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Marijuana

Marijuana is the most commonly abused illicit drug in the United States. It is a dry, shredded green and brown mix of flowers, stems, seeds, and leaves derived from the hemp plant *Cannabis sativa*. The main active chemical in marijuana is delta-9-tetrahydrocannabinol; THC for short.

How is Marijuana Abused?

Marijuana is usually smoked as a cigarette (joint) or in a pipe. It is also smoked in blunts, which are cigars that have been emptied of tobacco and refilled with marijuana. Since the blunt retains the tobacco leaf used to wrap the cigar, this mode of delivery combines marijuana's active ingredients with nicotine and other harmful chemicals. Marijuana can also be mixed in food or brewed as a tea. As a more concentrated, resinous form it is called hashish, and as a sticky black liquid, hash oil.† Marijuana smoke has a pungent and distinctive, usually sweet-and-sour odor.

How Does Marijuana Affect the Brain?

Scientists have learned a great deal about how THC acts in the brain to produce its many effects. When someone smokes marijuana, THC rapidly passes from the lungs into the bloodstream, which carries the chemical to the brain and other organs throughout the body.

THC acts upon specific sites in the brain, called cannabinoid receptors, kicking off a series of cellular reactions that ultimately lead to the "high" that users experience when they smoke marijuana. Some brain areas have many cannabinoid receptors; others have few or none. The highest density of cannabinoid receptors are found in parts of the brain that influence pleasure, memory, thoughts, concentration, sensory and time perception, and coordinated movement.[1]

Not surprisingly, marijuana intoxication can cause distorted perceptions, impaired coordination, difficulty in thinking and problem solving, and problems with learning and memory. Research has shown that marijuana's adverse impact on learning and memory can last for days or weeks after the acute effects of the drug wear off.[2] As a result, someone who smokes marijuana every day may be functioning at a suboptimal intellectual level all of the time.

Research on the long-term effects of marijuana abuse indicates some changes in the brain similar to those seen after long-term abuse of other major drugs. For example, cannabinoid withdrawal in

chronically exposed animals leads to an increase in the activation of the stress-response system[3] and changes in the activity of nerve cells containing dopamine.[4] Dopamine neurons are involved in the regulation of motivation and reward, and are directly or indirectly affected by all drugs of abuse.

Addictive Potential

Long-term marijuana abuse can lead to addiction; that is, compulsive drug seeking and abuse despite its known harmful effects upon social functioning in the context of family, school, work, and recreational activities. Long-term marijuana abusers trying to quit report irritability, sleeplessness, decreased appetite, anxiety, and drug craving, all of which make it difficult to quit. These withdrawal symptoms begin within about 1 day following abstinence, peak at 2–3 days, and subside within 1 or 2 weeks following drug cessation.[5]

Marijuana and Mental Health

A number of studies have shown an association between chronic marijuana use and increased rates of anxiety, depression, suicidal ideation, and schizophrenia. Some of these studies have shown age at first use to be a factor, where early use is a marker of vulnerability to later problems. However, at this time, it not clear whether marijuana use causes mental problems, exacerbates them, or is used in attempt to self-medicate symptoms already in existence.

Chronic marijuana use, especially in a very young person, may also be a marker of risk for mental illnesses, including addiction, stemming from genetic or environmental vulnerabilities, such as early exposure to stress or violence. At the present time, the strongest evidence links marijuana use and schizophrenia and/or related disorders.[6] High doses of marijuana can produce an acute psychotic reaction, and research suggests that in vulnerable individuals, marijuana use may be a factor that increases risk for the disease.

What Other Adverse Effect Does Marijuana Have on Health?

Effects on the Heart

One study found that an abuser's risk of heart attack more than quadruples in the first hour after smoking marijuana.[7] The researchers suggest that such an outcome might occur from marijuana's effects on blood pressure and heart rate (it increases both) and reduced oxygen-carrying capacity of blood.

Effects on the Lungs

Numerous studies have shown marijuana smoke to contain carcinogens and to be an irritant to the lungs. In fact, marijuana smoke contains 50 to 70 percent more carcinogenic hydrocarbons than tobacco smoke. Marijuana users usually inhale more deeply and hold their breath longer than tobacco smokers do,

which further increases the lungs' exposure to carcinogenic smoke. Marijuana smokers show dysregulated growth of epithelial cells in their lung tissue, which could lead to cancer;[8] however, a recent case-controlled study found no positive associations between marijuana use and lung, upper respiratory, or upper digestive tract cancers.[9] Thus, the link between marijuana smoking and these cancers remains unsubstantiated at this time.

Nonetheless, marijuana smokers can have many of the same respiratory problems as tobacco smokers, such as daily cough and phlegm production, more frequent acute chest illness, a heightened risk of lung infections, and a greater tendency toward obstructed airways. A study of 450 individuals found that people who smoke marijuana frequently but do not smoke tobacco have more health problems and miss more days of work than nonsmokers.[10] Many of the extra sick days among the marijuana smokers in the study were for respiratory illnesses.

