15 Assessing THC passage and the impact in human perfused placenta cotyledons

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OBJECTIVE: Maternal cannabis use in pregnancy continues to increase with legalization. Frequent cannabis use in pregnancy is associated with fetal growth restriction and low birth weight. The mechanism by which maternal cannabis use influences fetal growth remains unclear but is linked to the cannabinoid, Tetrahydrocannabinol (THC). Studies in animal models suggest exogenous THC crosses the placenta and observational human studies support these findings. The objectives of this study are to understand the mechanisms of THC transfer and its influence on fetal arterial vascular tone in human cotyledons.

STUDY DESIGN: A human placental dual-cotyledon, dual-perfusion model was utilized (Figure 1). For each experiment two cotyledons were isolated and compared from n=5 unlabored, uncomplicated cesarean placentas from pregnancies with no known tobacco, alcohol or drug use. To simulate maternal exposure experimental cotyledons were infused with 5μM THC into the intervillous space for two hours, control cotyledons received the vehicle. THC concentration were analyzed in maternal fetal venous effluents. Fetal arterial pressures were monitored to assess viability and function. To confirm viability, lactate was also measured in fetal venous effluent at the end of each experiment. Values reflect mean and SEM.

RESULTS: From 5μM infused THC, the concentration in the fetal effluents was 0.1μM (+/- 0.04) (Figure 2A). In contrast, intervillous biopsy concentrations were 111μM (+/- 42). There were no significant differences in placenta fetal arterial pressures with THC exposure (Figure 2B). Lactate levels were not different between THC and vehicle infused cotyledons; THC 0.56 mmol/L (+/-0.023), vehicle 0.64 mmol/L (+/-0.015).

CONCLUSION: Approximately 2% of the infused THC concentration crosses the human placenta. A substantial proportion is retained in the tissue though this necessitates further examination. THC at concentrations infused did not alter vascular tone or viability within the timeframe of our experiments. Future directions include characterizing the mechanism of THC retention and transport through the placenta.

16 Comprehensive quantification of human milk oligosaccharides (HMOs) & sparse-but-true microbes in 2nd-trimester amniotic fluid (AF)

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OBJECTIVE: There has been recent controversy as to whether mammalian fetuses normally develop in sterile intrauterine environments, or rather amidst sparse & low-abundance/low-diversity beneficial microbial communities. Despite supportive evidence from cultivation, metagenomics, molecular tagging & functional immune experiments, this controversy has persisted because of (1) presumptive contaminants, and (2) a lack of identifiable intrauterine substrates which could support beneficial microbial growth. Milk oligosaccharides are evolutionarily preserved complex glycans which