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DrugFacts

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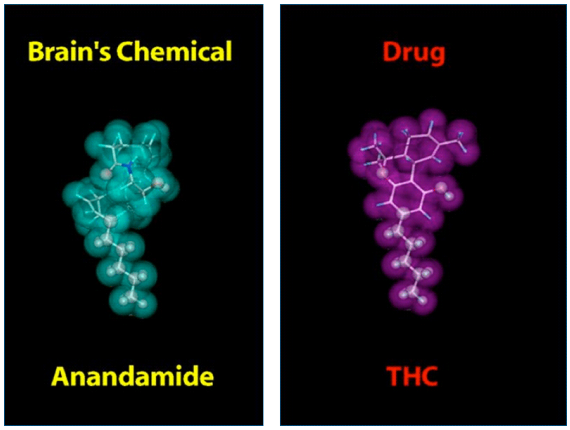
Marijuana

Marijuana is a dry, shredded green and brown mix of leaves, flowers, stems, and seeds from the hemp plant *Cannabis sativa*. In a more concentrated, resinous form, it is called hashish, and as a sticky black liquid, hash oil. The main psychoactive (mind-altering) chemical in marijuana is delta-9-tetrahydrocannabinol, or THC.

Marijuana is the most common illicit drug used in the United States. After a period of decline in the last decade, its use has generally increased among young people since 2007, corresponding to a diminishing perception of the drug's risks. More teenagers are now current (past-month) smokers of marijuana than of cigarettes, according to annual survey data.

How Is Marijuana Used?

Marijuana is usually smoked in hand-rolled cigarettes (joints) or in pipes or water pipes (bongs). It is also smoked in blunts—cigars that have been emptied of tobacco and refilled with a mixture of marijuana and tobacco. Marijuana smoke has a pungent and distinctive, usually sweet-and-sour, odor. Marijuana can also be mixed in food or brewed as a tea.



How Does Marijuana Affect the Brain?

When marijuana is smoked, THC rapidly passes from the lungs into the bloodstream, which carries the chemical to the brain and other organs throughout the body. It is absorbed more slowly when ingested in food or drink.

However it is ingested, THC acts upon specific molecular targets on brain cells, called cannabinoid receptors. These receptors are ordinarily activated by chemicals similar to THC called endocannabinoids, such as anandamide. These are naturally occurring in the body and are part of a neural communication network (the endocannabinoid system) that plays an important role in normal brain development and function.

The highest density of cannabinoid receptors is found in parts of the brain that

influence pleasure, memory, thinking, concentration, sensory and time perception, and coordinated movement. Marijuana overactivates the endocannabinoid system, causing the high and other effects that users experience. These include distorted perceptions, impaired coordination, difficulty with thinking and problem solving, and disrupted learning and memory.

Effects on Life

Research clearly demonstrates that marijuana has the potential to cause problems in daily life or make a person's existing problems worse. In fact, heavy marijuana users generally report lower life satisfaction, poorer mental and physical health, relationship problems, and less academic and career success compared to their peers who came from similar backgrounds. For example, marijuana use is associated with a higher likelihood of dropping out from school. Several studies also associate workers' marijuana smoking with increased absences, tardiness, accidents, workers' compensation claims, and job turnover.

Research has shown that, in chronic users, marijuana's adverse impact on learning and memory persists after the acute effects of the drug wear off; when marijuana use begins in adolescence, the effects may persist for many years. Research from different areas is converging on the fact that regular marijuana use by young people can have long-lasting negative impact on the structure and function of their brains.

A recent study of marijuana users who began using in adolescence revealed a profound deficit in connections between brain areas responsible for learning and memory. And a large prospective study (following individuals across time) showed that people who began smoking marijuana heavily in their teens lost as much as 8 points in IQ between age 13 and age 38; importantly, the lost cognitive abilities were not restored in those who quit smoking marijuana as adults. (Individuals who started smoking marijuana in adulthood did not show significant IQ declines.)

What Are the Other Health Effects of Marijuana?

Marijuana use can have a variety of adverse, short- and long-term effects, especially on cardiopulmonary and mental health.

Marijuana raises heart rate by 20-100 percent shortly after smoking; this effect can last up to 3 hours. In one study, it was estimated that marijuana users have a 4.8-fold increase in the risk of heart attack in the first hour after smoking the drug. This may be due to increased heart rate as well as the effects of marijuana on heart rhythms, causing palpitations and arrhythmias. This risk may be greater in older individuals or in those with cardiac vulnerabilities.

