Reduced activation and inter-regional functional connectivity of fronto-striatal networks in adults with childhood Attention-Deficit Hyperactivity Disorder (ADHD) and persisting symptoms during tasks of motor inhibition and cognitive switching.

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Source

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Abstract

Attention-Deficit Hyperactivity Disorder (ADHD) in children has been associated with fronto-striatal functional abnormalities during tasks of inhibitory control. In adults with ADHD, however, hardly any functional magnetic resonance imaging (fMRI) studies have investigated the neurofunctional correlates of the most compromised cognitive functions of motor response inhibition and no study has investigated cognitive flexibility. In this study we used fMRI to compare brain function and task-relevant inter-regional functional connectivity between 11 medication-naïve adults with persistent inattentive/hyperactive behaviours, followed up from childhood when they had been diagnosed with ADHD, and 14 age-matched healthy controls during a Stop and a cognitive Switch tasks. Whole-brain regression MR analyses were conducted within patients to correlate symptoms with brain activation. Despite comparable task performance, adults with childhood ADHD showed reduced activation compared to controls in bilateral inferior prefrontal cortex, caudate and thalamus during both tasks, as well as in left parietal lobe during the Switch task. Within patients, the severity of the behavioural symptoms was negatively correlated with more extensive activation of similar regions in fronto-striatal, parietal and cerebellar brain areas. In the Stop task, patients showed reduced inter-regional functional connectivity between right inferior fronto-frontal, fronto-striatal and fronto-parietal neural networks. The findings demonstrate that adults with childhood ADHD and persisting behavioural symptoms show strikingly similar patterns of fronto-striatal and parietal dysfunction to those observed in childhood ADHD during the same tasks of inhibitory control. This suggests that neuro-functional abnormalities in ADHD patients are likely to continue between childhood and early adulthood.