

# Cannabinoids and the Workplace



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**Yuma-Pacific Section**  
**American Industrial Hygiene Association**  
**San Diego, California**

# Overview

- Uses
- Science
- Legal
- Workplace





# Uses

- Industrial Use
- Medicinal Use
- Recreational Use



# Industrial Use

- *Cannabis sativa* is the oldest and most widely used plant in the world. Origins date back 12,000 years in Central and Southeast Asia and India.
- Products
  - Clothes, rope, yarns, canvas made from hemp stalks.
- Hemp cultivated in America since 1600
  - George Washington planted *Cannabis* on his plantation.
- Hemp Farming Act of 2018
  - Removes hemp (“cannabis < 0.3% THC”) from Schedule I of the Controlled Substances Act, making it an ordinary agricultural commodity.
  - USDA issued hemp regulations 10/29/19.
    - <https://www.ams.usda.gov/rules-regulations/hemp/rulemaking-documents>





# Medicinal Use

- Marijuana is the most widely used illicit drug in Western societies and also the one with the longest recorded history of human use.
- **China**
  - 2737 BCE, Chinese Emperor Shen-Nung was the first to describe its medicinal value
- **India**
  - Euphoric properties discovered in India
- **U.S.**
  - Marijuana was listed in the U.S. Pharmacopeia from 1850 to 1942



# Recreational Use

- **1914**
  - Marijuana was not classed as a major drug, unlike opium and heroin, which were prohibited under the Harrison Narcotics Tax Act of 1914.
- **1930s**
  - Recreational use of marijuana surges in the U.S.
- **1937**
  - ***Marihuana Tax Act*** abolishes the medicinal use of marijuana by requiring importers to register and pay an annual tax of \$24.
- **1969**
  - *Leary v. United States*
  - Tax Act was ruled unconstitutional as a violation of the 5<sup>th</sup> Amendment against self-incrimination.
- **1970**
  - Marijuana placed on Schedule I by the Controlled Substances Act
    - “The **drug** or other substance has a high potential for abuse. The **drug** or other substance has no currently accepted medical treatment use in the U.S.”
  - Physician licensed by the Drug Enforcement Administration (DEA) can “recommend” marijuana, but cannot “prescribe” marijuana.
  - Patient in possession is subject to “felony possession.”

# Science

- **Types of Cannabinoids**
  - Endocannabinoids
  - Phyto-cannabinoids
  - Synthetic Cannabinoids
- **Cannabinoid receptors**
- **Medical Benefits**

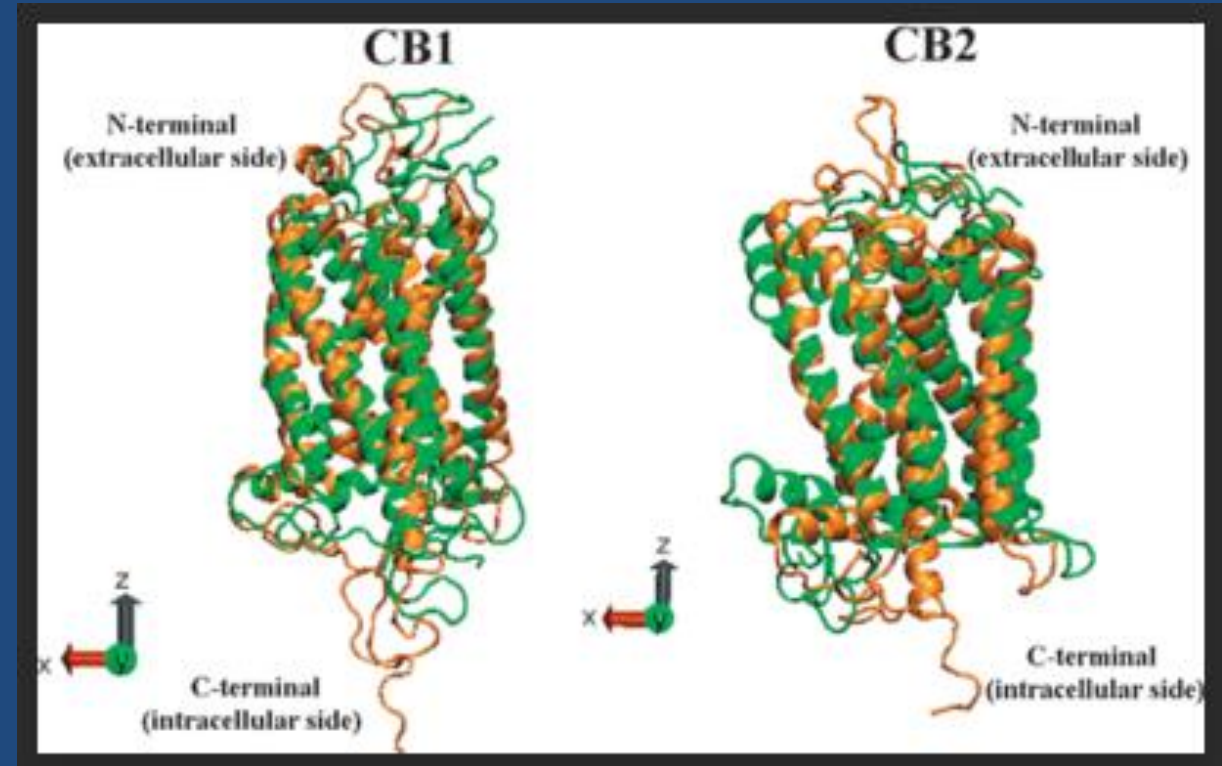
# Cannabinoids

- **Endogenous Cannabinoids**
- **Phyto Cannabinoids**
- **Synthetic Cannabinoids**



# Cannabinoid Receptor Chemistry

- In 1965, delta-9-tetrahydrocannabinol (THC)—responsible for the psychoactive effects of *Cannabis* was isolated.
  - > 500 chemicals are synthesized by the plant.
- 1990s, cannabinoid receptors isolated
  - CB1—Brain (1990)
  - CB2—Immune cells (1993)
- Natural function of cannabinoid receptors?
  - 1992—anandamide—an endocannabinoid neurotransmitter was isolated
    - Affects energy, appetite, mood and perception of time.
    - THC chemically resembles anandamide



