Poster #13

Glucocorticoid-Induced Disruption of Vertebral Development in the Fathead Minnow, *Pimephales promelas*

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Pharmaceuticals and personal care products detected in surface waters and their sublethal effects are of emerging toxicological concern. Sublethal disorders of unknown etiology include vertebral deformities in fish species worldwide, and despite extensive case studies and clinical investigations, the etiology of idiopathic scoliosis in humans is largely unknown. Synthetic glucocorticoid pharmaceuticals affect *in vitro* chondrocyte proliferation and may therefore disrupt cartilage and bone deposition during development. We hypothesize that xenobiotics with glucocorticoid-like activity may have an adverse impact on bone formation; this study seeks to characterize vertebral anomalies as morphological markers of endocrine disruption in fish exposed to a pharmaceutical agent. The accessibility and rapid development of the fathead minnow make them a well-suited model for examining perturbations in developing vertebrae. Juvenile fish were exposed to the glucocorticoid dexamethasone (400ppt to 400ppm) for 96-h during varying stages of vertebral development (2-5, 6-9, and 10-13 days post hatch (dph)). Fish were analyzed microscopically for vertebral malformations at 26-29 dph using a fluorescein stain to illuminate calcified tissue. Deformities ranged from vertebral compression and bone fusion to severe scoliotic curvatures. Fish exposed to dexamethasone at 6-9 dph developed vertebral anomalies in an inverted U-shaped dose-response curve, with the highest response at 400ppt (up to 17% affected fish, a 3-fold increase over controls). This data conforms to previously reported studies of endocrine disrupting chemicals showing a nonmonotonic dose-response, and suggests a possible critical window in bone patterning and deposition subject to perturbation by exogenous compounds with corticosteroid-like properties.

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