

# Problems with our High Potency THC Marijuana from the perspective of an Addiction Psychiatrist

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May 1, 2020

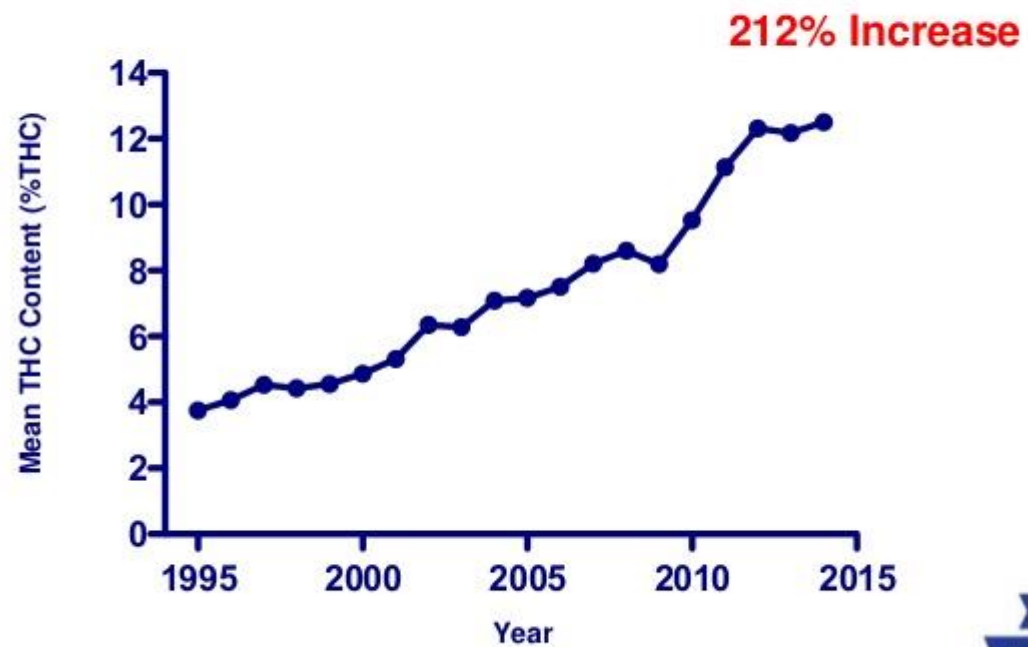


# The Biggest Problem: THC Content is Not Like It Used to Be...

- 1980 THC content was less than 2%
- 1997- 4.5%
- 2006- 8.5%
- 2015- 20% or more
- Average potency of marijuana flowers/buds in Colorado is now 17.1% THC while the average potency for concentrates is 62.1%. Potency rates of up to 95% have been recorded. Smartcolorado.org
- After the Dutch observed negative impacts from rising THC potencies, a team of health experts concluded that THC potencies above 15% should be considered a hard drug.

(Laar, Margriet van, Guus Cruts, Marianne van Ooyen-Houben, Esther Croes, Peggy van der Pol, Ronald Meijer, and Toine Ketelaars. "The Netherlands Drug Situation 2014:" Reitorx National Focal Point, n.d. [http://specialtydiagnostix.de/wp-content/uploads/ti/en/trimbos\\_2014.pdf](http://specialtydiagnostix.de/wp-content/uploads/ti/en/trimbos_2014.pdf). )

## THC Content Over Last 20 Years



Mahmoud A. Elsohly (2014), Potency Monitoring Program, Supported by NIDA



# Formulations – can be up to 95% THC

Joint



Bong



Oil



Shatter



Dabbing






# Edibles







# There is no difference in products available in medical versus recreational dispensaries in Colorado despite lack of research supporting use of high THC concentrates

- Whiting PF, Wolff RF, Deshpande S et al. Cannabinoids for medical use a systematic review and meta-analysis. JAMA 2015;313:2456-2473
- Studies of smoked cannabis all lower than 10% THC
- study in healthy volunteers on the effects of cannabis on capsaicin-induced pain found that there is a window of modest analgesia for smoked cannabis, with 2% THC providing no benefit, 4% THC providing significant decrease in pain but 8% THC resulting in an increase in pain or hyperalgesia.
- several of the pain studies utilized the pharmaceutical drug Sativex which is an oral mucosal spray with 2.7 mg THC and 2.5 mg CBD per dose. A typical marijuana joint weighs 0.5 g. If the product is 12 – 23% THC then a typical joint contains 60 – 115 mg of THC which is 20 – 40 times the medicinal dose.

