

Tampa Dr. Nelson Mane asks, “Is The Basal Ganglia implicated in ADHD and Autism.”

As a physician who treats ADHD and ASD in children I am frequently asked if there are any structural changes that can be found in the brain from ADHD. Although there are some changes that are seen on an MRI, no hard lesions are usually found. Some variations such as an increase in white matter at different stages and an increase or decrease in size associated with different areas are seen. I found a recent article in the scientific literature which describes physical change in the basal ganglia.

1: Am J Psychiatry. 2008 Nov 18. [Epub ahead of print] Links

Basal Ganglia Volume and Shape in Children With Attention Deficit Hyperactivity Disorder. Qiu A, Crocetti D, Adler M, Mahone EM, Denckla MB, Miller MI, Mostofsky SH.

Objective Volumetric abnormalities of basal ganglia have been associated with attention deficit hyperactivity disorder (ADHD), especially in boys. To specify localization of these abnormalities, large deformation diffeomorphic metric mapping (LDDMM) was used to examine the effects of ADHD, sex, and their interaction on basal ganglia shapes. Method The basal ganglia (caudate, putamen, globus pallidus) were manually delineated on magnetic resonance imaging from 66 typically developing children (35 boys) and 47 children (27 boys) with ADHD. LDDMM mappings from 35 typically developing children were used to generate basal ganglia templates. Shape variations of each structure relative to the template were modeled for each subject as a random field using Laplace-Beltrami basis functions in the template coordinates. Linear regression was used to examine group differences in volumes and shapes of the basal ganglia. Results Boys with ADHD showed significantly smaller basal ganglia volumes compared with typically developing boys, and LDDMM revealed the groups remarkably differed in basal ganglia shapes. Volume compression was seen bilaterally in the caudate head and body and anterior putamen as well as in the left anterior globus pallidus and right ventral putamen. Volume expansion was most pronounced in the posterior putamen. No volume or shape differences were revealed in girls with ADHD. Conclusions The shape compression pattern of basal ganglia in boys with ADHD suggests that ADHD-associated deviations from typical brain development involve multiple frontal-subcortical control loops, including circuits with premotor, oculomotor, and prefrontal cortices. Further investigations employing brain-behavior analyses will help to discern the task-dependent contributions of these circuits to impaired response control that is characteristic of ADHD.

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The basal ganglia as defined by Wikipedia state that the basal ganglia (or basal nuclei) are a group of nuclei in the brain interconnected with the cerebral cortex, thalamus and brainstem. Mammalian basal ganglia are associated with a variety of functions: motor control, cognition, emotions, and learning. In modern use the term

'ganglia' is in this instance considered a misnomer; 'ganglion' refers to concentrations of neural nuclei in the periphery only (for example those of the autonomic nervous system), and the term 'basal nuclei' is preferred.

As a functional neurology practitioner using a sensory motor hemispheric approach to ADHD our model deals with desynchronization and under connectivity of the brain. In this case the various frontal-sub cortical loops from the cortex to the basal ganglia and back. We see once again from the Wikipedia definition that the basal ganglia is not just involved in motor control but also in cognition (thought) and emotions. By activation to these pathways through motor systems is how our model effects cognition and emotion. This of course is only if the practitioner has localized the lesion to the basal ganglia.

Dr. Mane offers one on one consultations as well as Group Seminars for parents and children who suffer from Autism Spectrum Disorders. If you are interested in scheduling a consultation or to attend a seminar please call 813-935-4744.

For more information about Dr. Nelson Mane, D.C. and his treatment approach for ASD go to <http://www.manecenter.com/ADHD.htm>.