LINDSEY MORAIS, DARON WEEKLEY, AND HOLLY RACINE, Dept. of Biomedical Sciences, West Liberty University, WV, 26074. Differential morphometric analysis of the anterior fontanelle in an embryonic avian model of induced-thyrotoxicosis.

Craniosynostosis (CS) is the premature fusion of the cranial sutures during embryonic development, and this results in intracranial pressure and skull deformities. Thyrotoxicosis, specifically maternal hyperthyroidism, has been linked to the development of CS. Our lab is currently validating an avian model of thyroxine-induced CS to study the mechanism involved in thyroxine-enhanced cranial ossification. We hypothesized that thyroxine exposure will alter skull morphology. Two groups of fertilized chicken eggs were injected with saline or 25 ng T_4 into the air cell on embryonic days (E) 11 and 15. A set of skulls from each group were collected on E17-19 (n = 17-21/day). They were fixed in formalin and processed using Alizarin Red whole-mount staining, imaged (superior view), and quantified to determine thyroxine-induced alteration in skull morphology. Geometric morphometric analysis using MorphoJ was performed to identify shape variation between treatment groups of the fibrous space between ossifying regions of the anterior fontanelle. These preliminary results demonstrated a significant variation in the shape of the fibrous gap between developing sutures on embryonic days 17, 18, and 19 ($p<0.05$). Using the same methodology, an additional set of skulls on E19 were collected from each group and processed using both Alizarin red and Alcian blue whole-mount staining to better delineate the ossifying region of bone. Analysis is currently in progress. In conclusion, these findings support that our model is successful in promoting the fusing of the cranial bones with thyroxine exposure in our avian model through altered skull morphology visualized in the anterior fontanelle.

Running Title Ideas

Analysis of differential morphology

Anterior fontanelle membrane

Thyroid and Saline Treatment groups

Running Abstract Ideas

Intro to craniosynostosis

Brief description of methodology –

Ideas from KB SURE Poster

Craniosynostosis is the premature fusion of cranial sutures which causes intercranial pressure during development and skull deformities.

Thyrotoxicosis, more specifically hyperthyroidism has been linked to the development of craniosynostosis

Two groups of fertilized chicken eggs were injected into the air cell with 0.1mL saline or 0.1mL 25 ng T_4, through a small hole in the egg's "north pole" on embryonic days 11 and 15

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Running Title: Analysis of differential morphology of the anterior fontanelle membrane by thyroxine-induced craniosynostosis in an embryonic avian model

Running Abstract:

Craniosynostosis occurs when the cranial sutures of the skull fuse prematurely, and this results in intracranial pressure during development and skull deformities. Maternal hyperthyroidism during embryonic development has been linked to the development of craniosynostosis. Two groups of fertilized chicken eggs were injected with 0.1mL saline or 0.1mL 25 ng T_4 into the air cell on embryonic days 11 and 15. Skulls from each group were collected on embryonic days 17 through 19 (n = 17-21 per day). They were processed using Alizarin Red whole-mount staining to image and quantify any morphological differences in the anterior fontanelle membrane between the treatment and control groups. Analysis was conducted using a conjunction of ImageJ and MorphoJ to quantify the area of the fontanelle membrane and the area of ossification. Insert results and data. In conclusion, we determined there is a significant change in the morphology of the anterior fontanelle membrane. This demonstrates that the cranial bones are fusing at different rates between our two treatment groups.

Abstract is currently 139 words including words in RED