Table 1

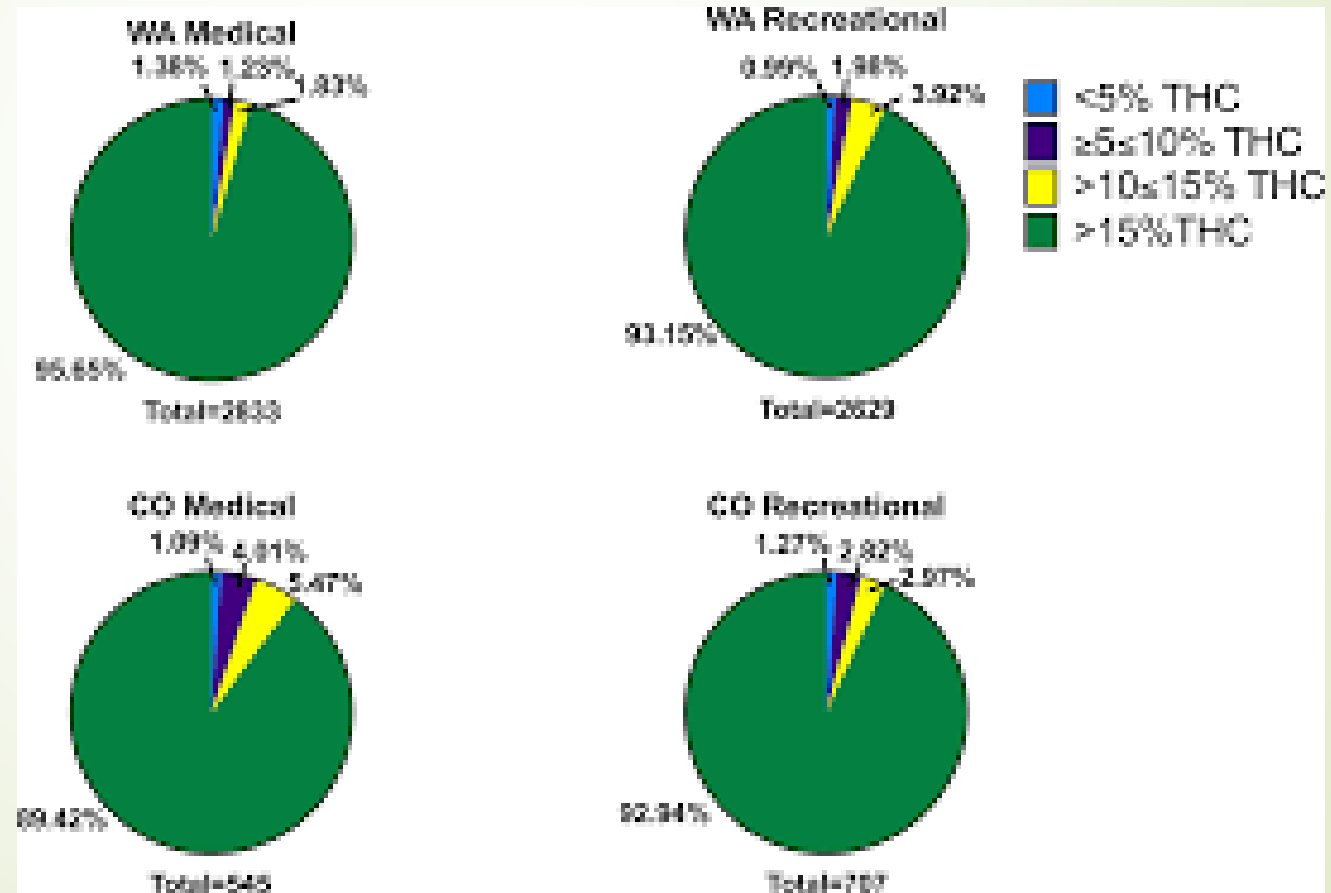
## U.S. States with Medical or Recreational Cannabis Laws (May 2016)

