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Marijuana: Effects, Medical Uses and Legalization

Botanical name: *Cannabis sativa*
Other common names: weed, pot, herb, bud, dope, spliff, reefer, grass, ganja, 420, chronic, Mary Jane, gangster, boom, skunk. There are over 200 street names for marijuana.

What is Marijuana?

Marijuana (cannabis) is a green, brown or gray mixture of dried, shredded leaves, stems, seeds and flowers of the hemp plant *Cannabis sativa*. Marijuana is used as a psychoactive (i.e. mind altering) recreational drug, for certain medical ailments and for religious and spiritual purposes. Sinsemilla, hash/hashish (resinous form) and hash oil (sticky black liquid) are stronger forms of marijuana.

According to the National Institute on Drug Abuse (NIDA), marijuana is the most abused drug in the US. Many states in the US have now legalized marijuana for medical or recreational use. However, according to federal law, the possession of marijuana (cannabis) is still illegal in the US, except within approved research settings.

How Does Marijuana Work?

The main active chemical in marijuana is THC (delta-9-tetrahydrocannabinol), the psychoactive ingredient. The highest concentrations of THC are found in the dried flowers, or buds. When marijuana smoke is inhaled, THC rapidly passes from the lungs into the bloodstream and is carried to the brain and other organs throughout the body. THC from the marijuana acts on specific receptors in the brain, called cannabinoid receptors, starting off a chain of cellular reactions that finally lead to the euphoria, or "high" that users experience. Feeling of a relaxed state, euphoria, and an enhanced sensory perception may occur. With higher THC levels in those who are not used to the effects, some people may feel anxious, paranoid, or have a panic attack.

Certain areas in the brain, such as the hippocampus, the cerebellum, the basal ganglia and the cerebral cortex, have a higher concentration of cannabinoid receptors. These areas influence memory, concentration, pleasure, coordination, sensory and time perception.[1]

Marijuana's strength is correlated to the amount of THC it contains and the effects on the user depend on the strength or potency of the THC. Different strains will contain different levels of THC. In general, the THC content in marijuana has been increasing since the 1970s, when it contained roughly 10% THC. In 2015, as reported by Live Science, researchers from the American Chemical Society found levels of THC at roughly 30%.

There are many other chemicals found in marijuana, many of which may adversely affect health. Marijuana contains over 60 different cannabinoid compounds, and overall 400 different compounds have been identified in marijuana, including THC, cannabidiol (CBD), cannabinol, and β-caryophyllene, as noted by the National Institute of Drug Abuse (NIDA).

How is Marijuana Used?

Marijuana may be smoked as a cigarette (called a joint or a nail) or in a pipe or bong. It may be smoked in "blunts", which are cigars that have been emptied of tobacco and refilled with marijuana, often in combination with another drug, such as crack. The “blunts” retain tobacco leaf used to wrap the cigar and therefore it combines marijuana's active ingredients with nicotine and other harmful chemicals.

Some users also mix marijuana into food or use it to brew tea. In states that have now legalized sale of marijuana for recreational use, the marketing of edible products, such as cookies, brownies, and chocolates, are popular for those who prefer not to smoke the product.

Vaporizers are also popular for those who prefer not to inhale smoke. The devices concentrate the THC from the marijuana into a storage unit and the person then inhales the vapor, not the smoke. Some vaporizers use a liquid marijuana extract that can be extremely high in THC content, and can be **dangerous to novice users**, resulting in emergency room admissions.

Approved and Investigational Products

In the United States, the **Controlled Substances Act** (CSA) of 1990 classifies marijuana as a Schedule I substance, which states it has no approved medical use and a high potential for abuse. This Federal definition is highly controversial, and can limit marijuana's availability for clinical research studies. However, many US states have legalized the use of marijuana for medical and/or recreational use. Prescription medicines containing synthetic cannabinoids (THC) are also available. Dronabinol, a pharmaceutical form of THC, and nabilone, a synthetic cannabinoid, are approved by the FDA to treat certain conditions.

