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Reduced structural and functional connectivity in infants with prenatal opioid exposure

Stephanie Merhar[1], Adebayo Braimah, Traci Beiersdorfer, Brenda Poindexter and Nehal Parikh
[1]Cincinnati Children's Hospital Medical Center

OBJECTIVES/SPECIFIC AIMS:. This study aims to understand the effects of prenatal opioid exposure on structural and functional connectivity in the neonatal brain. Our central hypothesis is that infants with prenatal opioid exposure will have decreased structural and functional connectivity as compared to non-exposed controls. Our overarching goal is to improve neurodevelopmental and behavioral outcomes in infants with prenatal opioid exposure. METHODS/STUDY POPULATION:. Infants with prenatal opioid exposure were recruited from 2 birth hospitals in our area. Control infants were recruited from the larger community. Infants underwent MRI between 4-6 weeks of age in the Cincinnati Children's Hospital Imaging Research Center. MRI sequences included 3D structural T1 and T2-weighted imaging, resting state functional connectivity MRI, and multi-shell DTI (36 directions at b=800 and 68 directions at b=2000). Tract-based spatial statistics (TBSS) was used to identify differences in fractional anisotropy (a measure of white matter integrity) between groups. Group independent component analysis was used to identify differences in resting-state networks between groups RESULTS/ANTICIPATED RESULTS:. There were 5 subjects enrolled in the study with evaluable imaging, 3 infants with prenatal opioid exposure and 2 unexposed controls. Structural MRI was normal in all cases. Infants with prenatal opioid exposure had reduced structural connectivity as measured by fractional anisotropy (FA) in the genu and splenium of the corpus callosum as compared with controls. The orange/red color represents areas in which the FA of the opioid-exposed group was lower than controls and green represents the white matter skeleton common to both groups. Infants with prenatal opioid exposure also had significantly reduced within-network functional connectivity strength (z-transformed partial correlation coefficient 0.358 vs 0.199, $p = 0.03$) in the sensorimotor network as compared with controls. DISCUSSION/SIGNIFICANCE OF IMPACT:. In this small pilot study, both structural and functional connectivity were reduced in opioid-exposed infants compared with controls. This data suggests that differences in structural and functional connectivity may underlie the later developmental and behavioral problems seen in opioid-exposed children. These findings must be validated in a larger population with correction for confounding factors such as maternal education

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Relationship between abnormal nocturnal blood pressure patterns and end-organ damage following heart transplantation.

Kris Oreschak[1], Eugene E. Wolfel, Amrut V. Ambardekar and Christina L. Aquilante
[1]University of Colorado at Denver

OBJECTIVES/SPECIFIC AIMS: Heart transplant (HTx) recipients are more likely to exhibit abnormal circadian blood pressure (BP) patterns (e.g., lack of nocturnal dip in BP) compared with the general population. Our goal was to assess the relationship between abnormal circadian BP patterns and end-organ damage in HTx recipients. METHODS/STUDY POPULATION: The retrospective study included 30 patients who were ≥ 6 months post-heart transplant and had 24-hour ambulatory BP data collected during a parent study. Nocturnal BP decline was categorized as: ≥10% decline, dipper; <10% decline, non-dipper. The primary end-organ damage outcomes we plan to analyze are left ventricular hypertrophy (LVH), chronic kidney disease (CKD), and proteinuria. The association between nocturnal BP decline and the primary outcomes will be analyzed using logistic regression. RESULTS/ANTICIPATED RESULTS: The study cohort consists of 83% men and 83% Caucasians (mean age=57±14 years; mean time post-transplant =9.0±6.6 years). Systolic and diastolic non-dippers represent 53.3% and 40% of the cohort, respectively. Data are currently being analyzed for the association between nocturnal BP dipping status and LVH, CKD, and proteinuria. These findings will be presented at the conference. DISCUSSION/SIGNIFICANCE OF IMPACT: An understanding of factors, such as abnormal circadian BP patterns, that contribute to the development of end-organ damage following HTx may provide opportunities to improve BP management and prevent adverse complications in this high-risk population.

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Relationship between smoking and alcohol use status: variations in candidate genes associated with addiction and successful quitting smoking

Magda Shaheen[1], Amira Brown[2], Deyu Pan[2] and Katrina Schrode[2]
[1]David Geffen School of Medicine at UCLA and [2]Charles R Drew University

OBJECTIVES/SPECIFIC AIMS: Previous studies showed that 52% of smokers were unsuccessful in quitting smoking. Smoking in alcoholics is 2-3 times that of the general population with 50%-80% of alcoholics smoking regularly. Studies have linked several genetic variants to addiction. We examined the relation between successful quitting smoking, alcohol use, and genetic data for CYP2A6, CYP2B6, DRD2, DRD1 and GABRB1 alleles. METHODS/STUDY POPULATION: We analyzed data from NHANES III 1988-1994 for socioeconomic factors, physical activity, body mass index (BMI), alcohol status, successful quit smoking, and genetic data for CYP2A6, CYP2B6, DRD2, DRD1 and GABRB1 alleles. Multivariate logistic regression was used to examine the association between successful quit smoking and genotypes adjusting for other variables. Data were analyzed using SAS version 9.3 (design & weight). RESULTS/ANTICIPATED RESULTS: Of the 2,269 smokers, 57% were current smokers, 35% were heavy drinkers, 24% were both smokers & heavy drinkers and 41% successfully quitted smoking. Successfully quit smoking was associated with CYP2A6 (rs28399433-TG) (adjusted odds ratio (AOR) = 3.6, 95% confidence interval (CI) = 1.1-11.9, $p = 0.03$), CYP2B6 (rs2279343-AA and AG) (AOR = 2.3, 95%CI = 1.5-3.5, $p = 0.0003$ for AA & AOR = 2.3, 95%CI = 1.2-4.2, $p = 0.01$ for AG) and DRD1 (rs4532-AA) (AOR = 2.2, 95%CI = 1.01-4.6, $p = 0.04$). Among heavy drinkers, those with CYP2A6 (rs28399433-TG) and CYP2B6 (rs2279343-AA and AG) were more likely to successfully quit smoking and those with CYP2A6 (rs5031017-GG) and GABRB1 (rs1442099-CC) were less likely to successfully quit smoking ($p<0.05$). DISCUSSION/SIGNIFICANCE OF IMPACT: We concluded that while rs28399433-TG, rs2279343-AA & AG positively impacted the success to quit smoking, rs5031017-GG & rs1442099-CC negatively impacted the success in quitting smoking both overall and specifically in heavy drinker smokers.

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