State	Has MCL	MCL duration (years)	Has RCL	Permit home cultivation	Permit dispensary	# de jure operating dispensaries	U.S. Census Population (2015)	Dispensary per 100,000 people
AK	Yes	18	Yes	Yes	No	0	738,432	0.00
AZ	Yes	6	No	Yes	Yes	93	6,828,065	1.36
CA	Yes	20	No	Yes	Yes	1000–2000 *	39,144,818	2.55–5.11
CO	Yes	16	Yes	Yes	Yes	949	5,456,574	17.39
CT	Yes	4	No	No	Yes	6	3,590,886	0.17
DC	Yes	6	Yes	Yes	Yes	5	945,934	0.53
DE	Yes	5	No	No	Yes	1	672,228	0.15
HI	Yes	16	No	Yes	Yes	0	1,431,603	0.00
IL	Yes	3	No	No	Yes	36	12,859,995	0.28
ME	Yes	17	No	Yes	Yes	8	1,329,328	0.60
MD	Yes	2	No	No	Yes	0	6,006,401	0.00
MA	Yes	4	No	Yes	Yes	6	6,794,422	0.09
MI	Yes	8	No	Yes	No	0	9,922,576	0.00
MN	Yes	2	No	No	Yes	3	5,489,594	0.05
MT	Yes	12	No	Yes	No	0	1,032,949	0.00
NV	Yes	16	No	Yes	Yes	26	2,890,845	0.90
NH	Yes	3	No	No	Yes	0	1,330,608	0.00
NJ	Yes	6	No	No	Yes	6	8,958,013	0.07
NM	Yes	9	No	Yes	Yes	23	2,085,109	1.10
NY	Yes	2	No	No	Yes	17	19,795,791	0.09
OR	Yes	18	Yes	Yes	Yes	423	4,028,977	10.50
PA	Yes	0.1	No	No	Yes	0	12,802,503	0.00
RI	Yes	10	No	Yes	Yes	3	1,056,298	0.28
VT	Yes	12	No	Yes	Yes	4	626,042	0.64
WA	Yes	18	Yes	Yes	Yes	237	7,170,351	3.31


Borodovsky  
JT et al.  
Drug  
Alcohol  
Depend  
2017  
177:299-306

# Most products available in medical dispensaries in Colorado have greater than 15% THC

Cash MC, Cunnane K, Fan C, Romero-Sandoval EA. Mapping cannabis potency in medical and recreational programs in the United States. PLOS ONE 2020.







# The higher the potency of the drug the more potential for addiction

- Nicotine – FDA now talking about reducing nicotine concentration in tobacco
- Alcohol – 3.2 beer versus Vodka
- Cocaine – coca leaf versus crack cocaine
- Opioids – codeine versus Oxycontin
- Cannabis – marijuana of the 60s-80s when THC was <2% versus current high potency THC 17-28% in the flower, 60-95% in the concentrates

