# A tiered approach for assessing individual and combined risk of pyrethroids using human biomonitoring data

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Pyrethroids are a major insecticide class, suitable for biomonitoring in humans. Due to similarities in structure and metabolic pathways, urinary metabolites are common to various active substances. A tiered approach is proposed for risk assessment. Tier I was a conservative screening for overall pyrethroid exposure, based on phenoxybenzoic acid metabolites. Subsequently, probabilistic approaches and more specific metabolites were used for refining the risk estimates. Exposure was based on 95th percentiles from HBM4EU aligned studies (2014-2021) covering children in Belgium, Cyprus, France, Israel, Slovenia, and The Netherlands and adults in France, Germany, Israel, and Switzerland. In all children populations, the 95th percentiles for 3-phenoxybenzoic acid (3-PBA) exceeded the screening value. The probabilistic refinement quantified the risk level of the most exposed population (Belgium) at 2% or between 1-0.1% depending on the assumptions. In the substance specific assessments, the 95th percentiles of urinary concentrations in the aligned studies were well below the respective human biomonitoring guidance values (HBM-GVs). Both information sets were combined for refining the combined risk. Overall, the HBM data suggest a low health concern, at population level, related to pyrethroid exposure for the populations covered by the studies, even though a potential risk for highly exposed children cannot be completely excluded. The proposed tiered approach, including a screening step and several refinement options, seems to be a promising tool of scientific and regulatory value in future.
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