RapidTox – Tools for Rapid Risk Assessments

Richard Judson, Antony Williams, Imran Shah, Grace Patlewicz, Eric Watt, Prachi Pradeep, Swapnil Chavin, Jeff Edwards, Ann Richard, Chris Grulke, Matt Martin, Kamel Mansouri, Doris Smith, Jennifer Smith, James Vail, Jason Lambert[1], Scott Wesselkamper[1], Rusty Thomas

US EPA, National Center for Computational Toxicology; [1] US EPA, National Center for Environmental Assessment

Science / Decision Context

Risk assessments are needed for hundreds to thousands of chemicals, many of which do not have the rich data sets required, for instance, for IRIS or PPRTV assessments

EPA program offices and groups (OLEM, OPP Inerts, OPPT and others) still need to carry out to risk assessments for data poor chemicals.

To support these efforts, the RapidTox project will:

- Provide easy access to high-quality (high-tier) data as inputs to risk assessments, when available
- Provide lower tier data when higher-tier is not available
- Develop and provide modeled inputs when even lower-tier data in not available
- Make all data and models made available through the RapidTox Dashboard
- Provide client-specific data, models and dashboards

Approach and timeline

1) Compile and organize data from many sources (chemical structure, physico-chemical properties, In vivo hazard, in vitro bioactivity, exposure, use, toxicokinetics, literature)
2) Develop or implement models to predict hazard, exposure, pharmacokinetics
3) Build a dashboard system to allow risk assessors to use and manipulate data and models in a use-case specific manner

FY16-17: Define Case studies, build preliminary dashboard

FY17-18: Build use-case-specific workflows for initial case studies

FY18-19: Expand Tools to further case studies

Case Studies

OLEM (Superfund) Case Study

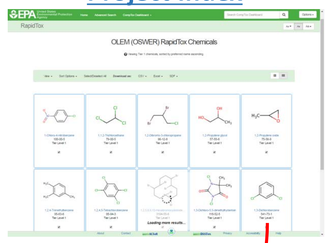
- 1505 chemicals ranging from data poor to data rich
- Data priorities:
  - In vivo hazard data [PODs (especially RfDs to RSLs), target class (chronic, cancer, repro, dev)]
  - Pharmacokinetics
  - Physchem properties / environmental fate and transport / bioavailability
  - Use Information
  - Literature summary
  - Uncertainty analyses

OPP Inerts Case Study

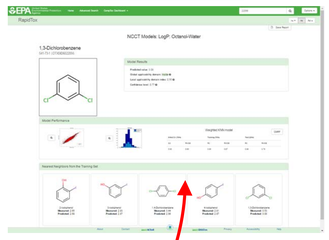
- 126 non-food use inert ingredients from external petitioners
- Data Priorities
  - In vivo hazard data (PODs (especially RfDs to RSLs), target class (chronic, cancer, repro, dev))
  - Physchem properties / environmental fate and transport / bioavailability
  - AOP information
  - Exposure Use Information, including use
  - Literature summary
  - Uncertainty analyses

RapidTox Dashboard

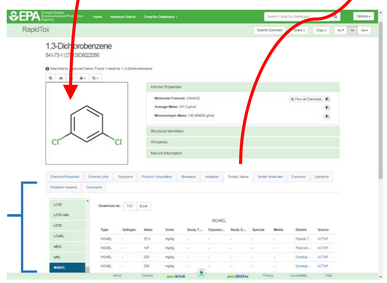
Project Index



Data Details



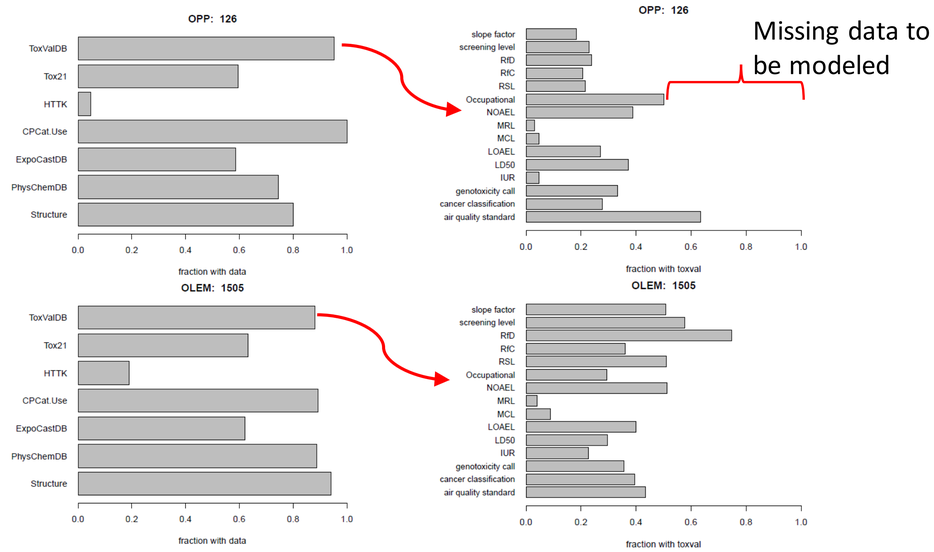
Chemical Summary



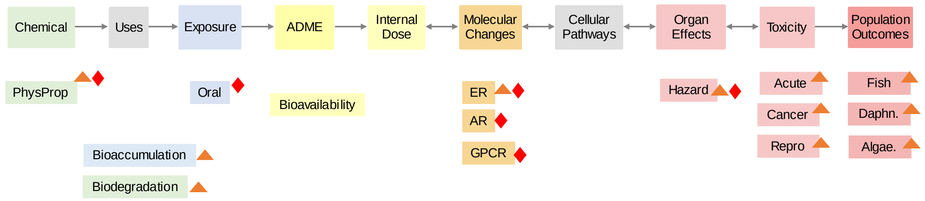
Data Domains

Data and Models

Summary of Available Information

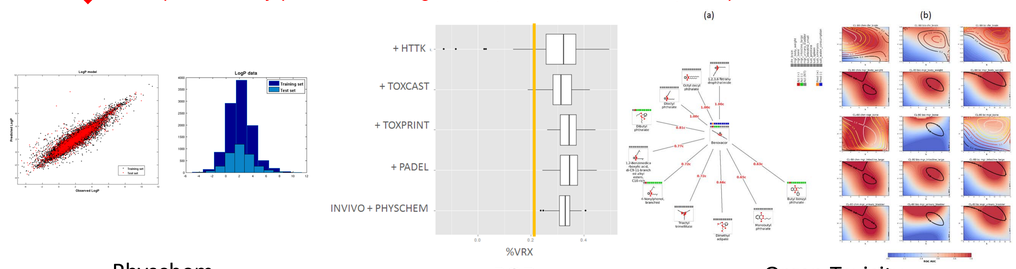


Filling Information Gaps: Thinking in AOPs and Models



▲ existing/legacy tools (TIMES, LeadScope, ECOSAR, EPIWIN)

◆ developed internally (Machine Learning derived, Read-across/GenRA, other)



Physchem PODs Organ Toxicity