

ECOS-TOX : Complex exposures to semi-volatile organic compounds in house: Derivation of cumulative toxicity reference values (TRVs)

Context and objective: Many semi-volatile organic compounds (SVOCs) are present in dwellings (air and settled dust) and are suspected to have reprotoxic, immunotoxic and neurotoxic properties. In addition, most of them are considered as endocrine disruptors and may have similar mechanisms of action. In order to carry out a cumulative risk assessment for children, the ECOS-TOX project aims at grouping SVOCs together according to their common effect and mechanism of action and deriving “multi-pollutants” toxicity reference values (TRVs) for each group of SVOCs

Methods: Based on several French measurement campaigns, SVOCs were selected according to their quantification frequency. A literature review was made in order to identify all mechanisms of action which could explain the effects of SVOCs observed in mammals and humans. SVOCs were classified in different groups characterized by a common cellular effect or a similar mechanism of action. For each group identified, point of departure indexes or relative potency factors will be derived according to the available scientific data and dose-response relationships.

First results: 21 pollutants were selected including phthalates, polybromodiphenylethers (PBDEs), polychlorobiphenyls (PCBs) and pesticides. Based on the effects on the reproductive, nervous and immune systems, 9 groups of SVOCs were constituted (example with the male reprotoxic effects: phthalates, some PBDEs, bisphenol A, lindane, and some pyrethrinoids could induce an inhibition of the testosterone synthesis in the Leydig cells).

Valorisation :

Articles:

Fournier K, Glorennec P, Bonvallot N. 2014. An exposure-based framework for grouping pollutant for a cumulative risk assessment approach. Case study of indoor semi-volatile organic compounds. Environmental research. 130, 20-28.

Fournier K, Glorennec P, Bonvallot N. 2014. La construction de valeurs toxicologiques de référence adaptées à la prise en compte des mélanges en évaluation des risques sanitaires : méthodes existantes et applications récentes. Environnement, Risques et Santé.

Communication on conferences:

“2nd European Doctoral College on Environment and Health (EDCEH)”- June 4th - 6th, 2012; Rennes, France. Poster with a short oral communication: “Indoor exposure to semi-volatile organic compounds: grouping chemicals for the derivation of toxicity reference values”

“1^{ère} journée des jeunes chercheurs de l’IRSET”- November 27th, 2012; Rennes, France. Oral communication: “Cumulative exposures to semi-volatile organic compounds: grouping chemicals for the derivation of “multi-pollutants” toxicity reference values”

“PNRPE: Recent advances on the environmental and health effects of endocrine disrupters”- December 10th - 11th, 2012; Paris, France. Oral communication: “Cumulative exposures to semi-volatile organic compounds: grouping chemicals for the derivation of “multi-pollutants” toxicity reference values”

“3^{ème} journée de recherche: Chimie, Biologie, Mathématiques et Physique, la recherche fondamentale au service du Médicament et de la Santé”- January 14th, 2013 ; Rennes, France. Poster with a short oral communication: “ECOS-TOX: Construction de valeurs toxicologiques de référence (VTR) pour des expositions multiples”

“Rencontres Scientifiques du Réseau Doctoral en Santé Publique”- April 15th - 16th, 2013 ; Paris, France. Oral communication and presentation of short film of popular science (“L’Union fait la Force”): “Cumulative exposures to semi-volatile organic compounds: grouping chemicals and derivation of “multi-pollutants” toxicity indicators”

“Congrès Annuel de la Société Française de Toxicologie” - November 14th – 15th, 2013 ; Paris, France. Poster communication : “Exposition cumulée aux polluants des environnements intérieurs : calcul d’indicateurs de toxicité”

“Primequal : La qualité de l’air à l’intérieur des bâtiments : effets, causes, prévention et gestion des pollutions” – November 19th, 2013 ; La Rochelle, France. Poster communication : “ECOS-TOX : Exposition cumulée aux polluants des environnements intérieurs : calcul d’indicateurs de toxicité”

“Society Of Toxicology” - March 23rd – 27th, 2014; Phoenix, Arizona. Poster communication: “Multiple exposures to indoor pollutants: derivation of benchmark doses based on reprotoxic effects”

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