

Resting State Functional MRI Connectivity in Infants with Neonatal Abstinence Syndrome

Sunday 12:30-1:00 PM | PD202-SD-SUA3 | PD Community, Learning Center, Station #3

PURPOSE

Exposure to opioids in utero is believed to have lasting consequences on brain development and behavior, including emotional dysregulation. However, little is known about the impact of in utero opioid exposure on brain function in neonates. We investigated functional connectivity (via resting-state functional MRI; rs-fMRI) of the amygdala (Amg; a limbic region pivotal for emotional function) in infants with neonatal abstinence syndrome (NAS) relative to opioid-naïve (ON) infants.

METHOD AND MATERIALS

We recruited 21 NAS and ON neonates. Subjects underwent rs-fMRI on a Siemens PRISMA 3T scanner at <48 weeks of age. After standard preprocessing, independent component analysis (ICA) was performed. The resulting components corresponded to published infant resting state networks (RSNs; see Figure). Regions of interest (ROIs) were created for the left and right Amg. ROIs were applied to the individual ICA maps, and average network coefficient values were extracted to determine the relative participation of the Amg within each RSN. Group differences in Amg RSN weights were compared with independent t-tests. Five subjects were excluded due to incidental findings and motion; data from 8 NAS and 8 ON were analyzed.

RESULTS

There were no differences between NAS and ON in mean gestational age at birth, age at MRI, and 5 min Apgar score. There were significant differences in mean birth weight and length of hospital stay. There were several significant and trend-level group differences in Amg RSN weights. NAS had higher R and L Amg RSN weights in the frontoparietal RSN ($p=0.04$; $p=0.08$) and higher L Amg RSN weights in the sensorimotor RSN ($p=0.09$). NAS had lower L Amg RSN weights in the executive control RSN ($p=0.07$), and lower R Amg RSN weights in the salience RSN ($p=0.07$).

CONCLUSION

The data suggest that in utero exposure to opioids may result in aberrant functional connectivity of the amygdala, a region involved in emotion regulation. This needs further investigation in larger samples.

CLINICAL RELEVANCE/APPLICATION

Understanding brain functional changes in neonatal abstinence syndrome is important in identifying best methods to manage this condition, and improve outcomes in these infants.