of organic solvents the gloves can be used 1/5 times the breakthrough time after the first exposure. Then the gloves should be cleaned and dried. Reuse is allowed, but the gloves should be discarded when physical degradation occurs.
Protective gloves may induce skin irritation and sensitization. In addition, glove usage may cause aggravation of dermatitis, slowing of the work, and even increasing of the risk of hand accidents (getting caught in moving or revolving parts of machinery). Gloves may increase absorption of hazardous substances through the skin (systemic adverse effects) and often they impair hand dexterity.

THE OCCUPATIONAL RISK MANAGEMENT TOOLBOX-CONTROL BANDING

CONTROL BANDING, EXPANSION OF RANGE: SAFETY

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[ID 779]

Objective: To explore possibilities to develop a Safety Toolkit, using Control Banding principles.
Results: Control Banding has a very powerful starting-point: you measure hazards or risks, you compare, and you control them. The focus on controls, without a lot of expert input, is a strong point of the technique and makes it applicable in branches and countries, which are deprived of expert support. 'Measuring' in Safety means an overview of dominant scenario's, finally resulting in damage, e.g. (serious) accidents, and incidents. In-between hazard and damage there is the so-called 'central event'. Scenarios are leading to this central event, which is similar to a loss of control/containment. A central event is a condition of uncontrolled energy (hazard). Emission of a hazardous chemical is an example of a central event, but also for instance falling (persons, objects), or struck by. In Safety Science we look at controls or barriers as we call them, which prevent scenarios to run towards a central event, and this is different from Occupational Hygiene, where most control strategies are placed after the central event. 'Comparing' in Safety is a bit complicated, because in Safety the concept of exposure is not present. We do have a so-called risk matrix, where actual or expected frequencies of central events are compared to actual or expected consequences. This matrix has a colour code as a result, which is an indication for the type of action required. 'Controlling', or better managing Safety is basically managing barriers, which prevent scenarios from developing. The barriers themselves are hardware ones, or distance, similar to most of the control strategies of Control Banding. Management factors control the quality of these barriers, including the design process of barriers, the availability of competent and committed workers (training), procedures for barriers, inspection and maintenance etc.etc. These management factors have a direct relation to management systems and to scenarios a company likes to prevent.
Conclusion: Similar to other toolkits, like asthmagens, silica, ergonomic, some reflection is necessary when applying Control Banding principles to Safety. A task based approach, as in an ergonomic toolkit does not make much sense. Instead a branch approach seems more promising, where a top 10 of 20 of the most dominant scenarios and central events can be selected. There are some problems arising with using banding principles to various controls. A working group on this topic to study these problems might be a good initiative.

DEVELOPMENT AND IMPLEMENTATION PROCESS FOR UTILIZING ERGONOMICS TOOLKITS IN INDUSTRIALLY DEVELOPING COUNTRIES

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[ID 836]

A reduction in work-related musculoskeletal disorders (WMSDs) is essential to improving occupational health in all countries. Currently 40% of the world's occupational and work-related health costs are attributed to WMSDs and this percentage is likely to be higher industrially developing countries. With industrialization taking root in several developing countries, ergonomic interventions need to be adaptable in order to span several industries and different cultures as well. Ultimately, this will require a programmatic process that is low cost, easy to understand, and sensitive and adaptable to the social, cultural, and political considerations of each targeted country. An initiation of this process is putting into place a permanent ergonomic infrastructure in the developing country and subsequently offering the infrastructure tools to train, implement, and disseminate simplified WMSD techniques to the groups/organizations in need. As an exploratory part of the primary process, with support from International Scholars in Occupational and Environmental Health, a Fogarty Foundation supported training project at the University of Washington, we prepared and presented ergonomic courses in three industrially developing countries: Thailand, Viet Nam and Nicaragua. These train-the-trainer (TTT) courses presented ergonomic hazard assessment tools and provided a fundamental working knowledge of applied ergonomics to the participants. However, it became evident that a simple and comprehensive set of ergonomic hazard/risk assessment tools, with an overarching process for implementation, needs to be developed to build confidence in participants to apply these skills. To further develop this process, using an initial TTT approach at a pre-determined worksite, participants would then be in a position to be instructors and facilitators in participatory ergonomics activities to apply ergonomics toolkits in targeted facilities to reduce WMSDs. The effectiveness of applying ergonomics in developing countries would be greatly enhanced by trade specific ergonomic toolkits that are easily translated (more illustrations than words), are adaptable to different cultures (multicultural representation in illustrations) and are easy to use. The latest edition of the ILO Ergonomics Checkpoints manuals has been developed with this process in mind and may well serve as a basis for augmentation into ergonomics toolkits. These toolkits would also need to provide clear direction for the development of controls to eliminate or mitigate the hazards as well as methods for simple cost/benefit analyses. Additionally, an economic evaluation of expected improvements should become an integral part of the overall process. This would help facilitate management's acceptance, increase sustainability, and build capacity. The parties providing the training could then be used more strategically, with expert assistance over time, to build an occupational health infrastructure to provide lasting impact.
(*) Work performed, in part, under the auspices of U. S. Department of Energy by the Lawrence Livermore National Laboratory under contract W-7405-Eng-48

A CHEMICAL CONTROL TOOLKIT FOR THE CONSTRUCTION INDUSTRY IN THE NETHERLANDS

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[ID 863]

On behalf of the Dutch government, a computer programme named "stoffenmanager" ("toxic substances manager") is being developed in The Netherlands. The aim of this programme is to provide small and medium sized enterprises with a tool to assess risk from chemicals and to take control measures accordingly. The programme is largely based on COSHH Essentials from HSE. The construction industry has asked Arbouw to evaluate if the "stoffenmanager" programme is suitable to assess risk from chemicals in the construction industry. Several problems were encountered. These were:
- Many toxic substances are released during a process, e.g. welding fume, quartz dust, wood dust, diesel exhaust. These are not recognised as hazardous, because they are not labelled.
- Many construction companies are small, over 80% have less than 10 employees. Employers feel that they don't have time to copy the data from the MSDS
- Some hazards do not appear from the MSDS. E.g. acetic acid curing, neutral and oxime curing silicone sealants have the same R-phrases, but the health hazards (and health complaints) are very different.
- Employers make mistakes when estimating the potential emission. E.g.: wood is classified in the lowest emission class (solid substances, blocks etc.), but it should be in a higher class when it is worked on with (electric) tools.
- Construction is a process that consists of many, sometimes short-during, tasks. People (even occupational hygienists) find it difficult to estimate the risk from these separate tasks.

For these reasons we are expanding the "stoffenmanager" programme. Items to be added are:
- We have grouped about 3500 materials and products used in the construction industry into about 200 groups. For these groups of materials/products, we assign the hazard and the potential for emission and put it into the programme.
- We assign potential for exposure to tasks (to take the difference from e.g. painting with a brush or by spraying: same paint, same vapour pressure of the solvent, but different exposure).
- We ask the user to estimate the duration and frequency of tasks, to estimate the hazard over the day and due to combination of tasks.
- We use exposure data, to improve the estimation of exposure.
- We put all control measures that we know of into the programme, and we assign reduction factors to the control measures

Lastly, the programme works with three ways of estimating risk, in order of preference:
- from exposure data
- when no exposure data are available or with skin exposure: from assigned hazard bands
- when the product is not classified, the "stoffenmanager" programme is used to estimate the hazard.

THE GLOBAL IMPLEMENTATION STRATEGY OF THE OCCUPATIONAL RISK MANAGEMENT TOOLBOX (CONTROL BANDING)

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[ID 2165]

This Global Implementation Strategy aims to build and implement an Occupational Risk Management Toolbox (Toolbox), containing toolkits to manage different workplace hazards. The first such toolkit, the International Chemical Control Toolkit (Chemical Toolkit), is based on an approach to risk assessment and management called "control banding". This approach groups workplace risks into "control bands" based on combinations of hazard and exposure information. It can also be applied to non-chemical workplace hazards. As this banding technique is semi-quantitative or qualitative depending on the application, it is particularly relevant for use in small and medium-sized enterprises, developing countries, and, in the case of chemicals, where no occupational exposure standard has been set. Under the auspices of the International Programme on Chemical Safety (IPCS), an International Technical Group (ITG) has been established to facilitate the further development and implementation of the Toolbox. This Global Implementation Strategy provides key high-level approaches to achieve this aim. A particular focus of this Strategy is implementation of the Chemical Toolkit. Partners in this international effort include: IPCS, ILO and WHO; UNITAR, IOHA; UKHSE. US NIOSH and the German GTZ and BAUA. As this Strategy is implemented, new partnerships will be encouraged. Stakeholders include implementers (including employers), researchers and workers/users of chemicals. The Chemical Toolkit (adapted from the HSE's COSHH Essentials) is undergoing further development, which will include technical improvement and additions. This process will also include translation and piloting in countries. The hazard information employed by the Toolkit is either the European Union (EU) label Risk (R) phrases, or the hazard statements of the Globally Harmonized System for Classification and Labelling (GHS). The target for global implementation of the GHS is by 2008, and individual country implementation dates could vary. Hence implementation of the Chemical Toolkit will need to be phased, initially focusing on capacity building, development and testing of guidance sheets, translation into languages, and application of more generic approaches, such as the GTZ Chemical Management Guide (which is based on a simplified control banding technique). Implementation of the full Chemical Toolkit in countries will be dependent on country use of EU risk phrases and/or GHS hazard statements.

The Occupational health programme in WHO is contributing to this implementation strategy through

a - In the WHO workplan, focusing as one of the 3 areas of work on "improving access to information and practical solutions for workplace problems, including piloting the toolkit in different countries and settings (piloting in going on in India, Singpore, Brasil and South Africa)

b - In the WHO Collaborating Centers Network (over 60 centers of excellence working on OH worldwide) by the creation of an activity area in the 06-10 workplan; AA 3: Practical approaches to identify and reduce occupational risks. The network members will be working together to develop tools (not only focused on chemicals, but also on e.g. noise, ergonomics, safety and psychosocial riskfactors, pilot test them and support WHO and ILO in promoting scaling up the use of the tools

CHEMICAL SUBSTANCES

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[ID 105]

In our everyday lives, we are surrounded by a large number of different chemicals and are continually becoming aware of new problems as a result of them. There are EU laws and national laws regulating substances and safe work and risk assessments are crucial when handling chemicals. Chemical Substances is the necessary tool for producers, suppliers and users of chemicals as well as for occupational hygienists and those responsible for dangerous waste or transportation of goods. Chemical Substances is an interactive register of more than 30 000 chemical substances with more than 2.3 million data of which 310 600 are searchable names. Those are divided into English, Swedish, German and French as well as trade names. Chemical Substances has been continuously improved for more than 10 years and is provided both as a cd-rom version, annually updated, and as a web version, updated twice a year. The database supplies information about physical data, structural formula, risk and safety phrases, hazard symbols, toxicology/ecotoxicology, directions for handling and storage, disposal and transport directions for senders and transport organizers, etc. This comprises the possibility to copy/paste/print Transport Instructions in writing, a List of All Available Information about a substance, basis for Product Safety Data Sheet and Warning Label. Chemical Substances covers all substances regulated in Regulations and Directives from the European Council and Commission. The textbook and study material Chemical Hazards has been fully included containing text search capabilities. Included in Chemical Substances are also three calculation programs: Classification of dilutions which calculates risk phrases and hazard symbols, marine pollutant and flammability. Limitation of quantities when transporting dangerous goods which also calculates Limited quantity provisions for air transports. The last program calculates the risk of major accident involving dangerous substances. Chemical Substances is produced by Prevent Sweden – Management and Labour Improving Work Environment.

THE CERTIFIED INDUSTRIAL HYGIENIST—MARK OF PROFESSIONALISM

THE CERTIFIED INDUSTRIAL HYGIENIST—MARK OF PROFESSIONALISM!

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[ID 2030]

Certification has often accompanied the maturing of a profession and its core competencies. In 1959, a joint committee of the American Conference of Governmental Industrial Hygienists (ACGIH) and the American Industrial Hygiene Association (AIHA) recommended that professional certification be conducted by an independent, incorporated Board. With that, the American Board of Industrial Hygiene (ABIH) emerged as the governing body. The first certification exams took place in 1963, followed by the formation of the American Academy of Industrial Hygiene (AAIH), the professional organizational arm, in 1966. Certified Industrial Hygienists today number approximately 6,500 Certified Industrial Hygienists. The mission of the ABIH today is twofold—a.) to ensure the highest level of competence among Industrial Hygiene Practitioners for the protection of workers and the public, and b.) to improve the practice and educational standards of the profession with the highest quality certification system. Accredited by the Council of Engineering and Scientific Specialty Boards, the ABIH has provided the measure of excellence in certification for the industrial hygiene profession since 1960. Its activities are many, but include the following—review of applicants'(wishing to sit for the exam) educational and experiential requirements; issuance of certifications (CIH, CAIH) to those having passed the Board's certification exam; revocation of certifications for cause; establishment and review of certification maintenance requirements; maintenance of a record of certificate holders; and furnishing of a roster of certificate holders in good standing to interested parties. The presenter will highlight the following--the evolution of the industrial hygiene profession in the United States, the origins of its professional organizations and certification process, the pre-requisites and process for certification, examination core competencies, types of certifications available, requirement for continuing learning/maintenance, Code of Ethics and business value today. Additionally, ABIH's top issues will be discussed—keeping the certification exam and maintenance relevant; demand for more accessible certification; keeping pace with the evolving definition of the Industrial Hygiene practice; and taking a more global perspective. The presenter will close with some thoughts about the profession's future challenges and certification needs, as well as ways in which the professional Industrial Hygiene organizations can leverage their combined strengths internationally.

CERTIFICATION OF OCCUPATIONAL HYGIENISTS IN THE UK

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[ID 732]

Certification of Occupational Hygienists in the UK is the responsibility of the The Faculty of Occupational Hygiene which is the professional arm of the British Occupational Hygiene Society. Membership of the Faculty is restricted to BOHS members with specific qualifications in occupational hygiene and related subjects. As the examining board for the profession, the Faculty administers a suite of examinations and awards qualifications in occupational hygiene and allied subjects. The key Certification level are the Certificate of Operational Competence and the Diploma of Professional Competence. The Certificate focuses on technical aspects of the profession, such as recognition of work related health hazards and evaluation of associated risks and the Diploma requires comprehensive understanding of the Certificate subjects and a broad knowledge of Control techniques and strategies. Pre requisites exist for entrance to the examinations, these will be described. The Faculty also runs a Continuing Professional Development (CPD) Scheme, to ensure that knowledge and competence of Members remains up to date, and which is mandatory for all non-retired Faculty members. The Faculty is also responsible for administering a Code Of Ethics. This has been developed to ensure that members act in such a way that the protection and preservation of worker health remains their paramount responsibility at all times, and to guide those who may be subject to contradictory pressures and enable them to act with integrity and objectivity. The Code of Ethics also provides a benchmark for clients, employers, other professionals and members of the general public to use where there is a question as to whether Faculty members have conducted themselves in an appropriate manner.

INTERNATIONAL OCCUPATIONAL HYGIENE ASSOCIATION (IOHA), RECOGNITION OF NATIONAL OCCUPATIONAL HYGIENE ACCREDITATION SCHEMES

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[ID 1052]

The International Occupational Hygiene Association (IOHA) was created in 1987, and has grown to a 25 member organization, representing over 20,000 occupational hygienists worldwide. The IOHA conducts a wide range of activities intended to promote and develop occupational hygiene worldwide, one of them being the recognition of national occupational hygiene accreditation schemes.

Globalisation has resulted in the rapid and widespread dispersal of hazardous materials and production processes to areas where there may well not be the resident expertise to address the associated risks. There is a great need to engage specialists with credentials that are recognized in a trans-boundary manner. Increasingly multinational corporations are applying a consistent set of health, safety and environment standards to their work sites, no matter where they are located. Consequently there is a need for global harmonization of the principles and standards of Occupational Hygiene. For these reasons, the rationale for the development of national professional Occupational Hygiene credential granting systems now applies internationally. The IOHA does not operate a certification scheme of its own but it has investigated common structures and approaches to assuring the knowledge and competence of professional occupational hygienists. The IOHA promotes international cooperation on certification to help develop the foundation of a recognised and more visible profession, using the following objectives:

- The development of appropriate national and international standards and practices to identify and characterize comparable levels of education and competence of professional occupational hygienists;
- The avoidance of unnecessary restrictions from and within national certification schemes relating to the training and certification of hygienists and their ability to practice;
- The sharing of technical information in relation to training and certification of hygienists;
- The development and wide application of principles of quality assurance to the education, training and competence of professional occupational hygienists.

CERTIFICATION OF INDUSTRIAL HYGIENISTS IN ITALY.

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[ID 2171]

Starting from 1990 the Italian Industrial Hygiene Association (AIDII) develops the process of certification of the Italian Industrial Hygienists. It was recognized that the profession needs not only a code of practice and of deontology but also a code and rules to validate the content of the professional act of the industrial hygienists too. The first evidence of this necessity was clearly obtained during the widespread application in the industrial environments of the occupational exposure assessment process in relation to the introduction of the new law (i.e.. D.Lgs.626/94) in Italian statement in early '90 years. In that period a large number of professionals made a large number of assessments but caused a poor real risk assessments. This fact in relation to the law too: indeed the Italian legislation do not yet recognize the Industrial Hygiene as a "profession" and acknowledge only "classical" university degrees such as Chemistry, Physician, Engineer degrees. These figures are grouped in Professional Orders as stated by Italian 1934 law. The original way for the first certification of the Industrial Hygienists meet the "accreditation to the excellence" schema: it permitted to certificate a huge number of Italian professionals, who are already on site, and to start adequate controls and checks at subsequent steps to show how the professionals perform the requested, up to dated, scientific knowledge. In latest years AIDII recognize the necessity to improve the original schema and to develop a new way to certification according international EN 45013 indications and more suitable for the Italian environmental situations and occupational health exposure situations. The paper shows how to overcome the difficulties found in this second process development.

BEST PRACTICES IN CONSTRUCTION INDUSTRY

EXPOSURE AND PROTECTION OF WORKERS IN THE REMEDIATION OF SITES CONTAMINATED WITH CHEMICALS

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[ID 2043]

Almost 20 000 possibly contaminated sites have been identified in Finland. Annually about 300 of these have undergone cleaning. The goals of this study were to characterize workers' exposure to soil contaminants and evaluate the need for protection. The studied sites included an old lead smelter area, three petrol station areas, a creosote impregnation plant, a metal scrap company area and an old sawmill area contaminated with chlorophenols and dioxins.

A lead smelter area was contaminated with lead fumes from the smelter. The measured lead concentrations in the air were <5-37 µg/m^3, lower than the binding occupational exposure limit (OEL) of 100 µg/m^3. The blood lead levels of the men working in the field separating old scrap from soil rose, however, from about 0.5 to over 1.0 µmol/l; this change suggested that worker protection was not sufficient.

The remediation of soil contaminated with creosote oil may involve the risk of exposure to polycyclic aromatic hydrocarbons (PAH). Our results indicated that the exposure of remediation workers is on the same level as that of coke oven workers. The uptake of PAHs was greatest for workers who smoked. Dermal exposure occurs and is an important route of exposure.

Old petrol stations are mainly contaminated with petrol and diesel oil. The main health risk of gasoline stems from its benzene content, which increases the risk of leukaemia. During remediation work the benzene level in the air was less than 1 mg/m^3, which is less than one third of the current OEL. Nevertheless the blood benzene level exceeded the recommended action level 50 nmol/l in one specimen.

For the most part, exposure to air impurities can be reduced by technical means and by the use of personal protective equipment. Technical prevention includes moistening of soil to reduce its dustiness and better air filtration of work machines. New excavators are normally equipped with air filtration, which at least removes coarse dust particles. Active charcoal-based filters are available as an option. At the end of this study a general recommendation concerning the use of respirators and protective gloves was presented. In addition recommendations on biomonitoring of workers are presented.

EFFECTS OF A TRAINING TO IMPLEMENT NEW MEASURES REDUCING KNEE LOAD IN FLOOR LAYERS. 2-YEARS FOLLOW-UP.

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[ID 428]

Floor layers have a high frequency of knee complaints mainly caused by spending more than half of the working time in kneeling working positions. The purpose of this study was to measure the long-term-effects (two years after intervention) of a participatory ergonomics implementation-strategy consisting of information, education, and facilitation of the use of new working methods.

Floor layers (n=292) were trained to use new working methods. The effects were evaluated by questionnaires and interviews before and 3 months after the courses.The 2-year follow-up included questionnaires and interviews of the participants in the courses and of the remaining floor layers in Denmark (controls, n=541).

The implementation strategy has had a positive effect as trained floor layers still uses the new working methods after two years (35% of the trained floor layers compared to 14% of the control group uses the new working methods weekly/daily). There has not been further increase in the use of the new working methods after the researchers leaved the project. To ensure that the process continues, it is therefore important to follow-up in relation to completed courses, and to arrange new courses.

At the 2-years follow-up the frequency of knee complaints did not differ when comparing floor layers who have used the new working methods weekly/daily compared to those, who did not use them, but the degree of pain was reduced. Floor layers with no knee complaints in the first questionnaire, having used the new working methods, reported a lower frequency of knee complaints >30 days compared to controls in the follow-up study. The study indicate that the new working methods may reduce the degree of knee-pain in floor layers, but that more severe knee complaints is mainly prevented if the working methods are introduced before the first symptoms arise.

BEST PRACTICES FOR THE HEALTH CONSTRUCTION WORKPLACE IN SWEDEN: PREVENTING WMSDS AMONG CONSTRUCTION WORKERS

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[ID 2137]

Generally, it is very well known that the construction work environment is in a poor state in many aspects; and many construction work tasks are still physically strenuous; thus the incidence of work-related injuries/accidents among construction workers is considerably higher than that in most other occupations. Therefore, there is a good reason why many efforts are being made to create a healthy construction workplace. It is possible to improve work conditions through studying the successful work activities and thus identifying best practices from which one can learn how to proceed in creating a healthy work environment at the construction site.

To identify the best practices in the Swedish construction industry designed to prevent work-related musculoskeletal disorders (WMSDs), 13 construction sites were investigated through interviews, sites observations and documentation studies. In each construction project, the study has focused on six mutually supporting areas of the construction workplace system balance, namely the planning, work organisation, the production technology used, the physical work environment, work tasks performed and the individual worker's effort/performance.

This study has produced results that have shown that there are plenty of best practices in the pre-production and the production phases of the construction projects investigated. Although, best practices were identified in different areas of the construction workplace system balance, there seems to be a significant need for good practices in the pre-production planning phase, in the Systematic Work Environment Management (SWEM), and implications of the piece rate remuneration methods on the production schedule have left much to be desired as far as the work-related musculoskeletal health of construction workers is concerned.

Based on the analysis of several best practices identified, a number of recommendations are given to improve construction workplaces' musculoskeletal health.

GUIDELINES AND TRAINING FOR PERSONAL PROTECTION IN CONSTRUCTION PAINTING

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[ID 2184]

Objectives Construction house painters´ work includes many different tasks and chemicals. In addition to paints and solvents, construction painters also use fillers and plasters, paint removers and wood preservatives in their work. In a Finnish questionnaire study, construction painters reported more respiratory, skin and eye symptoms than did the carpenters as their referents. Many painters felt that the quality and the use of personal protection equipment were not satisfactory, and about 1/3 of the painters named that the maintenance and storage of the equipment were not properly organised. The employer and employee organisations in the construction painting, together with FIOH and the paint manufacturers launched a program to improve the selection of safer paint products and good personal protection.

Methods The organisations agreed on the guidelines for the use of solvent-based paints in interior painting. Further permissible use of solvent-based paints was carefully considered and specified. Simultaneously, the guidelines for the personal protection in the application of building and anti-corrosive paints were agreed.

In the training campaign organized by The Finnish Construction Trade Union, 2500 guideline booklets were distributed to construction painting employers, painters and professional education centres for construction painters. Training on personal protection was arranged at education centres and at construction sites.

Results In the personal protection guide the suitable respirator masks, hearing protectors, goggles and protective gloves were specified for vari-

ous tasks: application and sanding of fillers, brush, roller and spray painting with water-based and solvent-based paints, paint stripping and high pressure cleaning both to continuous and temporary work. The majority of Finnish construction painting trade, altogether 6000 painters, 500 employers and 20 education centres participated in the training project in 2004-2005. A special personal protection bag was developed, so all necessary protection equipment is easily taken to the construction site.
Conclusions The painting firms have remarkably renewed and improved their workers´ personal protection. The painters have well adjusted to better protection. The final change to non-solvent paints has not been so successful, and especially architects and construction designers need further motivation in order to choose water-based paints.
Acknowledgements The project was financially supported by the Finnish Labour Pension Fund.

BEST PRACTICES FOR PREVENTING MUSCULOSKELETAL DISORDERS IN MASONRY: STAKEHOLDER PERSPECTIVE

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[ID 2220]

Brick masons and mason tenders report a high prevalence of disabling work-related musculoskeletal disorders (WMSDs), including high rates of back and shoulder injuries. Many of these disorders can be prevented with specific changes in materials, work equipment or work practices to reduce or eliminate WMSD hazards. To explore the use of these ergonomic "best practices" in the masonry industry, the National Institute for Occupational Safety and Health (NIOSH) organized a two-day meeting of masonry stakeholders. Attendees included 30 industry representatives, 5 occupational health and safety researchers, 4 health and safety specialists, 2 ergonomic consultants, and 2 representatives of state workers' compensation programs. Participants were divided into small groups and asked to discuss ergonomic interventions currently utilized in the masonry industry, including factors affecting intervention implementation and ways to promote widespread diffusion of interventions in the future. The discussions revealed a wide range of currently available ergonomic solutions, solutions in need of further refinement, and job tasks for which effective solutions have yet to be developed. Meeting participants also identified various barriers to intervention implementation, including business considerations, quality concerns, design issues, supply problems, jobsite conditions and management practices that can slow or limit intervention diffusion. To further explore geographic variations in practices and supplies, and explore the barriers to intervention, a series of focus groups will be conducted in four regions. This paper will present the results of the large meeting and the subsequent focus groups. To be successful, future diffusion efforts must not only raise awareness of available solutions but also address the practical concerns that will be assessed in this process.

