Addressing Complex Challenges Posed by Hazardous Substances

William A. Suk, Ph.D., M.P.H.

Director, Superfund Research Program

Chief, Hazardous Substances Research Branch

Division of Extramural Research and Training
National Institute of Environmental Health Sciences

Primary Objectives - SRP Mandates

Supported by the National Institute of Environmental Health Sciences, the Superfund Research Program (SRP) funds research related to the development of:

Methods and technologies to detect hazardous substances in the environment

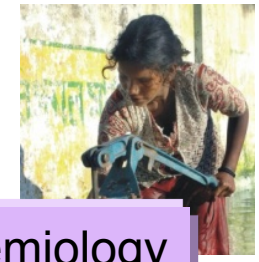
Advanced techniques for the detection, assessment, and evaluation of the effects on human health of hazardous substances

Methods to assess the risks to human health presented by hazardous substances

Basic biological, chemical, and physical methods to reduce the amount and toxicity of hazardous substances

Multidisciplinary research addressing broad, complex issues related to hazardous substance exposure

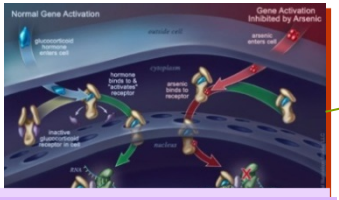
Health Effects



Epidemiology

Fate and Transport

Remediation



Mechanistic Toxicology

Unifying Theme

Ecology Studies

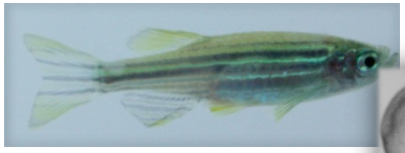
Training

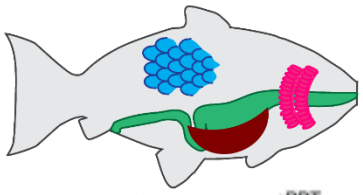
Community Engagement

Research Translation

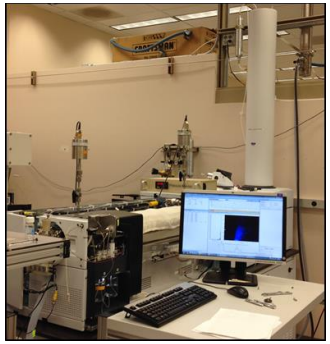
SRP Research Exposure and Health Effects

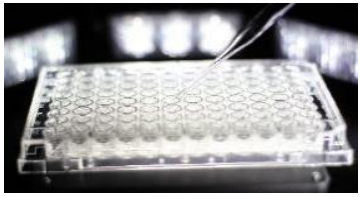
Tools to assess health effects

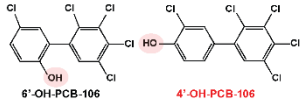


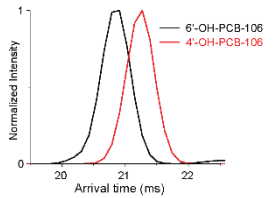


Tools to evaluate exposure









Chemical safety evaluation

SRP Research: New Approaches and Alternatives for Toxicity, Fate and Transport, and Ecotoxicity Testing

Zebrafish: health effects of developmental exposures

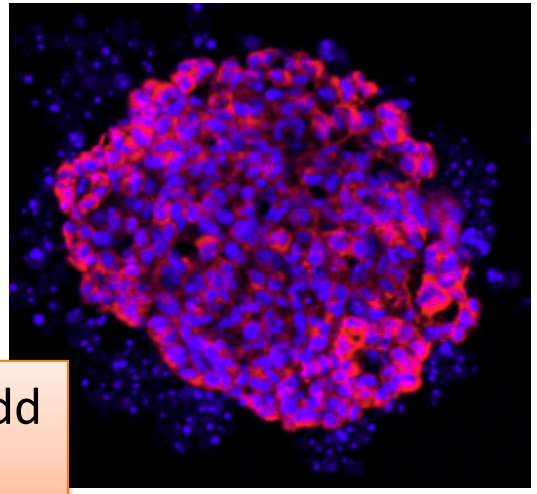
- Combined panel of zebrafish genes with a rapid testing platform to identify chemicals that induce oxidative stress (University of Washington)
- Found that PBDEs can bind to proteins that regulate thyroid hormones and bone development using zebrafish (Duke University)
- Zebrafish model to define the toxicity of complex PAH mixtures University)