- **Marinol**, generics (dronabinol capsules) - Classified as Schedule III
- **Syndros** (dronabinol liquid) - Classified as Schedule II
- **Cesamet** (nabilone capsules) - Classified as Schedule II

Syndros is a liquid form of dronabinol. Both dronabinol and nabilone are approved to treat patients receiving anti-cancer medicine (chemotherapy) who have nausea and vomiting, particularly patients who do not respond to other treatments.

Dronabinol (Marinol and Syndros) is also approved to treat anorexia (loss of appetite) associated with weight loss in patients with AIDS (Acquired Immune Deficiency Syndrome).

- **Sativex** (nabiximols)

Sativex (nabiximols) is not currently approved for use in the US, but is available in 30 countries outside the US, including Canada, the UK, Spain, Germany, Denmark, the Czech Republic, Sweden, and New Zealand. Sativex, an oral sublingual spray, is approved for use in multiple sclerosis (MS) spasticity. In Israel, Sativex is approved for the indications of MS spasticity and for chronic cancer pain. Sativex is composed of standardized extracts of THC and cannabidiol and is available as an oral mucosal spray formulation. Studies from Lakhan, et al report that THC and cannabidiol (CBD) provide therapeutic benefit for Multiple Sclerosis (MS) spasticity (muscle stiffness/spasm) symptoms.

GW Pharmaceuticals and Otsuka Pharmaceuticals announced results of three US Phase 3 trials in 2015 for the use of Sativex for the treatment of pain in patients with advanced cancer who

experience inadequate analgesia during optimized chronic opioid therapy. According to the study results, Sativex did not meet the primary endpoint of demonstrating a statistically significant difference from placebo for pain control.

Epidiolex (cannabidiol or CBD), also from GW Pharmaceuticals, is a cannabinoid product the FDA approved in June 2018 for the treatment of patients two years and older with **seizures** associated with Lennox-Gastaut syndrome (LGS) and Dravet syndrome. Epidiolex comes as an oral solution.

These forms of epilepsy -- Lennox-Gastaut syndrome and Dravet syndrome -- are severe, rare, and begin in childhood. Epidiolex is the first FDA-approved drug that contains a purified drug substance derived from cannabis -- CBD -- and the first treatment for Dravet syndrome.

In **pivotal Phase III studies** with 516 patients with either seizure type, Epidiolex, as an adjunct with other seizure drugs, was shown to be effective in reducing the frequency of seizures when compared with placebo.

Common side effects with Epidiolex included sleepiness, diarrhea, sedation and lethargy, signs of possible liver damage, and decreased appetite, among others. It was rescheduled from a Schedule I controlled substance to a Schedule V controlled substance in September 2018 by the DEA. However, in April 2020, the DEA fully removed the controlled drug status of Epidiolex in the US.

Extent of Marijuana Use

Marijuana is reported as the most widely used illicit drug in the US, according to the 2016 *National Survey on Drug Use and Health*. In the past survey year (2016), 37.6 million people, or 13.9% of US adults reported using marijuana. In the same survey, past year marijuana use among adolescents aged 12 to 16 years dropped from 12.9% to 11.7% in males, but remained steady at 12.3% females. Overall, marijuana use was highest amongst the age group 18 to 25 years of age at 33%.

In the 2016 *Monitoring the Future Survey*, 22.5%, 14% and 5.4% of 12th, 10th, and 8th graders, respectively, reported marijuana use in the past year. Interestingly, 68.9% of high school seniors do not view regular marijuana smoking as harmful, but 68.5% say they disapprove of regular marijuana smoking.

Marijuana Side Effects

Side effects of marijuana use will be variable from person to person, depending upon strength and amount of marijuana used and if the user is occasionally or chronically exposed to THC. Side effects can be magnified in older people.

