



# Weed and Your Workforce: What You Need to Know

National Safety Council

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# Behavioral Health is Essential To Health



Prevention Works



Treatment is Effective



People Recover



# Weed and Your Workforce “What You Need to Know”

**Presented by**

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**Division of Workplace Programs**

**Center for Substance Abuse Prevention**

**Substance Abuse and Mental Health Services Administration**



# Outline of Presentation

- DFWP Oversight of Federal and Federally Regulated Testing
- Legalization vs. Decriminalization vs. Recreational
- Driving Under the Influence of Drugs (DUID)
- Recognize the scientific supportability of ongoing studies and future studies

**Regulation**

**Policy**

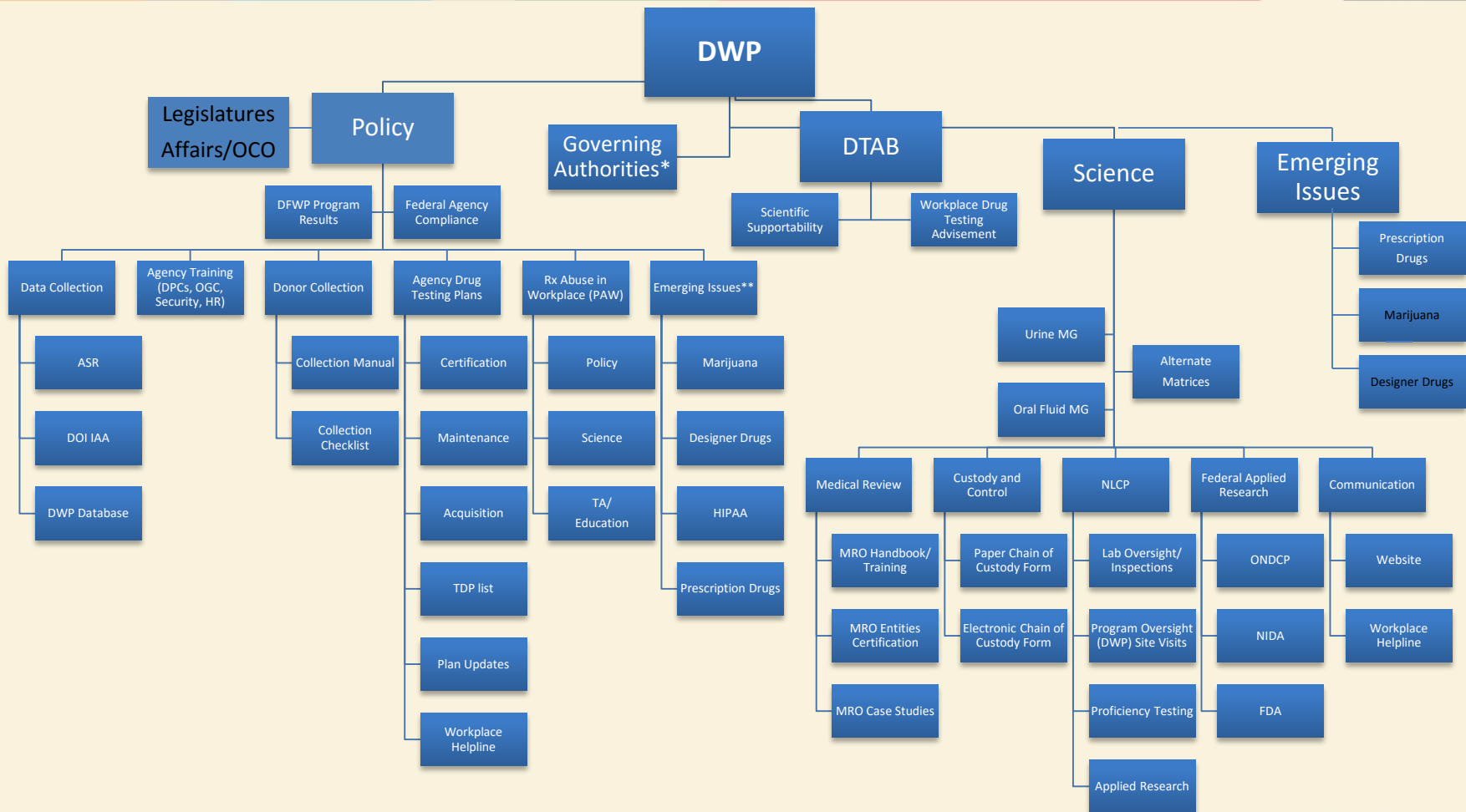
Donor  
Drug Test  
Result

**Medical Review Officers**  
**Trained Collectors**  
**HHS-Certified Laboratories**  
**National Laboratory Certification Program**  
**Federal Agency Plan and TDP List**  
**Mandatory Guidelines**




**Drug Testing Advisory Board**  
**Interagency Coordinating Group Executive Committee**  
**Division of Workplace Programs**  
**Office of National Drug Control Policy**  
**Executive Order 12564 – Public Law 100-71**



# DWP Oversight



# Definitions

-  ***Decriminalization***— Reduces penalties for possession and/or use of small amounts
-  ***Medical Marijuana***— Permits defense against state criminal charges of marijuana possession if a medical need can be proven
-  ***Legalization***— Makes possession and/or use of marijuana legal under state law



# Employment: Medical Marijuana

*In 2013, 32% of FT workers 18-64 years old indicated they lived in a state with laws allowing the use of medical marijuana.*

*Number of days marijuana was smoked in the past month*

15 days

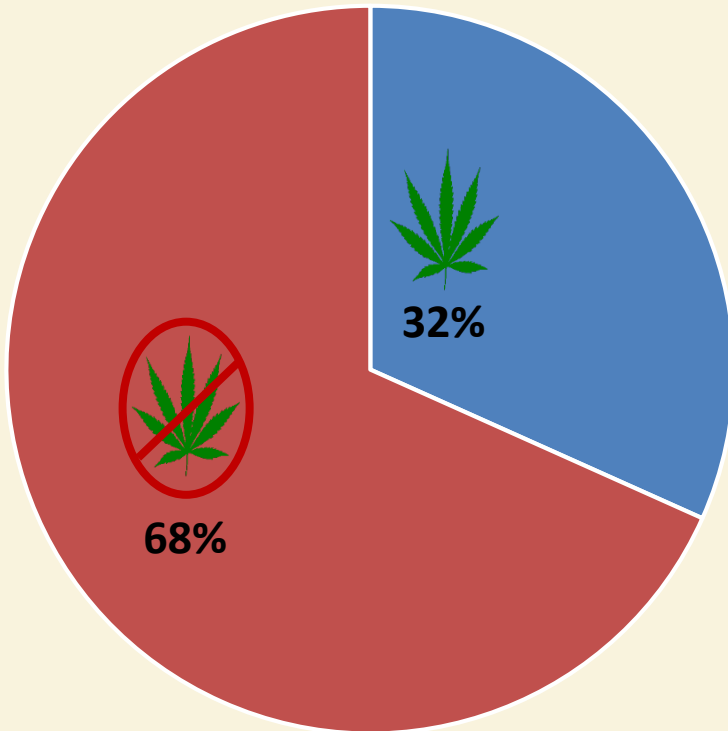
14 days



9.8%

6.9%

*Prevalence of 30-day marijuana use by state law status*

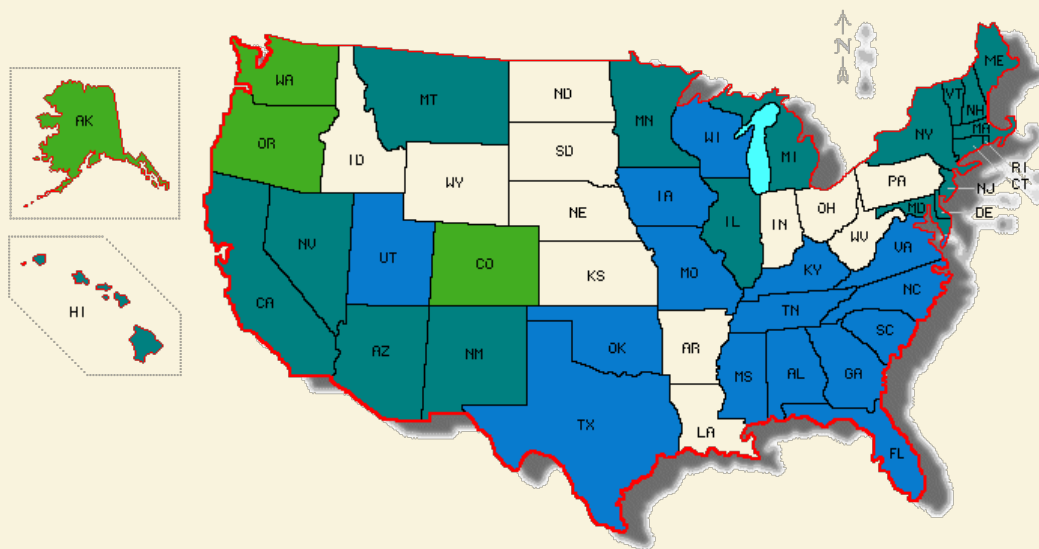


# Marijuana U.S.A.

## Medical, Recreational and Cannabidiol (CBD)

10

- - Medical & Recreation
- - Medical
- - CBD



Source: diymaps.net (c)

