Effects of Maternal Oxycodone Use on Placental Development

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In 2016, prescription opioids were abused by approximately four percent of the United States population (1). Oxycodone is considered at the epicenter of the current public health crisis, as it has and continues to be greatly overprescribed by physicians. Scant information is available on how maternal oxycodone exposure may affect conceptus development, which includes the placenta and fetus. The placenta is the primary communication organ between the mother and fetus that allows for exchange of gases, nutrients, and waste. Proximity of the fetal placenta to the maternal blood in rodents and humans who have a hemochorial form of placentation renders this organ vulnerable to pharmaceutical agents circulating in the mother's bloodstream (2). We thus hypothesized that oxycodone exposure may result in deleterious placental changes offspring. Twelve CF1 mice were exposed daily to 5 mg oxycodone/kg body weight or saline control two weeks prior to breeding until 12.5 days post-coitus. Half of placental tissue was frozen for RNA isolation, and the other half was fixed in 4% paraformaldehyde for histological sectioning and hematoxylin and eosin staining. This method revealed that the percentage of apoptotic trophoblast giant cells, which are the cells in the mouse placenta at the interface with uterine tissue, was significantly increased in the oxycodone exposed group relative to controls (16.5±2.1 vs 4.9±0.7%, respectively; $p<0.01$; $n=20$ placenta for each group). Preliminary assessments indicate oxycodone exposed mice showed a trend for greater vacuolization within the spongiotrophoblast layer ($p = 0.06$). RNA was isolated from the frozen placental tissues, and RNAseq analysis performed with the NovaSeq 6500 (Illumina). We are currenlty analyzing these data. Our data indicate maternal exposure to oxycodone detrimentally affects the placenta by increasing the number of apoptotic trophoblast giant cells and likely induces other pathological and molecular alterations.

References

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