**REFINED EXPOSURE ASSESSMENT TO CHEMICALS OF HIGH CONCERN INTEGRATING HUMAN BIOMONITORING DATA**

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**ABSTRACT**

The current study aims at the estimation of external and target tissue exposure to perfluorinated compounds (PFCs), starting from human bio-monitoring (HBM) data. PFCs are found in a wide array of consumer and industrial products, due to their surfactant attributes. However, their widespread use, persistence and mobility within the aquatic environment, results in ubiquitous exposure, while there is large amount of toxicological and epidemiological evidence between prolonged exposure to PFCs and adverse health effects. The simulations were carried out in the INTEGRA platform, a software that provides exposure assessment coupled with a generic physiologic based biokinetic (PBBK) model and numerical “reverse engineering” techniques for exposure reconstruction, based on the Markov chain Monte Carlo techniques. The process starts from ancillary exposure-related data that are fed into the exposure model taking into account multiple exposure routes. The results are evaluated against the biomonitoring data distributions, aiming at the reduction of uncertainty in back-calculating doses, by minimizing the error between the predicted and the actual biomonitored data. HBM data were obtained from cohort and biomonitoring studies from EU countries. Based on the available HBM data, exposure to perfluorinated compounds has been estimated on the basis of the available HBM data, namely PFOS, PFOA, PFNA and PFHxS. For PFOS the median daily intake EU-wide varied from 0.01 to 0.7 μg/kgbw/d, whereas for PFOA the EU-wide median intake was ranging from 0.04 to 0.025 μg/kgbw/d. For PFNA and PFHxS, the EU-wide median intake was ranging from 0.01 to 0.1 μg/kgbw/d. The results showed that the predicted intake dose is commensurate with bottom up intake estimates found in literature for both short and long term exposure scenarios of the European population. These intake levels, result in internal concentrations that are in the range between 1 to 50 μg/L in various tissues. Exposure re-construction offers unique capabilities for the use of the continuously growing amount of available biomonitoring data in Europe and the world for chemical exposure and risk assessment. In this way, biomonitoring data can be mechanistically linked to both external and internal exposure, effectively supporting the screening and prioritization process for assessing chemical risk.

**KEYWORDS:** Industrial chemicals, safety, sustainability, circular economy