Learn more from Lisa Truong in Session I of this series

New tools for studying ecotoxicology

- Explored the complex genetics involved in how Atlantic killifish have rapidly evolved to tolerate polluted East Coast estuaries (Boston University)

- Examined mechanisms of olfactory injury and oxidative stress in salmon (University of Washington)
- Developed a 3D liver cell model to screen chemicals for toxicity in fish (Brown University)



Learn more from April Rodd in Session I of this series

Screening for hazardous chemicals in the environment and in human samples

- Cell-based assays combined with imaging and web-based analysis to quickly assess the risks of endocrine disrupting chemicals during environmental emergencies. (Texas A&M)

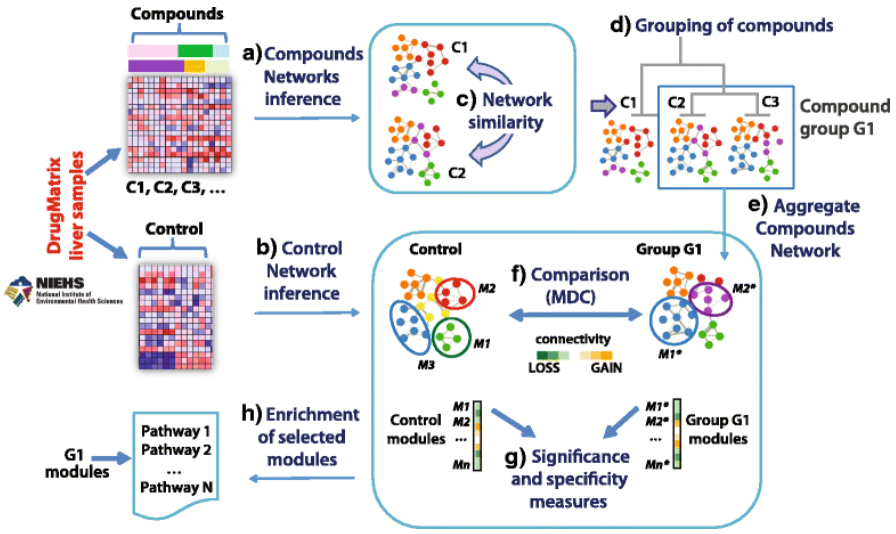
- Immunoassays using VHH antibodies isolated from alpacas to detect PCBs, pesticides, and other compounds and degradation products. (UC Davis)

New approaches to understand fate and transport

- Developing models to predict vapor concentrations seeping into buildings (Brown University and University of Kentucky)
- Assessing pathways that transport PAHs in the atmosphere using spatial and temporal tracking (Massachusetts Institute of Technology)
- Using novel statistical methods to fingerprint PFAS measured in fish and drinking water (University of Rhode Island)
- Identifying how asbestos forms aggregates and moves through groundwater (University of Pennsylvania)

Computational methods to predict the toxicity and exposure

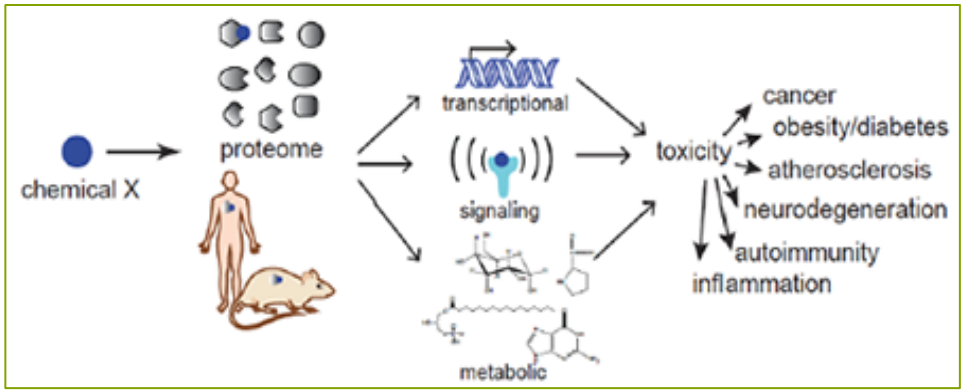
- Computational pipeline to construct chemical networks (Boston University)
- A novel platform that can rapidly and automatically analyze environmental samples to screen for chemicals (Texas A&M)



