

## MEDULLARY ARCuate NUCLEUS'S CELLULAR DIFFERENTIATION IN SIDS AND UNEXPECTED LATE FETAL STILLBIRTH CASES

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Aim of the present study is to analyze the arcuate nucleus (ARCn)'s cellular component, focusing on the neuronal maturative stage in SIDS and stillborn cases. The ARCn is an important cardio-respiratory center located in the ventral medullary surface. Some of the present authors have recently detected an ARCn hypoplasia in 30-35% of both SIDS and stillborn cases. This can be unilateral and when is bilateral can involve only a portion of the ARCn. The ARCn's neuronal density resulted decreased in our SIDS and stillborn cases compared with age-matched controls. Due to the lack of in data on the neuronal differentiation, particularly of the ARCn, in the literature, we perform a morphological and morphometric study in a large series of cases between the 17th week of gestation and the first year of age, subdivided into three groups: a) SIDS and stillborn cases with an hypoplastic ARCn, b) SIDS and stillborn cases without hypoplastic ARCn, c) control cases who died of various different documented causes. In every brainstem analyzed on serial sections, the ARCn's cytoarchitectural and dimensional parameters have been compared with the neurons of the near olivary nucleus, since both the nuclei have the same embryological origin, arising from the basal lamina of the neuronal tube. In the control group (group c), we have found that in fetuses under the 20th week of gestation, both the nuclei have a high density of small undifferentiated neuroblasts of similar size, roundish, apolar, with compact chromatin, nucleolus not clearly identifiable, and scarce cytoplasm. Starting with the 20<sup>th</sup> week, the olivary nucleus' cells have bigger size comparing with the ARCn' s neurons. From the 28<sup>th</sup> to the 36<sup>th</sup> week of gestation, the neuroblasts, particularly the ARCn' s ones, present a polygonal aspect, bipolar, with a big vesicular nucleus with loose chromatin. In the olivary nucleus the cells have a similar aspect, but are more roundish. After the birth, the neurons, often multipolar, are diminished in number. The nucleus is roundish with finely scattered chromatin and the nucleolus is much more evident comparing with the prenatal period. The same differentiation neuronal model resulted from the observation of the brainstem of subjects dying suddenly and unexpectedly. In the 20% of SIDS cases with a normal ARCn' s architecture (group b), an increase of the neuronal density has been observed, predominantly with lengthened neurons, with flattened nucleus, compact chromatin and poorly evident nucleolus. Thus, in some infants dying of SIDS a normally developed ARCn, could present an anomalous neuronal maturation. This maturation defect could be the morphological substrate for a deficit in a specific neurotransmitter responsible for a subsequent alteration of the ARCn' s chemoreceptorial function.

## POST MORTEM DISCIPLINE ON THE SUDDEN INFANT DEATH SYNDROME (SIDS) AND OF UNEXPECTED LATE FETAL STILLBIRTH VICTIMS.

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**ABSTRACT** - The honorable Dr. R. Calderoli, presented to the Chamber of Deputies the following bill draft n. 396 (July 5th, 2001). Being this problem of sudden infant death syndrome and unexpected fetal death after the 25th week of gestation (stillbirth) of great scientific complexity, it is clear the need of investigated anatomo-pathological researches performed in University institutes and in hospital departments of Pathology, authorized as regional referral centers, according to a specifically predisposed protocol. In every region will be defined, by a special decree, the institutes and the departments of Pathology that will be referral centers. Such centers will have the aim to examine the material and enhance the research activity on this issue. Furthermore, courses have to be held for physicians working in institutes and departments of Pathology. Such courses will be aimed to assure the uniformity and reproducibility of the autopsy techniques of and the inherent research. An accurate work of public sensitization on the SIDS issue will be carried out spreading the appropriate material and using the mass media. Among the industrialized countries, our country is the only one that does not have yet a national autopsy law regulation concerning the SIDS victims. The Lombardy Region is the only Italian region that has recently approved the "Project for the reduction of the risk of sudden infant death and of fetal unexpected death" (Deliberation of the Regional junta n. 49210 on the 34-03-00). Hereby we propose a remedy for this difficult situation, giving an Internationally innovative text in four simple articles at no additional cost for the tax payer.

### ART. 1

1. The SIDS and stillborn victims must undergo to autopsy in centers designated in the art. 2. The information regarding the pregnancy, the fetal development and the delivery, and in case of SIDS, the familial and environmental situation, must be accurately recorded and verified, for the diagnostic completion and diagnostic purpose, by the obstetric-gynecologist, the neonatologist, the personal pediatrician and by the pathologist, according to the adopted protocol.

### ART. 2

1. With the decree of the Health Minister, University institutes or the hospital departments of pathology are identified in every region as referral centers according to the art. 1.  
2. To accomplish the purpose showed in the art. 1, the babies dead of SIDS and of the fetuses died without apparent cause after the 25th week will undergo autopsy. Once the organs are removed, they are soon forwarded to the above mentioned authorized centers, following the protocol prepared by the Institute of Pathology of the University of Milan and available on the web site: <http://users.unimi.it/~patol/sids.html>

### ART. 3

1. The referral centers are expected to carry out the appropriated scientific researches under the light of the most revised knowledge and to furnish every psychological supports to the affected families, giving them a contact to the nearest Association for SIDS parents.  
2. The findings of the investigations are collected in the Data Bank available at the Institute of Pathology of the University of Milan and forwarded to the adequate Authority that will send the information to the designated physicians and make them available, in an anonymous way, to the close victims' relatives.

### ART. 4

For the purposes of the present bill draft, the national and regional sanitary authorities enhance and spread the scientific research on the SIDS and the unexpected late fetal stillbirth.