DIOXIN EXPOSURE AND HEALTH RISKS IN REMEDIATION OF OLD SAWMILL AREAS

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[ID 2243]

Old sawmill areas in Finland are often contaminated with chlorophenols and polychlorinated dibenzo-p-dioxins and polychlorinated dibenzo-p-furans. Chlorophenols were used for timber treatment until the mid-1980s. These preparations contained small amounts of polychlorinated dibenzo-p-furans, mainly heptachlorodibenzofuran (HpCDF) and octachlorodibenzofuran (OCDF). Most dioxins and furans are lipophilic, and they accumulate in the fat tissue of humans. Some dioxins and furans are highly toxic and some have dermal, hormonal, developmental and immunological effects.
Workers are exposed to dioxins via inhalation, dermal contact and ingestion. Dioxins and furans have a low vapor pressure, and they are bound to organic matter in soil. Thus workers inhale dioxins mainly in the form of dust particles. Dermal absorption is possible although only 2-3% of dioxins from soil are absorbed. Intake by ingestion depends greatly on the hygienic practices followed at a remediation site. If remediation workers do not wash their hands before eating or smoking, ingestion may be the most important route of exposure.
Measurements and calculations were used to study workers exposure to dioxins. Dust levels were measured by inhalable dust samplers from the breathing zones of workers and from stationary sampling points. Dioxin samples were collected on a glass fibre filters. The samples were analysed by high rersolution mass spectometry. The maximum dioxin concentrations and the measured dioxin concentrations in air are listed in Table 1.

Table 1. Dioxin concentrations in soil and air at the studied three sawmill sites.

Site/year	Dioxin concentration in soil, pg I-TEQ/kg	Dioxin concentration in air, pg I-TEQ/m^3
Site 1/summer 1998	max 133	7-29
Site 2/autumn 1998	max 16	6
Site 3/summer 2004	max 24	0,5 – 0,9
Background/summer 2004	-	0,005

The measured dioxin concentrations were under the suggested occupational exposure limit (OEL) of 200 ng I-TEQ/m^3. The exposure calculations showed that inhalation and ingestion are the main routes of exposure. The lifetime average daily dose (LADD) of the remediation workers was estimated to be about 1.25 pg I-TEQ/kg, which is within the limits of the WHO recommendation for acceptable daily intake (1-4 pg I-TEQ/kg) or the EU guide for the tolerable weekly intake 14 pg I-TEQ/kg. Daily exposure may, however, have exceeded these limits.
The tolerable daily intake of dioxins via inhalation is not exceeded if the average inhalable dust level does not exceed 1 mg/m^3. Respiratory protection is, however, needed during dusty work operations. Normal air filtration of modern excavatong is normally sufficient. Clean leather gloves are generally sufficient if chlorophenol or dioxin concentrations are not very high. Special work clothing (e.g. Tyvek) is recommended, and good washing facilities are important.

A COMPUTER PROGRAMME TO CHOOSE THE RIGHT COMBINATION OF DUST EXTRACTORS AND HAND-HELD TOOLS IN THE FINISHING SECTOR OF THE CONSTRUCTION INDUSTRY

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[ID 2256]

Without measures to reduce exposure, tooling of quartz containing materials, like sawing, sanding, cutting and polishing may cause exposure to quartz dust of over 10 times the limit value for quartz dust (8h TWA).
Periodic medical examination of workers in the construction industry reveals that about 60% of all workers in the finishing sector of the construction industry complain about dust. And although nearly 70% of the employers know about heath effects from quartz dust, only 50% of them provide dust extraction devices to reduce quartz dust exposure. Technical impediments are the major reason not to provide those, more than organizational or economic impediments. On the contrary, about 80% of both workers and employers state that they will use / provide dust extraction when the technical problems are solved.
The finishing sector of the construction industry has asked Arbouw to investigate how the use of dust extraction devices can be stimulated.
To gain more insight into the technical problems, we have visited several work places. Also, we have organised an expert meeting with suppliers of hand held tools, dust extractors, craftsmen and occupational hygienists. It appeared that much information about purchase and use of the right dust extractors gets lost in the long communication path from the manufacturer to the user. Consequently, the flow rate or the negative pressure generated by the dust extractor may be too low, the filtering device may be inadequate or connections simply don't fit.
Therefore we have developed a computer programme that matches parameters like flow rate, capacity and pressure drop from the tool and from the dust extractor. The programme also compares connectors of tools, hoses and dust extractors to make sure that connectors actually fit. Suppliers of both hand held tools and of dust extractors are very willing to cooperate with such a programme. Four suppliers of hand held tools and three suppliers of dust extractors have participated in the development of the programme. They have also supplied the information needed for matching.
Conclusion
Employers of small and medium sized enterprises do not possess the skills required to take measures against dust. Although 80% of them want to take measures, only 50% do and technical impediments are mentioned as the major reason not to do so. What employers of SME's want is a very precise advice, at the level of make and type of equipment

IS THE USE OF ERGONOMIC MEASURES ASSOCIATED WITH BEHAVIOURAL CHANGE PHASES IN CONSTRUCTION WORK?

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[ID 324]

The use of ergonomic measures to reduce the physical work demands is advocated both in the USA and Europe in the expectation that it will reduce the incidence and prevalence of musculoskeletal disorders. Various researchers stipulate the phasing of behavioural change among stakeholders to implement such ergonomic measures.
The aim of this study was to test the hypothesis that the sequentially ordered number of completed behavioural change phases (SBP) are positively associated with the use of ergonomic measures among employers and employees in bricklaying companies (employers/planners, n=27, and foremen/bricklayers, n=21). The measures, consisting of trestles, bricklaying scaffolds, mast-climbing work platforms and cranes, reduce the physical work demands made upon bricklayers and bricklayers' assistants. The behavioural change phases consisted of: awareness, receptiveness, understanding, wishing, intending and ability to use ergonomic measures. Structured interviews were conducted with stakeholders of 27 companies to determine the achievement of behavioural change phases and the actual use of the four ergonomic measures.
Ordinal regression of behavioural change phases on the use of ergonomic measures show a significant rise in completed SBP in relation to increased use of three of the four ergonomic measures by employers/planners and increased use of one ergonomic measure by foremen/bricklayers. Odd ratios between the use of ergonomic measures and SBP range from 1.3 to 1.8 for each completed behavioural change phase.
To stimulate the use of ergonomic measures and reduce the risk of musculoskeletal disorders it is recommended that activities be carried out by occupational health and safety professionals that cover all six behavioural change phases among employers/planners. The pathway of behavioural change phases and the use of ergonomic measures among workers may be less distinct in a working site context than in a context of individual health promotion.

PESTICIDE EXPOSURE ASSESSMENT: MEASURES AND MODELS

PESTICIDE EXPOSURE SCENARIOS FOR RISK ASSESSMENT

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The amount of pesticides used in agriculture is still increasing although modern pesticides are applied in trace amounts compared to the old ones. The same farmer might apply several different kinds of compounds during the season. Exposure situation at individual worksites, or, of individual workers, should primarily be assessed by monitoring. All this makes exposure assessment quite complicated. However, data on exposures to single compounds are rarely available. Inhalation and dermal exposures to pesticides at work seem to be many times higher than oral exposures through food. There are also more risks when pesticides are used in closed sites as factories or greenhouses than in open field like vineyards and potato farms. The number of workers dermally exposed at harvesting is high compared to sprayers. Routine exposure monitoring is not applied in almost any country but the data is received from studies by research institutes. The EUROPOEM, German Model and UK Model as well as the EUROPIT Model are deterministic exposure assessment methods used for registration purposes. Nowadays, there is a need to move to probabilistic assessment which gives more useful data on a range of exposure and risk. Modelling is an alternative for monitoring in some pesticide registration cases. The increased capacity of PCs makes it possible to use more sophisticated mathematics more easily. However, in all cases the modelling results are heavily dependent on the quality of the basic algorithm, backround database, parameters or parameter distributions used, etc. The amount of expertise needed for using the models varies, but is needed at some level in all cases. In REACH regulations, a new proposal for improvement of chemical safety in Europe, exposure scenarios are needed for risk assessment. These scenarios are not possible to produce without data from real exposure conditions, occupational hygiene measurements and biomonitoring.

INTERPRETING EXPOSURE DATA FOR HAND HELD APPLICATION TECHNIQUES: EXPERIENCES FROM EUROPE AND LATIN AMERICA

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The use of hand held application techniques for pesticides is generally considered to be one the worst in terms of applicator exposure. The proximity of the nozzle and the treated crop to the applicator results in pesticide contaminating the body and protective clothing. A number of operator exposure models have been developed in North America and Europe, which have databases dominanted by studies done with application equipment such as tractor drawn boom sprayers. Recent datasets have been added from studies done in Europe funded by the European Union or Crop Life. There are many variables to consider with hand held application techniques, not least the wide range of application equipment available. There is also a critical interaction between the applicator and the crop. Many greenhouse crops represent a worse case scenario, as they are often over 2m in height, and grown in rows which at times have spacing of 1m or less. This results in a predominantly upward application technique, with repeated contact with the treated crop. The application of pesticides to tree crops tends to result in lower levels of exposure, as the pesticide can be applied such that the air movement carries any spray away from the applicator. During the last 8 years a large number of field studies have been done in Southern Europe and Latin America with a wide range of crops. The data for potential dermal exposure tends to be variable, and work is being done to identify the most important variables, which affect exposure. Another variable, which needs to be considered, is the protective clothing worn by the applicator. In hot conditions, suitable protective clothing is often difficult to obtain. The wide range in the level of protection makes the predicting of the absorbed dose difficult. Studies have shown that the temperature and relative humidity also play a role in dermal absorption, together with the area of the body exposed to the pesticide.

POPULATION ESTIMATES OF CHOLINESTERASE ACTIVITIES IN SOUTH AUSTRALIA

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[ID 2523]

Monitoring exposure to OPs can include the measurement of the activity of a variety of peripheral cholinesterase enzymes, the inhibition of which can act as a sentinel for subclinical effects. The use of this enzyme as a biomarker depends on the comparison of measured values with population estimates of 'normal' activity. There may be significant differences in the standard population estimates. Over several years we have measured serum and plasma cholinesterases using the method of Kalow and Lindsay (1955) where the disappearance of substrate was measured at 240 nm with data expressed as nmol benzoylcholine hydrolysed/min/ml serum. We have recently used a spectrophotometric kit (Test-Mate ChE, EQM Research Inc., Cincinnati) using butyrylthiocholine as substrate and Ellman's reagent as indicator at 450 nm. This paper reports our experience in measuring cholinesterases in control, or unexposed groups in South Australia (SA). Mean serum cholinesterase measured in 34 SA controls was 853.6 ± 38.5 nmol/min/ml, averaging 78% of levels seen in 129 UK controls with mean serum cholinesterase of 1107.0 ± 19.5 nmol/min/ml (Mutch et al 1992). Plasma cholinesterase measured in 2004 in 171 SA blood donors was 2.18 ± 0.04 u/ml, relative to a published reference norm of 2.55 u/ml (EQM Research Inc.) using whole blood samples. Plasma cholinesterase measured in 76 SA blood donors in 2005 was 2.69 ± 0.09 u/ml using separated plasma, and this was compared with the EQM reference norm of 2.55 u/ml.

We have determined that the two main systematic influences on these observations are;

- The level of background exposure to cholinesterase inhibitors in the reference population.
- The use of whole blood or separated plasma/serum from blood samples.

The comparison of field or clinical tests of cholinesterase activity with population estimates must take these factors into account in order to be valid.

CURRENT PESTICIDE RISK ASSESSMENT AND SETTING OF OCCUPATIONAL EXPOSURE LIMITS IN EUROPE - GUARANTEE OF SAFETY?

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Pesticides (plant protection products; PPPs) are a group of chemicals requiring marketing authorization (MA) in EU Member States (MS). MA is provided by national authorities and is considered necessary because exposure to PPPs takes place in the occupational environment, via food, and the environment. Hence, exposure to these compounds is widespread, and may be considerable at the work environment causing risks to human health. At EU level, Directive 91/414/EC provides the general framework for assessment of risks of PPPs to human health and the environment. This task is carried out by the authorities in EU MS, and is based on information, provided by the producer of a given PPP on toxicological and other properties of the compound. Classification and labeling of pesticides by the EU Commission is based on this work carried out by EU MS. EU Commission is supported by the European food Safety Authority (EFSA) in assessing risks of PPPs, and by the Scientific Committee on Occupational Exposure Limits (SCOEL) in protecting workers of risk of PPPs. SCOEL proposes indicative OELs for pesticides and other chemicals based on available scientific information. There are, however, currently no indicative OELs for pesticides. At national level, authorities are responsible for setting of OELs for pesticides and other chemicals. In EU MS there are, however, only very few OELs for PPPs. The most important exposure route for pesticides is the skin, and for this reason, setting of OELs for pesticides is problematic, because OELs are usually applied only for inhalation exposures. Reliable methods for dermal exposure assessment are under development, but none of the existing methods is generally accepted. There is, however, a clear need to develop both national and EU level procedures to better control exposure to PPPs in the work environment.

REFERENCE VALUES FOR BIOLOGICAL MONITORING OF OCCUPATIONAL AND ENVIRONMENTAL EXPOSURE TO PESTICIDES

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[ID 1608]

Background and aims: this study was addressed at defining reference values for urinary ethylenetiourea (ETU), 2,4 fenoxy acid (2,4-D) and 3,4-dichloroaniline (3,4-DCA) as biomarkers of exposure to ethylenebisdithiocarbamate fungicides, fenoxy herbicides and herbicides generating aromatic amines (propanil, neburon, diouron, linuron), respectively.

Materials and methods: groups of 100 healthy subjects, not exposed to known sources of pesticides, were investigated. For each subject a urine spot sample was collected in the morning (second void of the day). To measure these chemicals specific analytical methods were developed and applied. Information on pesticide concentrations in food and drinks in the area of residence of these subjects were collected, if available.

Results: ETU was detected in 59% of samples. Based on these data, we estimated a 95th percentile for the Italian general population is the in the range 4.5-5.0 µg/g creatinine. The presence of small ETU amounts in the urine of these subjects is very likely attributable to the intake of EBDC residues through diet. The study did not point out any sample with 2,4-D concentrations exceeding the limit of detection (LOD) of the analytical method (0.08 µg/L). This result does not confirm previous studies conducted in USA showing the presence of this chemical in a significant proportion of the unexposed healthy population. 3,4-DCA was detected in 51% of samples. Based on our estimates, the predicted 95th percentile is 1.15 µg/g creatinine. Since data on the presence of propanil, neburon, diouron, linuron and their residues in the Italian diet are lacking, we cannot give an explanation to this finding.

Conclusions: values of 4.5-5 µg/g creatinine for ETU and 1.15 µg/g creatinine for 3,4-DCA can be used as reference for biomonitoring occupational and environmental exposure to ethylenebisdithiocarbamate fungicides and herbicides generating aromatic amines, while a tentative reference value for 2,4-D in urine is in the order of 0.08 µg/L.

HEALTH SURVEILLANCE PROGRAMS OF SOUTH EAST EUROPE AGRICULTURE WORKERS OCCUPATIONALLY EXPOSED TO PESTICIDES

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[ID 596]

Health surveillance programs of South East Europe (SEE) agriculture workers exposed to pesticides evolved from former Yugoslavia OH regulation so there are a lot of common solutions and problems. Comparing surveillance programs for agriculture workers indicate that those programs are quite similar in Macedonia, Bosnia and Herzegovina, Croatia, Serbia and Montenegro. All those mentioned countries have regulation which includes the mandatory check up for all agricultural workers exposed to pesticides which includes preemployment as well as periodical checkups. For those checkups national regulation proscribes a minimum set of examination. The only exception is Croatia where occupational health specialist decides on the checkup program. All SEE countries share the same problem of noncompliance of employers in agriculture sector to legislation. In last few years it seems that this problem is the most prominent in Bosnia and Herzegovina where only few agriculture workers exposed to pesticides underwent preemployment and periodical checkups. According to information's provided by national institutes of occupational health, the health surveillance coverage of agriculture workers is bit better in Croatia, Macedonia and Serbia and Montenegro. Also, in all SEE countries agriculture workers underwent periodical checkups during winter period after few months of cessation of pesticide exposure so the biological monitoring could not provide any useful information. Paradoxical, almost in all countries (except in Croatia) biological monitoring is mandatory part of checkup. To make paradox even bigger, erythrocyte acetyl choline esterase activity is mandatory part of biological monitoring of agriculture workers regardless the compound source of exposure.

Generally, the SEE programs for health surveillance of agriculture workers exposed to pesticides is good backbone for further development. Further improvements must include better exposure assessment and better regulation of check ups of self employed agricultural workers.

THE USE OF HUMAN DATA IN THE RISK ASSESSMENT OF PESTICIDES

SPONTANEOUSLY REPORTED HUMAN DATA IN RISK ASSESSMENT: POTENTIAL USES AND PITFALLS

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Human data is of obvious interest in determining the risk associated with chemical use. Removed from the controlled environment of the toxicology laboratory, chemicals are employed in industry and in domestic environments in ways that may not ever have been anticipated by a standard testing battery. While use of engineering controls and protective equipment are expected in the use of potentially hazardous chemicals, failures in application and effectiveness occur. Mixtures of compounds may result in very different toxicological effects (synergy, potentiation, additive or antagonistic effects) than those expected based on single substance testing. Negligent and abusive use of chemical products is not at all uncommon and label directions are frequently ignored. The data gleaned from incidents deriving from these facts should be very useful indeed to risk assessment specialists in industry and government.

Multiple systems of spontaneous reporting exist for human exposures, particularly as concerns pesticides. Several examples will be discussed, including a pesticide surveillance systems, the American Association of Poison Control Center's Toxic Exposure Surveillance System, and the Federal Insecticide Fungicide and Rodenticide Act (FIFRA) 6(a)2 program. Examples of data collected and their meaning will be discussed. Issues of data validity and traceability, documentation of exposures, importance of exposure intent (intentional versus unintentional exposures) and issues of impact (relation of exposures to clinical impact in the context of product sales data) will be explored. An example of the use of spontaneously reported data for pesticide re-registration will be presented.

The presentation will focus on efforts to improve data collection, including dose assessment and expectations for the future.

ACHIEVING A CONSISTENT USE OF HUMAN DATA IN CHEMICALS RISK ASSESSMENT AND MANAGEMENT

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Although the risk assessment of chemicals is best served by the examination of all information, available human effects data (HD) are not consistently considered across and within many risk assessment processes. Such practice is cause in itself, but more so given society's increasing call for risks to be properly evaluated and animal welfare concerns respected. ECETOC, together with other regulatory agencies and international non-governmental bodies, has set itself the challenge of identifying mechanisms that enable available human data to be better utilised to improve the accuracy of human risk assessments.

The presentation will review some of the activities that ECETOC is engaged in which aim to ensure that human data can be consistently interpreted. Specifically it will describe the results of a workshop, run by ECETOC in conjunction with IPCS, the EU and OECD, that sought to evaluate the validity and value of a range of human data sources for a variety of risk assessment and management purposes. The workshop concluded that whilst various forms of HD are available, they are frequently not readily accessible and that their use is further hindered by the absence of suitable framework for evaluating data quality and facilitating data interpretation and application. As part of the workshop, participants reviewed a range of different forms of HD with the aim of investigating the extent to which they might be useful across the spectrum of risk assessment.

Building on the above, the presentation will outline a basis for a framework in which different forms of human data can be consistently and reliably integrated in risk assessments and which account for the societal expectation for the process to be straightforward, transparent and equitable. The presentation will also identify the requirements which need to be considered and implemented in order to improve the availability and collection of reliable human data; to reduce the uncertainties often associated with it's use; and the role it might play in maximising the effectiveness of chemical risk management strategies.

USE OF HUMAN DATA FOR QUANTITATIVE RISK ASSESSMENT OF PESTICIDE EXPOSURE

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A fundamental principle of pesticide regulations is to protect the health of those who apply pesticides, those who are exposed as bystanders, and those who are exposed to residues in food and water. This is done through a process of quantitative risk assessment in which analysis of human data is considered a critical component. The individual steps in the process are hazard identification, dose-response relationship and exposure assessment. The latter two steps combine to form the risk characterisation part of the process.

A tiered approach is being advocated to the generation and use of human data for pesticide operator risk assessment[1]. Each tier involves the comparison of an exposure data set with the appropriate No Observed Adverse Effect Level (usually obtained from animal toxicology studies) and applying an assessment or safety factor to account for uncertainties when extrapolating from animal data to human exposure, as well as inter-individual differences in human response.

The first tier involves the use of generic databases which allow model calculations for the likely exposure level. The source and type of data used should be clearly identified and the database or model used must be validated and applied correctly. At this stage, very conservative assumptions are used (e.g. no protective equipment, 100% skin absorption). In the second tier the data set is refined, for example using actual skin absorption data (animal or human in vitro) and building in factors to account for personal protection. The third tier involves the generation of actual human data. These could be exposure measurements or, ideally, biological monitoring backed by human pharmacokinetic information generated through appropriate, scientifically and ethically sound studies. If the risk assessment still indicates excessive exposure, further risk mitigation factors may be considered to reduce the absorbed dose to an acceptable level.

Human health surveys can be of considerable benefit in the risk assessment process, particularly at the time of re-registration of a pesticide, when a considerable amount of human use experience data has accumulated. In addition, health surveys may help to refine assessment factors for the calculation of acceptable risk, particularly where there are questions about the applicability of animal data at high doses to the human use conditions which may involve exposure at doses several orders of magnitude lower than encountered in animal studies.

[1] OECD (1997). Guidance Document for the Conduct of Studies of Occupational Exposure to Pesticides During Agricultural Application. OECD Environmental Health and Safety Publications, Series on Testing and Assessment, No. 9. Environment Directorate, Organisation for Economic Co-operation and Development, Paris.

HUMAN DATA IN RISK ASSESSMENT OF PESTICIDES: ASSESSMENT OF RELEVANCE FOR MAN OF RODENT TOXICITY AND EVALUATION OF INTERSPECIES SENSITIVITY

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The process of registration of new pesticides requires extensive toxicological testing in animals to characterise their toxicity and assess their potential toxicological risk for humans. Most of the experimental studies are performed on rodents. In spite of the relative similarity between rodents and man, the greatest uncertainty of the risk assessment often resides in the extrapolation of data from animal to man. The key issues of this extrapolation concern the relevance for man of the toxic effects observed in animals and, when they are relevant, the relative sensitivity to these effects of the human species in comparison with the rodents (rats and mice).

Through a number of examples, this paper will demonstrate that even minor physiological differences among humans, rats and mice may determine remarkable differences in toxicity and in the dose-response curve among the species. Such differences are revealed when comparable toxicological data are available both in humans and in the tested animal species.

The key human toxicological information that may reduce the uncertainty in the assessment can be obtained from understanding of relevant interspecies physiological differences as well from results of controlled human studies. The former has proved to be essential in the assessment of the risk of dithiocarbamates, while the latter has resulted to be particularly important for acute toxic risk of anti-cholinesterase compounds.

Recent scientific acquisitions on the mode of action of carcinogenic chemicals suggest that remarkable differences in toxicity exist even among different strains of mice and different rodent species. In order to properly predict the toxic risk for the human species it is therefore essential to investigate the biochemical metabolic pattern of human tissues and compare it with that of the experimental animals.

THE OLDER WORKER IN THE CONSTRUCTION INDUSTRY

DISABILITY RETIREMENT AMONG FORMER EMPLOYEES AT THE CONSTRUCTION OF THE GREAT BELT LINK

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[ID 2591]

Background: The general demographic development result in an ageing working population. There is thus a need that people can stay in work more years. It is assumed that health and safety at work must be accommodated to this situation. Construction work is considered hard work, and we investigated the impact on the retirement among construction workers.

Objective: To investigate incidences of disability retirement among men who had been employed at the construction of a large traffic link in Denmark, which involved long work-hours and long distances between home and work place.

Methods: Men aged 20-54 years at baseline who had been engaged in the construction of the Great Belt Link (N=5882) were followed up for disability retirements from 1996-2000. Age standardised incidence ratios (SIR) were calculated and compared to those of other construction workers (N=117 157). As standard population we used all economically active men in Denmark.

Results: The SIR's for the two groups were 2.29 (95% CI: 1.95-2.67) and 0.98 (95% CI: 0.93-1.03) respectively**.**

Conclusions and discussion: The Great Belt construction workers had a significantly elevated risk for disability retirement both in comparison with other construction workers and with economically active men in general. This is a major challenge for the construction sector and health and safety professionals if construction workers should be more years in active work. This might need both improved standards in safety in construction work, but also more individual employment arrangement if such improvement should be achieved.

MONITORING WORKING CONDITIONS AND HEALTH OF OLDER WORKERS IN CONSTRUCTION INDUSTRY

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[ID 2592]

Accurate reporting of work-related conditions is necessary to monitor workplace health and safety, and to identify the interventions that are most needed (Pransky et al, 1999).

In the Netherlands, working conditions and health are monitored on an aggregated level in construction industry. Every two years, more than 70,000 construction workers fill out a questionnaire as part of their periodical health check up. In this paper we present the data of the period 1989-2003 and focus on working conditions and health of older workers (>55 years). The number of older workers in Dutch construction industry nearly doubled in this period: from 7.5% in '89/'90 to 15.1% in 2003 (Hoonakker, 2005). We compare working conditions (e.g. physical and psycho-social workload, environmental conditions, etc.) and physical symptoms and conditions (e.g. heart complaints, musculo-skeletal disorders, allergic reactions etc.) of older workers with other age categories. Results show that –in general- older workers have more complaints about working conditions and health. We also look at changes over time. We discuss possible explanations of the changes in the results such as policy implementations to improve working conditions and reduce absenteeism. Finally, we focus on the interventions most needed to improve working conditions and health of older workers in construction industry.

THE BIFURCATION OF THE CONSTRUCTION INDUSTRY: COMPETITIVE PRESSURES ON AN AGING ESTABLISHED SECTOR

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[ID 2593]

The construction industry in the U.S., like in most industrialized countries, is increasingly bifurcated between an established, highly unionized, high performance and high cost sector, and a more informal, non-union and lower cost sector consisting of immigrant workers from less developed countries. The hourly labor cost differential between these sectors is 2-4 fold. In the U.S., workers in the lower cost sector typically are young and come from rural backgrounds in Mexico and other Central American countries, while the workforce in the established sector is aging rapidly. Although the immigrants, due to language and skills barriers, may be less productive than the established workforce, overcoming the very large differential in cost between the two sectors nonetheless is placing a heavy level of productivity pressure on the established workforce.