# Endocannabinoid System

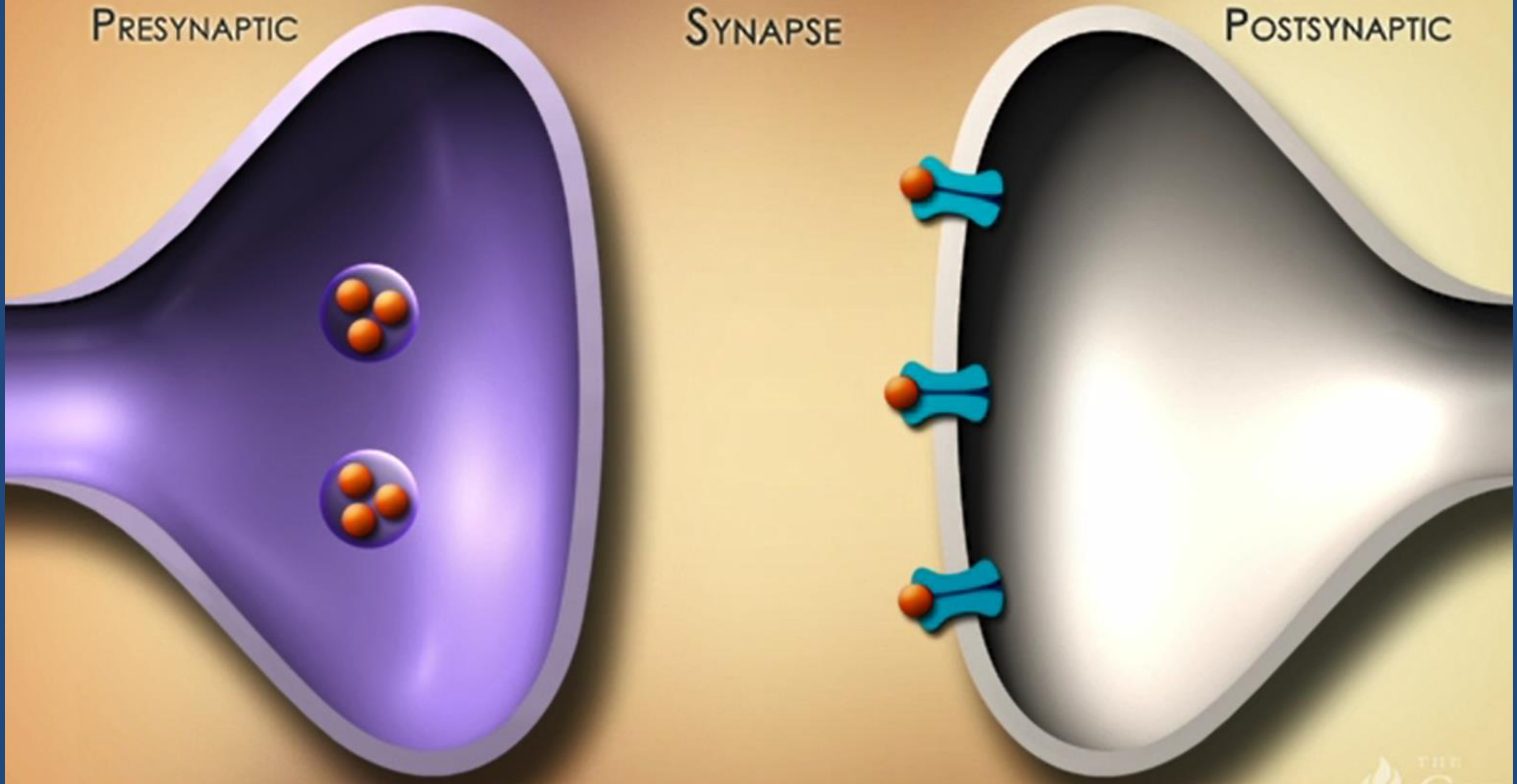
Pacher et al., 2006

- Endocannabinoids
  - Different from most neurotransmitters stored in the brain
  - Most neurotransmitters are *stored* in presynaptic neurons
  - Endocannabinoids appear to be made *only when needed*
- In the past decade, the endocannabinoid system has been implicated in a growing number of physiological functions, both in the central and peripheral nervous systems and in peripheral organs.
- Endocannabinoids act as “retrograde messengers”
  - Major endocannabinoids are arachidonylethanolamide (AEA or anandamide) and 2-arachidonoylglycerol (2-AG).

