

YOUR SUBMITTED ABSTRACT FOR ISEE 2019

ISEE2019 - 31ST ANNUAL CONFERENCE OF THE INTERNATIONAL SOCIETY OF ENVIRONMENTAL EPIDEMIOLOGY



Contact

ID: 1057

Jorunn Kirkeleit

Jorunn.kirkeleit@helse-bergen.no

University Hospital Of Bergen

Po Box 1400

Bergen 5021

Norway

Work Phone: +4755977753

Mobile Telephone: +4795200121

Email: Jorunn.kirkeleit@helse-bergen.no

Presentations

Exposure to styrene and styrene-7,8-oxide among workers in the glass fibre-reinforced plastics industry

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Abstract Text Background/Aim: We aimed to characterize the exposure to styrene and styrene-7,8-oxide (StyOx) among Norwegian workers in the glass fibre-reinforced plastic (GRP)-industry, and to assess their biological uptake of styrene by determination of the metabolites mandelic acid (MA) and phenylglyoxylic acid (PGA) in urine. Methods: Thirty workers from two GRP-companies participated, comprising repeated full-shift personal samples of styrene and styOx (n = 58) using organic vapour passive dosimetry badges (3M 3500®), and urinary samples for determination of MA+PGA post-shift (n = 55). Styrene and StyOx were determined by gas chromatography-mass spectrometry (GC-MS). Urinary MA+PGA was assayed by liquid chromatography with tandem mass spectrometry (LC-MS/MS). Association between styrene exposure and urinary MA+PGA was described by Pearson's correlation coefficients. Results: GRP-workers overall geometric mean exposure to styrene and StyOx were 34.8 mg/m³ (geometric standard deviation (GSD) 2.7) and 128.3 µg/m³ (3.8), respectively. The exposure to styrene in the foundry (n=23), assembly (n=21) and vacuum (n=14) departments were 39.2 mg/m³ (2.9), 40.3 mg/m³ (1.8) and 22.9 mg/m³ (3.7), respectively. Overall mean concentration of urinary MA+PGA was 121.1 mg/g creatinine (2.0, max.494). The highest mean urinary concentration of MA+PGA were measured in the foundry department in company A (110.7 mg/g creatinine; GSD 2.4) and assembly department in company B (191.5 mg/g creatinine; GSD 1.5) in company B. Despite use of personal protective equipment (PPE) the correlation between styrene exposure and urinary concentration of MA+PGA was high with a correlation coefficient of 0.71 (p<0.001). Conclusions: GRP-workers' geometric mean styrene exposure was in compliance with the Norwegian occupational limit value of 105 mg/m³, but

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with the potential for exceeding the limit for all processes. The correlation between styrene in the breathing zone and its' metabolites in urine indicates that PPE did not protect the workers from uptake of styrene, and that improvement of control measures is needed.