

We Know A Lot About Cannabis

Trecia Ehrlich, MPH

Research Consultant, Washington State Liquor and Cannabis Board

Using research to reframe how we think about Cannabis

Disclaimer

- ▶ Today's presentation is intended to inform the audience around the scope of research on cannabis as it relates to a better understanding cannabis and public health. It aims to provide both information from research, as well as a framework for analyzing that research.
- ▶ The views expressed today represent the speaker's summary of that process, and do not necessarily reflect the views of the Washington State Liquor and Cannabis Board.
- ▶ The speaker is not (necessarily) intending to defend any research presented, but instead share the research observed.

What is research?

Research comprises "creative and systematic work undertaken to increase the stock of knowledge, including knowledge of humans, culture and society, and the use of this stock of knowledge to devise new applications."

-The Organization for Economic Cooperation and Development

Research isn't intended to be right, it's intended to add truth.

Hazardous Journeys

Parachute use to prevent death and major trauma related to gravitational challenge: systematic review of randomised controlled trials

BMJ 2003 ; 327 doi: <https://doi.org/10.1136/bmj.327.7429.1459> (Published 18 December 2003)

Cite this as: *BMJ* 2003;327:1459

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Gordon C S Smith (gcss2@cam.ac.uk), professor¹, Jill P Pell, consultant²

Author affiliations ▾

¹Correspondence to: G C S Smith

Abstract

Objectives To determine whether parachutes are effective in preventing major trauma related to

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The research on regulation

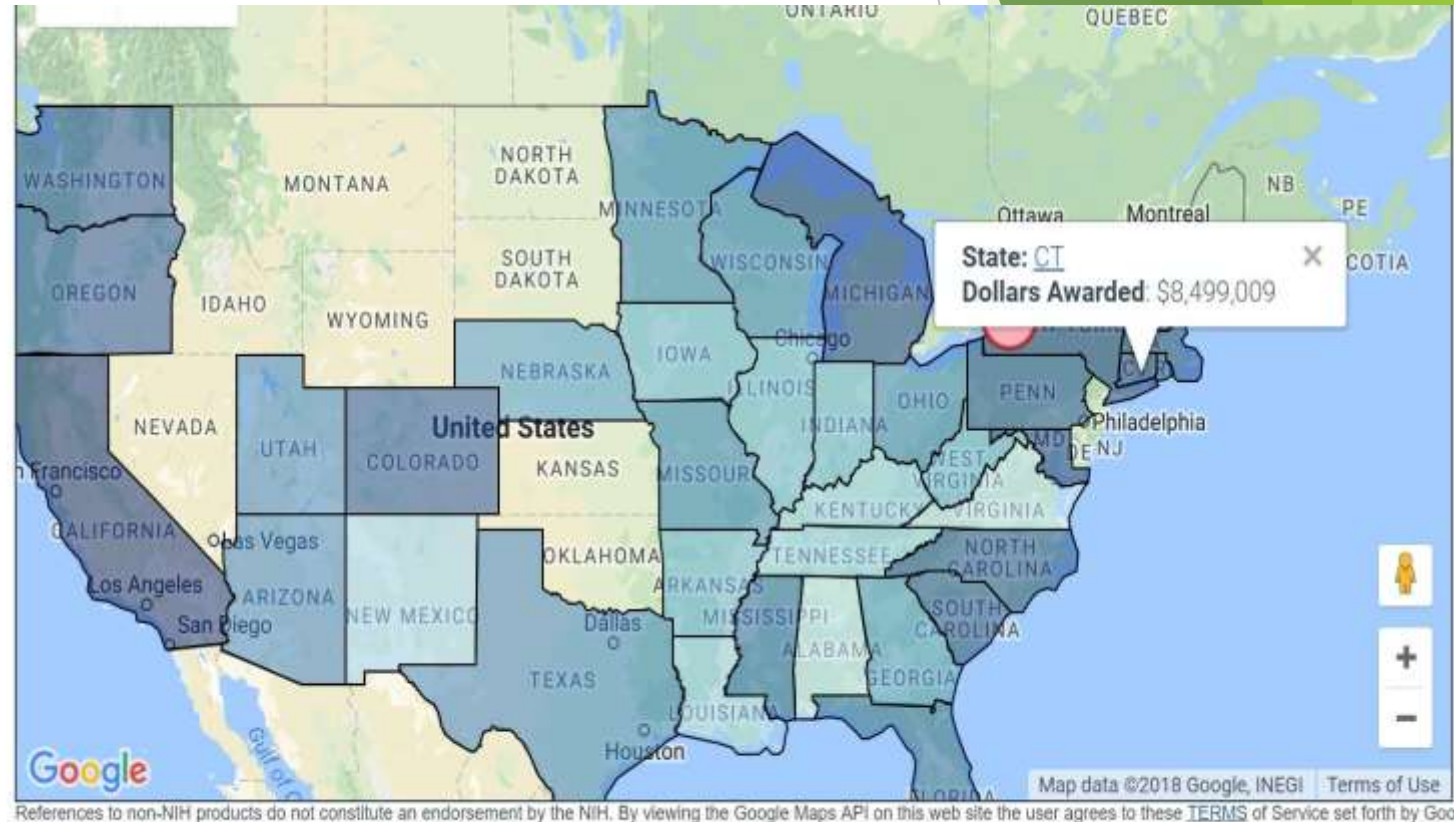
- ▶ Most research on regulation focuses on public opinion and efficacy of alcohol and tobacco regulations.
- ▶ The most effective policy interventions for reducing the health burdens and societal costs of alcohol are:
 - ▶ Reducing or restricting outlet density
 - ▶ Restricting advertising
 - ▶ Increasing prices ⁽¹⁾
- ▶ Providing constituents with information and education about the adverse health effects of a substance, or the effectiveness of an intervention increases support for the associated regulation. ^(1,2)