We have performed medical evaluations of 11,000 older construction workers from the established sector of the construction industry in the U.S. In these workers, we find a very high rate of musculoskeletal disorders, and chronic conditions, such as pulmonary diseases, hypertension and diabetes. These findings suggest that if the established sector is to remain competitive, workers need to remain much healthier for a longer period of time than at present. To achieve this, not only do work environments and work organization need to be improved upon, but the workers also need to be in better health condition than at present. Therefore, occupational health services have an important role in not only making working conditions better, but also promoting a healthier workforce.

Unfortunately, at least in the U.S., the occupational health services are poorly developed and ill prepared for this dual role. Health care for workers is divided between those who are concerned about safety and health on the job, and those who provide medical care services. These two groups are not in any way coordinated, and as a result, workers receive extremely sub-optimal care, and the opportunity to make the established sector more competitive is not addressed.

This paper will present data on the magnitude of these trends in the U.S., and discuss opportunities for improvement.

SOCIAL/ECONOMIC IMPACT OF INJURY OF INJURY/ILLNESS IN CAREER ROOFERS

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[ID 2594]

We have enrolled 989 actively working roofers in a longitudinal study to assess the social/economic impact of injury/illness, and will present results of the baseline survey. The baseline interview included questions on: (1) serious medical and musculoskeletal conditions in the past two years, (2) missed work and job accommodations related to these conditions, (3) frequency and duration of musculoskeletal symptoms, and (4) functional status and economic status. Preliminary results show that 69% percent of respondents had experienced at least one target medical or musculoskeletal condition in the previous two years. The vast majority of musculoskeletal conditions were linked to work-related injuries. Nearly one-third (31%) of all respondents reported missing time from work in the prior two years due to a target medical condition or MSD. Fourteen percent of workers with a condition of any type indicated a limitation in three or more work activities, compared to only 4% of respondents with no condition; workers with both medical and musculoskeletal conditions had the highest levels of impairment overall. Seventeen percent (17%) of roofers an MSD and a medical condition felt they could not take care of their families "like they used to" often or almost always, as opposed to 2.4% of those without a condition. Of those roofers with an MSD and a medical condition, 38.5% had dipped into savings in the past year, significantly higher than the 24% among the participants without a medical condition or an MSD. Among those who had missed work due to any condition, 43% had dipped into savings. The prevalence of medical conditions, and the impact of those conditions, increased significantly with age. This presentation will present a detailed analysis of the interaction of aging, disease and injury and describe the impact of diseases of aging on work ability among roofers.

DOES IT MAKE A DIFFERENCE? CASE STUDIES IN GOOD OCCUPATIONAL SAFETY AND HEALTH COMMUNICATION PRACTICE. LESSONS LEARNED IN WORKING WITH HARD TO REACH AUDIENCES

SOCIAL MARKETING GOES TO WORK: USING MARKETING COMMUNICATION FOR OCCUPATIONAL SAFETY AND HEALTH

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[ID 577]

Social marketing seeks to create voluntary behavior change by using marketing communication techniques and strategies. In the last 30 years, social marketing campaigns have been used to promote a variety of health and safety behaviors, including tobacco cessation, childhood physical activity, condom use, and safe driving. Its use in occupational safety and health interventions remains relatively unexplored.

This presentation will discuss basic concepts of social marketing and its applications for workplace settings. We will discuss the importance of being audience focused, theory based, and research driven. We will review practical elements of creating a campaign, and examine several examples of past and current initiatives, including preparations for a tractor safety campaign sponsored by the National Institute for Occupational Safety and Health in Washington, DC. Throughout the discussion participants will be asked to consider how to define an audience in a workplace setting; the importance of creating an effective brand and call to action; and the critical differences between commercial and social marketing.

INFORMING, COUNSELING, AND ADVISING (ICA). DOES IT MAKE A DIFFERENCE IN IMPROVING THE HEALTH AND SAFETY OF YOUNG WORKERS?

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[ID 2054]

Introduction and objectives

A case-study of ICA was the first phase of a research project aiming to develop a model of good ICA practice in OHS for young workers. The objective was to find out what ICA is in practice, and how different stakeholders perceive its impact on the health and safety of young workers.

Material and methods

The study was conducted during 1.9.2003-30.6.2004 in one OHS-unit of a large Finnish construction company. The data was comprised of 40 interviews and 16 observations generated from 14 different situations called the forums of ICA. It also included 18 thematic interviews of the representatives of six stakeholder groups of the company.

Results

Nurses conducted ICA in all encounters with their clients either alone or in cooperation with different actors inside and outside the client-organization. In the work of the physician ICA played a minor role. In the OHS-unit ICA-activities were not systematically coordinated, followed up or evaluated. Discussion was the most often used method of ICA. Lectures, simulations and practical exercises were also utilized. In half of the forums health information was provided to foremen, occupational safety or HR-personnel. Foremen and more experienced co-workers were primary sources of health and safety information for young workers, who preferred learning OHS-issues by doing practical exercises and solving daily problems at the work site.

Discussion and conclusions

Besides counselling in one-to-one interactions with young workers OH-personnel utilize other methods and inform other organizational stakeholders. Especially foremen, occupational safety personnel and senior workers may provide better leverage to ICA in OHS. Consequently, future research should focus on cooperation between OH-personnel and other organizational stakeholders and on the needs and preferences of young workers. Additionally, more attention should be paid to the role of different OH-professionals and systematic planning, coordination, follow-up and evaluation of ICA in OHS.

COMMUNICATING OCCUPATIONAL SAFETY AND HEALTH TOPICS THROUGH SPANISH SOAP OPERAS

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[ID 1550]

In order to reduce occupational injuries and fatalities among Hispanic construction workers, it is necessary to increase awareness of occupational hazards through effective channels of communication. One channel that has proven successful in effectively communicating health issues to the Spanish speaking community is televised Spanish soap operas, also known as "telenovelas". In a recent study by Beck et. al, it has seen shown that the telenovela format is a trusted source of information for Hispanic audiences, and that the viewers often indicate that they learn about various health and social topics. An additional advantage is that linking the broadcast of message inserts containing health information to telenovela storylines with related content is an effective way to reach a geographically dispersed and mobile population. The National Institute for Occupational Safety and Health (NIOSH), which is part of the Centers for Disease Control and Prevention, has teamed up with the Center to Protect Worker's Rights (CPWR) and Health Hollywood and Society (HHS), to work with Telemundo to increase awareness of falls related to construction work. This team will serve as a resource for information for Telemundo writers, as they develop a storyline in one of their upcoming telenovelas. The team will also work with Telemundo to develop advertising spots to communicate key safety and health messages related to the broadcast storyline. The evaluation component of this collaborative effort will be conducted by HHS, and they will specifically measure the effectiveness of the storyline and the advertisements through a series of activities, including focus groups and tracking hotline calls. A quantitative methodology involving behavioral change analysis will be part of the impact evaluation for this project. The telenovela storyline and advertisement slots will also be followed with a complementary campaign, which will be done in collaboration with Telemundo.

MAKING HEALTH EDUCATION UNDERSTANDABLE TO THE LAY PERSON: HEALTH MANAGEMENT AND PRACTICES

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[ID 2148]

This research paper focused on the health management and practices of selected Filipino women workers and the factors that influence such behavior. Factors affecting the health behaviour were investigated as an insight into the formulation of the best or better approach for health management at the workplace. Several information dissemination techniques had been given to workers towards the maintenance of occupational health and in the prevention of illnesses, injuries and accidents. However, data show that there is still an increasing trend of occupational injuries and illnesses. Health promotion without considering the personalities, culture and the social structure where individuals work may become futile and counterproductive. It is therefore expedient that all efforts to uplift the health conditions of the workers should incorporate sociological concepts and approaches that make strategies both rational as well as sensitive to the real situation and mileau of the workers. A review of the Occupational Injuries and Work Accidents Consolidated Report from 1991-1993 showed an estimated 220,000 to 248,000 occupational injuries occurring per year./6 Of these, 70% are non-disabling while 30% are disabling. Of these disabling cases, 0.5% to 0.9% are fatal while 91%-95% are non-fatal. Of the non- fatal disabling injuries, 99% result in temporary total disability while the rest resulted in either permanent partial or permanent total disability. From 1991-1993, 45%-58% of the occupational injuries occurred in the manufacturing establishments. The accidental causal factors include use of handtools and machineries, unsafe mechanical or physical conditions and unsafe acts. The problem in the workplace is therefore very serious.

Some of the important conclusions in this study include:

- Any existing ideology in the workplace will foster a particular kind of health behavior congruent to the dominant culture. Whatever information dissemination given to the workers , including detailed discussion of the physiology of illness, when ideology are in direct contrast to these body of knowledge, the workers persist with their dominant health management.
- There is a need to incorporate transcultural health care values and practices and the need to accept clients on their own terms that transcend the more obvious cultural classifications.
- Health promotion at the workplace without considering the personalities, culture and the social structure where individuals work may be futile and counterproductive.

WHAT MAKES A DIFFERENCE? CASE STUDIES IN GOOD COMMUNICATION PRACTICE. LESSONS LEARNED IN OCCUPATIONAL SAFETY AND HEALTH: KNOWLEDGE MANAGEMENT AND WEB-BASED DELIVERY

DEVELOPING AND MANAGING AN INTERNATIONAL OCCUPATIONAL HEALTH AND SAFETY PORTAL

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[ID 1483]

Knowledge from experience and research occurring throughout the world provides a better understanding of the wide variety of many real issues and concerns in workplace health and safety, whether arising from physical, environmental, job content, organizational, psychosocial or personal risk factors. The International Occupational Health and Safety Portal created jointly by the WHO and the ILO captures relevant information contributions from the WHO Collaborating Centres and ILO/CIS National Centres throughout the world. It makes this information readily available to the world population in a convenient format for easy access and retrieval from a single Web Portal.

The International Portal provides Centres from both developing and developed countries alike the facility: to show-case and provide their occupational health and safety products, services and information to the world on a technically sophisticated portal; to benefit from the work and knowledge sources of other centres; to avoid unnecessary duplication and, to collaborate in achieving shared goals.

The presentation addresses the design, the multi-lingual structure, the search and navigational features, the content management process and the methods of co-operative content development and updating by participating centres.

FUNDAMENTALS IN OCCUPATIONAL HEALTH: CASE-BASED MODULES IN RISK ASSSESSMENT AND MANAGEMENT

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[ID 2055]

Fundamentals in Occupational Health, WHO modules in occupational health, hygiene and safety, are designed to provide education for professionals who are charged with the responsibility of protecting the health of workers, including public health officers, physicians, nurses, policy makers, labor inspectors, and worker health and safety advocates. These materials were developed to support the implementation the Forty-ninth World Health Assembly global strategy for occupational health (WHA49.12). Where relevant, the materials complement the effort of the International Programme on Chemical Safety (IPCS) Global Implementation Strategy on occupational risk management.The materials are organized into three 16-hour, case based modules for a multidisciplinary audience, by economic sector: agriculture, manufacturing, and service. Occupational health encompasses many disciplines-- toxicology, epidemiology, industrial hygiene, and safety. It employs the methods of hazard/risk identification, characterization, and evaluation and touches on issues related to policy and ethics. We have used the “economic sector” as an organizing format; classroom exercises are built around cases related to each sector and cover each of the occupational health disciplines in one classroom. The instructor may choose to re-organize the content to fit a different student group. For example, the hygiene-related exercises may be pulled out and re-assembled to educate a group of physicians in exposure assessment. The modules were developed by an interdisciplinary multi national team that included occupational medicine physicians, industrial hygienists and curriculum specialists. Additionally, the materials were piloted in Turkey, South Africa, and Costa Rica. The materials are also available at

REAL-TIME ONLINE TRAINING IN ENVIRONMENTAL AND OCCUPATIONAL HEALTH

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[ID 2102]

In two consecutive Fall semesters (15 week periods), a real-time internet course entitled, Principles of Environmental and Occupational Health was offered to a total of 14 international students. The overall goal of the course is to improve familiarity with the disciplines encompassed by environmental and occupational health and to foster an appreciation of the approaches by which professionals identify, analyze and solve occupational and environmental health problems. Competencies include: taking an occupational history, answering questions on specific content, engaging in a debate demonstrating trade-offs inherent in environmental policy, posting and following current environmental events, finding internet-based resources, and gaining facility with on-line learning. The course was developed within the Blackboard software framework www.blackboard.com) and utilized the textbook, Basic Environmental Health by Yassi et al. Fourteen students from Senegal, Ghana, South Africa, Kenya, Turkey, Poland, Vietnam, Philippines, Thailand, and Costa Rica enrolled in the course. This session will describe an evaluation of this experience by the students and the instructors and frame it in the context of potential formats for distance education.

INFORMATION TRANSFER IN OCCUPATIONAL HEALTH BY MEANS OF A TOPIC SPECIFIC INTERNET PORTAL

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[ID 1614]

Introduction: The diversity of topics and tasks in Occupational Health (OH) requires constant and efficient information input towards OH. The internet cannot satisfy this need of specific information transfer sufficiently as the selection of information is time consuming and often likely to be unsuccessful. A feasible solution might be the following principle:

- Existing competence in competence centres (e.g. universities) is being used for
- targeted information transfer to a target group (here: OH) by the
- efficient use of electronic media.

Here, the advantages of the internet and the existing expertise are combined. We have investigated the functioning of the principle with “ariadne” – an internet portal for OH (www.ariadne.uni-wuppertal.de).

Method: A free internet portal was set up targeting at OH and covering “psychosocial factors at work” (=competence of research institution). Ariadne presents relevant a) events, b) links to literature, c) links to support material, d) other useful links. The content of all links has been validated and regular updates took place. Publicity was achieved by short articles in relevant media and email based newsletters to 500 OH staff. The efficiency and effectiveness was evaluated.

Results: a) time spent: 10 h/week (student assistant) were not sufficient in the phase of establishment but in the later project phase. b) costs: project costs of 15.000€covered student wages but not academic input. c) content: larger part of the content came from the departments’ daily work. Later updates required more search input. Event search was time consuming. d) acceptance: after 1 year: 50 visitors/day. An email survey documented a very positive response.

Discussion/Conclusion: The ariadne project shows that it is possible to efficiently – by use of the internet – make topic specific information accessible to a limited target group (about 15.000 OH staff in Germany). But limits must be seen: cooperation of users is likely to be almost absent and the continued input besides regular work shall not be underestimated.

Still, the vision would be a network of different targeted information portals provided by several competence centres which would then effectively support the work of OH Services and increase their quality.

WEB UTILITY AND USABILITY. THE GOOD, THE BAD, THE UGLY

LUM M.R.
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[ID 2194]

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RISKS IN THE MODERN SOCIETY

OPENING
JEAN-LUC MARIE
[ID 2599]
[[Text not delivered]

RISKS IN THE MODERN SOCIETY
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Chairman of the ISSA-Special Commission on Prevention Institut National de Recherche et de Sécurité [1]
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[ID 2600]
To this ISSA-ICOH-Session the introduction shall be made by Jean-Luc Marié, Chairman of the ISSA-Special Commission on Prevention (of occupational risks) with eleven international Sections as members. We shall present the results of a project group of the ISSA-Section Machine and System Safety on "risks in the modern society".
Our Section has the task to deal with machine safety and with the connecting system safety. Safety of machines and installations cannot be regarded from the technical-engineering safety viewpoint alone but must also consider the different production processes themselves as well as the users'/operators' performance. Going beyond this approach the Machine and System Safety Section has also been dealing with a still wider approach which was successfully presented for the first time at our conference 2000 "Future - Work - Prevention - What can risk management contribute?".
Since some time we are working in a project group with recognized experts in the fields of occupational safety and health and environment on risks in the modern society. The project is starting from occupational safety and health as this is a core competence of the ISSA-Special Commission on Prevention and its Sections. One main goal is a systematic, integrated approach to deal with risks using a widely accepted terminology when describing the common and necessary steps for risk management and risk governance.
We have considered some important recent changes in working life on a global level but also leading to changes at the national, regional and local levels, for big and also for small and even micro companies. Catastrophes, terrorist attacks, large scale diseases, the threat of more catastrophes have its impact on how to assess, manage and govern risks. The impact on work life and social life is strong.
The session shall draw attention on some of the important challenges to deal with: rapid and constant development of technologies/growing connectivity, interaction and interdependence/new trends in economic structures and conditions of work, for example company structures, fragmented and insecure work life, aging and multi-cultural work force.
We try to describe and present a model to govern and manage these risks, based on risk profiles from modern work life.
The experts from specific areas shall present some essential results from the group's discussions: Jorma Rantanen on "challenges to risk governance in a changing world of work", Domenico Geraci, ISPESL Roma, on "how to develop a safety society?".
The specific aspects of occupational safety, occupational health and environment and the question how closely they are linked shall be shown in their interconnectivity in a panel discussion during the special session with experts: Jorma Rantanen (occupational health), Siegfried Radandt (occupational safety), Ortwin Renn (environment), Leonard Sassano (roles of actors, some examples towards a safe society).

CHALLENGES TO RISK GOVERNANCE IN A CHANGING WORLD
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[ID 2601]
All aspects of human life and the ecosystem are affected in the globalization process. As the driving force is the development of the global economies and the production life, the work places and the working people are in the frontline to experience the global change.
The international organizations, UN, ILO, WHO, Bretton- Woods Institutions and WTO are discussing the strategies to generate tools for global governance which is needed to fill the hole, which has been generated through weakening of the national and local governance. Many NGOs, professional, political and cultural groups and their leaders, national and local level bodies try to develop responses, to manage the situation in which the major decisions are made at the global macro level and the practical consequences are faced at local micro level. The discussion has introduced two new concepts, the *global governance* and the *global common goods, GCGs.* The topics to be subjected to the global governance are according to Reinicke et al. (2000) environmental sustainability, security and peace and equality and justice. As the work life is one of the most central arenas of the human life and it has a great impact on the governance of any other human activity, it is reasonable that a third point, the Decent Work, is added to Reinicke's list according to the proposal of ILO (1999).
In terms of work life risk management the governance implies the prevention and control of several types of risks: safety and health risks of work environment, risk of compromising workers' rights at work, risk of unemployment and under-employment, risk of absolute or relative poverty, risk of lack of basic services, social risks social exclusion, i.e. governance of change in a balanced way.
Occupational safety and health can be understood as a global common good; it benefits all the workers, their families, companies, communities, nations and the whole global system as unnecessary losses due to accidents and injuries, occupational diseases and hazards and overloading conditions are eliminated. It also promotes health, work ability and productivity and thus supports wellbeing of workers and their families and counteracts the risk of poverty. As in the case of most other GCGs occupational health is undersupplied simultaneously while the knowledge and capacity of existing occupational health professionals are underutilized. In line with the theoretical definition of the GCG, OSH benefits all, does not reduce others safety and health and is in principle, non-exhausting commodity.
1. Reinicke W H, Deng F. Witte J M., Benner T, Whitaker B, and Gershman, G. *Critical Choices*. The United Nations, Networks, and the Future of Global Governance IDRC 2000.ISBN 0-88936-921-6.164 pp.
International Labour Office. Decent Work. Report by the Director General for the International Labour Conference 87th Session. International Labour Office, Geneva 1999.

GOVERNANCE OF OCCUPATIONAL HEALTH RISKS, OCCUPATIONAL SAFETY RISKS
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[ID 2602]
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HOW TO DEVELOP A SAFE SOCIETY?
GERACI D.
[ID 2603]
[Text not delivered]

DERMAL EXPOSURE AND RISK ASSESSMENT

RISKOFDERM: RISK ASSESSMENT FOR OCCUPATIONAL DERMAL EXPOSURE TO CHEMICALS (QLK4-CT-1999-01107)

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[ID 416]

A research programme with interrelated work parts, was carried out.
1: Qualitative dermal exposure survey, to create an overview of qualitative information about exposure throughout Europe (processes, tasks, populations and determinants of exposure).
2: Quantitative dermal exposure survey, to gather quantitative data on potential (and actual) exposure in selected workplace situations.
3: Exposure model set, to develop an appropriate predictive exposure model (set) for generic assessment of exposure of single chemicals based on measurements.
4: Risk assessment and management toolkit, to develop a risk assessment and management Toolkit for exposure and risk assessment (and management) in small and medium-sized enterprises (SMEs).
The work resulted in a large database with information on determinants of dermal exposure for the qualitative survey carried out in various industry sectors throughout Europe. Two large databases have been created containing the results of hand and body exposures based on the quantitative dermal exposure studies carried out for a large series of different use scenarios for chemicals. These databases are available for use by policy makers, other researchers and exposure modellers.
On the basis of these results the two major products were prepared in accordance with the two main objectives of the project.

- A predictive dermal exposure model set structured according to the chosen format of six different dermal operation exposure units. Also a set of adaptations has been prepared for the Technical Guidance Document Risk Assessment for new and existing substance regulations (currently being developed into REACH). This set of adaptations can easily be integrated in the TGD.
- A Toolkit for risk assessment and risk management has been developed and is available on CD-rom and on the internet, for use by competent authorities, labour inspectorates and SMEs.

The results of the project have been published or are in the process of being published.

IS IT NOT TIME TO ESTABLISH DERMAL OCCUPATIONAL EXPOSURE LIMITS?

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[ID 2056]

Occupational exposure limits (OEL´s) for inhalation exposure has been established in order to reduce the risk to develop work related diseases such as respiratory impairments, cancer or other systemic effects. OEL´s are set up for additional chemicals as supplementary toxicological data and/or epidemiological data has been published and evaluated. Supplementary data about occupational exposure and health problems related to the exposure may cause a reduction of the level of an existing OEL. The development of sensitive and specific analytical methods and reliable sampling methods has also contributed to the reduction of present exposure limits and in establishing additional OEL´s. In general, inhalation exposure has decreased within different industrial branches and this has drawn more focus to dermal occupational exposure as dermal exposure may contribute to a relatively large extent to the internal exposure. Some chemicals may cause allergic dermatitis and others may cause skin cancer following dermal exposure. Intensive research activities regarding occupational dermal exposure are carried out by numerous research groups. Experimental studies concerning dermal uptake through human skin, in vitro and in vivo, has been carried out. Samplers for dermal exposure assessments have been developed or are under development. A lot of data about dermal occupational exposure levels to different kinds of chemicals has been published. Studies about systemic and local effects following occupational dermal exposure for various substances have been performed. Sampling strategies for dermal exposure assessments are intensely discussed.
This talk will discuss
- how much data regarding dermal uptake (flux) do we need
- how much toxicological data do we need
- how much occupational exposure data do we need
- how much information from epidemiological studies do we need
- what more do we have to take into consideration before establishing a DOEL?

DERMAL OCCUPATIONAL EXPOSURE LIMITS: THEIR APPLICABILITY IN REGULATORY SETTINGS

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[ID 2103]

Significant resources have been invested over the last 30 years to develop methodologies to reduce inhalation exposure to chemical agents, which are hazardous to health. One of the major anchors is the development and application of inhalation occupational exposure limits (IOELs). The efforts in this area have helped to reduce the incidence and prevalence of work-related respiratory disease and highlight the relative significance of work related skin disease.
During the last decade therefore, regulatory and scientific research agencies within the European Union (EU) and North America have recognised and agreed to the aim to significantly reduce dermal exposure to hazardous substances and wet work.
A number of approaches have been initiated to meet this aim. One such initiative was an attempt to develop dermal occupational exposure limits (DOELs) for chemical agents, which have a significant potential for dermal uptake (absorption). DOEL is defined as the total dose deposited on the skin during a work shift. The concept of DOEL is claimed to be relevant for compliance testing and health surveillance, when the dermal uptake plays a significant role to the total body dose.
This paper will analyse:

- How small firms (SMEs) perceive OELs and how they use them for regulatory compliance;
- The relevance of DOEL as a regulatory tool;
- The usefulness for compliance testing and enforcement;
- The likely advantages or disadvantages of DOEL in a court of law for achieving justice;
- The usefulness of DOEL in health surveillance for risk management and compliance testing; and
- What is being done, by regulatory authorities, to facilitate the needs of SMEs in the absence of DOELs.

Finally, It will provide an overview of the views of people involved in the development and application of workplace limits.

DERMAL ABSORPTION THROUGH DAMAGED SKIN

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[ID 2150]

Risk assessment of dermal exposure usually refers to healthy skin. However, in daily life, skin is exposed to a variety of occupational and environmental insults capable to compromise the skin barrier. Examples are chemicals (detergents, solvents), physical (mechanical trauma, UV radiation) and biological agents (pathogens, immune stimulants). Once barrier function is impaired, a higher absorption of chemicals will occur. It has been shown (Nielsen JB, 2005) that even slight damage of the skin achieved by sodium lauryl sulphate, SLS, leads to increased percutaneous penetration of pesticides covering a wide range of solubilities. Higher dermal absorption was reported also in the skin damaged by acetone (Tsai JC et al., 2001, Benfeldt E, 1999), trichloroethylene (Baynes RE et al., 2005) and by tape stripping (Benfeldt E, 1999, Tsai JC et al., 2003). Enhanced permeability has also been reported in various skin diseases such as atopic dermatitis, psoriasis, and ichthyosis (Jakasa I., et al. 2005, Gould AR., et al., 2003). The enhanced diffusion in these skin disorders has been associated with the altered composition and organization of lipids in the stratum corneum (Madison KC, 2003). Reduced skin barrier integrity also enables penetration of larger molecules which would not have been able to penetrate an intact stratum corneum. As a consequence, the impaired barrier, even in the clinically normal skin may predispose to the development of contact dermatitis evoked by irritants and allergens.
To conclude: several lines of evidence indicate that a compromised skin barrier is not uncommon and should be considered in risk assessment and in the setting of standards for dermal exposure to chemicals.

