

Exposure to chemical agents originates either from environmental contamination (air, water), or from consumer products (food contact materials, construction materials, cosmetics, clothes, etc.) through multiple routes, namely inhalation, ingestion and dermal contact. Aggregate exposure, i.e. the quantitative exposure assessment to a single agent from all potential exposure pathways (the physical course taken by an agent as it moves from a source to a point of contact with a person) and the related exposure routes, raises specific issues that need to be addressed, particularly:

- identification of the sources and the strength of emissions-migration;
- estimation of the media concentrations, e.g. in air and water;
- exposure based on media concentrations and exposure duration;
- internal dose in target tissue(s) based on temporal variation of exposure and contribution of exposure routes;

- the exposure distribution regarding the wider population under study;
- the probabilistic definition of the fraction of exposures that exceed safety thresholds;
- identification of contribution of sources to exposure, or possible exposure patterns when biological indices of exposure (biomarkers) are measured (inverse modeling).

As can be seen from the above, aggregate exposure assessments are very data-intensive, requiring information in every step of the exposure pathway (including emission-concentration modeling), exposure factors for the potential exposure routes, toxicokinetic information for combining exposure doses in view of risk assessment and information on time-patterns of levels and exposures. However, full aggregate assessments need not always be performed for risk assessment because it may be possible to argue it is not necessary from limited use / emissions, the properties of the chemical (e.g. only inhalation exposure), or limited relevant health endpoints (e.g. local health effect).