The Challenges of Cannabis Research

- ▶ Classification as a Schedule 1 Federal Controlled Substance
 - ▶ Prevents some human subjects research, challenges funding streams, limits the type of cannabis available for testing
- ▶ Polysubstance use makes it difficult to isolate the effects of cannabis from those of tobacco or alcohol
- ▶ Much of research funding is provided to states that have not legalized retail use
 - ▶ Challenges understanding the effects of legalization and understanding different sociopolitical and economic contexts

Where is cannabis research happening?

- ▶ Washington - \$4.66 million
- ▶ California - \$26.19 million
- ▶ New York - \$12.47 million
- ▶ Michigan \$11.39 million
- ▶ Connecticut - \$8.49 million
- ▶ Colorado - \$6.97 million
- ▶ Oregon- \$3.94 million



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<input type="checkbox"/>	4	R01	DA023668	09		CANNABIS AND TOBACCO INVOLVEMENT: A TWIN STUDY	AGRAWAL, ARPANA	WASHINGTON UNIVERSITY	2016	NIDA	NIDA	\$289,034	
<input type="checkbox"/>	5	K02	DA032573	07		DELINEATING THE ROLE OF GENETIC INFLUENCES ON CANNABIS INVOLVEMENT	AGRAWAL, ARPANA	WASHINGTON UNIVERSITY	2018	NIDA	NIDA	\$119,134	
<input type="checkbox"/>	5	R01	DA040411	03		CANNABIS, DEPRESSION AND SUICIDAL THOUGHTS AND BEHAVIORS	AGRAWAL, ARPANA et al.	WASHINGTON UNIVERSITY	2017	NIDA	NIDA	\$381,250	
<input type="checkbox"/>	2	R01	DA027232	05A1		EFFECT OF SEX DIFFERENCES AND CONCURRENT CANNABIS USE ON STRESS-RELATED PSYCHOBIOLOGICAL MECHANISMS ASSOCIATED WITH SMOKING CESSATION AND RELAPSE	AL'ABSI, MUSTAFA N.	UNIVERSITY OF MINNESOTA	2017	NIDA	NIDA	\$397,279	
<input type="checkbox"/>	5	K99	AT009156	02		USING PRE-CLINICAL BIOMARKERS AND EPIDEMIOLOGICAL MODELS TO ASSESS THE EFFECTS OF CANNABINOIDS ON DISEASE	ALSHAARAWY, OMAYMA O	MICHIGAN STATE UNIVERSITY	2017	NCCIH	NCCIH	\$90,591	
<input type="checkbox"/>	5	R01	DA040716	02		NEUROCOGNITIVE CONSEQUENCES OF ADOLESCENT MARIJUANA USE	ANOKHIN, ANDREY P.	WASHINGTON UNIVERSITY	2018	NIDA	NIDA	\$599,842	
<input type="checkbox"/>	5	R01	DA039924	03		ECOLOGICAL MOMENTARY ASSESSMENT OF CANNABIS USE EFFECTS IN YOUNG ADULTS	ANSELL, EMILY B	SYRACUSE UNIVERSITY	2018	NIDA	NIDA	\$423,990	



