

Medical News & Perspectives Pay Attention: Ritalin Acts Much Like Cocaine

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THIS AUTHOR NOTES THE FOLLOWING:

"Advanced imaging research has answered a 40-year-old question about methylphenidate (Ritalin), which is taken daily by 4 million to 6 million children in the United States."

Ritalin "acts much like cocaine, albeit cocaine dripped through molasses."

Taken orally in pill form, Ritalin rarely produces a cocaine-like high.

However, if Ritalin is injected as a liquid it sends a jolt that "addicts like very much."

According to Nora Volkow, MD, psychiatrist and imaging expert at Brookhaven National Laboratory, Upton, NY, addicts say that injected liquid Ritalin is like cocaine.

PET (positron emission tomography) images show that after the oral administration of 60 mg of Ritalin, that there is a decreased availability of open dopamine receptors. This indicates that Ritalin increases extracellular dopamine levels.

PET images show that cocaine produces a similar increase in dopamine effect in those who take it.

Volkow and colleagues are acknowledged as leaders in the field of brain imaging of drug effects. They have spent years tracing the effects on the brain of drugs of addiction using PET scans.

These researchers have identified the brain's dopamine system as a major player in compulsive behavior, including drug taking and overeating.

A PRAGMATIC PARADOX

Ritalin is a legal stimulant. Ritalin has been used to treat attention-deficit/hyperactivity disorder (ADHD) for 40 years.

Ritalin is chemically similar to cocaine and other stimulants.

Ritalin decreases activity in people with ADD / ADHA, and increases their ability to concentrate.

However, in about half of people, without ADHD, Ritalin is found unpleasant, like drinking too much coffee.

Volkow notes that as a psychiatrist, she is sometimes embarrassed about the lack of knowledge of how Ritalin works because Ritalin "is, by far, the drug we prescribe most frequently to children."

The dopamine system stimulates the reward and motivation circuits during pleasurable experiences such as eating, having sex, learning, eating chocolate, etc.

A pleasurable experience, like tasting chocolate ice cream, will trigger cells in the basal ganglia to release more dopamine molecules. This dopamine finds receptors in the reward / pleasure centers and translate to "this experience is worth paying attention to."

Too much dopamine signal and the experience feels unpleasant, over-stimulating. Too little dopamine signal, and the experience is not pleasurable, causing only boredom and distraction.

After the pleasure signal is sent on its way, dopamine molecules are recycled back to the neurons that produced them (called transport inhibition).

Research has shown that cocaine blocks about 50% of this recycling of dopamine (transport inhibition), leading to an increase of dopamine in the synapse and another hit of pleasure.

Initially, it was theorized that Ritalin's chemical similarities to cocaine allow it to work in the same way, only less potently.

STARTLING RESULTS

However, primary research on 11 healthy men who took various doses of Ritalin orally, produced shocking results:

"Instead of [Ritalin] being a less potent transport inhibitor than cocaine, methylphenidate was more potent."

[This means that Ritalin worked more potently than cocaine in causing another hit of pleasure].

A typical dose of Ritalin for children of 0.5 mg/kg, blocked 70% of dopamine transporters. Dr. Volkow stated: "The data clearly show that the notion that Ritalin is a weak stimulant is completely incorrect."

The second major surprise from the volunteers who took Ritalin is that they showed high levels of extracellular dopamine, just like people using cocaine.

"But if methylphenidate works like cocaine, why aren't millions of US children getting high and becoming addicted?"

After someone swallows Ritalin, it enters the bloodstream and eventually finds the brain, where it blocks dopamine recycling (transport inhibition).

Cocaine acts the same way, except Ritalin takes about an hour to raise dopamine levels, whereas inhaled or injected cocaine hits the brain in seconds.

"It is the speed at which you increase dopamine that appears to be a key element of the addiction process."

Importantly, the long-term dopamine effects of taking Ritalin for years, as many children do, are "unknown."

One large epidemiological study reports more drug addiction in children with ADHD who took Ritalin compared with children with ADHD who took no drug. (J Learn Disabil. 1998;31:533-544).

Another study did not show this. (Pediatrics. 1999;104:e20).

Dr. Volkow asks:

"Could chronic use of Ritalin make you more vulnerable to decreased dopamine brain activity as cocaine does? It's a key question nobody has answered."

KEY POINTS FROM DAN MURPHY:

- (1) Ritalin is by far the most frequent drug prescribed to children.
- (2) Ritalin and cocaine are chemically very similar.
- (3) Both Ritalin and cocaine effectively increase brain levels of dopamine.
- (4) Increasing levels of brain dopamine classically leads to addiction.
- (5) Through this date, the long-term effects of taking Ritalin are unknown.