Rapid Exposure Modeling & Dosimetry Research Area

Most chemicals in commerce lack vital information to help us understand whether the chemicals we breathe, eat, drink, and touch may impact our health. EPA's Chemical Safety for Sustainability Research Program conducts research to model exposure to chemicals and generate dosage information to thoroughly evaluate potential risks to humans, wildlife, and ecosystems.

EPA's Chemical Safety for Sustainability Research Program

The goal of EPA's Chemical Safety for Sustainability (CSS) National Research Program is to provide information and methods to make better-informed, more timely decisions about the safety of chemicals, many of which have not been thoroughly evaluated for potential risks to human health and the environment.

About Rapid Exposure Modeling & Dosimetry Research

The **Rapid Exposure Modeling & Dosimetry** research area focuses on modeling and forecasting chemical exposures across various scenarios relevant to human and ecological assessments. This research helps rapidly generate estimates for exposure and dosage of chemicals, including new chemicals found in consumer products and the environment.

This research has many goals, including:

- Addressing gaps in data collection, curation, and modeling needs
- Creating ways to estimate exposure concentrations at the organ or individual levels
- Developing tools to rapidly predict chemical exposure conditions and estimate human and ecological exposure to chemicals
- Developing models and tools to address data needs for the composition and exposure potential of environmental media, including consumer products.

Why is Rapid Exposure Modeling & Dosimetry Research Important?

Rapid Exposure Modeling & Dosimetry research provides vital support to exposure assessments through the development of advanced chemical monitoring approaches, refinement of exposure pathways and factors, and high-throughput toxicokinetics to support dosimetry estimates associated with hazard data.

Interested In Learning More?

EPA's Chemical Safety Research Program: epa.gov/chemical-research

Contact Us:
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The Question

How are we being exposed to chemicals in the environment?

Our Rapid Exposure Modeling & Dosimetry Tools

CompTox Chemicals Dashboard: dashboard that provides chemistry data for thousands of chemicals across EPA's computational research databases including:

⇒ **CPDat:** database containing information on chemicals in consumer products

⇒ **ToxCast:** high-throughput screening data

SHEDS: model providing estimates of exposure to chemicals used in consumer and in-home products

ExpoCast: models using rapid estimates to predict potential chemical exposure for thousands of chemicals

Rapid Exposure Modeling & Dosimetry Research Area Up Close

Visualizing the CSS Program

*Our **Rapid Exposure Modeling & Dosimetry** research is categorized under the **Chemical Evaluation** research topic. This topic is dedicated to developing new and efficient methods to evaluate thousands of chemicals found in consumer products, the air we breathe, and the water we drink.*

How Rapid Exposure Modeling & Dosimetry Fits In

CSS is organized around three research topics that address specific science challenges in assessing the safety of chemicals: Chemical Evaluation, Complex Systems Science, and Knowledge Translation & Delivery.

Included in our *Chemical Evaluation* research topic, our **Rapid Exposure Modeling & Dosimetry** research develops methods to model and forecast the potential for real-world human exposure to chemicals, including those associated with consumer product use.

Examples of Research and Products

Application of non-targeted analysis to characterize constituents of consumer products and articles

⇒ **Description:** a dataset providing information on chemical compounds in consumer products, generated using suspect screening analysis

⇒ **Impact:** The quantification of compounds in commonly used products that are provided by this dataset will provide important parameter estimates for high-throughput exposure forecasting models developed under the ExpoCast research effort. This data will also be incorporated into the Chemical and Products Database, which contains consumer product information.

⇒ **Who Can Use It?:** Researchers interested in forecasting exposure or in need of data on consumer products

⇒ **Learn More:** epa.gov/chemical-research/rapid-chemical-exposure-and-dose-research

Stochastic Human Exposure and Dose Simulation (SHEDS) HT

⇒ **Description:** SHEDS-HT is a high-throughput probabilistic model that can quickly provide human exposure estimates for new chemicals that have limited data and provide information to help prioritize chemicals for future study on the basis of risk.

⇒ **Impact**: SHEDS models enhance estimates of exposure in many contexts to inform EPA human health risk assessments and risk management decisions.

⇒ **Who Can Use It?:** The SHEDS models can be used by anyone, including individuals from academia, industry, government, and consulting firms.

⇒ **Learn More:** epa.gov/chemical-research/stochastic-human-exposure-and-dose-simulation-sheds-estimate-human-exposure

Evaluating In Vitro-In Vivo Extrapolation of Toxicokinetics

⇒ **Description:** a journal article published in *Toxicological Sciences* providing useful research into understanding the relationship between *in vitro* bioactivity dose and external exposure concentration

⇒ **Impact**: a recipient of a *Toxicological Sciences* Editor's Highlight, this article provides useful information on translating *in vitro* (cell-based) experiential results to predict *in vivo* (animal-based) outcomes

⇒ **Who Can Use It?:** everyone, including researchers and risk assessors

⇒ **Learn More:** doi.org/10.1093/toxsci/kfy020

Learn more

EPA's Chemical Safety Research Program: epa.gov/chemical-research