CHRD 2024: Abstract Submission Form

Presenter Name
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Presenter Status
Undergraduate Students

Role in the project
Perform Experiments
Analyze Data
Write Abstract

Research Category
Basic Science

Title
Tooth Agenesis as a Diagnostic Marker for Oral and Gastrointestinal Cancers

Background
Up to 10.1% of the population is born with missing teeth, a condition called tooth agenesis. Wnt-signaling pathway mutations are linked to tooth agenesis, along with oral and gastrointestinal epithelial cancers (OGC).

Objective
Due to the linkage through the Wnt-pathway, our study examined whether tooth agenesis can serve as a marker for OGC, using Mexican tetra (Astyanax mexicanus), a teleost fish, as the animal model.

Methods
Pachon cavefish were treated with Wnt-pathway activator (LiCl, 2 mM), inhibitor (WNT-C59, 10 nM) and regular system water (control) at 10 hours post-fertilization. Samples fixed at 10 and 20 days post-fertilization (dpf) were stained using Alizarin red. Stereomicroscope analyzed tooth number, length and pattern. Statistical analysis was performed using an independent two-sample t-test. Surface fish aged 3-4 years in regular system water were stained with Hematoxylin and Eosin, and immunostained via antibodies Mucin-1 and Tumor-associated Calcium Signal Transducer 2 (TACSTD-2). Stained samples were analyzed for epithelial changes associated with OGC.

Results
For 10 dpf cavefish, WNT-C59 and LiCl were non-significantly associated with increased tooth number compared to the control. For 20 dpf, WNT-C59 was significantly associated with increased tooth number compared to control ($P<0.032$), while LiCl was non-significantly associated with increased tooth number. For 10 dpf and 20 dpf cavefish, treatment with WNT-C59 and LiCl were non-significantly associated with increased tooth length compared to the control. Immunostaining of control surface fish sections with TACSTD-2 showed no epithelial changes associated with OGC, while immunostaining with Mucin-1 showed no mucosal abnormalities associated with OGC.

Conclusion
Wnt pathway's role in tooth agenesis is likely more intricate than initially anticipated. Additionally, control surface fish did not show epithelial changes associated with cancer formation. The data gathered provides a foundation to explore whether Wnt-pathway modulators induce epithelial changes associated with OGC, and the role of the Wnt-pathway in cancer progression.

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