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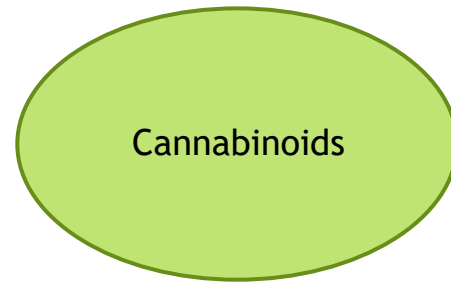
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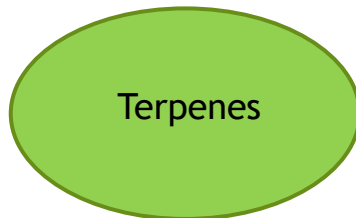
<input type="checkbox"/>	T	Act	Project	Year	Sub #	Project Title	Contact PI/ Project Leader	Organization	FY	Admin IC	Funding IC	FY Total Cost by IC	Similar Projects
<input type="checkbox"/>	5	R01	DA039707	03		MARIJUANA HARM REDUCTION: INNOVATIVE STRATEGIES FOR DEVELOPING NEW KNOWLEDGE	HUTCHISON, KENT E	UNIVERSITY OF COLORADO	2018	NIDA	NIDA	\$478,010	
<input type="checkbox"/>	1	R01	DA043475	01A1		BEHAVIORAL PHARMACOLOGY OF CANNABINOID AND TERPENOID EFFECTS AND INTERACTIONS	VANDREY, RYAN G	JOHNS HOPKINS UNIVERSITY	2017	NIDA	NIDA	\$716,141	
<input type="checkbox"/>	1	R01	DA045003	01		COMPARATIVE PHARMACOLOGY OF CANNABINOIDS IN RODENT MODELS	WILEY, JENNY L	RESEARCH TRIANGLE INSTITUTE	2018	NIDA	NIDA	\$526,837	

What is cannabis composed of?

The aromatic compound of cannabis. A natural pesticide attracting pollinators and repelling predators, attracting beneficial predators. Provides odor to the plant, and works synergistically with cannabinoids to moderate or modulate their effects.



The most common cannabinoid is THC (psychoactive). CBD is known for anti-inflammatory and anti-epileptic properties. THCA is the precursor to THC. CBG and CBN are known as appetite stimulants and anti-emetics.



Linalool- relaxant



Humulene - Anti-inflammatory



Myrcene- Sedative, effect modulator



Provides pigmentation (greens and purples), contribute to odor and flavor. Some therapeutic indications (anti-fungal, antioxidant). Protects plant from UV rays. The most understudied, and least understood of cannabis compounds.

Let's do some math! Thinking about dosage and potency

1 gram joint = 1000 mg



- ▶ Myrcene: 0.84% = 8.4 mg
- ▶ Limonene: 0.67 % = 6.7 mg
- ▶ β Caryophyllene: 0.28% = 2.8 mg
- ▶ β Pinene: 0.22% = 2.2 mg
- ▶ THC: 19.52% = 195 mg
- ▶ CBD 0.32% = 3.2 mg

- ▶ Examples of dosages studied:
Myrcene @ 100mg/kg weight (in mice). CBD @ 20mg/kg weight (in pediatric epilepsy patients).