# Increasing drug culture increases drug use in Pueblo

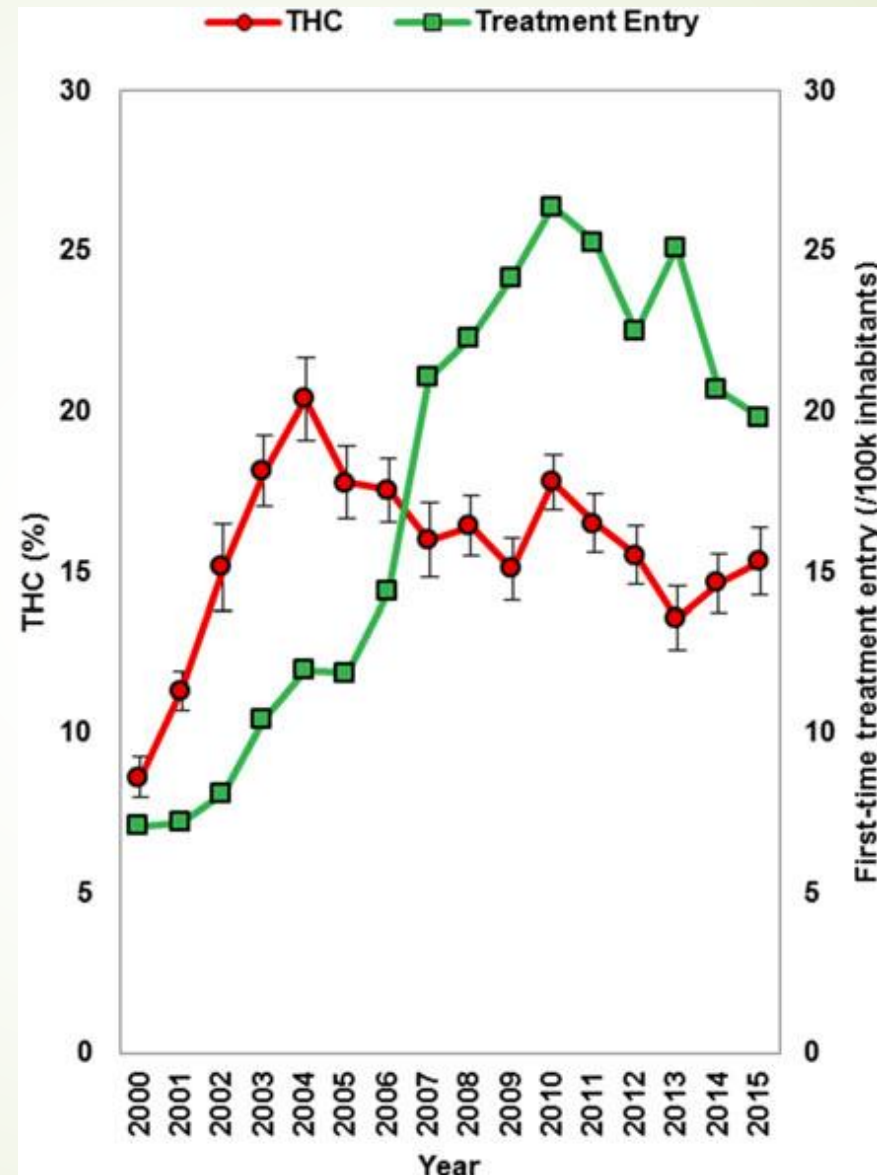
Emergency Department Drug Screens By Year, Parkview Medical Center –  
data collected by Karen Randall, MD ER physician

2013 (Census 80,185 patients)	2018 (Census 82,025 patients)	Percentage Increase
570 tests/month (11.7 patients per test)	636 tests/month (10.7 patients per test)	
273/month positive (47%)	389/month positive (61%)	42.5% increase
129/month positive for cannabis	202/month positive for cannabis	56.6% increase
133/month positive for opiates	147/month positive for opiates	10.5% increase
53/month positive for amphetamines	129/month positive for amphetamines	143% increase

# Changes in cannabis potency and first-time admissions to drug treatment: a 16-year study in the Netherlands

Freeman TP et al.  
Psychological  
Medicine 2018

**Fig. 1.** Mean (95% CI) concentrations of  $\delta$ -9-tetrahydrocannabinol (THC) in domestic herbal cannabis and first-time cannabis admissions to specialist drug treatment (per 100 000 inhabitants) from 2000 to 2015.



