

KIRSTEN BOGUNOVICH, PERI GRAY, AND HOLLY RACINE, Dept. of Biomedical Sciences, West Liberty University, WV, 26074. Thyroxine Metabolism in an Avian Model of Induced Thyrotoxicosis.

Craniosynostosis (CS) is the premature fusion of cranial sutures which leads to abnormal cranial structure and causes abnormal neurocognition and behavior. Maternal thyroid disorders are associated with incidence of CS in infants. However, the mechanism of TH-induced CS is still obscure. Thyroxine (T<sub>4</sub>) metabolism is regulated by the expression of deiodinases. Type I and type II deiodinases (DIO1 and DIO2) remove iodine from T<sub>4</sub> producing active triiodothyronine (T<sub>3</sub>). Deiodinase III (DIO3) inactivates both T<sub>4</sub> and T<sub>3</sub>. Our lab is establishing a model to study the effects of thyrotoxicosis induced CS using fertilized chicken eggs. Eggs were injected into the air cell with either saline or 25 ng T<sub>4</sub> on days E11 and E15 of embryonic development. Heart rates were measured daily from EKG recordings and on E19, tissue samples were collected for qRT-PCR analysis. The main objective was to validate the induced state of thyrotoxicosis by evaluating negative feedback mechanisms of thyroid hormone regulation following exposure by measuring expression of *DIO1* and *DIO3* in embryonic livers. Since livers are the main site of metabolism, we hypothesize that levels of *DIO3* will increase following thyroxine exposure. Results demonstrated a significant upregulation of *DIO3* 2 days after exposure and a significant downregulation 4 days following exposure. No significant differences were observed in *DIO1* on any of the days after exposure. These results, along with correlating heart rates, support our model by of induced thyrotoxicosis by demonstrating the metabolism of thyroxine in response to our treatment regimen.

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