Abnormal control of hand movements may hint at ADHD severity in children

February 14 2011

Measurements of hand movement control may help determine the severity of attention deficit hyperactivity disorder (ADHD) in children, according to joint studies published in the February 15, 2011, print issue of *Neurology,* the medical journal of the American Academy of Neurology. ADHD is a brain disorder characterized by impulsiveness, hyperactivity, such as not being able to sit still, and inattention or difficulty staying focused.

The studies were led by Stewart H. Mostofsky, MD, with the Kennedy Krieger Institute in Baltimore and Donald L. Gilbert, MD, MS, with Cincinnati Children's Hospital Medical Center in Cincinnati.

For the first study, researchers examined mirror overflow movements in 25 boys and girls between the ages of eight and 13 with ADHD and 25 boys and girls without the disorder. Mirror movements are characterized by the inability to move one side of the body without moving the other. All children were right-handed. Using video and a device that recorded finger position, the researchers measured differences in how the children tapped their fingers.

The children with ADHD experienced more mirror movements than the children without ADHD. During left-handed finger tapping, children with ADHD showed more than twice as much mirror overflow than children without ADHD. The differences were particularly prominent for boys with ADHD, who showed nearly four times as much mirror overflow than boys without ADHD on one of the two measures used in

the study.

In the second study, scientists applied transcranial magnetic stimulation (TMS) to the motor control area of the brain in 49 children with ADHD and 49 children without ADHD, all right-handed and ages 8 to 12. TMS technology allows scientists to activate brain cells with magnetic pulses in order to measure brain activity.

The study found that the brain's short-interval cortical inhibition (SICI), which is an important "braking mechanism" in the brain, was reduced by 40 percent in children with ADHD compared to those without the disorder. On motor development tests, those with ADHD scored nearly 60 percent worse compared to those children without ADHD. Importantly, the scientists also found that the amount of reduced inhibition in the motor area of the brain was strongly associated with the severity of ADHD symptoms reported by the parents.

"These studies are an important step toward understanding how ADHD affects communication between the brain and other parts of the body," said Jonathan W. Mink, MD, PhD, with the University of Rochester Medical Center in New York in an accompanying editorial. Mink is also an associate editor of Neurology. "These findings show that mirror movements are likely a marker of abnormal development of motor control that improves with age and is more prominent in boys. They also provide a more specific way to measure ADHD. The hope is that, ultimately, these studies and others will guide us toward development and testing of new therapies."

Provided by American Academy of Neurology

Citation: Abnormal control of hand movements may hint at ADHD severity in children (2011, February 14) retrieved 18 April 2024 from https://medicalxpress.com/news/2011-02-abnormal-

movements-hint-adhd-severity.html

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