SC 10: The Future of Environmental and Human Health Exposure Modelling of Chemicals

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Abstract

In Human Health risk assessment, exposure assessment is often the weakest point because of:
(a) lack of integrated approaches for combined stressors (mixtures),
(b) widespread use of over-conservative 'worst-case' scenarios;
(c) estimation of external exposures and not of internal exposures;
(d) lack of uncertainty/sensitivity tools for identification of key exposure drivers.
In response, we present software called MERLIN-Expo which contains a library of models for exposure assessment coupled with environmental multimedia and pharmacokinetic (PBPK) models. The main features are:

- Integration of multimedia and PBPK models. Consideration of pharmacokinetics is crucial considering the future development of 'Equivalent Biomonitoring Reference Doses';
- Coverage of the total exposure assessment chain and estimates of internal exposures for different human populations;
- Exposure through multiple pathways for multiple chemicals able to give estimates for combined exposures;
- Uncertainty and sensitivity analysis is systematically identified as essential in current health risk assessment guidelines. Considering this, WHO recently published a guideline for conducting such analysis. MERLIN-Expo contains functionality for uncertainty/sensitivity analysis (from screening methods to variance-based approaches) in line with the tiered approach recommended by WHO.

The course will be interactive and will allow participants to test the tool on specific case studies.

Course objectives

MERLIN-Expo incorporates advanced models simulating the fate of chemicals in the environment and human body into an easy-to-use tool. To avoid the 'black box' approach, models available in the MERLIN-Expo library are implemented on a common 'easy-to-use' and 'difficult-to-abuse' platform to facilitate integrated full-chain assessments for combined exposures. Complex scenarios can thus be built by combining independent modules that are available in the library. MERLIN-Expo also follows a Quality Assurance and Standardisation process for documentation in collaboration with CEN.

The objective of the course is demonstrate the principles and capability of the tool and to practice using it on specific case studies related to transfer of contaminants in water, air, soil and biota systems, as well as in human body.

Course level

Advanced

Note

Participants should bring their own laptop in order to follow this course