The short-term effects of marijuana or cannabinoid use include:

- increased heart rate
- low blood pressure, orthostatic hypotension
- muscle relaxation
- slowed digestion
- dizziness
- distorted perception (sights, sounds, time, touch)

- difficulty in thinking, memory, and problem solving
- loss of coordination and motor skills
- agitation, anxiety, confusion, panic, paranoia
- increased appetite
- dry mouth, dry eyes

Reaction time may be impaired while driving. NIDA research shows that drivers have slower reaction times, impaired judgment, and problems responding to signals and sounds if driving while under the influence of THC.

Panic attacks, paranoia and psychosis may occur acutely and be more common in psychiatric patients, a reported by Heller. For chronic users, the impact on memory and learning can last for days or weeks after its acute effects wear off, as noted by the NIDA. Marijuana, if purchased on the street, may be cut (or substituted) with substances that can lead to unknown, dangerous side effects.

THC in marijuana is strongly absorbed by fatty tissues in various organs. Generally, traces of THC can be detected by standard urine testing methods several days or more after a smoking session. In heavy chronic users, traces can sometimes be detected for weeks after they have stopped using marijuana.

Long-term abuse of marijuana may lead to dependence in some people. McKenna, et al have reported on the addicting potential of marijuana, noting that "it is an erroneous belief widely held by the general public, and among many physicians, that marijuana is not addicting." However, not all people will become addicted to marijuana and the effects can be psychological in some patients. Withdrawal symptoms can occur upon abrupt cessation of the drug, including:

- anxiety
- agitation
- tremulousness
- elevation of vital signs
- insomnia
- irritability

Marijuana also may affect mental health. Studies show that use may increase the risk of developing psychosis (a severe mental disorder in which there is a loss of contact with reality) including false ideas about what is happening (delusions) and seeing or hearing things that aren’t there (hallucinations), particularly if you carry a genetic vulnerability to the disease. Also, rates of marijuana use are often higher in people with symptoms of depression or anxiety, as reported by the NIDA. There have been no reports of THC overdose leading to death.

Marijuana Effects on the Heart

Shortly after smoking marijuana the heart rate increases drastically and may remain elevated for up to 3 hours. This effect may be enhanced if other drugs are taken with marijuana. One study from

Mittleman, et al has suggested that the risk of heart attack may increase by up to 4.8-fold in the first hour after smoking marijuana. The effect may be due to the increased heart rate, as well as altered heart rhythms. The risk of heart attack may be greater in those with specific risk factors such as patients with high blood pressure, heart arrhythmia, or other cardiac disease.

Harvard Health also reports that the risk of a heart attack is several times higher in the hour after smoking marijuana than it would be normally, and this should be a red flag for anyone with a history of heart disease. The risk of stroke may be increased, as well.

Marijuana Effects on the Lungs

After smoking marijuana, the bronchial passage relaxes and becomes enlarged. Marijuana smoke contains many of the same cancer-causing chemicals found in cigarette smoke, often in greater quantities, as reported by Mehmedic and colleagues. Both types of smoke contain cancer-causing nitrosamines, polycyclic aromatic hydrocarbons, vinyl chlorides, and phenol per research reported by Martinasek. Studies have shown that marijuana smoke contains 50 to 70 percent more carcinogenic hydrocarbons than tobacco smoke, and is an irritant to the lungs. Marijuana users tend to inhale more deeply and hold their breath longer than tobacco smokers do, which further increases lung exposure to carcinogenic smoke.

People who smoke marijuana often have the same respiratory problems as cigarette smokers. These individuals may have daily cough and phlegm, symptoms of chronic bronchitis, shortness of breath, chest tightness, wheezing and more frequent chest colds. They are also at greater risk of getting lung infections like pneumonia, as reported by the NIDA.

A 2016 systematic review of the respiratory effects of inhalational marijuana from Martinasek, et al indicates that there is a risk of lung cancer from inhalational marijuana as well as an association between inhalational marijuana and spontaneous pneumothorax, emphysema, or COPD. In the review, eight of the 12 studies indicated an increased risk of lung cancer from cannabis use or cases indicating lung cancer occurrence.