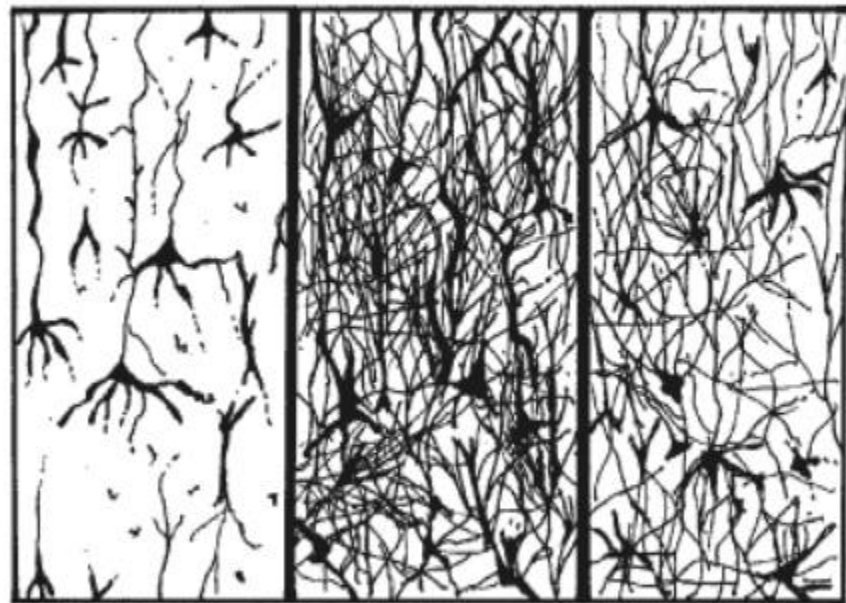


# Endocannabinoid Receptors



- Are all over the brain – receptors for anandamides - “supreme joy”
- CB1 receptors regulate the balance between excitatory and inhibitory neuronal activity
- Exposure to cannabis during adolescence disrupts glutamate which plays an important role in synaptic pruning in PFC – disrupting normal brain development
- Lubman et al. Cannabis and adolescent brain development. Pharmacology and Therapeutics 2015;148:1-16

# Synaptic Pruning



at a child's birth

at 7 years of age

at 15 years of age

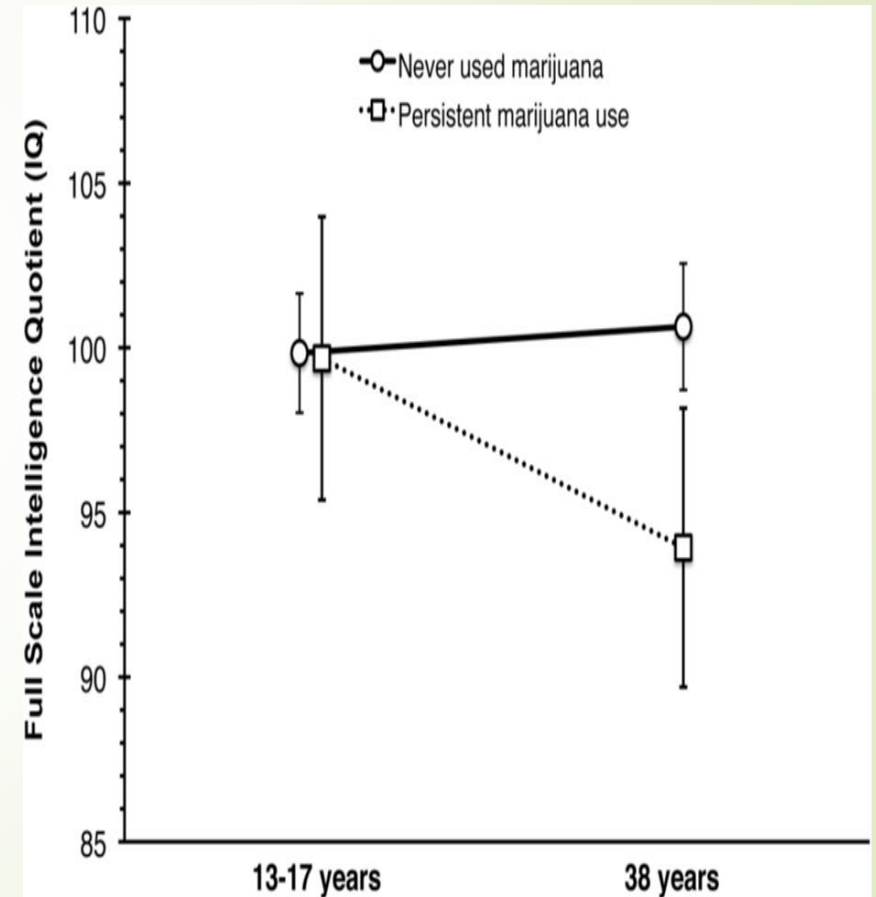
The next change after this synaptic growth spurt is a selective pruning which takes place.

