Examining how prenatal alcohol exposure interacts with cafeteria diet to affect metabolic health and gut microbiome in rats

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Rational

Prenatal alcohol exposure (**PAE**) affects 9% of the global population

Associated with **cognitive challenges**

Metabolic syndrome
Higher risk following PAE

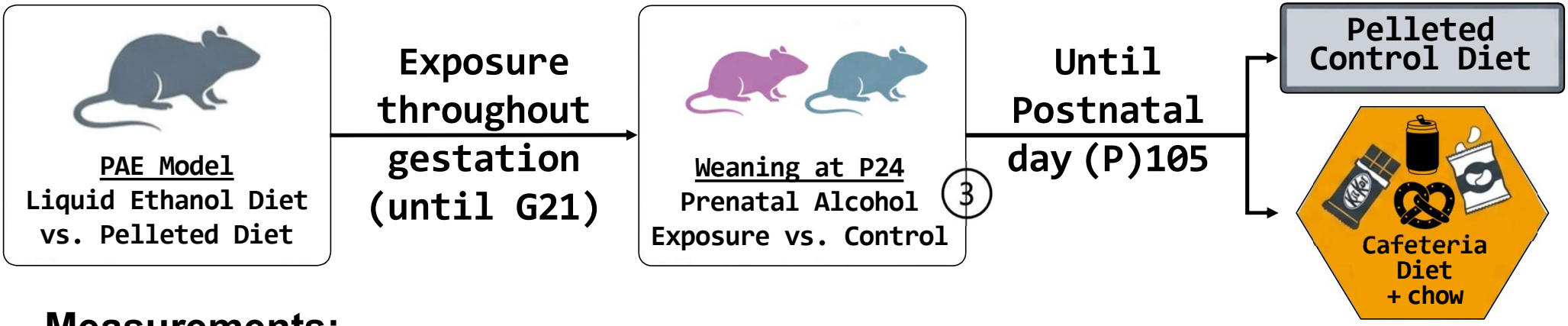
Insulin resistance
Obesity
Glucose dysregulation
Excess abdominal fat

Altered eating behaviour
Selective eating, altered hunger and satiety

Postnatal diet
possible contributor

How does PAE interact with postnatal diet to shape metabolic health?

Methods



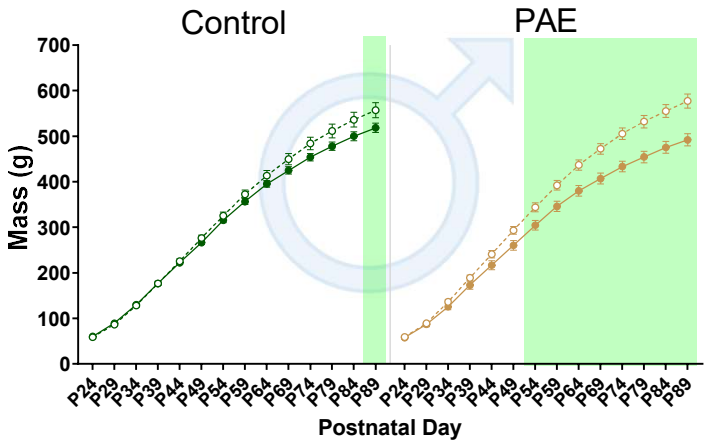
Measurements:

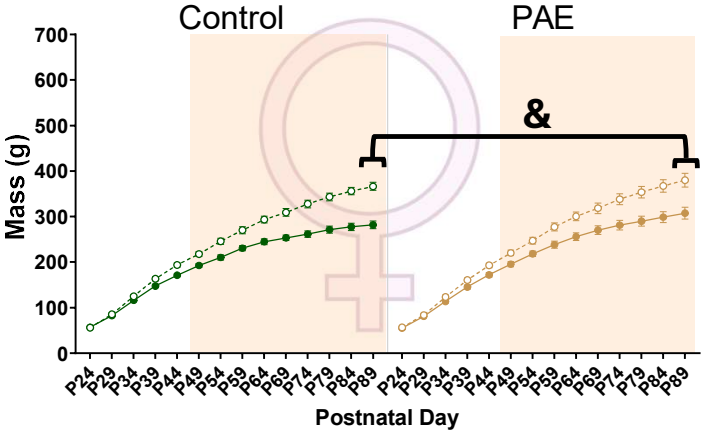
- Body weight every five days
- Daily food intake
- Insulin resistance (P92)
- Energy expenditures (P94 -104)
- Body composition with DXA scans (P24, P65, and P104)
- Fecal samples before (P24) and after (P104) dietary exposure.

