ICE Tools to Support Chemical Evaluations

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The National Toxicology Program's Integrated Chemical Environment (ICE, https://ice.ntp.niehs.nih.gov/) provides easy access to data and tools to explore and contextualize chemical bioactivity. The interactive computational tools in ICE allow users to characterize, analyze, and identify potential hazards for their chemicals of interest. ICE Search lets users select and merge data sets for lists of chemicals and mixtures, yielding summary-level information, curated reference data, and assay results mapped to mechanistic targets and modes of action. With the ICE Curve Surfer tool, users can explore concentration–response relationships for curated high-throughput screening assays. The ICE Physiologically Based Pharmacokinetics (PBPK) tool predicts tissue-level concentrations resulting from in vivo doses, while the ICE In Vitro–In Vivo Extrapolation (IVIVE) tool translates in vitro activity concentrations to equivalent in vivo dose estimates. The ICE Chemical Characterization tool provides consumer use information and physicochemical and pharmacokinetic properties for chemicals of interest, and allows users to compare properties of two sets of chemicals. The newest ICE tool, Chemical Quest, leverages existing data to help characterize data-poor query chemicals. Chemical Quest allows users to explore ICE's database of over 800,000 chemicals through SMILES or 2D renderings. Query results are ranked based on the similarity of the query chemical fingerprints with chemicals in the ICE database. These similar chemicals can then be entered into any ICE tool, including the PBPK and IVIVE tools, expanding available information and enhancing queries. This presentation will highlight how ICE tools and data can support various chemical evaluation use cases, such as identifying information from data-poor chemicals, comparing the bioactivity of chemicals across multiple toxicity endpoints of regulatory concern, and putting in vitro assay results into an in vivo context. This project was funded with federal funds from the NIEHS, NIH under Contract No. HHSN273201500010C.

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