

POSTNATAL BRAIN DYSMORPHOLOGY INDUCED BY PRENATAL ALCOHOL EXPOSURE: A PRECLINICAL MRI STUDY

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Brain dysmorphology is one of the most critical features of Fetal Alcohol Spectrum Disorders (FASD). This study was designed to use high resolution preclinical MRI system to compare the brain structures between alcohol exposed C57BL/6 mice with control. The objective is to examine how alcohol affects a dose- and timing-dependent brain dysmorphology during development comparable to that of human FASD. Three treated groups, ALC (pre- and pregnancy alcohol with 4.2 % (v/v) alcohol liquid), PF (pre alcohol and a calorically matched liquid pregnancy diet), and CHOW (ad lib chow/water), were examined. Mouse heads were imaged using 9.4T preclinical MRI system with 3D gradient echo (GRE) sequence to acquire volumetric images with voxel size as low as 40 microns. Whole brain, olfactory bulbs, cortex, hypothalamus, and cerebellum were segmented and the volumes were calculated. Data was examined by ANOVA followed with paired comparison between treatment groups to test the effect of prenatal alcohol exposure. ALC group had shown consistently smaller mean volumes of difference brain regions than the other two groups. Volume of total brain, olfactory bulbs and cerebellum were observed to be significantly different for ALC compared to PF pups. This indicated that prenatal alcohol exposure caused retarded fetal brain development. Comparing PF with CHOW pups, only cerebellum volume was observed to be significantly different. For cortex volume, no significant difference was shown for any pairwise comparison. These results suggest that alcohol effect contribute to brain dysmorphology, and match with our previous craniofacial dysmorphology study. This could be important to assist in the understanding of clinical variants of human FASD patients in brain dysmorphology.

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