Prediction:

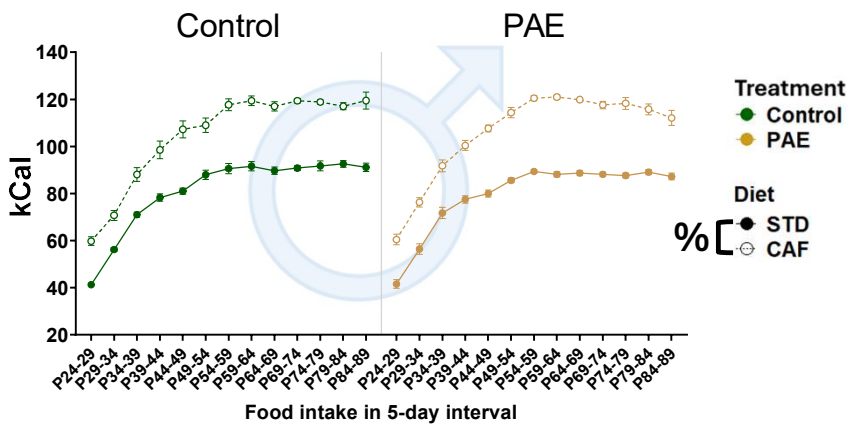


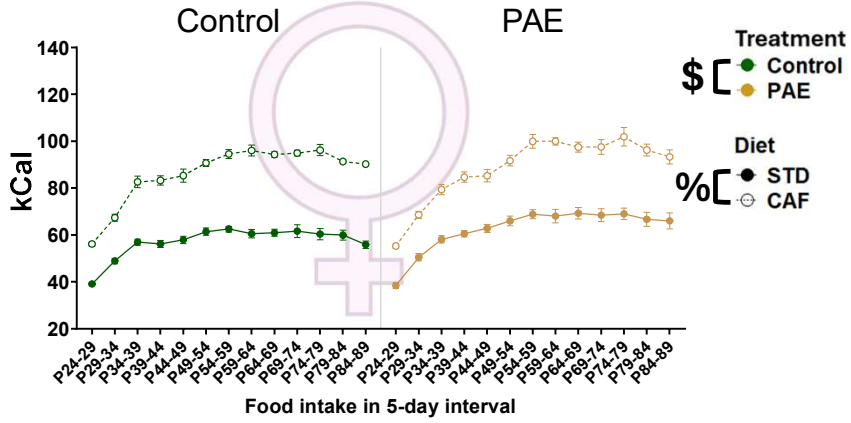
Body Weight



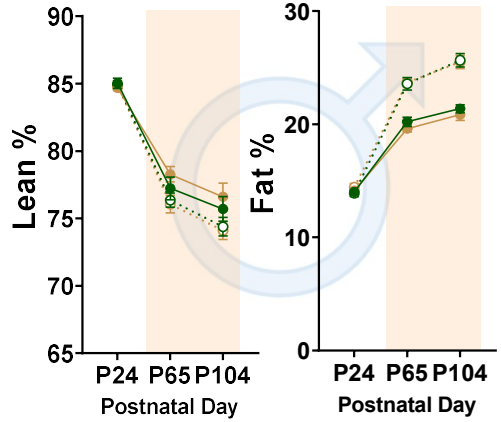


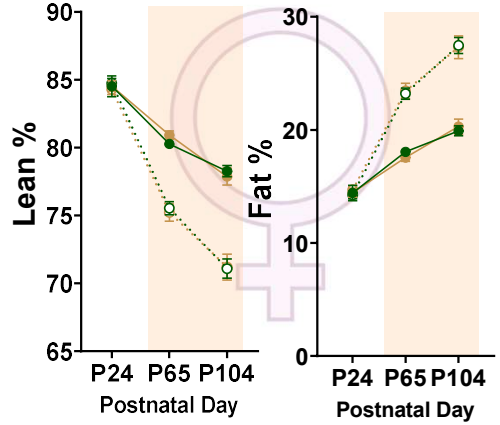
Energy Consumption





Lean and Fat Mass %





Treatment
- Control
- PAE

Diet
- STD
- CAF

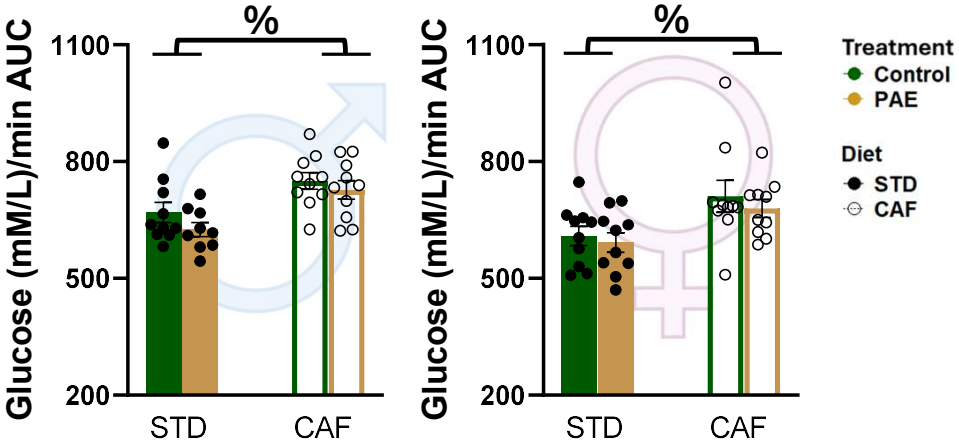
Treatment **x** Diet **x** Age

Age **x** Diet

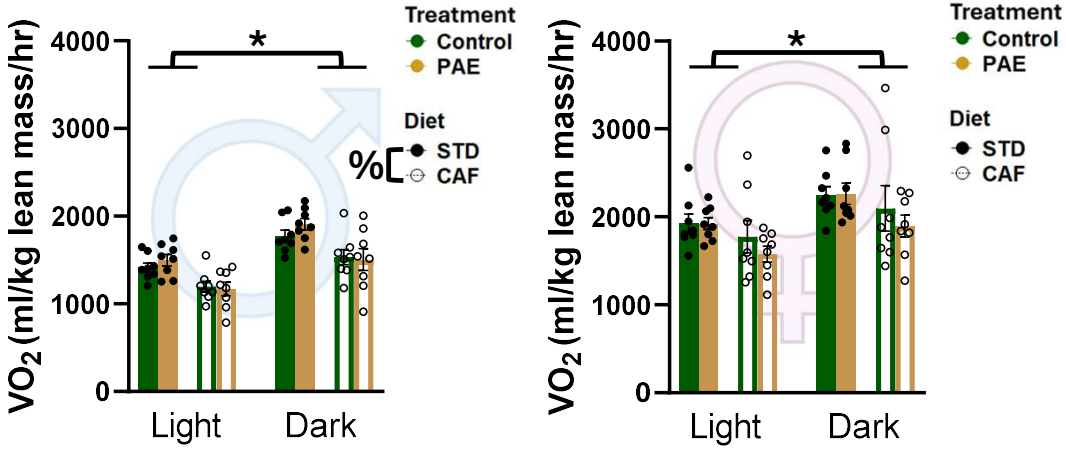
&: Age **x** Treatment

%: Diet main effect

Insulin Tolerance Test

