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W1.ANALYTICAL ASPECTS FOR LONG-TERM AND ACUTE INTOXICATION IN OCCUPATIONAL CLINICAL AND POSTMORTEM TOXICOLOGY AND OF BIO MONITORING STUDIES FOR LINKING TO DISEASES

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Linking of chemical intake or exposure to health effects to diseases and to death has been extensively reported in experimental studies and in epidemiology research. Bio-monitoring of human exposure to hazards nowadays plays crucial role in the formation of governmental public health policy that consists in the acceptance of required decisions, development of a laws, regulations, administrative actions and practice aimed to achieve specific health care goals within a society. And these decisions, regulations and laws can have important impact on the community organization, on the personal behavior and habits and even on directions of technological progress. It is obvious that bio monitoring data used for the acceptance of the mentioned measures should be reliable and thoroughly validated. Recent developments in chromatography-mass spectrometry ensure the requested validity and extend substantially the potential of bio monitoring by enhancing speed and efficiency of chromatographic and mass analysis. Also these achievements contribute in the development of new approaches in bio-monitoring and in particular screening for non-target and unknown compounds. Nevertheless one major problem for the inadequacy of validated linking of chemical exposure to health problems refers to the biomarkers used for the studies. This issue is complicated due to the complexity of the overall human exposure and the multiple effects excreted by one chemical in terms of the mechanisms of toxicity. There are considerable uncertainties concerning health risks as a consequence of long term and low dose chemical exposure. An important factor in these apparent discrepancies is the difficulty in reliable identification of exposed and control groups. Furthermore, the characteristics of exposure, in particular concerning duration and involvement of variable environmental factors and mixtures make any epidemiological approach very difficult. Real life is a variability and diversity of exposures the overall effect of which is pending on the certain case. The complex issue of linking exposures to diseases/health effects can be summarized under the term “web of interactions”. Using database-derived terminology, the type of problems and interactions can be described as a many-to-many relationship. There is a long list of issues that can lead to controversies (e.g. hidden effects from other pollutants, unknown or not studied confounders, issues of chemical analysis, misclassification of exposure or disease, variability in response etc.). Exposure issue effects in reality are not monomodal/monotonic events even in very low, low and/or high exposures. Principles and applications of hair analysis and a brief overview of published studies concerning hair analysis of various chemical groups in bio monitoring of pollutants low level long-term exposure acute will be presented. Furthermore, the role of in-vivo experiments in method optimization and validation will be discussed. Findings from the recent studies on polybrominated ethers, pyrethroids, neonicotinoids and arsenic will be reported. Cross-sectional studies on pregnant women and the neonates with documented prenatal pesticide low level chronic exposure revealed the impact of pesticides on fetus development and pregnancy outcomes and also for hypospadias in children. Hair analysis is a subject of great interest because it provides information on chronic and acute exposure with many applications in several areas of medical, forensic and environmental science. Hair is a suitable matrix for the assessment of exposure to chemicals

(e.g. drugs, pharmaceuticals, environmental pollutants, pesticides) as hair possesses certain advantages (time-efficient, practical, cost effective, and non-invasive) over the conventional biological samples (blood, urine, saliva). Moreover hair traps information for prolonged periods of time while a dose-response relationship between the drug dose and their detected levels in the hair has been established in many studies. Hair testing has already been applied in various forensic investigations (autopsy, criminal) in doping control and in clinical practice to check compliance to therapy regime for people under long-term treatment. The knowledge of the drugs deposition variability in different anatomical hair sites is of significant importance to obtain and evaluate the data.