In adolescence, most of this pruning is taking place in the frontal lobes.


The adolescent loses approximately 3 percent of the gray matter in the frontal lobes.

# IQ and Brain Development Studies

- Prospective study New Zealand – 1,037 individuals followed for 20 years
- Neuropsych testing at 13 before initiation of cannabis and again at age 38
- IQ decrease by 8 points with early persistent teen use of cannabis
- Meier et al. Proc Natl Acad Sci, 2012





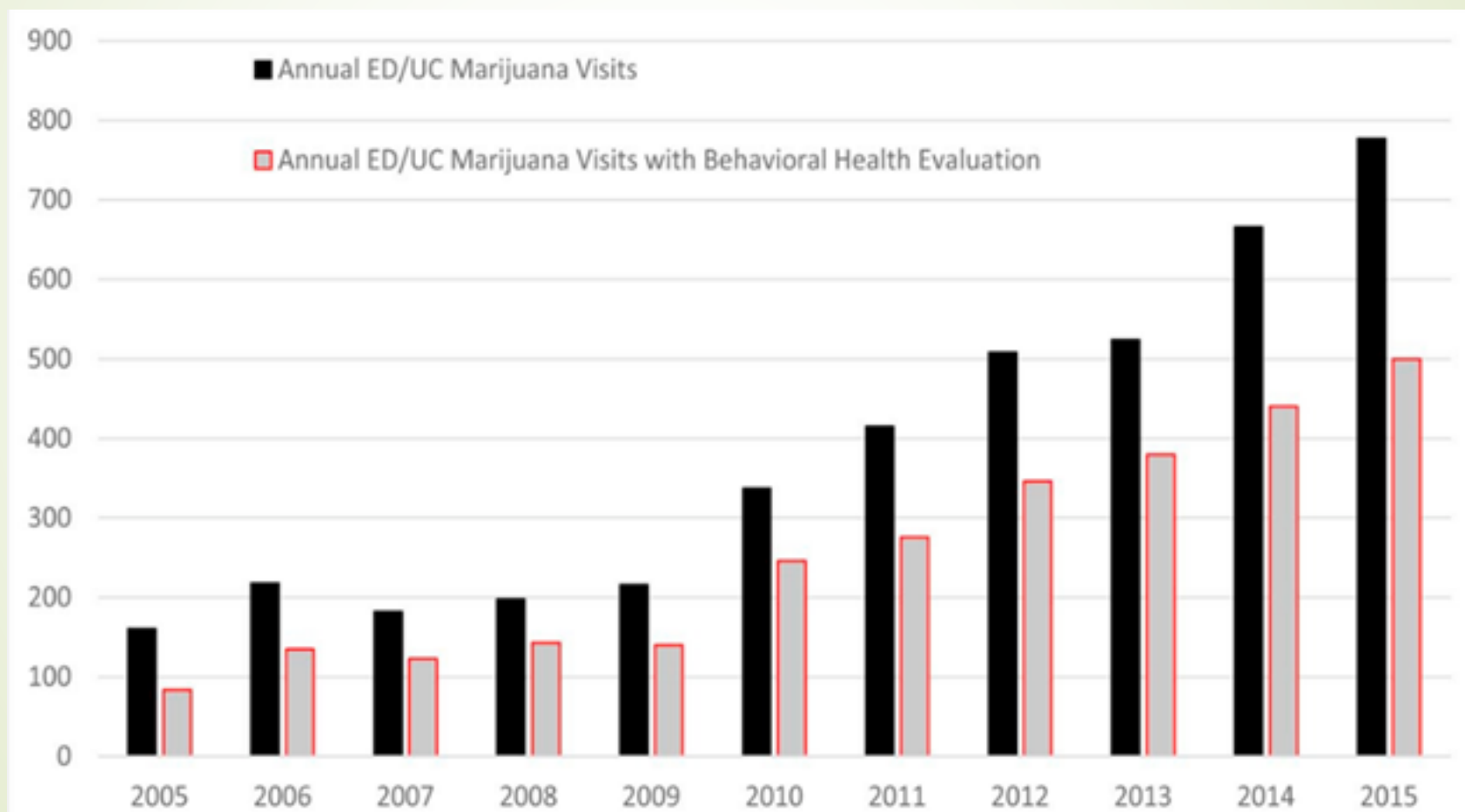


# High Potency Cannabis associated with a tripled risk for Psychosis

- DiForti et al. Lancet Psychiatry, 2015
- London – analyzed 780 people ages 18-65, 410 with first episode psychosis and 370 healthy controls
- High potency – THC > 15% - 3X increased risk of psychosis
- Daily use – 5X increased risk
- Psychosis not associated with Hash < 5% THC