ACUTE AND CHRONIC EXPOSURE TO INDUSTRIAL CHEMICALS AND SENSORY PERCEPTION IN WORKERS

SENSORY PERCEPTION: AN OVERLOOKED TARGET OF CHRONIC OCCUPATIONAL EXPOSURE TO INDUSTRIAL CHEMICALS

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[ID 1068]

The effect of industrial chemicals on sensory perception in exposed workers has received scant attention until recent years. Among causes certainly are the complexity of sensory perception, and the lack of adequate quantitative methods for testing groups of subjects “in the field”. Despite these difficulties, an increasing number of experimental and epidemiological studies show that vision, hearing and olfactory function are affected by chronic exposure to several chemicals, and some data exist for touch and taste. Metals, as lead and mercury, or solvents like carbon disulphide, hexane, styrene, tetrachloroethylene and toluene, or solvent mixtures, can affect visual function in exposed workers. Arsenic, lead, manganese, mercury, carbon monoxide, carbon disulphide, hexane, styrene, toluene, trichloethylene, xylene and solvent mixtures can impair hearing and/or induce a synergistic effect with noise in inducing hearing impairment. Olfactory function can be impaired by metals as arsenic, cadmium, chromium, lead, manganese and mercury, and by organic compounds as ammonia, acrylates, benzene, hydrogen sulphide, sulphur dioxide, toluene, xylene and solvent mixtures. Cadmium, chromium, lead and mercury, and solvent mixtures can induce a reduction in taste perception. An evaluation of the effect on touch (tactile sense) is more difficult, as various receptors and nerve fibres are involved, nevertheless at least lead, and mercury, or organophosphates, styrene, xylene and solvent mixtures are known to impair this sense. Knowledge on thresholds is limited, but some chemicals seem to induce an impairment in sensory perception at relatively low exposure levels compared to the current occupational limits. Knowledge on pathogenesis of these effects is lacking. Available data support the need for further research in this field. Priorities are the standardization of methods for quantitative evaluation of perception, studies on the effect of co-exposures, testing of different senses in the same subjects, and longitudinal studies to evaluate evolution and reversibility of the impairment.

CHEMICAL EXPOSURE AS A RISK FACTOR FOR HEARING LOSS: IMPLICATIONS FOR OCCUPATIONAL HEALTH

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[ID 364]

Research conducted over the last two decades has brought attention to the interaction between noise and chemicals in the workplace as a cause for hearing disorders. Since then, several research labs have become involved in investigating the ototoxic properties of agents such as toluene, styrene, xylenes, ethyl benzene, n-hexane, trichloroethylene, stoddard solvent, carbon monoxide, hydrogen cyanide, and lead. Reports confirmed earlier observations that some chemicals interact synergistically with noise or potentiate its effects on the auditory system. Studies have shown that chemicals reached the inner ear through the blood stream, were found in the inner ear fluids and have caused damage to some of the inner ear structures and functions. Although noise is particularly damaging to the cochlea, industrial chemicals tend to affect both the cochlear structures and the central auditory system. This compound action may profoundly impact a worker’s particular hearing loss because not only will the detection of sounds be impaired but also the discrimination of sounds may be affected (i.e., not only will sounds be perceived as less loud but also as more distorted). In light of the many chemicals that are used in the work place and evidence that they may affect hearing, numerous populations are being underserved with regard to the prevention of hearing loss. The new evidence has prompted the proposal of new guidelines and standards on the prevention of hearing loss from ototoxic agents. This presentation will review the current knowledge of chemical ototoxicity and discuss research needs regarding hearing loss prevention.

SENSORY EFFECTS OF OCCUPATIONAL TOLUENE EXPOSURE IN VIEW OF AN ENHANCED CONCEPT OF ADVERSITY

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[ID 1560]

Typically, critical levels of occupational exposure to toluene have been derived from studying effects on separate sensory domains like colour vision, olfaction and hearing. Introducing an enhanced concept of adversity data from two sensory domains will be analysed simultaneously.

Individual data of 162 subjects from rotogravure printing was collected during a longitudinal study with 3 repeated examinations on colour discrimination ability (CCI from Lanthony D-15d) and auditory thresholds (pure tone audiometry). Current and long-term exposure (LWAE) was 25.7 ppm and 42.7 ppm for high exposed (n=93) and 3.5 and 9.2 for low exposed (n=69). Mean exposure duration was 13.3 yr. for high and 13.7 for low exposed. Parametric analysis of the data was performed with MANCOVA models. Nonparametric analyses comprised 2x2 tables for cases with threshold declines of at least 10 dB and/or CCI declines of at least 10 percent between two examinations and respective comprehensive logistic models aiming at specific risk factors.

Neither parametric nor nonparametric approaches revealed significant effects of toluene exposure, of exposure duration, or their interaction. The covariables CDT, smoking and occupational qualification were insignificant, too.

The distribution of cases with remarkable impairments of hearing abilities and/or colour vision was not significantly associated to exposure level or -duration. Estimation of odds ratios for developing hearing and/or CCI deficits did not reveal significant effects of current or long-term toluene exposure or of relevant covariables.

Even simultaneous analyses of our hearing and colour vision data did not support results of other studies finding significant effects of toluene in single sensory domains at comparable toluene levels. Instead, our previously published results from separate hearing and colour vision analyses were confirmed.

Summarising all our results, long-term occupational toluene exposure at the observed level should not be expected to result in adverse effects in hearing and/or colour vision.

TESTING THE VISUAL SYSTEM: SCREENING, CROSS-SECTIONAL STUDIES AND COMPREHENSIVE MEASUREMENTS IN CLINICAL ASSESSMENTS

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[ID 1617]

The occupational chronic solvent encephalopathy (CSE) may develop after long-term life-time work exposure to organic solvents. There is a great need to develop tests to enable effective screening for toxic effects. Since repeated observations of visual system defects, reduced color vision and contrast sensitivity, these have been suggested for screening purposes. However, the pathogenesis of these findings is unclear.

Since 1995, we have performed visual function tests to CSE patients (N=109). The life-time solvent exposure has been assessed. Brain dysfunction remained stable during 2 to 5 years of follow up. Patients’ ocular health was studied and tested for visual field performance (automated perimetry by Octopus 101), color vision (FM100) and contrast sensitivity (Vistech6500). Furthermore, a group of patients with visual field or color vision disturbances were studied by multi-focal electroretinogram. Also, a group of patients were studied by visual search/attention tasks combined with eye movement measurements.

In 31 % of the CSE cases (N=70, without any ocular reason in biomicroscopy) a wide range color hue sensitivity reduction was found, while contrast sensitivity was intact. The age-normative controls of color vision testing revealed that at 2000 lux the age-related reduction in hue sensitivity was minimized. This has important implications for the testing conditions when testing workers above 40 years of age. CSE cases often showed a tunnel-type of reduced sensitivity at the periphery of the visual fields, which usually was not associated with the color vision defect. The mERG did not reveal reduced retinal potentials in CSE cases with color vision or visual field sensitivity reduction, but at group level peripheral amplitudes were inferior to controls. CSE cases showed slowness in visual search tasks without eye movement pathology. The visual system abnormalities suggest cortical pathology. The use visual tests in screening and field studies of exposed workers and the relation of visual findings with exposure and encephalopathy is discussed.

ASSESSING CHEMOSENSORY PROPERTIES AND EFFECTS OF THE LOCAL IRRITANT ETHYL ACETATE

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[ID 1537]

The chemosensory senses olfaction and trigeminal chemoreception are mediators and target site of adverse health effect of chemical exposures. Acute exposures stimulate these senses and might trigger symptoms, inflammation, or attentional deficits. Long-term exposure might adversely reduce the functional capacity of these senses and direct toxicity might occur. The incomplete knowledge about chemosensory properties and effects of occupationally used chemicals constrict the adequate regulation of local irritants. To cope with this problem we assessed the chemosensory properties and effects of the local irritant ethyl acetate in a three-stage approach.

(1) To obtain 'objective' information about the chemosensory properties of ethyl acetate we assessed the odor (OT) and irritation threshold (IT) psychophysically. These chemosensory thresholds are valid clues for the stimulation of olfactory and trigeminal receptors and for ethyl acetate these values were: OT=1.5 ppm and LT=1230 ppm.

(2) We used psychophysical intensity scaling to investigate how subjects perceive ethyl acetate across this chemosensory effect range. 44 male and female volunteers' evaluated different chemosensory sensations (e.g. annoyance, pungency) elicited by nine ascending concentration levels (ranging from 4 to 580 ppm) of ethyl acetate. At 400 ppm, corresponding to the German OEL, subjects perceived ethyl acetate as very annoying and reported strong sensations of pungency.

(3) We conducted an experimental study exposing 24 male and female volunteers to three different concentrations of ethyl acetate. Chemosensory effects during these exposures were assessed by means of subjective ratings, nasal resistance, substance P in nasal fluid, neurobehavioral performance, and alternations of eye blink rates. Preliminary analysis of the rating data showed that subjects evaluated the annoyance of exposure peaks (800 ppm) as 'moderate to strong' and the pungency as 'moderate'.

After the complete analysis of all three stages precise information about chemosensory effects of ethyl acetate can be provided to assist regulatory authorities.

GLOBAL HARMONIZATION OF DIGITAL CHEST IMAGES INCLUDING HRCT FOR PNEUMOCONIOSIS

OUTLINE OF INTERNATIONAL CLASSIFICATION OF HRCT FOR OCCUPATIONAL AND ENVIRONMENTAL RESPIRATORY DISEASE

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[ID 2025]

High resolution computed tomography (HRCT) plays an indispensable role in the diagnosis of pneumoconiosis and other lung damage arising from inhalation. Till now, however, there has been no agreed standardized convention for the use of the technique, or for documenting results uniformly.

Purpose of this paper is to present the coding sheet, which has been developed and tested by an international working group comprising experts from Belgium (P.A.Gevenois), Germany (K.G. Hering, T. Kraus, S. Tuengerthal), Finland (L. Kivisaari, T. Vehmas), France (M. Letourneux). Great Britain (M.D. Crane), Japan (H. Arikawa, Y. Kusaka, N. Suganuma) and the USA (J. Parker).

The standardized documentation of computertomogrphic findings in occupationally and environmentally related lung and pleural changes will be shown with the help of CT/HRCT reference films.

The classification scheme is purely descriptive, so that all aspects of occupationally and environmentally related parenchymal and pleural abnormalities may be recorded.

APPLICATION OF THE INTERNATIONAL CT CLASSIFICATION FOR OCCUPATIONAL AND ENVIRONMENTAL RESPIRATORY DISEASES IN A COHORT OF ASBESTOS EXPOSED WORKERS

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[ID 1283]

The International CT Classification for Occupational and Respiratory Diseases (ICOERD) has been developed to improve a standardisation of computed tomography (CT) evaluation in respiratory disorders. The aim of this study was to check the applicability of this new classification in a cohort of workers with an asbestos exposure history.

Several thousands former asbestos workers were enrolled into a prospective surveillance study to improve early detection of asbestos related findings. Occupational history, physical examination, pulmonary function tests and chest X rays or computed tomography (CT) were performed using CT with a standardized protocol. ICOERD was applied in 725 cases. Prevalence of opacities and pleural findings, classified by using ICOERD, was calculated.

Mean duration of asbestos exposure was 26.1 years (range 1-55). Mean latency period was 40.5 years (range 16 – 61). Rounded opacities and irregular opacities were described in 25 (3.4%) and 249 cases (34.3%) resp. Inhomogeneous attenuation, ground glass opacity, honeycombing and emphysema were described in 7.6%, 11.7%, 1.2%, 34.8% resp. .Pleural plaques and pleural calcification were found in 60.7% and 31.0%.

ICOERD proved to be a suitable tool to describe findings consistent with asbestos related disorders in a cohort of former asbestos workers. The application of ICOERD might improve the comparability of CT/HRCT findings in asbestos exposed workers in longitudinal studies and among different readers. However, large-scale studies assessing inter- and intrareader agreement are warranted.

EARLY ASBESTOSIS IN MEDICAL SCREENING OF ASBESTOS EXPOSED WORKERS BY HRCT

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[ID 2119]

High-resolution thin-section CT is a widely accepted diagnostic measure for diffuse lung diseases including asbestosis. Proposed classification of HRCT for occupational and environmental respiratory diseases explores HRCT application into medical screening of dust-exposed workers. This presentation attempts to explain HRCT findings observed in screening and surveillance using low dose HRCT. Summary of small scale HRCT screening program will be shown in the presentation.

Subpleural dots appear usually on or off the posterior pleura at interlobular septum. This seems one of the earliest signs of asbestosis, but this sign only is not sufficient enough to diagnose asbestosis. Intralobular core lines or centrilobular opacities are also considered earliest finding of asbestosis but this sign can be found among smokers (RB-ILD), and hypersensitivity pneumonitis. Interlobular septal thickening is highly indicative of interstitial fibrosis and when this findings profuse much, indicator of severity such as traction bronchiectasis and/or honeycombing would appear together. Subpleural curvilinear line is considered to be a merged subpleural dots, and specific finding of asbestosis. Parenchymal band is a specific finding in asbestosis because implies coexistence of pleural abnormalities. The HRCT classification considers this finding as an indicator of visceral pleural thickening. Parietal pleural thickening or plaque is also specific findings of asbestos-related respiratory diseases. It should be noted that there are two normal findings that mimics these abnormal findings: Depending opacities that mimic interstitial fibrosis in the posterior part when supine scan and fat pad that looks similar to plaque on chest radiograph, but easily distinguished by HRCT.

By use of HRCT we can detect more asbestos-related diseases than radiograph screening. But who cover the cost of 120USD per examinee? The screening should be applied to well-defined exposed population of age over 50 or it should be an intensive medical check for those rich enough to be underwent HRCT? For now it is a matter of social demand and preparedness whether or not to implement HRCT screening.

HARMONIZING THE INTERPRETATION OF HRCT IN THE APPLICATION OF THE AMERICAN THORACIC SOCIETY STATEMENT AND THE HELSINKI CRITERIA FOR THE DIAGNOSIS AND ATTRIBUTION OF NON-MALIGNANT ASBESTOS RELATED DISEASE IN CLINICAL & EPIDEMILOGICAL PRACTICE

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[ID 2166]

Clinicians and epidemiologists were guided for nearly two decades by the 1986 American Thoracic Society publication - The diagnosis of nonmalignant diseases related to asbestos, Am Rev Respir Dis 1986 134:363–368. More recent scientific guidance has been provided by the publication of The Helsinki criteria: Asbestos, asbestosis, and cancer, criteria for diagnosis and attribution in Scandinavian J Work Environ Health 1997 23:311-6, and by the American Thoracic Society Statement - Diagnosis and Initial Management of Nonmalignant Diseases Related to Asbestos in American Rev Resp Crit Care Med 2004 170:691-715.

The principal points raised in the Helsinki Criteria include: reliable work histories are the most practical and useful measures of occupational asbestos exposure; high resolution CT scans facilitate detection of asbestosis and asbestos-related pleural abnormalities, but are not recommended as a screening tools; radiologic findings of small opacities, ILO grade 1/0, are usually regarded as an early stage of asbestosis. The 2004 ATS statement concludes: the diagnosis of nonmalignant asbestos-related disease rests on the essential criteria of a compatible structural lesion, evidence of exposure, and exclusion of other plausible conditions, with an additional requirement for impairment assessment if the other three criteria suggest asbestos-related disease. Each criterion may be satisfied by one of a number of findings or tests. For example, HRCT has increased the sensitivity of detection of asbestos lung injury and has become a standard method of imaging. Evidence for exposure still rests on the occupational history, the demonstration of asbestos fibers or bodies, or pleural plaques. Impairment evaluation remains an essential part of the clinical assessment. The broad international application of these authoritative references will require harmonization of HRCT classification systems.

COMPARISON OF DIGITAL RADIOGRAPHS WITH FILM-SCREEN RADIOGRAPHS FOR CLASSIFICATION OF PNEUMOCONIOSIS

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[ID 156]

The ILO system for rating chest radiographic changes related to inhalation of pathogenic dusts is predicated on film-screen radiography (FSR). Digital radiography (DR) has replaced FSR in many centers, but there are few data to indicate whether DR is equivalent to FSR in identifying and quantifying interstitial and pleural abnormalities. Furthermore, DR images can be printed and viewed on film, so-called 'hard copy' DR, or can be viewed on a monitor at a computer workstation, so-called 'soft copy' DR. Little is known about the impact on ILO scores of reading FSR versus DR, or reading 'hard copy' versus 'soft copy' DR images. The goal of this investigation is to assess the equivalency of DR in comparison to FSR for diagnosis and quantification of parenchymal and pleural abnormalities due to pneumoconiosis and other forms of fibrotic lung disease, using the ILO rating system. We captured FSR and DR images (taken on the same day) from 107 subjects with a spectrum of pneumoconiotic lung disease and fibrotic interstitial lung diseases. Six NIOSH-certified B-readers scored each image on each subject (FSR, hard copy DR and soft copy DR) presented in random order using the 2000 version of the ILO system. Analyses compare the intra-reader and inter-reader reliability of ratings for quality, parenchymal abnormalities and pleural abnormalities across the image formats. Analyses further investigate marginal rating differences across image formats controlling for potential confounders such as age, smoking and BMI. A mixed model approach was adopted for statistical analyses to account for the clustering effect induced by multiple ratings made on the same subject. Results from the present study will help to provide an empirical foundation for the utilization of DR in application of the ILO system for screening, diagnosis, medical surveillance, and epidemiological study of pneumoconioses and other forms of interstitial fibrosis.

A COMPOSITE FILM FROM HRCT AND DR ON INDIVIDUAL BASE AS A TOOL FOR BETTER INTERPRETATION OF CHEST PLAIN RADIOGRAPH

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[ID 2277]

Digital image technique can make it easy to formulate images composed by individual original images. Digital radiograph of flat panel type for chest can represent as well as analogue images. We made up composite films from HRCT and DR for individual pneumoconiotic cases. We used boundary composites as teaching material in training course on ILO Classification System. We show data how the composite film contribute for readers to differentiate between non-silicosis and silicosis patients.

OCCUPATIONAL HEALTH CARE FOR THE UNDERSERVED – HOW BEST TO REACH SMALL ENTERPRISES AND THE SELF-EMPLOYED

OCCUPATIONAL HEALTH CARE FOR THE UNDERSERVED – CURRENT SITUATION

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[ID 1632]

Increasing competition on the global market has led to considerable fragmentation of enterprise structure through retreat to core business and outsourcing. The number of and employment rates in small enterprises have been steadily increasing worldwide together with the rates of self-employment, unemployment, clandestine work and migration.
General uncertainties and diminished economic and social perspectives are reflected by decreased fertility rates especially in the more affluent industrialized regions of the world thus endangering once stable social protection and pension schemes. Individual and public interest meet in the stabilization of the eco-nomic dependency ratio at a reassuring level that warrants as much the creation of more and better job opportunities as a general enlargement of the work force by increased participation of all available resources (young, old, both sexes, migrants) along with an intensified absorption of the informal sector into regu-lar employment.
Improved work participation rates of "vulnerable" groups and sustainable employment throughout a prolonged working life necessitates continuous skill-upgrading and improved preventive health care.
Occupational health care, however, is widely not available. Even in wealthier countries with well-developed social protection systems and infrastructure an equal preventive and protective outreach to all workers likewise – as requested by international and often national regulation – becomes increasingly difficult to realize.
The Mini-Symposium presents exemplary several routes of action towards better occupational health for currently underserved workers through community-based modified primary care, through company or combined com-pany/ accident-insurance efforts as well as basic self-empowerment strategies via efficient and easy accessible information management and action-training.

COMMUNITY-BASED COMPREHENSIVE OCCUPATIONAL HEALTH CARE IN FINLAND

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[ID 2050]

The Finnish occupational health services (OHS) is based on the OHS Act 2001. This Act sets the targets and organization for the OHS-system in Finland. The main aim for OHS is prevention of work-related diseases and accidents, promotion and maintenance of work ability but in the law it is made possible that in preventive OHS there could be also curative activities included. Preventive OHS is obligatory for the employers to organize but the curative part of OHS is voluntary. In practice, more than 80 per cent of the Finnish OHS includes at least some curative activities. There is a long tradition in Finland for this kind of OHS: both preventive and curative activities are included, thus OHS is part of the Finnish primary health care system.
The OHS in Finland can be organized through four different models. The latest published survey of the OHS system in Finland (situation in 2000) shows that the OHS units of municipal health care centres were the most important providers of OHS both in the number of served persons (37 % of all) and enterprises (61 %). Of these enterprises 85 % employed less than ten workers. Private medical centres served 33 % of the enterprises and 32 % of the employees. The own integrated OHS units of the enterprises served 28 % of the persons but only 2 % of the enterprises. Joint-model OHS units served 4 % of the enterprises and 6 % of the employees. In the year 2003 92 % of the salaried employees and wage-earners were covered by OHS. Those salaried employees who were not covered by OHS are working in enterprises with <10 workers. The OHS coverage was about one third of all micro-size enterprises in Finland when the coverage of larger firms was almost 100 %.
Thus it can be concluded that the municipal health care centres OHS-units' clients are mostly micro-enterprises (<10 employees), and the rest of OHS - organizational models covers medium size and large enterprises. For this kind of organizing OHS for the small (microsize) enterprises the community based model (municipal health care centres) is a feasible way because this infrastructure covers the whole country. OHS for the self-employed (OHS is voluntary) have been organized by the municipal OHS units. For example 50 % of the family farmers in Finland have voluntarily joined to the municipal OHS which is unique in the world.
The community-based model for organizing OHS for small enterprises has many advantages in practice. The municipal health care centre system is the only existing primary health care in remote areas of the large country, it is easy to integrate prevention and curative services under the same organization, and through OHS the municipal health care centre can easily coordinate the activities targeted in prevention of general public health problems especially in near future when we are facing the growing problems of the aging workforce. Also promotion and maintenance of work ability for entrepreneurs and for those working in micro-size small enterprises can be organized from the municipal health care centres' OHS units.

OCCUPATIONAL HEALTH SERVICES FOR THE UNDERSERVED - THE FRENCH EXPERIENCE

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[ID 2097]

Purpose:
Description of the French situation regarding occupational health services (OHS) organisation proposed to SMEs and self-employed work population.
Method:
Obligations from regulation are first described. Parts of these obligations are coming from EU. Application towards SMEs and self-employed are then analysed.
Results:
The French OHS organisation is widespread in the country and covers SMEs. Most of the professionals are physicians. OHS propose yearly examination to SMEs workers. Some of these OHS have safety technicians, ergonomics or hygienists. These professionals usually help physicians on workplaces study and enterprise counselling.
Very little is done for the self-employed. There are some experiences in association with special insurance those people are obliged to contract. One in Strasbourg was initiated two years ago. The insurance proposes an examination regarding professional hazards to the self-employed, and if needed assist in risks analysis.

CORPORATE SOCIAL RESPONSIBILITY - INTEGRAL HEALTH MANAGEMENT

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[ID 2144]

It is a prime responsibility of the employer to manage OSH, and it is increasingly acknowledged that this is part of a broader range of social responsibilities. It is increasingly recognised that safety and health at work should be an integral part of Corporate Social Responsibility, and also that CSR like initiatives offer a range of new opportunities for promoting OSH in an innovative and more effective way.
Some global initiatives that do combine CSR and OSH aspects will be discussed shortly, especially the Global Compact Initiative and the Business Coalitions against HIV/AIDS.
However, there is also a need to develop initiatives for the promotion of OSH that are compatible with CSR initiatives. Two recent developments will be presented and discussed.
Integral health management (for SMEs)
It is often said that good occupational health, and healthy employees, are necessary for a healthy organisation. On an individual level we all know, that health is the basis for wealth. However, managers tend to think differently. They are primarily interested in the health of their company (it survival, its longevity); for them the health of the employees could be a means to achieve a healthy company. Communication between company owners and OSH people is often difficult because they think and communicate in different mental frames. How then, can we make progress with implementing health management?
Strategic OSH Management
In the usual approaches to OSH, the overwhelming attention for concrete risks and solutions at the operational level is often a barrier for the development of a strategic vision, of defining at company level meaningful and

tangible improvements that should be achieved trough OSH in a timeframe of say 5 years. Defining this requires a redefinition of OSH, beyond the usual risk paradigm, and a positioning of OSH as generating added value for the company's ambitions.
The experiences with these two, related developments, are seen as promising for creating commitment from entrepreneurs/employers and will be presented and discussed.

OCCUPATIONAL SAFETY & HEALTH (OSH) IN SMALL & MEDIUM-SIZED ENTERPRISES: THE GERMAN "EMPLOYER MODEL"

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[ID 2189]

Introduction
The German Arbeitssicherheitsgesetz (ASiG) was established in 1973. It is the legal basis for the establishment of medical care and safety supervisions in enterprises. This law specifies the demands on and the tasks of safety engineers and occupational physicians (regular supervision). The ASiG also defines minimum values for working time of the safety engineers (per year and per employee), taking into account the occupational hazards which are encountered in the enterprises. For example, in an enterprise with low hazards a safety engineer must spend 0,2 hours per employee per year on these issues, whereas in a highly hazardous environment the time amounts to three hours. These minimum values – especially the lower ones - pose problems especially in small and medium-sized enterprises (SMEs). In these enterprises the support by occupational physicians and safety engineers is linked with special challenges. In particular accident statistics indicate the need for further qualified consultation and support in SMEs in the field of occupational safety and health (remark: the hightest accident rates occur in companies with 25 – 100 workers).
Methods
The Federal Institute for Occupational Safety and Health is engaged in research in safety supervision and medical care in small and medium-sized enterprises.
Several studies have pointed out that the implementation of recommendations and legislation in SMEs in this field was insufficient. New concepts were necessary to tackle this problem. Nearly every statutory accident insurer in Germany developed it's own employer model. The principal aim of these models is the information of the employer about occupational safety and health to convince him the necessity to take action in this field. Additionally, the motivation to tackle problems in OSH is one further objective.
Two types of employer model (type "training" and type "correspondence course") were established. The type "training" consists of a seminar, the employer participates in (2 – 8 days), and a brush-up training every three years. The type "correspondence course" starts with an one-day-attendance course and a correspondence course (to be completed in two years). Every three years the employer participates in a brush-up training.
Although many different models exist, these models have got common objectives like law obligations / law consequences, basic knowledge and economic aspects of occupational safety as well as the prevention of occupational accidents.

