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This Is Your Brain on Drugs

BY ABIGAIL SULLIVAN MOORE | OCT. 29, 2014

“If I were to design a substance that is bad for college students, it would be marijuana.”

The gray matter of the nucleus accumbens, the walnut-shaped pleasure center of the brain, was glowing like a flame, showing a notable increase in density. ...

Dr. Gilman was reviewing a composite scan of the brains of 20 pot smokers, ages 18 to 25. What she and fellow researchers at Harvard and Northwestern University found within those scans surprised them. Even in the seven participants who smoked only once or twice a week, there was evidence of structural differences in two significant regions of the brain. The more the subjects smoked, the greater the differences.

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Marijuana samples seized by the federal Drug Enforcement Agency show the concentration of THC, the drug’s psychoactive compound, rising from a mean of 3.75 percent in 1995 to 13 percent in 2013. Potency seesaws depending on the strain and form. Fresh Baked, which sells recreational marijuana in Boulder, Colo., offers “Green Crack,” with a THC content of about 21 percent, and “Phnom Penh,” with about 8 percent. The level in a concentrate called “Bubble Hash” is about 70 percent; cartridges for vaporizers, much like e-cigarettes, range from 15 to 30 percent THC.

High-THC marijuana is associated with paranoia and psychosis, according to a June article in The New England Journal of Medicine. **“We have seen very, very significant increases in emergency room admissions associated with marijuana use that can’t be accounted for solely on basis of changes in prevalence rates,”** said Nora D. Volkow, director of the National Institute on Drug Abuse and a co-author of the THC study. **“It can only be explained by the fact that current marijuana has higher potency associated with much greater risk for adverse effects.”** Emergency room visits related to marijuana have nearly doubled, from 66,000 in 2004 to 129,000 in 2011, according to the Substance Abuse and Mental Health Services Administration.

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Concerns over increasing potency, and rising usage among the young, is giving new urgency to research.

For the Harvard-Northwestern study, published in the April issue of The Journal of Neuroscience, the team scanned the brains of 40 young adults, most from Boston-area colleges. Half were nonusers; half reported smoking for one to six years and showed no signs of dependence. Besides the seven light smokers, nine used three to five days a week and four used, on average, daily. **All smokers showed abnormalities in the shape, density and volume of the nucleus accumbens, which “is at the core of motivation, the core of pleasure and pain, and every decision that you make,”** explained Dr. Hans Breiter, a co-author of the study and professor of psychiatry and behavioral sciences at Northwestern’s medical school.

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Evidence of long-term effects is also building. A study released in 2012 showed that teenagers who were found to be dependent on pot before age 18 and who continued using it into adulthood lost an average of eight I.Q. points by age 38. And last year at Northwestern, Dr. Breiter and colleagues also saw changes in the nucleus accumbens among adults in their early 20s who had smoked daily for three years but had stopped for at least two years.

They had impaired working memories as well. "Working memory is key for learning," Dr. Breiter said. **"If I were to design a substance that is bad for college students, it would be marijuana."** ■

Illinois Can't Afford Pro-Pot Policies



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