Partnering To Improve Human Exposure Methods

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Abstract

Methods development research is an application driven scientific area that addresses the Agency's programmatic needs. The goals are to reduce measurement uncertainties and data gaps, and to improve existing analytical procedures for estimating human exposures. Methods development researchers are working to maximize the effectiveness of the program and resources by integrating methods research across the National Exposure Research Laboratory (NERL) and partnering with other ORD laboratories, Regions, Program Offices, and Federal Agencies. The methods developed and the data produced are being used to perform risk assessments, make regulatory decisions, provide tools to state governments, and provide databases to the general public on potential exposures.

Objectives

- Apply research to specific programmatic needs
- Develop methods for determining human exposures to new chemicals
- Reduce uncertainties and data gaps
- Improve existing analytical procedures
- Maximize resources by integrating research efforts and partnering with other laboratories, program offices, federal agencies and state governments

Approach

- Identify programmatic needs
- Perform a customer value analysis
- Propose research. Contact collaborators
- Get customer feedback on proposed research
- Peer review research plan
- Develop, test, evaluate, apply and deliver method
- Customer feedback and performance/utility measures of product/data delivered

Conclusions and Future Work

Partnerships have proven to be effective means to integrate research and maximize resources. New areas of research mean new partnerships. Future directions include collaborations with the new centers (e.g. Center for Computational Toxicology).

Disclaimer: *Although this work was reviewed by EPA and approved for publication, it may not necessarily reflect official Agency policy.*

Examples of Current Partnerships

Chromated Copper Arsenate (CCA) Methods Research

Potential Human Exposure Routes: dermal, ingestion

Outcome: increased cancer risk

Methods: in-vitro methods for arsenic, in-vivo bioavailable techniques, standard operating procedures (SOPs) for sampling and analyses

NERL Contacts: Sharon Harper, Karen Bradham

Collaborators: National Risk Management Research Laboratory (NRMRL, M. Mason), Consumer Safety Product Commission

Impact: Analytical data produced will complement NRMRL dermal transfer data to be reported to Office of Pesticide Programs for guidance on management of the arsenic risk from CCA-treated wood.

Perfluorinated Compounds (PFCs) Methods Research —

Fluoro-telomer Alcohols, Perfluorinated Acids & Sulfonates

Potential Human Exposure Routes: ingestion (primary), inhalation, dermal.

Outcome: potential endocrine disrupting compound (EDC), neonatal malformations, potential carcinogenic (occupational exposure), teratogenic (occupational exposure)

Methods: GC/MS, LC/MS/MS

NERL Contacts: Andrew Lindstrom, Mark Strynar

Collaborators: National Health & Environmental Effects Research Laboratory (NHEERL - C. Lau), NRMRL (J. Rosati), Office of Prevention, Pesticides & Toxic Substances (OPPTS- L. Libelo, J. Seed)

Impact: Data will help OPPTS assess sources of residential exposure and potential risks. NHEERL will use serum, liver, kidney, and brain data for Physiologically Based Pharmacokinetic (PBPK) modeling. NRMRL will use coated paper bags data for indoor air quality study. OPPTS will use soil and dust data for the PFOS/PFOA assessment of the enforceable consent agreement. It will also help OPPTS to determine potential sources of perfluorinated compound exposure and health effects. NERL-Athens will use the data for biodegradation modeling projects.

Alkylphenol Ethoxylates (APE) Methods

Potential Human Exposure Routes: dermal, ingestion

Outcome: known endocrine disruption

Methods: GC/MS,LC/MS, extraction

Collaborators: NERL (Myriam Medina-Vera), Region 3, (Jennifer Gundersen), Region 5 (Larry Zintek)

Impact: Methods to obtain baseline discharge data (Michigan, Wisconsin)

Toxic Organics (TO) Series Replacement Method — *Pesticides and Polychlorinated Biphenyls (TO-4A) Semi-volatile Organic Compounds (TO-13)*

Potential Human Exposure Routes: inhalation

Methods: Pressurized Fluid Extraction, new sampling equipment & sampling method to replace the PS-1 sampler

NERL Contacts: James Starr, Elin Ulrich

Collaborators: Region 4 (Danny France, Tim Slagle, Sam Dutton, and Sallie Hale)

Impact: Alternative method for current users of TO-4A and TO-13 methods.

Detroit Exposure and Aerosol Research Study (DEARS) — *Air toxics & Particulat Matter (PM)*

Potential Human Exposure Route: inhalation

Outcome: potential adverse health effects, including premature mortality and higher instances of respiratory illness

Methods: canister, personal exposure diffusion tubes, large volume injection GC/MS

NERL Contacts: Robert Seila, Stephen McDow, David Olsen

Collaborators: NHEERL; National Center for Environmental Assessment (NCEA); Office of Transportation & Air Quality; Michigan Department of Environmental Quality; University of Michigan

Impact: Data will be used by NCEA for criteria document & by Office of Air Quality Planning and Standards to develop standards which are protective of human health for PM, and air toxics.

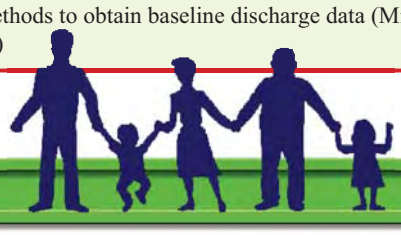
American Healthy Homes Survey (AHHS) — *National Survey of Housing Related Hazards*

Collaborators: NERL, Office of Pollution Prevention & Toxics (OPPT, J. Smith) Office of Healthy Homes and Lead Hazard Control, US Department of Housing and Urban Development (HUD, W. Friedman)

NERL Contacts: Karen Bradham (main), Sharon Harper, Andy Lindstrom, Mark Strynar, Dan Stout

Methods: Standard operating procedures (SOPs) for sampling and analytical methods for pesticides, chromated copper arsenic (CCA), and other environmental hazards

Impact: Sampling SOPs will be used by HUD for sample collection. Analytical data will be included in the first national residential multi-parameter database produced by HUD and EPA.



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