Marijuana in the Workplace

Presented by
Judge Mary Celeste (Ret.)

HR30
4/5/2017
8:30 AM - 9:30 AM

The handouts and presentations attached are copyright and trademark protected and provided for individual use only.
The Impact of Marijuana Legalization on Workers Compensation

By Jack Green and Patricia Ostrowski

Welcome to a Brave New Workplace

As the use of medical marijuana becomes more widely accepted nationwide, challenges and changes to state Workers Compensation systems abound. The legalization of marijuana is a very complex issue, and will impact all areas of employment including: drug testing and drug-free workplace policies; employment practices; hiring practices; discrimination; compliance with the Americans with Disability Act (ADA); and other lines of insurance coverage such as EPLI, Auto, and General Liability.

Growth of Marijuana Legalization

The number of states allowing the use of medical marijuana is growing at an extremely rapid pace. Currently, there are 23 states and the District of Columbia with laws legalizing marijuana for recreational or medicinal use, as below.

<table>
<thead>
<tr>
<th>Recreational</th>
<th>Medicinal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alaska</td>
<td>Arizona</td>
</tr>
<tr>
<td>Colorado</td>
<td>California</td>
</tr>
<tr>
<td>Oregon (July 2015)</td>
<td>Connecticut</td>
</tr>
<tr>
<td>Washington</td>
<td>Delaware</td>
</tr>
<tr>
<td>Washington, D.C.</td>
<td>Hawaii</td>
</tr>
<tr>
<td></td>
<td>Illinois</td>
</tr>
<tr>
<td></td>
<td>Maine</td>
</tr>
<tr>
<td></td>
<td>Maryland</td>
</tr>
<tr>
<td></td>
<td>Massachusetts</td>
</tr>
<tr>
<td></td>
<td>Michigan</td>
</tr>
<tr>
<td></td>
<td>Minnesota</td>
</tr>
<tr>
<td></td>
<td>Montana</td>
</tr>
<tr>
<td></td>
<td>Nevada</td>
</tr>
<tr>
<td></td>
<td>New Hampshire</td>
</tr>
<tr>
<td></td>
<td>New Jersey</td>
</tr>
<tr>
<td></td>
<td>New Mexico</td>
</tr>
<tr>
<td></td>
<td>New York</td>
</tr>
<tr>
<td></td>
<td>Rhode Island</td>
</tr>
<tr>
<td></td>
<td>Vermont</td>
</tr>
</tbody>
</table>

How Marijuana Legislation is Impacting Workers Compensation

Marijuana use in any form is not legalized federally.

Since state legislation is at odds with federal law, local governments do not have precedence or guidance, which makes policy decisions challenging and acrimonious. This tension and lack of direction is resulting in a range of disparate decisions about who is required to pay for medical marijuana in workers compensation cases. The National Counsel for Compensation Insurance (NCCI) has reported that it is starting to receive requests to cover the costs of medical marijuana and is monitoring state decisions carefully.

Examples of some state legislation and decisions that impact the workers compensation forum follow.
Arizona - HB 2541 was presented on January 28, 2015 and signed by Governor Ducey on April 6, 2015. The bill updates Arizona’s “Medical Marijuana Act” adding workers compensation insurers and self-insured employers as entities that will not be required to pay for medical marijuana.

Iowa – Marijuana is not legal in the state of Iowa. A claimant was injured in Iowa and later moved to Oregon where a doctor prescribed medical marijuana for the injury related to the workers compensation claim. The Iowa Workers Compensation Commission found that the cost of the marijuana was compensable and ordered it paid (Mary McKinney v. Labor Ready and ESIS Inc. No: 5005302), despite Oregon law stating, “Nothing in the Medical Marijuana Act shall be construed to require a governmental medical assistant program or private health insurer to reimburse a person for costs associated with medical use of marijuana.”

New Mexico - On January 13, 2015, the New Mexico Court of Appeals reversed the decision of the Workers Compensation board that found payment for medical marijuana did not constitute reasonable and necessary medical care, as the claimant tested positive prior to the treating doctor authorizing use. In the case of Maez v. Riley Industrial, 33, 154 (N.M. Ct. App. 2015), the Court of Appeals found that the “compassionate use” law allows for the use of medical marijuana to be treated as a “functional equivalent of a prescription,” that it was “reasonable and necessary medical care,” and ruled it was to be paid for under the New Mexico Workers Compensation system.

The New Mexico Court of Appeals also affirmed the Workers Compensation board decision to direct payment for medical marijuana in the case of Vialpando v. Ben’s Automotive Services and Redwood Fire Casualty, No. 32,920 (N.M. Ct. of Appeals 5/19/14), which is believed to be the first workers compensation case that allowed benefits to pay for medical marijuana.

Michigan - A federal court affirmed a district court decision that found an employer had the right to terminate an employee who tested positive for marijuana even though the claimant had a registry card and the use was after a compensable workers compensation injury (Casias v. Walmart Stores Inc., 764 F. Supp 2d914 (2011)).

Ohio - The Court of Appeals Stark County, Ohio Fifth Appellate District, confirmed that a worker who tested positive for marijuana was entitled to workers compensation benefits. The claimant tested positive for marijuana six days after the accident (on the day of the accident the claimant said he could not take the test); witnesses testified that the claimant advised them that he would not pass the test on the date of the accident due to smoking marijuana three weeks prior. The employer, who had a policy that “employees will not be allowed to work with prohibited drugs in their system,” argued that the claimant was not within the scope of employment since he had broken a workplace rule. The Stark County Common Pleas Court disallowed the testimony of the witnesses and also found the case compensable. The Court of Appeals affirmed the decision (Trent v. Stark Metals Sales, Inc., 2015-Ohio-1115).
What Does All This Legislation Mean for Workers Compensation?

When states first began to legalize marijuana use for medical purposes, the prevailing professional opinion was that workers compensation systems would not pay for medical marijuana use, as it still remains illegal under the Federal Controlled Substance Act of 1970, The Drug-Free Workplace Act of 1988, and The Omnibus Transportation Employee Testing Act of 1991. In spite of these federal regulations, various boards are ruling that medical marijuana is compensable under the Workers Compensation system.

The contradiction between state and federal laws will continue to present a challenge to employers and insurers within the Workers Compensation system. It would appear that legalization will continue among the states, and eventually the federal government will legalize some form of medical use of cannabis. Until that time we will look to the various Workers Compensation boards and courts to provide guidance and decisions.

How Marijuana Legalization Complicates Compensation Claims

Marijuana can stay in a person’s system for up to 30 days. Unlike alcohol, it is currently very difficult to prove impairment. If the impairment is confirmed, it would have to be the proximate cause of the accident.

In addition, there is no formal way to bill for marijuana, no usual and customary charge, no fee schedule, and no pricing guidelines. The lack of formal billing codes prevents drug utilization reviews usually performed by pharmacy systems to ensure patient safety. The Centers for Medicare and Medicaid Services (CMS) will not review the costs of marijuana when considering Medicare Set-Asides (MSA) since it is federally banned. The MSA providers are starting to include the costs in their calculations, but CMS still considers it a non-Medicare payment.

A debate within the medical community continues as to whether medical marijuana is effective in treating patients. It is also unknown how medical marijuana may inhibit an injured worker’s return to work.

What Employers Can Do

- All employers should have a drug policy in place, which must be reevaluated on a consistent basis, to ensure compliancy with state and federal laws.
- Paying for medical marijuana under workers compensation is a grey area and could have repercussions. Until the laws are clarified, payment should be under the direction of the state board. In addition, each case must be reviewed individually.
- When an employee returns to work after being treated with marijuana, keeping him/her and other employees safe should be the primary concern. Although this should also be considered when an employee is treated with any medications, extra caution is needed due to the fact that marijuana use is still illegal under Federal law.
- Employers should review their workplace and employment policies to incorporate changes as they occur.
Conclusion

The speed at which states have legalized the use of marijuana and the fact that workers compensation systems are paying for the medical use of marijuana, leads us to expect that marijuana use will eventually be legalized nationwide. The overuse of prescription pain medication and its associated complications begs a solution, and medical marijuana may provide an alternative treatment. However, mainstream use of medical marijuana will occur only when the FDA is able to regulate it for quality, dosage and strength. Along with FDA approval, influence and impairment ratings will have to be implemented, as well as tests akin to those used for alcohol impairment.

Employers should work with their insurance and legal advisors to stay informed of relevant court decisions and legislations regarding use of medical marijuana.

About the Authors

This paper was co-authored by Jack Green, managing principal, and co-leader of Integro’s Casualty Practice, and Patricia Ostrowski, senior vice president, a claims consultant within Integro’s Casualty Practice.

About Integro

Integro is an insurance brokerage and risk management firm. Clients credit Integro’s superior technical abilities and creative, collaborative work style for securing superior program results and pricing. The firm's acknowledged capabilities in brokerage, risk analytics and claims are rewriting industry standards for service and quality. Launched in 2005, Integro and its family of specialty insurance and reinsurance companies, some having served clients for more than 150 years, operate from offices in the United States, Canada, Bermuda and the United Kingdom. Its U.S. headquarter office is located at 1 State Street Plaza, 9th Floor, New York, NY 10004. 877.688.8701. www.integrogroup.com

© Integro Ltd. 2015
MARIJUANA AND THE WORKPLACE

Association of Legal Administrators

April 5, 2017, Denver, Colorado

- The Overseers
  - Management of law firms
  - Corporate legal departments
  - Government legal agencies

- Overview
- MJ Data & Statistics
- Status MMJ & MJ Laws
- How MJ Affects the Brain
- Federal Laws
- State Statutes
- Drug Testing
- Now What?

- Drug Use in the Workplace
  - 67.9% of all adult illegal drug users are employed full or part time.
  - Most binge and heavy alcohol users
  - Drug Use in the Workplace

   **When compared with non-substance users, substance using employees are more likely to:**

   - Change jobs frequently
   - Be late to or absent from work
   - Be less productive
   - Be involved in a workplace accident and potentially harm others
   - File a workers’ compensation claim.

- Research Says

  **MJ users have more:**

  - Workers Compensation
  - Unemployment insurance claims,
  - Lawsuits
  - Decreased productivity
  - Higher turnover
  - Medical Insurance Coverage
  - Occupational & Environmental Medicine
Study by the National Institute on Drug Abuse (NIDA) employees who tested positive for marijuana had:

- 55% more industrial accidents,
- 85% more injuries and
- 75% greater absenteeism compared to those who tested negative.

Occupational & Environmental Medicine
- In 2013, it was alleged that marijuana use was a key factor in a heavy machinery accident that left 6 people dead
- MJ the Most Commonly Used Drug
- Marijuana is the most commonly used Illicit drug worldwide
- Marijuana is the most commonly used illicit drug in Canada and the U.S.
- 22.2 million past-month U.S. users 2014

U.S. Gallup Poll
- 1 in 8 US Adults Smoke Marijuana
- July 13-17, 2016,
- Random sample of 1,023 adults
- 1 in 8 doubles the percentage who reported smoking marijuana 2013

U.S. MMJ
- Medical MJ Laws including oils for targeted ailments 42 States
- Medical full-blown MJ Laws 28 States
- Medical Limited CBD and THC a oils 14 States

- U.S. MMJ
  - Sativex (clinical phases)
  - Marinol (FDA approved)
  - Cesamet (FDA approved)
  - Ebideolex/cannabidoil/CBD (orphan drug status)

The Health Effects of Cannabis and Cannabinoids:
The Current State of Evidence…: Jan., 2017
- **Substantial Evidence**: chronic pain in adults; chemotherapy-induced nausea and vomiting; MS spasticity symptom
- **Moderate Evidence**: sleep disturbance associated with obstructive sleep apnea syndrome; fibromyalgia, chronic pain, and MS
- **Limited Evidence**: MS: Tourette syndrome; PTSD; dementia; glaucoma; social anxiety disorders;
Marijuana/Cannabis
And the Brain

Cannabis
Flowering plants that include three putative varieties, sativa, indica, and ruderalis
Indigenous to Central and South Asia
Active ingredient Delta 9 THC. Resinous substance is known as Hashish.

MJ & Its Compounds
(aka molecules)
- 483 chemical constituents isolated and identified in cannabis to date
- About 60-85 cannabinoids. Some are psychoactive and some are not.
- THC main psychoactive cannabinoid
- Some 20 Flavonoids
- 120 Terpenes

The Human Body Systems
The Endocannabinoid System
U.S. MMJ
Dec 23, 2015, DEA Eases Requirements for FDA Approved Clinical Trials on CBD
CBD contains less than 1 percent THC and has shown some potential medicinal value
Currently, CBD is also Schedule I
Cannabinoid Receptors
in Brain & Body

Cannabinoid receptors are believed to be more numerous than any other receptor system.

Endocannabinoids
Endocannabinoids are in every living animal above Hydra and Mollusks, with the exception of insects UNTIL 2014 when it was found in a fruit fly.
Endocannabinoids are the substances our bodies naturally make to stimulate cannabinoid receptors.

Brain Receptors for Cannabis
There are currently two known subtypes of cannabinoid receptors CB1 and CB2
The CB receptor is expressed mainly in the brain (central nervous system CNS). Also in the lungs, liver and kidneys

Cannabinoid Receptors
1992 Discovered natural transmitter or “endocannabinoid” that fits those receptors: anandamide
More recently an even more important endocannabinoid that normally activates these receptors was discovered 2AG (2 arachidonyl glycerol)

Anandamide
The Bliss Molecule
THC begins this process by binding to the CB1 receptors for anandamide and 2AG.
Anandamide is involved in regulating mood, memory, appetite, pain, cognition, and emotions.
How Brain Cells Communicate

Brain cells (neurons) communicate with each other and with the rest of the body by sending chemical “messages.” These messages help coordinate and regulate everything we feel, think, and do.

Cell Communication
Scheme Endocannabinoid System

Examples of MJ Acute Affects
- 2016 Independent Predictor of Stress Cardiomyopathy in Younger Men
- 2016 Heavy cannabis use associated with reduced dopamine release in brain affecting learning behavior
- 2015 Pot Affects Corpus Callosum
- 2015 Affects Bipolar
- 2015 Psychosis
- 2015 Shorter Boys
- 2015 Male adolescents at high risk for schizophrenia
- 2015 Shrinks & Rewires Brain
- 2014 Reduction in IQ under 21

Control Substances Act
A controlled (scheduled) drug is one whose use and distribution is tightly controlled because of its abuse potential or risk.
Five categories for drugs Schedule I is reserved for what the DEA considers to be the "most dangerous" drugs without currently accepted medical value.