# Are We Here?



# Marijuana vs. Coffee

12

- STARBUCKS IN L.A. COUNTY (2009) - 840
- POT SHOPS IN L.A. COUNTY (2009) - 966
  - *Los Angeles Times, Nov. 2009*





# Synthetic Marijuana



# Synthetic Marijuana

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- The main chemical used to produce synthetic marijuana is JWH-018 , similar to THC
- No psychopharmacological differences exist between JWH-18 and marijuana
- Both chemicals are considered cannabinoids, which attach themselves to the *cannabinoid*, or *CB*, receptors in the brain
- However, the synthetic compounds and THC differ in levels of potency
  - Potential problem with synthetic marijuana is rapid and cost effective ability to identify the substances (analytical screening test)
  - Recognize the immediate effects (pharmacological) they may have on an individual.



[Synthetic Marijuana](#)

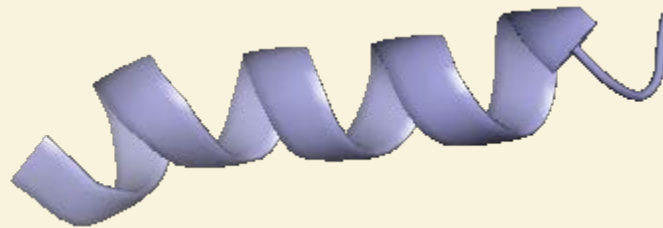


[Marijuana Plant](#)



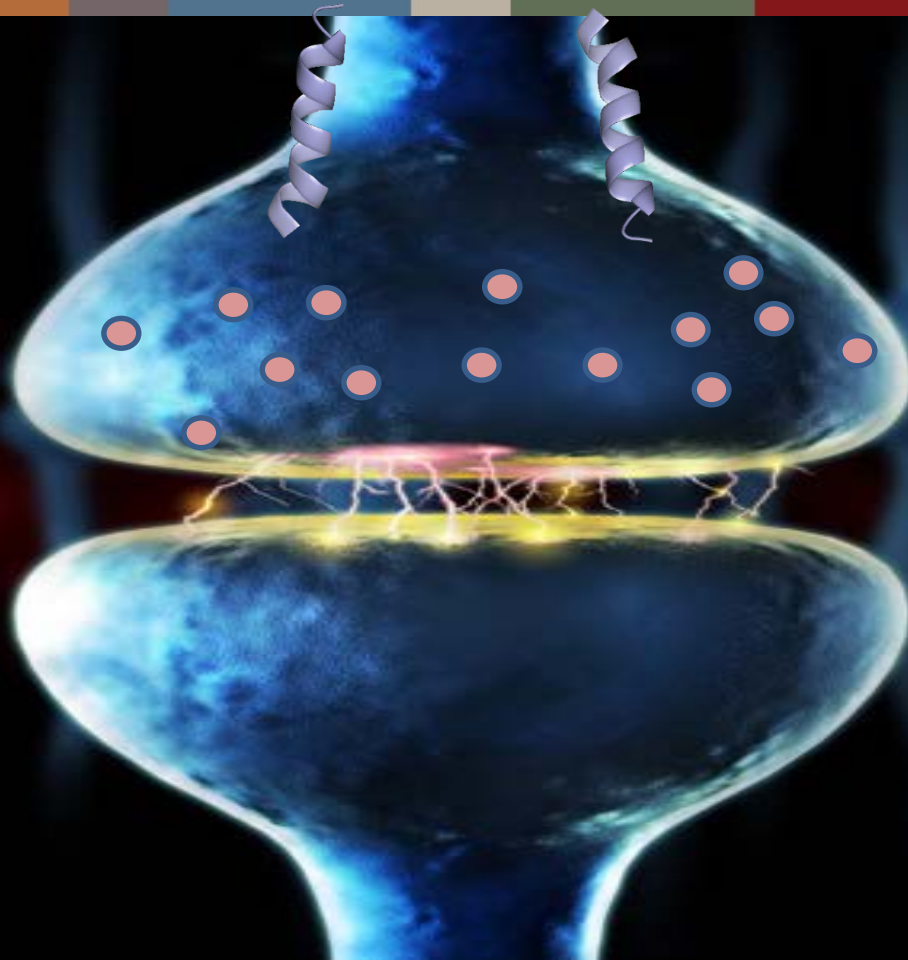
[Shatter](#)

# CB<sub>1</sub> Receptors are on Axon Terminal Buttons



**THC or Endocannabinoids  
attach to CB<sub>1</sub> Receptors  
and inhibit the release of  
neurotransmitters**

# CB<sub>1</sub> Synaptic Activity



copyright : ZD Solutions Harvinder Singh



# NIDA Encourages Community Based Marijuana Research



Watch the video at: [youtu.be/7127QLM2YWA](https://youtu.be/7127QLM2YWA)

# Herbal Incense (e.g. Spice)



K<sub>2</sub>

K<sub>9</sub>

Spice Gold

Silver or Diamond

Budda Blend,

Yucatan Fire

# Legal Potpourri

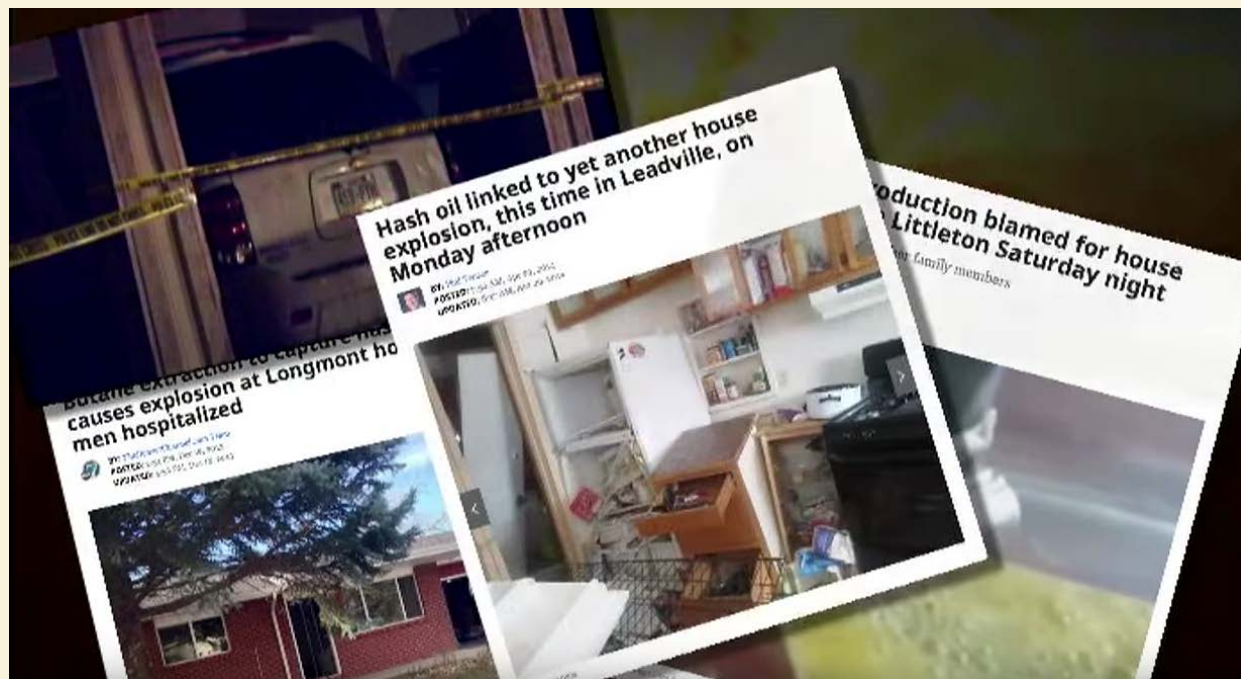
19

- Green grenade
- Clown Loyal
- Natural Spirits
- Red Planet
- Get Some Super Kush
- Red Led Leaf Herbal Potpourri
- Demon “Ritual Spicy Botanical Potpourri”
- Dark Herbal Potpourri Super Kush herbal Potpourri