Marijuana and Driving

Because it seriously impairs judgment and motor coordination, marijuana also contributes to accidents while driving. A recent analysis of data from several studies found that marijuana use more than doubles a driver's risk of being in an accident. Further, the combination of marijuana and alcohol is worse than either substance alone with respect to driving impairment.

Marijuana smoke is an irritant to the lungs, and frequent marijuana smokers can have many of the same respiratory problems experienced by tobacco smokers, such as daily cough and phlegm production, more frequent acute chest ill-

ness, and a heightened risk of lung infections. One study found that people who smoke marijuana frequently but do not smoke tobacco have more health problems and miss more days of work than nonsmokers, mainly because of respiratory illnesses.

A number of studies have shown an association between chronic marijuana use and mental illness. High doses of marijuana can produce a temporary psychotic reaction (involving hallucinations and paranoia) in some users, and using marijuana can worsen the course of illness in patients with schizophrenia. A series of large prospective studies also showed a link between marijuana use and later development of psychosis. This relationship was influenced by genetic variables as well as the amount of drug used and the age at which it was first taken—those who start young are at increased risk for later problems.

Associations have also been found between marijuana use and other mental health problems, such as depression, anxiety, suicidal thoughts among adolescents, and personality disturbances, including a lack of motivation to engage in typically rewarding activities. More research is still needed to confirm and better understand these linkages.

Marijuana use during pregnancy is associated with increased risk of neurobehavioral problems in babies. Because THC and other compounds in marijuana mimic the body's own cannabinoid-like chemicals, marijuana use by pregnant mothers may alter the developing endocannabinoid system in the brain of the fetus. Consequences for the child may include problems with attention, memory, and problem solving.

Finally, marijuana use has been linked in a few recent studies to an increased risk of an aggressive type of testicular cancer in young men, although further research is needed to establish whether there is a direct causal connection.

Is Marijuana Addictive?

Is Marijuana Medicine?

Although many have called for the legalization of marijuana to treat conditions including pain and nausea caused by HIV/AIDS, cancer, and other conditions, the scientific evidence to date is not sufficient for the marijuana plant to gain FDA approval, for two main reasons.

First, there have not been enough clinical trials showing that marijuana's benefits outweigh its health risks in patients with the symptoms it is meant to treat. The FDA requires carefully conducted studies in large numbers of patients (hundreds to thousands) to accurately assess the benefits and risks of a potential medication.

Also, to be considered a legitimate medicine, a substance must have well-defined and measureable ingredients that are consistent from one unit (such as a pill or injection) to the next. This consistency allows doctors to determine the dose and frequency. As the marijuana plant contains hundreds of chemical compounds that may have different effects and that vary from plant to plant, its use as a medicine is difficult to evaluate.

However, THC-based drugs to treat pain and nausea are already FDA approved and prescribed, and scientists continue to investigate the medicinal properties of cannabinoids. For more information, see http://www.drugabuse.gov/publications/drugfacts/marijuana-medicine

Contrary to common belief, marijuana is addictive. Estimates from research suggest that about 9 percent of users become addicted to marijuana; this number increases among those who start young (to about 17 percent, or 1 in 6) and among daily users (to 25-50 percent). Thus, many of the nearly 7 percent of high-school seniors who (according to annual survey data) report smoking marijuana daily or almost daily are well on their way to addiction, if not already addicted (besides functioning at a suboptimal level all of the time).

Long-term marijuana users trying to quit report withdrawal symptoms including irritability, sleeplessness, decreased appetite, anxiety, and drug craving, all of which can make it difficult to remain abstinent. Behavioral interventions, including cognitive-behavioral therapy and motivational incentives (i.e., providing vouchers for goods or services to patients who remain abstinent) have proven to be effective in treating marijuana addiction. Although no medications are currently available, recent discoveries about the workings of the endocannabinoid system offer promise for the development of medications to ease withdrawal, block the intoxicating effects of marijuana, and prevent relapse.

Rising Potency

The amount of THC in marijuana samples confiscated by police has been increasing steadily over the past few decades. In 2009, THC concentrations in marijuana averaged close to 10 percent, compared to around 4 percent in the 1980s. For a new user, this may mean exposure to higher concentrations of THC, with a greater chance of an adverse or unpredictable reaction. Increases in potency may account for the rise in emergency department visits involving marijuana use. For experienced users, it may mean a greater risk for addiction if they are exposing themselves to high doses on a regular basis. However, the full range of consequences associated with marijuana's higher potency is not well understood, nor is it known whether experienced marijuana users adjust for the increase in potency by using less.

Learn More

For additional information on marijuana and marijuana abuse, please see http://www.drugabuse.gov/publications/research-reports/marijuana-abuse