PRESYNAPTIC

SYNAPSE

POSTSYNAPTIC

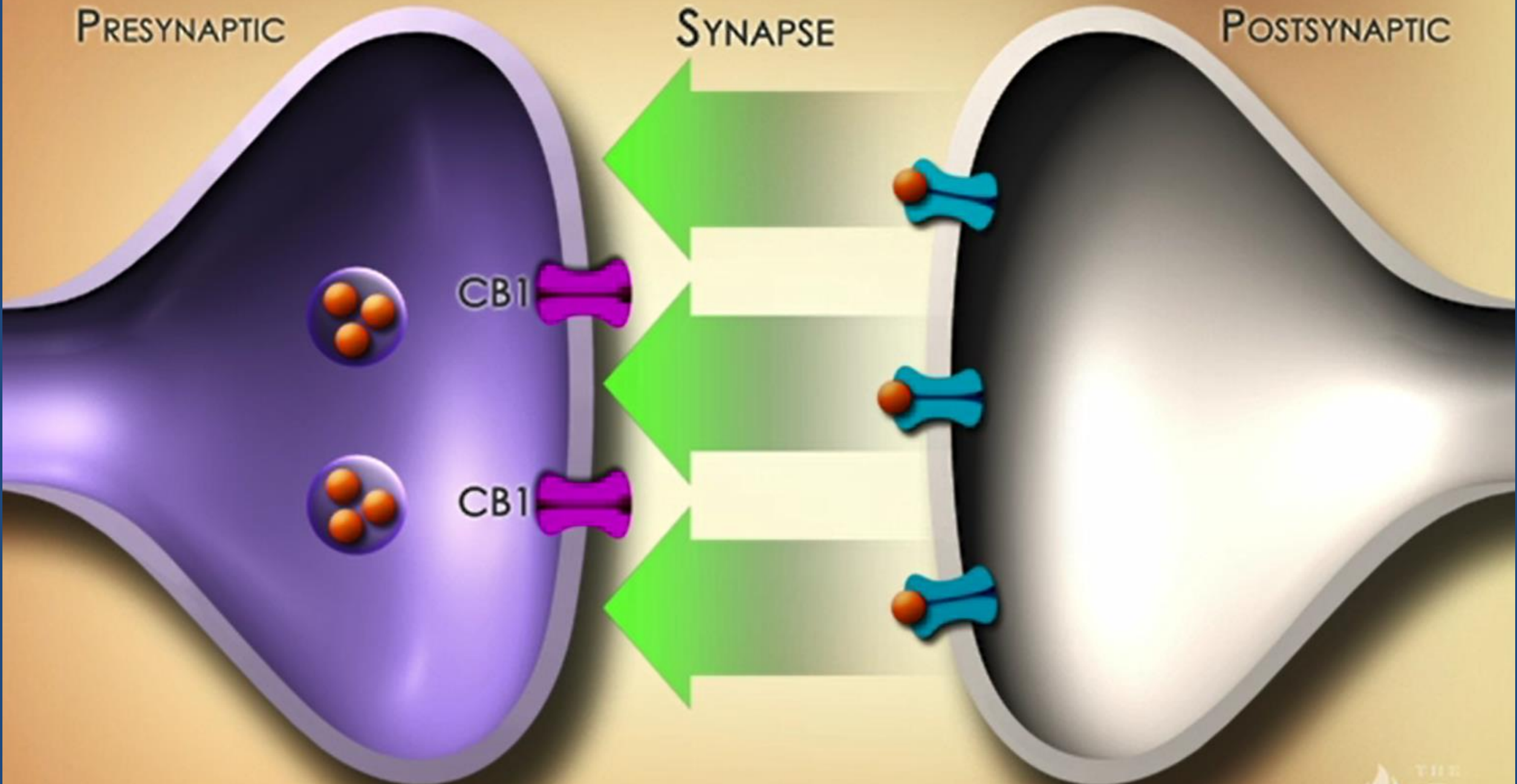




PRESYNAPTIC

SYNAPSE

POSTSYNAPTIC



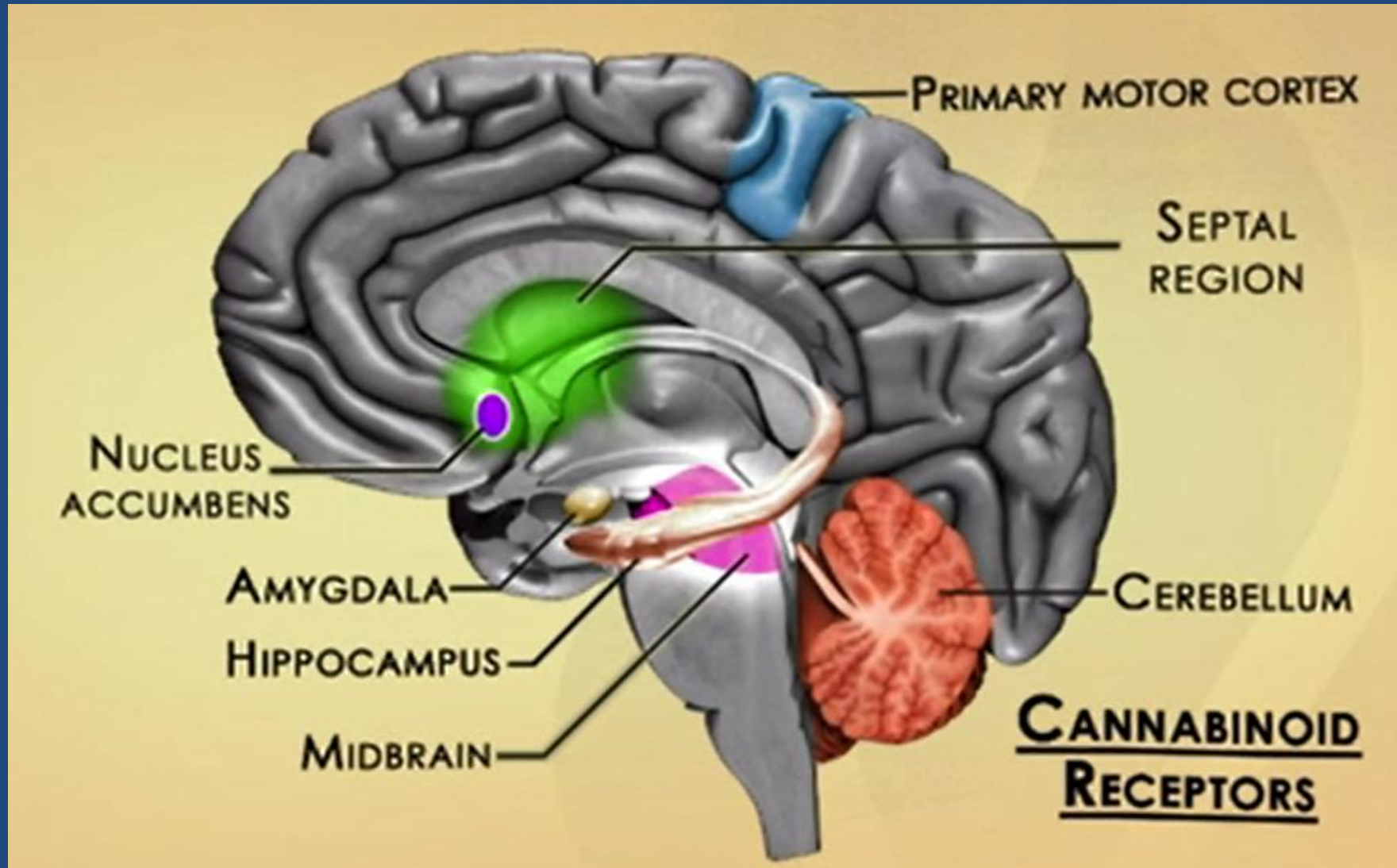
CB1

CB1

# Functions of Retrograde Signaling

- **Regulate neurotransmission**
  - Preventing over-release of transmitters by pre-synaptic neurons
  - CB1 receptors found in both excitatory and inhibitory neurons
- **Proactive interference**
  - Help us forget things we need to forget
- **Fear extinction**
  - PTSD patients found to have lower levels of anandamide

# CB Receptors Widely Distributed in the Brain

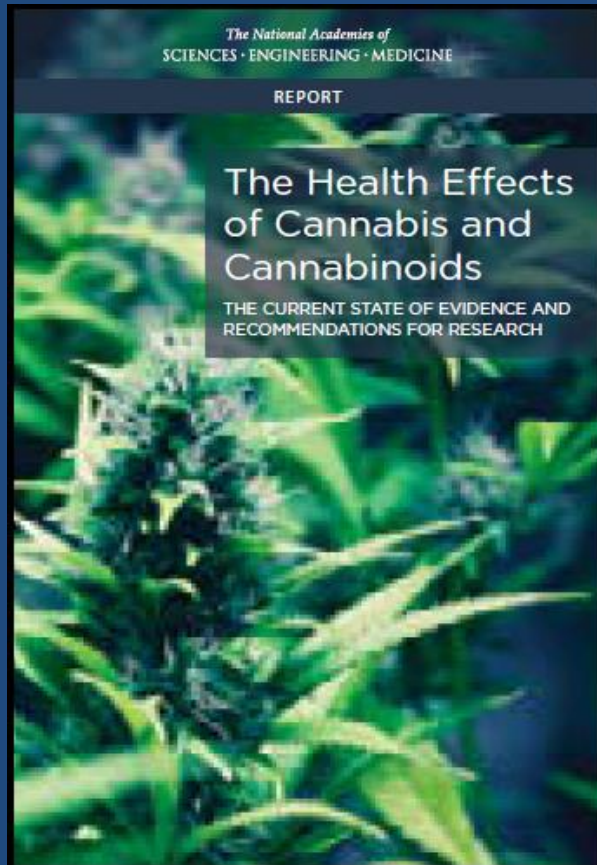




# Neurological Exposure Effects

- **Lower Doses**
  - Euphoria
  - Lowered inhibition
  - Relaxation
  - Visual/auditory hallucinations
  - Sensory enhancement
- **Higher doses**
  - Disorganized thoughts
  - Paranoia
  - Anxiety
  - Impaired judgement
  - Agitation
- **Fatalities?**
  - No reported cases of overdose deaths from THC exposure as with opioids, however...
  - Cannabinoid hyperemesis syndrome described in 2004 (Allen et al) and 3 fatalities from CHS reported in 2019 in chronic users (Nourbakhsh et al).

# Medical Benefits? Research is Ongoing



## There is **conclusive or substantial evidence** that cannabis or cannabinoids are effective:

- For the treatment for chronic pain in adults (cannabis) (4-1)
- Antiemetics in the treatment of chemotherapy-induced nausea and vomiting (oral cannabinoids) (4-3)
- For improving patient-reported multiple sclerosis spasticity symptoms (oral cannabinoids) (4-7a)

## There is **moderate evidence** that cannabis or cannabinoids are effective for:

- Improving short-term sleep outcomes in individuals with sleep disturbance associated with obstructive sleep apnea syndrome, fibromyalgia, chronic pain, and multiple sclerosis (cannabinoids, primarily nabiximols) (4-19)

## There is **limited evidence** that cannabis or cannabinoids are effective for:

- Increasing appetite and decreasing weight loss associated with HIV/AIDS (cannabis and oral cannabinoids) (4-4a)
- Improving clinician-measured multiple sclerosis spasticity symptoms (oral cannabinoids) (4-7a)
- Improving symptoms of Tourette syndrome (THC capsules) (4-8)
- Improving anxiety symptoms, as assessed by a public speaking test, in individuals with social anxiety disorders (cannabidiol) (4-17)
- Improving symptoms of posttraumatic stress disorder (nabilone; one single, small fair-quality trial) (4-20)

## There is **limited evidence** of a statistical association between cannabinoids and:

- Better outcomes (i.e., mortality, disability) after a traumatic brain injury or intracranial hemorrhage (4-15)

## There is **limited evidence** that cannabis or cannabinoids are *ineffective* for:

- Improving symptoms associated with dementia (cannabinoids) (4-13)
- Improving intraocular pressure associated with glaucoma (cannabinoids) (4-14)
- Reducing depressive symptoms in individuals with chronic pain or multiple sclerosis (nabiximols, dronabinol, and nabilone) (4-18)

# USG Not Convinced of Medical Benefits

- In 2011, governors of Rhode Island and Washington petitioned DEA to remove marijuana from Schedule I
- In 2016, HHS used a 5 part test to determine if marijuana may have “currently accepted medical use.”
  - Drug’s chemistry must be known and reproducible
  - There must be adequate safety studies
  - There must be adequate and well-controlled studies proving efficacy
  - Drug must be accepted by qualified medical experts
  - Scientific evidence must be widely available
- “Marijuana does not meet any of the five elements necessary for a drug to have a ‘currently accepted medical use.’”
  - 81 *Federal Register* 53690 (August 12, 2016)



