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CBC News

Young children taking Ritalin for attention deficit/hyperactivity disorder may experience chemical changes in their brains, say U.S. researchers who expressed concern about long-term prescriptions.

In one of the few studies to probe the effects of Ritalin on the neurochemistry of the developing brain, scientists found changes in areas linked to "higher executive functioning, addiction and appetite, social relationships and stress," the study's senior author Dr. Teresa Milner, a neuroscientist at New York's Weill Cornell Medical College, said in a release.

The findings, published recently in the Journal of Neuroscience, suggest doctors must be careful in their diagnosis of ADHD before prescribing Ritalin. That's because the brain changes noted in the study might be helpful in battling the disorder but harmful to youngsters with healthy brain chemistry, said Dr. Milner.

Ritalin, a stimulant similar to amphetamine and cocaine, remains one of the most prescribed drugs for the behavioural disorder.

In the study, researchers gave week-old male rat pups injections of Ritalin twice a day up until they were 35 days old.

"Relative to human lifespan, this would correspond to very early stages of brain development," Jason Gray, a graduate student in the program of neuroscience and lead author of the study, said in a release.
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"That's earlier than the age at which most children now receive Ritalin, although there are clinical studies underway that are testing the drug in two- and three-year olds."

The researchers examined the rats' brains when they were 35 days old, roughly equivalent to the adolescent period.

"These brain tissue findings revealed Ritalin-associated changes in four main areas," Dr. Milner says. "First, we noticed alterations in brain chemicals such as catecholamines and norepinephrine in the rats' prefrontal cortex Â— a part of the mammalian brain responsible for higher executive thinking and decision-making. There were also significant changes in catecholamine function in the hippocampus, a centre for memory and learning."

Treatment-linked alterations were also noted in the striatum Â— a brain region known to be key to motor function Â— and in the hypothalamus, a centre for appetite, arousal and addictive behaviours.

Dr. Milner was at pains to point out that it's too early to say whether the changes might benefit or harm humans.

"One thing to remember is that these young animals had normal, healthy brains," she said. "In ADHD-affected brains Â— where the neurochemistry is already somewhat awry or the brain might be developing too fast Â— these changes might help 'reset' that balance in a healthy way. On the other hand, in brains without ADHD, Ritalin might have a more negative effect. We just don't know yet."

It took three months for the rats' brain chemistry to revert to their pre-treatment state.

"That's encouraging, and supports the notion that this drug therapy may be best used over a relatively short period of time, to be replaced or supplemented with behavioural therapy," Dr. Milner said.

"We're concerned about longer-term use. It's unclear from this study whether Ritalin might leave more lasting changes, especially if treatment were to continue for years. In that case, it is possible that chronic use of the drug would alter brain

chemistry and behaviour well into adulthood."

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