The National Toxicology Program's Systematic Evaluation of the Application of Zebrafish in Toxicology: SEAZIT

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The National Toxicology Program (NTP) is collaborating with zebrafish experts to better understand the utility of zebrafish as a model in screening, prioritizing, or predicting toxicity. The goal is to evaluate the zebrafish as an alternative to in vitro systems or traditional rodent models for these studies. This effort, known as SEAZIT, began with interviewing zebrafish researchers in academic, federal, and industry labs about the practices employed in their laboratories. This information-gathering effort revealed a high degree of variability across the type of endpoints used, data collected, and analysis procedures. Information collected was presented in a 2017 NTP-hosted workshop and webinar series that highlighted the use of ontologies and data processing techniques to help address the current lack of standardization for design and data interpretation. At the workshop, data scientists demonstrated how applying ontologies to phenotype measurements conducted in zebrafish could create connections between large amounts of data. As a result, a project was initiated using zebrafish phenotype data generated in three laboratories with a diverse set of 91 chemicals with interest to NTP. The data were reformatted for consistency and ontologies applied to map the observed phenotypes to data on phenotypes, genes, and disease states to increase the information available on the test chemicals. SEAZIT is simultaneously conducting an interlaboratory study to address the impact of variation of two key protocol elements, repeat dosing and removal of the chorion, on study outcome. This study is testing a defined chemical set designed to provide overlap with other NTP studies, including chemicals with a range of physicochemical properties, developmental effects. Many of these chemicals have in vivo reference data available from rodent and other zebrafish studies. These efforts are identifying important variables in testing, control of which should lead to more reproducible interpretation of data. The use of ontologies and data mapping is expanding the information that can be associated with phenotypic changes following chemical insult.

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