Overview of the ToxCast Research Program: Applications to Predictive Toxicology and Chemical Prioritization

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Understanding the potential health risks posed by environmental chemicals is a significant challenge driven by the large number of diverse chemicals with generally uncharacterized exposures, mechanisms and toxicities. The U.S. EPA's ToxCast chemical prioritization research project has been developed to address the need for high-throughput testing of chemicals for bioactivity that may underly toxicity. To date, approximately 1000 chemicals have been tested in over 600 diverse biochemical, cellular and model organism assays. These chemicals include pesticide active ingredients, reference compounds known to be carcinogens or reproductive/developmental toxicants, high-production volume chemicals, food additives, cosmetic ingredients, "green" alternatives to commonly used industrial chemicals, and over 100 failed pharmaceuticals donated by industry partners. Activity in each of the assays is captured in the ToxCastDB database. Existing in vivo toxicity data on these same chemicals, when it exists, has been collated in the ToxRefDB database and serves to anchor computational models that link in vitro bioactivity profiles and measured or predicted structural and physicochemical properties with in vivo toxicity endpoints. These models are then used to prioritize and predict potential for toxicity of tested chemicals lacking in vivo data. Public access to these databases is being provided through the Chemical Safety for Sustainability Dashboard in December 2013. *This abstract does not necessarily reflect Agency policy.*