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17TH ANNUAL CHILD HEALTH RESEARCH DAYS

Nutrition for a Changing World

The Science of Nourishing the Next Generation

CHRD 2021: Abstract & Poster Submission Form

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Research Category:

- Basic Science
- Clinical
- Community Health / Policy

What was your role in the project?

- Design
- Perform Experiments
- Analyze Data
- Write Abstract

Presenter Status:

- Undergraduate Students
- Masters Student
- PhD Student
- Post-Doctoral Fellows
- Residents
- Non-Trainee

Title

Does Diet Quality Affect Birth Outcomes and Lipid Toxicity in Neonatal Brains with Prenatal Ethanol Exposure?

Background

Alcohol consumption during pregnancy leads to irreversible detrimental effects on fetal brain development, resulting in fetal alcohol spectrum disorders (FASD). The mechanism may be lipid (ceramide)-induced apoptosis, which is increased by prenatal ethanol (EtOH) exposure. We are finding promising results using nutrition as a preventative strategy during pregnancy. For example, prenatal EtOH exposure on a standard chow diet has detrimental effects on birth outcomes and brain development. However, whether an energy-dense diet (E-dense) has the same effect has yet to be shown. This study aims to compare chow diet with a formulated E-dense diet on birth outcomes, ceramides and neuroapoptosis in three brain regions in neonatal rats exposed to EtOH during gestation.

Objective

This study aims to compare chow diet with a formulated E-dense diet on birth outcomes, ceramides and neuroapoptosis in three brain regions in neonatal rats exposed to EtOH during gestation.

Methods

Pregnant Sprague-Dawley rats were randomly assigned to chow (n=6), chow+EtOH (20%, v/v in drinking water) (n=7), E-dense (n=6), and E-dense+EtOH (n=8). At postnatal day (PD) 7, representing rat brain growth spurt peak, cortex, cerebellum and hippocampus were collected. Ceramides and apoptosis were measured by gas chromatography and a caspase-3 assay kit, respectively.

Results

EtOH exposure significantly lowered the maternal body weight in chow groups ($P < 0.05$), and pups' weight at PD7 with both diets ($P < 0.0001$). Compared to chow, E-dense diet increased body weight at PD7 regardless of EtOH ($P < 0.0001$). EtOH exposure significantly reduced absolute brain weight of PD7 pups with both diet groups ($P < 0.05$). EtOH exposure increased ceramides, but only in the hippocampus in pups from the chow groups ($P < 0.05$), as it was reduced by the E-dense diet ($P < 0.05$). No significant differences were observed in caspase-3 activity among experimental groups in the three brain regions.

Conclusion

E-dense diet attenuated EtOH-induced weight loss and ceramide elevations in hippocampus of PD7 pups, suggesting its potential to mitigate EtOH effects. Overall, the quality of maternal diets affect birth outcomes and ceramides when after EtOH insults during pregnancy.

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- For each author, please click "[+] Add Item" and provide the author's information

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