PROMOTING HEALTH AND SAFETY IN SMALL ENTERPRISES BY TARGETED INFORMATION MANAGEMENT AND SUPPORT TARGETED INFORMATION MANAGEMENT AND SUPPORT

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[ID 2224]

SMEs are key drivers of economic growth and job creation. In the European Union, they employ more than 65% of the workforce and account for over 99% of the EU's 19 million enterprises, outside the agricultural sector.
However a large proportion of SMEs are faced with limited financial and organisational resources and have limited occupational health and safety knowledge and preventive capacity. Statistics reveal that workers in enterprises of fewer than 50 employees are 2-3 times more at risk of becoming accident victims and that the incidence rate for fatal accidents in these very small enterprises is around double that of larger companies.
Initiatives that aim at enhancing SMEs' knowledge and preventive capacity to combat accidents and safety and health risks can be of great benefit for small businesses and their employees as well as for the whole European economy.
That is why the European Agency for Safety and Health at Work has identified SMEs as one of the most relevant target audiences for its information services and products.
Hans Horst Konkolewsky will inform conference participants about the European Agency for Safety and Health at Work' s recent and current actions to promote improved levels of occupational safety and health (OSH) in small enterprises through targeted information management and support.
These activities include:

- The co-financing of more than 140 innovative projects aimed at enhancing SMEs' knowledge and capacity to combat safety and health risks. Independent evaluations of the SME funding scheme, which ran from 2001 to 2004, have highlighted the projects' wide 'demonstration effect' and added value. All project outputs have been promoted through the Agency's website as well as in printed publications and CD-Roms.
- An Agency information project has examined SME assistance schemes in a range of European countries and developed not only transferable information that other organisations can use or adapt to their situation, but it has also identified success criteria. For a scheme to be successful, it should: focus on a particular sector or risk; be appropriate - neither too complicated nor too expensive; have the involvement of different partners (employers, employer associations, workers, trade unions) in its planning and implementation; measure its adequacy by assessing the needs before the action and carrying out a systematic evaluation of its effects afterwards; offer support for free or at a minimal cost; help to create a sustainable OSH prevention culture in SMEs; combine active interventions with practical documentation and tools.
- The Healthy Workplace Initiative (HWI) is the latest Agency action to target SMEs. Aimed at strengthening a prevention culture in the EU-10 new member states, the HWI is focusing on raising awareness of OSH essentials and knowledge transfer in particular to meet the needs of SMEs. Information developed through the Agency's SME funding schemes will be adapted, translated and disseminated in the EU-10 and new products such as SME-oriented web features and risk assessment tools are being developed.
- Other Agency activities include the dissemination of good practice and training tools in sectors where SMEs are numerous such as fisheries and agriculture; the development of a dedicated SME web feature to communicate efficient good practice examples in a user friendly way; the running of an annual European Week campaign to raise awareness of risks and promote effective preventing measures, targeting SMEs, organised every year in more than 30 countries, the publication of short factsheets on key OSH topics in 20 language.

EFFECTIVENESS OF ACTION-ORIENTED TRAINING IN SMALL WORKPLACES – MODELS FOR SELF-HELP ACTION

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[ID 2246]

Participatory action-oriented training methods are increasingly applied to various workplaces as a means of improving safety and health of workers. Recent experiences through networking of partner institutions in developing countries in Asia are reviewed and discussed. Training packages relying on the methods have been developed and widely applied to small enterprises, construction sites, home workers and farmers. In order to support self-help initiative of local people, each package utilizes "good practice" methods that can facilitate immediate improvements using local skills despite many existing constraints.
This facilitation of self-help action is realized by a combination of three kinds of methods: (a) use of action tools comprising local good examples, action checklists and low-cost improvement guides; (b) serial group work sessions and (c) local trainers acting as moderators of identifying and implementing low-cost improvements practicable in each local situation. In supporting the roles of local trainers, it is commonly found effective to use (a) photographs of good examples incorporated in the action tools, (b) skills to animate group discussions and (c) trainers' manuals presenting slides and sheets used. Further, it is confirmed useful to focus on low-cost improvements conducive to improving both productivity and work life, such as efficient materials handling, ergonomic workstations and better environment.
The regional networking has been beneficial particularly for developing the locally adjusted training packages. It is suggested to organize inter-country networking for spreading similarly action-oriented training for the underserved in developing countries.

CHRONIC SOLVENT-RELATED ENCEPHALOPATHY: SCREENING AND RECOGNITION OF AN OCCUPATIONAL DISEASE

THE RISE AND FALL OF CSE IN NETHERLANDS

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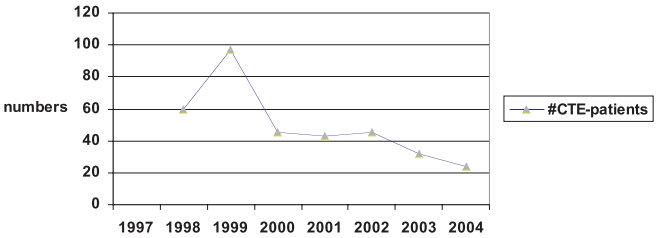
[ID 1709]

The assessment of patients with probably CSE requires a multidisciplinary approach. In the Netherlands two Solvent Teams are functioning in which a specialst in occupational medicine, a neurologist, a neuropsychologist and an industrial hygienist cooperate according to a protocol. In addition a psychiatrist or toxicologist can be consulted. This Solvent Team project started in 1997 and since then 2172 patients were seen; in 401 cases it was concluded that these patients suffer from CSE. The project is embedded in research activities with the intention of increasing our understanding of the syndrome (gene-environmental interaction) and refining the diagnosis (classification, imaging techniques, differential diagnostic issues). We also made a contribution in the prevention of this disease.
A substantial reduction in the occupational exposure to solvents has been achieved in recent years in the Netherlands as a result of a series of legal measures and agreements at sector level. Results of the Solvent Team Project did have a catalytic effect on the improvement of working conditions in different industries. The Solvent Teams are participating in information-related activities in sectors that are at risk and in consultation with representatives of employees' and employers' organizations. The anonamised findings of the Solvent Team assessments are used as a monitoring instrument for evaluating the preventive measures.



Experiences of this Solvent Team project and the contribution towards prevention will be presented.

CHRONIC SOLVENT ENCEPHALOPATHY; TOWARDS TRANSPARANT DIAGNOSTICS

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[ID 1634]

The two current 1985 internationally classification systems for chronic solvent-induced encephalopathy (CSE) lack well-defined criteria. An elaboration of the principles of those systems into a nearly-univocal diagnostic system was recently proposed (van der Hoek et al) based on 6 years of experience in The Netherlands with 1543 patients. The diagnosis comprises three elements: description of the extent of cognitive and somatic impairment, the causality of the solvent exposure compared to non-solvent causes, and complaints of mood and well-being. This diagnostic system is now applied to extensive patient data that have been independently collected by experts in Finland and the resulting diagnoses will be compared to the diagnoses that were already given by the Finnish expert team. We expect that this experience will contribute to a practicable, internationally accepted and respected diagnostic system for CSE.

THE PRACTICE AND PROBLEMS OF DIAGNOSING CSE IN KOREA

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[ID 2129]

Backgrounds**:** Korea has used many kinds of organic solvents as paints, adhesives, and degreasing agents in most manufacturing industries. Workers exposed to neurotoxic chemicals for several years might have chronic solvents encephalopathy (CSE). However, it is very rarely reported because it is very difficult that causal-relationship between exposure and diseases is proved. Authors will review the diagnostic criteria of CSE and practical approach to diagnose it.
Methods**:** Korea Occupational Safety and Health Agency (KOSHA) has investigated claimed cases for compensation since 1992 by request of the Korea Labor Welfare Corporation (KLWC), which is a compensation agency. We will review cases of CSE confirmed by KOSHA. Cases accepted as occupational diseases by organic solvents poisoning will be reviewed and the diagnostic criteria of organic solvents poisoning will be also reviewed.
Results**:** Five cases were accepted as occupational diseases caused by chronic solvents exposure. All were exposed to mixed solvents, which contained mainly toluene in two cases.
Four cases were working on painting process; two from shipyard, one printing machine manufacturer, and one from rubber boat manufacturer. Four cases were diagnosed to mild chronic toxic encephalopathy, while one showed cerebella syndrome. The exposure durations were 4 -10 years, and the exposure levels were mostly over the value of the occupational exposure standard in mixed solvent and the highest value was 4.62. The regulation of the Industrial Accidents Compensation Insurance Act describes chronic toxic encephaopathy at the Article 30 Table 1 Section 17 Poisoning by Aliphatic and Aromatic Hydrocarbons, however, it does not have any detail description how to diagnose it.
Conclusions**:** CSE would have been common in Korea since many workplaces have used large amount of organic solvents, however it has not been revealed frequently because of limited diagnostic criteria

SCREENING AND EVALUATION OF SOLVENT EXPOSURE AND NEUROTOXIC SYMPTOMS - AN APPROACH FOR OCCUPATIONAL HEALTH SERVICES

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[ID 1387]

The exposure levels of solvents in industrialized countries have been declining since the 1970s due to the increasing use of water-based products and improved work processes. At present, the early recognition of organ system injury related to long-term, low-level solvent exposure is difficult in clinical practice, especially in occupational health services (OHS). Sensitive and easily applicable screening tests are therefore needed.
A sensitive neurotoxic screening instrument, such as the Euroquest (EQ) [1], is likely to be affected by excess alcohol use and by the general burden of somatic in addition to psychiatric diseases, which can also have a solvent-related fraction of aetiology. A common feature of existing questionnaires is the lack of incorporated questions on exposure. Exposure intensity should be considered in addition to the length of exposure history [2].
A stepwise approach of evaluation aimed for the use of OHS will be presented. This scheme is currently being introduced to Finnish OHS units. The possibility of solvent-related health effects is considered in pre-placement or periodical health examinations, and in the context of diagnostics of diseases. The procedure starts with EQ and a one-page table of exposure history, proceeding to interview, clinical investigations and aspects of differential diagnostics. The aim has been a practice applicable for use in units with little experience of adverse solvent effects and limited possibilities for extensive use of clinical methods. Finally, the role of specialized clinics in further evaluation will be discussed.
[1] Chouaniere D, Cassitto MG, Spurgeon A, Verdier A, Gilioli R (1997): An international questionnaire to explore neurotoxic symptoms. Environ Res 73: 70-2.
[2] Kaukiainen A, Riala R, Martikainen R, Akila R, Reijula K, Sainio M (2004): Solvent-related Health Effects among Construction Painters with Decreasing Exposure. Am J Ind Med 46:627-636.

SOLVENT-RELATED CHRONIC TOXIC ENCEPHALOPATHY: LESSONS TO LEARN FROM CLINICAL DIAGNOSTIC EXAMINATIONS

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[ID 1260]

Chronic solvent encephalopathy (CSE) presents a diagnostic challenge because no specific examinations exist. Also, conditions as early Parkinson disease, alcohol or white matter encephalopathy, and depression and sleep disorders resemble in symptomatology and findings. At the Finnish Institute of Occupational Health, the clinical diagnostic procedure of CSE has been thorough to find evidence of possible occupational nervous system disease.

We present the findings of our diagnostic examinations in a cohort of over 200 acknowledged CSE cases of occupational disease since 1990. Investigations have included 1T MRI, HM-PAO-SPECT perfusion imaging, P300 auditive evoked potentials and quantitative EEG. The diagnostic and differential diagnostic aid of these investigations has not proven substantial. However, at group level findings suggest CSE-related changes. Since 1995, investigations of ocular health and visual functions have been included in the clinical procedure. Visual findings in the CSE cohort have included an excess of ocular findings, impairment of color hue discrimination, reduced sensitivity in the peripheral visual fields by automated perimetry. The multifocal electroretinograms done in cases with color vision impairment were normal, but at group level in cases with visual field findings showed minor lengthening of the peripheral latencies. CSE patients showed slowening of visual search. Altogether, the clinical diagnosis in CSE, especially in the milder cases, relies in the demonstration of cognitive dysfunction by neuropsychological or psychophysiological methods.

OCCUPATIONAL SAFETY AND HEALTH IN AFRICA - SCOHDev SYMPOSIUM

OCCUPATIONAL HEALTH SERVICES FOR HEALTH CARE WORKERS IN MPUMALANGA PROVINCE IN SOUTH AFRICA

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South Africa

[ID 2542]

Professional nurses were the agents of change and rallying point for the successful implementation of occupational health services(OHS) in Mpumalanga province in South Africa.

Despite a favourable legislative environment for occupational health services to be developed, formidable challenges were faced in the introduction and provision of accessible OHS for health care workers.

A participatory approach was employed whereby trained professional nurses were facilitated to review the state of affairs, designed a questionnaire and collect information. There was process of collective reflection and problem solving The occupational health nurses(OHN) became the champions for decisions made after the findings of the study. This created the momentum for action.

The impetusfor success include quality training, hospital accreditation process, organizational structure, social network of occupational health nurses, mobilization of HCW through Health & safety committees and management of the OHNs through empowerment of OHN in technical knowledge and skills.

The existence of an atmosphere of mutual trust and respect among the clients, hospital management and the service providers is a clear signal of the success, relevance and sustainability of the services and the approach used in the implementation.

The nurses are now poised to provide services to small, medium and micro industries.

INITIATIVES IN OS&H OF HEALTH CARE WORKERS IN GHANA

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[ID 2543]

The paper summarizes the findings of three studies carried out in health institutions in Ghana between 1999 and 2004 with the objectives of assessing physical conditions under which staff work within the Ghana Health Service, unearthing prevailing health and safety conditions among various categories of health workers at different levels of health care delivery, and assessing occurence of musculoskeletal conditions among female nurses in 2 public health institutions

Findings:

Illumination was found to be poor in over 75% of rooms with their resultant risks to the eye and accident promotion. The level of illumination was however not always at par with level of sophistication of institution's facilities. Internal temperatures and humidity were considered higher than desirable. Studies indicated that, biological factors, handling of patients and psychological stress were the three most common hazards in health care work with variations among the various professional groups. Personal protective clothing as well as caution at the personal level were the main measures adopted to mitigate the effects of hazards. There were no measures in place to monitor the various hazards on a routine basis. Medical surveillance for staff was inadequate. Based on their experience nurses described specific parts affected most by injury as the lower back, neck and upper back. They identified lifting of patients, poor working postures, stress, slips and falls as activities or situations that constitute hazards affecting these areas.

Conclusions

Not only do workers work under conditions that are hazardous to their health, but also staff are not abreast with OHS measures. Studies called for urgent action towards the development and implementation of a policy for OHS. Actions have began to be taken to address these challenges including the development of an occupational health policy for staff of the health service, strategic plan for OHS and a health surveillance plan.

OCCUPATIONAL SAFETY AND HEALTH IN SMALL ENTERPRISES

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[ID 2544]

Small and Medium – sized Enterprises (SMEs) which could be defined[1] in terms of quantitative parameters such as the number of employees, capital investment and sales turnover has continued to play an important role in the economy of Tanzania. Common types of industry among Small and Medium Enterprises include building construction, textiles, radio and television repairs, brick making, carpentry, metal, auto repairs, mining, ad commerce and services, etc.

The ability of the SMEs to provide employment for the ever-increasing number of entrants to the labour market is widely acknowledged. Given the low level of investment per job created, the SMEs have tended to be more labour-intensive and thus providing the greatest opportunities for employment. In Tanzania, new entrants ins the labour market are estimated to be around 700,000 annually, the Government is only able to absorb about 40,0000 of these. It is therefore evident that the majority of job seekers end up in the SMEs. The informal sector survey (1991) revealed that SMEs in Tanzania employed at least 3 million people which is about 20% of the labour force. Furthermore, the survey showed that about one third of the GDP comes from the SME sector – a sector with such importance need in place measures to increase productivity and improve working conditions.

EXPERIENCE FOLLOWING THE ENACTMENT OF FACTORIES AND OTHER PLACES OF WORK (HEALTH AND SAFETY COMMITTEE) RULES IN KENYA

MBATHA S.

[ID 2546]

The department of Occupational Health and Safety services in Kenya enacted the rules in2004 in pursuance of section 65A of the Factories and other places of work Act, Cap. 514, Laws of Kenya, which is the principle law governing occupational safety and health in Kenya. This made it mandatory for all workplaces which regularly employ twenty persons or more to constitute a safety and health committee.

The rules provide guidelines for the establishment, functions and organization of the committees.

Since their enactment, the rules have enhanced worker participation on issues pertaining to health, safety and welfare at their places of work and in the process have promoted social dialogue which has had a positive impact. They have also reduced the burden of statutory inspection thereby enabling the department to provide more quality work in other areas as per its mandate in addition to promoting entry avenues for action even though the responsibility for occupational health and safety remain with the employer.

The rules require regular reporting to the department and initial indication is that the general awareness of occupational health and safety is growing. The information centre for the department has been capturing various data on this for monitoring purposes and for any other necessary action.

One of the main challenges of the rules is the failure of the rules to cover those workplaces that employ less than twenty persons regularly notwithstanding the fact that the majority of workers are to be found in this category of workplaces. Other challenges include inadequate knowledge, lack of training opportunities at higher levels on occupational health and safety in the country and lack of basic equipment for assessing the working environment.

THE CONTROL OF ASBESTOS IN MAURITIUS

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[ID 2547]

The presentation will focus on the experience of Mauritius in identifying the presence; and in controlling the use of asbestos and asbestos containing materials in the country. With the support of Government and the International Labour Organisation; and the commitment of employers, employees, the media and the public at large, effective policies were defined and implemented. These policies will be discussed in detail. The concern of the population about the hazards of asbestos and the real risks were looked into. Within a period of about 10 years, the country has stopped the new use of the substance and the existing asbestos is being effectively controlled. New legislations have been passed and contractors are accordingly trained to plan all works with asbestos. With the forthcoming into operation of an Industrial Hygiene Laboratory, whereby the exposure of workers to asbestos in the working environment will also be evaluated, Mauritius will be able to ratify the C162 Asbestos Convention, 1986.

EXPOSURE STRATEGIES AND MEASURMENT IN RISK ASSESSMENT

BENCHMARK ANALYSIS OF STANDARD METHODOLOGIES FOR THE ASSESSMENT OF CHEMICAL RISK AND CRITICAL REVIEW OF THE IMPLEMENTATION METHODS OF THEIR PRINCIPLES IN THE STRATEGIES AND IN THE MONITORING PROGRAMMES

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[ID 2608]

The assessment of chemical risk is a procedure that shall be carried out taking into consideration the specific purpose of developing a "decision support system" to be a real tool for preventive actions in the different implementation contexts. Assessment methodologies and techniques with different characteristics presently exists and many of them have been subject to a standardization process (NIOSH, EN-UNI, AIDII). At times, some binding norms clearly suggest principles or reference methodologies.

The aim of this work is therefore the critical appraisal of the most adequate implementing methods used for the most consolidated methodologies in the expositive scenarios of main interest, taking care of studying operational protocols able to grant, in addition to the necessary effectiveness, the maximum efficiency in terms of better allocation of the available resources for monitoring and evaluation activities.

The main methods have been compared and characterised in terms of fields of application, effectiveness and efficiency. The comparison has been carried out by using the "Montecarlo" methodology.

Discussing the results of the comparison, a protocol for defining a strategy of evaluation has been developed, and a new proposal of evaluating algorithm is here proposed.

The protocol is presently being tested in a pilot field application.

MANAGING AND RESOLVING GLOBAL OCCUPATIONAL HEALTH CHALLENGES: THE DEFENSE OCCUPATIONAL HEALTH PROGRAM

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[ID 566]

The U.S. Department of Defense (DoD) Occupational Health Program is a composite of the individual Occupational Health programs established and executed by the military Services and Defense Agencies. Even more than most industries, DoD is experiencing significant increases in work requirements with essentially no change in manpower staffing levels. As a result, reducing lost work time, duty limitation prescriptions, injuries and accidents is one of the highest priorities in the Department.

The Executive Agent (EA) for the Defense Occupational Health Program is a key enabler in this reduction effort, leveraging technical expertise and evolving technologies to reduce worker exposures to chemical, noise, laser, radiation, and ergonomic hazards. In addition, the EA facilitates the work of select DOD Safety and Occupational Health Working Groups, consisting of world-renown scientists and technical experts.

The initiatives and tools of note from the Working Groups are:

DoD Industrial Hygiene Exposure Assessment Model which establishes and formalizes operational risk management practices.

Defense Occupational and Environmental Health Readiness System (DOEHRS), a web-based standardized exposure collection and assessment tool, providing remote data collection capabilities to assess chemical, biological and physical stresses.

Suite of Ergonomics tools, including a web-based self assessment tool; a PDA based technical assessment program which provides a central database, specific engineering recommendations, references and citations and user-friendly reporting; and a one-stop reference website with downloadable educational materials, a best practices database, reference materials and tools.

Hearing conservation data collection tool and repository, providing a longitudinal record for DoD military and civilian employees.

The DoD Occupational Health Program capitalizes on cutting-edge technical expertise and the economies of scale in one of the largest organizations in the world. Focusing on real-world challenges and developing cost effective solutions has allowed DoD to maximize resources and implement programs and controls to reduce or eliminate exposure to occupational hazards.

EXPOSURE ASSESSMENT TO TRADITIONAL CHEMICALS AND CARCINOGENIC AGENTS AT WORKPLACE: THE ITALIAN SITUATION

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[ID 2609]

Occupational Exposure Assessment is a difficult task always to perform. This paper introduce the Italian situation for the risk assessment in industrial environment with particular regard to the integration of the ambient and personal occupational exposure data with those deriving from the health surveillance and the biological monitoring for exposure to traditional chemicals and carcinogenic agents. This paper also analyses the Parliamentary Act D.Lgs 25/02. The Authors also undersigned parts of the law which appear to be unclear and controversial and highlight the expected difficulties arising for the employers and the safety and health professionals during the application of this legislation. Moreover, a number of discrepancies are noted between the Italian law and the European Directive or other current Italian rules such as the translation of the term "slight risk", as from the original Directive, into "moderate risk", and the resulting non compulsoriness of health surveillance and biological monitoring of the workers in presence of a "moderate risk". Moreover, the Authors examine and criticize, both in semantic and in toxicological terms, the proposed definition of "moderate risk" made by the Consulting Committee of the Labour Ministry, in which the term "moderate" has been interpreted either as "low" or as "irrelevant for health effects", clearly two very different meanings. Besides, it would be inappropriate to define the conditions of a moderate risk based only on the level of exposure to the chemical (expressed as a fraction of the corresponding limit value), without considering the two other components of risk assessment for that chemical (hazard and susceptibility). Even worse would be the use of simplified models based on "algorithms", which might be useful in a preliminary phase of risk assessment, but easily could lead to an under- or over-estimation of risk, particularly when used by non professionals or not particularly expert.

SETTING UP OF OCCUPATIONAL EXPOSURE LIMITS (OELS) FOR AIR-BORNE CONTAMINANTS IN WORKPLACES

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[ID 1590]

Background

The Labour Department of the Government of the Hong Kong Special Administrative Region (HKSAR) is the authority to regulate the occupational safety and health laws and to monitor employers or responsible persons in implementing the important precautionary measures for the protection of employees. In order to assist in the assessment of airborne exposure to chemical substances, a list of the occupational exposure limits (OELs) for the commonly used or likely exposed chemical substances in workplaces is publicised under the "Code of Practice of air impurities in the workplaces."

Content

The first publication of the OELs in 1992 was only guidance in a reference note. Later on, the content has been reviewed and updated by 2000. It was re-issued after public consultation under the status of "Code of Practice" in 2002. Management of the factories and industrial undertakings has the obligation to demonstrate the conditions of workplace environment are meeting the minimum requirement. Otherwise, preventive and control measures should be implemented to ensure the health and safety of their fellow workers. In the listings, there are over 250 substances; most values are adopted from international or national recommendations. However, in the consideration of the standard values for OELs, local or industrial experience would be emphasised. To illustrate the strategies for the setting up of the airborne exposure standards as well as their applications, several listed substances are chosen for discussion, namely, asbestos, benzene, raw cotton dust, n-hexane, hydrogen sulphide and respirable silica dust.

Conclusion

Industries and responsible persons may now make reference to the listing in routine health risk assessment. It becomes a practical guidance for implementing the necessary precautionary measures for hazard prevention and protection of workers.

OCCUPATIONAL EXPOSURE TO CARCINOGENIC, MUTAGENIC AND REPROTOXIC CHEMICALS IN FRANCE

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[ID 1074]

During 2005 a survey has been conducted in France in order to identify the CMR (Carcinogenic, Mutagenic and Reprotoxic) chemicals occupationally and currently used, the number of workers potentially exposed to each CMR and by industrial activity.

Information issued from national or European statistical boards were collected and analysed for evaluating the annual consumption of CMR chemicals. Main uses for each CMR were then after identified by collecting data from a firm sample corresponding to 30 industrial activities. Interviews of industrial hygienists belonging to a one thousand firms sample permit to estimate the numbers of workers exposed to CMR.

The most relevant figures issued from this survey will be presented by CMR, by industrial activity and target population.

OCCUPATIONAL DISEASES RECOGNITION: NEW INTERNATIONAL DEVELOPMENTS

THE ILO LIST OF OCCUPATIONAL DISEASES

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[ID 508]

The annual number of non-fatal work-related diseases has been estimated to be 160 million. Diseases caused by work have to be discovered and their victims be properly compensated. The relationship between exposure and the severity of the impairment among workers and the number of workers exposed are important criteria for the determination of occupational diseases. Definitions of occupational diseases are usually set out in legislation. Identification of occupational diseases has an impact not only on provisions of employment injury benefits, but also on national and enterprise level preventive programmes.

The International Labour Organization (ILO) has had a long history in identification of diseases as occupational in origin and in establishment of international lists of occupational diseases for the purpose of their prevention and compensation. The ILO lists play a key role in the harmonization of the development of policy on occupational diseases and in promoting their prevention.

At national level, the ILO lists of occupational diseases are important in promoting the inclusion of a range of internationally acknowledged occupational diseases in national lists. The ILO plays a key role in harmonising the development of policy on occupational diseases and in promoting their prevention. The lists of Occupational diseases established by the ILO have always served as an example for countries establishing or revising their national lists. Adding to the lists would imply the extension of preventive measures to control the use of harmful substances and would assist better health surveillance of workers.

Two important ILO lists of occupational diseases are currently being promoted widely by the ILO. The list of occupational diseases appended in schedule I of the Employment Injury Benefits Convention, 1964 (No. 121) is legally binding if a country has ratified the Convention. A ratifying state shall, as a minimum, recognise the occupational origin of all the diseases comprised in this list. The second list of occupational diseases was adopted in 2002 as an annex to the ILO Recommendation No. 194. This new list supplements Schedule I of the ILO Employment Injury Benefits Convention, 1964 (No. 121), which has not been revised since its last amendment in 1980.

THE USE OF ICD-10 IN OCCUPATIONAL HEALTH

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[ID 2074]

Classifications of occupational diseases have been developed mainly for two purposes: (1) notification for labour safety and health surveillance and (2) compensation. The absence of unified diagnostic criteria, coding systems and classifications reduce the compatibility and comparability of national statistics on occupational diseases. Currently, the WHO document "International Statistical Classification of Diseases and related Health Problems (ICD-10) in Occupational Health" from 1999 serves as a guideline for the use of ICD-10 in notification of occupational diseases in countries which do not have a well-established notification system.