Drug Interactions With Marijuana

- Combining marijuana with other CNS depressant drugs that also cause drowsiness or sedation (such as alcohol, barbiturates, sedating antihistamines, anti-anxiety medications, opiate pain killers, etc) can magnify the drowsiness. DO NOT drive if you are under the influence of marijuana, alcohol or any sedating drug.
- A study from Hartman, et al shows that low doses of alcohol can significantly elevate the concentrations of THC in the blood.
- Marijuana use can raise the heart rate (tachycardia) and may be dangerous if used with other drugs that may also increase the heart rate. People with cardiovascular disease should avoid marijuana use.
- The cannabinoids in marijuana (THC, cannabidiol) can affect liver enzymes and may alter the blood levels and effects of medications.
- Drug interactions are often unpredictable or undocumented with marijuana and extreme caution should be exercised.

Effects During Pregnancy and Breastfeeding

Marijuana is also the most common illicit drug used during pregnancy, in roughly 2% to 5% of women. According to a 2017 updated report published by the American College of Obstetricians and Gynecologists (ACOG) entitled *Marijuana Use During Pregnancy and Lactation*, 34% to 60% of marijuana users continue use during pregnancy, with many women believing that use is relatively safe. These numbers could rise as more states continue to legalize marijuana for medicinal or recreational purposes. Due to possible adverse effects of marijuana on the fetus, ACOG recommends that marijuana should be avoided during pregnancy.

Any drug of abuse can affect a mother's health. It can be difficult to determine the effects of marijuana on a baby's health because women who use marijuana often use other substances, such as alcohol, nicotine, or drugs of abuse. THC appears to cross the placenta, according to Davies et al.

Human fetuses exhibit the cannabinoid receptor type 1 in the nervous system as early as 14 weeks of gestation, and animal studies suggest cannabinoid exposure may lead to abnormal brain development. As reported by de Moraes Barro and colleagues, babies born to adolescents who used marijuana during pregnancy have shown adverse neurological behavior effects of the newborns in the first 24 to 78 hours after delivery.

Most reports do not show an association between marijuana use and preterm birth. However, as noted by ACOG, studies have suggested the use of marijuana with tobacco may increase the risk for preterm delivery. In addition, research demonstrates that babies born to mothers who used marijuana during pregnancy at least once per week (or more) were smaller than those born to mothers who used the drug less frequently.

Studies on school performance have shown differing results: in middle class children age 5 to 12 years, no specific cognitive effects were seen; however, in lower socioeconomic, primarily urban groups, poorer reading and spelling scores and lower teacher-perceived school performance was observed, per ACOG.

THC is excreted in breast milk, according to Davies, et al. ACOG recommends that marijuana use be discontinued during breastfeeding. The scientific data are not strong enough to determine the risk to the nursing infant.

Addictive Potential of Marijuana

A drug is addicting if it causes compulsive, uncontrollable drug craving, seeking, and use, even in the face of negative health and social consequences.

Research suggests that roughly 9 percent of users become addicted to marijuana, with higher rates if the user starts at a young age (17 percent) and in those who use marijuana daily (25-50 percent). While not everyone who uses marijuana becomes addicted, when a user begins to seek out and take the drug compulsively, that person is said to be dependent or addicted to the drug. Some heavy users develop a tolerance to marijuana; meaning that the user needs larger amounts to get the same desired results that he or she used to get from smaller amounts, as noted by the NIDA.

Long-term users who try to quit could experience withdrawal symptoms such as sleeplessness, irritability, anxiety, decreased appetite and drug craving. Withdrawal symptoms usually begin about

a day after the person stops using marijuana, peaks in 2 to 3 days and may take about 1 to 2 weeks to subside. McKenna reports that marijuana addiction is difficult to treat in the clinic. Patients can have a lengthy withdrawal and symptoms that can continue for months after stopping marijuana use.