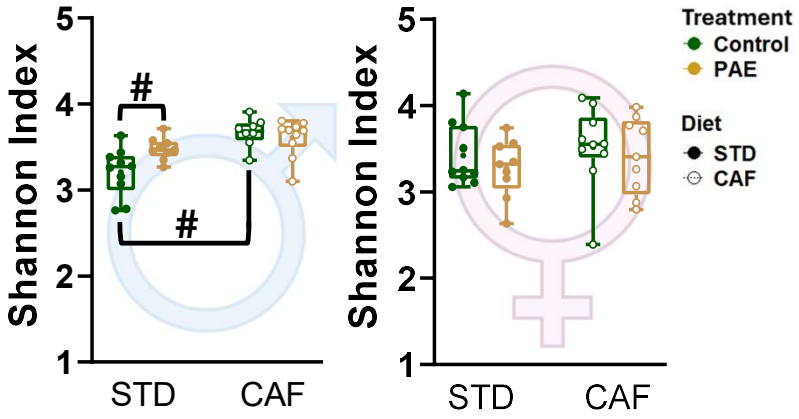


Relative Lean Oxygen Consumption

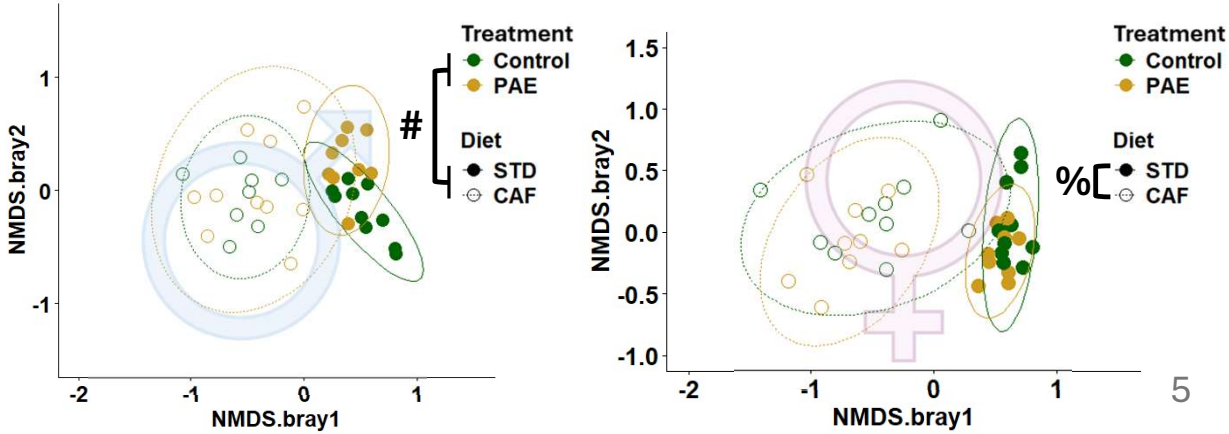


%: Diet main effect **# :** Treatment **x** Diet ***:** Day cycle main effect

Gut Microbiome - Alpha Diversity



Gut Microbiome – Beta Diversity



Conclusions

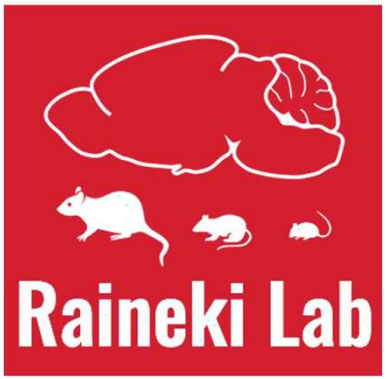
- PAE and control animals exhibit differential biometric responses to cafeteria diet. Moreover, these effects were not explained by changes in energy expenditure.
- PAE induced differential gut microbial shifts (alpha and beta diversity) of adult males across diets, whereas these shifts were diet-driven in females.
- The cafeteria diet impaired metabolic health in both PAE and control animals, inducing insulin resistance and increased body fat percent.
- Further analyses will focus on the central and peripheral mechanisms that may help explain the differential responses between males and females, and how PAE affect metabolic health.

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