The document contains general guidelines for the use of ICD-10 codes and a comprehensive list of ICD-10 codes which are relevant for notification of occupational diseases. The list enables one to select, for each country, a selection of occupational disease entities that are the most relevant when building a notification system for that country. The document also provides typical examples of the causative agents/risk factors and risk industries/occupations for each occupational disease.

An occupational disease is characterised by a combination of the medical diagnosis and the causative factor that caused it. National and international lists of occupational diseases are often organised in a way that includes both categories defined by the causative factor and categories defined by the diagnosis. For the society, the information on the exposure is crucial for the prevention and the information on disease for the assessment of the health burden. Therefore both the causative factor and the diagnosis should be recorded for each case of occupational disease. This approach has been adopted in 2003 by the European Commission in the updated Recommendation concerning the European schedule of occupational diseases. ICD-10 is the natural choice for coding the medical diagnosis and this classification is used in the European Occupational Diseases Statistics collected by the Commission.

The current paper examines the needs for updating the WHO document from 1999 in the light of the new international developments in the lists of occupational diseases.

DEVELOPMENT OF A PROJECT FOR INTERNATIONAL HARMONISATION OF OCCUPATIONAL DISEASE IDENTIFICATION AND RECOGNITION

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[ID 2121]

The ILO "Employment Injury Benefits Convention (N° 121)" issued in 1964 presented a list of 15 occupational diseases that was updated in 1980 to include 29 occupational diseases. Subsequently, with the ILO Recommendation no. 194 of 2002, the list was updated and expanded and occupational diseases were organised into 3 groups including respectively. 1- diseases by agents (chemical, physical, biological), 2 – diseases by organ targets (Respiratory, skin, liver, etc.), 3 – occupational cancers. A further revision of the ILO list took place at the end of 2005. The WHO in 1999 published the International Statistical Classification of Diseases and Related Health Problems (ICD-10) in Occupational Health. The European Commission with the Recommendation 90/326 first adopted a European List of Occupational diseases and with the Recommendation 03/670 revised the list dividing the diseases into two groups: those certainly attributable to an occupational origin and those possibly attributable to an occupational origin.

At the Joint WHO-ILO meeting held in December 2003, it was recommended to develop a common work programme on occupational diseases, to pursue the following objectives: standardise and harmonise the definition of occupational diseases in the various lists, develop criteria for an improved diagnosis and recognition, strengthen the potential of the list as a tool for prevention.

To meet these goals, a common project has been developed that is focussed on the following actions:

- comparison and revision of the existing lists aimed at providing harmonisation of the definitions of the occupational diseases and providing the supporting evidence of their causal occupational origin;
- definition of the clinical itinerary and diagnostic investigations necessary to diagnose such diseases;
- definition of the minimal criteria in terms of exposure intensity and duration for the recognition of the occupational origin of these diseases where examining a single case;
- identification of specific risk assessment and risk management strategies to reduce the health impact of each occupational risk factors.

It is anticipated that the project will require 2-3 years for its implementation and the creation of international teams of experts including occupational epidemiologists, clinicians, toxicologists and industrial hygiene professionals.

DEVELOPING CRITERIA FOR DIAGNOSING OCCUPATIONAL DISEASES: OPTIONS AND LIMITATIONS

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[ID 2168]

It is axiomatic that to achieve effective prevention of disease requires a mechanism for recognising the entity when it occurs. This certainly applies to occupational diseases. A difficulty with diagnosing occupational disease is that for many such diseases, there is no common agreement on the criteria for diagnosis. One proposal is for a diagnosis to require sufficient exposure to a causative workplace agent, relevant health effects, with a suitable time interval between exposure and effect, and that due consideration be given to the differential diagnosis. To produce criteria for what constitutes sufficient exposure, and relevant health effects several options are available:

a) review of published evidence - limitations of this approach include a dearth of high quality evidence on occupational diseases, cost, existence of a degree of subjectivity is deciding on quality of evidence, and publication bias.
b) Consensus view, involving Delphi exercise - limitations include choice of participants and views based on current perceptions rather than evidence
c) Consensus views based on 'round-table' discussions - limited by inappropriate influence by one or more vocal individuals
d) Expert opinion - from one or more experts or organisations. Views from experts may not necessarily be correct, and views from organisations may depend on their philosophy and degree of caution or scepticism.

Regardless of the methods used and their inherent difficulties, it is preferable to have some agreed criteria than none at all. Towards this end, several organisations have made attempts to develop diagnostic criteria - including the European Commission Employment and Social affairs DG.

HUMAN HEALTH AND CEMENT DUST EXPOSURE

RISK ASSESSMENT IN CEMENT PRODUCTION WORKERS

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[ID 2039]

Dust exposure represents the major problem for the health of cement production workers. Cement dust can be released in different amounts in the work place depending on production phase and plant technology. Worldwide, most of the cement plants do not have a systematic record of dust exposure. In fact although individual studies have indicated an excess of diseases, results are not consistent because of the lack of systematic exposure record-keeping. This presentation is aimed to give a brief description of the cement production process, of the materials employed and to show some exposure data collected by the University of Tor Vergata. These exposure data have been recorded from 1986 to 2005 in italian cement plants. Total dust, respirable dust and quartz concentration have been monitored in both environmental and personal samples. The average concentrations of dust was measured for all the occupational groups. Quartz content was analysed by X-ray diffractometry. Our results showed a diminished dust exposure level in the present compared to the past, and a variability in dust exposure among workers in cement factories.The use of these detailed workers exposure data in well-designed epidemiological studies may have the power to elucidate causality and quantify risk for workers.

CEMBUREAU COMPREHENSIVE HEALTH RISK STUDY

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[ID 2508]

As some stakeholders have expressed an uncertainty about health effects of exposure to cement, the CEMBUREAU Board decided to carry out a Comprehensive Health Risk Study in order to provide CEMBUREAU and its Members with a factual basis for arguments and for actions if needed.
CEMBUREAU Comprehensive Health Risk Study consists of different elements, that are not separable:
- Scientific Literature Survey
- Toxicological Study
- Exposure Measurements Study in the Construction Industry
- Prospective Lung Function Monitoring Study.

And will benefit from the results of on-going regional studies like:
- French Epidemiological Study
- Italian Clinical Study.

This French epidemiological study, on a national scale, looks at the health record of persons working in the cement industry. All the employees having worked in cement activity between 1990 and 2005 will be analysed. About 5,000 persons are working for the moment in the French cement industry, and a total of more than 10,000 workers will be considered (due to the turn over). The study will integrate exposition information on a semi quantitative basis.The results are expected in 2007 and will be integrated to the maximum possible extent into the CEMBUREAU Comprehensive Health Risk Study.The on-going Italian Clinical Study (follow-up of health of cement employees and exposure measurements since 15 years), will provide a consistent set of data with a close link with CEMBUREAU Comprehensive Health Risk Study.

SCIENTIFIC LITERATURE SURVEY

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UK HSE

[ID 2509]

Two studies undertaken by independent bodies will provide an update on the literature on cancer and cement:
- the Norwegian Meta Analysis
- the UK HSE (Health and Safety Executive) Cement Dust Exposure Health Review, 2005 update of the 1994 HSE review of Portland Cement

The previous conclusion: "Overall, the pattern of evidence clearly indicates that occupational exposure to cement
dust has produced deficits in respiratory function. However, the evidence available at the
present time is insufficient to establish with any confidence the dose-response relationship
for these effects." Does not provide a clearly established causal link, but the cautious wording used in those
studies calls for further studies. The HSE have very recently published the Cement Dust Exposure Health Review electronically following encouragement from the cement industry (CEMBUREAU, BCA & LCUK) to help balance other published papers. It deals with ill-health and cement dust inhalation and reviews more recently published studies, some of which had noted increased incidences of cancers at several sites (stomach, lungs, colon, pharynx and larynx). The report does not address dermatitis issues. The HSE concluded:
- A causal association between Portland cement exposure and cancer has not been established.
- The findings of the recent studies reviewed in this document maintain the uncertainty concerning a possible risk of cancer raised by the earlier data.
- Many of the 15 recent studies, all conducted outside of the UK, provide evidence of the presence of respiratory problems among cement factory workers, consistent with the earlier literature. Overall, the pattern of evidence clearly indicates that occupational exposure to cement dust has produced deficits in respiratory function. However, the evidence available at the present time is insufficient to establish with any confidence the dose-response relationship for these effects. The other parts of the CEMBUREAU Comprehensive Health Risk Study should help to remove the remaining uncertainties.

TOXICOLOGICAL STUDY

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[ID 2510]

The Toxicological Study will be carried out in two phases:
- In-vitro tests: toxicological test on 12 samples (CEM I, CEM II, CEM 111, clinker and limestone);
- Ex-vivo tests: clinical study of susceptibility of cement particles for pre-carcinogenic effects using healthy tissue from the upper respiratory tract of head-neck cancer patients.

Centre of Expertise in Life Sciences (CEL) as an independent body will carry out the study. Five partners will carry out the test: Institut fur Umweltmedizinische Forschung (IUF) - Heinrich-Heine University Dusseldorf, HERE - UZF Leipzig-Halle, ENT - University of Leipzig, BWK - Army Hospital Ulm and GIE - University of Giessen. VDZ (Verein Deutscher Zementwerke), through FIZ (Research Institute of the German Cement Industry) supports the toxicological study with the preparation of the fine fractions. The expected deliverables are:
- An expert evaluation of cement being a co-carcinogen or a genotoxic carcinogen based on vitro and ex-vivo studies with relevant human target cells;
- The relevance of selected material properties (alkalinity, trace metals) of cement-related particles in relation to DNA damage, inflammation and proliferation in human cells in vitro and ex-vivo;
- An expert assessment on the role of individual susceptibility in the genesis of cement induced neoplasms.

A few dust samples from the Exposure Measurements Study should be tested in the framework of the Toxicological Study to create an interface between both studies and an understanding of real life workplace samples in the toxicological test-systems.

EXPOSURE MEASUREMENTS STUDY IN THE CONSTRUCTION INDUSTRY

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[ID 2511]

This case study, not to be considered as representative of the whole construction industry, would be carried out in the region of Rhein-Neckar in Germany, where previous epidemiological work involving measurements of exposure to cement was done. An independent specialist IRAS (Institute for Risk Assessment Sciences) will dp the overall co-ordination of the study and the analytical work. The Norwegian National Institute of Occupational Health (NIOH) will do the chemical analytical work. TUV Sud will be assigned to perform the personal and stationary dust exposure measurements at different working places. The study will cover different stages and ail key job titles of the construction of a fire station in

Heidelberg by Bilfinger/Berger, a construction company from Mannheim. The construction site has started in April 2006 and will end in Spring 2007. The time frame for the exposure measurements at the site goes from May until December, over 8 months. For the first measuring campaign, the following job titles were chosen:
- cement plant worker, preferably in the milling or dispatching department
- mix operator of a ready mixed concrete plant
- worker in a precast concrete plant
- concrete repair worker
- floor screed worker or mason
- concrete worker, processing concrete or mortar
- construction worker, not dealing with cement or concrete

The second study phase will be elaborated, based on the results of the first phase. The focus will be on specific job titles and more comprehensive measurements of the different dust fractions. The aim of the study should not be to examine the health condition of construction workers, but rather to verify their real cement exposure and to compare this with cement plant workers (e.g. bagging department), who are exposed to higher levels of cement dust. The sample analysis in the exposure measurements and the Prospective Lung Function Monitoring Study should be consistent or at least comparable.

PROSPECTIVE LUNG FUNCTION MONITORING STUDY

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[ID 2512]

The main aim of the study is to examine possible exposure related effects on the respiratory system among cement production workers within a prospective design. More specifically:
- Does cement dust exposure lead to reduced lung function (FVC, FEVt) in cement production workers during a five year period?
- Does cement dust exposure lead to other respiratory effects?

For the *main part* of the study, the worker's current personal inhalation exposure to dust (thoracic fraction) and trends shall be measured. All workers shall be asked to complete a standardised questionnaire (respiratory symptoms, job type, tasks, technical parameters and other possible determinants of exposure and of confounding factors). The lung function will be measured by "forced expired volume" in one second – spirometric surveillance. The association between dust exposure and lung function and respiratory systems will be studied. The content of the *subset studies* needs to be elaborated together with the participating plants after the start of the measurements of the main part of the study. NIOH will establish a Monitoring Protocol for the exposure of workers in the cement industry, in co-operation with the participating plants, national associations and national health institutes as applicable and the *University of Rome Tor Vergata* (Prof. Bergamaschi). The National studies will have to be carried out in strict compliance with the CEMBUREAU Monitoring Protocol and can be carried out by institutes selected at national level. The plants selected for the national studies will participate on a voluntary basis and should not have formerly been involved in the production of asbestos cement, The observation period is five years. The total number of workers would be 2,000-2,500. Possible volunteers to be included in the cohort (to be confirmed) are plants from: Estonia, Greece, Italy, Norway, Spain, Sweden, Switzerland and Turkey. A project group consisting of experts from the NIOH and the cement industry will supervise
the project. A beneficial cooperation would be possible with already ongoing Regional Studies.

CHILD LABOUR

RISK OF WORK-RELATED MUSCULOSKELETAL DISORDERS FOR CHILDREN AND ADOLESCENTS

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[ID 2032]

Many young people are exposed to strenuous work, like carrying or lifting heavy loads, working in uncomfortable positions and carrying out repetitive stressful movements, which could affect their musculoskeletal development and may place them at high risk of developing work-related musculoskeletal disorders (WMSDs). Little is known about the risk of WMSDs for children and adolescents who perform physically demanding jobs. Children differ biologically from adults in their anatomical and physiological characteristics because of their process of growth and development, thus these risk factors that affect adults can affect children much more strongly. Since children respond differently than adults to these risk factors, the permissible exposure limits established for adults might not be sufficiently protective for children. For example, while the NIOSH lifting equation predicts that a maximum of 50 pounds represents the ideal lifting condition for an adult, it is likely that this equation would not be valid for children/adolescents. In Italy, the maximum permissible weights in manual loads handling for children and adolescents were established by law No. 977 of 17 October 1967:
Male: children 10 Kg., adolescents 20 Kg.; Female: children 5 Kg., adolescents 15 Kg.
The decree Law No.345 of 4 August 1999 repealed these maximum permissible load limits and at present, if children are allowed to work in places where manual load handling risk exist, Italian legislation specifically envisages evaluation of the manual load handling risk with respect to the negative consequences it may provoke. This risk should be evaluated according to the child's age, gender, maturation, and body motion. Therefore, it is necessary to make an individual assessment of each child in relation to his or her work, but this is very difficult because there is no reliable information on what the physical capabilities are for children of various ages, genders, statures, and developmental stages.

THE JOB CHOICE OF ADOLESCENTS WITH ASTHMA AND ALLERGIES.

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[ID 2079]

The prevalence of asthma and allergies in the general population has been rising during the last decades. On the other hand a considerable proportion of occupations lead to contact with potentially sensitizing agents and new sensitizing agents are emerging. Occupational asthma is one of the most common occupational lung diseases in many countries. In addition other allergic diseases such as occupational allergic rhinitis or allergic skin diseases play an important role in occupational medicine. However, there is still a lack of strategies how to advice atopic subjects concerning their job choice. Workplace exposure reduction, surveillance schemes and educational programmes seem to be most effective. Pre-employment screening for atopy remains problematic for practical, scientific, legal and ethical reasons. The link between asthma and allergies and the job choice is often not sufficiently considered by patients, physicians and state authorities. In a population-based study of adolescents we found no indication that the presence of an atopic disease influenced job choice. In Germany there is a mandatory medical examination of teenagers less than 18 years before starting vocational training that includes a detailed assessment of asthma and allergies. However, the effectiveness of this approach seems to be limited for a variety of reasons. This includes limited awareness of occupational diseases by many physicians and the lack of detailed evidence-based guidelines.
A promising strategy to rise awareness of this issue is to inform subjects early before the start of working life. Vocational schools or even secondary schools should be involved in this process. We are currently evaluating new strategies to reach adolescents before the start of potentially sensitizing exposure at work, including the development of e-learning resources for vocational schools.

AN INTERNATIONAL TRAINING PROGRAMME FOR OCCUPATIONAL SAFETY AND HEALTH: A CONTRIBUTION IN THE PERSPECTIVE OF CHILD LABOUR.

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[ID 2126]

Child labour includes a wide range of situations that can be hazardous to the health, safety, and morals of children. Many efforts has been made by the International labour organization (ILO) to make governments aware of child labour problems and to examine different solutions to this problem which is still widespread in many countries. The Department of Occupational Medicine of the University of Turin has been working on the development of a project, in collaboration with the International Professional Training Centre founded in Turin in 1964, based on officially recognised common strategies, which also include vocational training in social security and occupational medicine. To this aim a first level Master was planned, with a yearly course, entitled: "Occupation and safety at the work place" which will start in the year 2006. The course is aimed at various aspects of health and safety at the work place and many aspects of child labour will be focused. There may be many factors that contribute to the growth of child labour (i.e. low development of the country, deception, illiteracy and poverty…), and education can contribute to control and to a certain extent propose a solution to these aspects. The programme framework, dealing with child labour, is based on the ILO guidelines of the International Programme on the elimination of Child Labour with its multisectorial strategies such as motivating a broad alliance of partners to acknowledge and act against child labour, strengthening existing organizations and setting up institutional mechanisms, creating awareness on the problem nationwide, in communities and workplaces, promoting the development and application of protective legislation, replicating and expanding successful projects into the programmes of partners. Child labour involves complex factors such as psychological aspects and physical factors with the relationship between them and specific occupational exposures. Particular attention will be paid throughout the course to psychological factors such as poor judgment, poor risk assessment, incomplete self-image, need to prove independence and maturity leading to an emotionally and cognitively unprepared youth. Because of their biologic, social, and economic characteristics, young workers have unique and substantial risks for work-related injuries and occupational diseases. These subjects with their preventive strategies will be one of the main teaching points. As to physical risk factors, the children's physiological state and their susceptibility to injury and illness will be examined. For example, as young bodies are developing, higher metabolisms and faster circulation make them more sensitive to exposure from chemical agents such as pesticides during farm work, benzene during work at petrol stations, lead poisoning during car body repairs, asbestos and silica during construction and maintenance work. The Action Programmes set up in the training activities cover wide fields of intervention such as: issues to develop a policy on child labour, the information required for the employment of children, comparison between campaign methods, external institutional approaches. Some questions included in the examination process will be dedicated to the main policies aimed at the elimination of the worst forms of child labour.

CHILD LABOUR: AN OVERVIEW ON REPRODUCTIVE HEALTH

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[ID 722]

Every occupation has inherent risks. Health and safety at work are important matters that relate to the general health and safety of the working population. These matters should be given adequate consideration in policy making at both national and organizational levels. Adolescent health involves different professional perspectives and is of high public health importance, particularly reproductive health. Seven million adolescents are legally employed in the WHO European Region, but many others are illegally employed in different situations, and exposed to many hazardous conditions. The health and Safety Policy is crucial, as it reaffirms government commitment to safe working conditions. More coordinated action in this field is required internationally, nationally, sub nationally and at other levels of government. It is important to underline that:

- health problems are more prevalent in children and in adolescents than in adults;

- the impact of occupational risk factors are different for children / adolescents than for adults;
- more serious consequences of some health problems take place in children/ adolescents than in adults;
- health problems need to be dealt with differently in children / adolescents than in adults.

Within the framework of WHO's definition of health as a state of complete physical, mental and social well-being, and not merely the absence of disease or infirmity, reproductive health addresses the reproductive processes, functions and system at all stages of life. Published data indicate that many agents (physical, chemical, biological, etc) can be dangerous for male and female reproductive system through direct or indirect mechanisms and contribute to alter fertility, growth and endocrine function. The aim of our contribution is to give a worldwide perspective about the contribution to adverse reproductive outcomes due to injuries caused by exposure to physical, chemical and biological agents in the workplace.

INTERVENTION STUDIES IN OFFICES

METHODOLOGICAL EXPERIENCES FROM CONTROLLED WORKSITE INTERVENTIONS IN NORWAY

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[ID 2038]

Intervention field trials are regarded as a superior research method, compared to retrospective or cross-sectional studies. If conducted well, an intervention field trial may combine the strengths of a laboratory experiment with the advantage of using the actual working environment where coexposure to other naturally occurring environmental factors take place. However, this study design also has limitations, and several challenges have to be dealt with. We will discuss methodological experiences from indoor air and ergonomic/optometric interventions in Norway.

Table 1. Indoor air interventions evaluated

Study no.	Intervention	Control intervention	N	Follow-up time	Health endpoints
1	Antistatic VDU treatment + grounding	Sugar solution, no grounding	120	2 and 4 weeks	Skin symptoms/colour, reaction tests
2	Comprehensive office cleaning	Superficial cleaning	114	3 weeks	Respiratory symptoms, acoustic rhinometry
3	Electrostatic air filter with activated unit	Inactive filter/ active fan	80	3 weeks	Respiratory symptoms, peak expiratory flow, acoustic rhinometry

Table 2. Ergonomic and optometric interventions evaluated

Study no.	Intervention	Control intervention	N	Follow-up time	Health endpoints
4	Vertical mouse (Parallell group design)	Traditional mouse	67	6 months	Musculoskeletal pain, headache
5				12 months	
6				3 years	
7	Lighting + optometric correction (serial)	No intervention	181	2 years	Visual discomfort, musculoskeletal pain
8				6 years	
9	Optometric correction 3 types of progressive lenses	Single vision lenses	160	1 year	Visual discomfort, musculoskeletal pain

The following factors were regarded as most important in the intervention studies:
- Reversibility of health effects, use of objective health indicators
- Power considerations (size of intervention and control groups)
- Inclusion criteria (sensitivity of study versus generalisability)
- Exclusion criteria (resource limitation)
- Control group (comparability)
- Randomisation and matching
- Blinding (should be controlled)
- Length of follow-up
- Exposure contrast (sufficient to detect health effect)
- Confounder control, environmental control in study period

INTERVENTION ON INDOOR AIR WITH LOCAL ELECTROSTATIC CLEANERS IN OFFICES - METHODOLOGICAL EXPERIENCES

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[ID 2085]

The aim of this intervention study was to identify health improvements in the upper and lower airways of office workers after the installation of local electrostatic air cleaners.

Material and methods: Eighty persons with airways symptoms were recruited and randomly assigned to an intervention or control group. Half of the air cleaners had a non-functioning electrostatic unit. Both participants and field researchers were blinded to the group status. Subjective symptoms were recorded using a questionnaire, and indexes calculated for general, irritation and skin symptoms. Objective respiratory health indicators were recorded, with acoustic rhinometry and peak expiratory flow (PEF) meters.

Results: In the intervention group there was a decrease in mean dust concentration from 65 to 35 $\mu g/m^3$, and a reduction from 57 to 47 $\mu g/m^3$ in the control group. The irritation and general symptom indices decreased in both groups, but there was no improvement in the intervention group, compared to the control group.

Discussion of methods: The intervention reduced dust exposure in the intervention offices by 35% relative to the control offices. The effect of the intervention is diluted by exposure outside the office but other exposures were not measured. Thus dust levels may have changed differently between the two groups, although this was not expected due to random selection of the offices. In a previous intervention study, dust levels were reduced by cleaning and associations were found between irritative effects and the intervention. The reduction was almost twice as large (66%) as in the present study and largest for particles with size >10 μm (75% versus 34%). The observed effects were mainly in the upper airways where larger particles deposit. It seems therefore likely that the effect of the intervention was too small in the present study. Preliminary studies to quantify the effect of an intervention are therefore recommended.

Skulberg KR, Skyberg K, Kruse K, Eduard W, Levy F, Kongerud J, Djupesland P. The effects of intervention with local electrostatic air cleaners on airborne dust and the health of office employees. Indoor Air, 2005; 15: 152-159

METHODOLOGICAL CHALLENGES IN A CONTROLLED INTERVENTION STUDY WITH TWO DIFFERENT COMPUTER MICE

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[ID 2132]

Musculoskeletal disorders or illnesses are characterized by the pain being reversible within a limited time period. By reducing the exposure, i.e. mechanical load on the musculoskeletal system, the pain should be less. Therefore, musculoskeletal disorders are suitable for studies using experimental (laboratory or field) design.

A comparison between a vertical mouse (Anir) giving a more neutral position of the forearm and a traditional one, showed a significant less muscle load on the forearm when operating a vertical mouse versus a traditional one.

Sixty seven computer workers with neck, shoulder, forearm and wrist/hand pain were randomly divided into an intervention or control group (1). After randomisation the two groups showed a similar distribution of demographic variables and pain. The study was performed as a prospective parallel group design. The intervention group got the vertical mouse while the control group continued with the traditional mouse for 6 months. Then the control group got the vertical mouse while the former intervention group continued with the vertical mouse. Pain was measured after 6, 12, 24 and 36 months. The vertical mouse reduced significantly the pain in neck, shoulder and forearm and wrist/hand. The pain reduction lasted 2.5 years. A long follow up period is preferable to check if the values of the dependent variables are stabilized. Internal validity was considered by following 30 important confounding factors for musculoskeletal pain. Including only subjects with pain, limits the generalisation of the results to computer workers with pain. Subjects using vertical mouse were excluded from the study due to the design. The intervention and the control group were equally distributed in several buildings.

METHODOLOGICAL ASPECTS OF AN INTERVENTION STUDY COMPARING SINGLE VISION LENSES TO VDU-PROGRESSIVE ADDITION LENSES

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[ID 2179]

A high prevalence of visual problems and headache is reported among VDU users. Optometric intervention has been shown to be an effective remedy to reduce these problems (Horgen & Aarås, 1998). Ordinary progressive addition lenses (PAL) may lead to increased postural load. Three types of PAL specially designed for VDU-work and one single vision lens (SVL) were compared in a prospective field study, to see if progressive lenses created different development of visual discomfort and pain compared to SVL.

The study had a prospective, parallel group design. A clinically relevant difference in pain measurement was defined as one standard deviation, and with a power of 95%, a minimum number of 31 participants was needed in each group. Because of possible drop-outs, 160 VDU-workers were divided into four test groups by a stratified randomization procedure. Based on a comprehensive task analysis, with emphasis on viewing distances and angles, the first sample was totally randomized. The second sample was randomized for the three progressive groups and the third sample was randomized only for two of the progressive groups, to fit the PAL's to the work tasks. The study was single blinded.

A questionnaire concerning subjective symptoms, pain intensity and duration, using mainly 10 cm visual analogue scales, was completed by the participants before the intervention, after six months and one year.