# Significant increase in adolescent marijuana-associated ED/urgent care visits

Wang GS, Davis SD, Halmo LS, Sass A, Mistry RD. Impact of marijuana legalization in Colorado on adolescent emergency and urgent care visits. J Adolesc Health 2018;63:239-241



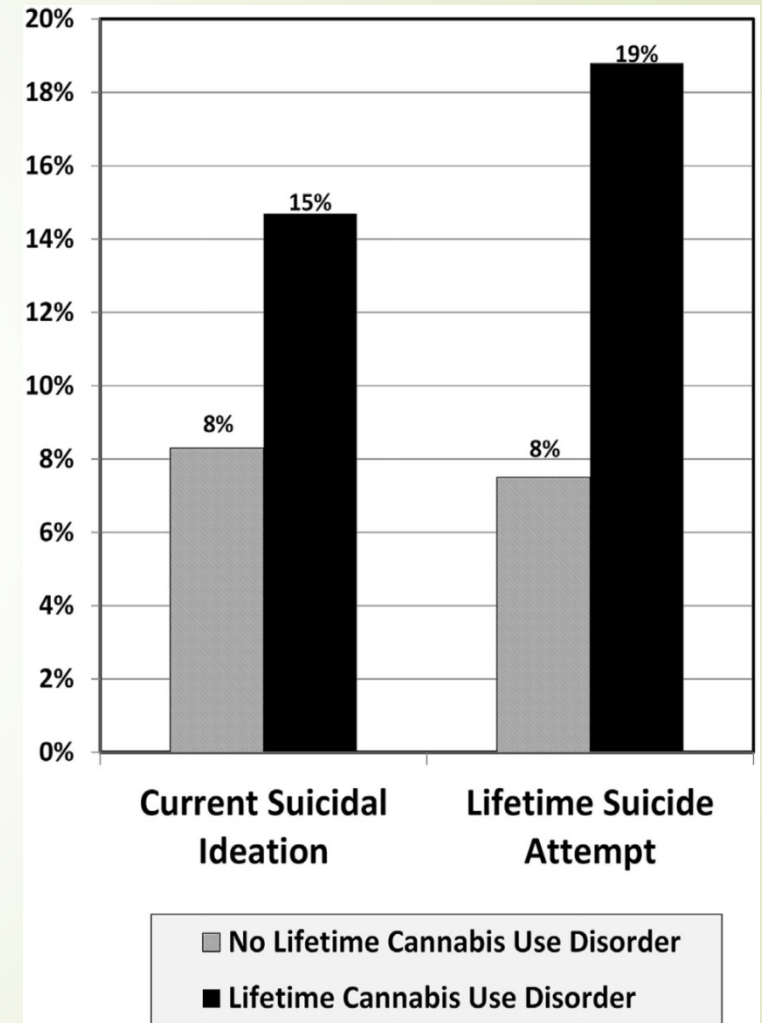
# Cannabis use disorder and suicide attempts in Iraq/Afghanistan-era veterans

