Structural and functional neuroimaging in attention-deficit/hyperactivity disorder

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Abstract

Over the last decade, there has been a dramatic increase in the number of neuroimaging studies in attention-deficit/hyperactivity disorder (ADHD). In terms of brain structure, magnetic resonance imaging (MRI), and diffusion tensor imaging studies have evidenced differences in volume, surface-based measures (cortical thickness, surface area, and gyrification), and white matter integrity in different cerebral regions, in children and adults with ADHD compared to population norms. Abnormalities in the basal ganglia, prefrontal structures, and the corpus callosum have been the most consistently reported findings across studies. Hemodynamic (functional MRI, functional near-infrared spectroscopy, positron emission tomography, single-photon emission computed tomography) and magnetoencephalography measurements have also shown differences in neural activity during the execution of neuropsychological tasks and during rest, in widespread regions of the brain. Importantly, multimodal studies combining structural and functional methods have shown an intercorrelation between structural and functional abnormalities in ADHD. Further longitudinal studies are needed to clarify the effects of age and medication on brain structure and function in individuals with ADHD.