Towards a network-centric approach in systems toxicology

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Toxicity studies in the 21st -century require the development of novel methodologies which augment existing techniques by the application of in silico modeling and simulation, machine learning and large-scale data analytics connected in custom pipelines through integrated platforms. Particularly, mechanistic understand of causal effects of toxicity are critical in both pharmaceutical and non-pharma related domains. Molecular pathway provide a powerful platform to query, simulate and hypothesize potential molecular mechanisms associated with different toxicological processes at the cellular level. At the same time, curation, construction and analysis of large scale molecular interaction maps require the development of sophisticated tools and techniques at the intersection of standards for computer-ready representation of interactions, text mining tools, visualization and data mapping as well as network based analytics to obtain biological insights. While research in systems biology has made significant progress in these areas, connecting and customization the tools in a pipeline for systems toxicology presents unique challenges and opportunities.

This talk explores the role of network-centric approaches in systems toxicology, identifies how existing tools and techniques can be leveraged, customized and connected through a platform to build the next generation computational pipelines for toxicological studies.