Federal Laws
Rehabilitation Act: 501, 503, 504, 508
Americans with Disabilities Act
- Title I
- Title II
- Title III
- Title IV
Air Carrier Access Act
FMLA
United States Code Title 29 - Chapter 16 - Vocational Rehabilitation and Other Rehabilitation Services. (Cornell University Law School's Legal Information Institute (LII) Website)
Workforce Investment Act - U.S. Department of Labor, Employment & Training Administration, Workforce Investment Act Information page

ADA 1990
The ADA is a federal law protecting employees from discrimination on the basis of disability.
Title I of the ADA applies to private employers, state and local governments, employment agencies and labor unions, provided that such employers employ fifteen or more employees.

ADA
The ADA prohibits employers, including states, from "discriminating against a qualified individual with a disability" and requires employers to "make reasonable accommodations [for] . . . physical or mental limitations . . . unless [to do so] . . . would impose an undue hardship on the . . . Business

ADA
Continuing conflict between states that have adopted MMJ laws and federal prohibitions against the drug
Since marijuana use is still considered illegal by the federal government, it seems clear that marijuana users, even those registered through a state’s medical marijuana program, may be excluded from ADA protection under 42 U.S.C. § 12114(a).

ADA
This issue has not yet been decided by the courts, and may ultimately be decided based on a choice of competing interpretations of the ADA.
The United States Supreme Court may ultimately be asked to decide whether medical marijuana use is permitted under the ADA.

Addiction to MJ Not a Disability

ADA Case
The Fifth Circuit addressed whether the ADA excludes persons who are currently using illegal drugs from its protection (cocaine).
The Zenor court held that the ADA specifically exempts current illegal drug users from being considered “qualified individuals”.

ADA Case
In James v. Costa Mesa, (700 F.3d 394, 397 (9th Cir. 2012), the Ninth Circuit has addressed the ADA issue, holding that the
ADA does not protect individuals who use marijuana for medical purposes or require accommodation of such use.

FMLA
The fact that employee might be using MMJ during my FMLA time off is irrelevant
What if employee takes time off to use…can they come back after use? Fitness for duty examination? If zero tolerance w/o statutory protection may be terminated?
The employee could argue that the job termination was in retaliation for his taking FMLA leave, or an attempt to interfere with his/her use of FMLA leave?
In *Emerald Steel Fabricators, Inc. v. Bureau of Labor & Industries*, (230 P.3d 518, 535–36 (Or. 2010) (*en banc*)), the Oregon Supreme Court held that, consistent with the ADA, employers have no obligation to reasonably accommodate an employee’s medical-marijuana use under Oregon’s disability-discrimination statute because marijuana is still considered an “illegal drug” under federal law.

If medical marijuana is recommended by a physician to treat an employee’s pain resulting from a workplace injury, the employer and their workers’ compensation insurer must pay for it. The court rejected the argument that paying for the MMJ would cause the employer and insurer to violate federal law and public policy since marijuana remains a prohibited Schedule I drug under federal law.

A south Jersey man injured on the job at a lumber company will have his MMJ tab paid by his employer's workers compensation insurance, according to a state administrative law judge ruling in what appears to be the first decision of its kind in the state.

"the effects of the marijuana, in many ways, is not as debilitating as the effects of the Percocet. The pharmacy records show that, ultimately (Watson) was able to reduce his use of oral narcotic medication." Admin Judge

Employers have “just cause,” for purposes of unemployment compensation, to terminate Employee is not entitled to receive workers’ compensation if the employee was under the influence of marijuana at the time of injury and the use of marijuana was the proximate cause of that injury.
Unemployment Benefits
The Michigan Supreme Court permitted a worker to collect unemployment insurance benefits after he was terminated for using medical marijuana.

MMJ State Statutes
Connecticut, Illinois, Maine and Rhode Island, protect employees’ rights and safeguard against disciplinary action for medical marijuana use.
Conversely, California, Montana and Washington have found in favor of employers, ruling that they can fire employees for using medical marijuana.

State MMJ Statutes
Where Employers Likely Have A Duty To Accommodate
Arizona; Connecticut; Delaware; Illinois; Maine; Minnesota; Nevada; New York; Rhode Island

Connecticut MMJ Law
No employer may refuse to hire a person or may discharge, penalize or threaten an employee solely on the basis of such person’s or employee’s status as a qualifying patient or primary caregiver under sections 21a-408 to 21a-408n, inclusive.
Nothing in this subdivision shall restrict an employer’s ability to prohibit the use of intoxicating substances during work hours or restrict an employer’s ability to discipline an employee for being under the influence of intoxicating substances during work hours.

State MMJ Statutes
Laws That Do Not Require Workplace Accommodations
Alaska; California; Colorado; D.C.; Georgia; Hawaii; Maryland; Massachusetts; Michigan; Montana; New Hampshire; New Jersey; New Mexico; Ohio; Oregon; Vermont; Washington

Georgia (GA. CODE ANN. § 16-12-191)
The statute does not require an employer to permit or accommodate the use, consumption, possession, transfer, display, transportation, sale or growing of marijuana in any form.
An employer may have a written zero tolerance policy prohibiting the on-duty, and off-duty, use of marijuana, or prohibiting any employee from having a detectable amount of marijuana in such employee's system while at work.

Oregon (OR. REV. STAT. ANN. § 475.300-.342, § 475.340, § 475.316)
An employer is not required to accommodate the medical use of marijuana in the workplace.
A private health insurer is not required to reimburse a person for costs associated with the medical use of marijuana.
The statute does not discuss operating heavy machinery.
Ohio State MMJ Statute
September, 2016
The new law expressly addresses employment issues, resolving each of these issues clearly in favor of employers.
Not required to permit or accommodate
Permitted to terminate or discipline an employee or refuse to hire
Permitted to establish and enforce a drug testing policy,

Lawful Activity Statutes
“lawful products” or “lawful activities” statutes protect employees’ rights to engage in lawful activities during non-working hours

Off-Duty Conduct Statutes
29 States & D.C.
18 Tobacco only: Connecticut; D.C.; Indiana; Kentucky; Louisiana; Maine; Mississippi; New Hampshire; New Jersey; New Mexico; Oklahoma; Oregon; Rhode Island; South Carolina; South Dakota; Virginia; West Virginia; Wyoming

Off-Duty Conduct Statutes
8 Use of Lawful Products: Illinois; Minnesota; Missouri; Montana; Nevada; North Carolina; Tennessee; Wisconsin
4 Employees who engage in lawful activities: California; Colorado; New York; North Dakota

Jan., 2017 Oregon Bill
Off-the-job MJ Use
SB 301 amends ORS 569A.315, which originally protected workers that used lawful tobacco products while on their own time. The bill would update that law to read as follows:
It is an unlawful employment practice for any employer to require, as a condition of employment, that any employee or prospective employee refrain from using a substance that is lawful to use under the laws of this state during nonworking hours.
Exceptions if the substance restriction relates to a bona fide occupational qualification or the performance of work while impaired.

Lawful Activities Statute Case
No. 13SC394, Coats v. Dish
The supreme court holds… Colorado’s “lawful activities statute,” the term “lawful” refers only to those activities that are lawful under both state and federal law.
Therefore, employees who engage in an activity such as {MMJ} use that is permitted by state law but unlawful under federal law are not protected by the statute. We therefore affirm

Arkansas MMJ House Bills Introduced 2017
HB 1057 Add background check AMMA
HB 1058 Registry ID card not medical record and exemption from Arkansas Freedom of Information Act
Impact on Employers & background checks

MJ & Drug Testing

Greater Share of U.S. Workers Testing Positive for Illicit Drugs
Detection of illicit drugs increased slightly both for general and ‘safety-sensitive’ workforce
Workplace Drug Testing
“studies show drug testing works;
employees are 3xs less likely to produce a positive test result if they know they will be tested.”

When Do You Test
Pre-employment testing
Random testing
Reasonable suspicion/cause testing,
Post-accident testing
Return to duty testing
Follow up testing.
This usually involves collecting urine samples to test for drugs such as marijuana, cocaine, amphetamines, PCP, and opiates.

Testing
Employers should consider whether or when they will conduct drug testing.
With the passage of these laws, employers should expect that more of their employees may be using marijuana outside of the workplace.

Federal Drug-Free Workplace Act
Marijuana use is still illegal under federal laws. Therefore, any workplace that receives federal funding or is subject to federal regulations requiring the testing of safety-sensitive workers — like the Department of Transportation, for example — must consider marijuana a prohibited substance according to the Drug-Free Workplace Act of 1988

California Case
Pre-employment Test
Physician recommended marijuana use chronic pain
Employee fired when a pre-employment drug test revealed his MJ use.
Nothing in the text or history of the California Compassionate Use Act (MMJ Law) suggests the voters intended the measure to address the respective rights and duties of employers and employees.
Under California law, an employer may require pre-employment drug tests and take illegal drug use into consideration in making employment decisions.
Standard Urine Test Panel
- Alcohol
- Amphetamines
- Barbiturates
- Benzodiazepines
- Cannabinoids (THC)
- Cocaine
- Creatinine
- Opiates

MJ Toxicology
Elimination

Active

THC a/k/a delta-9-tetrahydrocannabinol is the main psychoactive substance found in marijuana

Metabolites

11-Hydroxy-THC (aka 11-OH-THC) is the main psychoactive metabolite of THC formed in the body after marijuana consumption

11-nor-9-Carboxy-THC (aka 11-nor-9-carboxy-delta-9-tetrahydrocannabinol, 11-nor-9-carboxy-delta-9-THC, 11-COOH-THC, THC-COOH, and THC-11-oic acid, ) is the main secondary metabolite of THC which is formed in the body after marijuana is consumed. It is NOT active.

Metabolization of Marijuana
- On the other hand, studies have shown that regular users can test positive (20 ng/ml limit) for THC metabolites for up to 46 consecutive days following marijuana usage.
- In an extreme case, a heavy cannabis user of more than 10 years was able to test positive (20 ng/ml limit) for up to 67 days after last being exposed to marijuana.

Assumption that cannabinoids will remain detectable in urine for 30 days or longer following the use of marijuana.
- THC is not found in its active form in urine rather as the metabolite THC-COOH…
For new or infrequent users, the window of time for detection (50ng/ml limit) is believed to last 1 to 2 days.

THC Levels & Impairment

Employers should expect more challenges, based on the long period of time that marijuana metabolites remain in an individual's system, from employees that have failed drug tests but who claim they were not impaired while working.

Second Hand MJ Smoke
2015 Study
Six experienced cannabis users smoke in the same sealed chamber as six non-users.
The design of this study utilized three different experimental sessions, accounting for two concentrations of THC (5.3% and 11.3% THC) and two air-control conditions (non-ventilated and ventilated chambers).
Results: extreme exposure to second-hand cannabis smoke can produce blood-THC levels high enough to test positive on a drug test for several hours.

Second Hand MJ Smoke
2015 Study
Results: extreme exposure to second-hand cannabis smoke can produce blood-THC levels high enough to test positive on a drug test for several hours.

What to Expect in the Workplace
2017 L.A. Times
According to HR Research and Advisory Company CEB
As states make marijuana legal, companies will update their policies
Companies are reviewing pre-employment testing for MJ except pilots and drivers
Considering testing for MJ only if suspicion

Now What?
Review & Evaluate
Review Federal and State Drug Testing Standards
Establish pre-employment screening including polygraph testing and clear drug-testing and drug-free workplace policies
Evaluate these policies and procedures to safeguard that they are in compliance with federal and state laws and appellate case decisions.

Now What?
Train Managers & Supervisors
Train managers that will enforce workplace policies.
“Employers should train their supervisors and managers to recognize signs of impairment (whether due to marijuana, alcohol, or other substances) and how to deal with inquiries from employees regarding their use of medical marijuana”
Now What?
Utilize MRO
“Medical review officer” or “MRO” means a licensed physician, employed with or contracted with an employer,
Who has knowledge of substance abuse disorders, laboratory testing procedures, and chain of custody collection procedures;
Who verifies positive, confirmed test results;

Now What?
Workers Compensation
Marijuana can stay in a person’s system for up to 30 days or more
Difficult to prove impairment
If impairment confirmed it has to be the proximate cause of the accident or injury

Now What?
Workers Compensation
“Paying for medical marijuana under workers compensation is a grey area and could have repercussions.
Until the laws are clarified, payment should be under the direction of the state board .
In addition, each case should be reviewed individually.”

Now What?
Lawful Activities Statutes
Employers in states that generally do not provide for employment protections should still consider whether their state has a "lawful activities" or "lawful products" statute or whether courts in their state may be more favorable to finding a clear public policy protecting medical marijuana users.

Now What?
Review & Revise
According the Journal of Economics, “medical marijuana legalization would decrease costs for employers as it has reduced self-reported absence from work due to illness/medical issues”
“An economist from the University of Wisconsin analyzed work absence data following the enactment of medical marijuana laws in 24 states, with an emphasis on sickness-related absenteeism among individuals most likely to be eligible for cannabis therapy.”

Now What?
2017 Proposed Testing Regulations
SAMHSA and DOT
HHS Expanded Opioid Testing and Allowance of Oral Fluid Testing:
Revised Mandatory Guidelines for Federal Workplace Drug Testing Programs using Urine allow federal executive branch agencies to test for additional Schedule II drugs of
the Controlled Substances Act (i.e., oxycodone, oxymorphone, hydrocodone and hydromorphone)

- Require MRO requalification training and re-examination at least every five years after initial MRO certification,
- Allow federal agencies to authorize collection of an alternate specimen (e.g., oral fluid) when a donor in their program is unable to provide a sufficient amount of urine specimen at the collection site.
- The effective date of these changes is October 1, 2017.

**TECHNOLOGY ON THE HORIZON**
- Laser Technology to Detect Drugs
- Fingerprint Technology
- Oral Fluid
- Electronic Sensor
- Breathalyzer

- In those states that do provide for some form of employment protection, you should carefully revise your policies to be consistent with those laws.

- Review your drug-free workplace and drug-testing policies to see if they need clearer language so employees understand the risks of using marijuana under any new state law.

