Effects of atrazine on mixed function oxygenases in *Xenopus laevis*.

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**Introduction**

Atrazine is a chloro-s-triazine herbicide that is used extensively in agriculture worldwide. Studies conducted over the past decade have suggested that atrazine or its metabolites can act as endocrine disrupters (Sanderson et al. 2002; Eldridge et al. 1994; Hayes et al. 2002). Although numerous studies have been conducted to describe possible effects in amphibians none of these have identified a specific mode of action for atrazine. It has been suggested, however, that atrazine may alter the hepatic mono-oxygenase system, and thus affect metabolization of hormones (Hanioka et al. 1998). Therefore, in this study possible effects of atrazine on mixed function oxygenase activity were investigated.

**Methods**

**Study Design**

- **Test Organism**: Adult male African clawed frogs (*Xenopus laevis*).
- **Treatments**: Atrazine (10 and 100 µg/L), Estradiol (0.1 µg/L), untreated control (laboratory freshwater).
- **Frogs were exposed in a static renewal system with 50% test solution change every 3 days**.
- **Exposure duration**: 24 days or 49 days.

**Analytical methods**

Concentrations of atrazine in the test solutions were verified every three days by ELISA (Strategic Diagnostics, Inc., Newark, DE, USA).

**Methods (Continued)**

EROD activity was measured in microsomal liver fractions following a protocol modified from Kennedy and Jones (1994). Cytochrome P450 activity was measured simultaneously in a microtiter plate with a fluorescence reader. Protein was determined following the method described by Bradford (Bradford 1976). Liver somatic index (LSI): LSI(%) = Liver weight/body weight * 100

**Conclusions**

- Atrazine has the potential to decrease EROD activity in African clawed frogs at concentrations ≥ 10 ppb.
- Effects of atrazine on mixed function oxygenases may provide an alternative hypothesis for the potential of atrazine to interfere with hormone homeostasis (e.g. increase of hormones as a result of decreased metabolic activities).
- However, except for E2 treated frogs there were no effects observed on plasma sex steroids (see poster PM242).

**Acknowledgments**

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**Results**

- Measured atrazine concentrations were consistent over the entire course of the experiment and were close to nominal concentrations for both test concentrations (Figure 1).
- Atrazine concentrations in the control and E2 tanks were less the method detection limit of the applied assay.
- Significant decreases in EROD activity relative to controls were observed for all treatments except for the 100 µg/L exposure group after 24 days (Figure 2).
- Exposure duration did not have a significant effect on median EROD activities.
- LSI of *X. laevis* treated with E2 were significantly greater than those of control frogs and both atrazine treatments (Figure 3).
- LSI in frogs from both atrazine treatments were not different from controls.

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