# The Extraction

“Dabbing” butane hash oil (BHO). Often referred to as Wax, Shatter, Honey Oil, Butane Honey Oil, Skuff and/or Kief, Hash, Liquid Solvent, Bubble Hash, Butane Hash Oil (BHO), Cannabis Oil



Watch the video at: [youtu.be/3P\\_CEXRt010](https://youtu.be/3P_CEXRt010)

# Synthetic Marijuana

## THC 2000's Synthetic Cannabinoids

Dronabinol (Marinol)  
Nabilone (Cesamet)  
THC + CBD (Sativex)  
Cannabinol Extract  
(Cannador)  
CBD (Epidiolex) in IND-  
Phase III trials

# Edibles and Coupons

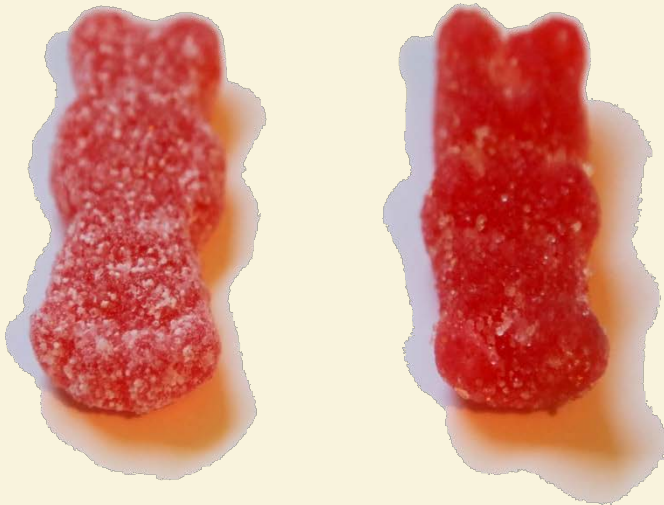
## \$1 Joints in Colorado



# Pot Edibles Not Medibles

## Targeted for Preadolescents

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Buttercrunch  
Pot Tarts  
Stoney Rancher  
Sodas (e.g. Joint and Bongs)  
KeefKat  
Double Puff Oeo  
Stoneos  
Gumballs



# Passive Inhalation Study





# Passive Study Design

- Six active smokers, six non-smokers per session
- Enclosed room with air flow control, Plexiglas walls for observation
- Smokers smoked as much as they wanted to without limitation in a “social-like” setting
- Three exposure sessions:
  - Session 1: smokers each smoke ad lib MJ cigarettes (5.3% THC) for one hour, no active air flow
  - Session 2: smokers each smoke ad lib MJ cigarettes (11.3% THC) for one hour, no active air flow
  - Session 3: smokers each smoke MJ ad lib MJ cigarettes (11.3% THC) for one hour, with active air flow simulating room air conditioning

# Passive Inhalation Sessions



Session 1: 5.3% MJ, No Ventilation



Session 2: 11.3% MJ, No Ventilation



Session 3: 11.3% MJ, With Ventilation

# Passive Study: Bottom Line

- ✿ Extreme passive smoking is a form of drug administration
  - Estimated that non-smokers inhaled 5-15% of the amount of THC that smokers did
  - Could test positive at lower cutoffs
  - SAMHSA urine cutoff differentiated “passive” from “active”

Urine	Oral Fluid	Blood
Multiple positives confirmed at 20 ng/ml cutoff, but none at 50 ng/ml	Confirmed positives up to ~3 hours	Up to ~2 ng/ml

## Passive Exposure Results



# Ingestion Study



# Cannabis Edibles

- Increasing popularity of oral “Edible” cannabis products
  - 16-26% of medical cannabis users
  - No combustion
  - Longer time course of effects
- Most controlled human cannabis research uses smoked/inhaled route of administration
- Federal organizations that regulate medicine food cannot regulate cannabis

(Courtesy of Ryan Vandrey, JHU)

# Cannabis Brownie Preparation

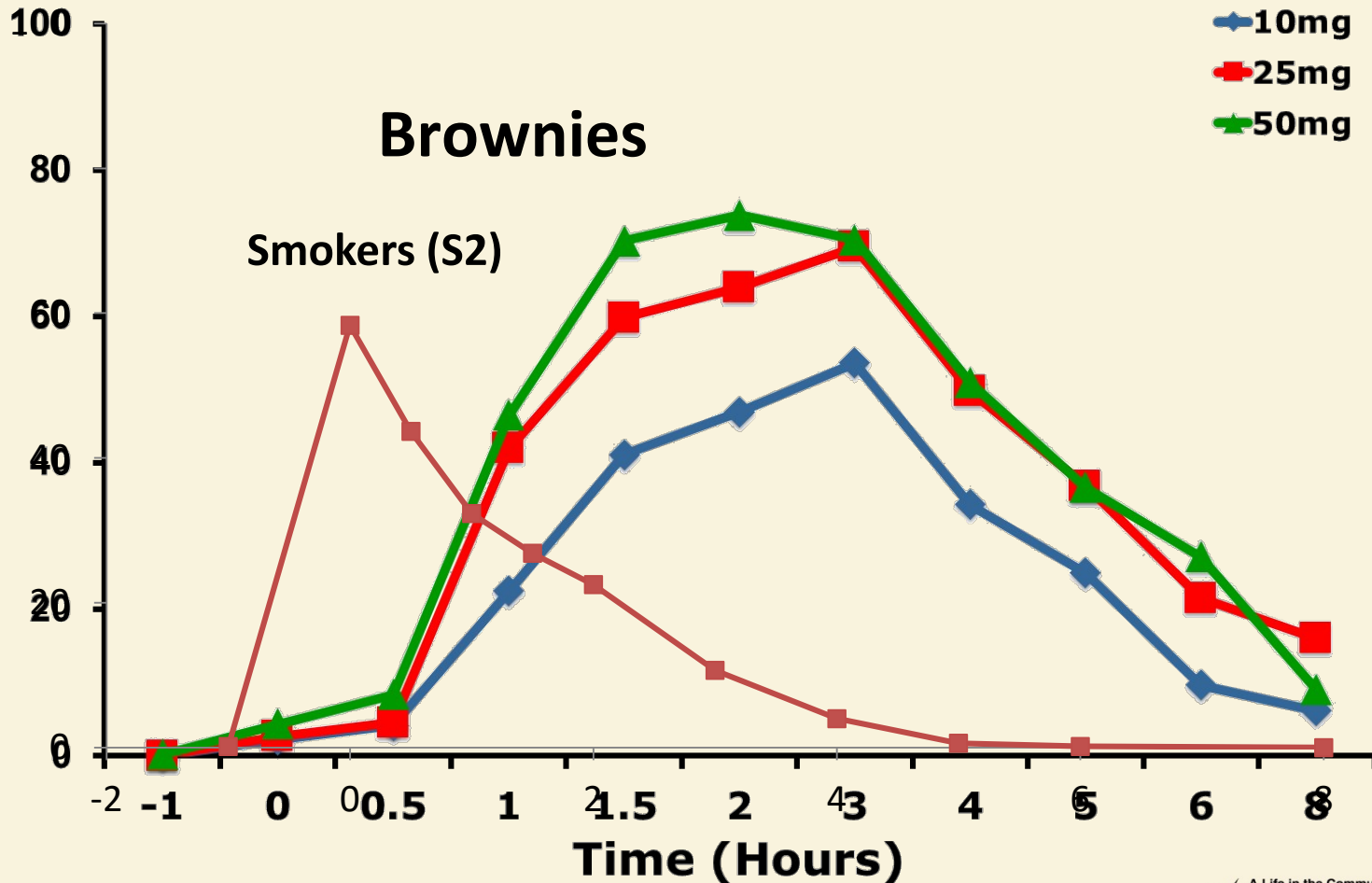
- Cannabis ground into powder
- Heated for 30 min at 250°F (121°C)
- Individual doses stirred into brownie batter and baked for 30 min at 325°F (163°C)
- Individual doses of 10, 25, & 50 mg of THC



