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## **Brain Differences Found in ADHD Kids**

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HealthDay Reporter

FRIDAY, Dec. 5 (HealthDayNews) -- Children with attention-deficit hyperactivity disorder (ADHD) may harbor unusual levels of certain neurotransmitters in the frontal part of their brains.

Researchers reporting in the December issue of the *Journal of Neuropsychiatry and Clinical Neurosciences* found levels of glutamate were increased in ADHD children while levels of GABA, a neuro-inhibitor, were decreased.

If seeing is believing, then the research does add to the "believability" and "reality" of this disorder, which manifests in behavioral changes. It is considered the most common childhood illness; on average, almost every classroom in the United States will have one child who needs to be treated for this disorder.

"There's such a lot of contention about ADHD and, in my opinion, too many kids are diagnosed because they fidget," says study author Dr. Helen Courvoisie, an assistant professor of child and adolescent psychiatry at the Johns Hopkins Medical Institutions in Baltimore. "What studies like mine will do is show there is a biological basis to those kids who really have ADHD."

Dr. Bradley Peterson, a professor of pediatric neuropsychiatry at Columbia University and New York State Psychiatric Institute in New York City, agrees. "Historically, [seeing is believing] has been very true for other conditions," he says. "Brain imaging studies showed pretty major differences in brain structure that really legitimized schizophrenia as a biological disturbance. I think the same is true for other conditions."

Although the study is small, it is in line with previous work. "It's one more brick in the wall," says Russell Barkley, a professor of psychiatry

at the Medical University of South Carolina in Charleston. "It is consistent with a number of other larger studies that have shown both structural and functional abnormalities in ADHD children."

The frontal lobe is responsible for executive functioning, which regulates impulse control, attention and other thought processes that can be compromised in people with ADHD.

Here, the study authors looked at eight children aged 6 to 12 who had been diagnosed with hyperactive-type ADHD. Of the three types of ADHD (attention-deficit, hyperactive and combined), this one most involves a malfunction of executive function. These children were compared to eight children without ADHD.

All of the ADHD children were taking some kind of stimulant medication, such as Ritalin (news - web sites), but not for the 24 hours preceding the scan.

All 16 children first underwent neuropsychological and IQ testing in one session. Later, they had a type of magnetic resonance imaging (MRI) that measured the levels of six metabolites in the frontal part of the brain.

The results revealed that children in the ADHD group seemed to have decreased levels of GABA, which might explain poor impulse control, and higher levels of glutamate, which is excitatory and can be toxic to nerve cells in high amounts. Both GABA and glutamate are neurotransmitters, or brain chemical messengers.

The levels of the neurotransmitters were measured in relation to each other, Barkley points out. "It's not necessarily overall levels that were interesting," he says. "It really is the relative proportion of chemicals." Future studies will need to be larger and will need to "see what kids look like both on and off medication," Courvoisie says.

Eventually, there may be implications for drug therapies. "Certainly the hope would be that by understanding the biological basis for these conditions, it'll provide clues as to how better to intervene therapeutically," Peterson says. "This particular set of findings suggests that some neurotransmitters may be increased in concentration in the frontal lobe in children of ADHD. We don't have good ways of manipulating those neurotransmitters currently, but we will soon and that may be helpful."