UC Berkeley meeting explores methods to detect more chemicals

By Sara Mishamandani

Understanding the bigger picture of human exposure through state-of-the-art analytical chemistry was the focus of the Sept. 20 NIEHS-funded University of California (UC), Berkeley Superfund Research Program (SRP) meeting in California. The gathering brought academic researchers together with interested stakeholders, to focus on the field of chemical analysis and its potential for identifying emerging contaminants and analyzing the totality of human exposure.

Kyle leads the UC Berkeley SRP Research Translation Core, which works to translate research findings and scientific knowledge for government agencies, relevant business interests, and general audiences. (Photo courtesy of Amy Kyle)

"We have a lot of targeted methods for determining contaminants, but these usually only pick up what we already know about. The fact that we are still finding emerging contaminants is proof that we don't want to assume only known chemicals are important," said Amy Kyle, Ph.D., UC Berkeley SRP Research Translation Core co-leader and meeting organizer. "This meeting emphasized the importance of untargeted methods that look across the environmental spectrum to see the whole picture."

What Kyle described as the whole picture is also known as the exposome, which represents the totality of environmental exposures of an individual from conception forward. Evaluating the exposome is important, because the internal chemical environment reflects the combined effects of contaminants from air, water, and food, as well as chemicals produced in the body.

Linked Video

Watch as Smith explains the "Exposome Paradigm" (25:47)

Discussing new advances to investigate the exposome

UC Berkeley SRP Director Martyn Smith, Ph.D., kicked off the meeting and was followed by David Balshaw, Ph.D., program director in the NIEHS Center for Risk and Integrated Sciences, who presented a national overview of metabolomics and exposomics.

In the keynote, David Sedlak, Ph.D., co-director of UC Berkeley Water Center, described a systems approach to understanding contaminated water, which requires an interdisciplinary approach involving chemists, health scientists, and engineers.

Panel discussions focused on new technology advances to detect contaminants, and explored ways to link technologies and institutions, to address emerging contaminants. In each panel, scientists with expertise in a specific technology or field had 15 minutes to explain their work. Presentations will be available online on the UC Berkeley SRP website. *(http://superfund.berkeley.edu/)*

"We think we are at the point where the technology has developed sufficiently so that we can start to see the whole picture with regard to human exposure to chemicals," said Smith in his opening talk. (Photo courtesy of Martyn Smith)

Presenters discussed state-of-the-art mass spectrometry and other techniques to explore the human exposome and metabolome. Topics focused on using untargeted techniques and measuring classes, as well as groupings of chemicals, rather than one specific chemical, in an environmental sample.

Expanding partnerships at the UC Berkeley SRP

The meeting also offered opportunities for participants to learn more about the UC Berkeley SRP. The day began with a poster session, where students and postdoctoral scholars affiliated with the UC Berkeley SRP presented their current projects and recent results to meeting

participants. A session for Superfund project updates provided participants with a concise summary of results and next steps for each UC Berkeley SRP project.

"Berkeley has one of the best chemistry programs in the world, and several experts in the field of analytical chemistry attended our meeting," said Kyle. "Continuing to expand these partnerships at Berkeley SRP provides us with vast intellectual and technical resources to think about exposure science in different ways and see the larger picture moving forward."

The UC Berkeley SRP focuses on using advanced technology, including omics and nanotechnology, to develop biological markers and apply them in human population studies, to improve chemical detection, and to facilitate and lower the cost of waste site remediation.

(Sara Mishamandani is a research and communication specialist for MDB Inc., a contractor for the NIEHS Superfund Research Program and Division of Extramural Research and Training.)

"There are multiple conceptualizations of the exposome and a need to develop a unifying conceptual framework," said Balshaw. Balshaw explained common elements of the exposome concept, current challenges to measure the human exposome, and ideas moving forward. (Photo courtesy of Steve McCaw)

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