The conclusion was that lens designs covering viewing distances from near out to approximately 2 meters are significantly better than lens designed to cover greater range of clear vision.
Horgen, G., & Aarås, A. (1998). *Optometric examination and correction of vdu-workers.* Advances in Occupational Ergonomics and Safety, USA.

IS IT POSSIBLE TO CONCLUDE THAT HEAT THERAPY MAY REDUCE NECK PAIN AT THE WORK PLACE?

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[ID 2217]

Neck pain is a common cause of discomfort, disability and sick leave in modern society. This intervention study evaluates the use of a heat package in self-treatment of neck pain at the work place.
The study was performed as an intervention study on data operators performing similar tasks in two physically separated departments of a data company. Operators with non-invalidating neck pain, but with a degree that at least reduced neck mobility and influenced daily activities, were consecutively invited during a four months period when they attended the medical department. At baseline a physiotherapist assessed and optimised the workstation ergonomics for all included subjects in both the intervention and the control group (placebo intervention). Thirteen subjects (54 % women) constituted the intervention group in one department and were offered a personal heat package and easy access to a microwave oven. Seventeen subjects (47 % women) constituted the control group in another department. A questionnaire and a four-week diary collecting data on workload, treatment and neck pain were distributed monthly for one year to all participants.
A follow-up by the physiotherapist after the observation period indicated a high and equal compliance in both departments related to the ergonomic adjustments suggested at baseline. A significant reduction of neck pain was recorded in the second quarter after the intervention in the intervention group, but not in the control group.
It was not possible to analyse data from the third and fourth quarter due to drop out. The lack of randomisation, the low number of subjects, the high drop out and the moderate compliance concerning use of heat package constituted the main methodological weaknesses of the study. These limitations only allow vague conclusions on evidence for an effect of heat therapy on neck pain.

HANDLING OF FIBRES MATERIALS - REGULATORY ASPECTS

THE ROLES OF SIZE, CHEMISTRY AND BIOPERSISTENCE ON FIBRE PATHOGENESIS AND THEIR INFLUENCE ON THE DEVELOPMENT OF NEW FIBRES

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[ID 2011]

Since the 1980s it has been recognised that any hazard from mineral fibres is related to the so-called "three ds" dose, dimension and durability. These terms are used loosely; for example dose is confused with exposure concentration. "Dose" should be used to describe the tissue content of fibres. Fibre dimension determines both the ability of fibres to reach the lung and their biological activity once there. The term "durability" has largely been replaced by "biopersistence" and in this context refers to their residence time in the lung or the rate at which they are cleared. There are therefore three approaches available to reduce any likelihood of a fibre having a harmful effect. Some of these are also recognised by various regulatory regimes

The first approach is to change fibre size. Within the EU there is no need for the carcinogen classification of very thick fibres. This was intended to apply to the continuous filament fibres containing virtually no respirable material. Even with wools which contain a wider range of fibre diameters the thicker the product the less dusty and the lower the content and release of respirable fibres. However thick wools are not so efficient as insulation, are more skin irritant and less resilient. Despite this there are several types of very useful fibre wool that have only a small content of fine fibres. It is well established that biological activity is maximised in a subset of longer respirable fibres; hence if a fibre product consists of only short fibres it will pose little risk. If all the fibres are less than 5µm long such a product can release no statutory fibres and may not need to be classified as fibrous. Again such products have limited, but important uses.

The realisation that a limited ability to persist in tissue would reduce hazard is again recognised in European law and this has led the manufacturers of many types of fibre to develop new materials or concentrate on the less biopersistent products in their portfolio. This has been very successful and for some applications such low persistence fibres are dominating the market. This has represented a rare example of the application of principles derived from toxicological research in reducing real life risks.

Biopersistence is clearly determined in large part by fibre composition but it is often suggested that other chemical effects are also important; however there is little evidence that this is so. Once resident in tissue fibre surfaces are coated in protein and other materials such that whatever they are made of they will all eventually have the same activity. This is well illustrated in that all types of "asbestos" can cause the same pathologic conditions despite very diverse chemical properties.

I therefore suggest that research and regulation on man made fibres has led to the reduction of what may be an already small risk, It is also suggested that as with many classes of chemical all fibres are qualitatively similar but differ in their ability to persist and accumulate in exposed persons. Knowledge of these principles allows the intelligent choice of which materials to manufacture and use.

ON THE CONSEQUENCES OF FIBRE SIZE AND SPLITTING BEHAVIOUR OF ACTINOLITE AND TREMOLITE WHO-FIBRES FROM GABBRO QUARRIES AND TUNNEL CONSTRUCTION

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[ID 2058]

Aim: Fibrous but not the non-fibrous types of the asbestos minerals are defined as asbestos. In Germany however, fragments from non-fibrous actinolite and tremolite (A/T) whose shape corresponds to the definition of WHO-fibres are regulated as asbestos-fibres in quarries and during road construction. Toxicity of these fibres should be assessed.

Methods: Samples of non-fibrous A/T from the Odenwald (A/T-Od), from Norway (A/T-Nor), a fibrous sample from the Harz (A/T-Hz) and UICC-crocidolite (UICC-croc) which altogether were prepared for a genotoxicity test and in addition historical samples of granular and fibrous SiC, containing whiskers (SiC-Gr, SiC-Wh) - which previously had been injected intraperitoneally in rats - were suspended in H_2O using ultrasonification. After filtration WHO-fibres were analysed by scanning electron microscopy (SEM, x2.500). Additionally the fibrous samples were analysed by TEM (x10.000).

Results: WHO-fibre-counts per mg were 0,064 x10^6 for SiC-Gr and ranged between 0,14 and 0,41. for A/T-Od and A/T-No while 377, 141and and 51x10^6 fibres/mg resulted for A/T-Hz, UICC-croc and SiC-Wh. Fibre size equally was different. Aspect ratio was >10/1 in 3%(SiC-Gr), 10%(A/T-Od), 63%(A/T-No), 100%(A/T-Hz), 87%(UICC- croc) and 96%(SiC-Wh). Fibres were <0,4µm in diameter in 3,3%(SiC-Gr), 4%(A/T-Od), 6,3%(A/T-No) 100%(A/T-Hz), 46%(UICC-Krok) and 48%(SiC-Wh). With TEM percentage increased to 100% and 91% (A/T-Hz, UICC- croc) but remained at 52% for SiC-Wh. Fibres were longer than 10µm in 0%(SiC-Gr), 14%(A/T-Od), 44%(A/T-No) 38%(A/T-Hz), 54%(UICC- croc) and 44%(SiC-Wh).

Discussion: If aspect ratio is >10/1 for more than 80% of WHO-fibres an asbestiform habit of the sample is expected. According to EPA(2003) fibres longer than10µm and thinner than 0,4µm represent carcinogenicity the best. None of these are present in A/T-Od and SiC-Gr. After injection of 1 gram of SiC-Gr no extra tumours were observed, though the same amount of WHO-fibres from SiC-Wh would have caused 45% tumours.

THE CARE (CONTROLLED AND REDUCED EXPOSURE) PROGRAMME: WHAT DID WE LEARN AFTER 7 YEARS OF REFRACTORY CERAMIC FIBRES (RCF) PERSONAL MONITORING?

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[ID 2105]

Refractory ceramic fibres (RCF) are used primarily in industrial furnace applications. Occupational exposures has been measured and, where possible, reduced as a part of project aimed at identifying and controlling any possible risks from these materials. In Europe this has formed a highly structured sampling programme (CARE), which has run for 7 years and has collected more than 4000 task or shift length actual time weighted average measurements. Plants and user sites are selected at random but weighted by the amount of fibre used and hence the higher the probability of significant exposure the higher the chance of selection. The resulting data have been analysed and the results, reviewed here, show that there are large differences between different job categories but not between manufacturing and user sites carrying out the same tasks. Fibre levels have reduced at both types of site. The success of hygiene advice given to users was monitored by repeat visits to the same plants and found to reduce fibre levels by an average of 37%. Both the European data and the worldwide database of over 14,500 measurements suggest that the practical limits of control may have been reached. However in the future these data will enable exposure reduction measures to be targeted more efficiently.

TESTING STRATEGIES FOR INVESTIGATING THE TOXICITY OF NEWLY DEVELOPED FIBRES

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[ID 2152]

Biopersistent fibres can induce health effects like lung tumours in exposed humans. The current OECD Guidelines for testing of chemicals are not specific enough for the needs of fibre testing. Specific approaches for testing of fibres were proposed in various international meetings and publications. One of the key questions is how to assess the predictive value of short-term tests for estimating the potential carcinogenicity of a newly developed fibre. Some of these considerations were presented recently in a publication of a working group of the International Life Sciences Institute (Inhalation Toxicology 17: 497-537, 2005).

Key parameters for assessing a potential fibre-induced carcinogenicity are chemical composition which influences the durability of the fibre in body fluids, biopersistence, critical dimensions which govern the respirability and mobility in the body. A controversy is still existing in regard to the role of the surface area and surface activity of fibres for health effects. For example respirable carbon fibres may behave differently in this regard compared to silicon carbide whiskers. Generally, in vitro tests are performed before studies with experimental animals are done. This approach usually limits the number of animal tests for assessing fibre toxicity.

Key parameters in subchronic studies are lung weight, investigations of the bronchoalveolar lavage fluid, proliferation in epithelial cells in the lung,

fibrosis and histopathology. Persistent inflammatory reactions after end of exposure are supposed to be a significant marker for chronic effects.
One substantial item is how to define a “new fibre”. Man-made vitreous fibres are produced in many different compositions. The question is in which case a composition is considered to be so different that it has a significant influence on the biopersistence. Related to this issue is the question how to define a “Chemical Range” in which a composition may vary but the fibre should not considered as a new fibre type. For technical reasons vitreous fibres cannot be produced always within the same composition.
One critical point is to produce the fibre material in a rat respirable fraction without contamination of granular particles. Biopersistent granular dusts also induce biological effects in short-term and chronic tests partly similar to fibres and contribute to the observed health effects. For assessing fibre specific effects this contamination is unwanted. As fibres are usually regulated by the concentration of the fibre number, granular dusts are considered as a confounder when data from animal studies are used for extrapolation for regulatory purposes.
One open question is the analysis of the critical fibre dimension. For biopersistence tests in the European Union the critical fibre length is considered to be > 20 µm whereas for occupational exposure limits in many countries a fibre length of > 5 µm is used. This limit is of critical importance when a benchmark material e.g. asbestos fibre is chosen for comparing health effects.

MACROPHAGE CULTURE AS A PREDICTIVE PARADIGM FOR MAN MADE MINERAL FIBRES BIOPERSISTENCE EVALUATION

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[ID 2196]

Formulations of newly man made mineral fibers (MMMF) are in constant progress. These evolutions are necessary so that mineral wools satisfy physical requirements such as increasingly resistance to high temperatures or better ageing in hot or wet conditions. Thus, MMMF biopersistance, given by half-life in lung (clearance) of inhaled fibers, is continuously evaluated by tests using rodents. Concurrently, European Centre for the Validation of Alternative Methods (ECVAM) has focused on the development and evaluation of *in vitro* alternative methods which would reduce, refine or replace the use of laboratory animals, while bringing valuable information necessary for the preservation of human health. For this purpose, we developed an *in vitro* assay to investigate MMMF degradation using a U-937 monocytic cell line. These cells have retained the ability to be activated into functional macrophages, a target cell largely involved in MMMF toxicity and clearance.
We activated U-937 monocytes with several factors such as *Escherichia coli* and *Curtobacterium sp* extracts, interleukine 6 (IL6), lipopolysaccharide (LPS), tumor necrosis factor α (TNF-α) and a combination of *Curtobacterium sp* extracts or cytokines IL6 and TNFα. *E. coli* supernatant induced U-937 monocytes differentiation into active macrophages as shown by light microscopy and gene expression studies. Surface alteration and holes formation in MMMF demonstrated by scanning electron microscopy (SEM), reflect macrophage activation. Results were consistent with *in vivo* biopersistence studies for 4 tested fibers. Degradation of fibers was also demonstrated by silicon release in the culture medium due to macrophages which was a function of time and of *E. coli* supernatant amount added to activate cells. The comparison of U-937 monocytes incubated with a rock wool fiber in presence and absence of *E. coli* extracts was made possible using 20 K-microarrays. Among 1,037 highly expressed genes, 56 were differentially expressed that were related to inflammation, oxidative stress, tissue remodeling. Among oxidative stress related gene, a gene similar to *NCF1* lead us to show that reactive oxygen species are involved in fiber surface degradation. In fact, fiber incubated in an acellular medium with hydrogen peroxide (H_2O_2) displayed similar surface erosion.
Thus, using various bacterial extracts, various cytokines and U-937 macrophages, we mimic physiological alveolar macrophage activation that lead to physical and chemical degradation of MMMF.

INDOOR ENVIRONMENT, WORK AND HEALTH

PERFORMANCE CRITERIA FOR HEALTHY OFFICE BUILDINGS: DEFINITION, ASSESSMENT AND BUILDING CLASSIFICATION

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The EU project HOPE (Health Optimisation Protocol for Energy-efficient buildings) aimed at characterising building performance in both energy efficiency and occupant health and comfort. One of the aims has been to develop a method to assess healthiness of buildings.
A set of qualitative and quantitative health and comfort performance criteria and related target values and factors to be checked have been stated for each parameter considered. Following these criteria a protocol to test performance of the buildings has been developed, consisting of two phases:
1. Data collection phase, in which buildings are assessed by checklist, questionnaires and related algorithms of assessment, with a preliminary building assessment. Checklist responses are evaluated in order to assess presence of health and comfort risk factors. Questionnaire responses are elaborated using two algorithms: the Building Symptom Index (BSI_s) that is based on five symptoms related to the Sick Building Syndrome; the Overall Comfort Score (OCS) that takes in to account some parameters of the inner environment.
2. Detailed investigation, performed by environmental measurements based on the outcome of the first stage.
Combining the results three categories are identified to classify buildings:
Category 1- Healthy building: the building complies with all the performance parameters, no health hazards are present nor significant complaints about the indoor environment are detected.
Category 2 - Uncertainly healthy building: further diagnostics should be considered before assuring that health hazards do not exceed the target values, while no excessive frequency of complaints about the indoor environment is detected.
Category 3 – Unhealthy building: health risk factors are definitely present or an excessive frequency of complaints about the indoor environment is detected.
This method has been tested and applied in 67 office buildings in nine European countries. The main problems found in the investigated office buildings were inadequate ventilation, too high temperatures (too hot) and high concentrations of particulate matter. Poor ventilation was occurring in both mechanically ventilated buildings (e.g. due to incorrect control settings) and naturally ventilated buildings (due to an inadequate control strategy or improper functioning of parts of the system).

INDOOR AIR QUALITY AND MOLD

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[ID 100]

Background
Workers at a law enforcement center in the southeastern United States attributed health complaints to mold in the workplace. Twenty-three workers sued the employer (county government) in hopes of getting a total award of at least $2,300,000. Complaints about indoor air quality may be a reflection of sick building syndrome (which has no identifiable specific illness or cause) or building-related illness (which may have causes such as mold or other allergens or irritants).
Objectives
The author was requested by the employer to investigate the complaints and to advise whether the workers had medical conditions that were caused by mold in the workplace.
Methods
Attorneys obtained past medical records and deposed the 23 workers involved in the law suit. Air sampling for mold was done throughout the workplace and compared to sampling at 21 workers' homes and outdoor air. The 23 workers were examined for respiratory diseases and allergies.
Results
Soon after construction of the workplace around 1998, there was visible evidence of roof leaks, condensation, rust and mold growth. Indoor humidity was generally too high, and temperature was sometimes too high. Smoking of cigarettes and cigars was prevalent throughout the offices. Air concentrations of Aspergillus and Penicillium molds in 6 of 28 indoor locations at the workplace were higher than outdoor concentrations. However, Aspergillus and Penicillium were also present in all of the workers' homes, and were higher than outdoor concentrations in 10 of the 21 homes that were tested.
75% of the workers reported headache, 55% eye/nose/throat irritation, 55% fatigue, 30% shortness of breath, 30% muscle aches, 25% nausea and dizziness, 25% difficulty with concentration, 20% cough, and 10% chest tightness. Several workers also reported low job satisfaction and high work stress.
None of the workers were found to have asthma or other impairment of lung function. Five of the 23 workers were found to be allergic to Aspergillus or Penicillium. Two of these workers had concentrations of Aspergillus and Penicillium at home that were higher than at work. Moreover, 15 of the 23 workers were allergic to various airborne allergens: 13 had multiple allergies, and only 2 had allergies limited to mold.
Conclusions
Recommendations were made to repair the roof leaks and air conditioning system, and to stop cigarette and cigar smoking inside the workplace. Most of the workers' symptoms were consistent with allergic rhinitis, and 65% were found to have some form of inhalant allergy. However, only 22% were allergic to Aspergillus or Penicillium and only 9% had a clinically significant response to these molds. Among the 5 workers who were allergic to Aspergillus or Penicillium, it was determined that exposure to mold in the workplace probably caused the allergy in one worker, and exacerbated symptoms but did not cause the allergy in the other 4 workers.
The case settled for $150,000 before trial. The factors leading to the settlement included not only the medical and environmental findings, but also economic, social and "political" issues.

THE ROLE OF SENSORY IRRITANTS AND ODOROUS COMPOUNDS IN OFFICE ENVIRONMENTS

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[ID 938]

Sensory irritation in eyes and airways and odour effects of organic compounds in indoor environments are reviewed.
It is proposed to distinguish roughly between four groups of organic compounds in indoor air (OCIAs) according to their expected health effect, including odour annoyance. These groups are: 1) Chemically non-reactive, 2) Chemically "reactive", 3) Biologically reactive (i.e. form chemical bonds to receptor sites in mucous membranes), and 4) Toxic compounds. Specific OCIAs may belong to two or more of the above groups.
Chemically non-reactive OCIAs are considered non-sensory irritants at typical indoor air concentrations. However, compounds with low odour thresholds contribute to the overall sensory perception of the indoor air quality that is built up during the working day. It appears that odour thresholds for many OCIAs probably are considerably lower than previously reported. This explains why many building materials persistently are perceived as odorous, although the concentrations of the detected organic compounds are close to or below their reported odour thresholds. Certain odours in addition to odour annoyance may result in psychological effects, such as sensory perception and distraction from work, in addition to retention of breathing. Terpenes and terpenoids (used in many consumer products) are chemically-reactive OCIAs, which are oxidised by ozone producing both gas and aerosol products, some of which are sensory irritants, i.e. biologically reactive (e.g. formaldehyde). A number of caveats that are important for interpretation of sensory irritation and odour annoyance in the context of indoor measurements will be presented.

IRRITATIVE AND GENERAL SYMPTOMS IN WORKERS IN A NEW HOSPITAL DESIGNED WITH A DOUBLE-LOADED, ENCLOSED WORK-STATION ENVIRONMENT

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[ID 1312]

Aim. Although hospital workers are exposed to a wide range of health hazards, workers in a modern hospital may be exposed to risks deriving from the building itself. This study evaluated work-related irritative and general disturbances and symptoms in staff in a New Hospital in central Italy, soon after their transfer there from older hospitals.
Methods. The new 7-storey hospital (AC) had a double-loaded, enclosed work-station environment and was air-conditioned with no recirculation of indoor air. Study participants included 735 workers from AC and from two traditionally built hospitals, one with mechanical ventilation an opening windows (MV); the other with natural ventilation (NV).
Partecipants answered a questionnaire investigating work-related complaints and symptoms. Symptoms were considered work-related if they began or worsened after starting work in the hospital and if they improved or disappeared after work. Only work-related symptoms were analysed and classified in the following groups: general (headache, lethargy, lack of concentration, irritability, dizziness, nausea); ocular (burning and/or conjunctival hyperemia, lacrimation); respiratory (rhinorrea, stuffy nose, itchy nose, repeated sneezing, dry throat, hoarseness, thirst), cutaneous (erythema, wheals, dry skin, itchiness).
Results.The prevalence of work related group of symptoms in AC, MV and NV hospitals were respectively 77.8%, 41.1% and 29% for ocular, 88%, 62.1% and 40.3% for respiratory symptoms, 67.7%, 61.1% and 38.6 %for cutaneous, 92.8%, 75.8% and 62.7% for general symptoms.
Working in AC correlated with all groups of symptoms, after adjusting for age, sex and job.Younger age was positively associated with ocular, cutaneous and general symptoms. The jobs of nurses and ward orderlies were most associated with cutaneous and airway symptoms.
Conclusion.In the AC pattern of the symptoms reported by the workers, their high prevalence and correlation with the workplace are similar to what has been reported in outbreaks of Sick Building Syndrome.

INDOOR AIR ASSOCIATED SYMPTOMS AMONG HOSPITAL WORKERS

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[ID 444]

Aim. The indoor air quality in hospitals is deteriorated by the factors from the hospital activities and the microbes and their metabolites from the moisture-damaged buildings. The present study aimed to evaluate the indoor air associated symptoms among hospital workers.
Methods. The modified Indoor Air Questionnaire established by the Finnish Institute of Occupational Health (MM-40) was sent to the workers of different units of the ten chosen central hospitals in Finland. The questionnaire comprises parts of work environment, work arrangements, allergy history of employees and work-related symptoms. Altogether 5 598 questionnaires were distributed to the workers of inpatient wards, outpatient clinics, laboratories, X-ray departments, rehabilitation units and operating departments in the ratio of the amount of employees in each unit.
Results. Altogether 3811 workers responded to the questionnaire. The response rate was 68%. The most common symptoms associated with indoor air were irritation of nose (25% of the respondents), hand irritation (24%), eye irritation (23%) and fatigue (21%). Ten percent of the participants were men, ninety percent were women. 10% reported having asthma, 42% had hay fever or other allergic rhinitis and 28% had atopic eczema. Those who were allergic reported significantly (p=***) more symptoms than non-allergic participants: irritation of nose 34%/14%, irritation of eyes 28%/18%, hand irritation 29%/18%, fatigue 24%/18%. Women reported significantly more symptoms than men: eye symptoms 24%/12%, nose symptoms 26%/14%, hand symptoms 25%/11%, headache 10%/4%, throat symptoms 18%/9%.
Conclusions. The hospital workers reported more indoor air associated symptoms than the office workers in a reference material. Female and allergic workers experienced work-related symptoms more often than men and non-allergic workers.
This study emphasizes the significance of good indoor air quality in hospitals.

CRITICAL APPRAISAL OF THE SETTING AND IMPLEMENTATION OF INDOOR EXPOSURE LIMITS IN THE EU - THE INDEX-PROJECT (2002–2004)

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[ID 1727]

The INDEX project was funded by the European Commission´ DG SANCO and JRC and was scientifically coordinated by the JRC in collaboration with a Steering Committee of leading European experts in the area of indoor air pollution. The project was given the assignment to identify priorities and to assess the needs for a Community strategy and action plan in the area of indoor air pollution by: (1) setting up a list of compounds to be regulated in indoor environments with priority on the basis of health impact criteria, (2) providing suggestions and recommendations on potential exposure limits for these compounds, and (3) providing information on links with existing knowledge, ongoing studies, legislation etc. at world scale.
On the basis of the available information the Steering Committee decided to include into a detailed assessment 14 compounds (out of initial 41 candidate compounds) i.e.: acetaldehyde, alpha-pinene, benzene, carbon monoxide, d-limonene, formaldehyde, meta-, orto- and para-xylene, naphthalene, ammonia, nitrogen dioxide, styrene and toluene. Finally a list of compounds, consisting of 5 chemicals, with potential of high indoor concentrations, uncontested health impacts, and effective risk management were selected to be regulated with priority, as reported below:
Formaldehyde: The non-carcinogenic no-effect level is 30 µg/m^3. Pending on IARC revision of formaldehyde carcinogenecity, a guideline should be as low as reasonably achievable. Management options are to restrict and avoid the use of formaldehyde containing materials and products in buildings.
Carbon Monoxide: Proposed guideline values are 10 mg/m^3 (8-hour) and 30 mg/m^3 (1-hour). Management options are to connect each combustion equipment/appliance to chimney or vented hood, to ensure sufficient local extract ventilation in kitchens with gas stove, mandatory inspection and maintenance of indoor combustion devices, and CO alarms.
Nitrogen Dioxide: Proposed guideline values are 40 µg/m^3 (1-week) and 200 µg/m^3 (1-hour). Management options are to connect each indoor combustion device/appliance to chimney or vented hood, and to ensure sufficient local extract ventilation in kitchens with gas stove.
Benzene: Benzene is a carcinogen, its indoor air concentration should be kept as low as reasonably achievable, and not exceed outdoor concentrations. Management options are to ban benzene sources indoors, and lower the permissible benzene content in any building material and consumer product.
Naphtalene: Proposed long term guideline value is 10 µg/m3. Management option is to restrict the use of naphthalene containing household products.
The final report, on the Web for public comment, is available at:
http://europa.eu.int/comm/health/ph_projects/2002/pollution/fp_pollution_2002_exs_02.pdf

SMALL SCALE ENTERPRISES AND THE INFORMAL SECTOR

SMALL ENTERPRISES AND THE INFORMAL SECTOR: ADVANCES AND SETBACKS IN OCCUPATIONAL HEALTH AND SAFETY

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[ID 2595]

Since the last few years, great advances have been achieved in many parts of the world, both in developed and developing countries. In some countries, either existing or new legislation has been extended to such enterprises. In these and other countries, national committees have been established to address the special problems in those enterprises. Unfortunately, many such enterprises are not registered, and therefore not inspected or supervised by statutory authorities. Educational and training schemes exist, but the attendance at courses is often very poor. On the international front, there is still an insufficient system of cooperation between countries or regions which send and those which receive outside workers who usually gravitate to small enterprises and the informal sector. There is, moreover, an acute shortage of manuals and guidebooks to address the peculiar difficulties in surveillance of occupational health and safety problems and the implementation of preventive measures in such enterprises. This paper suggests several measures to cope with these problems.

