

Presentation Type:

Platform (Invited)

Track:

Aquatic Toxicology and Ecology

Session:

Strategies to Assess the Impacts of Toxic Substances in Large North American Aquatic Ecosystems

Abstract Title:

Application of Mechanistic Toxicology Data to Ecological Risk Assessments

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Abstract:

The ongoing evolution of knowledge and tools in the areas of molecular biology, bioinformatics, and systems biology holds significant promise for reducing uncertainties associated with ecological risk assessment. As our understanding of the mechanistic basis of responses of organisms to toxic chemicals increases, opportunities exist to better extrapolate effects across chemical structures, species, and from the laboratory to field. To support this, however, it is critical to clearly define relationships between endpoints indicative of toxic mechanisms (e.g., changes in gene, protein or metabolite expression; alterations in cellular function; tissue histopathology; etc.) and responses at the individual- and population-levels. This is both a science and communication challenge. A framework recently was described to address this challenge: the adverse outcome pathway (AOP). The AOP builds on the toxicity pathway concept proposed in a recent National Academy of Sciences report (*Toxicity Testing in the 21st Century*) and is defined specifically as a “conceptual framework that portrays existing knowledge concerning the linkage between a direct molecular initiating event and an adverse outcome at a biological level of organization meaningful to risk assessment.” Several meetings and symposia concerning application of AOPs to ecological risk assessment have been conducted, including a SETAC Pellston workshop. This presentation will review the AOP concept and, using case studies, provide examples of its application to risk assessments focused on contaminants of emerging concern such as pharmaceuticals and new-generation pesticides.