# Phytochemistry of *Cannabis sativa*

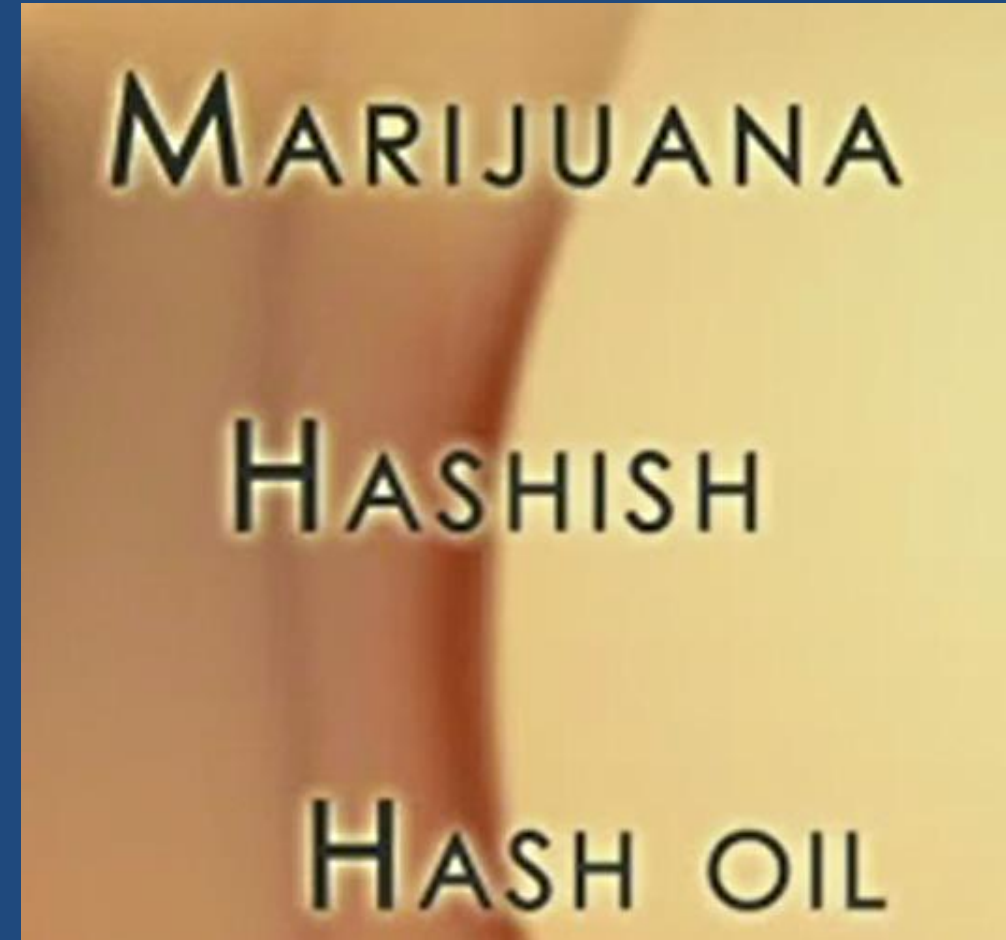
- Phyto-cannabinoids have been a focus of research since the 1965 discovery of  $\Delta^9$ -THC—the main psychoactive cannabinoid.
  - Found in the resin produced by the leaves and buds primarily of the unfertilized female cannabis plant.
- Besides  $\Delta^9$ -THC, the plant also contains more than 500 other chemicals, including more than 100 compounds that are chemically related to THC, called cannabinoids.
  - Some of these non-psychoactive cannabinoids have several medicinal functions, e.g., cannabidiol (CBD).



# THC Content of Phyto-Cannabinoids

Natural Plant Derivatives

- Hemp Stalks <0.4% THC
- Marijuana—0.5 to 5% THC
  - *Sinsemilla*—7 to 14% THC
    - Flowering tops of unfertilized female plants
- Hashish—2 to 8% THC
- Hash Oil—15 to 50% THC
  - THC extraction with butane (BHO or “dab”)—90% THC



# Rising Potency

NIDA, 2019

- Marijuana potency, as detected in confiscated samples, has steadily increased over the past few decades.
- In the early 1990s, the average THC content in confiscated marijuana samples was roughly 3.8%.
- In 2014, it was 12.2%. The average marijuana extract contains more than 50 percent THC, with some samples exceeding 80%.
- These trends raise concerns that the consequences of marijuana use could be worse than in the past, particularly among those who are new to marijuana use or in young people, whose brains are still developing.

– <https://www.drugabuse.gov/publications/research-reports/marijuana/marijuana-addictive>

# Natural Plant Cannabinoid Products

- Natural Products Approved by the FDA
  - *Epidiolex* (Cannabidiol)
    - Oil
    - Patients with *Dravet* syndrome
    - Severe Myoclonic Epilepsy of Infancy
  - Nabiximols (*Sativex*)
    - Mouth spray
    - THC and CBD in 1:1 ratio



# Synthetic Cannabinoids

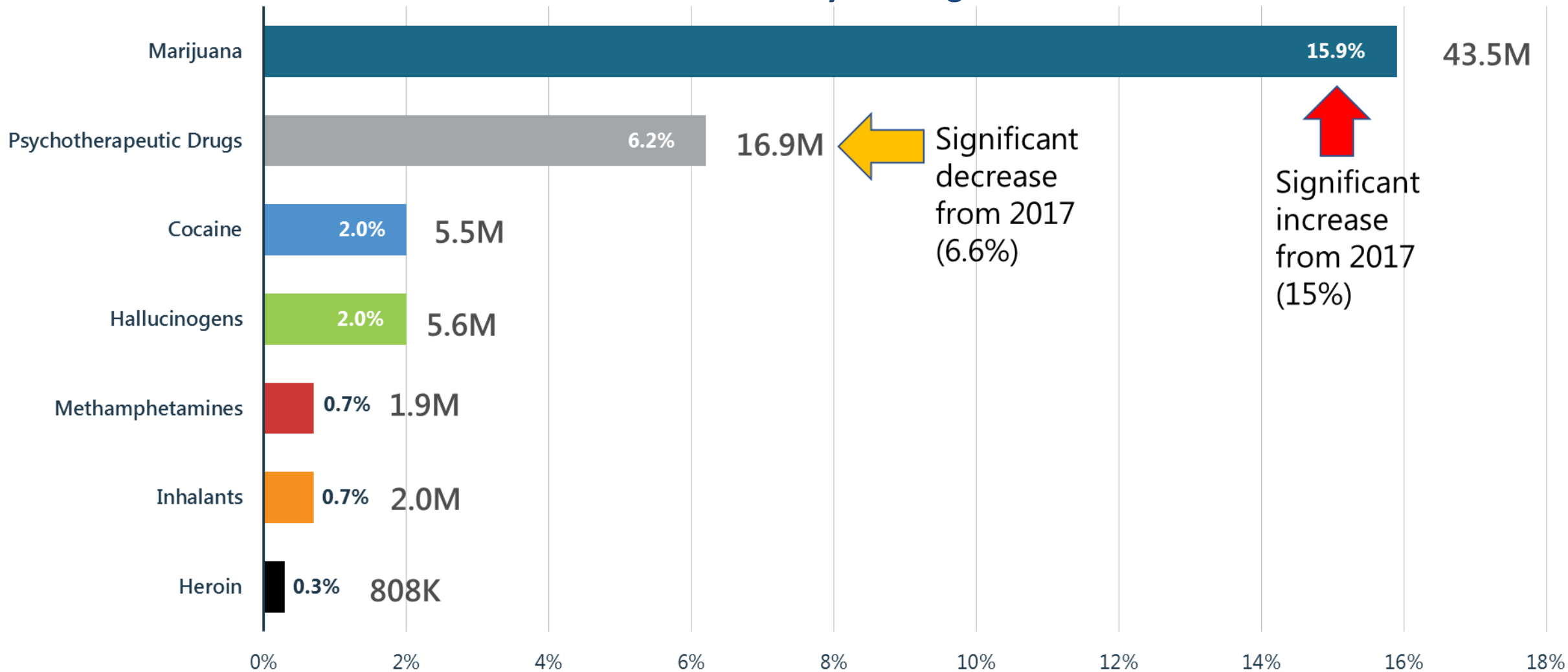
- **Synthetic cannabinoids**
  - Cannabinoid receptor agonists
  - Human made chemicals that mimic some of the effects produced by natural marijuana
- **FDA Approved Synthetic Cannabinoid**
  - Dronabinol
    - *Marinol, Syndros*
    - Nabilone (*Cesamet*).
  - Used to stimulate appetite in AIDS patients
  - Used in cancer chemotherapy patients to treat nausea and vomiting