- Is there anything positive about MJ in the workplace
  - Maybe.
  - According the Journal of Economics, “medical marijuana legalization would decrease costs for employers as it has reduced self-reported absence from work due to illness/medical issues”
  - “An economist from the University of Wisconsin analyzed work absence data following the enactment of medical marijuana laws in 24 states, with an emphasis on sickness related absenteeism among individuals most likely to be eligible for cannabis therapy.”
A SURVEY OF MEDICAL MARIJUANA LAWS IMPACTING THE WORKPLACE

BY JOSEPH H. YASTROW

Joseph H. Yastrow
Laner Muchin, Ltd.
515 N. State Street, Suite 2800
Chicago, IL  60654
312-467-9800
312-467-9479 (fax)
jyastrow@lanermuchin.com
A SURVEY OF MEDICAL MARIJUANA LAWS IMPACTING THE WORKPLACE

The survey results set forth below summarize the medical marijuana laws in Washington, D.C. and the twenty-four (24) listed states. The results are grouped into two (2) categories as follows: (1) states where employers likely have a duty to accommodate; and (2) states where the relevant laws are either silent or expressly exempt employers from providing accommodations to medical marijuana users.

In reviewing these materials, please keep in mind that the limited protected status of registered qualifying patients in the various statutes listed below and the obligation to “accommodate” such individuals is separate and apart from state disability discrimination laws and the ADA. Thus, an individual who enjoys a protected status under one of the statutes listed below may, nevertheless, be excluded from disability laws as a result of their status as a current user of illegal drugs because marijuana remains an illegal drug under federal law. For this reason, the employer of such an employee may have no accommodation obligation under state or federal disability laws. The survey is current as of July 1, 2015.

I. States Where Employers Likely Have A Duty To Accommodate

**Arizona** (ARIZ. REV. STAT. ANN. Title 36, Chapter 28.1, § 36-2802, §36-2807, §36-2813, §36-2814)

- Summary:
  - An employer may not discriminate against a person in hiring, termination or imposing any term or condition of employment or otherwise penalize a person based upon either:
    - the person’s status as a cardholder;
    - a registered qualifying patient’s positive drug test for marijuana components or metabolites, unless the patient used, possessed or was impaired by marijuana on the premises of the place of employment or during the hours of employment.
  - There is an exception if the employer’s compliance would cause the employer to lose a monetary or licensing related benefit under federal law or regulations.
  - Employers are not required to allow the ingestion of marijuana in their workplaces or allow an employee to work while under the influence of marijuana. However, a registered qualifying patient is not considered to be under the influence of marijuana where the presence of metabolites or components of marijuana appear in insufficient concentration to cause impairment.
  - The statute does not specifically discuss restrictions on the operation of heavy machinery. However, the Act expressly states that it does not authorize operating, navigating or being in actual physical control of any motor vehicle while under the influence of marijuana.
What proof of medical marijuana use is required?

- An employer may use the verification system only to verify a registry identification card that an employee or applicant provided to the employer after receiving a conditional offer of employment.


- Summary:
  - Unless required by federal law or required to obtain federal funding, no employer may refuse to hire a person, or discharge, penalize or threaten an employee solely on the basis of such person’s status as a qualifying patient for medical marijuana use.
  - The statute does not prohibit an employer from prohibiting the use of intoxicating substances during work hours or disciplining an employee for being under the influence of intoxicating substances during work hours.
  - The statute does not discuss operating heavy machinery. However, the statute expressly states that ingestion of marijuana while in a moving vehicle is not a protected activity.


- Summary:
  - Unless a failure to do so would cause the employer to lose a monetary or licensing-related benefit under federal law or federal regulations, an employer may not discriminate against a person in hiring, termination or any term or condition of employment, or otherwise penalize a person, if the discrimination is based upon either of the following:
    - the person’s status as a cardholder; or
    - a registered qualifying patient’s positive drug test for marijuana components or metabolites, unless the patient used, possessed or was impaired by marijuana on the premises of the place of employment or during the hours of employment.
  - An employer is not required to allow the ingestion of marijuana in any workplace or to allow an employee to work while under the influence of marijuana. However, a registered qualifying patient cannot be considered to be under the influence of marijuana solely because of the presence of metabolites or components of marijuana.
  - Employers are not prohibited from disciplining an employee for ingesting marijuana in the workplace or working while under the influence of marijuana.
  - The statute does not discuss operating heavy machinery. However, operating, navigating or being in actual physical control of any motor vehicle while under the influence of marijuana is not authorized under the statute. A registered qualifying patient or visiting qualifying patient is not considered to be under the
influence of marijuana solely because of the presence of metabolites or components of marijuana.

- **What proof of medical marijuana use is required?**
  - With the cardholder’s permission, the Department of Health and Social Services shall confirm a person’s status as a registered qualifying patient to an employer.
  - Qualifying patients are given access to medical marijuana at state-regulated, “compassion centers.”

- **Delaware’s statute protects “visiting” qualifying patients, as well.** A visiting qualifying patient is a person who:
  - has been diagnosed with a debilitating medical condition;
  - possesses a valid registry identification card, or its equivalent, that was issued pursuant to the laws of another state, district, territory, commonwealth, insular possession of the United States or country recognized by the United States that allows the person to use marijuana for medical purposes in the jurisdiction of issuance; and
  - is not a resident of Delaware or who has been a resident of Delaware for less than 30 days.

**Illinois** *(410 ILL. COMP. STAT. ANN. 130/40, 130/30, 130/50)*

- **Summary:**
  - Unless a failure to do so would cause the employer to lose a monetary or licensing-related benefit under federal law or federal regulations, an employer may not penalize a person solely for his or her status as a registered qualifying patient or a registered designated caregiver.
  - The statute does not require a private health insurer to reimburse a person for costs associated with the medical use of cannabis.
  - An employer may not be penalized or denied any benefit under State law for employing a cardholder.
  - An employee remains subject to civil, criminal or other penalties if he or she were to engage in any task under the influence of cannabis, when doing so would constitute negligence, professional malpractice or professional misconduct.
  - A private business may restrict or prohibit the medical use of cannabis on its property.
  - The statute does not protect or permit the use of cannabis in any motor vehicle.
  - Operating, navigating or being in actual physical control of any motor vehicle or aircraft while using or under the influence of cannabis, is not authorized under the statute.
  - The use of medical cannabis is not permitted by:
    - an active duty law enforcement officer, correctional officer, correctional probation officer or firefighter; or
    - a person who has a school bus permit or a Commercial Driver's License.
○ An employer may adopt reasonable regulations concerning the consumption, storage or timekeeping requirements for qualifying patients related to the use of medical cannabis.

○ An employer may enforce a policy concerning drug testing, zero-tolerance or a drug free workplace provided the policy is applied in a nondiscriminatory manner.

○ An employer may discipline a registered qualifying patient for violating a workplace drug policy.

○ An employer may discipline an employee for failing a drug test if failing to do so would put the employer in violation of federal law or cause it to lose a federal contract or funding.

○ An employer may consider a registered qualifying patient to be impaired when he or she manifests specific, articulable symptoms while working that decrease or lessen his or her performance of the duties or tasks of the employee's job position, including symptoms of the employee's speech, physical dexterity, agility, coordination, demeanor, irrational or unusual behavior, negligence or carelessness in operating equipment or machinery, disregard for the safety of the employee or others, or involvement in an accident that results in serious damage to equipment or property, disruption of a production or manufacturing process or carelessness that results in any injury to the employee or others. If an employer elects to discipline a qualifying patient under this subsection, it must afford the employee a reasonable opportunity to contest the basis of the determination.

○ The statute does not create or imply a cause of action for any person against an employer for:
  ➢ actions based on the employer's good faith belief that a registered qualifying patient used or possessed cannabis while on the employer's premises or during the hours of employment;
  ➢ actions based on the employer's good faith belief that a registered qualifying patient was impaired while working on the employer's premises during the hours of employment;
  ➢ injury or loss to a third party if the employer neither knew nor had reason to know that the employee was impaired.


- Summary:
  ○ An employer may not refuse to employ or otherwise penalize a person solely for that person’s status as a qualifying patient unless failure to do so would put the employer in violation of federal law or cause it to lose a federal contract or funding.
  ○ An employer is not required to accommodate an employee’s ingestion of marijuana in its workplace.
A business owner may prohibit the smoking of marijuana for medical purposes on the premises of the business if the business owner prohibits all smoking on the premises and posts notice to that effect on the premises.

The statute does not discuss operating heavy machinery. However, operating, navigating or being in actual physical control of any motor vehicle or all-terrain vehicle while under the influence of marijuana is not authorized under the statute.

- Relevant Case Law:
  - An employee filed a claim in state court that her employer violated ME. REV. STAT. ANN. tit. 22 § 2423-E, because the employer refused to rehire the employee, a qualifying patient, after she failed a drug-test. The employer moved to have the case removed to federal court and the United States District Court of Maine decided that federal jurisdiction was proper under diversity jurisdiction, as the parties were from diverse states and the amount in controversy would likely exceed $75,000. Thomas v. Adecco USA, Inc., No. 1:13-CV-00070-JAW, 2013 WL 6119073 (D. Me. Nov. 21, 2013). The case settled in 2014.

Minnesota (MINN. STAT. §§ 152.21-.37, § 152.32, § 152.23)

- Summary:
  - Unless a failure to do so would violate federal law or regulations or cause an employer to lose a monetary or licensing-related benefit under federal law or regulations, an employer may not discriminate against a person in hiring, termination, or any term or condition of employment, or otherwise penalize a person, if the discrimination is based upon either of the following:
    - (1) the person's status as a patient enrolled in the registry program under sections 152.22 to 152.37; or
    - (2) a patient's positive drug test for cannabis components or metabolites, unless the patient used, possessed or was impaired by medical cannabis on the premises of the place of employment or during the hours of employment.
  - An employee who is required to undergo employer drug testing pursuant to state law, may present verification of enrollment in the patient registry as part of the employee's explanation under the state law.
  - An employee remains subject to civil, criminal or other penalties if he or she were to undertake any task under the influence of medical cannabis that would constitute negligence or professional malpractice.
  - A private business may restrict or prohibit the medical use of cannabis on its property.
  - The statute does not permit the vaporization of medical cannabis in a place of employment.
  - The statute does not discuss operating heavy machinery. However, operating, navigating or being in actual physical control of any motor vehicle, aircraft, train,
or working on transportation property, equipment or facilities while under the influence of medical cannabis is not authorized under the statute.

**Nevada** (NEV. REV. STAT. §§ 435A.010-.810, § 453A.800, § 453A.300)

- **Summary:**
  - An employer is not required to modify the job or working conditions of a person who engages in the medical use of marijuana that are based upon the reasonable business purposes of the employer, but the employer must attempt to make reasonable accommodations for the medical needs of an employee who engages in the medical use of marijuana if the employee holds a valid registry identification card, provided that such reasonable accommodation would not:
    - (a) Pose a threat of harm or danger to persons or property or impose an undue hardship on the employer; or
    - (b) Prohibit the employee from fulfilling any and all of his or her job responsibilities.
  - The statute does not require that an employer allow the medical use of marijuana in the workplace.
  - An insurer or any person or entity who provides coverage for a medical or health care service is not required to pay for or reimburse a person for costs associated with the medical use of marijuana.
  - The statute does not discuss operating heavy machinery. However, a person who holds a registry identification card cannot establish an affirmative defense to charges arising from driving, operating or being in actual physical control of a vehicle or a vessel under power or sail while under the influence of marijuana.

- **Relevant Case Law:**
  - In *Clevenger v. Nevada Employment Sec. Dept.*, 770 P.2d 866, 868 (Nev. 1989), the Supreme Court of Nevada faced the issue of whether an employee’s off-the-job marijuana use in violation of the employer’s drug policy was “misconduct connected with his work” for purposes of unemployment benefits eligibility.
    - The Court held that when off-the-job conduct violates an employer’s rule or policy, such as the prohibition of marijuana use, courts must determine if the employer’s rule or policy has a reasonable relationship to the work to be performed; and if so, whether there has been an intentional violation or willful disregard of that rule or policy.
  - The Court held there was a reasonable connection between the employer’s policy prohibiting illegal drug use off-the-job and the employer’s legitimate safety interests where the employer manufactured explosives. Additionally, the fact that the employee was a continuous marijuana user demonstrated she intentionally violated the employer’s drug policy.
pleaded guilty to possessing marijuana and was subsequently terminated from his teaching position by the district was properly denied unemployment benefits. The decision was made “in light of [the State’s] Uniform Controlled Substances Act provision affording certain first-time drug offenders the opportunity to avoid criminal conviction if [the] offender pleads guilty and then successfully completes a probationary period.”

➢ The Court adopted the reasoning used by a Maryland court in interpreting its parallel statute and decided that the Nevada statute “forestalls a final judgment of conviction ‘for purposes of employment, civil rights or any statute or regulation or license or questionnaire or for any other public or private purpose’ if the offender successfully completes probation, the guilty plea may not be used to establish misconduct-based grounds for termination for purposes of denying unemployment compensation during the probationary period.”

➢ The Court remanded the case to the Employment Security Division to determine whether the school district met its burden to demonstrate that the teacher had committed misconduct, without considering his guilty plea, that would make him ineligible for unemployment benefits.

New York (N.Y. PUB. HEALTH LAW §§ 3360 to 3369-d (McKinney), § 3369; N.Y. COMP. CODES R. & REGS. tit. 10, § 1004, § 1004.18)

➢ Summary:
  o Certified patients and designated caregivers shall not be subject to arrest, prosecution, or penalty in any manner, or denied any right or privilege, including but not limited to civil penalty or disciplinary action by a business or occupational or professional licensing board or bureau, solely for the certified medical use or manufacture of marijuana, or for any other action or conduct in accordance with this Act.
  o Being a certified patient shall be deemed to be having a “disability” under the executive law (human rights law), the civil rights law, sections of the penal law, and a section of the criminal procedure law.
  o An employer may enforce a policy of prohibiting an employee from performing his or her employment duties while impaired by a controlled substance.
  o The statute shall not require any person or entity to do any act that would put the person or entity in violation of federal law or cause it to lose a federal contract or funding.
  o Approved medical marijuana products shall not be vaporized in places of employment.
  o The statute does not discuss operating heavy machinery. However, consumption of approved medical marijuana products is not permitted in any motor vehicle, either public or private, that is located upon public highways, private roads open to motor vehicle traffic, parking area of a shopping center or any parking lot.
Rhode Island (R.I. GEN. LAWS ANN. §§ 21-28.6-4, 21-28.6-7)

- Summary:
  - No employer may refuse to employ or otherwise penalize a person solely for his or her status as a cardholder.
  - The statute does not discuss operating heavy machinery. However, operating, navigating or being in actual physical control of any motor vehicle while under the influence of marijuana is not authorized. A registered qualifying patient shall not be considered to be under the influence solely for having marijuana metabolites in his or her system.
  - An employer is not required to accommodate the medical use of marijuana in its workplace.