Medical Marijuana

Marijuana has been used as a therapeutic and medicinal agent for centuries, dating back to the 27th century BC. Today, it is still used for medicinal purposes, although restrictive laws surrounding its use now exist. Medical marijuana is available in many different forms from dispensaries: as an oil, pill, vaporized liquid, nasal spray, and as the dried plant product.

As of 2019, 33 US states, the District of Columbia, Puerto Rico and Guam now legally allow marijuana for personal medical use. Rules surrounding the use of medical marijuana vary by state.

The first state in the union to legalize the medical use of marijuana was California in 1996 with Proposition 215. States that allow medical marijuana include: Alaska, Arizona, Arkansas, California, Colorado, Connecticut, Delaware, Florida, Hawaii, Illinois, Louisiana, Maine, Maryland, Massachusetts, Michigan, Minnesota, Missouri, Montana, Nevada, New Hampshire, New Jersey, New Mexico, North Dakota, New York, Ohio, Oklahoma, Oregon, Pennsylvania, Rhode Island, Utah, Vermont, Washington, and West Virginia, plus the District of Columbia, Puerto Rico and Guam.

Legal Status of Marijuana

It is important to recognize that these state medical and recreational marijuana laws do not change the fact that using marijuana continues to be an offense under Federal law.

Medical marijuana in the US is controlled at the state level. Per federal law, cannabis, a schedule I drug, is illegal as noted in the Controlled Substances Act, but the federal government, under the previous Obama administration, had stated they would not actively prosecute patients and caregivers complying with state medical marijuana laws. However, use of medical marijuana outside of the state laws for illegal use or trafficking would not be tolerated by state or federal government.

Political leaders, US government officials, health care providers and medical organizations take differing views of the benefits and risks of medical marijuana. Proponents state that marijuana has valid medical uses and further research should be pursued, while opponents list concerns about health risks, and the "gateway" effect of marijuana that can lead to more dangerous drug abuse, among other issues. Nonetheless, legalization of medical marijuana continues to be pursued at the state level, with California being the most recent state to legalize recreational use in January 2018.

An August 2017 Quinipiac University Poll found that 75% of US respondents oppose the federal government enforcing federal laws against marijuana in states that have already legalized medical or recreational marijuana. Nonetheless, state and federal laws are at odds in the US, currently.

In order to qualify for legal medical marijuana, patients must have a diagnosed condition that is on their state’s list of qualifying medical marijuana conditions, and receive a recommendation from their doctor. The patient can then obtain a medical marijuana card, or qualification, to purchase medical marijuana and associated products from dispensaries.

Although the conditions vary from state-to-state, top medical conditions for which patients might use medical marijuana include:

- **Cancer**
- **Glaucoma**
- **HIV/AIDS**
- Persistent **muscle spasms**, including those that are characteristic of **multiple sclerosis**
- **Seizures**
- **Severe pain**
- **Severe nausea**
- **Cachexia or dramatic weight loss and muscle atrophy (wasting syndrome)**

According to various state laws, medical marijuana can be used for treatment of other debilitating medical conditions, such as decompensated cirrhosis, amyotrophic lateral sclerosis, Alzheimer's disease, and post-traumatic stress disorder. Not all states that approve of medical marijuana have enacted laws to allow its use for all of these conditions. Another difference between states - the amount of marijuana for medical use that can be possessed by the individual patient or primary caregiver varies, but may include dried marijuana and live plants.

In addition, the quality of research studies, or the availability of research, is often limited for some of these conditions.

Cancer

According to 2017 data published by the National Cancer Institute, a number of *in vitro* (laboratory), animal, and human studies have looked at the use of cannabinoids (delta-9-THC, CBD) in various cancer uses; however, it's important to remember many studies were small and more research may be needed.