(Courtesy of Ryan Vandrey, JHU)

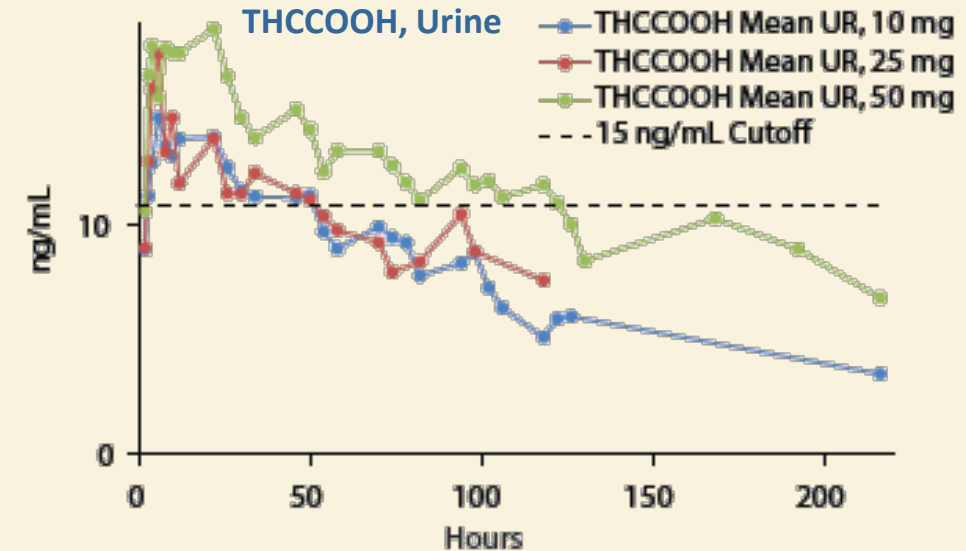
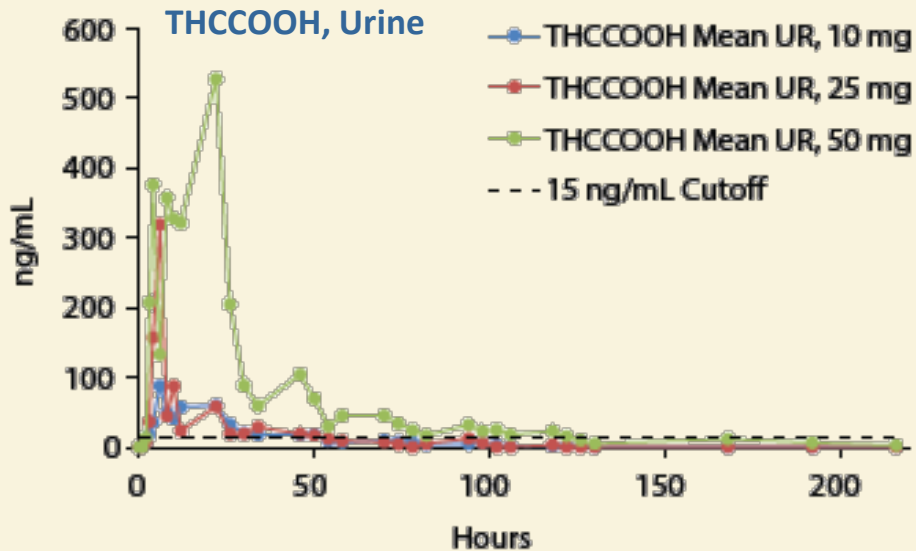


# Edible Results: “Drug Effect”



(Courtesy of Ryan Vandrey, JHU)

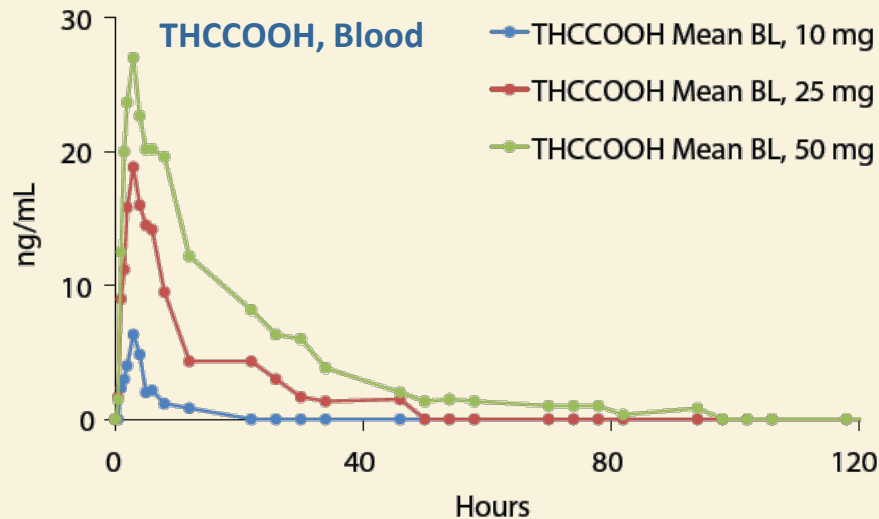
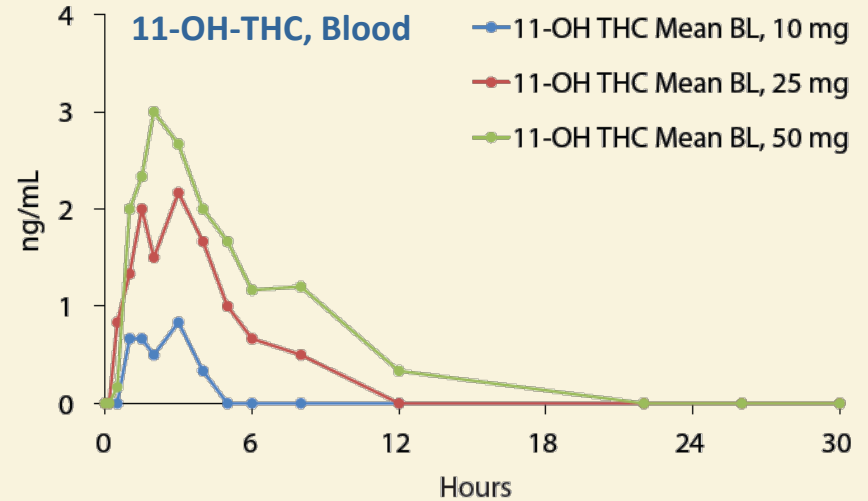
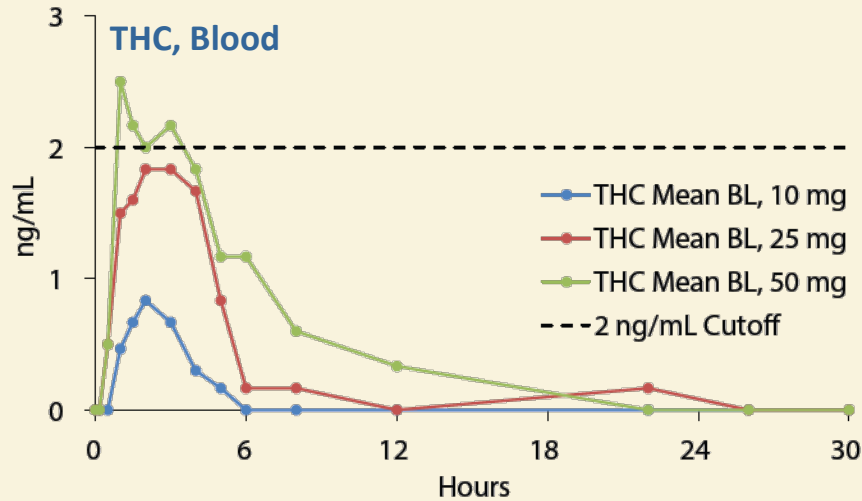
# The Pharmacokinetic Dose Effects of Oral Cannabis Administration, Urine



