

"Long before it's in the papers"

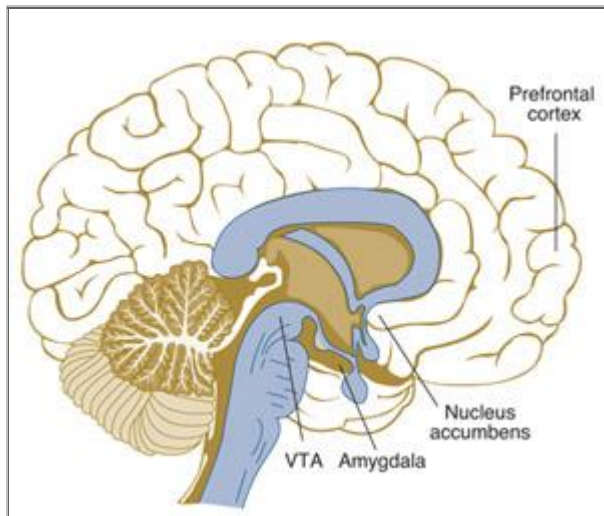
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Even moderate pot use tied to clear brain changes: study

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Courtesy of Northwestern University
and World Science staff

Young adults who used marijuana only recreationally showed clear abnormalities in two key brain regions important for emotion and motivation, scientists report.

It's the first study to tie casual marijuana use to major brain changes, the researchers said: it showed the degree of abnormalities is directly related to smoking frequency. More frequent smoking was linked to more abnormal shape, volume and density, or compactness, of the brain regions.



Young adults who used marijuana only recreationally showed clear abnormalities in two key brain regions important for emotion and motivation, scientists report. These regions are the nucleus accumbens and the amygdala—key regions for emotion and motivation, and associated with addiction. (Image courtesy NIH/NIAAA)

This “raises a strong challenge to the idea that casual marijuana use isn’t associated with bad consequences,” said study co-author Hans Breiter, a psychiatrist and behavioral scientist at Northwestern University and a psychiatrist at Northwestern Memorial Hospital, both in Chicago.

“Some of these people only used marijuana to get high once or twice a week,” he added. “People think a little recreational use shouldn’t cause a problem, if someone is doing OK with work or

school. Our data directly says this is not the case.”

“I’ve developed a severe worry about whether we should be allowing anybody under age 30 to use pot unless they have a terminal illness and need it for pain,” he added.

The study was published April 16 in the *Journal of Neuroscience*.

The scientists examined the nucleus accumbens and the amygdala—key regions for emotion and motivation, and associated with addiction—in the brains of casual marijuana users and non-users. Researchers analyzed three measures: volume, shape and density of grey matter (that is, where most cells are located in brain tissue).

Both regions in recreational pot users were abnormally altered for at least two of these measures, the investigators said. The nucleus accumbens was found to be abnormally large, and its alteration in size, shape and density was found to be directly related to smoking frequency.

“We looked at the nucleus accumbens in three different ways to get a detailed and consistent picture of the problem,” said lead author Jodi Gilman, a researcher in the Massachusetts General Center for Addiction Medicine and an instructor in psychology at Harvard Medical School.

Examining the three measures also was important because no single measure is the gold standard, the researchers added. But “these are core, fundamental structures of the brain,” said co-senior study author Anne Blood, director of the Mood and Motor Control Laboratory at Massachusetts General and a psychiatrist at Harvard Medical School. “They form the basis for how you assess positive and negative features about things in the environment and make decisions about them.”

Through different brain imaging methods, the scientists examined the brains of young adults, ages 18 to 25, from Boston-area colleges; 20 who smoked marijuana and 20 who didn’t. Each group had nine males and 11 females. The users underwent a psychiatric interview to confirm they weren’t dependent on marijuana. They didn’t meet criteria for abuse of other drugs.

“It may be that we’re seeing a type of drug learning in the brain,” Gilman said. “We think when people are in the process of becoming addicted, their brains form these new connections.” In animals, these new connections are thought to indicate that the brain is adapting to the unnatural level of reward and stimulation from marijuana, making other, natural rewards less satisfying.

Drugs of abuse can cause greater release of dopamine, a brain chemical associated with a pleasurable sensation, “than natural rewards like food, sex and social interaction,” Gilman said. “In those you also get a burst of dopamine but not as much as in many drugs of abuse. That is why drugs take on so much salience, and everything else loses its importance.”

Marijuana is the most commonly used illicit drug in the U.S. with an estimated 15.2 million users, the study reports, based on the National Survey on Drug Use and Health in 2008. The drug’s use is increasing among adolescents and young adults, partially due to society’s changing beliefs about cannabis use and its legal status.