

Abstract Title:

An assessment of the effects of the endocrine disrupting chemical 17 β -trenbolone on Japanese medaka fish in a multigenerational exposure

Authors:

Megyn Mereness³, Rodney Johnson¹, Kevin Flynn¹, Dean Hammermeister¹, Doug Lothenbach¹, Frank Whiteman¹, Mary Haasch², Jessica Nagel³, Will Backe³, Maicie Sykes³, Melissa Dybvig³, Hillary Waterhouse³, Chad Blanksma³

¹, U.S. EPA, NHEERL, Mid-Continent Ecology Division, Duluth, MN; ², National Research Council, Research Associate; ³, Student Services Contractor.

Presently the research emphasis for endocrine disrupting chemicals has been on the development of short-term screening assays. However, assessing effect concentrations of the most sensitive developmental stages impacted in longer-term and multi-generation tests remains to be determined, including the implications of adverse reproduction and/or developmental effects on fish populations. One approach being developed to evaluate these long-term effects is the medaka multigenerational test. The test consists of continuously exposing three generations of Japanese medaka fish to a chemical, 17 β -trenbolone, starting with young adults in the first generation. The endpoints measured include fecundity and fertility for evaluation of population-level effects, liver vitellogenin mRNA levels, sexual phenotypic markers such as anal fin papillae and gonadal sex, and histopathology evaluation of kidney, liver and gonad. All of these endpoints are evaluated in the context of the genetic sex of the individual, based on the presence or absence of the medaka male-sex determining gene DMY. Non-reproductive toxicity evaluation is also measured using standard toxicity endpoints such as embryo hatch, growth, and survival. Results of 17 β -trenbolone exposure show that the following endpoints were affected: growth, secondary sex characters (anal fin papillae), liver vitellogenin mRNA-levels, fecundity, and gonad genotype/phenotype mismatch. F1 and F2 generations showed increased sensitivity to the chemical, and endpoints for toxicity were not observed in any treatment. The likely mode of action for trenbolone is an endocrine disrupting pathway related to androgen receptor agonism.

Keywords:

17 β -trenbolone, Japanese medaka, medaka multigenerational test, endocrine disrupting chemical

Megyn Mereness
Mid-Continent Ecology Division
Environmental Protection Agency
6201 Congdon Blvd.
Duluth, MN 55811
218-529-5208
mereness.megyn@epa.gov

Presentation Type:

Poster preferred