CHRD 2024: Abstract Submission Form

Presenter Name
Ola Salama

Presenter Status
Non-Trainee

Role in the project
Perform Experiments
Analyze Data
Write Abstract

Research Category
Basic Science

Title
In-utero Exposure to Maternal Diabetes and DNA Methylation Alterations in the Next Generation Birth Cohort

Background
The incidence of type 2 diabetes (T2D) in youth is increasing and in-utero exposure to maternal diabetes is a known risk factor, with higher risk associated with pregestational T2D exposure compared to gestational diabetes mellitus (GDM) exposure. We hypothesize this differential risk is reflected in DNA methylation (DNAm) changes induced by in-utero exposure to maternal diabetes, and that exposure to diabetes throughout pregnancy (T2D) compared to exposure later in development (GDM) induces both different DNAm signatures and different predispositions to T2D.

Objective
This study presents an epigenome-wide investigation of DNAm alterations associated with in-utero exposure to either maternal pregestational T2D or GDM, to determine if the timing of prenatal diabetes exposure alters DNAm differently.

Methods
We performed an epigenome-wide analysis on cord blood from 70 newborns exposed to GDM, 99 exposed to pregestational T2D and 41 unexposed to diabetes in-utero from the Next Generation Birth Cohort. Associations were tested using multiple linear regression models while adjusting for sex, age, BMI, smoking status, and cord blood cell type proportions.

Results
We identified 27 differentially methylated sites associated with exposure to GDM, 27 sites associated with exposure to T2D, and 9 sites associated with exposure to either GDM or T2D (adjusted p-value < 0.05 and effect size estimate > 0.01). One site at CLDN15 and two unannotated sites were previously reported in the EWAS Atlas as associated with obesity. Furthermore, we identified novel CpG sites in the PTPRN2 gene, a gene previously associated with DNAm differences in youth with T2D from the same population.

Conclusion
Our findings suggest that in-utero exposure to maternal diabetes is associated with DNAm alterations in offspring. Moreover, the timing of maternal diabetes in-utero exposure (GDM or T2D) produces different DNAm patterns, suggesting that the window of exposure to maternal diabetes produces different molecular modifications and may explain, at least in part, the difference in risk for youth onset T2D in offspring.

Do you have a table/figure to upload?
No

Authors

Name	Email	Role	Profession
Ola E Salama	ola.salama@umanitoba.ca	Presenting Author	Data Analyst
Yash Rawal	yrawal@chrim.ca	Co Author	Research Coordinator
Priscilla Irabor	pirabor@chrim.ca	Co Author	Research Assistant
Christy Pylypjuk	christy.pylypjuk@umanitoba.ca	Co Author	Assistant Professor
Elizabeth Sellers	elizabeth.sellers@umanitoba.ca	Co Author	Associate Professor
Brandy Wicklow	bwicklow@hsc.mb.ca	Co Author	Associate Professor
Meaghan J Jones	meaghan.jones@umanitoba.ca	Co Author	Assistant Professor