Learn more from Erin Baker in Session II of this series

Computational methods to predict the toxicity

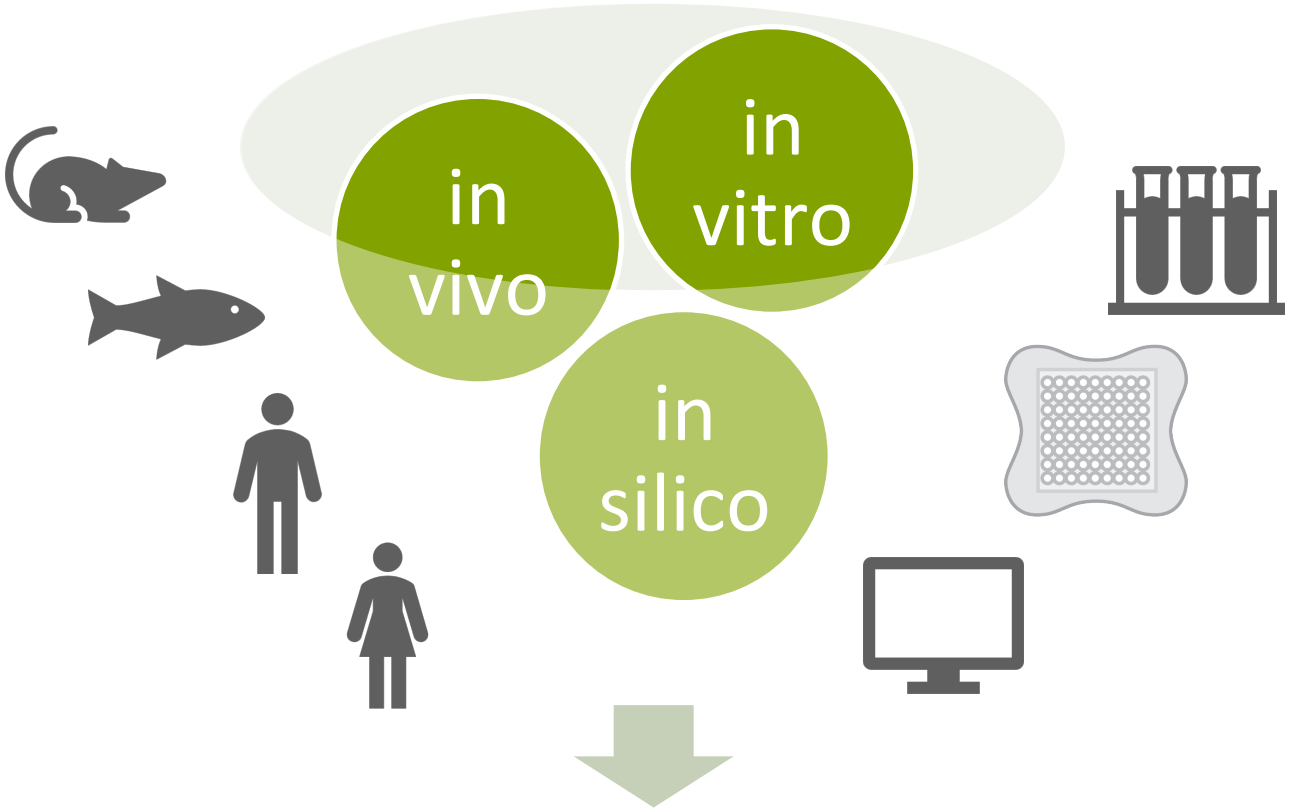
- Platform to map the reactivity of environmental chemicals (UC Berkeley)



- A computational approach using cell-based data to estimate differences in susceptibility to chemicals based on population variability (Texas A&M)

You will hear more from Weihsueh Chiu

Developing models to integrate diverse data sets



Chemical safety evaluation

Enhancing environmental health solutions through data integration

Biological response data

Epidemiology data

Exposure data

Reducing the burden of disease

Sustainable remediation data

Fate and transport data

Past SRP Risk e-Learning Webinars

- Archives are available from related SRP Risk e-Learning webinars
- **Fall 2017:** Adverse Outcome Pathways
  - Introduction to the Adverse Outcome Pathway Framework
  - Assembling and Assessing AOP Information
- **Spring 2017:** Analytical Tools and Methods
  - Field-Ready Biosensors to Assess Bioavailability and Toxicity
  - Techniques for Trace Analysis of Metals and Chemical Mixtures
  - Fate and Transport of Contaminants
- **Current series:**
  New Approaches and Alternatives for Toxicity Testing