II. State Medical Marijuana Laws That Do Not Require Workplace Accommodations

Alaska (ALASKA STAT. § 17.37, § 17.37.040)

- Summary:
  - No accommodation of medical marijuana use is required in any place of employment.

California (CAL. HEALTH & SAFETY CODE § 11362.5, §11362.785, §11362.79 (West))

- Summary:
  - Employers are not required to accommodate any marijuana use on the property or premises of any place of employment or during the hours of employment.
  - The law does not discuss operating heavy machinery. However, a qualified patient cannot engage in smoking medical marijuana while operating a motor vehicle.
- Relevant Case Law:
  - The California Supreme Court held employers do not have to accommodate their employee’s medical marijuana use. Ross v. RagingWire Telecommunications, Inc., 42 Cal. 4th 920, 930 (2008).
    - In Ross, the Plaintiff was fired after a pre-employment drug test required of all new employees revealed marijuana use. The court held that an employer’s requirement of a pre-employment drug test and subsequent discharge of the employee after a positive test did not violate California’s anti-discrimination statute or public policy because the statute did not require employer accommodations.
Colorado (COLO. CONST. art. XVIII, § 14)

- Summary:
  o An employer is not required to accommodate the medical use of marijuana in any workplace.
- Relevant Case law:
  o On June 15, 2015, in Coats v. Dish Network, LLC, No. 13SC394, ( Colo. June 15, 2015), the Colorado Supreme Court affirmed a 2013 Colorado Court of Appeals’ decision that an employee’s off-duty medical marijuana use was not “lawful activity” protected by Colorado’s “lawful activities statute,” COLO. REV. STAT. § 24-34-402.5, as the term “lawful” refers to activities that are lawful under both state and federal law.
     In Coats, Petitioner, a quadriplegic who obtained a medical marijuana license and “consume[d] medical marijuana at home, after work, and in accordance with his license and Colorado state law . . . tested positive for tetrahydrocannabinol ("THC") during a random drug test” by his employer. Petitioner’s employment was terminated “for violating the company’s drug policy.”
     Petitioner filed a wrongful termination lawsuit under COLO. REV. STAT. § 24-34-402.5, claiming that his use of medical marijuana was a protected, lawful activity. A Colorado District Court granted the employer’s motion to dismiss and “found that the Amendment provided registered patients an affirmative defense to state criminal prosecution without making their use of medical marijuana a ‘lawful activity’ within the meaning of section 24-34-402.5.”
     The Colorado Court of Appeals affirmed the district court’s ruling based on the plain language of the term “lawful” in COLO. REV. STAT. § 24-34-402.5, which means “‘permitted by law.’” For an activity to be “lawful” where the activity is “governed by both state and federal law [the activity] must ‘be permitted by, and not contrary to, both state and federal law.’” Under the federal Controlled Substances Act, 21 U.S.C. § 844(a) (2012), marijuana use is prohibited, therefore, the majority “concluded that [the employee’s] conduct was not ‘lawful activity’ protected by the statute.”
     The Colorado Supreme Court, agreeing with the Court of Appeals, determined “that a ‘lawful’ activity is that which complies with applicable ‘law,’ including state and federal law.” The federal Controlled Substances Act, 21 U.S.C. § 844(a), makes marijuana a Schedule I substance thus “meaning federal law designates it as having no medical accepted use, a high risk of abuse, and a lack of accepted safety for use under medical supervision.” The Court held that Petitioner’s “use of medical marijuana was unlawful under federal law and thus not protected by section 24-34-402.5.”
The Court declined “to address the issue of whether Colorado’s Medical Marijuana Amendment deems medical marijuana use ‘lawful’ by conferring a right to such use.”

- A court found that an employee, per employer's “standard policies, took a drug screen that tested positive for cannabinoids” and that “[u]nder established Colorado law, discharging an employee under [those] circumstances [was] lawful, regardless of whether the employee consumed marijuana on a medical recommendation, at home or off work.” Curry v. MillerCoors, Inc., No. 12-CV-02471-JLK, 2013 WL 4494307 (D. Colo. Aug. 21, 2013). The employee claimed that his “termination violated the employment discrimination provisions found in C.R.S. §§ 24–34–402(1)(a), C.R.S. § 24–43–402.5, C.R.S. § 24 34–402(1)(d), and also that MillerCoors tortiously invaded his privacy.”

- The court found that the employee’s first cause of action failed to state a claim for which relief can be granted because a positive test for marijuana, whether from medical or any other use, is a legitimate basis for discharge under Colorado law.

- The court also found that the employer's request for information regarding the employee’s status as a medical marijuana patient did not constitute “an unreasonable manner of intrusion or an intrusion for an unwarranted purpose.”

- The court cited Beinor v. Industrial Claims Appeals Office, 262 P.3d 970, 976 (Div. VII, 2011) which held “that the Colorado Constitution as amended with respect to medical marijuana ‘does not give medical marijuana users the unfettered right to violate employers’ policies and practices regarding use of controlled substances.’”

- The court also found that because the employee’s “state-licensed medical marijuana use was, at the time of his termination, subject to and prohibited by federal law, it was not ‘lawful [off-site] activity’ for the purposes of C.R.S. § 24–34–402.5.”

**District of Columbia** (D.C. Code §§ 7-1671.01-.13, D.C. Mun. Regs tit. 22-C, § 1001.1; D.C. Code § 7-1671.03)

- Summary:
  - The statute does not discuss employment-related issues dealing with medical marijuana use, but D.C. Municipal Regulations, Title 22-C (1001.1) states that it does not relieve a qualifying patient or caregiver from criminal prosecution or civil penalties for possession, distribution or transfer of marijuana or use of marijuana at the qualifying patient's or caregiver's place of employment.
  - The statute does not discuss operating heavy machinery. However, operating, navigating, or being in actual physical control of any motor vehicle, aircraft or motorboat while under the influence of medical marijuana, is not authorized.
The statute does not permit a person to undertake any task under the influence of medical marijuana when doing so would constitute negligence or professional malpractice.

**Georgia (Ga. Code Ann. § 16-12-191)**

- **Summary:**
  - The statute does not require an employer to permit or accommodate the use, consumption, possession, transfer, display, transportation, sale or growing of marijuana in any form.
  - An employer may have a written zero tolerance policy prohibiting the on-duty, and off-duty, use of marijuana, or prohibiting any employee from having a detectable amount of marijuana in such employee's system while at work.

**Hawaii (Haw. Rev. Stat. §329)**

- **Summary:**
  - The authorization of medical marijuana use does not apply to the medical use of marijuana in the workplace.
  - The statute does not discuss operating heavy machinery. However, use of medical marijuana in any moving vehicle, is not authorized.

**Maryland (Md. Code Ann., Health-Gen. §§ 13-3301-16 (West))**

- **Summary:**
  - The statute does not discuss employment-related issues dealing with medical marijuana use.
  - The statute does not prevent the imposition of any civil, criminal or other penalties for the following:
    - Undertaking any task under the influence of marijuana or cannabis, when doing so would constitute negligence or professional malpractice;
    - Operating, navigating or being in actual physical control of any motor vehicle, aircraft, or boat while under the influence of marijuana or cannabis;
    - Smoking marijuana or cannabis in any public place; or
    - Smoking marijuana or cannabis in a motor vehicle.
  - The statute does not discuss operating heavy machinery.
Massachusetts (105 MASS. CODE REGS. 725.650)

- Summary:
  - An employer is not required to accommodate the medical use of marijuana in any place of employment.
  - The act does not require any health insurance provider to reimburse any person for the expenses of the medical use of marijuana.
  - The regulation does not limit the applicability of other law as it pertains to the rights of employers.
  - The regulation does not discuss operating heavy machinery. However, the statute does not allow for the operation of a motor vehicle, boat or aircraft while under the influence of marijuana.

Michigan (MICH. COMP. LAWS §333.26421, §333.26427)

- Summary:
  - An employer is not required to accommodate the ingestion of marijuana in any workplace or accommodate any employee working while under the influence of marijuana.
  - The act does not require a commercial or non-profit health insurer to reimburse a person for costs associated with the medical use of marijuana.
  - The act does not permit a person to undertake any task under the influence of marijuana, when doing so would constitute negligence or professional malpractice.
  - The statute does not discuss operating heavy machinery. However, operating, navigating or being in physical control of any motor vehicle, aircraft or motorboat while under the influence of marijuana, is not authorized by the statute.

- Relevant Case Law:
  - The Sixth Circuit Court of Appeals recently held that Michigan’s Medical Marihuana Act does not impose restrictions on private employers. Casias v. Wal-Mart, 2012 WL 4096153 (6th Cir. 2012).
    - In Casias, the plaintiff sued his employer after the employee was terminated for testing positive for marijuana, in violation of the company’s drug policy. The plaintiff contended that he complied with state laws and never used marijuana while at work, nor did he attend work under the influence of marijuana.
    - The Court held that private employers are not prohibited from disciplining employees as a result of their medical marijuana use, and that private employers are not required to accommodate the use of medical marijuana in the workplace.
  - The Michigan “Court of Appeals held that claimants, who all had medical marijuana cards pursuant to the Michigan Medical Marihuana Act (MMMA) and were all discharged for failing a drug test as a result of having used marijuana,
were not disqualified from receiving unemployment compensation benefits.” *Braska v. Challenge Mfg. Co.*, 861 N.W.2d 289 (2014).


- **Summary:**
  - An employer is not required to accommodate the use of marijuana by a registered cardholder.
  - An employer can include, in a contract, a provision prohibiting the use of marijuana for a debilitating medical condition.
  - Neither group benefit plans nor insurers, as defined by statute, are required to reimburse a person for costs associated with the use of marijuana by a registered cardholder.
  - The Medical Marijuana Act does not provide a cause of action for wrongful discharge or discrimination.
  - The statute does not discuss operating heavy machinery. However, operating, navigating or being in actual physical control of a motor vehicle, aircraft or motorboat while under the influence of marijuana, is not authorized by the statute.

- **Relevant Case Law:**
  - The Supreme Court of Montana upheld the dismissal of the plaintiff’s wrongful discharge claims after the plaintiff was discharged for testing positive for marijuana. *Johnson v. Columbia Falls Aluminum Co., LLC*, 350 Mont. 562 (2009).
    - In *Johnson*, the plaintiff filed suit against his former employer for, among other things, violations of Montana’s Wrongful Discharge from Employment Act, the Americans with Disabilities Act (“ADA”) and the Montana Human Rights Act. In rejecting all of the plaintiff’s claims, the Court held that the Medical Marijuana Act does not provide an employee with an express or an implied private right of action against an employer. Additionally, the Court held that the statute does not require employers to accommodate the medical use of marijuana in any workplace. [Note: this is an unpublished decision and not binding precedent, but has been codified in the statute listed above.]


- **Summary:**
  - An employer is not required to accommodate the therapeutic use of cannabis on the property or premises of any place of employment.
  - The statute in no way limits an employer's ability to discipline an employee for ingesting cannabis in the workplace or for working while under the influence of cannabis.
Under the statute a person is not exempt from arrest or prosecution for being under the influence of cannabis while:

- Operating a motor vehicle, commercial vehicle, boat, vessel or any other vehicle propelled or drawn by power other than muscular power; or
- In his or her place of employment, without the written permission of the employer; or
- Operating heavy machinery or handling a dangerous instrumentality.

Under the statute a person is not exempt from arrest or prosecution for the possession of cannabis in a place of employment, without the written permission of the employer.

The statute does not require any health insurance provider or health care plan to be liable for any claim for reimbursement for the therapeutic use of cannabis.


- Summary:
  - Employers are not required to accommodate the medical use of marijuana in any workplace.
  - Private health insurers are not required to reimburse a person for costs associated with the medical use of marijuana.
  - The statute does not discuss operating heavy machinery. However, operating, navigating or being in actual physical control of any vehicle, aircraft, railroad train, stationary heavy equipment or vessel while under the influence of marijuana is not authorized under the statute.

New Mexico (N.M. STAT. ANN. § 26-2B-1-7, § 26-2B-5)

- Summary:
  - Participation in the Medical Cannabis Program does not relieve the qualified patient from criminal prosecution or civil penalty for possession or use of marijuana in the qualified patient’s workplace.
  - The statute does not discuss operating heavy machinery. However, a qualified patient remains liable for damages or criminal prosecution arising out of the operation of a vehicle while under the influence of cannabis or cannabis-derived products.
  - There are currently two cases pending in the New Mexico state and federal courts dealing with employee use of medical marijuana. See Smith v. Presbyterian, D-202-CV-201403906 (New Mexico state court); Stanley v. County of Bernalillo, 1:14-cv-00550 (New Mexico federal court). Both cases involve veterans whose doctors recommended medical marijuana to treat PTSD. In Smith v. Presbyterian, Donna Smith, a physician’s assistant, sued Presbyterian Healthcare Services after she was fired four (4) days into her job at an urgent care clinic because she tested positive for marijuana during a company-mandated drug test. In her
lawsuit, Smith claimed that Presbyterian violated her rights under the NMHRA by wrongfully terminating her due to her physical or mental handicap or serious medical condition, PTSD. In Stanley v. County of Bernalillo, Lieutenant Augustine Stanley, an experienced corrections officer at a county jail, was terminated when he tested positive for marijuana during a random drug test and jail officials made his continued employment contingent on future negative tests. Stanley claimed that he used medical marijuana only after work, and that his supervisors never noticed any negative effects in his performance. He alleges that his employer violated his rights under the ADA and NMHRA by refusing to accommodate his PTSD.

Oregon (OR. REV. STAT. ANN. § 475.300-.342, § 475.340, § 475.316)

- **Summary:**
  - An employer is not required to accommodate the medical use of marijuana in the workplace.
  - A private health insurer is not required to reimburse a person for costs associated with the medical use of marijuana.
  - The statute does not discuss operating heavy machinery. However, a person authorized to possess marijuana for medical use remains subject to criminal laws if the person drives under the influence of marijuana.

- **Relevant Case Law:**
  - The Oregon Supreme Court held employers do not have a duty to accommodate employee use of medical marijuana because federal law, which explicitly prohibits marijuana use, preempts the sections of Oregon’s Medical Marijuana Act that authorize the use of medical marijuana. *Emerald Steel Fabricators, Inc. v. Bureau of Labor and Industries*, 230 P.3d 518 (2010).
    - In *Emerald*, the plaintiff claimed his former employer had failed to accommodate his disability when the plaintiff was terminated after he told his employer that he used marijuana for medical reasons. Because the plaintiff was engaged in the illegal use of drugs according to federal law and the employer discharged him for that reason, the protections of Oregon’s discrimination statute did not apply.