# Synthetic Marijuana: New Psychoactive Substances

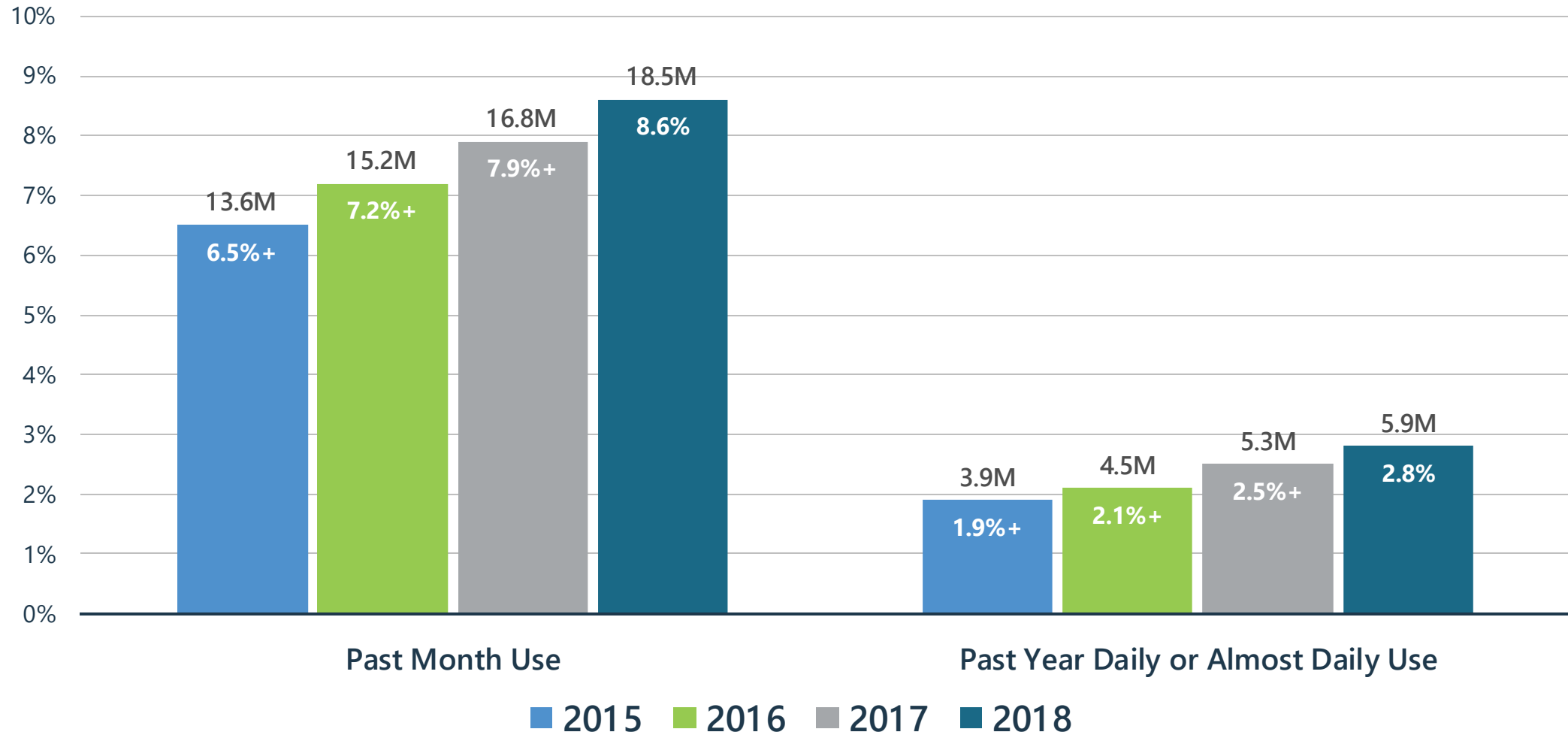
- Spice, K2, etc.
  - Human-made mind-altering chemicals—sprayed on dried, shredded plant material so they can be smoked or sold as liquids to be vaporized.
    - <https://www.cdc.gov/nceh/hsb/chemicals/sc/default.html>
  - For sale on the Internet, head shops, gas stations.
  - Not detected by standard urine testing.
- In 2012 alone, 26 new synthetic cannabinoids and cathinones were placed into CSA Schedule I. *See FDA Safety and Innovation Act of 2012.*
  - <https://www.fda.gov/regulatory-information/selected-amendments-fdc-act/food-and-drug-administration-safety-and-innovation-act-fdasia>
- Impossible for regulators to keep up with “clandestine chemists” seeking to circumvent DEA regulatory controls.

# Illicit Drug Use

## 2018 National Survey on Drug Use



# Significant Increase in Marijuana Use Age 26+





# Consequences of Marijuana Use

- Does chronic use = abuse? Does chronic use lead to significant negative consequences for users?
  - Marijuana Use Disorder
- Systematic Review of 48 studies
  - Regular users get lower grades, drop out of high school more
  - Correlation studies, not causation studies
- Amotivational syndrome
  - Correlation studies
- Gateway Theory
  - Early use is associated with later use of more addictive drugs
  - Correlation studies

# Consequences of Chronic Marijuana Use

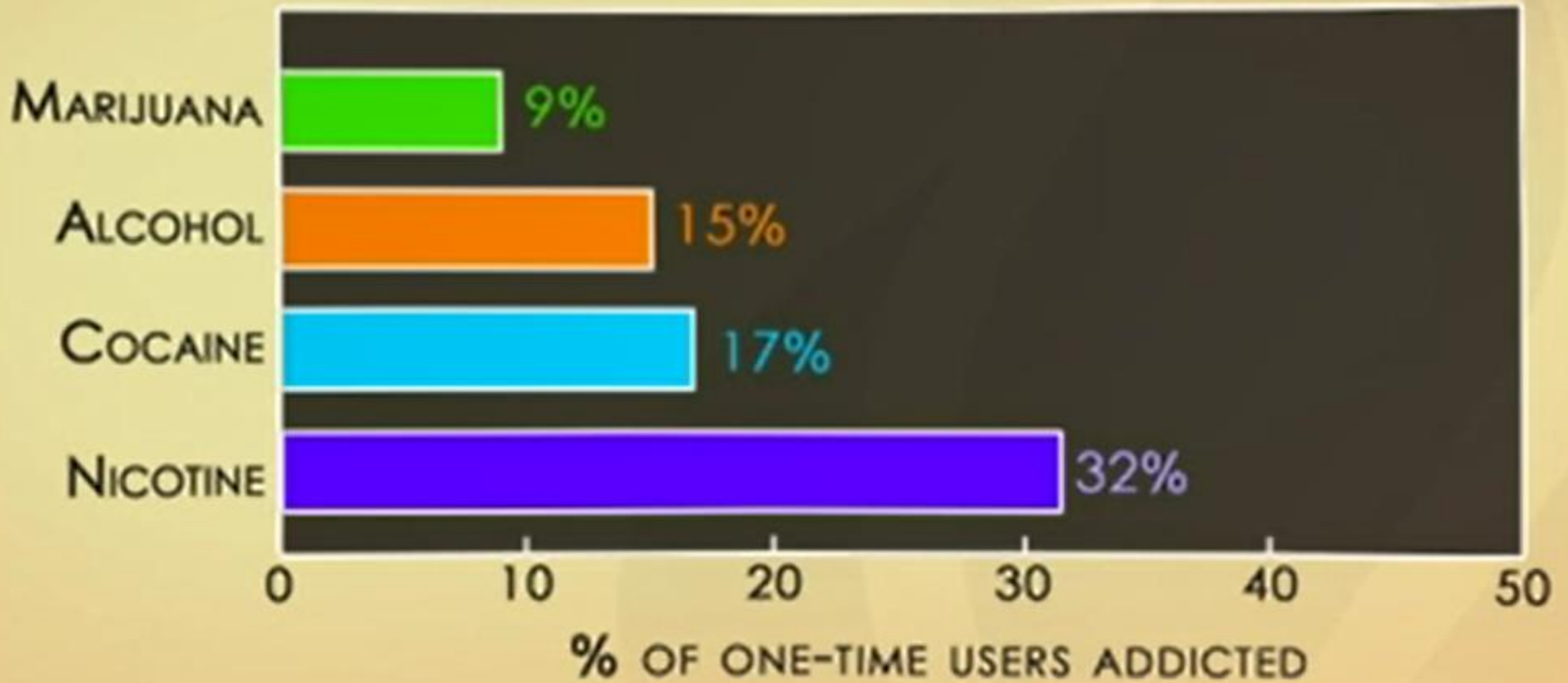
- **Dependence**

- Marijuana use disorders are often associated with *dependence*—in which a person feels withdrawal symptoms when not taking the drug. People who use marijuana frequently often report irritability, mood and sleep difficulties, decreased appetite, cravings, restlessness, and/or various forms of physical discomfort that peak within the first week after quitting and last up to 2 weeks. Marijuana dependence occurs when the brain adapts to large amounts of the drug by reducing production of and sensitivity to its own endocannabinoid neurotransmitters.

- **Tolerance**

- Mixed evidence
- Amount used does not rapidly escalate; users report same high as first uses

1994 SURVEY  
NATIONAL INSTITUTE ON DRUG ABUSE



# Consequences of Marijuana Use: Opioid Prescribing

McMichael et al., 2020

- Access laws have reduced the use of prescription opioids across several different measures of opioid prescriptions.
- Evidence that both recreational cannabis laws (RCLs) and medical cannabis laws (MCLs) decrease opioid prescribing, and the sizes of the estimated reductions are in line with previous estimates derived from more limited populations.
- Evidence suggests that cannabis access laws could be a useful tool in combatting the prescription opioid epidemic. In reducing opioid prescriptions, however, RCLs and MCLs are not created equally. Across the general population, RCLs consistently reduce opioid prescriptions to a greater extent than MCLs.



