Summit attendees translate big data into useful knowledge

By Catherine Sprankle

Some 30 NIEHS scientists joined more than 200 representatives from industry, academia, regulatory agencies, and nongovernmental organizations Sept. 29-30 for a workshop at the U.S. Environmental Protection Agency (EPA) in Research Triangle Park, North Carolina.

The workshop *(https://sites.google.com/site/toxcastdatasummit/home)* was the agency's Second Data Summit. The summit provided an opportunity for researchers to share ideas about translating massive amounts of new chemical data generated by EPA's Toxicity Forecaster (ToxCast) program into knowledge that can inform policy and regulatory decisions.

ToxCast *(http://www.epa.gov/comptox/toxcast/)* uses high-speed, automated screening technologies, or assays, to identify chemicals that trigger biological activity that may lead to adverse health effects. To date, more than 2,000 chemicals have been evaluated in 700 assays. The data from these tests were made publicly available, and the data summit was the first opportunity for researchers to present the results of research projects using this data.

Presenters discuss research and regulation

NIEHS staff and grantees were key contributors to platform presentations. National Toxicology Program (NTP) Interagency Center *(http://ntp.niehs.nih.gov/pubhealth/evalatm/index.html)* for the Evaluation of Alternative Toxicological Methods director Warren Casey, Ph.D., summarized work by center staff relating ToxCast assay data to the potential health effects of chemicals that interact with the body's estrogen receptor.

"These assays generate lots of data, but how do we put it all together?" he asked. "We need to identify the assays measuring the interactions that are driving the toxicity responses, [because] the ultimate goal is to run the fewest assays that provide the most information for the least cost."

Robert Tanguay, Ph.D., one of four NIEHS grantees presenting at the meeting, discussed lessons learned from his experiments using zebrafish embryos, in automated tests, to evaluate the biological effects of ToxCast chemicals. He explained the ways in which his laboratory is increasing the content of these assays, by deriving more endpoints from a single exposure. He said that one of the major challenges of the system is determining the internal dose that causes the adverse effect.

While the meeting focused on research presentations, a key theme was the potential for knowledge coming from this research to influence regulation and policy. In his keynote presentation, Jim Jones, assistant administrator for the EPA Office of Chemical Safety and Pollution Protection, provided a regulatory perspective on ToxCast, describing ways information derived from ToxCast data will help fulfill the goals of the agency's Endocrine Disruptor Screening Program.

Posters and breakout groups enabled detailed discussions

In addition to two days of speakers, a poster session featured 77 presentations by researchers from throughout the U.S., Canada, and Europe. A total of 18 NIEHS staff and contractors contributed to 13 posters at the meeting, on topics including developmental toxicity, endocrine disruption, and testing prioritization. A poster by NTP scientists, discussing how they used ToxCast data to identify chemicals with the potential to cause allergic contact dermatitis, was one of six posters recognized with an Exemplary Poster Award.

The meeting also provided researchers with specific and practical information. Robert Kavlock, Ph.D., deputy assistant

Finding alternatives to animal testing

Federal agencies work to reduce the use of animals in research and testing. Methods that use fewer or no animals, or that reduce animal pain and distress, are referred to as alternative methods *(http://www.niehs.nih.gov/health/topics/science/sya-iccvam/index.cfm)*. The NTP Interagency Center *(http://ntp.niehs.nih.gov/pubhealth/evalatm/index.html)* for the Evaluation of Alternative Toxicological Methods supports the program's high-throughput screening projects and conducts other projects relevant to test method development.

Nicole Kleinstreuer, Ph.D., displays her award-winning poster, "Predicting Skin Sensitization Using ToxCast Assays." Kleinstreuer, a member of the NTP center's ILS contract support team, was also co-author of another award-winning poster presented by EPA scientists. (Photo courtesy of Catherine Sprankle)

administrator for science in the EPA Office of Research and Development, presented a new ToxCast analysis workflow. Technical breakout groups presented details about the program's assays and chemicals, and instructions for downloading data.

Organizers will soon add slides and video from the meeting to materials already available on the workshop website *(https://sites.google.com/site/toxcastdatasummit/final-materials)* . A report from the workshop will also be developed.

(Catherine Sprankle is a communications specialist with ILS Inc., support contractor for the NTP center.)

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