US EPA Mid-Continent Ecology Division

Research Project Summary

Small Fish Models for Assessing Developmental and Reproductive Toxicity

Overview

A 21-day fathead minnow reproduction assay is being developed as a basis for identifying endocrine function disrupting chemicals. Mechanism-specific endpoints diagnostic of alterations in endocrine function (e.g., induction of vitellogenin, alterations in sex steroid concentrations, changes in secondary sex characteristics) and data relevant to assessing recruitment (fecundity, fertility, hatch, early development) are collected in a fraction of the time and cost required for full life-cycle tests. Data are far less variable (statistically more powerful) than what is possible to collect from most full life-cycle test designs. Hence, although the test was developed initially to deal with specific classes of endocrine-disrupting chemicals, the basic test (and its underlying premises) should be valuable for other risk assessment scenarios. Plans are to assess the utility of the abbreviated fathead minnow assay for both predictive and diagnostic purposes. For the former, we will use the test to generate data for chemicals, such as pesticides and/or high production volume materials, which are commonly subjected to higher-tier, prospective risk assessments via EPA regulatory programs. Toxicity data will then be integrated with existing demographic population models developed for the fathead minnow and predictions will be assessed through field studies with native fish.

Key Products

Ankley GT, Jensen KM, Makynen EA, Kahl MD, Korte JJ, Hornung MW, Henry TR, Denny JS, Leino RL, Wilson VS, Cardon MC, Hartig PC, and Gray LE. 2003. Effects of the androgenic growth promoter 17-B-trenbolone on fecundity and reproductive endocrinology of the fathead minnow (*Pimephales promelas*). Environ Toxicol Chem 22:1350-1360.

Ankley GT, Kahl MD, Jensen KM, Hornung MW, Korte JJ, Makynen EA, and Leino RL. 2002. Evaluation of the aromatase inhibitor fadrozole in a short-term reproduction assay with the fathead minnow (*Pimephales promelas*). Toxicol Sci 67:121-130.

Ankley GT, Jensen KM, Kahl MD, Korte JJ, and Makynen EA. 2001. Description and evaluation of a short-term reproduction test with the fathead minnow (*Pimephales promelas*). Environ Toxicol Chem 20:1276-90.

http://www.epa.gov/endocrine/index.html

For further information on this research contact:

Gary Ankley
ankley.gerald@epa.gov
218-529-5147