

New Clues on Causes of ADHD

Brain Chemical Called Dopamine and a Dopamine Gene May Be Involved, New Studies Show

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Aug. 6, 2007 -- Two new studies show that a brain chemical called dopamine may play a role in attention deficit hyperactivity disorder (ADHD).

The studies, published in the August edition of the *Archives of General Psychiatry*, don't claim to explain exactly what causes ADHD. But the new findings zero in on dopamine's role in the condition.

The first study focuses on the genetics of ADHD -- specifically, on a particular variation of the DRD4 gene, which makes a dopamine receptor in the brain. Dopamine is an important chemical messenger used between nerve cells in the brain. It is linked to many functions including movement and mental health.

The researchers included Philip Shaw, MD, PhD, who works in the child psychiatry branch of the National Institute of Mental Health. Shaw and colleagues studied the DRD4 gene in 105 kids with ADHD and 103 children without ADHD. The children were about 10 years old when the study started. They got their brains scanned using magnetic resonance imaging (MRI); 67 of the kids got follow-up brain scans six years later.

ADHD Gene Clue

The children with ADHD were more likely to have a certain variation of the DRD4 gene than children without ADHD.

But not all kids with ADHD had that particular gene variation. Those who did generally had higher IQ scores than other children with ADHD.

In addition, the gene variation was most common in children whose ADHD improved over time.

"The central finding was that the most important known genetic risk factor for ADHD (the 7-repeat form of the dopamine D4 receptor gene) was associated with having a better clinical outcome and higher intelligence in a large group of children with ADHD," Shaw tells WebMD.

The brain scans may provide a clue about that improvement. Kids with ADHD who had the DRD4 gene variation tended to have a thinner brain cortex in regions related to attention when the study started, but their cortex thickened during the follow-up period.

"The study thus links genes with clinical outcome and brain development," says Shaw. He notes that most of the children took ADHD medications at some point during the study, but that didn't explain the study's findings.

Shaw's team isn't saying that the DRD4 gene is the only gene involved in ADHD. Many genes probably influence ADHD, the researchers note.

Adults With ADHD

The second study included 19 adults with ADHD who had never taken ADHD medications, as well as 24 adults without ADHD. Participants were in their early 30s, on average.

The researchers included Nora Volkow, MD, of the National Institute on Drug Abuse.

Volkow's team studied participants' dopamine activity in a series of tests that included intravenous injections of the active ingredient of the ADHD drug Ritalin. The tests showed that adults with ADHD had a sluggish dopamine system.

"By documenting that subjects with ADHD have decreased brain dopamine activity, it gives us an understanding of why medications such as Ritalin and Adderall, which increase dopamine in the brain, would be beneficial to ADHD subjects by strengthening the weak dopamine signals in their brains," Volkow tells WebMD.

"It also provides evidence that ADHD is a disease that connotes specific disruption of the dopamine system," Volkow notes.

She adds that "since drugs of abuse like nicotine and cocaine also temporarily increase brain dopamine activity, these findings also help us understand why subjects with ADHD are at much greater risk of abusing drugs."

<http://www.forbes.com/forbeslife/health/feeds/hscout/2007/08/06/hscout607086.html>