The purpose and objectives of the Exposure Specialty Section shall be:

- To facilitate the exchange of information and interactions across Society
- To foster the evolution, advancement, and integration of exposure-based approaches as they pertain to the needs of toxicology and risk evaluation.
- To serve as an educational, mentorship, and networking resource for graduate students, postdoctoral fellows, and scientists interested in exposure research.
- To develop, propose, and conduct a variety of cutting-edge programs and educational activities that emphasize the latest developments and issues in exposure research.

What is Exposure Important For?

New to SOT in 2018!

Exposure Specialty Section

Evaluating Exposure Impacts

Although many efforts have focused exclusively on the contribution of one chemical or stressor to an adverse effect, the modulation of these effects or resulting cellular responses are in many cases impacted by the overall environment or “exposome” of the cell or organism. While suggested an exposome that encompasses life-course environmental exposures (including lifestyle factors), from the prenatal period onwards, just as genome-wide association studies (GWAS) can search for genes related to health effects, exposome-wide association studies (EWAS) may allow new toxicological hypotheses for chemical-but-induced alterations in health. It is becoming increasingly recognized that this is not any stressor—chemical or otherwise. New tools have been developed to better understand the broader context of diet, behavior, and other agents, endogenous and exposome-wide assets. Miller and Jones recently proposed a refinement of the original definition of the exposome to capture these thoughts considering cumulative assessments of environmental influences and biological response across the life course.

New Tools in Analyzing Exposure

There is a current paradigm shift in exposure science comparable to the advent of polyvater panel reaction (PCR) in biology and inexpensive computing in analytical sciences. The tools available to exposure scientists now include: meaningful positive samples that are as simple as a wetted band; computational models that can make space estimates for thousands of chemicals; and next-generation analytical chemistry that can identify thousands of previously unimagined chemicals in everything from a glass of drinking water to a handful of dust. When used together, toxicological data and exposure information allows prioritization and analysis of the potential risk posed by chemicals. Traditionally, there has been little to no exposure data available for most chemicals to place possible chemical hazard within a relevant human exposure context. New and emerging computational exposure science tools are rapidly turning this on its end.

Advances in exposomics go hand in hand with advances in non-targeted analytical chemistry and suspect screening (i.e., untargeted analysis). As opposed to targeted analytical chemistry focused upon individual analytes, untargeted high resolution mass spectrometry now allows identification of thousands of chemicals to be discovered in biological and environmental samples. Also, these chemicals can be thought with difficulty, but the needed tools and datasets are rapidly developing. A particularly recent, novel methodology was suggested by Roger et al.4, where, in addition to exposure considerations, data from high-throughput toxicology screening was used to prioritize among potential matches to mass features (i.e., these chemicals with greater potential to do harm should be considered first). By the nature of their methods, untargeted analyses help identify those mismatches that occur in people and the environment.

Understanding Exposure to Improve Consumer Products

An area that is currently of keen interest to the exposure science community is consumer products (e.g., cosmetics, cleaning products, building materials, and food contact material). The presence of chemicals in such “near-field” sources has been shown to be a key driver of high exposure levels in Centers for Disease Control (CDC) National Health and Nutrition Survey (NHANES) exposure biomonitoring data; information on chemical constituents of products, while only a prerequisite for exposure, provides demonstrable health benefits for estimating human exposure. New high-throughput measurement strategies that combine high-resolution mass spectrometry with cheminformatics data-driven analysis of chemicals present in these products5–11. Government requirements for product testing and new industry initiatives are providing additional inventories of chemicals present in products, leading to either intentional inclusion or contamination. These data sources, in concert with data-driven or mechanistic modeling approaches, can elucidate potential human exposures to thousands of commercial chemicals and reduce uncertainty in modeling approaches.

Identifying Exposure Pathways

Pharmacokinetics (PK/TK) exist at the intersection of toxicology and exposure science. Some ideas from exposure science, such as reverse dosimetry to infer exposure from biomonitoring12–14, have already been adopted to toxicology for evaluating risk priorities for chemicals in the environment.15 Efforts to build rapid, "hit-for-purpose" models to describe PK/TK for hundreds of chemicals are starting to yield insights that can inform development of more targeted exposure assessments and PK/TK models.15-17

Teegarden et al.18 argue for "the aggregate exposure pathway (AEp) concept as the natural and complementary companion in the exposure sciences to the adverse outcome pathway (AOP) concept in the toxicological sciences." There is already precedent evidenced for the need for new exposure pathway concepts, which will result in a framework for classifying chemical risk based on chemical-to-cellular to near-field sources.19 New models have been developed to predict from chemical structure the probable functional roles of chemicals in consumer products and environmental matrices.20–21 These new models have been combined with toxicology information to begin to suggest "poor substitutes"—chemicals that may serve similar functions with lesser biotransformation.19

References

... (References continue)

Please feel welcome to attend our first ever meeting and luncheon Wednesday March 14, from noon to 1:30 pm in Convention Center Room 211.