CEFIC Long-range Research Initiative
Request for Proposals (RfP)

Code Number and Title:

LRI-B17: Human exposure to emerging chemicals present in the indoor environment

Background

Recent scientific literature shows an increasing number of reports on chemicals such as e.g. flame retardants, dirt repellers and plasticizers in indoor dust and air, often at concentrations that are relatively high compared to outdoor levels. Furniture, electronic devices, carpets and floor polish all contain mixtures of compounds that may to a certain extent be transferred to the indoor air and dust in homes, schools and offices. Nowadays people spend more time indoor, often in front of the computer and television, while homes have been better insulated to save energy. This combination of facts may result in increasing daily exposures to a suite of chemicals. Exposure models for substances in indoor air and dust have been developed and are available, e.g. through former CEFIC LRI projects (LRI B4-THL, B12-ETHZ, B11-CERTH, MIAT4-VITO,). These models predict intake from various indoor sources and by different routes. In combination with toxicokinetic models it should be possible to predict chemical concentrations in easily accessible human matrices such as urine or blood that are routinely sampled in human biomonitoring studies. The exposure and toxicokinetic models have been validated for some well-known “older” chemicals. The new generation of chemicals is expected to cause less environmental concern and be devoid of toxicity at current exposure levels. Halogenated flame retardants have partly been replaced by a new generation of less persistent halogen free flame retardants such as various organophosphorus compounds, new perfluoroalkyl substances with shorter chain lengths are replacing PFOS and PFOA, and new plastics contain substitutes for bisphenol A and DEHP.

The challenge of the proposed project will be to evaluate whether current exposure models are performant to predict internal exposure to these newer chemicals. As a first step multi component screening of air and dust samples is needed to identify a broad set of chemicals that is currently present in typical indoor environments. The analysis should include chemicals for which there is a shortage of information. The results should feed the exposure models and build on already available knowledge. Assumptions on human behavior should be included to estimate intake levels and internal concentrations. A complicating factor is the rapid metabolism of most of the newer chemicals. This should be addressed as young children and toddlers may be at a higher risk due to dust exposure, special attention should be given to these categories.

Objectives

1. Carry out a review of the existing literature and existing data bases such as the one from ECHA to select a relevant set of chemicals for screening in this project. This should be well argued based on a review of literature and existing databases such as the one from ECHA.

2. Analyse indoor air and dust from various sources (home, school, offices) for a number of emerging substances which have been selected in the literature review to identify most relevant substances in terms of expected occurrence, i.e. use and emission (plasticizers, flame retardants, dirt repellers, sealants, glues, textile, paints and possible others).
3. Apply relevant exposure models for human uptake of chemicals using the above results
4. Compare the measured and modelled data with biomonitoring data (from literature or recent project reports) to analyse the suitability of the modelled exposures and adjust the models where needed.

Scope

The project should improve knowledge on chemicals that occur in the new generation consumer products and may be present in indoor air and dust in modern buildings and houses. It should generate exposure data for chemicals that are present in indoor air and dust due to emissions of plasticizers, flame retardants, etc. and evaluate whether current exposure assessment methods are adequate to predict the extent to which humans are effectively exposed to these chemicals. It is expected that the project will support ongoing initiatives taken by the European Commission (including IHCP) and World Health Organisation to establish harmonised frameworks for health based evaluation of emissions from construction products and development of the lowest concentration of interest (LCI) concept for health based evaluation of indoor products emissions. The successful research group would take into account the findings and outcomes of research projects such as AIRMEX, SINPHONIE, OFFICAIR.

The final report shall contain an executive summary (2 pages max), a main part (max. 50 pages) and a detailed bibliography.
It is expected that the findings will be developed into at least one peer reviewed publication, following postering(s) and presentation(s) at suitable scientific conference(s).

Cost and Timing

Start: early 2016, duration: 3 years
Budget in the order of €300 000

Partnering/Co-funding

Applicants should provide an indication of additional partners and funding opportunities that can be appropriately leveraged as part of their proposal. Partners can include, but are not limited to industry, government/regulatory organizations, research institutes, etc. Statements from potential partners should be included in the proposal package.

Fit with LRI objectives/Possible regulatory and policy impact involvements/ Dissemination

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Applicants should provide information on the fit of their proposal with LRI objectives and an indication on how and where they could play a role in the regulatory and policy areas. Dissemination plans should also be laid down.

DEADLINE FOR SUBMISSIONS: 6 Sept 2015

Please see www.cefic-lri.org for general LRI objectives information, project proposal form and further guidance for grant applications.