Medical Xpress

Researchers see cognitive changes in offspring of heavy cannabis-using rats

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Washington State University researchers have seen cognitive changes in the offspring of rats exposed to heavy amounts of cannabis. Their work is one of the rare studies to look at the effects of cannabis during

pregnancy. The drug is the most commonly used illicit substance among pregnant women.

Ryan McLaughlin, an assistant professor of Integrative Physiology and Neuroscience, exposed pregnant rats to various concentrations of cannabis vapor and documented how the offspring of those exposed to high amounts had trouble adjusting their strategy to get sugar rewards.

"Prenatal exposure to cannabis may cause meaningful changes in brain development that can negatively impact cognitive functioning into adulthood," McLaughlin and his colleagues wrote in a summary for a presentation Sunday at the Society for Neuroscience's annual meeting, Neuroscience 2018, in San Diego.

The researchers used a new model of exposure, vaporizing cannabis extracts to recreate the way humans most often use the drug. Pregnant rats, or dams, received various amounts of vapor. Controls received none, while others got cannabis-free vapor, or vapor with low or high amounts of cannabis. The smoke, administered in atmospherically controlled cages over two hour-long sessions per day from before pregnancy through gestation, raised the THC levels in the blood to that of a person who has had a few puffs.

About 60 offspring were submitted to a task similar to the Wisconsin Card Sorting Test, an 80-year-old method of testing a human's flexibility when the conditions of positive reinforcement change. Rats were first trained to press one of two levers, learning that they got sugar when they pressed the lever near a light. The next day, they got a sugar reward when they pressed the left or right lever, regardless of the light.

Rats exposed to cannabis in utero learned the first rule easily enough. But rats exposed to a high concentration of cannabis, "showed marked deficits in their ability to shift strategies when the new rule was

implemented," the researchers wrote.

Rats from dams exposed to high levels of cannabis often appeared to learn the new reward strategy, hitting the correct lever several times in a row. But they would not keep to the strategy long enough to strike the right lever ten times, like the offspring of dams exposed to less or no cannabis.

"The general take-home message is that we see deficits, particularly in the domain of cognitive flexibility, in rats prenatally exposed to high doses of cannabis vapor," McLaughlin said. "The impairment is not a general learning deficit, as they can learn the initial rule just fine. The deficit only emerges when the learned strategy is no longer resulting in reward delivery. They cannot seem to adapt properly and tend to commit more regressive errors as a result, which suggests impairment in maintaining the new optimal strategy."

McLaughlin notes that the high-exposure rats may not necessarily be less intelligent, just less motivated. They could be less interested in the task, not want so much sugar, or want to explore other avenues.

"They don't have these opinions about how they need to perform because they don't want to be perceived as 'the stupid rat,'" he said. "Clearly that's not what's motivating their behavior. They're just going to try to get as many sugar pellets as they can. But at some point, do sugar pellets continue to motivate your behavior after you've eaten 100? Do you still care as much about them?"

Provided by Washington State University

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