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
Ron R. Flegel, B.S., MT(ASCP), MS., Director
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
Drug Free Workplace Programs

Federal Laws

State Laws

Employer

“Drug Testing Policy”

Testing Issues

Contract / Legal Issues
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
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: 9.8%
- 14 days: 6.9%

Prevalence of 30-day marijuana use by state law status:
Are We Here?
Marijuana vs. Coffee

• STARBUCKS IN L.A. COUNTY (2009) - 840
• POT SHOPS IN L.A. COUNTY (2009) - 966
  – Los Angeles Times, Nov. 2009
Synthetic Marijuana
Synthetic Marijuana

• 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.
CB₁ Receptors are on Axon Terminal Buttons

THC or Endocannabinoids attach to CB₁ Receptors and inhibit the release of neurotransmitters
CB₁ Synaptic Activity
NIDA Encourages Community Based Marijuana Research

Watch the video at: youtu.be/7127QLM2YWA
Herbal Incense (e.g. Spice)

K₂
K₉
Spice Gold
Silver or Diamond
Budda Blend,
Yucatan Fire
Legal Potpourri

- 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
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

nugtella
Hazelnut spread with Medical Marijuana

STOP BY ON YOUR WAY UP THE MOUNTAIN FOR ALL YOUR RECREATIONAL NEEDS!
SHOW YOUR SKI PASS AND RECEIVE A $1.00 JOINT WITH PURCHASE!

Kellogg’s pop tarts
Strawberry

Kellogg’s pop tarts
Strawberry
Pot Edibles Not Medibles
Targeted for Preadolescents

- 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”

<table>
<thead>
<tr>
<th>Urine</th>
<th>Oral Fluid</th>
<th>Blood</th>
</tr>
</thead>
<tbody>
<tr>
<td>Multiple positives confirmed at 20 ng/ml cutoff, but none at 50 ng/ml</td>
<td>Confirmed positives up to ~3 hours</td>
<td>Up to ~2 ng/ml</td>
</tr>
</tbody>
</table>

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”

Brownies

Smokers (S2)

(Courtesy of Ryan Vandrey, JHU)
The Pharmacokinetic Dose Effects of Oral Cannabis Administration, Urine

THCCOOH, Urine

Note: "Y" axis is log scale.
The Pharmacokinetic Dose Effects of Oral Cannabis Administration, Blood

THC, Blood

11-OH-THC, Blood

THCCOOH, Blood
The Pharmacokinetic Dose Effects of Oral Cannabis Administration, Oral Fluid

**THC, Oral Fluid**

- THC Mean OF 10 mg
- THC Mean OF 25 mg
- THC Mean OF 50 mg

**THCCOOH, Oral Fluid**

- THCCOOH Mean OF 10 mg
- THCCOOH Mean OF 25 mg
- THCCOOH Mean OF 50 mg

*Axis is Log scale

2 ng/mL Cutoff

50 pg/mL Cutoff

*SAMHSA* Substances Abuse and Mental Health Services Administration
www.samhsa.gov • 1-877-SAMHSA-7
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

### Edible Results

<table>
<thead>
<tr>
<th>Urine</th>
<th>Oral Fluid</th>
<th>Blood</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>THC-COOH Cmax (ng/mL):</strong></td>
<td><strong>THC Cmax (ng/mL):</strong></td>
<td><strong>Highest concentrations of THC was ≤ 5 ng/mL for THC; only 2 participants @ 50 mg THC achieved 5 ng/mL</strong></td>
</tr>
<tr>
<td>10 mg THC = 106 (34 – 278)</td>
<td>10 mg THC = 192 (47 – 412)</td>
<td>No THC detected for 2 participants (10 mg)</td>
</tr>
<tr>
<td>25 mg THC = 335 (75 – 729)</td>
<td>25 mg THC = 478 (70 – 1128)</td>
<td>Cmax THCCOOH (ng/mL)</td>
</tr>
<tr>
<td>50 mg THC = 713 (216 – 1025)</td>
<td>50 mg THC = 598 (350 – 1010)</td>
<td>10 mg THC = 7 (5 – 14)</td>
</tr>
<tr>
<td>Tmax range 3-22 hrs; consistent across doses</td>
<td>Window of detection for THC and THCCOOH was 1.5-22, 0-126 hours respectively</td>
<td>25 mg THC = 21 (12 – 39)</td>
</tr>
<tr>
<td>Window of detection was 74 – 216 hrs</td>
<td></td>
<td>50 mg THC = 29 (16 – 44)</td>
</tr>
<tr>
<td>THC-COOH detectable in 6 at end of study</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**THC Cmax (ng/mL):**
- 10 mg THC = 192 (47 – 412)
- 25 mg THC = 478 (70 – 1128)
- 50 mg THC = 598 (350 – 1010)

**Window of detection for THC and THCCOOH was 1.5-22, 0-126 hours respectively**
Ongoing and Future Studies

- 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
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:


