Acute and Subchronic Enantioselective Toxicity of Fipronil to the Fathead Minnow (*Pimephales promelas)*. Baird S[1],Garrison AW[2], Avants J[3] , Black MC[1]. [1]Department of Environmental Health Science, University of Georgia, Athens, GA; [2] US Environmental Protection Agency, National Exposure Research Laboratory, Athens, GA; [3] Senior Service America, US EPA, NERL, Athens, GA

Fipronil is a relatively new chiral phenylpyrazole insecticide used to control both agricultural and household invertebrate pests. Fipronil is applied as a racemate, or equal mixture, of its two enantiomers. As regulations on older pesticides increase, production and application of fipronil is expected to increase, leading to increased inputs into aquatic environments. Although a number of toxicity studies have demonstrated acute and chronic enantioselective toxicity of fiprinil in aquatic invertebrates, data on enantioselective toxicity in fish is limited. We conducted three 7-day aquatic toxicity experiments to determine the acute and subchronic toxicity of the fipronil racemate and each enantiomer to larval fathead minnows (*Pimephales promelas).* Acute (96-hr) LC50s for the fipronil racemate and each enantiomer were not significantly different. However, enantioselective toxicity was observed in fathead minnow exposures with longer exposure durations (7-d), with increased toxicity of the racemate (7-day LC50 = 191 µg/L) and (+) enantiomer (7-day LC50 = 207 µg/L) observed compared to the (-) enantiomer (7-day LC50 = 312 µg/L). Reduced fish growth was also observed in fish exposed to the (+) enantiomer and racemate, compared to the (-) enantiomer. Linear regression of concentration vs. fish weights at 7 days revealed significantly increased slopes for the (+) enantiomer and racemate versus the (-) enantiomer ($p<0.05$). Curiously, for both chronic endpoints toxicity of the racemate and (+) enantiomer was not significantly different, even though the racemate contains 50% of the (+) enantiomer and 50% of the less toxic (-) enantiomer. Metabolic processes could potentially change the enantiomeric fraction present in the organism, so that fathead minnows selectively transform and eliminate the (-) enantiomer, increasing the proportion of the more toxic (+) enantiomer in the racemic exposure. An on-going bioaccumulation experiment where fathead minnows are exposed to fipronil under realistic sediment:water exposure conditions should allow us to test this hypothesis.

Although this work was reviewed by EPA, it may not necessarily reflect official Agency policy.