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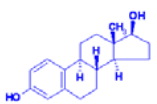
Next Generation Scientists—Next Opportunities

Endocrine Disruptors and Growth in the Tilapia, a Euryhaline Fish

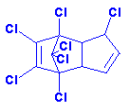
Background

- Endocrine disruptors (ED) are compounds that affect animal reproduction, development, and behavior, but little is known about their effects on growth.
- Vertebrate growth is regulated by the growth hormone (GH)-insulin-like growth factor (IGF-I) axis.

- Primary objective of my study is to examine *in vitro* effects of heptachlor, an estrogenic pesticide, on the GH-IGF-I axis, using estradiol-17β (E_2) as a positive control.



E_2



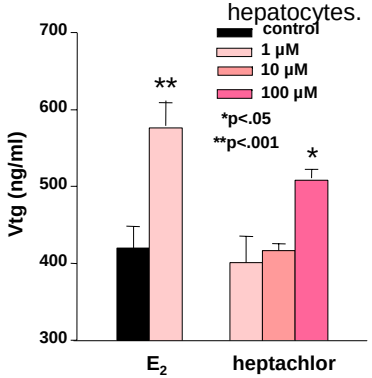
heptachlor

Methods

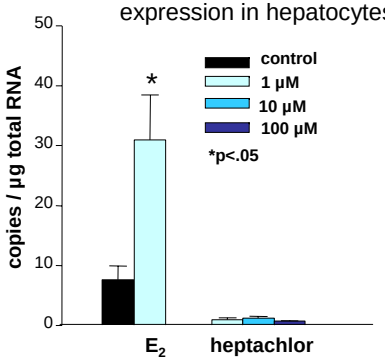
- Hepatocytes of the male tilapia (*Oreochromis mossambicus*) were isolated by collagenase digestion.
- Hepatocytes were dispersed, plated, and treated with 1 μM E_2 or 1-100 μM heptachlor for 48 h.
- Culture media was analyzed for secretion of the yolk precursor protein, vitellogenin, using ELISA.
- Total RNA was isolated for analyses of gene expression of IGF-I and GH-receptor (GH-R) via real-time PCR.

Results

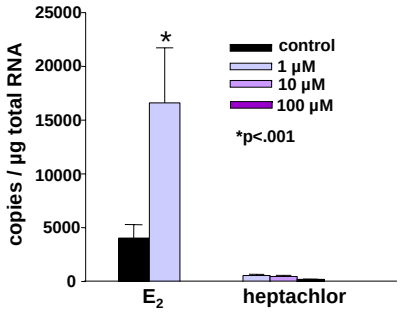
Heptachlor induces a dose-dependent increase in vitellogenin (Vtg) secretion in hepatocytes.



Heptachlor reduces IGF-I gene expression in hepatocytes.



Heptachlor reduces GH-R gene expression in hepatocytes



Conclusions & Future Plans

- Heptachlor stimulated Vtg secretion dose dependently in tilapia hepatocytes.
- E_2 stimulated both IGF-I and GH-R mRNA expression at 1 μM.
- Unexpectedly, however, heptachlor suppressed expression of IGF-I and GH-R genes at all concentrations tested, suggesting that E2 and heptachlor use different mechanisms in interacting with the GH-IGF-I axis.
- Further studies will be done to clarify these differences, in part by using other EDs such as DDE and PCB #138 and analyzing expression of the three different forms of Vtg.
- *In vitro* culture of pituitary glands with EDs will also be done to see how EDs alter normal pituitary activity and responsiveness. In addition, long- term *in vivo* studies will be carried out to examine how EDs affect growth regulation at whole animal level.

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