Effects on Daily Life

Research clearly demonstrates that marijuana has the potential to cause problems in daily life or make a person's existing problems worse. In one study, heavy marijuana abusers reported that the drug impaired several important measures of life achievement including physical and mental health, cognitive abilities, social life, and career status.[11]

Several studies associate workers' marijuana smoking with increased absences, tardiness, accidents, workers' compensation claims, and job turnover.

What Treatment Options Exist?

Behavioral interventions, including cognitive behavioral therapy and motivational incentives (i.e., providing vouchers for goods or services to patients who remain abstinent) have shown efficacy in treating marijuana dependence. Although no medications are currently available, recent discoveries about the workings of the cannabinoid system offer promise for the development of medications to ease withdrawal, block the intoxicating effects of marijuana, and prevent relapse.

The latest treatment data indicate that in 2006 marijuana was the most common illicit drug of abuse and was responsible for about 16 percent (289,988) of all admissions to treatment facilities in the United States. Marijuana admissions were primarily male (73.8 percent), White (51.5 percent), and young (36.1 percent were in the 15–19 age range). Those in treatment for primary marijuana abuse had begun use at an early age: 56.2 percent had abused it by age 14 and 92.5 percent had abused it by age 18.[††]

How Widespread is Marijuana Abuse?

According to the National Survey on Drug Use and Health, in 2006, 14.8 million Americans age 12 or older used marijuana at least once in the month prior to being surveyed, which is similar to the 2005 rate. About 6,000 people a day in 2006 used marijuana for the first time—2.2 million Americans. Of these, 63.3 percent were under age 18.[†††]

Monitoring the Future Survey

According to the 2007 Monitoring the Future survey—a national survey of 8th, 10th, and 12th graders, marijuana use has been declining since the late 1990s. Between 2000 and 2007, past-year use decreased more than 20 percent in all three grades combined. Nevertheless, marijuana use remains at unacceptably high levels, with more than 40 percent of high school seniors reporting use at least once in their lifetimes.[††††]

Percentage of 8th Graders Who Have Used Marijuana

	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Lifetime	22.6	22.2	22.0	20.3	20.4	19.2	17.5	16.3	16.5	15.7	14.2
Past year	17.7	16.9	16.5	15.6	15.4	14.6	12.8	11.8	12.2	11.7	10.3
Past month	10.2	9.7	9.7	9.1	9.2	8.3	7.5	6.4	6.6	6.5	5.7
Daily	1.1	1.1	1.4	1.3	1.3	1.2	1.0	0.8	1.0	1.0	0.8

Percentage of 10th Graders Who Have Used Marijuana

	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Lifetime	42.3	39.6	40.9	40.3	40.1	38.7	36.4	35.1	34.1	31.8	31.0
Past year	34.8	31.1	32.1	32.2	32.7	30.3	28.2	27.5	26.6	25.2	24.6
Past month	20.5	18.7	19.4	19.7	19.8	17.8	17.0	15.9	15.2	14.2	14.2
Daily	3.7	3.6	3.8	3.8	4.5	3.9	3.6	3.2	3.1	2.8	2.8

Percentage of 12th Graders Who Have Used Marijuana

	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Lifetime	49.6	49.1	49.7	48.8	49.0	47.8	46.1	45.7	44.8	42.3	41.8
Past year	38.5	37.5	37.8	36.5	37.0	36.2	34.9	34.3	33.6	31.5	31.7
Past month	23.7	22.8	23.1	21.6	22.4	21.5	21.2	19.9	19.8	18.3	18.8
Daily	5.8	5.6	6.0	6.0	5.8	6.0	6.0	5.6	5.0	5.0	5.1

"Lifetime" refers to use at least once during a respondent's lifetime. "Past year" refers to use at least once during the year preceding an individual's response to the survey. "Past month" refers to use at least once during the 30 days preceding an individual's response to the survey.

Data Sources

† For street terms searchable by drug name, street term, cost and quantities, drug trade, and drug use, visit: http://www.whitehousedrugpolicy.gov/streetterms/default.asp.

†† These data are from the *Treatment Episode Data Set (TEDS) Highlights – 2006: National Admissions to Substance Abuse Treatment Services* (Office of Applied Studies, DASIS Series: S-40, DHHS Publication No. SMA 08-4313, Rockville, MD, 2008), funded by the Substance Abuse and Mental Health Services Administration. The latest data are available at 800-729-6686 or online at www.samhsa.gov.

††† *Results from the 2006 National Survey on Drug Use and Health: National Findings* (Office of Applied Studies, NSDUH Series H–32, DHHS Publication No. SMA 07-4293 Rockville, MD, 2007). NSDUH is an annual survey conducted by the Substance Abuse and Mental Health Services Administration. Copies of the latest survey are available from the National Clearinghouse for Alcohol and Drug Information at 800-729-6686.

†††† These data are from the 2007 Monitoring the Future survey, funded by the National Institute on Drug Abuse, National Institutes of Health, DHHS, and conducted annually by the University of Michigan's Institute for Social Research. The survey has tracked 12th graders' illicit drug use and related attitudes since 1975; in 1991, 8th and 10th graders were added to the study. The latest data are online at www.drugabuse.gov.

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