Network Coherence in Autism Spectrum Disorder:
A Multimodal Neuroimaging Study of Functional Connectivity and Spectroscopy MRI

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Abstract

The underlying neuropathology and effects on neuronal activity in individuals with ASD are still being elucidated; as well as their impact on intervention and treatment outcomes. Frontal, temporal, parietal and cerebellar pathways exhibit disrupted structural and functional connectivity in individuals with ASD and we sought to investigate the potential clinical utility of altered network coherence. *Beta*-adrenergic antagonism improved information processing in a subset of individuals with ASD and improved performance was related to pharmacologically-mediated alterations in functional connectivity in the fronto-parietal control network. These findings support the potential utility of *beta*-adrenergic antagonists for some patients with ASD and the clinical significance of alterations in network coherence. There are also additional considerations for functional connectivity investigations in ASD. The cerebellum is interconnected via feedback loops to the neocortex and thus has some modulatory influences on cortical and subcortical neuronal circuits. The cerebellum is consistently implicated in the neuropathology of ASD but has been largely ignored in investigations of functional network coherence. Functional connectivity between the cerebellum and neocortex was anticorrelated in a subset of individuals with ASD. These individuals exhibited reduced glutamate levels in the cerebellum and diminished interpretive linguistic abilities, suggesting a potential mechanism underlying altered cerebrocerebellar connectivity in some individuals with ASD as well a cognitive outcome of alterations in cerebrocerebellar network coherence.