Exposure reconstruction from biomonitoring data using screening level approaches: application to chemicals in the ToxCast database

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Population biomonitoring data can be used both as early indicators of biological effect for assessing health risks to the general population and, under certain circumstances, they may also be used to identify important contributors to exposures, thus allowing for rational health risk management planning. As part of exposure reconstruction, several screening techniques are available for reconstructing population exposures. These screening approaches include biomonitoring equivalents, direct deconvolution, exposure conversion factors, etc. They often involve assumptions of chronic, steady exposures and are not directly applicable for reconstructing real-world exposure scenarios. However, they can be applied to prioritize environmental toxins through an “order of magnitude” type analysis for more detailed exposure assessments. A set of screening level techniques were applied to selected chemicals from the ToxCast database, for which sufficient information is available. These techniques utilize existing guidance values for chemical exposure, and available toxicokinetic models in conjunction with available population-level biomonitoring databases such as the National Health and Nutrition Examination Survey (NHANES) and the National Human Exposure Assessment Survey (NHEXAS). Biomonitoring Equivalents and distribution of possible exposures were calculated and the results are discussed in the context of a comprehensive exposure reconstruction framework.

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