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Effects of Diethylstilbestrol in Fathead Minnows: Part 1. Effects on Reproductive Endocrine Function

Diethylstilbestrol (DES), a synthetic nonsteroidal estrogen, was once widely prescribed to prevent miscarriages, and was used as a growth promoter in feed for beef and poultry production. After it was determined that DES caused significant adverse effects in the offspring of mothers exposed to the compound, its use was limited in both pharmaceutical and veterinarian applications. However, since DES might still be used as a growth enhancer in aquaculture in some countries, it is important to determine possible endocrine impacts it could have on fish, as well as its potential to accumulate in tissues that might result in exposure of human consumers to DES. A fathead minnow (FHM) experiment was conducted in which adult fish were exposed to DES at 1.0, 10 and 100 ng/L for 96 h followed by a 96 h depuration under flow-through conditions. Several endpoints associated with reproductive endocrine function were evaluated at both time periods. There was a significant concentration dependent decrease in male secondary sex characteristics (tubercle score) at the end of the study. Vitellogenin (Vtg) protein levels were significantly increased in the plasma of male fish exposed to DES at 10 and 100 ng/L. Vitellogenin mRNA and estrogen receptor (*esr1*) mRNA increased significantly in the male liver in the 10 and 100 ng DES/L exposure groups, while insulin like growth factor (*igf1*) mRNA showed a significant increase in animals from the 100 ng/L treatment. Overall our results show that that DES is a relatively potent estrogen in fish, capable of disrupting normal endocrine function.

The contents of this abstract do not reflect USEPA policy.