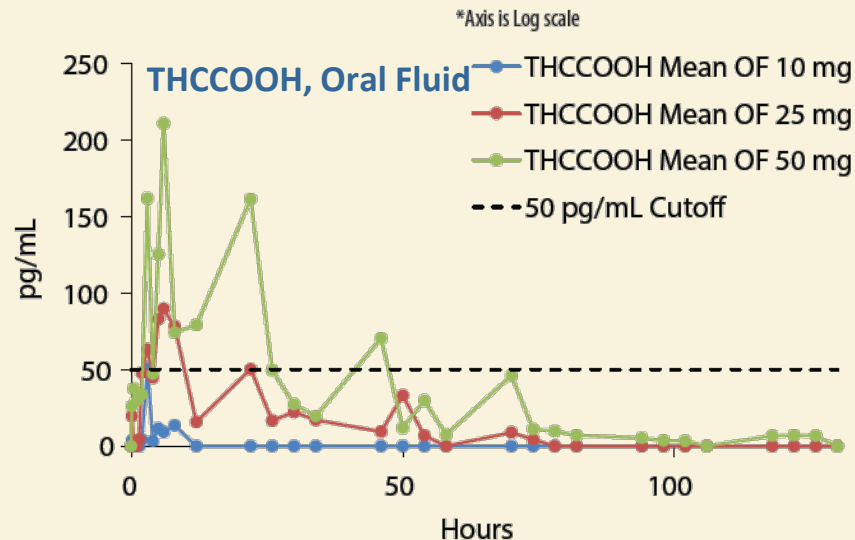
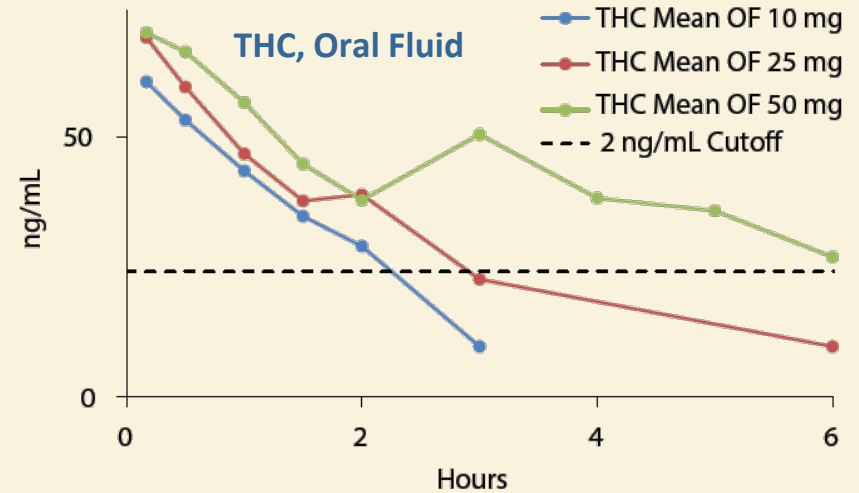
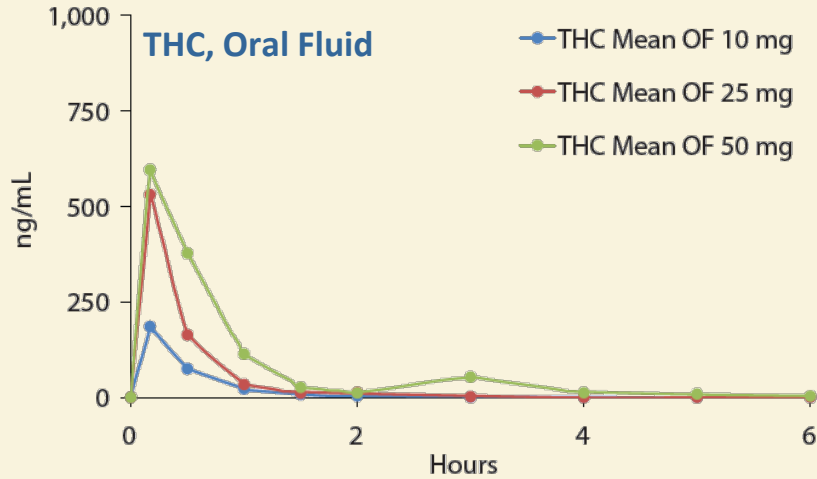
Note \*Y\* axis is log scale



# The Pharmacokinetic Dose Effects of Oral Cannabis Administration, Blood



# The Pharmacokinetic Dose Effects of Oral Cannabis Administration, Oral Fluid



# Cannabis Edibles: Bottom Line

- Cannabis edibles produced severe behavioral effects
  - Behavioral effects lasted considerably longer than smoked route
  - Urine and oral fluid tests were positive
  - Blood levels of THC were extremely low and most participants who were highly impaired would not have tested positive during periods of impairment or later

Urine	Oral Fluid	Blood
<ul style="list-style-type: none"> <li>• THC-COOH Cmax (ng/mL):                             <ul style="list-style-type: none"> <li>• 10 mg THC = 106 (34 – 278)</li> <li>• 25 mg THC = 335 (75 – 729)</li> <li>• 50 mg THC = 713 (216 – 1025)</li> </ul> </li> <li>• Tmax range 3-22 hrs; consistent across doses</li> <li>• Window of detection was 74 – 216 hrs</li> <li>• THC-COOH detectable in 6 at end of study</li> </ul>	<ul style="list-style-type: none"> <li>• THC Cmax (ng/mL):                             <ul style="list-style-type: none"> <li>• 10 mg THC = 192 (47 – 412)</li> <li>• 25 mg THC = 478 (70 – 1128)</li> <li>• 50 mg THC = 598 (350 – 1010)</li> </ul> </li> <li>• Window of detection for THC and THCCOOH was 1.5-22, 0-126 hours respectively</li> </ul>	<ul style="list-style-type: none"> <li>• Highest concentrations of THC was <math>\leq 5</math> ng/mL for THC; only 2 participants @ 50 mg THC achieved 5 ng/mL</li> <li>• No THC detected for 2 participants (10 mg)</li> <li>• Cmax THCCOOH (ng/mL)                             <ul style="list-style-type: none"> <li>• 10 mg THC = 7 (5 – 14)</li> <li>• 25 mg THC = 21 (12 – 39)</li> <li>• 50 mg THC = 29 (16 – 44)</li> </ul> </li> </ul>

# Ongoing and Future Studies

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- Oral Cannabis Ingestion
- DUID POCT Device Evaluation
- Synthetic Opiates / MRO Review Process for Oral Fluid / Urine
- Oral Fluid Collection Device Stability / Marijuana Recovery
- Marijuana Decriminalization vs. Legalization
- Federal Program Evaluations (NTSB, NHTSA, DOT, NRC, etc.)
- Other scientific, legal, and public policy concerns for safety sensitive positions around Marijuana

# Considerations

Drug Testing will continue to face difficult and challenging issues related to the changing landscape of marijuana legalization and decriminalization in the federal, state, local, and community levels and at the workplace.

As states modify marijuana laws, non Federal workplaces will need to review and possibly adjust their drug free workplace policies but drugs impair performance in the workplace

Discussion needs to be continued about current and future research, policy, and legal issues related to the changing landscape of marijuana legalization and decriminalization efforts and shifting knowledge and findings.



