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New Cerebrum Story Updates the Latest on ADHD

Few topics stir controversy around a dinner party like attention-deficit/hyperactivity disorder (ADHD). From estimating the number of people who suffer from some variety of symptoms, to how ADHD is diagnosed and treated, to conjecture about the disorder's actual cause, almost every aspect of ADHD is up for debate. In this month's *Cerebrum* story, "[ADHD: Ten Years Later](#)," [Philip Shaw, Ph.D.](#), writes about the progress that has been made in the 10 years since a landmark study showed that the structure of the brains of children with ADHD differs from that of unaffected children. When it comes to ADHD, determining the key hubs in the brain and how they network may be the easy part.



Shaw, an investigator connected to the National Human Genome Research Institute and an adjunct faculty member of the National Institute of Mental Health, is a colleague of [Judith Rapoport, M.D.](#), chief of the National Institute of Mental Health child psychiatry branch and lead author of a landmark study that made a major splash when it first reported a tie between brain structure and ADHD in 2002. That study, which appeared in the *Journal of the American Medical Association*, used magnetic resonance imaging (MRI) to scan and compare the brains of 152 children with ADHD to a group of 139 children with no symptoms over a 10-year period. The ADHD group showed a slight reduction—about three percent—in total brain volume.

“This did not mean the children with ADHD were less intelligent; they were as intelligent as the comparison children in the study,” Shaw writes in *Cerebrum* about the previous study. “Rather, it suggested that severe, impairing problems with attention, impulse, and activity control are associated with differences in brain structure.” ADHD is a developmental disorder involving difficulty with attentional focus, overactivity, and dysregulation of behavioral impulse control, or combinations of these. The disorder is also statistically associated with co-occurring specific learning disorders, mood, anxiety, and personality disorders. For these problems to be diagnosed as ADHD, they must be out of the normal range for a person's age and development.

Since that study, marked advances in acquiring and analyzing brain images have enabled researchers to pinpoint the brain regions most tightly linked with ADHD. These advances allow the identification of structural differences in the hubs of networks that most strongly contribute to control of attention and movement (you can see three of the hubs in the [figure](#) in our article). Interestingly, Shaw points out that ADHD's cause is “as yet unknown, although genetic factors and their interaction with the environment are known to be pivotal.”

Shaw was skeptical when I wrote in my original editor's note that precedes the story, where I point out that the Center for Disease Control estimates that one in four children and 11 percent of school-age children (about 4.7 million) in the U.S. suffer from ADHD. He tends to believe other studies, where the number is closer to 1 in 20. Whatever the number, there is little doubt that ADHD as a neurological phenomenon has an enormous effect on many children at school, at home, with their peers, along with about 4.1 percent of adult men and women ages 18 to 44, impacting career, social, intellectual, marital and familial domains of life.

Daniel Nienaltow, M.D., a practicing psychiatrist in New York City, a former ten-year faculty member of Columbia

University's College of Physicians & Surgeon's Department of Psychiatry, and supervising consultant to the Columbia University Health Services in clinical psychiatry, is among those who believe ADHD is over diagnosed and that drugs are too readily seen as the solution. For one thing, he says, parents who cannot afford psychiatric care often use a general practitioner or a pediatrician, many of whom have limited experience with mental disorders. Too often, he says, drugs are prescribed. For another, he suspects that ADHD is often misdiagnosed and that the real issue may be related to another specific learning disorder, such as nonverbal learning disability, and/or temperamental or developmental disorders, or traumatic conditions that involve mood, anxiety, or personality in ways that secondarily affect attention and impulsivity.

Stories like the one published in this month's Cerebrum are important for a number of reasons, Dr. Nienaltow points out. Research not only legitimizes that ADHD exists as a neurological phenomenon, but also that multiple varieties may need distinct and specialized treatment. By studying such aspects as white matter tracks, neural networks, and brain structure, and by understanding the interaction of environment and genetic disposition related to cognitive and temperamental/socio-emotional vulnerability—i.e., “epigenetics”—along with new knowledge gleaned from the Human Genome Project, he and his colleagues are inspired to improve their own understanding, and, with such new causal comprehension, comes the possibility of new treatments, both psychological and neuro-psycho-pharmacological.

--Bill Glovin

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