WORKPLACE CHECKPOINTS FOR OCCUPATIONAL HEALTH TEAMS SERVICING SMALL ENTERPRISES

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[ID 2596]

Workplace checkpoints have been compiled for their direct use by local occupational health teams in providing occupational health services to small enterprises. The checkpoints have been designed in collaboration with a district occupational health centre in Tokyo, local medical associations and a bookbinding industry association. The services provided by part-time occupational physicians and other team members servicing small enterprises employing less than 50 workers are taken into account. As action-oriented checkpoints, practical workplace actions contributing to work-related health risk reduction have been selected based on joint inspections of bookbinding workplaces. These checkpoints present practicable options for improving materials handling, workstation design, machine safety, teamwork environment and health care support. Attention is thus paid to a broad range of risks including musculoskeletal and stress-induced disorders. An action checklist comprising 21 items representing low-cost actions commonly applicable to small enterprises has been proposed and tested together with an illustrated handbook of corresponding checkpoints in the form of locally practicable options. This set has proven useful for its direct use by part-time occupational physicians and other professionals particularly for facilitating group work involving managers and workers of these enterprises. Presentation of locally achieved improvements and a clear focus on low-cost improvements from basic hygiene and ergonomics points of view and are found essential. It is suggested to develop similar sets of action checklists and illustrated handbooks for promoting participatory workplace improvement through workplace visits of occupational health teams.

DELIVERY OF BASIC OCCUPATIONAL HEALTH SERVICE TO SMALL ENTERPRISES AND THE INFORMAL SECTOR

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[ID 2597]

This paper describes several examples of effective delivery of occupational health and safety service in the Asia-Pacific Region. Side by side with statutory authorities, such services have been established by industry groups, trade unions, medical and health associations, cooperatives and charitable foundations. In most of these services, both preventive and curative care are provided. Usually payments are on a pro-rata and periodic basis and low. Often subsidies are accorded by state or private or international agencies. Most of the professional staff, mainly of doctors and nurses, are trained in basic occupational health and hygiene, as well as primary health care and emergency treatment. They are often reinforced by other visiting staff, such as ergonomists, occupational hygienists, and health promotional experts. Examples of such services are given, with suggestions as how to widen their coverage and long-term survival projects.

PRACTICAL APPLICATION OF ILO-OSH 2001 (ILO GUIDELINES ON OCCUPATIONAL SAFETY AND HEALTH MANAGEMENT SYSTEMS) TO SMALL ENTERPRISES IN VIETNAM

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[ID 2598]

Small enterprises play vital roles in the socio-economic development of Viet Nam. Responding to the immediate safety and health needs of small enterprises, a two-day pilot training course using ILO Guidelines on Occupational Safety and Health Management Systems (ILO-OHS 2001) was carried out in Cantho City of Viet Nam. Twelve small enterprises attended the pilot training. Each of the twelve enterprises sent one representative from the management and another from their workers. The training programmes was designed to give the participants practical tips how to apply ILO-OSH 2001 in an action-oriented manner. In the first session of the training, a risk-assessment exercise with the application of the ILO's WISE (Work Improvement in Small Enterprises) action-checklist was conducted. In the second session, the five main elements of ILO-OSH 2001 (policy, organizing, planning and implementation, evaluation, and action for improvement) were explained in an easy-to-understand manner. The third session of the training was the exercise to formulate safety and health management systems in the participants' own workplaces based on ILO-OSH 2001. The participants were provided with concrete samples of OSH policy, organization, and OSH objectives for planning. Eight months after the pilot training, we visited the participants' factories as a follow-up. They established their safety and health policies and implemented their action plans in a step-wise manner. They kept all the activity records in a file for easy reference. It was concluded that ILO-OSH 2001 can become a practical instrument to assist local small enterprises in improving safety and health in a systematic way. Risk-assessment using action checklists and low-cost improvement methods of WISE provided concrete technical know-how for small enterprises to implement essential elements of ILO-OSH 2001 effectively.

APPLICATION OF MOLECULAR EPIDEMIOLOGY IN OCCUPATIONAL HEALTH: A MULTICENTRE STUDY ON BENZENE AND PAH EXPOSURE

MOLECULAR EPIDEMIOLOGY IN OCCUPATIONAL AND ENVIRONMENTAL HEALTH

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[ID 2513]

The traditional epidemiological research has so far allowed to identify high risk groups, consisting of subjects that because of their occupational exposure, life style or environmental conditions, are more likely to develop specific diseases. Such studies also proved several associations between chemical exposure and specific diseases. Over the last years these associations have been evaluated by the so-called molecular epidemiology, i.e. by incorporating techniques of molecular biology within the epidemiological studies.

Molecular epidemiology may assume a pivotal role in disease prevention by 1) providing evidence that specific environmental agents pose human hazards, 2) establishing their causal role, 3) identifying subsets of the population who are at special risk, and 4) using this information to suggest or to develop new and more effective strategies to reduce risk.

However, the use of biological monitoring for the prediction of individual risk profiles appears to be conditioned by problems linked to validation of the biomarkers. Issues such as the dose-response relationship, complex intra- and interindividual variability, defining a different individual susceptibility to xenobiotics need to be further elucidated. The susceptibility to chemical carcinogens largely depends upon factors affecting the metabolic pathway and fate of the compounds, and upon the efficiency of DNA repair mechanisms. Knowing these polymorphisms and their role in modulating internal dose and, hence, health risk may greatly enhance our capability to prevent harmful effects of environmental factors. It is not yet defined whether the interaction associated to genetic polymorphisms occurs at high or low doses. If the influence of polymorphism on modulation of chemical carcinogens occurs at low doses, it means that at high doses the effect will be entirely due to carcinogen; at low doses only genetically susceptible subjects will show high levels of biomarkers for interaction effects. If interaction occurs only at high doses, it will be possible to consider "safe" the low doses.

BIOMONITORING LOW LEVEL BENZENE EXPOSURE: BASIS AND CHALLENGES

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[ID 2514]

In spite of limitations to its use, occupational and environmental benzene exposure is still widespread. Tobacco smoking is the main non-occupational factor, with concentrations around 50 ppm, and urban traffic and gas stations contribute to maintain elevated mean annual levels of benzene in the urban environment ranging 5-30 μg/m^3, while levels in rural areas range 0.5-6 μg/m^3. Oil refineries and petrochemical plants also convey benzene exposure not only for the workers, but also for the general population in the surroundings. As benzene is a recognized human carcinogen, biomonitoring low level exposure is of paramount importance to understand mechanisms of benzene toxicity and whether thresholds exist based on the genotype in specific loci devoted to benzene transformation, excretion, and interference with DNA. Post shift urinary benzene is best correlated with recent exposure, but strict technical procedures are needed. Also, urinary cotinine excretion should be monitored to assess the extent by which passive smoking might account for an elevated benzene excretion. S-phenylmercapturic acid (S-PMA) results from conjugation of benzene epoxide with glutathione; although only 1% benzene converts to S-PMA, such indicator has been suggested to monitor low level benzene exposure based on its elevated sensitivity and specificity. Urinary trans,trans muconic acid (t,t-MA), a benzene metabolite widely used to biomonitoring occupational exposure to benzene, is poorly specific at low levels, due to the possible confounding effect of dietary intake of foods and beverages preserved with sorbic acid. Finally, genetic polymorphisms of the enzymes CYP2E1 and NQO1 [NAD(P):H quinone oxydoreductase] have been associated with an increased haematotoxicity and risk of leukaemia following benzene exposure. Their effects on the inter-individual variability of biomarkers of benzene exposure are still unclear. Our project on biomonitoring low level benzene exposure is addressed to provide answers and allow more effective preventive action.

MULTICENTRE STUDY ON BENZENE AND PAH EXPOSURE: POPULATION AND METHODS

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[ID 2515]

A large European multicentre study was designed to investigate the effects of exposure to low levels benzene and PAH. Several occupational groups (and referents) were identified and surveyed in a cross-sectional study in Bulgaria, Poland, and 5 Italian regions (Apulia, Liguria, Lombardy, Sardinia, Veneto). For benzene the following were selected: petrochemical workers, filling station and fuel attendants, bus drivers, urban policemen, side-products workers of a coke oven plant. For PAHs: coke-oven and asphalt workers. Similar questionnaires, procedures to collect environmental and biological samples, and laboratory methods were developed and used in the different centres. Benzene and PAH exposure was measured on all subjects except general population referents in Veneto. Spot urine samples were collected at the beginning and at the end of the work shift. We measured the excretion of benzene metabolites t,t-muconic acid (t,t-MA) and S-phenylmercapturic acid (S-PMA), and non-metabolized benzene. Urinary 1-hydroxypyrene was used as the main dose biomarker of PAH exposure. Differential white blood cell count (WBC) was performed on blood samples collected the day following exposure monitoring; DNA single strand breaks in leukocytes (SSB) were measured in a selected subsample of subjects. Several metabolic and repair polymorphisms were determined to study genome-environment interactions. The project also included a hospital-based case-control component (Lombardy), in which the cases were 200 subjects with bladder cancers and the controls 214 patients with other non-neoplastic urinary diseases; adduct levels and several genetic polymorphisms were measured in blood samples. In the period 1999-2005 we enrolled 840 subjects in the benzene and 1394 in the PAH project (980 in the cross-sectional, 414 in the case-control component). The main merits of this project were: common study project; large sample size; wide range of exposure levels; similar field and laboratory methods; vast array of biomarkers of dose, effect, and genetic susceptibility.

INFLUENCE OF POLYMORPHISMS ON BIOMARKERS OF LOW BENZENE EXPOSURE

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[ID 2516]

Benzene is a human carcinogen and an ubiquitous environmental pollutant. This investigation evaluated the influence of genetic polymorphisms of metabolic enzymes CYP2E1 (*RsaI* and *DraI*), GSTM1, GSTT1 and NQO1 on some biomarkers of benzene exposure, namely: urinary *t,t*-muconic acid (*t,t*-MA), S-phenylmercapturic acid (S-PMA) and benzene (U-benzene). Italian petrochemical workers, side-products workers of a coke oven plant, gas station attendants, urban policemen, bus drivers and 6

groups of controls were studied (632 subjects). Median personal benzene exposure ranged between 99 and 2 μg/m^3. U-benzene, but not *t,t*-MA and S-PMA, showed an exposure-related increase. All the biomarkers were strongly increased by cigarette smoking. Significant correlations of the biomarkers with each other and with urinary cotinine were found. In a preliminary analysis performed on a subset of 415 subjects, an effect of the presence of a variant CYP2E1 (*RsaI* and/or *DraI*) allele on *t,t*-MA (increase) and U-benzene (decrease) was found. Using multiple linear regression models we simultaneously evaluated the contribution of genetic polymorphism, smoking habit and job on the level of the investigated biomarkers. R^2 was up to 0.55 for U-benzene. For pre-shift *t,t*-MA, both the presence of a variant allele of CYP2E1 (RsaI) and of smoking habit were found to double the levels, while no significant influence was exerted by job. For U-benzene (both pre- and post–shift), the presence of a variant allele of CYP2E1 (RsaI) decreased the level of one third, smoking habit increased the level 3-4 times while being a traffic policeman or a gasoline attendant in comparison with being a control increased the level 1.5-2.0 and 2.8-3.3 times, respectively.
The result of our study suggests, for the first time, a role of the genetic polymorphisms of CYP2E1 in the metabolism of benzene.

LOW BENZENE EXPOSURE AND EARLY HEMATOLOGIC CHANGES

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[ID 2517]

Background

Because of its widespread diffusion in the general environment, the possible toxic effects of low benzene levels are a major public health problem. Recent studies reported early toxic effects on white blood cells in workers exposed to very low doses of benzene [1]. Different occupational groups exposed to low benzene levels and unexposed control subjects were examined in order to identify possible decrease in blood cell count.

Methods

The study population included 584 workers from different occupational groups in Bulgaria (158 petrochemical workers) and Italy (fuel attendants and petrochemical workers in Cagliari, bus drivers in Genova, side-products workers of a coke-oven plant in Bari and traffic policemen and gasoline station attendants in Milan). 263 unexposed subjects were enrolled as referents (50 in Bulgaria and 213 in Italy). For each participating subject, personal exposure to airborne benzene was measured during the work shift. The next day, before the beginning of the work shift, a blood sample was collected. Total and differential white blood cells (WBCs) counts, red blood cells (RBC) and platelets have been determined. Detailed information about working history, education, lifestyle, concurrent illness and non-occupational exposure to environmental pollution was collected through a self-administered questionnaire.

Results

The median, first and third quartile of airborne benzene exposure were 0.006 (0.002-0.01) in the Italian and 0.26 (0.03-0.89) in the Bulgarian populations. No significant decrease in total and differential WBC, RBC and platelets were found using a multiple regression model, adjusting by age, gender, current smoking habits and participating centre.

Conclusion

Our study did not found early haematological toxic effects among European workers exposed to low and very low benzene levels.

AN INTEGRATED APPROACH TO EVALUATE PAH EXPOSURE

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[ID 2518]

An integrated evaluation of PAH exposure has to consider different routes of absorption, reliability and specificity of biomarkers of dose, and individual susceptibility.
The present study investigated the exposure to PAHs in coke oven workers (CO, n=100), asphalt pavers exposed to bitumen fumes (AW, n=98) and ground construction workers exposed to diesel exhausts (RC, n=47), by means of environmental and biological monitoring.
Personal exposure to total airborne PAHs [from naphtalene to indeno(1,2,3-cd)pyrene] in CO (median 140 μg/m^3), was much higher than in AW (0.6 μg/m^3), and in RC (0.4 μg/m^3) workers. Urinary 1-hydroxypyrene (1-HOP) in end-shift samples was significantly higher in CO (2.2 μg/l) than in AW (0.7 μg/l) and in RC (0.4 μg/l) workers. An increasing trend in 1-HOP levels, over the workweek and the workshift was registered. A similar trend was observed for urinary 2-hydroxyfluorene (2-FLE) and 3-hydroxyphenanthrene (3-PHE) as well as for some unmetabolised PAH in urine. In smoking subjects with low exposures an important contribution to biomarkers was given by tobacco smoking. PAH-DNA adducts levels in peripheral blood lymphocytes were not associated with external exposure. Genetic polymorphisms of metabolic and DNA repairing enzymes (CYP1A1, GSTM1, GSTT1, XPD) did not appear to influence the levels of biomarkers. Total dermal contamination of PAHs, assessed in a subgroup of 22 AW, ranged from 23 to 623 μg. Significant correlations between dermal phenanthrene or pyrene and 1-HOP (r = 0.41 and 0.55), indicate that dermal exposure could contribute to the internal dose of these compounds.
Our results suggest that urinary biomarkers of PAHs, integrating exposure from all sources and routes, are reliable tools for risk assessment in occupational health.

DETERMINANTS OF ANTI-BENZO[a]PYRENEDIOLEPOXIDE-(B[a]PDE)-DNA ADDUCT FORMATION IN LYMPHOMONOCYTES OF HUMANS EXPOSED TO POLYCYCLIC AROMATIC HYDROCARBONS

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[ID 2519]

For some years our research group has been evaluating anti-benzo[a]pyrenediolepoxide-(B[a]PDE)-DNA adduct formation (adduct induced by the ultimate carcinogen of B[a]P) in lymphomonocytes of humans occupationally and environmentally exposed to polycyclic aromatic hydrocarbons (PAHs) (B[a]P). We first demonstrated that an HPLC/fluorescence method could be applied to *anti*-B[a]PDE-DNA measurements to assess high and chronic occupational exposure to PAHs (B[a]P) (n= 200 workers). Adduct levels were significantly higher in coke oven workers and chimney sweeps than controls, but not in aluminium plant workers and psoriatic patients. No influence of smoking or diet was detected due to overlap with the high occupational exposure. In coke oven workers, the greater risk of *anti*-B[a]PDE-DNA adduct formation was also related to the lack of glutathione *s*-transferase activity μ1 (*GSTM1 *0/*0* genotype). Additionally in more highly exposed coke oven workers (with urinary 1-pyrenol exceeding the proposed BEI (2.28 μmol/mol creatinine)) the increase in adduct levels was significantly related to some low-activity NER (nucleotide excision repair) genotypes together with *GSTM1**0/*0. These genetic factors appear to be as important as occupational exposure to PAHs in modulating the levels of the biomarker.
Recently determinants of anti-B[a]PDE-DNA adduct formation in lymphomonocytes of general population exposed to low doses of PAHs (B[a]P) were also evaluated (n=585). Our results indicate that anti-B[a]PDE-DNA adduct can be detected in the general population and its formation, associated not only with tobacco smoke exposure, but in smokers also with indoor and diet exposures, is modulated by GSTM1 genotype. The information provide here are important since DNA adduct formation in surrogate tissues is considered an index of genotoxic exposure also in target organs (e.g., lung) and their increase may also be predictive of higher risk of PAH-related cancer.

GENE-ENVIRONMENT INTERACTION: PAH EXPOSURE AND BLADDER CANCER

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[ID 2520]

BACKGROUND: Some metabolic and DNA-repair genetic polymorphisms may modulate susceptibility to occupational/environmental carcinogens as well as DNA-adducts formation.
OBJECTIVE: to investigate bladder cancer (BC) risk in relation to genetic polymorphisms and DNA-adducts, taking into account environmental and occupational exposure to known or suspected carcinogens, such as PAH.

METHODS: within a hospital-based case-control study, 200 cases and 214 controls were interviewed on BC risk factors. An occupational PAH exposure score was calculated (considering duration, reliability, frequency, level). Various genotypes and total leucocyte DNA-adducts were determined. Odds ratios (OR) and 95% confidence intervals (CI) were calculated through multivariate logistic regression.
RESULTS: increased risks were recorded for lathe operators (OR 3.54; CI 1.16-10.81), manufacture of some machinery and equipment (OR 2.25; CI 1.12-4.55) and certain fabricated metal products (OR 2.79; CI 1.40-5.53). 38.5% cases and 34.1% controls had occupational PAH exposure: no excess risk was found according to reliability, level, frequency, mode, calendar, starting age; duration >30 years (OR 2.11, CI 1.00-4.42) and score >10 (OR 2.76, CI 1.08-7.04) were associated to BC risk.
DNA-adducts assessment is ongoing; preliminary analyses (350 samples) seem to reveal no differences in DNA-adducts levels in cases versus controls and PAH exposed versus not exposed.
GSTM1 null (OR 1.69, CI 1.11-2.56), GSTT1 null (OR 1.74, CI 1.02-2.95), MnSOD Val/Val (OR 1.91; CI 1.2-3.04) increased BC risk. MPO A/A (OR 0.31; CI 0.12-0.8), XRCC3^{241}Met (OR 0.63; CI 0.42-0.93) reduced BC risk. Effects of GSTM1 null, MnSOD Val/Val, MPO A/A were stronger among heavy smokers; a combined effect was found for GSTM1 null, GSTT1 null, MnSOD Val/Val and occupational PAH exposure.
CONCLUSION: employment in some metal industries and heavy occupational PAH exposure may be associated to BC risk; individual susceptibility may be modulated through the interaction between genetic polymorphisms and environmental carcinogens, such as tobacco smoking and occupational PAH exposure.

LIFESTYLES RELATED TO ALLERGIC AND IMMUNOTOXICOLOGICAL RESPONSES IN LIVING AND WORKING ENVIRONMENTS

LIFESTYLE AND IMMUNOPOTENTIALS

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[ID 2503]

Our lifestyles, or ways of daily life as assessed by cigarette smoking, alcohol drinking, working and sleeping patterns, physical exercise, mental stress, nutritional balance in diet, and regularity in daily living, might affect comprehensive talking-networking patterns in psycho, neuro-, endocrino- and immuno-responses. We comprehensively assess the psychological response by self-reported questionnaires such as GHQ-28, Zung SDS or sujective feeling of stress, the neurological ones by measuring HBR, HRV or saliva chromogranin-A, the endocrinological ones by saliva cortisol and amylase levels, and the immunoligical ones by natural-killer (NK) cell activity in the circulating blood. Unhealthy lifestyles, specially mental stress and cigarette smoking, usually dysfunction these net-works.

Twin-studies including both mono- and dizygotics indicate that genetic predisposions affect these immunopotential networkings in an age-dependent manner. Atopic genes, for example, play an important role in such modificatoins of immunopotential networkings.

Our brain also control these interactons and modifications in immunopotential networkings. We will show caffein-effects on habituation in ERP, and alcohol-drinking effects on button-pushing resposes to sight-stimulation by the NIRS (light-topography) brain imaging.

REPRODUCTIVE HAZARDS IN THE WORKPLACE

PATHWAYS OF ACTION OF OCCUPATIONAL AGENTS AFFECTING MALE REPRODUCTIVE FUNCTION

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[ID 2040]

Toxicants can attack the male reproductive system by one of several pathways or by multiple pathways. These pathways and assays associated with their respective functions are discussed individually. This does not necessarily indicate, however, that there exists an absolute one-to-one relationship between a particular measurement and the associated pathway of action. These pathways include the neuroendocrine system, the testes, accessory sex glands, and sexual function. Methods for assessing each of these pathways for toxicant effects are described. Examples of exposures which have had a detrimental effect on each pathway are provided.

The methods described are from a male reproductive profile for assessing the effects of toxicants on male reproductive health. The same profile can be used for both individual and population investigations, but there are some basic differences in methodology. The assessment profile described is that being used by the National Institute for Occupational Safety and Health (NIOSH) to assess populations exposed to potential reproductive toxicants. Differences between assessing the individual versus the population will be noted. If individual data (versus population comparisons) are to be used, care should be taken to compare the results with the normal range of results of the laboratory conducting the analyses and not published values. If a cross-sectional population study is being conducted, a concurrent comparison group must be used and the analysts should be blind to exposure status.

The findings and conclusions in this abstract have not been formally disseminated by the National Institute for Occupational Safety and Health and should not be construed to represent any agency determination or policy.

MALE FERTILITY IN THE LIFE SPAN PERSPECTIVE

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[ID 2087]

It has become well established that exposures in the workplace may interfere with the hormonal regulation of male reproductive functioning or exert detrimental actions on testicular and post-testicular tissues. Current knowledge on the impact of chemical exposures on male reproduction has first of all been derived from occupational studies of well-defined groups with rather high exposures. The list of putative noxious exposures includes several chemicals spanning heavy metals as lead, some chlorinated pesticides and some organic solvents, radiant heat and ionizing radiation. Effects may be detectable following few weeks or months of exposure and effects may be transient reduction of for instance sperm counts unless severe toxicity damages spermatogenic stem cells or causes a strong depletion of Sertoli cells. However, circumstantial evidence indicating substantial temporal changes and regional differences in male reproductive function and disorders has directed interest towards exposures that are more prevalent than most specific occupational exposures and that are more likely to result in permanent effects. Few studies indicating birth cohort effects on testicular function are together with a large body of experimental evidence and the peculiar epidemiology of testicular cancer pointing to the possible importance of exposures taking place during critical phases of fetal and early postnatal life. Most attention has been devoted chemicals with weak hormonal effects but other toxicological mechanisms might be of importance as well. If it is true that exposures during early life has a strong impact on male reproductive function in adult life, the focus of interest from the occupational point of view should be women during pregnancy rather than male exposures after puberty. So far the evidence linking prenatal exposures with reduced male fertility is very scanty – mostly based upon studies of drug effects (diethylstilbestrol) and tobacco smoking. Population based studies of environmental chemical exposures are emerging but beset with several methodological limitations. As studies of workplace exposures contributed a lot to our understanding of toxic effects of male reproductive function in the adult, such studies could also advance knowledge on the importance of prenatal exposures.

WOMEN, WORK AND REPRODUCTIVE HEALTH IN RUSSIA

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[ID 424]

Introduction. Russia as some developed countries has a low birth rate but high mortality rate. Women constitute 48.3% of workforce and over 1 million of them work in hazardous conditions and contract over 25% of all cases of occupational diseases.

Objective. The outlay of the system of reproductive health protection (RHP) in Russia.

Methods. Hygienic, clinical, epidemiological, risk assessment.

Results. The system of RHP is based on Federal laws for sanitary and epidemiologic well-being of the population, labor protection, obligatory social insurance of occupational accidents and diseases. Occupational risk assessment is based on guides: Hygienic criteria for of working environment and labor load and Principles of occupational risk assessment introducing weight of evidence (GHS, UN, 2003). Recommendations are planned for methods and criteria for reproductive health risk assessment. The concept of Reproductive health as a problem of occupational health was put forward with gender approach for better health protection of male and female workers and their off spring. Also the concept of complex account for risks from working environment and living site pollution is elaborated. Evidence based medicine principles are used, e.g. numerical scale of work relatedness assessment of a disease is constructed based on epidemiological data. E.g. it is shown that in petrochemical factory risk for newborn babies health is one category higher than for mothers so childe need more protection from occupational hazards affecting the mother. Also the glossary of terms on workers' RHP is elaborated. Ethical principles of ICOH (2002) as applied to RHP are also formulated.

Conclusion. The elaborated in Russia RHP system is under implementation. The National action plan on environment and children's health for 2006-2010 is directed to improve the situation. The cooperation in the field is essential aiming at the elaboration of set international instruments covering modern concepts, terminology, criteria etc.

SICKNESS ABSENCE AMONG FRENCH MALE AND FEMALE HEALTH CARE WORKERS: WHEN PROBLEMS DURING PREGNANCY EXPLAINS THE DIFFERENCE

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[ID 2181]

BACKGROUND : Sickness absence represents a public health problem that concerns society, work place ant the affected individuals and their families.

Prior research has shown large differences in sickness absence in relation to sex, where women, as compared to men, are known to have a higher risk of sickness absence.

But only 15 days are officially linked with pregnancy. However women may have problems during their pregnancy which may start early. So this hidden factor may contribute to the difference observed between men and women's sick-leave duration.

METHODS : Data consisted of the French sample of the NEXT study, to which an extension in six Paris university hospitals was added, for a total of 6,729 Health Care Workers. Analyses was performed with SPSS12.

RESULTS:

1) When we exclude sick-leave due to problems during pregnancy there is no more differences between male and female in the age groups under 30 and over 45 years old. For the group 30-45, females are more absent for their child health care than males.
2) When we restrict the analysis to HCWs under age 45, the mean sick-leave duration is nearly double for women when problems during pregnancy are included and the same when they are excluded
3) When we analyse the subgroup of female HCWs under 45 years old, the negative impact of physical working conditions becomes clear. HCWs dissatisfied with their working conditions, having to stand 6 hours or more, to lift patients 10 times per day or more or to maintain un uncomfortable postures more than 6 times per day have more sick leave and longer ones.

CONCLUSION : HCWs continue to be exposed to physical constraints at work. They remain standing for a long time, carry heavy loads and have frequent awkward postures and un-ergonomic furniture. Planning and development of work places with suitable ergonomic furniture and proper equipment are essential to reduce sick-leave frequency due to MSD of both males and females and due to problems during pregnancy for females.

MONDAY

TUESDAY

MONDAY

TUESDAY

WEDNESDAY

THURSDAY

FRIDAY

MONDAY

TUESDAY

THURSDAY

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