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EPA DSSTox and ToxCast™ Project Updates: Generating New Data and Linkages in Support of Public Toxico-Cheminformatics Efforts

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EPA's National Center for Computational Toxicology is generating data and capabilities to support a new paradigm for toxicity screening and prediction. The DSSTox project is improving public access to quality structure-annotated chemical toxicity information in less summarized forms than traditionally employed in SAR modeling, and in ways that facilitate data-mining and data read-across. The DSSTox Structure-Browser provides structure searchability across the full published DSSTox toxicity-related inventory, enables linkages to and from previously isolated toxicity data resources (soon to include public microarray resources GEO, ArrayExpress, and CEBS), and provides link-outs to cross-indexed public resources such as PubChem, ChemSpider, and ACToR. The published DSSTox inventory and bioassay information also have been integrated into PubChem allowing a user to take full advantage of PubChem structure-activity and bioassay clustering features. Phase I of the ToxCast™ project has generated high-throughput screening (HTS) data from several hundred biochemical and cell-based assays for a set of 320 chemicals, mostly pesticide actives, with rich toxicology profiles. DSSTox and ACToR are providing the primary cheminformatics support for ToxCast™ and collaborative efforts with the National Toxicology Program's HTS Program and the NIH Chemical Genomics Center. DSSTox will also be a primary vehicle for publishing ToxCast™ ToxRef summarized bioassay data for use by modelers. Incorporating and expanding traditional SAR concepts into this new high-throughput and data-rich world pose conceptual and practical challenges, but also offer great promise for improving predictive capabilities. *This work was reviewed by EPA and approved for publication, but does not necessarily reflect EPA policy.*