

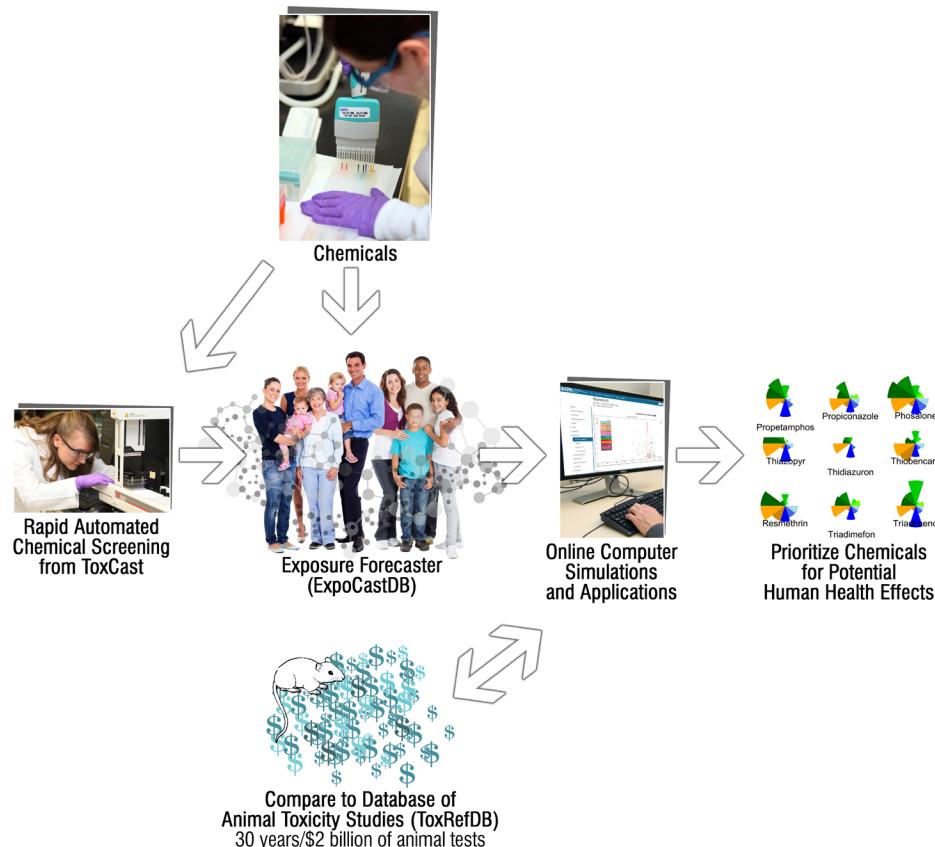
Toxicity Forecaster (ToxCast™)

ADVANCING THE NEXT GENERATION OF CHEMICAL SAFETY EVALUATION

Under different federal statutes, EPA makes a broad range of decisions to protect public health and the environment from unintended consequences of using chemicals. Decisions about chemicals are also made by other Federal Agencies, State Environmental and Health Agencies, International Governmental Agencies and Industry. As examples, there are specific federal laws for pesticides, drinking water contaminants, commercial and industrial chemicals, chemicals found on contaminated sites and endocrine disrupting chemicals.

Through its computational toxicology research (CompTox), the U.S. Environmental Protection Agency (EPA) is working to figure out how to change the current approach used to evaluate the safety of chemicals. CompTox research integrates advances in biology, biotechnology, chemistry, and computer science to identify important biological processes that may be disrupted by the chemicals and tracing those biological disruptions to a related dose and human exposure. The combined information helps prioritize chemicals based on potential human health risks. Using CompTox, thousands of chemicals can be evaluated for potential risk at a small cost in a very short amount of time.

A major part of EPA's CompTox research is the Toxicity Forecaster (ToxCast™). ToxCast is a multi-year effort launched in 2007 that uses



automated chemical screening technologies (called “high-throughput screening assays”) to expose living cells or isolated proteins to chemicals. The cells or proteins are then screened for changes in biological activity that suggest potential toxic effects. These innovative methods have the potential to limit the number of required laboratory animal-based toxicity tests while quickly and efficiently screening large numbers of chemicals.

The first phase of ToxCast, appropriately called “Proof of Concept”, was completed in 2009 and it evaluated over 300 well studied chemicals (primarily pesticides) in over 500 high-throughput screening assay endpoints. Most phase one

chemicals have extensive data from animal-based toxicity testing, which allow EPA researchers to compare results of the high-throughput assays with the traditional animal tests.

The second phase of ToxCast was released in 2015 and evaluated over 1,800 chemicals from a broad range of sources; including industrial and consumer products, food additives, and potentially “green” chemicals that could be safer alternatives to existing chemicals. The chemicals were evaluated in over 700 high-throughput assay endpoints.

Released in 2018, the third phase of ToxCast added over 2,000 chemicals, bringing the total library to over 4,500 chemicals.

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Based on scientific advances, EPA intends to use ToxCast high-throughput screening data to develop new methods to evaluate chemicals. For example, the ToxCast high-throughput screening data identified in the development, proof of concept and implementation of the strategy documents for the Toxic Substance Control Act's Pre-prioritization strategy, and new approach methods for chemical testing strategy and to evaluate chemicals for potential endocrine disruption.

As part of EPA's commitment to gather and share its chemical data in open and transparent ways, all ToxCast chemical data is publicly available for anyone to access and use through a user-friendly web application. Currently, the CompTox Chemicals Dashboard provides an accessible portal for users to search and query the ToxCast chemical screening data. Users can select the chemicals and data of interests and then explore and export this information.

Collaboration Opportunities

To continue to advance EPA's computational toxicology research, EPA scientists are partnering and collaborating with EPA regions and program offices, industry, academia, trade associations, other federal agencies, state and local government agencies and non-governmental organizations with an interest in revolutionizing the current approach to assessing chemical toxicity risk to humans and the environment.

EPA actively engages partners to get feedback about how to improve ToxCast data. EPA hosts workshops, webinars and training to inform partners and to solicit feedback about how to improve our research program. EPA has hundreds of research partnership agreements in place with outside organizations to share research data and studies.

For more information, go to:

ToxCast:

<http://epa.gov/ncct/toxcast/>

CompTox Chemicals Dashboard:

<https://comptox.epa.gov/dashboard>

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