Kimbrel NA et al. J Psychiatric Research 2017;89;1-5

3233 veterans in cross-sectional, multi-site study by VA

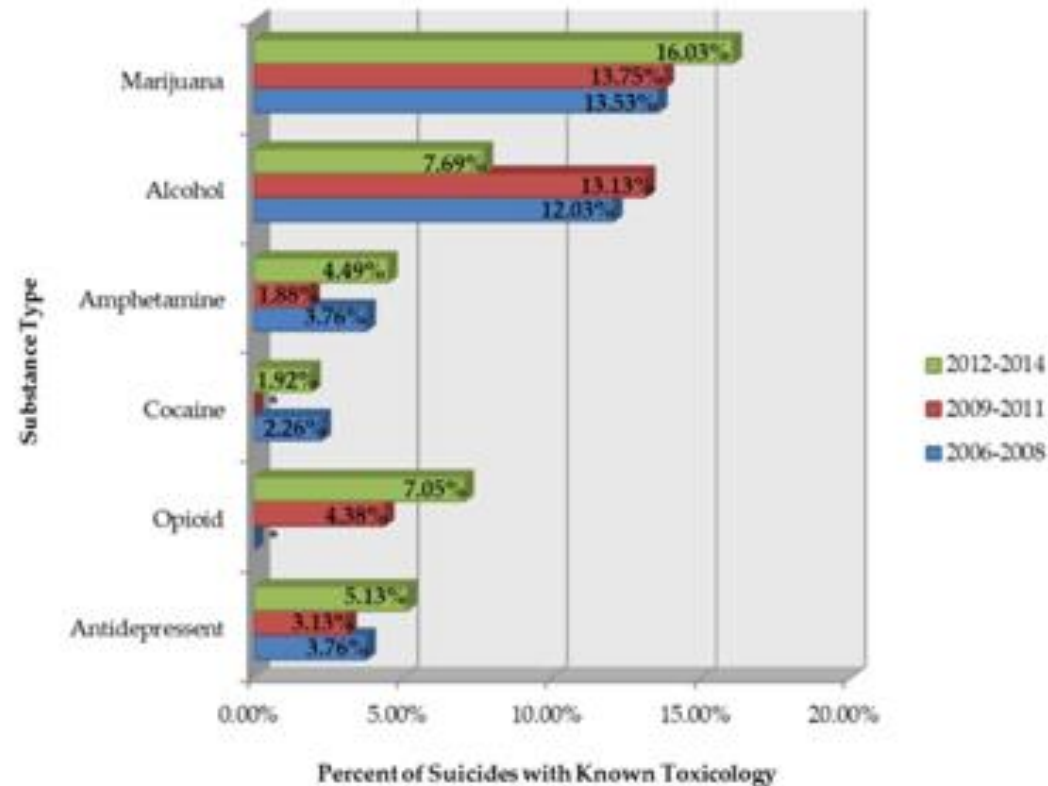
Cannabis use disorder was significantly associated with both current suicidal ideation ( $p < .0001$ ) and lifetime history of suicide attempts ( $p < .0001$ ) compared to veterans with no lifetime history of cannabis use disorder

The significance difference continued even after adjusting for sex, PTSD, depression, alcohol use disorder, non-cannabis drug use disorder, history of childhood sexual abuse and combat exposure.





## Average Toxicology of Suicides Among Adolescents Ages 10 to 19 Years Old



\*Results Unavailable

SOURCE: Colorado Department of Public Health and Environment (CDPHE), Colorado Violent Death Reporting System

SOURCE: Colorado Violent Death Reporting System, Colorado Department of Public Health and Environment (CDPHE)

# Recommendations

- 1. Limit potency of THC to under 10% in medical cannabis and eliminate the concentrates such as wax, shatter, dab from medical cannabis since there is no research on these products for any medical condition.
- 2. Improve data collection on high potency THC by mandating agencies in criminal justice and health care to collect information on cannabis use, This would include questions about THC potency, type of products, delivery system (smoke/vape/edibles/oil/concentrates) and including THC when drug testing.
- 3. Develop provider education on known impacts of cannabis use on physical and mental health and require that people selling cannabis products have some type of license or certificate that indicates they have been educated about the potential impacts and can warn consumers about them, similar to what we require of pharmacists.
- 4. Develop Public Service Announcements (PSAs) to educate the public regarding cannabis use risks – like what we have for alcohol/tobacco.
- 5. Limit advertising of cannabis products that appear to be directed to adolescents/young adults
- 6. Put Medical Marijuana recommendations on the Prescription Drug Monitoring Program (PDMP) in Colorado. If Colorado is legitimately supporting the use of medical marijuana in people with mental illness in the criminal and juvenile justice system, then there needs to be monitoring.