

## **Magnetic resonance spectroscopy outcomes from a comprehensive magnetic resonance study of children with fetal alcohol spectrum disorders.**

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### **ABSTRACT**

Magnetic resonance (MR) technology offers non-invasive methods for in vivo assessment of neuroabnormalities. A comprehensive neuropsychological/behavioral, MR imaging, (MRI), MR spectroscopy (MRS), and functional MRI (fMRI) assessment was administered to children with fetal alcohol spectrum disorders (FASD) to determine if global and/or focal abnormalities could be identified, and distinguish diagnostic subclassifications across the spectrum. The four study groups included: 1. FAS/Partial FAS; 2. Static Encephalopathy/Alcohol Exposed (SE/AE); 3. Neurobehavioral Disorder/Alcohol Exposed (ND/AE) as diagnosed with the FASD 4-Digit Code; and 4. healthy peers with no prenatal alcohol exposure. Results are presented in four separate reports: MRS (reported here), and neuropsychological/behavioral, MRI, and fMRI outcomes (reported separately). MRS was used to compare neurometabolite concentrations (choline, n-acetyl-aspartate, and creatine) in a white matter region and a hippocampal region between the four study groups. Choline concentration in the frontal/parietal white matter region, lateral to the midsection of the corpus callosum, was significantly lower in FAS/PFAS relative to all other study groups. Choline decreased significantly with decreasing frontal white matter volume and corpus callosum length. These outcomes suggest low choline concentrations may reflect white matter deficits among FAS/PFAS. Choline also decreased significantly with increasing severity of the 4-Digit FAS facial phenotype, increasing impairment in psychological performance, and increasing alcohol exposure. NAA and Cre concentrations did not vary significantly. This study provides further evidence of the vulnerability of the cholinergic system in FASD.