Intrinsic Brain Abnormalities in Attention Deficit Hyperactivity Disorder: A Resting-State Functional MR Imaging Study.

Li F, He N, Li Y, Chen L, Huang X, Lui S, Guo L, Kemp GJ, Gong Q.

Radiology. 2014 Apr 14:131622. [Epub ahead of print]

Abstract
Purpose
To explore alterations of regional and network-level neural function using resting-state functional magnetic resonance (MR) imaging in children and adolescents with attention deficit hyperactivity disorder (ADHD) and to assess the association between these alterations of intrinsic neural activity and executive dysfunction in ADHD.

Materials and Methods
This prospective study was approved by the local ethical committee, and written informed consent was obtained from guardians of all participants. Thirty-three boys with ADHD who were not receiving medication and who were without comorbidity (aged 6-16 years) and 32 healthy control subjects (aged 8-16 years) underwent imaging by using resting-state functional MR imaging. Amplitude of low-frequency fluctuation (ALFF) and seed-based functional connectivity (FC) were calculated to examine regional neural function and functional integration, respectively, and were compared between patients and control subjects by using the voxel-based two-sample t test, while Pearson correlation analyses were performed to identify neural correlates of executive function measured with the Wisconsin Card Sorting Test and the Stroop Color-Word Test.

Results
Relative to healthy control subjects, patients with ADHD showed impaired executive function (P < .05), along with the following: lower ALFF in the left orbitofrontal cortex (P = .004) and the left ventral superior frontal gyrus (P = .003); higher ALFF in the left globus pallidus (P = .004), the right globus pallidus (P = .002), and the right dorsal superior frontal gyrus (P = .025); lower long-range FC in the frontoparietal and frontocerebellar networks; and higher FC in the frontostriatal circuit that correlated across subjects with ADHD with the degree of executive dysfunction (P < .05).

Conclusion
These findings of focal spontaneous hyper- and hypofunction, together with altered brain connectivity in the large-scale resting-state networks, which correlates with executive dysfunction, point to a connectivity-based pathophysiologic process in ADHD. © RSNA, 2014 Online supplemental material is available for this article.