Vermont (VT. STAT. ANN. tit. 18, § 4474c)

- **Summary:**
  - The Act does not exempt any person from arrest or prosecution for being under the influence of marijuana while:
    - operating a motor vehicle, boat or vessel, or any other vehicle propelled or drawn by power other than muscular power;
    - in a workplace or place of employment; or
    - operating heavy machinery or handling a dangerous instrumentality.
The Act does not exempt any person from arrest or prosecution for the smoking of marijuana in any public place, including a workplace or place of employment.
The Act does not require that coverage or reimbursement for the use of marijuana for symptom relief be provided by a health insurer, any insurance company or an employer.

Washington (WASH. REV. CODE § 69.51A, § 69.51A.060)

- Summary:
  - The Act does not require accommodation of any on-site medical use of marijuana in any place of employment.
  - Employers may establish drug-free work policies. Nothing in the Act requires an accommodation for the medical use of marijuana if an employer has a drug-free workplace.
  - The Act does not require a health carrier or health plan to be liable for any claim for reimbursement for the medical use of marijuana.
  - The Act does not protect anyone who engages in the medical use of marijuana in a way that endangers the health or well-being of any person through the use of a motorized vehicle on a street, road or highway.

- Relevant Case Law:
  - The Supreme Court of Washington has held the Washington State Medical Use of Marijuana Act does not regulate a private employer’s conduct nor does it protect an employee for being discharged due to authorized medical marijuana use. Roe v. Teletech Customer Care Management LLC, 257 P.3d 586, 591-92 (2011).
    - In Roe, the Plaintiff was discharged for failing a drug test. Even though the Plaintiff was not ingesting marijuana while at work, the court held the statute does not require employers to accommodate an employee’s off-site use of medical marijuana.

For some helpful reference materials regarding the impact of marijuana laws in the workplace, see the following:


Tiffanie Benfer, BUDDING ISSUE: DO THE STATE LAWS LEGALIZING MEDICAL MARIJUANA PROVIDE JOB PROTECTION?, ABA Section of Labor & Employment Law, ERR Midwinter Meeting (March 2015),
http://www.americanbar.org/content/dam/aba/events/labor_law/2015/march/err/papers/err10b.authcheckdam.pdf

John M. Husband,“TAKING IT TO THE STATES:” A LOOK AT BUDDING ISSUES FROM STATE LAWS LEGALIZING MARIJUANA, ABA Section of Labor & Employment Law, ERR Midwinter Meeting (March 2015),
http://www.americanbar.org/content/dam/aba/events/labor_law/2015/march/err/papers/err10a.authcheckdam.pdf
Marijuana (cannabis) is the most frequently used illicit drug of abuse in the United States and worldwide. Moreover, it is second only to alcohol as the most prevalent psychoactive substance seen in cases of driving under the influence of drugs. It is also by a wide margin, the drug most often detected in workplace drug-testing programs. The primary psychoactive substance in marijuana is delta-9-tetrahydrocannabinol, known simply as THC. Present in steadily increasing concentrations in street-purchased, smokable plant material, the THC content in marijuana averaged 3% in the 1980s, but by 2012 it had increased to 12%. The US government classifies marijuana as a Schedule I drug (defined as those drugs with no currently accepted medical use and a high potential for abuse, and the use/possession of which is subject to prosecution). Workers covered by federal drug-testing programs are uniformly prohibited from using marijuana at any time. In addition, federal law allows employers in every state to prohibit employees from working while under the influence of marijuana and are permitted to discipline employees who violate this prohibition.

Nevertheless, with public attitudes toward marijuana use changing, prohibitions for its consumption outside of federal law now vary from state to state. Although the possession and use of marijuana continue to be prohibited by federal law, numerous states and the District of Columbia currently have enacted laws regarding marijuana use that conflict with federal law and policy, with legislation pending in other states.

This changing legal environment and the evolving scientific evidence of its effectiveness for treatment of select health conditions require an assessment of the safety of marijuana use by the American workforce. Although studies have suggested that marijuana may be used with reasonable safety in some controlled environments, there are potential workplace consequences involved in its use that warrant scrutiny and concern.

The potential consequences of marijuana use in the workplace include the risk and associated cost of adverse events and the loss of productivity. These safety concerns and the changing legal scene have led the American College of Occupational and Environmental Medicine (ACOEM) and the American Association of Occupational Health Nurses (AAOHN) to develop this guidance document to assist occupational health professionals and employers in identifying and addressing impairment issues related to the use of marijuana and prevention of injuries related to impairment.

This guidance summarizes current evidence regarding marijuana consumption, discusses possible side effects including temporary impairment as it relates to the workplace, reviews existing federal and state laws and legal implications for health care professionals and employers, and suggests various strategies available to employers for monitoring workers for marijuana use. It is outside the scope of this article to address any potential medical benefit of marijuana.

Studies conducted to evaluate the effects of marijuana drug use by workers have demonstrated variable risk. This variability relates to study design, demographics, work type, and potential confounders (eg, general risk-taking behavior among illicit drug users). This discussion on the effects of marijuana is based on a literature search of the currently available evidence (see the Appendix). Articles were graded using the following criteria: inadequate for evidence due to low-quality research; adequate for evidence (+); or high quality (+++). High-quality studies, meta-analyses, or multiple adequate studies with the same conclusion qualified as good evidence for the guidance purposes of this document. Statements referring to evidence without a qualifier reflect the results of an adequate study. Other articles are also cited when appropriate to clarify issues that may not have been addressed by studies qualifying as evidence.

LEGAL IMPLICATIONS OF MARIJUANA LEGISLATION

In late 2009, the US Department of Justice initiated a change in marijuana enforcement policy by issuing a memorandum encouraging federal prosecutors not to prosecute individuals who distribute marijuana for medical purposes in accordance with state law. Nevertheless, after voters in Colorado and Washington approved the recreational use of marijuana, the Department of Justice issued another memorandum in August 2013 that reiterated its right to contest the legality of state marijuana laws, stating that the Department "expects states like Colorado and Washington to create strong, state-based enforcement efforts . . . and will defer the right to challenge their legalization laws at this time." This discordance about use, regulation, and legislation places employers in the challenging position of maintaining compliance with divergent and evolving legislation, while continuing to provide a safe workplace.
job-related and necessary for business, and conducted when there is evidence of a safety or job performance problem. Currently, the ADA does not require employers to permit marijuana use as a reasonable accommodation for an individual with a disability, even if that person is a registered medical marijuana patient. In some states, court rulings involving the use of marijuana for medical purposes have held that employers are under no obligation to accommodate medical marijuana users, regardless of whether or not its use is permitted by state law. The basis of the rulings has been that a person “currently engaging in the illegal use of drugs” is not a “qualified individual with a disability,” and marijuana is still an illegal drug for the purposes of federal law. Nevertheless, the ultimate effects of specific state laws on this issue are yet unknown.

**Drug and Alcohol Testing Regulations**

The majority of private employers across the United States are not necessarily required to drug test, and many state and local governments have statutes that limit or prohibit workplace testing unless required by state or federal regulations due to the nature of the job. Guidance issued by the US Department of Transportation (DOT) for its Drug and Alcohol Testing Regulations states that marijuana use remains unacceptable for any safety-sensitive employee subject to drug testing under DOT regulations. This safety-sensitive category includes pilots, bus and truck drivers, locomotive engineers, subway operators, aircraft maintenance personnel, transit fire-armed security personnel, and ship captains, among others.

Federal agencies conducting drug testing must follow standardized procedures established by the Substance Abuse and Mental Health Services Administration (SAMHSA). Private nonunion employers who require drug testing for applicants and/or employees are usually not required to follow SAMHSA’s guidelines, but doing so helps to ensure the legality of testing. In unionized workforces, the implementation of testing programs must be negotiated through collective bargaining, even when federal regulations require testing.

**Drug-Free Workplace Act**

The Drug-Free Workplace Act (DFWA), enacted in 1988 to promote safety and accountability, requires all federal grantees to agree that they will provide drug-free workplaces as a condition of receiving a federal contract of more than $100,000 or a federal grant of any value. To qualify and remain eligible for federal funds, these entities are required to make continuous good faith efforts to comply with drug-free workplace requirements. The DFWA does not specifically require drug testing, but it does require that employers (1) publish and distribute a policy statement, (2) specify actions that will be taken against employees who violate the policy, and (3) provide education in the workplace about the dangers of drug use and available counseling and employee assistance programs. Employers are not required to fire employees on the basis of the results of a positive drug test. The Act requires employees to abide by the terms of the employer’s policy and notify the employer within 5 calendar days if they are convicted of a criminal drug violation in the workplace. The contracting or granting agency must be notified within 10 days after receiving notice that a covered employee has been convicted of a criminal drug violation in the workplace. Employees who work for federal contractors may be subject to discipline, including termination if marijuana use is proven, regardless of whether its use is permitted by state law.

**Federal Law Enforcement and Transportation of Marijuana Across State Lines**

Medical marijuana patients are also subject to federal and local charges of transporting marijuana if they cross state lines with the drug, even if they are traveling between states that allow medical marijuana. As the US Transportation Safety Administration enforces federal rules on commercial air lines, transporting marijuana on an airplane is illegal and can lead to federal drug transportation charges. Federal agencies may, in some situations, also arrest authorized users.

**State Laws**

With so many states and the District of Columbia having enacted medical marijuana laws or decriminalized its use, an employer’s legal right to fire or refuse to hire an applicant for failing an employment drug test due to off-the-job medical marijuana use depends on whether the state of employment has passed a medical marijuana law that includes employee discrimination protections. Most states that have legalized medical marijuana do not provide for employee protections, although there are exceptions such as Connecticut, Illinois, Maine, and Rhode Island. Michigan protects an employee’s rights and safeguards against disciplinary action at work for registered patients, except when a worker uses marijuana on site or comes to work impaired. Arizona and Delaware have more explicit statutory language prohibiting an employer from discriminating against a registered qualifying employee who has failed a drug test for marijuana metabolites or components, except if the employee used, possessed, or was impaired by marijuana at the work site during work hours, or if failure to dismiss an employee who failed a drug test would violate a contract or licensing-related benefit under federal law. States that to date have passed laws legalizing recreational marijuana do not provide protections for employee discrimination. Colorado presently allows employers to prohibit the use of marijuana at work. Nevertheless, another state law, the lawful off-duty conduct statute, prohibits employers in this at-will employment state from firing employees for engaging in lawful conduct while off-duty and off premises during nonworking hours. Conflicting legal decisions have arisen with regard to employees who have been fired for testing positive for marijuana, and as of early 2015, this issue is under review by the Colorado Supreme Court. Until state and federal laws coincide, legal challenges and uncertainty in the workplace will continue.

Although state laws vary, laws regulating marijuana require employers neither to permit drug use in the workplace nor to tolerate employees who report to work impaired. For this reason, employers may institute drug-free-workplace policies to help ensure that employees come to work in an unimpaired state and do not endanger themselves or others while working. Reconciling varying and dynamic state laws in regard to legality, permitted use in the workplace, and lawful drug testing can be challenging. Every employer should consult with legal advisors to ensure that they comply with any applicable state or local laws and design their testing programs to withstand legal challenges.

**MEDICAL ISSUES**

Regardless of the legal consequences, the medical implications of marijuana use for the workforce must be considered. In addition to the risk of injury due to impairment, employers must also consider the possibility that increases in absenteeism and presenteeism may occur as marijuana-containing products become increasingly available to workers. In 2007, SAMHSA estimated that 8.4% of full-time workers were engaged in some type of illicit drug use within the preceding month. With the legalization of marijuana in certain states, this number could climb. A recent poll found that 9.74% of 534 respondents reported going to work after smoking marijuana (the majority reported obtaining the drug illegally). Although this poll may not reflect the behavior of the US working population as a whole, the data do indicate the need for clear workplace policies addressing workers who use marijuana.

**Metabolism and Impairment**

When marijuana is smoked, THC blood levels rise immediately because of efficient pulmonary absorption across the alveolar capillary membrane. THC levels fall rapidly after smoking ceases due to
distribution of the substance to the brain and lipophilic tissues, as well as hepatic metabolism. The subjective “high” and associated impairment begins rapidly as well, within minutes of the initiation of smoking when blood levels are rapidly falling and THC is distributed into the central nervous system. Approximately 10% of the absorbed THC is metabolized by the cytochrome P450 (CYP) enzyme system into the equipotent psychoactive metabolite 11-hydroxy-THC (THC-OH), which appears in the blood soon after the THC peak and then falls off rapidly. The major nonpsychoactive metabolite, THC-COOH or carboxy-THC, appears later and can last for several hours or even much longer in long-term users. This metabolite is the component commonly assayed in workplace urine drug-testing programs.

Impairment periods vary with the dose administered and the route of administration. For smoked marijuana, subjective impairment begins soon after smoking initiation and peaks in about 1 hour and lasts 3 to 4 hours after smoking. Experimental studies suggest that measurable impairment in test subjects lasts approximately 6 hours. Many studies focusing on the duration of impairment after acute use were conducted when marijuana typically had a lower THC concentration. Thus, the applicability of these older study results to today’s more potent varieties is questionable as the duration of effect may be longer than previously reported.

Some studies have demonstrated longer impairment (up to 24 to 48 hours) on specific performance measures, but these studies are limited and the few studies showing this effect used small samples. In addition, no comparison of residual peak performance impairment was associated with situations encountered every day and accepted in the workplace (ie, poor sleep the night before, episodic minor illnesses, the use of cold remedies). As described previously, these residual impairment studies were also conducted when cannabis had a much lower potency than what is available today. It is conceivable that residual impairment may actually be more prolonged and problematic with today’s higher potency marijuana. The majority of studies of impairment related to driving and cognition show return to a generally nonimpaired state within 3 to 6 hours after smoking marijuana among occasional recreational users.

Impaired behavior from acute use differs between occasional users and long-term users. There is good evidence that chronic frequent marijuana users exhibit less impairment from acute THC than do occasional users, but the degree to which impairment is mitigated in safety-sensitive activities is unclear. This finding can be likened to the chronic drinker who has less apparent intoxication at a given blood alcohol concentration (BAC) than a naive drinker, yet is still acutely impaired.