## ***Resources:***

Drug Fact Sheet K2 or Spice. (2011, March 4). Retrieved from [http://www.dea.gov/druginfo/drug\\_data\\_sheets/K2\\_Spice.pdf](http://www.dea.gov/druginfo/drug_data_sheets/K2_Spice.pdf) Drug Enforcement Administration

DrugFacts: Synthetic Cannabinoids. (2015, November). Retrieved February, 2016, from <http://www.drugabuse.gov/publications/drugfacts/synthetic-cannabinoids> National Institute on Drug Abuse; National Institutes of Health; U.S. Department of Health and Human Services

Hash oil explosions on the rise in Colorado . (2014, May). Retrieved March, 2016, from [https://www.youtube.com/watch?v=3P\\_CEXRt010](https://www.youtube.com/watch?v=3P_CEXRt010) 7 NEWS – The Denver Channel; Youtube

Williams, Dr. (Speaker). (2014, November). NIDA Encourages Community Based Marijuana Research [Video file]. Retrieved February, 2016, from <http://www.drugabuse.gov/videos/nida-encourages-community-based-marijuana-research> National Institute on Drug Abuse; The Science of Drug Abuse & Addiction





**Division of Workplace Programs (DWP) main website:**

<http://beta.samhsa.gov/workplace>

**DWP phone number:**

(240) 276-2600

**Executive Order 12564:**

[http://beta.samhsa.gov/sites/default/files/executive\\_order.pdf](http://beta.samhsa.gov/sites/default/files/executive_order.pdf)

**Public Law 100-71:**

[http://beta.samhsa.gov/sites/default/files/workplace/public\\_law\\_100.pdf](http://beta.samhsa.gov/sites/default/files/workplace/public_law_100.pdf)

**Mandatory Guidelines:**

<http://www.gpo.gov/fdsys/pkg/FR-2008-11-25/pdf/E8-26726.pdf>

**Model Plan for a Comprehensive Drug-Free Workplace Program:**

<http://beta.samhsa.gov/sites/default/files/workplace/ModelPlan508.pdf>

**2013 Guidance for Selection of Testing Designated Positions:**

[http://beta.samhsa.gov/sites/default/files/workplace/2013\\_guidance\\_selection\\_TDPs\\_4\\_26\\_2013.pdf](http://beta.samhsa.gov/sites/default/files/workplace/2013_guidance_selection_TDPs_4_26_2013.pdf)



Weed and Your Workforce:  
What You Need to Know

# Prevalence and Impairment

Barry K Logan PhD, F-ABFT\*

NMS Labs

Center for Forensic Science Research and Education





# Please ask Yourself

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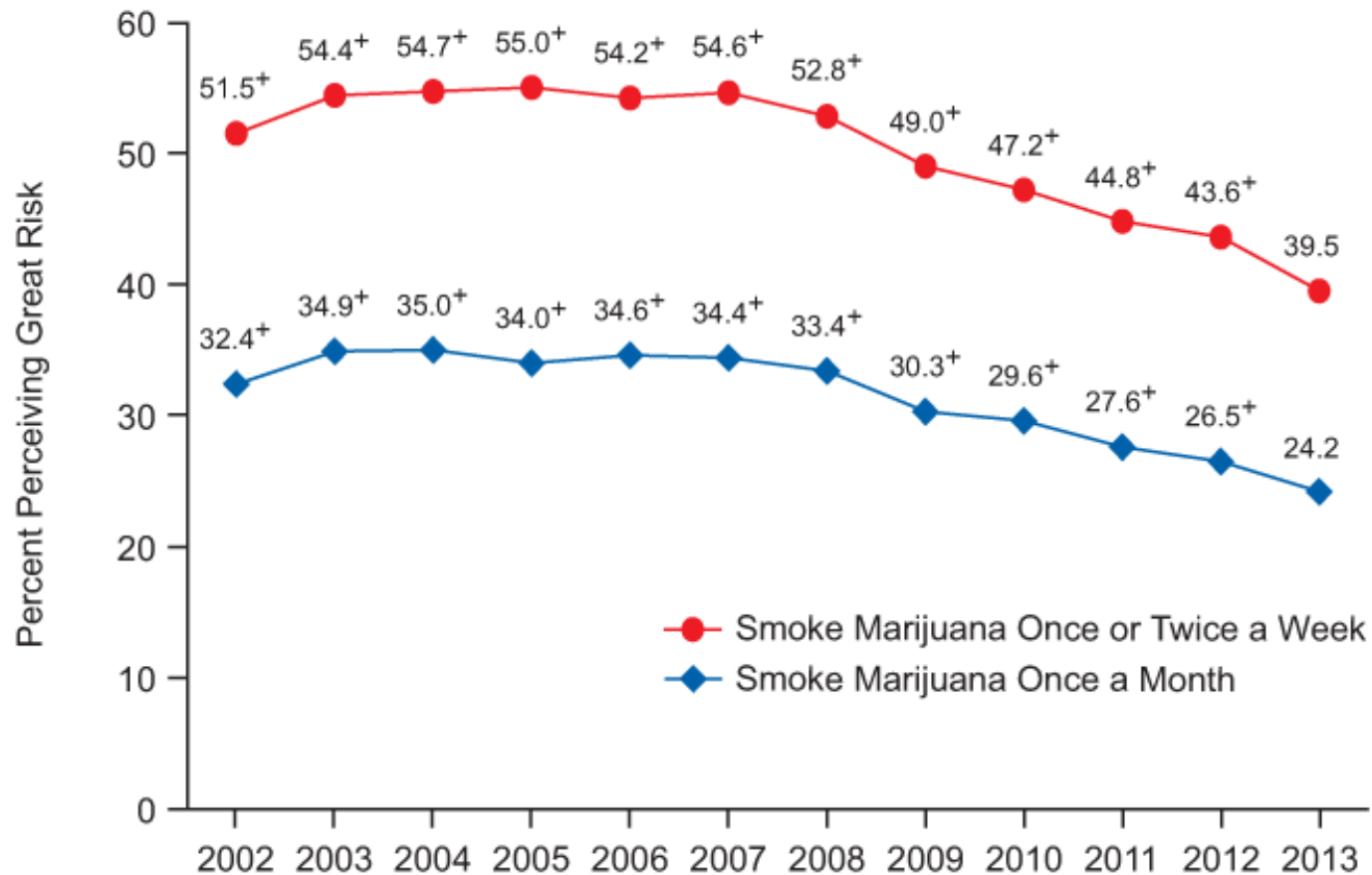
- What is known about the impact of legalization of marijuana on rates of use and **Prevalence**?
- What **Effects** of marijuana are relevant in the workplace?
- How do **Synthetic Cannabinoids** fit into the picture?
- What are some considerations around **Testing**?