Cannabis Advertising, Information Sharing, & Social Media

- ▶ 77% of past month marijuana users who viewed marijuana advertisements saw them through social media. ⁽³⁾
- ▶ In a study of Washington State cannabis retailers who advertised on weedmaps;
 - ▶ 35% had no age verification on their sites
 - ▶ 44% made health claims about the benefits of marijuana ⁽⁴⁾
- ▶ In a survey of 742 current marijuana users, 1/3 of users had viewed a marijuana product review in the last 30 days. ⁽⁵⁾



twitter

Social Media continued...

- ▶ In a content analysis of 116 YouTube videos about dabbing, 89% showed at least one person dabbing, and 54% made mention of medical marijuana. Twenty-one percent contained a brief cautionary message. ⁽⁶⁾
- ▶ In an analysis of a popular pro-marijuana twitter handle @stillblazingtho (~1 million followers), 73% of followers were under the age of 19, and were disproportionately African American (42.55%) or Hispanic (11.95%) when compared to twitter averages. ⁽⁷⁾
- ▶ In an analysis of 5,000 randomly sampled tweets about marijuana dabbing, 45% of tweeters expressed dabbing with an intention to pass out. ⁽⁸⁾

Pharmaceutical or fun?



[Redacted] all that you do, thank you to the mothers out there. Show your gratitude by hooking up mom with something she really needs!

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[Redacted] #instagood #weedporn #nugporn #love #beautiful #kush #frost #420 #bud #thc #growcannabis #stoner #highsociety #marijuana #cannabis #cannabiscommunity #smokeweedeveryday #maryjane #710life #dabstagram #legalweed #weedstagram #dank #garden #hightimes #cbd



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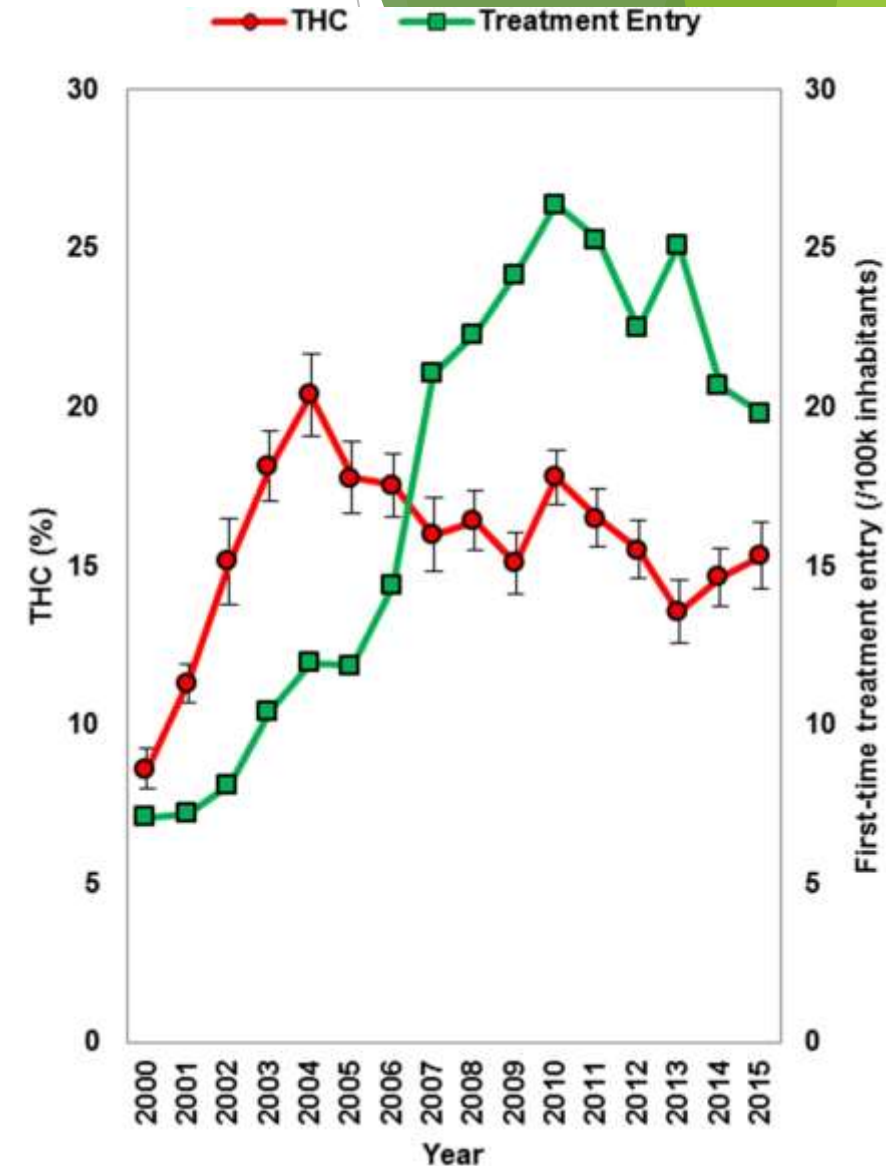


