

Use of adverse outcome pathways for assessing effects of the fungicide propiconazole on fish reproduction

Skolness, SY¹, Churchill, J², Durhan, EJ², Jensen, KM², Kahl, MD², LaLone, CA², Makynen, EA², Villeneuve, DL², and Ankley, GT²

1. University of Minnesota, Duluth, MN, USA
2. U.S. EPA Mid-Continent Ecology Division, Duluth, MN, USA

Adverse outcome pathways (AOP) are used to describe the linkage of biological events from a molecular initiating point, to individual-level-endpoints relevant to risk assessment. This study was done to assess toxicity outcomes for the conazole fungicide propiconazole based on a previously defined AOP for chemicals that inhibit reproduction through impacts on steroid synthesis. Conazoles are a class of chemicals that inhibit 14-alpha-demethylase (cytochrome p450, CYP51) in fungal cell wall development. In higher organisms, various other CYP enzymes become the common targets for conazoles, disrupting processes such as steroidogenesis. The present study assessed the physiological and reproductive impacts of propiconazole on adult fathead minnows (*Pimephales promelas*) based on an AOP for impaired reproduction. Fathead minnows were exposed to 0, 5, 50, 500, 1000 µg propiconazole/L in a 21 d reproduction study. Cholesterol, triglycerides, vitellogenin, and sex steroid (testosterone (T), 17β-estradiol (E2)) concentrations were determined in the plasma. Plasma E2 concentrations in the females were significantly reduced in the 500 and 1000 µg propiconazole/L treatments; however, the male plasma T concentrations were not altered after the 21 d propiconazole treatment. Consistent with the decrease in E2 concentrations in the females, plasma concentrations of the estrogen-responsive protein vitellogenin were significantly reduced in several of the treatments. Genes coding for steroidogenic acute regulatory protein and aromatase were up-regulated in ovaries of the treated fish. Propiconazole significantly reduced cumulative eggs per female in three of the four chemical treatments. This research will be used to further refine AOPs in predicting reproductive outcomes in fish.

Key words: fish, toxicity, reproduction, conazole

List Author Contact Information:

Sarah Skolness
University of Minnesota
5214 Tioga Street
Duluth, MN 55804
Skoln005@umn.edu

I prefer _____ platform presentation _____ poster presentation ___XXXX___ no preference

Student Presentation: __yes__ Include me in the Student Competition for Best Paper/Best Poster