Adverse outcome pathways in predictive toxicology

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Chemical risk assessment involves the weighing of diverse sources of information within specific decision contexts to reach conclusions about the safety or risk of unsafe exposure. Adverse Outcome Pathways (AOPs) offer a systems biology-based toxicological framework to support hazard and risk assessment and reduce uncertainty in regulatory decision-making. All information relating to what is known about a specific biological process, from the molecular initiating event through cellular-, tissue-, organ-, organism- and population-level events, to a resulting adverse outcome are collected and evaluated. This framework can be used to support and improve multiple different kinds of chemical assessment processes, from chemical categorization and read across, the design of Integrated Assessment and Testing Approaches (IATA), to predicting the likelihood of an adverse outcome based on mechanistic information. The utility of a pathway to support hazard and risk decisions is directly related to the amount and quality of information informing that pathway; nevertheless, even relatively sparsely informed pathways can be useful to support many types of decisions. The US EPA, European Commission and the Organization for Economic Cooperation and Development have jointly created templates, guidance and databases to support the development and assessment of AOPs. The success of pathway-based approaches depends on global cooperation to develop AOPs and strong international cooperation to implement them in safety decisions.

Biography

Catherine Willett obtained her PhD in Genetics at the University of California, Davis, followed by a Postdoc in developmental biology at the Massachusetts Institute of Technology. After serving as Principle Investigator on several projects for a biotech startup company, for the past 9 years, she has focused on non-animal approaches to assessing chemical safety. She is currently the Director of regulatory toxicology, risk assessment and alternatives at the Humane Society of the United States. She has authored more than 25 peer reviewed publications and is on the scientific advisory boards of several organizations.

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