

# Study: Recreational pot not as safe as presumed

By Roxanne Khamsi, *Scientific American*

Marijuana is more popular and accessible in the U.S. than any other street drug. In national surveys, 48 percent of Americans say they have tried it, and 6.5 percent of high school seniors admit to daily use.

So it was not too surprising when two states, Washington and Colorado, became the first to legalize recreational marijuana in the November 2012 general election, albeit in limited quantity, for anyone over the age of 21.

Activists expect that similar measures will soon win approval in other parts of the country.

Some success with medical marijuana helped to pave the road to wider legalization of pot. Eighteen states and the District of Columbia permit possession and consumption of the drug for medical purposes.

Doctors in those jurisdictions may prescribe cannabis to treat or manage ailments ranging from glaucoma—an eye disease in which the optic nerve is damaged—to menstrual cramps. Cancer patients sometimes smoke pot to relieve the pain and nausea brought on by chemotherapy, and some people with the inflammatory disease multiple sclerosis rely on marijuana to ease muscle stiffness.

Although many physicians agree that marijuana is safe enough to temporarily alleviate the symptoms of certain medical conditions, the safety of recreational use is poorly understood. Researchers worry that short- and long-term use of the drug may harm the body and mind.

Marijuana's continued popularity among teenagers raises particular concern because the drug might hinder the ongoing maturation of the adolescent brain.

Making matters worse, new growing techniques for the cannabis sativa plant – from which marijuana is prepared – have dramatically increased the drug's potency. Some experts suggest that such high-octane weed is fueling a rise in cannabis addiction.

Finally, although investigators still debate how the legalization of recreational marijuana will change road safety overall, studies indicate that the drug slows reaction time and impairs distance perception behind the wheel. Despite such evidence, most new marijuana regulations, for medical or recreational use, fail to account for these potential risks.

Whether rolled into a joint or mixed into brownie batter, marijuana profoundly changes behavior and awareness. The primary psychoactive compound in marijuana, tetrahydrocannabinol (THC), mimics the structure of molecules called endocannabinoids that the human body produces naturally. Endocannabinoids act on a group of cell-surface molecules called cannabinoid receptors that help to regulate appetite, mood and memory. Because of its shape, THC fits into these receptors, too.

After all, jokes neuroscientist Giovanni Marsicano of the University of Bordeaux in France, "We don't have a receptor in the body just to smoke marijuana."

When THC strikes specific cannabinoid receptors, it triggers domino chains of interacting molecules in neurons that culminate in both unusually elevated and abnormally low levels of various neurotransmitters (the molecules that brain cells use to communicate with one another). The result is the well-known "high" of marijuana. Suddenly, the mundane seems hilarious, and ordinary foods taste delicious. People

generally feel merry, relaxed and introspective, although undesirable effects—such as paranoia and irritability—are common as well.

Marijuana also temporarily impairs an array of mental abilities, especially memory and attention. Dozens of studies have shown, for example, that people under the influence of marijuana perform worse on tests of working memory, which is the ability to temporarily hold and manipulate information in one's mind. Participants in these studies have greater difficulty remembering and reciting short lists of numerals and random words.

Research has further revealed that cannabis blunts concentration, weakens motor coordination and interferes with the ability to quickly scan one's surroundings for obstacles.

Such mild cognitive deficits may not endanger anyone if a marijuana user lazes on the couch, but it is a different story when someone takes that high on the road. In driving-simulation and closed-course studies, people on marijuana are slower to hit the brakes and worse at safely changing lanes. Investigators still debate, however, at what point these impairments translate to more traffic accidents. A 2009 study found an increased risk of accidents for levels of THC higher than 5 nanograms per milliliter of blood, which some evidence indicates is as impairing as a blood alcohol concentration around the legal limit of 0.08 percent. Typically one would have to take several puffs of a joint to reach such a concentration.

Consequently, voters in Washington State have adopted 5 ng/mL as the upper threshold for drivers.

Enforcing that limit presents a technical challenge, however. Unlike alcohol, marijuana cannot be detected with a relatively unobtrusive breathalyzer test. Police officers would have to look for it in blood—something that often requires a warrant.

“There is currently no practical method for law-enforcement officers at the scene to collect blood samples from suspected DUI cannabis drivers in a timely manner,” says Paul Armentano, deputy director of the Washington, D.C.–based National Organization for the Reform of Marijuana Laws, which advocates the legalization of marijuana.

Instead of using a blood test, Armentano says that police should look for poor maneuvering and the smell of pot wafting from the vehicle.

Although marijuana’s immediate effects are relatively easy to monitor in the lab, the drug’s long-term effects on body and mind are harder to determine. So far the results – which admittedly are subject to multiple interpretations – indicate the need for caution. In one recent study, clinical psychologist Madeline Meier of Duke University and her colleagues examined data from 1,037 New Zealanders. They found that people who began using pot earlier in life and used it most frequently over the years experienced an average decline of eight IQ points by the time they turned 38. By comparison, those who never smoked pot had an average increase of one IQ point by the same age.

A reanalysis of the New Zealand data by Ole Røgeberg of the Ragnar Frisch Center for Economic Research in Oslo, however, suggested that the IQ difference could be explained by socioeconomic factors. People who start smoking marijuana at an earlier age are often less intelligent to begin with. Even if this is true, Meier says, her study shows that the IQ drop is greatest for those who started smoking pot as teenagers rather than in adulthood, indicating a worrisome cumulative effect regardless of intelligence. This finding, she thinks, makes it all the more important to discourage the early use of marijuana among teens.

Increasingly potent marijuana of recent years may be driving a sharp rise in cannabis addiction among adolescents, according

to a report released last year by the American Society of Addiction Medicine. Between 1993 and 2008, the average concentration of THC in confiscated marijuana jumped from 3.4 to 8.8 percent. Meanwhile hospital and rehabilitation center admission rates for minors abusing marijuana soared by 188 percent between 1992 and 2006. In contrast, admissions for alcohol abuse for the same group over the same period declined by 64 percent.

In addition to tracking levels of THC itself, some researchers have focused on the dangers of lingering contaminants in marijuana sold on the street. Dealers typically sell cannabis by weight, so some use sand or glass beads to make their products heavier. Breathing in these particles over the years may inflame and eventually scar the lungs.

An analysis published last year of data on more than 5,000 Americans did not find a decline in lung function among individuals who smoked joints two or three times a month over two decades. The authors emphasize, however, that they did not assess the effect of daily use on lung health.

“Somebody should do that study if marijuana is going to become legalized and prescribed” more widely, says Mark Pletcher, an epidemiologist at UC San Francisco, who co-wrote the paper.

Some opponents of legalization worry that lax regulation of medical marijuana foretells even looser laws concerning recreational marijuana. In states that have legalized medical pot, current laws do not guarantee the safety or quality of cannabis products or standardize levels of THC.

In Oakland, people can fill a marijuana prescription at Harborside Health Center, a massive dispensary with a strict quality-control system. Elsewhere in the state, however, people get their medical marijuana at mom-and-pop outfits or on the street.

The next big round of ballot initiatives to legalize cannabis

in states other than Washington and Colorado could happen as soon as three years from now, in the 2016 presidential election. Until then, researchers have plenty of marijuana health risks to weed through.