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# Prevalence

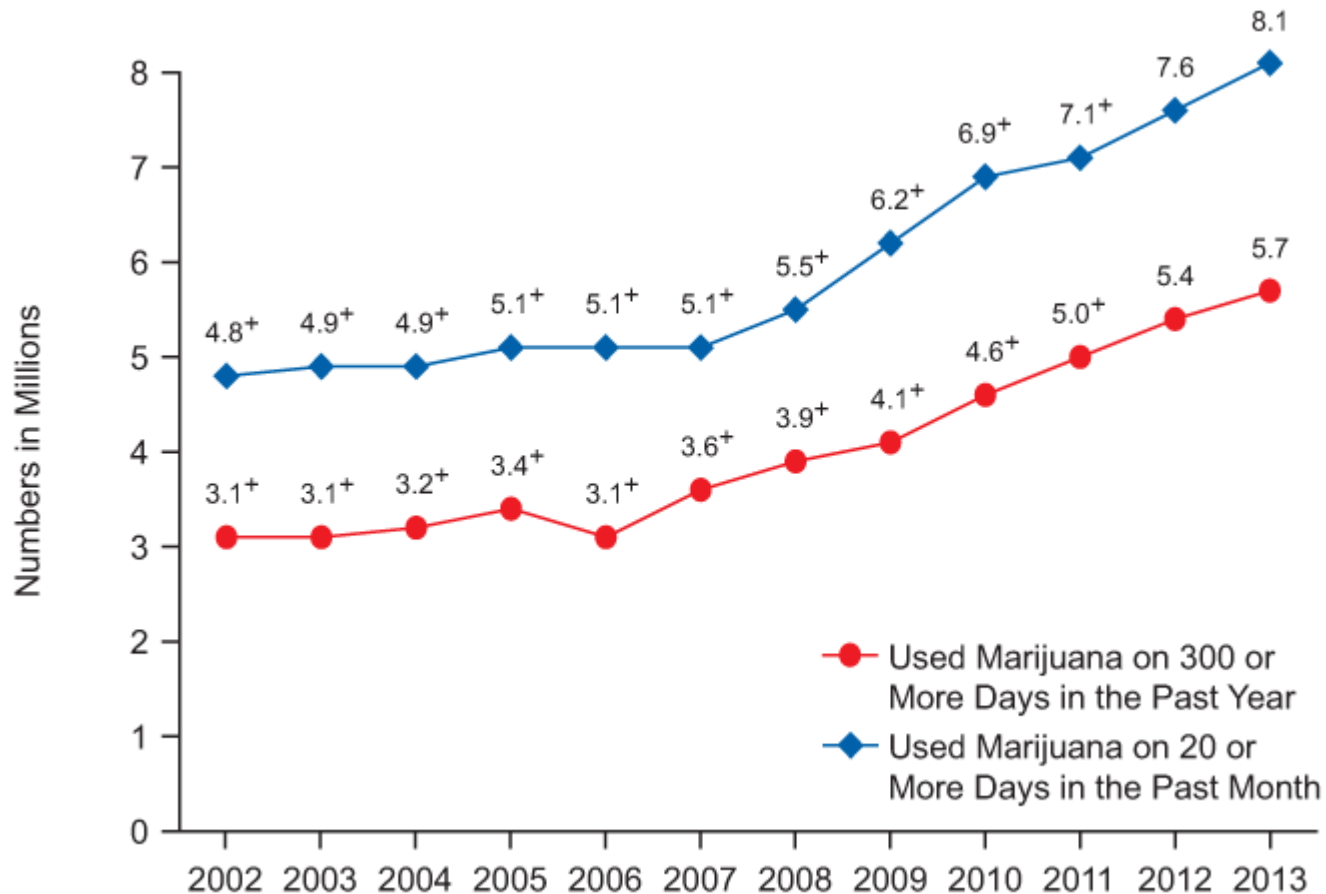
# Cannabis Use

- Perceived “Great Risk” of Marijuana Use (Youth 12-17)



# Cannabis Use

- Individuals reporting daily or almost daily cannabis use.



# National Workplace Drug Testing

US General Workforce, pre-employment 9.1M

Drug Category	2010	2011	2012	2013	2014
6-AM	0.011% <sup>1</sup>	0.013%	0.017%	0.020%	0.025%
Amphetamines	0.58%	0.69%	0.77%	0.85%	0.90%
Barbiturates	0.25%	0.26%	0.25%	0.23%	0.22%
Benzodiazepines	0.79%	0.78%	0.73%	0.74%	0.71%
Cocaine	0.25%	0.28%	0.23%	0.23%	0.24%
Marijuana	1.7%	1.6%	1.6%	1.7%	1.9%

<sup>1</sup>October - December 2010

*“Marijuana positivity increases nationally for the second consecutive year.” (11% increase)*

Dr. Barry Sample, Quest Diagnostics

<http://www.employer-solutions-resources.com/whitepaper/2015-drug-testing-index>

# Cannabis Use by Drivers

- National Roadside Survey 2013

Table 2  
**Overall Drug Prevalence by Data Collection Period and Type of Test in the 2013–2014 NRS**

Time of Day	% Drug-Positive Oral Fluid Test	% Drug-Positive Blood Test	% Drug-Positive Oral Fluid and/or Blood Test
Weekday Daytime	19.0%	21.6%	22.4%
Weekend Nighttime	19.8%	21.2%	22.5%

# Cannabis Use by Drivers

- National Roadside Survey 2013

Table 4  
Weekend Nighttime Drug Prevalence by Drug Category and Test Type Comparing 2007 Data to 2013–2014 Comparable Data

Drug Category	2007 Data						2013–2014 Comparable Data					
	Oral Fluid Test		Blood Test		Oral Fluid and/or Blood Test		Oral Fluid Test		Blood Test		Oral Fluid and/or Blood Test	
	N	%	N	%	N	%	N	%	N	%	N	%
Any Illegal Drug	635	11.4%	297	9.8%	699	12.4%	779	13.8%	422	14.3%	849	15.1%
Only Medications (prescription and over-the-counter)	201	3.0%	169	4.0%	277	3.9%	211	3.9%	155	4.9%	266	4.9%

Table 5  
Weekend Nighttime Prevalence of THC in 2007 Compared to 2013–2014 Comparable Data

2007 Data					2013–2014 Comparable Data						
Oral Fluid Test		Blood Test		Oral Fluid and/or Blood Test		Oral Fluid Test		Blood Test		Oral Fluid and/or Blood Test	
N	%	N	%	N	%	N	%	N	%	N	%
438	7.7%	234	7.6%	499	8.6%	597	11.3%	332	11.7%	663	12.6%



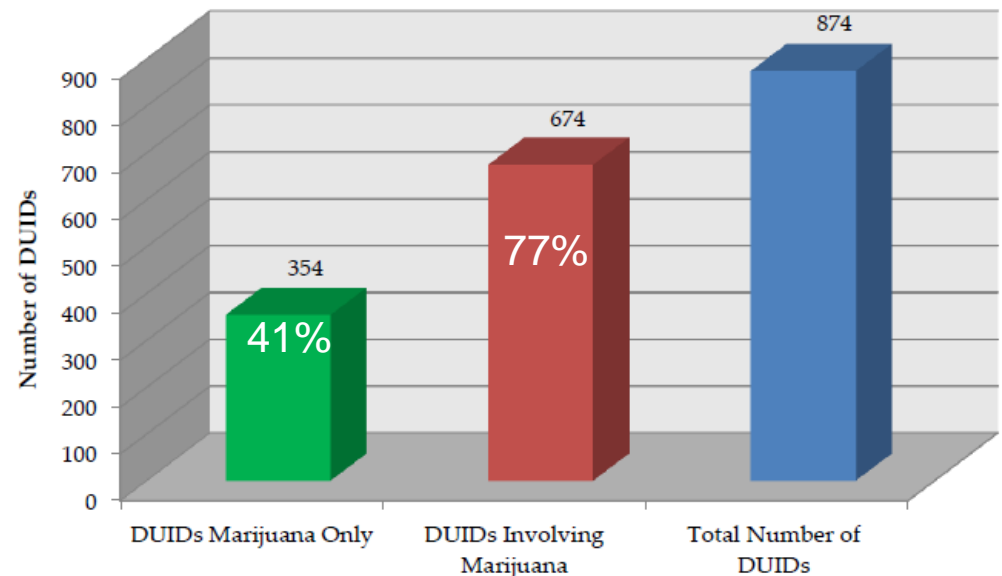
# Marijuana DUI

- Colorado – Post Legalization

## SECTION 1: Impaired Driving Data

*“MARIJUANA CITATIONS DEFINED AS ANY CITATION WHERE CONTACT WAS CITED FOR DRIVING UNDER THE INFLUENCE (DUI) OR DRIVING WHILE ABILITY IMPAIRED (DWAI) AND MARIJUANA INFORMATION WAS FILLED OUT ON TRAFFIC STOP FORM INDICATING MARIJUANA & ALCOHOL, MARIJUANA & OTHER CONTROLLED SUBSTANCES, OR MARIJUANA ONLY PRESENT BASED ON OFFICER OPINION ONLY (NO TOXICOLOGICAL CONFIRMATION).” - COLORADO STATE PATROL*

Colorado State Patrol  
Number of DUIDs, 2014



<http://www.rmhidta.org/html/2015%20PREVIEW%20Legalization%20of%20MJ%20in%20Colorado%20the%20Impact.pdf>



# Marijuana DUI

- Washington – Post **Legalization**

*“We have seen marijuana involvement in fatal crashes remain steady over the years, and then it just spiked in 2014. From 2010-2014, nearly 60 percent of drivers involved in fatal collisions were tested for drugs. Among these tested drivers, approximately 20 percent (349 drivers) were positive for marijuana.”*

Dr. Staci Hoff, WTSC Data and Research Director

**Table 1: Percentage of total driving cases confirming positive for THC (delta-9-THC)**

Year	Total # of impaired driving cases received for testing	Percentage of total cases testing positive for THC
2009	4,809	18.2 %
2010	5,012	19.4 %
2011	5,132	20.2 %
2012	5,298	18.6 %
2013	5,468	24.9 %
2014	6,270	28.0 %
<b>2015 (Jan-Apr)</b>	<b>2,231</b>	<b>33.0 %</b>

<http://wtsc.wa.gov/News/marijuana-increased-in-2014-as-a-factor-in-deadly-crashes/>

# Intoxication – Synthetic Cannabinoids

 THE TRIBUNE

## Driver in fatal Highway 1 crash allegedly smoked synthetic marijuana

Los Osos resident Tanner Mengore, 22, faces charges of DUI, manslaughter

BY NICK WILSON

nwilson@thetribunenews.com October 25, 2014



“The driver in a deadly weekend crash that has devastated a local family was under the influence of synthetic marijuana, also known as “spice,” according to the CHP”.