# Legal Issues

- Controlled Substances Act of 1970
- U.S. Department of Justice
- State marijuana reform laws
- Federal Preemption
- Duty to Accommodate
- Workers' Compensation

# Controlled Substances Act of 1970

- Federal statute prescribing U.S. drug policy under which the production, importation, possession, use and distribution of certain chemical substances is regulated.
- Passed by Congress as Title II of the *Comprehensive Drug Abuse Prevention and Control Act of 1970* and signed into law by President Nixon.
- CSA created 5 Schedules in a hierarchy of production, prescribing and dispensing controls.

<b>Schedule 1</b>	Drugs with no currently accepted medical use and a high potential for abuse. They are the most dangerous drugs of all the drug schedules with potentially severe psychological or physical dependence.	<ul style="list-style-type: none"> <li>- Heroin</li> <li>- Lysergic acid diethylamide (LSD)</li> <li>- Marijuana (Cannabis)</li> <li>- Methylenedioxymethamphetamine (Ecstasy)</li> <li>- Methaqualone</li> <li>- Peyote</li> </ul>
<b>Schedule 2</b>	Drugs with a high potential for abuse, with use potentially leading to severe psychological or physical dependence. These drugs are also considered dangerous.	<ul style="list-style-type: none"> <li>- Combination products with less than 15mg of hydrocodone per dosage unit (Vicodin)</li> <li>- Cocaine</li> <li>- methamphetamine</li> <li>- Methadone</li> <li>- Hydromorphone (Dilaudid)</li> <li>- Meperidine (Demerol)</li> <li>- Oxycodone (OxyContin)</li> <li>- Fentanyl</li> <li>- Dexedrine</li> <li>- Adderall</li> <li>- Ritalin</li> </ul>
<b>Schedule 3</b>	Drugs with a moderate to low potential for physical and psychological dependence. Schedule 3 drugs abuse potential is less than Schedule 1 and Schedule 2 drugs but more than Schedule 4.	<ul style="list-style-type: none"> <li>- Products containing less than 90mg of codeine per dosage unit (Tylenol and codeine)</li> <li>- Ketamine</li> <li>- Anabolic steroids</li> <li>- Testosterone</li> </ul>
<b>Schedule 4</b>	Drugs with a low potential for abuse and low risk of dependence.	<ul style="list-style-type: none"> <li>- Xanax</li> <li>- Soma</li> <li>- Darvon</li> <li>- Darvocet</li> <li>- Valium</li> <li>- Ativan</li> <li>- Talwin</li> <li>- Ambien</li> <li>- Tramadol</li> </ul>
<b>Schedule 5</b>	Drugs with lower potential for abuse than Schedule 4 and consist of preparations containing limited quantities of certain narcotics. Schedule 5 drugs are generally used for antidiarrheal, antitussive, and analgesic purposes.	<ul style="list-style-type: none"> <li>- Cough preparations with less than 200mg of codeine per 100ml (Robitussin AC)</li> <li>- Lomotil</li> <li>- Motofen</li> <li>- Lyrica</li> <li>- Parepectolin</li> </ul>

# Legal Definition of Marijuana

21 U.S.C. § 802(16)

- “The term ‘marihuana’ means all parts of the plant *Cannabis sativa L.*, whether growing or not; the seeds thereof; the resin extracted from any part of such plant and every compound, manufacture, salt, derivative, mixture, or preparation of such plant, its seeds or resin.
  - Such term does not include the mature stalks of such plant, fiber produced from such stalks, oil or cake made from the seeds of such plant, any compound, manufacture, salt, derivative, mixture, or preparation of such mature stalks (except the resin extracted therefrom), fiber, oil, or cake, or the sterilized seed of such plant which is incapable of germination.”

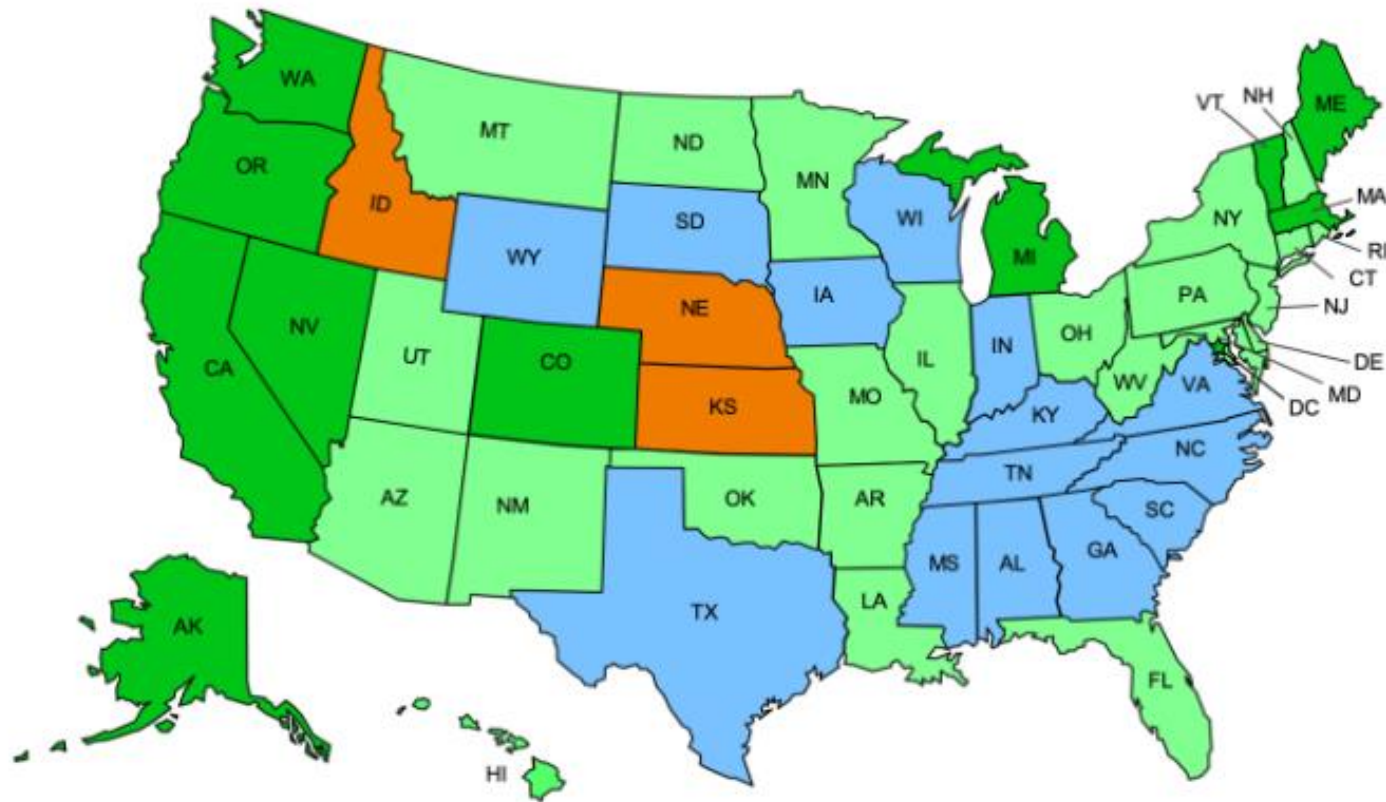
# U.S. Department of Justice: Recent History

- **2009**—statement about enforcement priorities
  - “It will not be a priority to use federal resources to prosecute patients with serious illnesses or their caregivers who are complying with state laws on medical marijuana, but we will not tolerate drug traffickers who hide behind claims of compliance with state law to mask activities that are clearly illegal.”
- **2013**—specified certain enforcement priorities
  - Distribution to minors
  - Revenue from sales going to criminal enterprises
  - State-authorized marijuana activities pretext for trafficking of other illegal drugs
  - Drugged driving
- **2018**—eliminated 2013 list of specific enforcement priorities
  - “Prosecutors should follow principles that govern all federal prosecutions”



# State Cannabis Laws

- 33 states & DC have passed laws broadly legalizing marijuana in some form.
- 11 states & DC—Alaska, California, Colorado, Illinois, Maine, Massachusetts, Michigan, Nevada, Oregon, Vermont and Washington—have the most expansive laws legalizing marijuana for medical and recreational use.
  - Most other states allow for limited use of medical marijuana under certain circumstances.
- Hemp-derived **CBD** is **legal in all 50 states**, **CBD** derived from marijuana, is not **legal** federally.
- The issue, therefore, of where **CBD** is **legal** is largely determined by the source **of the CBD**. **CBD** made from 'marijuana' with high levels of THC, is only **legal** if your **state** has **legalized** marijuana.
- A number of states have also decriminalized the possession of small amounts of marijuana, e.g. New York.