Division of Workplace Programs (DWP) main website:
http://beta.samhsa.gov/workplace

DWP phone number:
(240) 276-2600

Executive Order 12564:

Public Law 100-71:

Mandatory Guidelines:

Model Plan for a Comprehensive Drug-Free Workplace Program:

2013 Guidance for Selection of Testing Designated Positions:
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

- 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?
Prevalence
Cannabis Use

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

http://www.samhsa.gov/data/sites/default/files/NSDUHresultsPDFWHTML2013/Web/NSDUHresults2013.htm#2.13
Cannabis Use

- Individuals reporting daily or almost daily cannabis use.
Marijuana positivity increases nationally for the second consecutive year.” (11% increase)

Dr. Barry Sample, Quest Diagnostics

US General Workforce, pre-employment 9.1M

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

*October = December 2016

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

<table>
<thead>
<tr>
<th>Time of Day</th>
<th>% Drug-Positive Oral Fluid Test</th>
<th>% Drug-Positive Blood Test</th>
<th>% Drug-Positive Oral Fluid and/or Blood Test</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weekday Daytime</td>
<td>19.0%</td>
<td>21.6%</td>
<td>22.4%</td>
</tr>
<tr>
<td>Weekend Nighttime</td>
<td>19.8%</td>
<td>21.2%</td>
<td>22.5%</td>
</tr>
</tbody>
</table>
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

<table>
<thead>
<tr>
<th>Drug Category</th>
<th>2007 Data</th>
<th></th>
<th>2013–2014 Comparable Data</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Oral Fluid Test</td>
<td>Blood Test</td>
<td>Oral Fluid and/or Blood Test</td>
<td>Oral Fluid Test</td>
</tr>
<tr>
<td></td>
<td>N</td>
<td>%</td>
<td>N</td>
<td>%</td>
</tr>
<tr>
<td>Any Illegal Drug</td>
<td>635</td>
<td>11.4%</td>
<td>297</td>
<td>9.8%</td>
</tr>
<tr>
<td>Only Medications (prescription and over-the-counter)</td>
<td>201</td>
<td>3.0%</td>
<td>169</td>
<td>4.0%</td>
</tr>
</tbody>
</table>

### Table 5

<table>
<thead>
<tr>
<th></th>
<th>2007 Data</th>
<th></th>
<th>2013–2014 Comparable Data</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Oral Fluid Test</td>
<td>Blood Test</td>
<td>Oral Fluid and/or Blood Test</td>
<td>Oral Fluid Test</td>
</tr>
<tr>
<td></td>
<td>N</td>
<td>%</td>
<td>N</td>
<td>%</td>
</tr>
<tr>
<td>THC</td>
<td>438</td>
<td>7.7%</td>
<td>234</td>
<td>7.6%</td>
</tr>
</tbody>
</table>
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

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)

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

Intoxication – Synthetic Cannabinoids

“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”.

Driver in fatal Highway 1 crash allegedly smoked synthetic marijuana
Los Osos resident Tanner Mengere, 22, faces charges of DUI, manslaughter
BY NICK WILSON
nwilson@thetribunenews.com  October 25, 2014
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

Blood synthetic cannabinoid concentrations in cases of suspected impaired driving.

- 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.
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
Testing
NSC 2013 Recommendations

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

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

\textsuperscript{1}Center for Forensic Science Research and Education, Fredric Rieders Family Renaissance Foundation, Willow Grove, PA, USA, \textsuperscript{2}NMS Labs, Willow Grove, PA, USA, \textsuperscript{3}New York State Police Forensic Investigation Center, Albany, NY, USA, \textsuperscript{4}Wisconsin State Laboratory of Hygiene, Madison, WI, USA, \textsuperscript{5}New Hampshire Department of Safety, Division of State Police Forensic Laboratory, Concord, NH, USA, \textsuperscript{6}Sam Houston State University, Huntsville, TX, USA, and \textsuperscript{7}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:

<table>
<thead>
<tr>
<th>Recommended Immunoassays</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cannabis</td>
</tr>
<tr>
<td>Methamphetamine</td>
</tr>
<tr>
<td>Amphetamine</td>
</tr>
<tr>
<td>Cocaine/Metabolite</td>
</tr>
<tr>
<td>Benzodiazepines</td>
</tr>
<tr>
<td>- plus lorazepam, clonazepam</td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>
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...

- 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 *(RX webpages)*
- nsc.org/rxactionkit *(Community Action Kit)*
- nsc.org/rxemployerpolicy *(Employer Kit)*
- nsc.org/painmedevidence *(report)*
- safety.nsc.org/sideeffects *(report)*
- nsc.org/workerscomp *(report)*
- nsc.org/prescriptionnation *(infographic)*
- nsc.org/hiddenepidemic *(infographic)*
- nsc.org/nnt *(infographic)*
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Questions and Discussion

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