No cannabis (marijuana) or cannabinoid agent is approved by the FDA for the treatment of cancer. Cannabis is not approved for treatment of any related symptom of side effect of cancer therapy. Two cannabinoids (dronabinol and nabilone) are FDA-approved for the treatment of chemotherapy-related nausea and vomiting in patients who have not responded to standard therapy.

- **Antitumor Activity**: Studies in rodents have shown that cannabinoids may be able to kill cancer cells while protecting normal cells. These agents may be able to inhibit tumor growth by causing cell death and blood blood vessels growth. Animal or lab studies have shown positive results in colon cancer, liver cancer, breast cancer, brain cancer, and lung cancer, although many more studies are needed. Animal studies are often not reproducible in humans.
- Oral cannabidiol (CBD) has been looked at to treat recurrent solid tumors in humans.
- An oral spray combining 2 cannabinoids (delta-9-THC and CBD) given with temozolomide to treat recurrent glioblastoma multiforme (brain cancer).
- Cannabidiol (CBD) to treat acute graft-versus-host disease in patients who have had an allogeneic hematopoietic stem cell transplantation (stem cell transplant from a donor).

Stimulating Appetite

Animal and human studies have shown that delta-9-THC (dronabinol) taken by mouth can stimulate appetite, although in cancer patients the use of megestrol may be more effective. However, in patients with AIDS, a clinical trial showed that delta-9-THC incerased appetite and reduced weight loss compared to those taking a placebo.

In the US, dronabinol (brand names Marinol and Syndros) are FDA-approved to treat anorexia (loss of appetite) associated with weight loss in patients with AIDS (Acquired Immune Deficiency Syndrome). **According to the NCI**, there are no published studies of the effect of inhaled cannabis on cancer patients.

Nausea and Vomiting

According to NCI, cannabinoid receptors found in brain cells may have a role in controlling nausea and vomiting. Animal studies have shown that delta-9-THC and other cannabinoids may act on cannabinoid receptors to prevent vomiting caused by certain types of chemotherapy. Two cannabinoid drugs are approved in the US for the treatment of anti-cancer treatment (chemotherapy) nausea and vomiting in patients who have not responded to standard therapy:

- dronabinol (Marinol, generics)
- nabilone (Cesamet)

Several studies have evaluated the use of inhaled cannabis for chemotherapy-related nausea and vomiting, although results were mixed and a there is not enough information to interpret the results.

Nabiximols (Sativex) is an oral spray of standardized extracts of THC and cannabidiol not available in the US. It is approved outside the US to treat spasticity linked with multiple sclerosis. Nabiximols was shown in a small randomized trial in Spain to treat chemotherapy-related nausea and vomiting.

Severe Pain and Neuropathy (Nerve Pain)

The use of cannabinoids or cannabis **has been evaluated** in the treatment of cancer and nerve pain.

- One small study showed that vaporized cannabis combined with oxycodone did not lead to better pain relief than using oxycodone alone. However, when vaporized cannabis was combined with morphine, pain relief was significantly great than morphine used alone; however, larger studies are needed.
- The use of oral delta-9-THC has been shown to provide good pain relief as well as provide relief from nausea and vomiting in cancer patients. In one study, it's pain relief was comparable to codeine. Cannabinoids have also been shown to prevent chemotherapy-induced neuropathy in animal models exposed to various cancer drugs (paclitaxel, vincristine, cisplatin).
- Marijuana may be effective for **neuropathic (nerve) pain** in HIV and other patients. A **review** from the *Annals of Internal Medicine* in August 2017 noted that marijuana is associated with low strength evidence of effectiveness at reducing chronic nerve pain known as neuropathy.
- A cannabinoid spray used under the tongue was effective for advanced cancer pain in patients whose pain was not relieved by strong opioids alone. Sleep was also improved.

