NEW METHODS IN 21ST CENTURY EXPOSURE SCIENCE

Background:

The U.S. Environmental Protection Agency (EPA), through its Science to Achieve Results (STAR) grant program, is awarding $4.5 million to universities to conduct innovative research to advance methods for characterizing real-world human exposure to chemicals associated with consumer products in indoor environments.

EPA received a total of 33 grant proposals and is awarding research funding to five of those universities. The universities will:

1. Develop and/or apply innovative technologies and methods to characterize the presence and co-occurrence of suites of semivolatile chemicals (dozens to hundreds) in real-world indoor environments associated with the emissions from and use of consumer products.

2. Generate data to advance the scientific basis of exposure predictions by providing values for key model parameters, building confidence in model assumptions, and confirming model predictions for relevant pathways.

3. Develop and/or apply innovative technologies and methods to profile chemicals and related metabolites associated with consumer products in biological media.

University of California, Davis
Award: $900,000
Project: *Tracking Semivolatile Organic Compounds Indoors: Merging Models and Field Sampling to Assess Concentrations, Emissions, and Exposures*

The research project will measure for possible semivolatile organic compounds in indoor dust from homes that agreed to participate in a field study. The measurements will help estimate possible SVOC emissions and exposures. The project will also evaluate/refine multiple exposure models including indoor exposure and air-to-skin transdermal uptake models. The research will result in: new analytical methods to measure multiple semivolatile organic compounds (SVOCs) in indoor dust, additional knowledge about the distribution and occurrence of SVOCs found in indoor dust, and the refinement of exposure models that can be used to predict exposure to compounds, specifically when exposure to the chemical occurs through the dermal pathway (i.e. the skin).

Duke University
Award: $900,000
Project: *Residential Exposure of Young Children to SVOCs*

The research project will study 50 families who agreed to participate in a study that will measure possible exposure to a wide range of SVOCs that could be emitted from sources found in their homes (such as products they use in the home). The project will measure possible exposures by collecting: wipe samples from children's hands, wipe samples from consumer products (furniture, vinyl flooring, insulation, etc) already in their homes, air and dust samples from the home, serum and urine samples from family members as well as their responses to questions about diet, home characteristics and behavioral patterns. All the collected samples will be evaluated using statistical analysis and will be compared to existing exposure models. The research will result in the first data source of SVOC levels from indoor air in

homes, additional knowledge about multiple exposures. This will improve the understanding of exposure to mixtures, the identification of links between specific products in the home and children's exposure levels, and the refinement of models used to predict indoor exposures to SVOCs.

University of California, San Francisco
Award: $900,000
Project: *A Non-targeted method for measuring multiple chemical exposures among a demographically diverse population of pregnant woman in Northern California*

The research project will use an innovative biomonitoring method to evaluate everyday exposure to over 700 chemicals (classified as Environmental Organic Acids) and the extent to which these exposures vary among different racial/ethnic and socio-economic groups of 200 pregnant women. Environmental Organic Acids have chemical structures similar to hormones, increasing the potential for endocrine disruption. Many of these chemicals are used extensively in consumer products that people use every day but are not included in most biomonitoring studies. Blood samples have already been collected from 200 demographically diverse pregnant women (30% white, 30% Latino, 10% African American and 12% Asian) who agreed to participate in this study and are receiving prenatal care from two clinics. One clinic serves primarily low income patients and the other

primarily high income. The research will result in providing new data on the extent to which pregnant women are exposed to chemicals and help prioritize chemicals for potential risks. It will also result in an improved understanding of racial, ethnic and economic differences in chemical exposure.

University of Michigan
Award: $900,000
Project: *3- dimensional micro-gas chromatography device for rapid and sensitive indoor air chemical exposure assessment*

The research project will develop a portable automated device that can be used for rapid analysis of hundreds of SVOCs for indoor exposure assessment and will then test the device using about 150 chemicals from various categories of indoor exposures. The research will result in a new technology that can be used to characterize the presence of hundreds of SVOCs and provide quantitative information about the distribution of hundreds of indoor chemicals. The results are vital to evaluating human exposure to SVOCs and reducing health risks associated with those exposures.

Virginia Polytechnic Institute and State University
Award: $900,000
Project: *Rapid methods to estimate exposure to SVOCs in indoor environments*

The research project will evaluate two rapid methods to estimate exposures to SVOCs. The first method will characterize a specific indoor product and then estimate

exposure. The second approach will characterize exposures in a particular indoor environment, for example indoor air, and then estimate exposure. The research will result in two validated models, one that can be used to make rapid estimates of exposures to SVOCs released from specific products used indoors and the second can be used to make rapid estimates of exposure to a wide range of SVOCs. When combined with rapid estimates of toxicity and exposure from EPA's high-throughput research, the rapid estimates of exposure will allow risk-based prioritization of a wide range of SVOCs.

Information about the Awards:
http://epa.gov/ncer/2013newmethods

More Information on EPA's CSS Research:
http://www.epa.gov/research/chemicalscience/

CONTACT:
Intaek Hahn,
EPA/ORD
National Center for Environmental Research
Hahn.Intaek@epa.gov

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