Recreational Use Legalized
Medical Marijuana Broad Legalization
CBD/Non-Psychoactive Legalized
Marijuana Illegal All Forms



# Federal Preemption

- Employers that fired or refused to hire medical marijuana patients have been sued under state law for discrimination. Employers argue federal law prohibits medical marijuana use and thus state marijuana laws afford no protection to workers.
- Courts that agree with employer argument
  - 2008—California Supreme Court
    - *Ross v. RagingWire Telecommunications, Inc.* 174 P.3d 200 (Cal. 2008).
  - 2010—Oregon Supreme Court
    - *Emerald Steel Fabricators, Inc. v. Bureau of Labor and Industries*, 230 P.3d 518 (Or. 2010)
  - 2015—Colorado Supreme Court
    - *Coats v Dish Network*, 350 P.3d 849 (2015).
  - 2016—U.S. District Court for District of New Mexico
    - *Garcia v. Tractor Supply Co.*, 154 F.Supp.3d 1225 (D.N.M. 2016)
- Courts that do not agree with employer argument
  - 2018—U.S. District Court for the District of Connecticut
    - *Noffsinger v. SSC Niantic Operating Co., LLC*, 338 F.Supp.3d 78 (D. Conn. 2018)
      - CSA does not speak to the issue of employing marijuana users so CSA could not be viewed as intending to pre-empt the Connecticut Palliative Use of Marijuana Act

# Employer's Duty to Accommodate

- Do employers' drug-free workplace policies violate their obligations under state disability accommodation laws?
- Early cases—Employer Friendly:
  - 2006—Oregon Supreme Court
    - *Washburn v. Columbia Forest Products, Inc.*, 134 P.3d 161 (2006)
  - 2009—Montana Supreme Court
    - *Johnson v. Columbia Falls Aluminum Co.*, 213 P.3d 789 (2009)
  - 2011—Washington Court of Appeals
    - *Roe v. Teletech Customer Care Mgmt.*, 257 P.3d 586 (2011)
- Recent Cases—Employee Friendly:
  - 2017—Massachusetts Supreme Court
  - *Barbuto v. Advantage Sales and Marketing, LLC*, 477 Mass. 456 (2017)
    - Court held that an exception to employer's drug policy to permit offsite marijuana use may be a reasonable accommodation where a physician determines marijuana is the most effective treatment for the employee's disability

# Lessons from Court Cases

- **Federal Preemption**

- Zero tolerance drug policies may increase employer's liability under state law
- Employers may not longer prohibit cannabinoid use across the board simply because it is illegal under federal law
- Drug testing policies must account for anti-discrimination protections
- Employers should be aware of a growing list of cannabinoids that may no longer violate federal law, e.g., CBD products made from hemp stalks, FDA approved synthetic cannabinoids

- **Duty to Accommodate**

- To avoid court battles, a growing number of states are writing employment protections into their marijuana reform laws.
  - Arizona, Arkansas, Connecticut, Delaware, Illinois, Maine, Minnesota, New York, Pennsylvania and West Virginia provide specific employment protections for medical marijuana patients.
- In such states, employers need to confirm whether positive drug tests are connected to medical use before making employment decisions. Reasonable accommodation policies may also need to be revised.



# Workers' Compensation

- **Two Issues**

- Can a workers' compensation claim be denied if an employee tests positive for using state-approved medical marijuana?
- Can an injured employee seek reimbursement for medical marijuana to treat a workplace injury?

- **Courts**

- 2018—Maine Supreme Court
  - *Bourgin v. Twin Rivers Paper Company, LLC et al.*, 187 A.3d 10 (2018).
    - Employer not required to pay for employee's medical marijuana as that would conflict with federal law
- 2014—New Mexico
  - *Vialpanda v. Ben's Auto. Servs.*, 2014-NMCA-084, 331 P.3d 975 (N.M. Ct. App.), cert. denied, 331 P.3d 924 (N.M. 2014).
    - Employer appealed a workers' compensation administration order
    - Court held that marijuana may be a "reasonable and necessary" medical treatment for a workplace injury, and if a treatment is reasonable and necessary, the employer and its insurer must pay the bill.
- 2015—New Mexico
  - *Lewis v. Am. Gen. Media & Gallagher Bassett*, 355 P. 3d 850 (N.M. Ct App. 2015)
  - Appellate court held that workers' compensation judge erred by failing to recognize the legitimacy of the plaintiff's prescription.

- **State Action**

- Florida and North Dakota (expressly prohibit reimbursement)
- Illinois, Louisiana, and Oregon (reimbursement permitted, but not required)
- Minnesota (issued rules excluding medical marijuana from definition of illegal substances)
- New Mexico established maximum reimbursement amount in its workers' compensation fee schedule

# Workplace

- Employers Attitudes
- Safety and Health Risk
  - Marijuana Production & Sales Workplaces
  - General Workplaces
  - Occupational Vehicle Driving
- Workplace Drug Testing
- Impairment

# Rethinking Marijuana: Employer Attitudes

- **Major League Baseball**

- Effective spring training 2020, marijuana will no longer be considered a banned substance for players
- “Natural Cannabinoids (e.g., THC, CBD, and Marijuana) will be removed from the Program’s list of Drugs of Abuse.”

- **National Football League**

- Considering removing marijuana from its list of banned substances

# **Marijuana Production & Sales Workplaces**

# Evaluation of Potential Hazards: Harvesting & Processing Cannabis

- HHE Report No. 2015-0111-3271
  - Employees were concerned about repetitive hand motions when trimming cannabis.
  - Some hand trimming activities required a lot of hand motions, but not a lot of force.
  - *Botrytis cinerea* was the main fungal species in the air.
  - Actinobacteria was the most frequently identified bacterial phyla in the air.
  - We found tetrahydrocannabinol in every surface wipe sample.
  - Endotoxin concentrations were all below the occupational exposure limit.



# Evaluation of Chemical Exposures at a Vape Shop

- HHE Report No. 2015-0107-3279
  - Employees vaped at work.
  - Concentrations of vaping-related chemicals in our air samples were below occupational exposure limits.
  - Not all employees wore chemical protective gloves when they were working with liquids that contained nicotine.
  - The bottle of stock nicotine solution was stored in the same refrigerator used to store employees' food.

# Cannabinoid Exposures to Law Enforcement

- Evaluation of Law Enforcement Agents' Potential Exposures during a Raid of a Clandestine "Spice" Lab
- HHE Report No. 2014-0039-3246
  - AB-PINACA and/or mitragynine (from a plant called Kratom, or *Mitragyna speciosa*) found in urine of 6 of 9 agents after the raid.
  - One surface wipe from spice lab had a detectable amount of AB-PINACA.
  - 50% of agents reported symptoms handling synthetic cannabinoids.
  - Most of the agents did not use gloves when handling evidence bags in the agency's office.

# General Workplaces

# General Workplaces

- Does marijuana use lead to increased workplace injury?
  - Studies evaluating the effects of marijuana use by workers demonstrated variable outcomes on safety (Phillips et al, 2015).
  - Previous studies may underestimate the risk as THC levels in marijuana have increased over time
- States with legal medical marijuana have seen a drop in workplace deaths
  - Review of BLS/CFOI in states with marijuana reforms showed that legalizing medical marijuana was associated with a 19.5% reduction in expected number of workplace fatalities among workers aged 25-44 in 29 states and DC (Anderson et al, 2018).

# Occupational Vehicle Driving

- A study of more than 10,000 vehicle crashes in France revealed increased dose-dependent odds ratio for a crash, from 2.18 for THC < 1 ng/ml to 4.72 for THC of  $\geq 5$  ng/ml. (Laumon et al., 2005).
- Studies on driving show that marijuana can negatively effect drivers' attentiveness, perception of time and speed, and ability to draw on information from experience. (Berghaus et al, 2011).
- 2013/2014 survey conducted by the NHTSA shows that the number of drivers killed in crashes who tested positive for marijuana doubled from 2007 to 2015.
- Tolerance?
  - Controlled cannabis smoking impaired psychomotor function, more so in occasional smokers, suggesting some tolerance to psychomotor impairment in frequent users. (Desrosiers et al. 2015)



# Workplace Drug Testing—History

- **1971**
  - Nixon ordered DOD to test soldiers returning from Vietnam because of heroin use by soldiers.
- **1980s**
  - DOD expanded testing because of accidents and developed forensically credible testing program.
- **1986**
  - Executive Order 12564 established the drug-free workplace.
  - Section 1. *Drug-Free Workplace.*
    - (a) Federal employees are required to refrain from the use of illegal drugs.
    - (b) Use of illegal drugs by Federal employees, whether on duty or off duty, is contrary to the efficiency of the service.
    - (c) Persons who use illegal drugs are not suitable for Federal employment.
- **1988**
  - Congress passed the Drug-Free Workplace Act (DFWA). DFWA required some federal contractors (for contracts > 100K) and all federal grantees to agree that they will provide drug-free workplaces.
  - Act did NOT require urine drug testing.

