Opioid and polysubstance exposure effects on metabolomics during pregnancy

Ahmad Aboaziza, MD; Kadesha McIntyre, MS; Kim Kew, PhD; Samantha Poppenfuses, BS; Dmitry Tumin, PhD; Sri Ravisankar, MD; Devon Kuehn, MD
East Carolina University/Vidant Medical Center; Greenville, NC
Department of Biochemistry and Molecular Cell Biology/Brody School of Medicine

Introduction
The number of mothers diagnosed as dependent on or using opiates at the time of delivery increased by almost five-fold between the year 2000 and 2009. Opioid exposure during pregnancy is associated with a 60-80% risk of the infant having neonatal abstinence syndrome (NAS) and the incidence of NAS continues to increase, tripling in the last decade. In addition to NAS, exposure to opioids during pregnancy increases the risk for intrauterine growth restriction, preterm delivery, and birth defects.

It is known in a recent study that opioids and polysubstance abuse during pregnancy has a negative impact on maternal dietary intake, specifically vitamin A, vitamin B6, vitamin E, iron, folate, and choline. Currently there is a lack of research in regards to nutritional deficiencies among drug exposed infants.

Objective
To investigate the influence of maternal drug exposure on the status of key nutrients in fetal development and neonatal outcome.

Study Design
❖ Single-center, prospective, cross-sectional study of women self-reporting opioid use, polysubstance use, or no illicit or alcohol use during pregnancy.
❖ Study population: pregnant women singleton neonate with a gestational age 23 weeks
❖ 61 patients enrolled . 9 cords excluded for the presence of suspected chorioamnionitis
❖ N= 52

Methods
❖ Demographic data on maternal substance abuse and pregnancy and neonatal data including NAS and any treatment needed was collected from the medical record
❖ Within 1 hour of birth, cord samples were collected from mothers who had consented to be in the study including the control mothers who had no prenatal drug exposure.
❖ The cords were rinsed of excess blood, weighed and cut in uniform segments that were stored at -80 °U until analyzed.
❖ Cord samples were homogenized, and extracted for analysis using solid phase or protein precipitation.
❖ Liquid chromatography/mass spectrometry used to measure global and targeted metabolite and drug levels.

Results
We found infants exposed to prenatal opioids had a measurable negative impact on several nutritional metabolites which play a significant role in fetal development, in particular, folate, DHA and Tryptophan.

We also identified a large number of diverse metabolic pathways that were substantially different from controls. We are currently working on defining these differences further.

Our study may potentially lead to development nutritional guidelines to improve NAS outcomes.

Acknowledgements
❖ Children’s Miracle Network Grant
❖ Interdisciplinary Grant

References
❖ Disclosure
The authors of this poster presentation have no conflict of interest to disclose.