Clinical Studies of Marijuana Exposure Show Harm

Clinical studies are:
- Retrospective
- Self-reported
- Dosing is unclear
- Nonspecific to marijuana components
- Contaminated with nicotine and/or alcohol

Clinical studies show:
- Decrease in birth weight
- Increase in preterm labor
- Increase in small for gestational age
- Increase in NICU admissions
- Increased anxiety
- Increased ADHD

Methods

3,4: Single cell RNA sequencing

Impact of Fetal CBD Exposure on Offspring Behavior

A. Schematic of tests

B. Y maze test shows no effect of fetal CBD on spatial memory (n=12-21)

C. Hargreaves test shows fetal CBD exposure increases thermal sensitivity in males (n=8 each)

D. Puzzle box test shows female CBD exposed offspring have decreased cognition (n=12 each)

E. Elevated zero maze tests of anxiety show no major effect of CBD exposure

Impact of Fetal CBD Exposure on Offspring Metabolism

A. Glucose tolerance test for CBD and Vehicle exposed males (CBD N=15, Vehicle N=13)

B. Insulin tolerance tests for CBD and Vehicle exposed males (CBD N=15, Vehicle N=13)

C. Decreased cognition in 50% of CBD exposed offspring

D. Increased anxiety in 25% of CBD exposed offspring

E. Increased ADHD in 40% of CBD exposed offspring

Conclusions

Fetal CBD exposure:
- Decreases cognition in female offspring
- Increases thermal sensitivity in male offspring
- Decreases glucose tolerance in male (14 weeks old) and female (21 weeks old) offspring
- Induces insulin resistance in female offspring
- Changes metabolic gene transcription and cell populations in the newborn hypothalamus of male and female offspring

Future work

- Blood collection from CBD dams and pups for pharmacodynamic analysis of CBD metabolite transfer and storage in fetal tissues
- Quantifying compulsivity via marble burying test
- Electrophysiological and morphological analysis of serotonergic neurons in the prefrontal cortex

Funding: Institute of Cannabis Research, Colorado Clinical and Translational Science TL1 TR002531, Diabetic Research Centre, University of Colorado-Anschutz Medical Campus IACUC approval: 139

References

CBD Exposure Alters Gene Expression in PD 1.5 Hypothalamus

Impact of maternal CBD exposure on gene expression in PD 1.5 hypothalamus

Above: cluster identification. Right: Genes with significantly different expression (intra-cluster) between CBD and Vehicle exposed offspring

CBD activates receptors in the developing brain

Schematic of tests

Methods

single cell RNA sequencing

Impact of Fetal CBD Exposure on Offspring Behavior

A. Y maze

B. Thermal Pain Sensitivity via Hargreaves Test

C. Schematic of tests

D. Aggregate data of open field test, light dark box, and elevated zero maze tests of anxiety show no major effect of CBD exposure

E. Elevated zero maze tests of anxiety show no major effect of CBD exposure

Conclusions

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