# Federal Workplace Drug Testing—History

- **1991**—Federal Workplace Drug Testing
  - Congress required USDOT regulated industries to test all safety-sensitive employees.
- **2017**—HHS Revised Mandatory Guidelines for Federal Workplace Drug Testing Programs.
  - 82 FR 7920 (January 23, 2017).
- **2019**—SAMSHA Memorandum
  - HHS has said that CBD (like marijuana) is classified as a Schedule I drug and that CBD products could contain THC.
  - Studies show that some CBD products labeling does not accurately reflect their content. Cannabis with > 0.3% THC are not hemp.
  - 2018 Farm Bill legalized hemp products under certain conditions but does not change the policy on marijuana under the DFWP.

<b>Aviation</b> FAA	Flight crews, flight attendants, flight instructors, air traffic controllers at facilities not operated by the FAA or under contract to the U.S. military, aircraft dispatchers, aircraft maintenance or preventative maintenance personnel, ground security coordinators and aviation screeners. Direct or contract employees of 14 CFR Part 121 or 135 certificate holders, Section 91.147 operators and air traffic control facilities not operated by the FAA or under contract to the US Military. See FAA regulations at 14 CFR Part 120.
<b>Commercial Motor Carriers</b> FMCSA	Commercial Drivers License (CDL) holders who operate Commercial Motor Vehicles, 26,001 lbs. gwvr. or greater, or operate a vehicle that carries 16 passengers or more including the driver, or required to display a DOT placard in the transportation of hazardous material. <sup>1</sup> See FMCSA regulation at 49 CFR Part 382.
<b>Maritime</b> USCG <sup>2</sup>	Crewmembers operating a commercial vessel. See USCG regulations at 46 CFR Parts 4 & 16.
<b>Pipeline</b> PHMSA	Operations, maintenance and emergency response. See PHMSA regulations at 49 CFR Part 199.
<b>Railroad</b> FRA	Hours of Service Act personnel, engine & train, signal service or train dispatchers. See FRA regulations at 49 CFR Part 219.
<b>Transit</b> FTA	Vehicle operators, controllers, mechanics and armed security. See FTA regulations at 49 CFR Part 655.

Links to these regulations can be found on-line at [www.dot.gov/odapc](http://www.dot.gov/odapc).

# Workplace Drug Testing—History

- Early on, employers adopted drug testing after being convinced that the costs of having drug users in the workplace was greater than the cost of a drug testing program.
- Use of a urine drug testing program to exclude “users” of illegal drugs provided a measurable way to identify individuals who were “not suitable for Federal employment.”
- Urine drug testing can tell you if a person has THC metabolites in their system, but not *when* they used the substance.

# Workplace Urine Drug Testing—Slow Decline

- American Management Association
  - 1987—21% of its members had institute drug testing programs
  - 1996—“the share of major U.S. firms that test for drugs rose to 81% ...”
  - 2003—63% conduct pre-employment and current employee testing
- Society of Human Resources Management (2011)
  - 57% pre-employment testing on **all** job candidates
- Current
  - <50% and declining

# Marijuana Use Increasing, Urine Drug Testing Declining

- Drug use among American employees, as measured by the percentage of employees who tested positive in urine drug tests, is at a 14-year high, standing at 4.4 percent.
  - Cannabis continues to be the most popular substance, with 2.8 percent of all employees tested showing positive results.
- Fewer jobs disclose that they require drug testing before confirming employment, or during employment.
  - On average, only 1.47 percent of job postings in the U.S. mention that they require pre-employment drug tests.
  - On average, only 0.66 percent of job postings mention regular drug testing.

– <https://www.forbes.com/sites/javierhasse/2019/08/05/drug-testing-at-work/#6d9bb7e3fa72>



# Workplace Drug Testing—Reasons for Decline

- **Labor shortages**
  - Aging workforce, low unemployment and a strong economy, employers having difficulty filling positions and are removing barriers that might exclude otherwise qualified people from the workplace.
  - Employers understand that use outside the workplace ≠ impairment for essential job duties
- **Negative ROI**
  - Employers do not see a positive ROI when they weigh the costs of pre-employment testing against the results.
- **Erosion of Morale**
  - Employers express concern that screening can hurt prompt applicants to look elsewhere.
- **Potential legal challenges**
  - Employers worry they will be caught up in a brewing legal battle over differences between federal and state law on marijuana.

# Workplace Drug Testing—Evolution

- Nevada
  - Assembly Bill 132—went into effect January 1, 2020
    - Prohibits, with certain exceptions, an employer from denying employment to a prospective employee because the prospective employee has submitted to a drug screening test and the test indicates the presence of marijuana.
- Nevada is now the first state that bans most employers from utilizing pre-employment drug tests for marijuana as a hiring practice.
  - Exceptions: Firefighters, EMTs, workers who have to drive for a living.

# Effectiveness of Drug Testing for Marijuana

- Effectiveness measures:
  - Deter marijuana use in the workplace
  - Reduce workplace injuries
  - Prevent loss of productivity
- Studies showing positive safety effects from drug testing
  - Decrease injury rates in construction (Wickizer et al., 2004).
- Studies showing no injury prevention effect from drug testing
  - 2010 systematic review (MacDonald et al., 2010)
    - “Urine drug testing has not been shown to have a meaningful impact on job injury/accident rates.”
  - 2014 systematic review of 23 studies from 1990 to 2013 (Pidd & Roche, 2014)
    - “Evidence base for the effectiveness of testing in proving workplace safety is at best tenuous.”

# Evaluation of Workplace Impairment

- If a positive urine drug test *for* marijuana is not equivalent to impairment *from* marijuana, then how do you determine whether the employee has the capacity to perform the essential job duties.
- Validated impairment instruments, protocols, or guidelines for prescription drugs or illicit substances like marijuana are needed.
  - (Reisfield et al., 2013)
- Impairment evaluations that have been suggested involve a reliance on expert (physician) observation for signs of acute drug intoxication, and advanced blood (plasma) testing indicating current or very recent use.
  - (Phillips et al. 2015; CCOHS, 2018)

# Efforts to Develop a *Per Se* Legal Standard

- **ACOEM/AAOHN (2015)**

- A plasma level of 5 ng/mL of THC can be used as one indicator with other medical signs of impairment from marijuana.

Table 1. Establishing Impairment—Casual vs Long-term User

THC Plasma Level	Casual User	Long-term User
0–2 ng/mL	Cannot establish impairment	Cannot establish impairment
2–5 ng/mL	Likely impaired	May be impaired
5+ng/mL	Likely impaired	Likely impaired

THC, delta-9-tetrahydrocannabinol.

- **Colorado and Washington State**

- Use 5 ng/ml in blood, equal to approximately 10 ng/ml in serum, of THC and active metabolites as a presumed level of driving under the influence when accompanied by behavior indicating impairment.

# Are Marijuana Breathalyzers Coming?

- Impetus
- Marijuana DUI cases hinge on blood test results. Traces of THC metabolites, the drug's byproducts, can remain in the body for up to a month. Proving impairment is notoriously difficult. There is no "per se" standard, or legal threshold, of what constitutes intoxication. Often, cases get thrown out of court. Officers who are qualified drug recognition experts and trained to spot stoned drivers can spend up to two days in court on the stand.
- Several companies are reported on the verge of releasing marijuana breathalyzers that they say will accurately show whether someone inhaled marijuana within a 3-hour of being tested.
- Vendors are expected to have marijuana breathalyzers on the market by the second half of 2020.
  - Hound Labs (Oakland, CA) <https://houndlabs.com/>
  - SannTek (Ontario, Canada) <https://www.sannteklabs.com/>
- Uses:
  - May enable law enforcement to assess drugged driving in the field as opposed to taking the individual to a hospital for a blood test.
  - May aid in evaluation of workplace impairment



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