Same, same- but different...



Potency

- ▶ High THC cannabis is more strongly associated with cannabis dependence. ⁽⁹⁾
- ▶ Market-wide increases in THC potency are associated with population level increases of first-time entry into addiction treatment. ⁽¹⁰⁾
- ▶ A growing number of case studies have been reported in regard to cardiotoxicity after dabbing, with patients presenting with tachycardia, hypertension, hyperthermia, and severe agitation. ⁽¹¹⁾
- ▶ CBD may attenuate some of the negative effects of THC, acting as an antagonist to some of the psychoactive effects and cognitive impairments associated with THC. CBD may have neuroprotective properties when used in conjunction with THC. ^(11, 13, 14)



Potency continued

- ▶ Butane Hash Oil (BHO, concentrate) use is associated with greater risk (RR=1.8) of physical dependence, academic/occupational issues, impaired control, and poor self care- even after controlling for sociodemographic factors, age of onset, and frequency of use. ⁽¹²⁾
- ▶ Issues relating to the adverse effects of potency are not necessarily isolating the negative effects of THC, but may be indicative of problems relating to very low amounts of CBD in popular strains and extracts.

Cannabinoid Hyperemesis Syndrome

- ▶ First described in 2004, cannabinoid hyperemesis syndrome (CHS) is characterized by episodic vomiting that is often relieved by hot water bathing or compulsive showering. Symptoms typically present after chronic, heavy cannabis use. Symptoms resolve with abstinence from cannabis use. (15)
- ▶ CHS has become more prevalent with increases in cannabis use and potency. (16)
- ▶ It is difficult to identify the incidence and prevalence of CHS, as the disease is poorly understood, and often underreported or misdiagnosed. In 2014, prevalence data suggested that somewhere between 2.1 and 3.4 million individuals have suffered from CHS since its first description in 2004. (17)



