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Cytochrome P450 Induction and Gene Expression in Channel Catfish (*Ictalurus Punctatus*) Following Wastewater Treatment Plant Effluent Exposure in Field and Laboratory Settings

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ABSTRACT

The objectives of this study were as follows: 1) to establish a baseline ethoxyresorufin-O-deethylase (EROD) activity level in channel catfish (*Ictalurus punctatus*), 2) to assess changes in induction of cytochrome P450 enzyme in channel catfish following exposure to creek water at the discharge point from the Troy (Alabama) Wastewater Treatment Plant (TWWTP) compared to upstream samples from Walnut Creek, 3) to compare EROD activity in populations maintained in laboratory and field settings, and 4) to quantify cytochrome P450 gene expression. Enzyme activity was measured fluorometrically and CYP1 gene expression was analyzed by quantitative real-time reverse transcription polymerase chain reaction. A mean EROD baseline was established at 0.03 nmol/min/μg of protein. The overall mean field effluent (TF) EROD had a significant 5-fold increase over field upstream (UF) exposed catfish; and overall mean laboratory effluent (TL) exposed catfish EROD had a significant 1.8-fold increase over laboratory upstream (UL) exposed catfish. Field exposures generally showed more robust enzyme induction over laboratory exposures on all sampling days. Expression of the CYP1B gene following TF exposure was 6-fold over UF. Results suggested that in situ exposure to wastewater pollutants using caged test organisms provided a much more sensitive local monitor of pollutant exposure and biological impact than ex situ toxicological studies.

KEYWORDS

EROD, CYP1B, Molecular Biomarker, Channel Catfish, Liver Monooxygenases, MFO

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