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Aquatic Toxicology and Ecology

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Beyond Estrogens and Estrogenicity: Pairing Chemistry and Mode of Action Screening

Abstract Title:

Effects of a glucocorticoid receptor agonist, dexamethasone, on fathead minnow reproduction and development

Authors:

Carlie A. LaLone, Daniel L. Villeneuve, Elizabeth K. Medlock, Michael D. Kahl, Kathleen M. Jensen, Elizabeth J. Durhan, Elizabeth A. Makeynen, Chad A. Blanksma, Rodney D. Johnson, Jenna E. Cavallin, Sara Seidl, Linnea M. Thomas, Leah C. Wehmas, Sarah Y. Skolness, Gerald T. Ankley

Abstract:

Few studies have examined the effects of synthetic glucocorticoids on the reproductive axis of fish, despite the fact that these chemicals are therapeutically prescribed anti-inflammatory agents that are abundantly produced and consumed. To generate data to assess potential risk to the aquatic environment, this study used a fathead minnow 21 day reproduction assay and a 29 day embryo/larvae exposure assay to determine reproductive toxicity and life stage exposure effects to the common human and veterinary drug, dexamethasone (dex). Exposure to 500 caused significant adverse effects on fathead minnow fecundity, female plasma estradiol concentrations, and increased abnormally hatched fry following the 21 d exposure. Female fish exposed to 500 also displayed a significant increase in plasma vitellogenin (vtg) protein levels potentially due to decreased spawning. A decrease in vtg mRNA expression in ovary tissue from females exposed to the high dex concentration lends support to this hypothesis. Concentrations of 0.1 and 50 significantly increased both gonad mass and gonadal somatic indexes for males and females, respectively. Histological results indicate that 29 day embryo/larvae exposure to 500 caused a significant increase in the development of deformed opercula. Taken together these results indicate that non-lethal concentrations of a model glucocorticoid receptor agonist can impair fish reproduction and development. *The contents of this abstract neither constitute nor reflect official US EPA policy.*