

Systems Biology & Mode of Action Based Risk Assessment

Summary

The application of systems biology for risk assessment of environmental chemicals is a natural extension of its use in pharmaceutical research. The basis for this is the concept of a key event network that builds on existing mode of action frameworks for risk assessment. The application of molecular networks derived from gene expression data for prediction of susceptible subpopulations of asthmatics and for characterization of disruption of the hypothalamic-pituitary-gonadal axis in fish will be presented.

Why consider proposal

By coupling reverse engineering of molecular networks with the existing frameworks guiding mode of action based risk assessment, we expect to overcome many of the current limitations (real & perceived) of biologically based dose response models in environmental risk assessment.

What the audience will gain

The audience will gain an appreciation for the need of systems biology in environmental risk assessment. In addition, the subtle distinction between systems biology in this context vs. drug discovery will be discussed.

Bio

Stephen Edwards is a Systems Biologist within the National Health and Environmental Effects Research Laboratory (NHEERL) in Research Triangle Park, N.C. NHEERL is the focal point for toxicological, clinical, epidemiological, and biogeographic research within EPA. Dr. Edwards is spearheading the development of a systems approach, integrating relationships and interactions at all levels of a biological system from the sub-cellular to whole organism to connect the effects of environmental pollutants to human health. The goal behind these efforts is to improve the scientific underpinnings of the Agency's risk assessments. Before joining the EPA, he served as a senior research scientist and research fellow at Rosetta Inpharmatics (Merck & Co.), in Seattle, Washington, a recognized leader in computational and systems approaches to drug development.