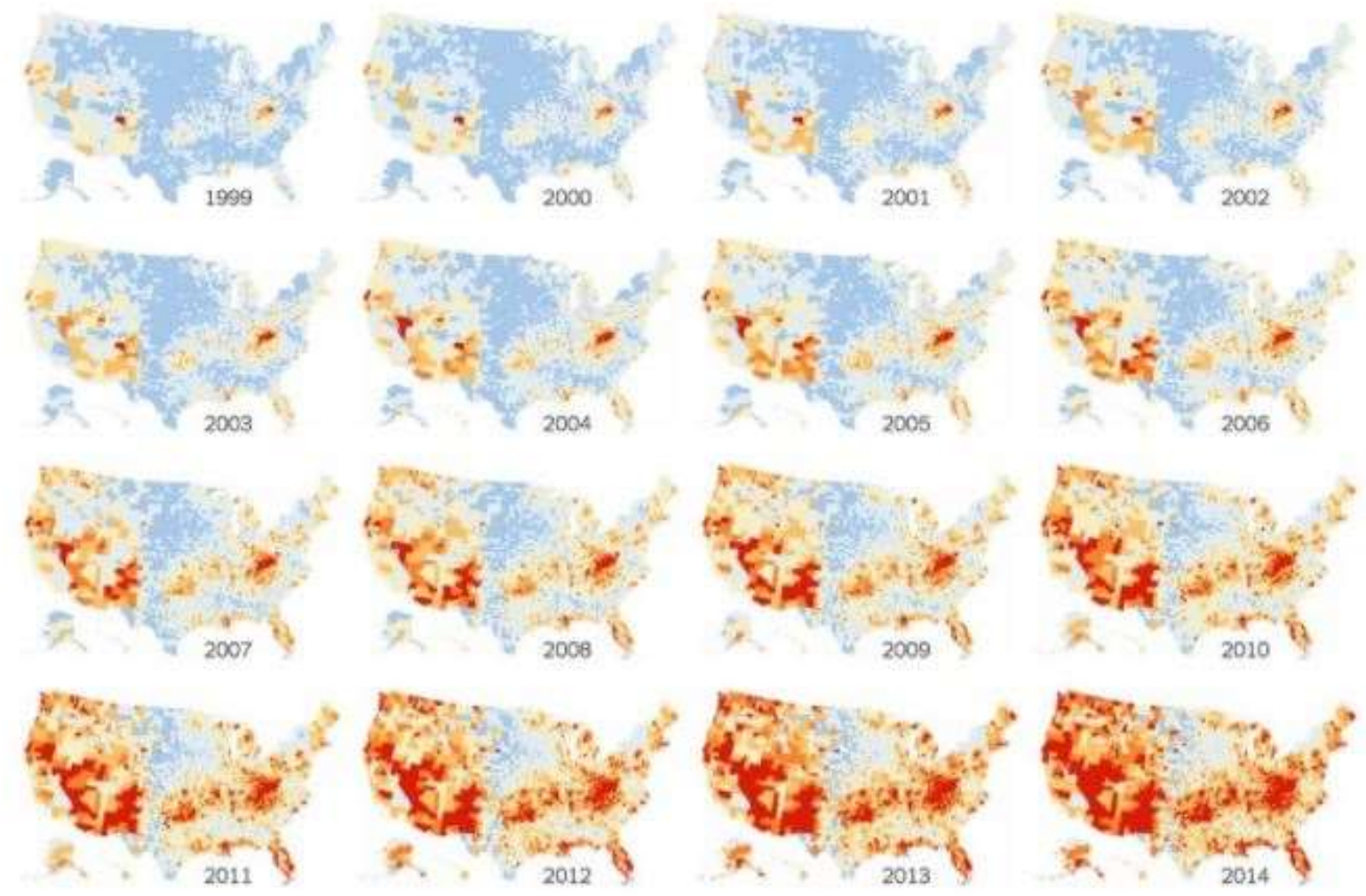
**States that legalized
medical marijuana had 25%
fewer opioid-related deaths.**

weedmaps
😊

October 2014 Medical Cannabis Laws & Opioid Analgesic Overdose Mortality in the United States, 1990-2010,
Marcus A. Bachhuber et. Al. (JAMA Intern Med.)



