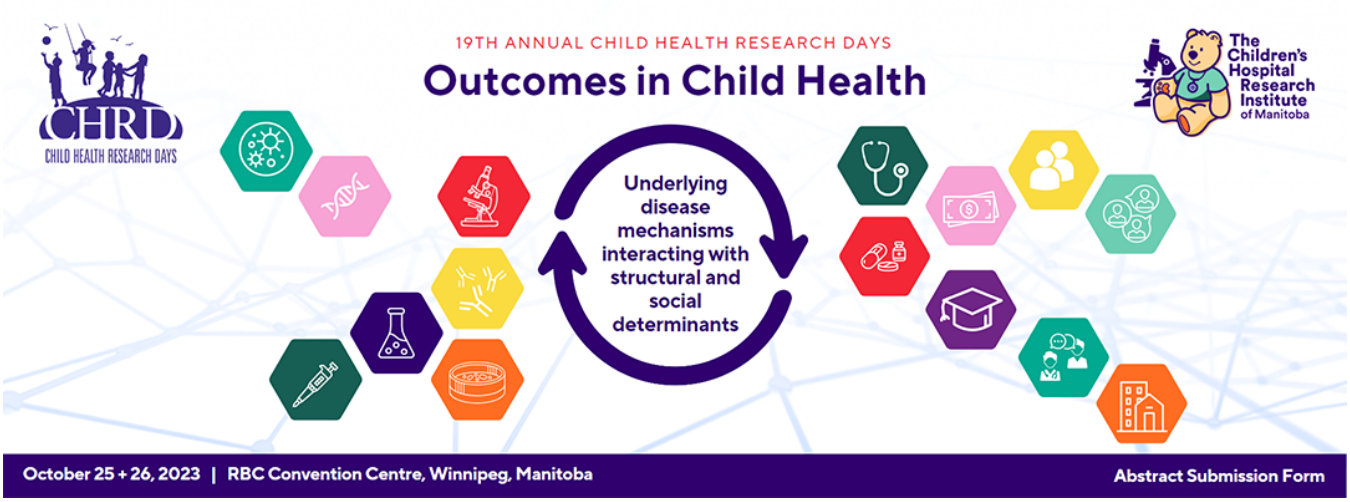

CHRD 2023: Abstract Submission Form

Submitter Name
Sophie Chen

Presenter Name
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Presenter Status
Undergraduate Students

Research Category
Basic Science

Role in the project
Perform Experiments
Analyze Data
Write Abstract

Title
Effect of Embryonic Alcohol Exposure on Tooth Histogenesis-Insights from Zebrafish (Danio rerio)

Background
Fetal alcohol spectrum disorder (FASD) is described as a range of birth defects associated with prenatal alcohol exposure. Increased children born with FASD as well as alcohol consumption and addiction among women of childbearing age are important global health issues regarding alcohol toxicity. While distinct craniofacial features of FASD have been well established, less is known about the effects of alcohol on tooth development (TD). TD is regulated by several cell signalling pathway molecules. Specifically, alcohol has been found to interact with the Wnt signalling pathway, which is important for regulating tooth number, shape and size.

Objective
To investigate the histomorphological structures of the dentition associated with embryonic alcohol exposure using zebrafish (ZF) (Danio rerio) as an animal model

Methods
Wild-type AB ZF embryos were treated with 1% EtOH, 2mM LiCl (Wnt activator), 10nM WC59 (Wnt inhibitor), and their combinations at 10 hours post fertilization. Samples were fixed at 6 days post fertilization (dpf) and processed for toluidine blue staining and electron microscopic analysis. Wnt10a antibodies were used in 10dpf samples for whole-mount fluorescent immunohistochemistry.

Results
The teeth of all treated ZF samples were deformed compared to the controls. These defects include

abnormalities in tooth number, tooth germ numbers, tooth shape, mineralization, and pulp size and density. The effects of the EtOH+LiCl combination present more similarly to that of EtOH alone than LiCl alone. The most severe tooth defects were observed with the EtOH+WC59 combination. Wnt10a expression in the pharyngeal tooth-bearing region corresponds with the above findings.

Conclusion
Embryonic alcohol exposure and Wnt–alcohol interactions affect the development and patterning of the dentition in ZF, and these phenotypes could be helpful in Dentistry to diagnose FASD-induced tooth defects.

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