When marijuana- or THC-containing products are orally ingested, the time to peak blood levels and effects are delayed, with lower peak concentrations and longer duration of effects. Bioavailability varies among marijuana products, owing to the lipophilic nature of THC—products containing more oil or fats tend to increase bioavailability. Bioavailability is also impacted by first-pass hepatic metabolism. Edible products do not allow for a titration effect because users cannot immediately gauge the effect of the dose consumed, and acute psychosis, presumably resulting from the higher dose received via the oral route, has been reported. The subjective “high” after oral administration usually occurs approximately 30 minutes after consumption. There is some evidence that with doses less than 18 mg, impairment decreases to a level of normal performance around 5 hours postingestion. A smaller study of oral ingestion demonstrated impairment of driving skills up to 10 hours after ingestion of higher doses. This impairment did not occur with lower doses. In addition, although a state may have regulations regarding the dose of THC to be used in edible products, it is not clear how this is actually being regulated. Thus, consumers may have difficulty controlling the dose they consume in edibles.

The subjective “high” from acute marijuana use varies with THC concentration, dose, route of administration, and users’ degree of experience with the drug. Common self-described effects are relaxation, euphoria, relaxed inhibitions, sense of well-being, disorientation, altered time and space perception, giddiness, increased appetite, and a more vivid sense of taste, sight, smell, and hearing. Commonly observed central nervous system effects include lack of concentration, impaired learning and memory, alterations in thought formation and expression, drouniness, and sedation. These psychological effects are accompanied by physiological manifestations of conjunctival injection, a significant increase in heart rate over baseline, dry mouth and throat, increased appetite, and vasodilatation. One study found that pupil dilatation, conjunctival injection, and decreased ocular reaction to light were the physiological symptoms most commonly related to marijuana use.

Some of these physiological signs are used by drug recognition expert law enforcement officers who conduct roadside field sobriety tests of suspected drug-impaired drivers. Studies have confirmed that while using cannabis, individuals demonstrate impaired motor performance in both driving simulator and on-the-road tests. In the driving studies, the strongest decrements were in drivers’ abilities to concentrate and maintain attention, estimate time and distance, and demonstrate coordination on divided attention tasks—all important requirements for operating a motor vehicle.

A large population-based, case-control study of blood levels from more than 10,000 vehicle crashes in France revealed an increased dose-dependent odds ratio for a crash, from 2.18 for THC less than 1 ng/mL, to 4.72 for THC 5 ng/mL or more. Additional studies have found that drivers with a THC-positive blood test were 3 to 6 times more likely to be involved in a crash than drivers without THC. In a study of
impairing effects of marijuana, Ménétérey et al. found that any concentration of the psychoactive component was associated with impairment; the impairment of the highest doses was found to correlate with a sum of THC and THC-OH blood concentrations more than 4.6 ng/mL. Another study showed that under experimental conditions, plasma THC higher than a level of approximately 2 to 5 ng/mL established impairment, and levels of THC above 5 to 10 ng/mL were indicative of severe impairment. A Norwegian study found that impaired drivers had, on average, blood THC levels higher than nonimpaired drivers, and those with levels of THC more than 3 ng/mL were at increased risk of being judged impaired.

In summary, there is good evidence from a number of studies and a meta-analysis that serum levels of an average of 3.8 (3.1 to 4.5) for oral and 3.8 (3.3 to 4.5) for smoked marijuana cause impairment approximately equivalent to a BAC of around 0.05 g%/L. Based on these consistent findings, a plasma level of 5 ng/mL of THC can be used as one indicator with other medical signs of acute impairment from marijuana. The active metabolite THC-OH can also be measured and it may provide additional information regarding impairment. Nevertheless, as the exact level of THC and THC-OH to use as a marker for impairment is not known at this time, the Joint Panel supports the need for further research to define serum levels reflecting impairment and to relate this impairment to chronic daily users. Employers may wish to use the sum of THC and THC-OH to establish impairment because THC-OH is equipotent to THC.

Long-term users are likely to experience less acute impairment by some performance measures, and fewer subjective effects at most of these levels. Using a 5 ng/mL cutoff for screening allows some consideration for all types of users. Given the rough correlation between approximately 4 ng/mL being equivalent in impairing effects to a BAC of approximately 0.04 g%/L or 0.05 g%/L, using the 5 ng/mL cutoff seen in the impairment studies noted previously would roughly parallel the current level of alcohol impairment for safety-sensitive workers under federal testing laws (ie, 0.04 g%/L BAC). Thus, this cutoff may be used to establish an initial presumption of impairment; however, the mere presence of this serum THC and THC-OH level may not establish acute impairment in an individual worker. This can be determined only when a medical evaluation for impairment has been performed in conjunction with consideration of the behavior, which led to the referral for testing.

On the basis of the evidence, the Joint Panel is proposing a serum level of THC plus THC-OH of 5 ng/mL to determine impairment. The Panel acknowledges that there are several states using higher levels for defining driving under the influence of drugs (eg, Colorado and Washington use 5 ng/mL in blood, equal to approximately 10 ng/mL in serum, of THC and active metabolites as a presumed level for driving under the influence when accompanied by behavior indicating impairment). Fewer than 20 states explicitly address marijuana and driving; of these, 11 have zero tolerance for any level of THC. It is the consensus of the Panel that a serum level of 5 ng/mL should be used to ensure a safe workplace (Table 1).

**Detecting Marijuana Impairment**

When a worker is suspected of being impaired by marijuana use, expected signs and symptoms of impairment must be clearly defined in advance and become part of supervisor training, so that reasons for body fluid testing can be documented. This is the same policy as that used for supervisor training in federally regulated drug-testing programs. When impairment is suspected, employees are sent for breath alcohol and urine drug testing. Urine drug testing for marijuana via immunoassay followed by confirmatory GC/MS testing targets the inactive THC-COOH metabolite, which can be present for weeks after last use, and has no correlation with acute impairment. This testing is sufficient for federally regulated programs in regulated environments where all marijuana use is illegal or prohibited by the employer. Nevertheless, a urine drug test showing past use is not sufficient evidence of impairment. Although this use is still prohibited under federally regulated employment programs, this prohibition might not be reasonable or enforceable in nonfederally regulated employer drug testing programs in states with legalized recreational use. Employers choosing to prohibit the use of marijuana during on/off-work time in states where it is legal should consult with counsel regarding this policy.

Detection of inactive THC metabolites (THC-COOH) in the urine of recreational users after legal use of marijuana would be analogous to detecting ethylglucuronide (ie, EtG—the “80-hour” ethanol metabolite) in the urine of a social drinker. Neither of these results would indicate acute impairment or violation of a law in states where marijuana is legal. For this reason, in states permitting marijuana use, standard workplace urine drug testing of suspected impaired employees would be inadequate. Although breath alcohol devices can be used to detect acute alcohol intoxication noninvasively, psychoactive THC cannot be detected in the same manner and currently requires a blood test. It is suggested that the employee suspected of being impaired be evaluated as per the employer’s standard protocol. Best practice suggests that employers include an evaluation of the impaired employee at an occupational medicine clinic (eg, emergency department in off-hours). The evaluation should include a physical examination to determine the presence or absence of clinical impairment, a breath alcohol test, and a urine drug test. To assess for marijuana, a blood test for the cannabinoids THC, THC-OH, and THC-COOH can evaluate potential acute impairment from cannabis use. The employee should be put on administrative leave until these results return, per established protocol. If THC (or THC plus THC-OH levels, for employers who choose to evaluate both psychoactive components) are above a plasma level of 5 ng/mL, the employee is likely acutely impaired by cannabis use. THC levels should never be assessed in isolation—definable signs of impairment (either documented by a supervisor and/or demonstrated on a medical examination) should also be present. Testing of oral fluid, that is, saliva, may prove useful in the future as a screening tool to determine whether further blood testing is necessary.

**ACCOMMODATING MARIJUANA USE IN THE WORKPLACE: LEGAL CONSIDERATIONS**

Employees who appear to be impaired in the workplace should always be assessed according to employer policies. Urine levels of THC do not correlate with impairment. Blood levels correlate more directly; however, all assessments should include an overall evaluation of impairment. The effect of cannabinoids on impairment includes consideration for the route of administration, concentration of THC, and other variables.

Employers who decide to or are required to accept employees’ use of medical

<table>
<thead>
<tr>
<th>THC Plasma Level</th>
<th>Casual User</th>
<th>Chronic User</th>
</tr>
</thead>
<tbody>
<tr>
<td>0–2 ng/mL</td>
<td>Cannot establish impairment</td>
<td>Cannot establish impairment</td>
</tr>
<tr>
<td>2–5 ng/mL</td>
<td>Likely impaired</td>
<td>May be impaired</td>
</tr>
<tr>
<td>5+ ng/mL</td>
<td>Likely impaired</td>
<td>Likely impaired</td>
</tr>
</tbody>
</table>

THC, delta-9-tetrahydrocannabinol.
and/or recreational marijuana consistent with state law must carefully assess risk of impairment from marijuana use, especially for those employees in safety-sensitive positions. The following guidelines should be observed:

1. A medical review officer (MRO) and other occupational health professionals should be included, with legal counsel, in discussions about company policy or individual use of marijuana.

2. Specific guidelines regarding testing for postaccident and possible impairment assessments should be developed and explained to employees.
   a. Blood tests are recommended for these assessments and employees should understand the implications of the results for their employment status based on the employers’ policy and tolerance for marijuana and other drug use. Most workers’ compensation statutes provide reduced benefits when a worker is under the influence of alcohol or illegal drugs. Proof of use and/or impairment may be necessary in these cases.
   b. The occupational health professional responsible for providing a medical evaluation of employees’ fitness for duty should establish and consistently apply clear guidelines on the situations for which use of medical marijuana would be considered. It is advisable for medical evaluations to include:
      I. documentation of state registration for medical marijuana;
      II. the schedule of use relative to working hours;
      III. cannabis form used (eg, smoked plant material, edible cannabis product, low THC/CBD product);
      IV. the need for any accommodations given the employees’ job duties; and
      V. anticipated duration of use.

3. The occupational health provider should work with site management to assess risk based on the safety-sensitive nature of the job. Considerations of workplace safety in the context of the underlying medical condition for which marijuana has been recommended may also be appropriate.

Employees who are included in federal workplace drug testing programs are prohibited from relying on state law as a valid explanation for marijuana or other Schedule I substance positive laboratory results. Nevertheless, employers should be aware that Drug Administration (FDA)-approved cannabinoid medications such as Marinol and Cesamet can be prescribed for medical marijuana patients with a positive marijuana test result in the workplace at the federal level. The HR departments have a responsibility to ensure that company policies and programs are compliant with regulations from these agencies.

Drug and alcohol or chemical impairment programs are not required practice for every employer. Nevertheless, some state and federal regulations require programs in specific industries that mandate employee drug testing before and during employment. Employers in some health care and education settings also require workplace drug testing. State regulations control these drug-testing protocols.

In the private sector, state laws requiring drug testing for employees postoffer or after hire may differ from union companies versus nonunion companies. Unless federal regulations require their use, workplace policies on drug testing must be negotiated in union contracts, and even if federally mandated, certain aspects of the policy must be determined through collective bargaining.
State laws for medical and recreational marijuana use vary. To better manage litigation risks, employers should consult legal counsel when writing the workplace policy specific to medical marijuana use by employees during the work shift and off the job. Although every policy must be tailored to meet regulations applicable to the specific workplace, employers could use the following content as a foundation for developing workplace policies for medical marijuana and other chemical substances:

- purpose/intent of the program;
- employees covered by the policy;
- when the policy applies;
- prohibited behavior;
- whether employees are required to inform their supervisor of medical marijuana prescription or drug-related convictions;
- whether the policy covers searches and extent of the search allowed;
- observable and measurable behaviors indicative of unsafe job performance;
- referral mechanism for unsafe work performance;
- requirements for drug testing with input from the MRO;
- consequences for policy violation;
- whether return-to-work agreements are needed after an absence related to substance abuse;
- measures to protect employee confidentiality;
- measures for policy enforcement;
- steps to communicate policy to employees, supervisors, occupational health professionals, management, union management when applicable, and contractors and their employees; and
- assistance is available to treat substance use or abuse.

Employers should consult with legal counsel when developing policies regarding employee use of medical marijuana. Historically, employees in safety-sensitive positions have been held to more stringent standards regarding permissible medication use. Thus, a reasonable basis exists for employers to restrict or ban medical marijuana use by these employees. Three states have upheld the employer’s right to terminate employees who were using medical marijuana in accordance with state statutes, even if they were not using it at the workplace. Nevertheless, Arizona currently prohibits termination of employment for medical marijuana use outside of work hours. Specific criteria for use by supervisors and HR personnel when referring employees suspected of impairment for an evaluation by a qualified occupational health professional are critical. Detailed actions based on the medical evaluation results must also be clearly delineated for HRs, supervisors, and workers.

The Joint Task Force recommends employers review the following points when developing workplace policies that address marijuana use in the workplace:

1. For employees covered by federal drug testing regulations (eg, DOT and other workers under federal contract), marijuana use, both on or off the job, is prohibited. Thus, employers may use urine drug screening in this population.

2. Employees in safety-sensitive positions must not be impaired at work by any substance, whether it be illicit, legally prescribed, or available over-the-counter. Employers may consider prohibiting on the job marijuana use for all employees in safety-sensitive positions, even when not covered by federal drug testing regulations. Nevertheless, legal review of the employer’s policy in the context of state statutes is strongly encouraged. When employers allow medical marijuana use by employees, consultation with a qualified occupational health professional is recommended.

3. Employers residing in or near states that allow the use of recreational marijuana must establish a policy regarding off-work use of marijuana. In many states, the employer may choose to prohibit employees from simply working while using or under the influence of marijuana or may choose to prohibit marijuana use both on and off the job. Urine drug testing above traditional cutoff levels, or serum testing at any level, would be reasonable criteria for the employer wishing to ban both on- and off-the-job use. To detect impairment, a limit of 5 ng/mL of THC measured in serum or plasma as THC (or possibly the sum of THC plus THC-OH for employers who choose to evaluate both psychoactive components) would meet the goal of identifying individuals most likely to be impaired. Nevertheless, employers using the 5 ng/mL level need to understand the limitations of using a single number to fit all cases; therefore, a medical examination focused on identifying impairment is always recommended. Legal consultation is strongly recommended.

4. Although it appears that in most states that allow the use of medical marijuana, employers may be able to continue policies banning or restricting the use of marijuana as previously discussed, this practice may change on the basis of future case law. Currently the ADA does not apply in these situations because marijuana is illegal under federal law. Legal consultation is again strongly recommended.