Cannabis and Opioids



How overdose deaths rippled across the United States.
Haeyoun Park and Matthew Bloch/The New York Times

Cannabis and Opioids

- ▶ Really challenging to disentangle correlation and causation.
 - ▶ Epidemic started at the same time as the initiation of MCL's.
 - ▶ Research around associations between changing cannabis laws and opioid death rates have not controlled for the liberalization of naloxone (Narcan).
 - ▶ Many states with legal cannabis laws also have more resources for people experiencing opioid addiction.
- ▶ Cannabis has been proven to help with pain management and sleep dysfunction, much like opioids. ⁽¹⁸⁾
- ▶ Ethnographic and qualitative research suggests that those living with chronic conditions are using cannabis as an alternative to, complimentary with, or tapering from opioids, with some able to significantly reduce their usage. ⁽¹⁹⁾
- ▶ Problematic use, as defined by the DSM IV was more common among those prescribed opioids for chronic pain (52.6%) than those using cannabis medicinally for chronic pain (21.2%). ⁽²²⁾

Cannabis for Medical Patients

▶ Post Traumatic Stress Disorder

- ▶ CB1 receptors in the hippocampal region have a prominent role in anxiety, the consolidation of fear related memories, and fear related behavior. Cannabinoids specifically target these receptors, while simultaneously aiding in acute symptom relief (including insomnia and stress). (28)