# Intoxication – Syn Canns



## Police: School bus driver high on synthetic marijuana during multi-vehicle crash

POSTED 11:24 AM, APRIL 22, 2015, BY DALLAS FRANKLIN. UPDATED AT 05:27PM, APRIL 22, 2015



“OKLAHOMA CITY – A local school bus driver who crashed into multiple cars in southeast Oklahoma City, leaving three people hospitalized, was reportedly high on synthetic marijuana at the time.

# Driving Case Studies

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Blood synthetic cannabinoid concentrations in cases of suspected impaired driving.

Yeakel JK, Logan BK. J Anal Toxicol. 2013 Oct;37(8):547-51.

- 12 cases of Suspected impaired driving involving synthetic cannabinoids.
- Attitude of the drivers was cooperative and relaxed, speech was slow and slurred, coordination was poor.
- Pulse and blood pressure were generally elevated.
- The most consistent sign noted was a marked lack of convergence in all cases where it was assessed.
- JWH-018 (n=4), 0.1-1.1ng/mL; JWH-081 (n=2) qualitative only; JWH-122 (n=3) 2.5ng/mL; JWH-210 (n=4) 0.1ng/mL; JWH-250 (n=1) 0.38ng/mL; AM-2201 (n=6) 0.43 – 4.0ng/mL.

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# Effects

# Cannabinoid Pharmacology

## Acute Psychoactive Effects

- Euphoria
- Relaxation/Stress Reduction
- Enhanced Perception
  - Music, Humor, Arts
- Increased Creativity/Abstract Thinking/Sensuality
- Illusions/Pseudohallucinations
- Time Distortion
- Ataxia
- Anxiety, Paranoia, Illusions, Depersonalization



# Cannabis and Impairment

- ☠ Well known **Cognitive** effects include:
  - ☠ Concentration and sustained attention/vigilance.
  - ☠ Fatigue, sleepiness, lethargy, memory problems.
  - ☠ Reaction time
  - ☠ Difficulty in thinking and problem-solving.
  - ☠ Difficulty in registering, processing, and using information.



# Cannabis and Impairment

## ☠ Well Known Performance Effects Include

☠ Attention

☠ Vigilance

☠ Arousal

☠ Weaving

☠ Impulsivity

☠ Reaction Time





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# Testing

# NSC 2013 Recommendations

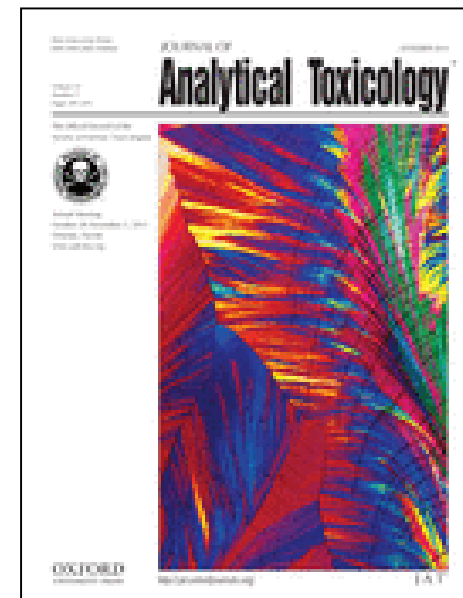


## Recommendations for Toxicological Investigation of Drug-Impaired Driving and Motor Vehicle Fatalities

Barry K. Logan<sup>1,2\*</sup>, Kayla J. Lowrie<sup>1</sup>, Jennifer L. Turri<sup>1</sup>, Jillian K. Yeakel<sup>1</sup>, Jennifer F. Limoges<sup>3</sup>, Amy K. Miles<sup>4</sup>, Colleen E. Scameo<sup>5</sup>, Sarah Kerrigan<sup>6</sup> and Laurel J. Farrell<sup>7</sup>

<sup>1</sup>Center for Forensic Science Research and Education, Fredric Rieders Family Renaissance Foundation, Willow Grove, PA, USA, <sup>2</sup>NMS Labs, Willow Grove, PA, USA, <sup>3</sup>New York State Police Forensic Investigation Center, Albany, NY, USA, <sup>4</sup>Wisconsin State Laboratory of Hygiene, Madison, WI, USA, <sup>5</sup>New Hampshire Department of Safety, Division of State Police Forensic Laboratory, Concord, NH, USA, <sup>6</sup>Sam Houston State University, Huntsville, TX, USA, and <sup>7</sup>Toxicologist/Consultant, Longmont, CO, USA

J Anal Toxicol. 2013 Aug 13



# NSC 2013 Recommendations



- Included Oral Fluid for the first time.
- Refined the list of recommended targets, which now includes a total of 33 drugs and metabolites.
- Includes Cannabis, Stimulants, CNS depressants, Narcotic Analgesics, Dissociative Drugs.
- Identifies selected immunoassay tests to cover this scope:

Recommended Immunoassays	
Cannabis	Carisoprodol
Methamphetamine	Zolpidem
Amphetamine	Barbiturates
Cocaine/Metabolite	Methadone
Benzodiazepines	Opiates
- plus lorazepam, clonazepam	Oxycodone
	PCP



# NSC 2013 Recommendations



## Structure:

- **Tier 1: Minimum Standard**
- Prevalent compounds most frequently associated with DUID:
  - Marijuana, cocaine, amphetamines, PCP, benzodiazepines, opioids, muscle relaxants, sedatives, anticonvulsants.
- **Tier 2: Supplemental Analysis**
- Emerging compounds, less prevalent, regional, less evidence for impairing effects:
  - Cathinones, antipsychotics, other antidepressants, synthetic cannabinoids

# What You Need to Know...

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- Public view of marijuana is changing from a “gateway drug”, to a lifestyle choice, and alternative medicine.
- Broad indicators of increasing rates of use of marijuana in US populations, including workplace and driving.
- Synthetic Cannabinoids are on the rise also.
- Evidence of impairing effects is well established and most profound in the 2-4, or 6-8 hours following single acute use.
- Effects include diminished attention, judgment and control, vigilance, and reaction time – significant workplace safety concerns.
- More testing options, especially on-site, and broader scope will help address DUID and workplace safety concerns.



# Key Links

- [nsc.org/rxpainkillers](http://nsc.org/rxpainkillers) (*RX webpages*)
- [nsc.org/rxactionkit](http://nsc.org/rxactionkit) (*Community Action Kit*)
- [nsc.org/rxemployerpolicy](http://nsc.org/rxemployerpolicy) (*Employer Kit*)
- [nsc.org/painmedevidence](http://nsc.org/painmedevidence) (*report*)
- [safety.nsc.org/sideeffects](http://safety.nsc.org/sideeffects) (*report*)
- [nsc.org/workerscomp](http://nsc.org/workerscomp) (*report*)
- [nsc.org/prescriptionnation](http://nsc.org/prescriptionnation) (*infographic*)
- [nsc.org/hiddenepidemic](http://nsc.org/hiddenepidemic) (*infographic*)
- [nsc.org/nnt](http://nsc.org/nnt) (*infographic*)



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# Questions and Discussion

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