5. Most workers’ compensation statutes allow reduced benefits when a worker is under the influence of alcohol or illegal drugs. Two samples should usually be obtained as a second confirmatory test may be needed. Proof of use and/or impairment is usually required for these cases, and a positive urine drug test (for the inactive metabolite) does not provide acute impairment. The serum level of less than 5 ng/mL could be used for presumptive evidence of impairment in these situations. An MRO is most helpful in helping determine these types of cases because legal testimony may be required.
6. All employers should have clear policies and procedures for supervisors to follow regarding the criteria for identifying potential impairment and the process for referring an employee suspected of impairment for an occupational medical evaluation. Policies should include action required by HR personnel based on the results of the examination.

7. Employee education is vital to ensure compliance with company expectations. Education is needed at hire and again at regular intervals. Workers must know the company’s chemical substance policy and management’s expectations for adherence. The employer’s commitment to a drug-free workplace and existing company policy will influence the education program’s content. At a minimum, employees should learn how chemical substances affect their health, safety, personal behavior, and job performance. Supervisors and employees should also be educated about how to recognize behaviors indicative of impairment, whether the resource is medical marijuana, prescription medications, illegal drugs, alcohol, over-the-counter medications, fatigue, or any combination thereof.

8. In states where marijuana use is permitted, employers should provide educational resources regarding the detrimental effects of marijuana use, including caution regarding dose and delayed effects of edible products. This information may be obtained from SAMHSA and state governmental agencies.

The safety of workers and the public must be central to all workplace policies and employers must clearly articulate that legalization of marijuana for recreational or medical use does not negate workplace policies for safe job performance. The evolving legal situation on medical and recreational marijuana requires employers to consult with legal experts to craft company policy and clarify implications of impaired on-duty workers. This changing environment surrounding marijuana use requires close collaboration between employers, occupational health professionals, and legal experts to ensure that workplace safety is not compromised.

ACKNOWLEDGMENTS

The Joint Panel thanks the following reviewers for their contributions: Phillip Franklin, MD, MPH, MRA; Michael J. Kornett, MD, MPH; Steven Wright, MD; Kimberly Siegel, MD; Gregory B. Cairns, ESQ; Annyce S. Mayer, MD, MSPH; Pam Carter, MSN, RN, Ronda Weiss, MS, MPH, MBA, RN; Kay N. Campbell, EdD, RN-C; Joy E. Wachs, PhD, RN, FAAN; and Pamela V. Moore, EdD, MPH, RN.

REFERENCES


61. OSHA. US Department of Labor. Drug Free Workplace Act of 1988. Available at:
APPENDIX EVIDENCE TABLES

Articles used as evidence were graded using the following criteria: adequate (Grade +) or high-quality (Grade ++). High-quality studies, meta-analyses, or multiple adequate studies with the same conclusion are qualified as good evidence for the purposes of this article. Statements referring to evidence without a qualifier reflected the results of an adequate study. Table A1 lists the articles deemed to be of high or adequate quality and these articles were incorporated into this guidance. Other papers were also cited when appropriate to clarify issues that may not have been addressed by studies qualifying as evidence. In addition, Table A2 includes studies also reviewed by the Joint Task Force but ultimately deemed inadequate for evidence due to low-quality research or found not directly relevant for the purposes of this article.

Search Strategy: PubMed, EBSCO, and Google Scholar were searched without limits on publication dates. The following search terms were used: THC blood levels and acute impairment, cannabis, driving, illicit, Δ⁹-Tetrahydrocannabinol, cannabis and dose impairment, THC and dependence, medical marijuana and performance, safety sensitive, toxicology, and driving. A total of 76 articles were identified and reviewed.
<table>
<thead>
<tr>
<th>Author (Year), Title, Journal</th>
<th>Study Type</th>
<th>Summary of Findings</th>
<th>Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phillips et al</td>
<td>Cohort study</td>
<td>Chronic daily marijuana smokers ($N = 30$) tested daily for up to 33 abstenent days found blood levels of THC-COOH can persist for a month whereas 11-OH-THC rapidly extinguishes and is undetectable beyond about 3 days.</td>
<td>++</td>
</tr>
<tr>
<td>Berghaus (2011), Meta-analysis of empirical studies concerning the effects of medicines and illegal drugs including pharmacokinetics on safe driving. Center for Traffic Sciences, University of Wurzburg</td>
<td>Meta-analysis</td>
<td>Included 78 experimental smoking studies and 21 experimental oral THC studies (all published after 1993). Found that a mean serum THC of 3.7 ng/mL (range, 3.1 to 4.5) for oral THC and a mean serum THC of 3.8 ng/mL (range, 3.3 to 4.5) for smoked THC caused driving impairment equivalent to that of BAC 0.05%.</td>
<td>++</td>
</tr>
<tr>
<td>Drummer (2004), The involvement of drugs in drivers of motor vehicles killed in Australian road traffic crashes. Accid Anal Prev.</td>
<td>Case-controlled culpability study</td>
<td>Fatal MVAs examined for driver culpability along with postmortem toxicology screens. Those with blood THC were more likely to be culpable compared with drug/alcohol free, esp. when THC &gt; 5 ng/mL. Combined THC and BAC &gt; 0.05% showed an even greater risk. OR for THC &gt; 5 ng/mL is 6 to 6 (95% CI: 1.5 to 2.8).</td>
<td>+</td>
</tr>
<tr>
<td>Gadegbeku (2011), Responsibility study: main illicit psychoactive substances among car drivers involved in fatal road crashes. Ann Adv Automot Med.</td>
<td>Case-controlled study</td>
<td>Very large case–control study examined car drivers responsible for fatal crashes vs those not responsible. Properly blinded, adjusted for age, sex and alcohol, demonstrated odds ratio of 1.89 (1.43 to 2.51) for cannabis 3 ng/ml and 8.39 (6.95 to 10.11) for alcohol.</td>
<td>+</td>
</tr>
<tr>
<td>Grotenhermen (2007), Developing limits for DUID for cannabis. Addiction.</td>
<td>Expert panel position paper</td>
<td>Relies on epidemiological and experimental science to propose a serum per se limit of 7–10 ng/mL. Authors note that 20 epidemiological studies have inconsistent results with most meaningful showing that under 10 ng/mL (serum) there is no higher crash risk, which increases ~10–20 ng/mL (serum). Impairment acute following use, with no effects on safety beyond acute impairment period (several hours after smoking). More than 120 experimental studies show dose-dependent THC impairment of driving skills, but with considerable individual variability in effect. Tolerance with regular use. Serum levels of 4 ng/mL may correlate with BAC of 0.04%; 9–10 ng/mL (serum) corresponds to BAC of 0.08%. Frequent users may show levels &gt;2 ng/mL (serum) for up to 48 h after the last use. Secondhand marijuana smoke may produce peaks of up to several ng/mL. Depending on dose, most acute effects subside within 3–4 hours of smoking. Most studies find no psychomotor effects after 4 h. Combination with alcohol appears additive. THC-COOH does not indicate acute impairment, but use in prior few days or weeks. Proficiency tests show considerable variation in tests of identical samples in comparing forensic labs—that should be considered in setting limits.</td>
<td>++</td>
</tr>
<tr>
<td>Grotenhermen (2005), Developing per se limits for DUID for Cannabis. Expert Panel Report</td>
<td>Expert panel position paper based on systematic review</td>
<td>Shows serum THC concentration in 8794 cases of Swedish population stopped for suspected DUID and tested. Shows large skew to the left 43% &lt; 1 ng/mL. Mean 2.1, median 1, max 67 ng/mL. Implies that because of rapid metabolism of inhaled marijuana, it is difficult to correlate with level of impairment. Advocates zero tolerance.</td>
<td>++</td>
</tr>
</tbody>
</table>

(continues)
### TABLE A1. (Continued)

<table>
<thead>
<tr>
<th>Author (Year), Title, Journal</th>
<th>Study Type</th>
<th>Summary of Findings</th>
<th>Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>Karschner (2009), Implications of plasma cannabinoid concentrations in chronic users. <em>J Anal Tox.</em></td>
<td>Cohort study</td>
<td>Eighteen (18) heavy, chronic marijuana users had daily marijuana levels drawn while drug free for 7 days; 50% maintained positive levels for 7 days. One level is as high as 5.5. Levels are not predictive of time of last consumption. No correlation with BMI.</td>
<td>+</td>
</tr>
<tr>
<td>Karschner (2009), Do Δ⁹-tetrahydrocannabinol concentrations indicate recent use in chronic cannabis users? <em>Addiction.</em></td>
<td>Cohort study</td>
<td>Chronic marijuana users (<em>N</em> = 25) monitored over 7 days of abstinence. Nine (9) had no measurable amount, and 6 had measurable THC amounts on day 7. Indicates substantial amounts of THC left in blood in long-term users.</td>
<td>+</td>
</tr>
<tr>
<td>Khiabani (2006), Relationship between THC concentration in blood and impairment in apprehended drivers. <em>Traffic Inf Prev.</em></td>
<td>Cross-sectional study</td>
<td>Study investigated whether a physician’s judgment on impairment in a real-life setting among suspected drugged drivers was related to blood THC concentration. Relationship between concentration of THC in blood and risk of being assessed impaired supports findings from previous experimental studies of concentration related effects of THC on psychomotor performance and driving skills.</td>
<td>+</td>
</tr>
<tr>
<td>Laumon (2005), Cannabis intoxication and fatal road crashes in France: population based case-control study. <em>BMJ.</em></td>
<td>Population-based, case-controlled study</td>
<td>See Gadegbeku (2011). A large study of 10,748 drivers, with known drug and alcohol concentrations involved in fatal crashes in France from October 2001 to September 2003. Positive cannabis detection was associated with increased risk of responsibility (odds ratio = 3.32; 95% CI: 2.63–4.18).</td>
<td>+</td>
</tr>
<tr>
<td>Liguori (1998), Effects of marijuana on equilibrium, psychomotor performance, and simulator driving. <em>Behav Pharmacol.</em></td>
<td>Cohort study</td>
<td>Ten subjects inhaled low-dose (1.77%) or high-dose (3.95%) marijuana and then took a battery of tests. High, but not low, dose increased body sway and brake latency. Effects similar to results of BAC of 0.05%.</td>
<td>+</td>
</tr>
<tr>
<td>Liguori (2002), Separate and combined effects alcohol, marijuana impairment driving simulator. <em>Psychopharm.</em></td>
<td>Cohort study</td>
<td>Subjects (<em>N</em> = 12) given different concentrations of EtOH followed by marijuana cigarette. Given equilibrium test (body sway) and then driving performance test (brake latency). No significant additive effects of THC to potentiate the effects of EtOH on these tests. Also no potentiation of perception of impairment in EtOH and THC.</td>
<td>+</td>
</tr>
<tr>
<td>Menetrey (2005), Driving skills of psychometric tests and blood THC following oral THC. <em>J Anal Tox.</em></td>
<td>Prospective case-controlled study</td>
<td>Oral Dronabinol and Hemp concoctions given to eight male long-term users. Blood levels measured over time and compared with degree of driving impairment and self-perception of safety. Significant levels present at 10 h postgestation. Higher oral ingestion of 45.7 mg demonstrated continued impairment at 10 h. THCOOH/THC ratio more reliable measure of metabolism postexposure. More accurate than THC and tends to underestimate exposure time.</td>
<td>+</td>
</tr>
<tr>
<td>Mura (2003), Comparison of the prevalence of alcohol, cannabinoids and other drugs in 900 injured drivers and controls subjects: results of a French collaborative study. <em>Forensic Sci Intl.</em></td>
<td>Collaborative case-controlled study</td>
<td>Examined prevalence rates of THC, EtOH, and other drugs in serum of ER patients for traumatic vs rates in nontraumatic patients (controls). Higher prevalence of THC 10% vs 5% of controls.</td>
<td>+</td>
</tr>
<tr>
<td>Papafotiou (2005), The relationship between performance on the standardized field sobriety tests, driving performance and the level of Δ⁹-tetrahydrocannabinol in blood. <em>Forensic Sci Intl.</em></td>
<td>Cohort study</td>
<td>Goal to determine whether impairment on sobriety test (ST) and head movement test (HMT) from THC effects also impairs driving performance test. Marijuana users (<em>N</em> = 40) smoked 0 dose, 1.74% THC, or 2.93% THC. Then, ST + HMT followed by driving test. At 50 min, 88% impaired ST, 38% of nonimpaired drivers correctly identified with ST. Suggests ST as screen for marijuana performance affected use.</td>
<td>++</td>
</tr>
<tr>
<td>Ramaekers (2006), High-potency marijuana impairs executive function and inhibitory motor control. <em>Neuropsychopharmacology.</em></td>
<td>Double-blinded, placebo-controlled, crossover study</td>
<td>Single doses of 0, 250, 500 μg/kg THC given to 20 recreational marijuana users. Performance tests conducted at regular intervals between 15 min and 6 h postsmedication and included measures of motor control, executive function, motor impulsivity, and risk taking. THC-induced impairments lasted up to 6 h postsmedication as indicated by absence of THC × Time after smoking interaction. Data suggest that high potency marijuana consistently impairs executive function and motor control.</td>
<td>++</td>
</tr>
<tr>
<td>Ramaekers (2009), Neurocognitive performance during acute THC intoxication in heavy and occasional cannabis users. <em>J Psychopharmacology.</em></td>
<td>Double-blinded, placebo-controlled, crossover study</td>
<td>Twelve (12) occasional and 12 heavy users smoked 500 μg/kg (35 mg for a 70-kg subject) THC or placebo by standardized smoking procedure. Performance on various psychomotor tasks and serum THC levels measured at baseline and over 8 h postadministration. Occasional users showed significant impairment on most tasks at serum THC levels ≤ 10 ng/mL and on all tasks at THC levels &gt; 10 ng/mL. Heavy users showed only significant impairment on the stop signal task (increased reaction time) at THC levels &gt; 10 ng/mL.</td>
<td>++</td>
</tr>
</tbody>
</table>
Table A1. (Continued)

