

Research shows how ritalin affects brains of kids with ADHD

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Medication activates areas associated with the disorder, scans show.

(HealthDay)—Ritalin activates specific areas of the brain in children with attention-deficit/hyperactivity disorder (ADHD), mimicking the brain activity of children without the condition, a new review says.

"This suggests that Ritalin does bring the brain [of a child with ADHD] back to the brain the typically developing kid has," said study author Constance Moore, associate director of the translational center for comparative [neuroimaging](#) at the University of Massachusetts Medical School.

Analyzing data from earlier studies that looked at how [children's](#) brains were affected by doing certain tasks that are sometimes challenging for kids with ADHD, the researchers found that Ritalin ([methylphenidate](#)) was having a visible impact on three areas of the brain known to be associated with ADHD: the cortex, the cerebellum and the [basal ganglia](#).

The study could be helpful in diagnosing and treating children with ADHD, Moore said. "It may be helpful to know that in certain children, Ritalin is having a [physiological effect](#) in the areas of the brain involved with attention and [impulse control](#)," she said.

The research was published recently in the *Harvard Review of Psychiatry*.

Nine studies analyzed by the researchers used functional MRI to evaluate [brain changes](#) after children had taken a single dose of Ritalin. The children were involved in different types of tasks that tested their ability to focus and inhibit an impulse to act.

For example, to observe the brain's reaction during a test of what is called "[inhibitory control](#)," a child was told that every time he saw a zero show up on a screen, he should push the button on the right; every time he saw an X appear, he should push the left button. The children would then be asked to flip their responses, pushing the left button when they saw a zero.

"That's hard to do," Moore said, "because you've developed the habit [of pushing the other button], so you have to suppress your impulse. If you do 20 zeros and keep pressing and then you see an X, most kids with ADHD will hit the wrong button."

In three out of five of the inhibitory control studies, Ritalin at least partially normalized brain activation in ADHD children.

To note how the brain reacted to a selective attention test, Moore said, children would first be asked, for example, what word they were seeing. The word would be "red," and the color of the type also would be red. Then they would be shown the word "red," but the color of the type would be green. In several studies, Ritalin affected activation in the

frontal lobes during such inhibitory control tasks.

Most of the studies included in the review were performed in the United States or the United Kingdom. The majority of participants were adolescent boys, and all studies compared their results to healthy children of the same approximate age.

Because none of the studies looked at the correlation between ADHD symptoms and whether the child was taking Ritalin, there is no way to link the changes in brain activation with clinical improvement, Moore said. "It's possible that kids who are not responsive to Ritalin may have brain changes too," she said.

ADHD affects between 3 percent and 7 percent of school-aged children in the United States, according to the American Psychiatric Association. Boys are more likely to have ADHD than girls.

One expert was not surprised by the results.

"The review article shows there is a consensus of well-designed imaging studies showing that [Ritalin] has an impact on the frontal cortex of the brain, where we have long believed these patients have issues," said Dr. Andrew Adesman, chief of developmental and behavioral pediatrics at the Steven & Alexandra Cohen Children's Medical Center of New York, in New Hyde Park. Adesman wondered if Ritalin may play a role in helping the brain mature.

"Their data provides partial support for that," he said. "But if anything, the medicine seems to help the [brain](#) look more normal and doesn't seem to do anything bad to it."

More information: Learn more about ADHD from the [U.S. Centers for Disease Control and Prevention](#).

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