- In several Phase 3 US trials of Sativex (nabiximols) spray (not currently approved in the US) for the treatment of severe cancer pain in patients with inadequate analgesia using chronic opioid therapy, Sativex did not meet the primary endpoint of demonstrating a statistically significant difference from placebo for pain control. Sativex is a standardized extracts of THC and cannabidiol.

Other Uses

Glaucoma

Marijuana has also been used for glaucoma to lower intraocular pressure (IOP), but research does not show that marijuana has a better effect than currently approved glaucoma medications. Studies have shown that smoked, oral or IV use may have an effect on lowering IOP, but the effect is short-lived, possibly only a few hours, which is a major drawback for a condition that requires around-the-clock effect. Topically applied marijuana derivatives to the eye have not been shown to have an effect. Marijuana in any form is not FDA approved for use in glaucoma.

Research suggests it is not only elevated IOP that may lead to a damaged optic nerve causing glaucoma, but also reduced blood flow to the optic nerve. Marijuana use has the potential to lower optic nerve blood flow, effectively canceling out the benefit of a lowered IOP, according to the American Academy of Ophthalmologists (AAO). The AAO does not recommend marijuana or other cannabis products for the treatment of glaucoma.4 However, in some US states, marijuana is used for glaucoma under medical marijuana programs.

Seizures

In June 2018 the **FDA approved Epidiolex** (cannabidiol), from GW Pharmaceuticals, for severe seizures in patients 2 years and older with Dravet Syndrome or Lennox-Gastaut Syndrome. The medication comes as a liquid oral solution to be taken by mouth.

Epidiolex contains cannabidiol, which is a purified drug substance derived from marijuana, but does not lead to a high as might be seen with ingestion of tetrahydrocannabinol (THC).

Epidiolex's effectiveness was shown in **three pivotal, Phase III studies** involving 516 patients with either Lennox-Gastaut syndrome or Dravet syndrome. Epidiolex, taken along with other medications, was shown to be effective in reducing the frequency of seizures when compared with placebo.

The most common side effects with **Epidiolex** shown in the clinical trials were:

- sleepiness
- sedation and lethargy
- elevated liver enzymes
- decreased appetite
- diarrhea
- rash
- fatigue

- malaise and weakness
- insomnia
- sleep disorder and poor quality sleep
- infections.

Multiple Sclerosis

As reported by Hill, there are several studies that have noted cannabinoids are effective in the treatment of symptoms of multiple sclerosis, including painful spasms.

In addition, evidence-based guidelines for complementary and alternative medicine (CAM) in multiple sclerosis (MS) from the American Academy of Neurology recommend oral cannabis extract (OCE) or tetrahydrocannabinol (THC) for spasticity symptoms and pain (excluding central neuropathic pain), and that the subjective benefit is possibly maintained for 1 year. For Sativex oromucosal spray (a mix of THC and CBD, not approved in the US), AAN states that Sativex is probably effective for improving subjective spasticity symptoms, pain, and urinary symptoms. Data are inadequate to support or refute use of smoked cannabis for improvement of spasticity, pain, balance/posture, or cognition in MS.

The AMA Stance on Medical Marijuana

As outlined in the AMA Policy Statement on Cannabis for Medicinal Use (H-95.952):

- The American Medical Association (AMA) encourages continued research of marijuana and related cannabinoids in patients who have serious conditions where marijuana may have efficacy.
- AMA also states that marijuana's status as a federal schedule I controlled substance should be reviewed "with the goal of facilitating the conduct of clinical research and development of cannabinoid-based medicines, and alternate delivery methods. This should not be viewed as an endorsement of state-based medical cannabis programs, the legalization of marijuana, or that scientific evidence on the therapeutic use of cannabis meets the current standards for a prescription drug product."
- The AMA urges the National Institutes of Health (NIH), Drug Enforcement Agency (DEA), and Food and Drug Administration (FDA) to implement procedures to facilitate grant applications and the conduct of well-designed clinical research into the medical utility of marijuana.
- The AMA believes that effective patient care requires the free and unfettered exchange of information on treatment alternatives and that discussion of these alternatives between physicians and patients should not subject either party to criminal sanctions.