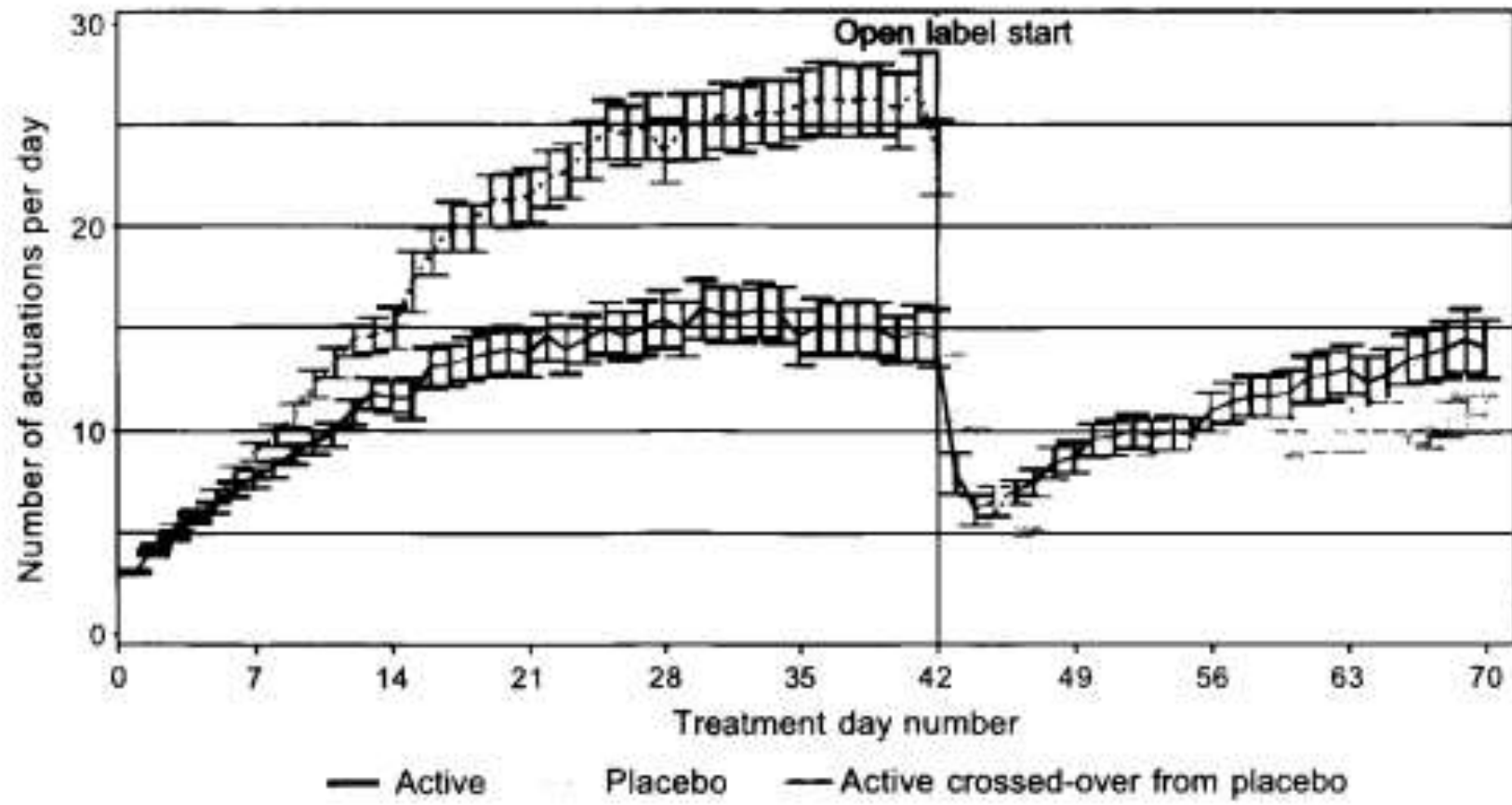
▶ Chronic Pain

- ▶ Cannabis for pain management dates back to 2900 BC, where it was recommended in ancient Chinese texts in the treatment of rheumatic pain, and was mixed with wine to anesthetize patients during surgical procedures. (29)
- ▶ Patients have reported reduced pain after administration with THC, however dosage, ideal routes of administration, and side effect profiles are still not clinically understood. (29)

- ▶ Cannabis has been tested for medical use for a variety of conditions including but not limited to; Alzheimer's disease, anorexia nervosa, anxiety, dementia, dystonia, Huntington's disease, Parkinson's disease, Tourette syndrome, glaucoma, HIV, cancer-related nausea, ALS, MS, and more.

Cannabis for Medical Patients continued...

- ▶ Plant composition, specifically as it relates to terpenes and cannabinoids may have greater implications in medical dosing and strain type than commonly understood. (30)
- ▶ Cannabis has been found helpful in reducing patient reports of spasticity, pain, and stiffness in patients with MS. (31)
- ▶ Doctors report low-self efficacy in advising patients on the use, dosage, phytochemical composition of cannabis for their health conditions. (32)



NB Clinic review occurred on days 14 and 42

Source: Wade, DT. Et al. Do cannabis-based medicinal extracts have general or specific effects on symptoms in multiple sclerosis? A double-blind, randomized-placebo controlled study on 160 patients. *Mult Scler.* 2004 Aug; 10(4) 434-441.

Cannabis Testing

- ▶ In a study of medical cannabis edibles in 2015 (75 products from 47 brands), THC content in 17% of products were accurately labeled, 23% were underlabeled, and 60 percent were overlabeled. (33)
- ▶ In an analysis of cannabis strains across Washington State, a research team found what they described as “systematic variability” between the cannabinoid content reported by different labs, with variations as wide as 6 percentage points of THC between different labs. (34)
- ▶ The chemical compounds (like THC and CBD) are not evenly distributed throughout the plant, therefore variations in potency (to some degree) are to be expected.
- ▶ Testing variability is common in many new industries, including nutrition and pharmaceuticals. Some of this variability has reduced over time. (35)

Cannabidiol - CBD

- ▶ A CBD based pharmaceutical, Epidiolex, was recently approved by the FDA for pediatric epilepsy.
- ▶ CBD for pediatric epilepsy is typically dosed at 20/mg/kg/day (approximately 400mg). (36)
- ▶ CBD has been shown to have anti-inflammatory and anxiolytic effects, however dosage has not been specified. (30)
- ▶ Dosage may have important implications for consumers concerned about cost/efficacy relative to other options.

Worker Safety

- ▶ Exposure to molds and allergens (terpenes) can cause rhinitis and contact dermatitis after prolonged exposures. (37, 38)
- ▶ CO2 exposures may cause fatigue. CO2 levels in grow rooms are typically below OSHA thresholds. (37)
- ▶ Forty-six percent of workers surveyed in Colorado reported having had little or no worker safety training since starting work. (39)
- ▶ Legalization invites new innovations and technologies into the field, with hazards constantly evolving, ozone generators and UV sanitizers have proven particularly harmful for human health if exposed. (38)

Questions and Answers

Trecia.Ehrlich@lcb.wa.gov

Thank you!

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