Anatomic Neuroimaging of Complex Motor Stereotypies in Children with and without Autism

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Objective:
Complex motor stereotypies (CMS: patterned, purposeless, rhythmical, repetitive, involuntary movements, which stop with distraction) occur in children with autism and in those who are otherwise typically developing. The underlying pathophysiologic mechanism for CMS in either group is poorly understood, with proposed hypotheses ranging from psychological to neurobiological abnormalities. This neuroimaging study compared children with CMS, with and without autism.

Methods:
High-resolution anatomical (MPRAGE) images, acquired at 3.0T, were analyzed in 36 children ages 8-12 years (12 with primary [non-autistic] CMS; 12 high-functioning autism [HFA], and 12 controls—matched on age, sex, handedness, and IQ). Cortical regions were delineated and measured using automated methods in Freesurfer; basal ganglia structures (caudate, putamen, globus pallidus) were manually delineated.

Results:
The HFA group had significantly increased total cerebral volume (TCV), and increased gray matter volume in frontal, temporal, parietal and occipital lobes bilaterally (all p<.05), compared to both CMS and control groups (the latter did not differ from one another). Primary CMS group had significantly reduced gray and white matter volumes (compared to controls) in the right occipital lobe. There were no significant differences in basal ganglia volumes among the three groups.

Conclusions:
Increased cortical and gray matter volumes distinguish children with HFA from those with primary CMS. Findings of altered cortical white matter in primary CMS (compared to controls) supports prior findings (Kates et al., 2005) and lends support to an underlying neurobiological etiology. Further neuroimaging studies in primary CMS are indicated to help define the underlying mechanism in complex stereotypic movements.