Recreational Use of Marijuana

A majority of Americans support legalization of marijuana -- 61 percent pro versus 33 percent against -- according to findings from a Quinnipiac University National Poll in August 2017. It is important to note that not states allow commercial sales of recreational marijuana.

As of Jan. 1, 2020, the states or districts where **recreational** use of marijuana is legal are:

- Alaska
- California
- Colorado
- Illinois
- Maine
- Massachusetts
- Michigan
- Nevada
- Oregon
- Vermont (allow marijuana possession and growing; recreational sales not yet allowed as of Jan. 2020)
- Washington
- Washington, D.C. (allowing marijuana possession and growing; recreational sales not yet allowed as of Jan. 2020)

In 2012, voters in Colorado and Washington state passed initiatives legalizing marijuana for adults 21 and older under state law. The states of Oregon and Alaska, as well as Washington, D.C also voted to approve recreational use of marijuana in November 2014. In November 2016, four more states - California, Massachusetts, Maine, and Nevada - voted in recreational marijuana. On July 1, 2018 Vermont's recreational use law came into effect. Adults in Vermont can carry up to one ounce of marijuana and grow up to two plants for recreational use, but retail production sales are not yet permitted. In 2018, Michigan became the 10th US state to legalize recreational use, but a legalization vote failed in North Dakota. In June 2019, the Illinois legislature **approved House Bill 1438**, a measure to legalize recreational marijuana sales by Jan. 1, 2020. Laws surrounding recreational use vary by state and change frequently.

It is important to note that the federal government still considers marijuana a dangerous drug and that the illegal distribution and sale of marijuana is a federal crime. Under the Controlled Substances Act (CSA), marijuana is still considered a **Schedule 1 drug**.

Cities, municipalities, employers, landlords, and universities may have special policies about the use of marijuana. Use within any federal land, national park or monument is illegal. Be sure to check all rules before use, especially in areas that may be under federal law.

Recreational marijuana is lucrative. According to New Frontier Data, a research company that analyzes legal marijuana revenue, in 2016 sales reached $6.6 billion. These numbers include $4.7 billion for medical marijuana and $1.9 billion for recreational use. If current trends continue, the marijuana industry overall may exceed $24 billion by 2025.

Marijuana Dangers: Driving, Use in Children

Smoking marijuana can make driving dangerous; do not mix the two. The cerebellum is the section of the brain that controls balance and coordination. When THC affects the cerebellum’s function,

drivers may have slower reaction times, impaired judgment, and problems responding to signals and sounds if driving while under the influence (DUI) of THC.

In all states, including states that allow recreational marijuana, driving under the influence of marijuana is illegal. However, because THC metabolites can remain in the blood for up to one month (or possibly longer), the DUI charge is usually based subjective measures. The evaluation will take into account driving patterns, one's physical symptoms and appearance, a field sobriety test, and possibly a blood test for THC. States differ on the penalties, although an arrest and court date will most likely be involved if the officer deems the person impaired.. First offenses rarely involve long jail time, but may involve probation, community service, a suspended license, fines and fees, and DUI school.

The American Academy of Pediatrics (AAP) released a report in February 2017 urging doctors to protect children from the harms of marijuana as the US becomes increasingly tolerant to the drug. The brain is not fully developed until around 25 years of age. Experts note that marijuana use in the young can lead to abnormal brain development. Frequent use of high-potency THC over extended periods of time suggests that there can be negative effects on learning, memory, attention and problem-solving ability, **as reported** in *Pediatrics* in October 2017. The AAP suggests that doctors urge parents not to use marijuana around children. Other concerns with children include the potential of exposing them to secondhand smoke and accidental poisoning with edibles such as brownies or candy.

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- **U-47700 (Pink)**

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Further information

Always consult your healthcare provider to ensure the information displayed on this page applies to your personal circumstances.