<table>
<thead>
<tr>
<th>Author (Year), Title, Journal</th>
<th>Study Type</th>
<th>Summary of Findings</th>
<th>Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>Schwope (2012), Psychomotor performance, subjective and physiological effects and whole blood delta-9-tetrahydrocannabinol concentrations in heavy, chronic cannabis smokers following acute smoked cannabis. <em>J Anal Toxicol.</em></td>
<td>Cohort study</td>
<td>Nine male/1 female heavy, chronic cannabis smokers in closed research unit smoked ad libitum one 6.8% THC cannabis cigarette. THC, 11-hydroxy-THC and 11-nor-9-carboxy-THC quantified in whole blood and plasma. Assessments: subjective (VAS and Likert scales); physiological (heart rate, blood pressure, respirations); psychomotor (critical-tracking and divided-attention tasks) performed before/up to 6 h after smoking. THC significantly increased VAS responses and heart rate, with concentration-effect curves demonstrating counterclockwise hysteresis. No significant differences observed for critical-tracking or divided-attention task performance. Cannabis influence factor not suitable for quantifying psychomotor impairment following consumption and not precise enough to determine recent cannabis use with accuracy.</td>
<td>+</td>
</tr>
<tr>
<td>Skopp (2008) Cannabinoids concentrations in spot serum samples 24-48 hours after discontinuation of cannabis smoking. <em>J Anal Toxicol.</em></td>
<td>Case series</td>
<td>Inpatients (<em>N</em> = 37) on closed detox ward for opioid dependence divided into 3 groups based on marijuana use: (1) heavy users (&gt;1 joint/day—<em>N</em> = 16); (2) moderate users (up to 1 joint/day—<em>N</em> = 15); and (3) light users (up to 1 joint/week—<em>N</em> = 6); 29 blood samples for THC, THC-OH, and THC-COOH drawn 24 to 48 h after abstinence from cannabis use; 4 samples &gt;48 h after the last use from heavy and moderate users. Impairment signs and subjects’ personal assessment of being “high” recorded at the time of blood sampling. No subject deemed to have drug effect by clinical signs or subjective rating. No specific tests for evidence of impairment performed; 8 specimens from 16 heavy users tested positive for THC (range: 1.2 to 6.4 ng/mL) 24 to 48 h after cessation of drug use; 5 positive for THC-OH (0.3 to 2.4 ng/mL). One specimen from subject with BMI of 30.7 contained THC and OH-THC 120 h after smoking. THC detectable in 6 of 15 moderate users in range of 0.3 to 2.6 ng/mL, THC-OH present in three samples (range, 0.3 to 1.2 ng/mL). None positive for active component &gt;48 h after cessation. One specimen of 6 light users positive for THC (1.4 ng/mL); all negative for THC-OH. Authors conclude that findings of blood levels of psychoactive components of cannabis (THC and THC-OH) may not unequivocally prove recent use of cannabis because these components are detectable 24 to 48 h after abstaining from cannabis use in some heavy and moderate cannabis users.</td>
<td>+</td>
</tr>
<tr>
<td>Spronk (2011), Acute effects of delta-9-tetrahydrocannabinol on performance monitoring in healthy volunteers. <em>Front Behav Sci.</em></td>
<td>Randomized double-blinded, placebo-controlled crossover study</td>
<td>Ten study subjects given vaporized THC in ethanol or vaporized ethanol alone on separate occasions, each serving as his own control in a crossover design. On separate study days, each received three subsequent doses of THC (4 mg, 6 mg, and 6 mg) at 90-min intervals, or placebo on placebo day. Subjects and investigators blinded to active THC vs placebo control administration. EEG monitoring while performing modified Flankers task. Blood for THC drawn at 5, 20, 95, 110, 185, and 200 min after initial THC administration. Found ERN amplitude on EEG significantly reduced after administration of THC, indicating that THC impairs performance monitoring. Task not designed to detect behavioral effects.</td>
<td>+</td>
</tr>
<tr>
<td>Theunissen (2012), Neurophysiological functioning of occasional and heavy cannabis users during THC intoxication. <em>Psychopharmacology.</em></td>
<td>Double blinded, placebo-controlled, crossover study</td>
<td>Tested 12 heavy marijuana users and 12 occasional users on Divided Attention Test (DAT) and Stop Signal Testing (SST) while performing EEG monitoring to discover if EEG evidence of differences in Event-Related Potentials (ERPs) between groups performing these tasks. Subject served as own control as on 1 occasion received a placebo cigarette. Investigators and subjects blinded to active/placebo days. Occasional users impaired on DAT, heavy users had some tolerance to acute intoxicating effects on DAT; both groups impaired on SST, specifically increased stop reaction times in heavy and occasional users. Findings confirmed by ERPs on EEGs. Specifically, P100 ERP showed adaptation/tolerance in heavy users but not occasional users, whereas P300 ERP proved a sensitive measure of intoxication in both groups. THC concentrations in blood positively correlated with SST reaction time, which is a measure of impulse control.</td>
<td>+</td>
</tr>
</tbody>
</table>

(continues)
TABLE A1. (Continued)

<table>
<thead>
<tr>
<th>Author (Year), Title, Journal</th>
<th>Study Type</th>
<th>Summary of Findings</th>
<th>Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>Van Elsland (2012), Influence of cannabis on fatal traffic crash: a detailed analysis. <em>Transp Res Rec.</em></td>
<td>Retrospective cohort</td>
<td>Reanalysis of SAM database of fatal crashes in France 2001–2003, an overall sample of 16,705 who had blood tests for drugs and alcohol. Original study showed dose effect of cannabis with an excess risk of 1.5 for THC blood level &lt;1 ng/mL (reaches 2.12 for THC level &gt;5 ng/mL). Reanalysis evaluated human functional failures of drivers with cannabis-only + tests with controls of age-matched drivers with no drugs detected. Analysts were blinded to cannabis status of all drivers. Generalized alteration of sensorimotor/cognitive capacities most common failure among cannabis drivers. Drivers with generalized sensorimotor alteration: median THC level 16.2 ng/mL vs THC of 2.5 ng/mL for drivers committing other failures; 78% committing generalized sensorimotor errors had THC &gt;5 ng/mL. Errors accounted for 18.4% of fatal crashes. Cannabis + drivers significantly more likely to have low level of physiological vigilance and attention, more likely to engage in risky driving behaviors. Threshold effect of blood THC levels: THC &lt;5 ng/mL conventional functional failure (alteration of 1 specific function); THC &gt;5 ng/mL extreme failure leading to breakdown of all functions required for safe driving and vehicle control loss. Also, 13.2% cannabis drivers unable to properly evaluate road infrastructure vs 5.7% controls. Cannabis drivers significantly more likely to be involved in single vehicle crashes; trend increased with increasing THC levels: 40% of single-vehicle crash drivers had THC &gt;5 ng/mL, and 63% of drivers with THC &gt;5 ng/mL lost control of vehicles. In contrast, 65% of control group crashes involved another vehicle.</td>
<td></td>
</tr>
<tr>
<td>Weinstein (2008), A study investigating the acute dose–response effects of 13 mg and 17 mg Δ9-tetrahydrocannabinol on cognitive-motor skills, subjective and autonomic measures in regular users of marijuana. <em>J Psychopharmacol.</em></td>
<td>Double-blinded, placebo-controlled crossover study</td>
<td>Fourteen (14) daily users administered a 17-mg THC cigarette on first day and performance measured on several psychomotor tasks 2 h later (inadequate washout time). Subjects then received a placebo cigarette and same performance tasks repeated. On second study day (1 week after first), each subject administered a placebo cigarette and underwent various psychomotor tests. Received 13-mg THC cigarette 2 h later and repeated tasks. Performance significantly affected after 17-mg THC compared to placebo and to 13-mg THC on one task; significantly lower for both THC doses compared to placebo on another. Other tasks did not show significant drug effects. No comparison to occasional users.</td>
<td></td>
</tr>
<tr>
<td>Yesavage (1985), Carry-over effect of marijuana intoxication on aircraft pilot performance. <em>Am J Psychiatry.</em></td>
<td>Controlled clinical trial, single blinded</td>
<td>Ten experienced private pilots tested on flight simulator landing task. Each served as own baseline performing task prior to THC administration and then tested 1, 4, and 24 h after smoking 19-mg THC cigarette. Each had significant subjective and measured impairment at 1 and 4 h. Final test at 24 h trended toward impairment on all variables with significant impairment in a number of measures. No report of subjective impairment or any awareness of impaired performance on simulated landing. It is unknown how these simulator tests directly relate to common safety-sensitive jobs.</td>
<td></td>
</tr>
</tbody>
</table>

BAC, blood alcohol concentration; CI, confidence interval; EEG, electroencephalogram; MVA, motor vehicle accident; OR, odds ratio; THC, delta-9-tetrahydrocannabinol.
## TABLE A2. Low Quality/Additional Articles Reviewed

<table>
<thead>
<tr>
<th>Author (Year), Title, Journal</th>
<th>Study Type</th>
<th>Summary of Findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Armentano (2013), Cannabis and psychomotor performance: a rational review of the evidence and implications for public policy. Drug Test Anal.</td>
<td>Editorial review</td>
<td>While EtOH accident risk is well established, THC role is less clear. Accident risk appears to be dose dependent, and most likely when there are unexpected changes in the driving environment that require complex psychomotor response. Concerns about per se levels include peak levels not corresponding to behavioral impairment, wide variations in psychomotor effects of THC, especially among naive subjects, and residual levels may persist for days. Recommends increased efforts to research and apply field sobriety type tests rather than using THC levels for establishing driving impairment.</td>
</tr>
<tr>
<td>Armentano-Humboldt (2013), Should per se limits be imposed for cannabis- equating THC levels with actual driver impairment. J Soc Relat.</td>
<td>Editorial review</td>
<td>Good editorial review that distinguishes “effect based DUI laws” (based on actual psychomotor impairment) from “per se” laws (either zero tolerance or specific levels). Notes scientific consensus for specific blood-alcohol levels and performance impairment, but not for THC. Peak THC blood levels do not correlate with maximum levels of impairment. Maximum effect of smoked marijuana is 20 to 40 minutes after smoking, diminishing 60 to 150 minutes later. Notes that THC-OH is psychoactive with detection up to 6 h after smoking. THC-COOH is not psychoactive and can be present for days or weeks in plasma. Oral ingestion peaks about 60 to 120 min after dosing and declines over several hours. Recent use by an occasional user difficult to distinguish from prior use by a long-term user due to lipid solubility and variable pharmacokinetics of THC. Thus, “it is difficult to establish a relationship between a person’s THC blood or plasma concentration and performance impairing effects.” Points out lack of consensus regarding plasma concentrations linked with impairment, studies showing divergent results, interindividual variability in effects, and tolerance of long-term users. All these factors limit scientific support for per se levels.</td>
</tr>
<tr>
<td>Asbridge (2012), Cannabis and MVA risk: a meta-analysis. BMJ.</td>
<td>Meta-analysis of observational studies</td>
<td>Nine studies reviewed; OR of 1.92 for motor vehicle crashes (MVCs) while driving under influence of cannabis. Collision risk higher for case-control studies and fatality studies vs culpability studies and studies of nonfatal collisions. Acute marijuana use doubles risk of MVC with serious injury or death. Impact of marijuana use on minor crashes is unclear. Association of MVC with marijuana less robust than EtOH, which is most prevalent substance present in crashes. While not a research study, it is a good quality review.</td>
</tr>
<tr>
<td>Bates (1999), Role of cannabis in motor vehicle crashes. Epi Rev.</td>
<td>Review</td>
<td>Older reviewer notes that although marijuana impairs driving performance, this is ameliorated by drivers’ awareness of their impairment, leading to compensatory, less-risky behavior. Nevertheless, this is not effective when events are unexpected or continuous attention required. Marijuana users drive slower, increase following distance, have increased reaction time, and may show impaired emergency behavior. Overall, no evidence THC alone increased risk of culpability for MVC fatalities or hospitalizations. Combined THC/EtOH does increase this risk. Not known if THC affects risk of less serious MVCs.</td>
</tr>
<tr>
<td>Berghaus (1995), Effects of cannabis on psychomotor skills and driving performance: a meta-analysis of experimental studies. Proc Int Conc Alc Drugs Traffic Safety Conf.</td>
<td>Meta-analysis</td>
<td>Variety of performance areas related to driving affected by THC: tracking, psychomotor skills, reaction time, visual functions, attention, and performance in simulated and real driving. Effects tended to be concentrated in first 2 h after smoking and was dose dependent. Frequent users are less impaired. Impairing effects tended to be subjectively overestimated, resulting in a greater ability to compensate compared with EtOH users. Peak effect lags behind peak blood level. Good-quality review of 60 experimental studies of smoked marijuana found that 50% of cumulated performance results showed significant decrements at 6 ng/mL plasma THC for tracking, 8 ng/mL for psychomotor skills, 9 ng/mL for attention, 11 ng/mL for divided attention, and 11 ng/mL for all performance areas taken together. Frequent users showed less impairment than occasional users.</td>
</tr>
<tr>
<td>Bolla (2002), Dose-related neurocognitive effects of marijuana use. Neurology.</td>
<td>Cohort study</td>
<td>A neuropsychological battery applied to 22 heavy chronic marijuana smokers after 28 days of abstinence found persistent deficits in performance. Association not determined to be causal. No control or light-smoking groups and no baseline tests done (only tested after 28 days). Various other study limitations preclude generalizing the results. Low-quality study.</td>
</tr>
<tr>
<td>Bosker (2013), Psychomotor function in chronic daily cannabis smokers during sustained abstinence. PLoS ONE.</td>
<td>Cohort study using unmatched controls</td>
<td>Nineteen (19) chronic daily marijuana smokers (mean 10.9 joints per day) underwent 3 weeks of abstinence on an inpatient unit. Performance on 2 psychomotor tasks measured at the beginning of abstinence and weekly for 3 weeks. Performance compared to placebo performance of controls (N = 30) who were occasional users (not matched for potential confounders). Chronic daily users’ performance improved over 3 weeks of abstinence but remained significantly worse than controls’ performance. Results suggest that chronic heavy users may be chronically impaired, apart from any acute THC-induced impairment.</td>
</tr>
</tbody>
</table>

(continues)
Table A2. (Continued)

<table>
<thead>
<tr>
<th>Author (Year), Title, Journal</th>
<th>Study Type</th>
<th>Summary of Findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bramness (2010), Impairment due to marijuana and EtOH—clinical signs and additive effects. Addiction.</td>
<td>Retrospective cross-sectional forensic database study</td>
<td>Norwegian drivers stopped by police for suspected DUI: 3480 + EtOH only; 589 + THC only; 894 + both; 79 negative. Subjects evaluated by police physician using Norwegian Clinical Test for Impairment (CTI). Relationship with blood THC level only seen for ocular tests. All levels of THC alone associated with CTI determination of impairment, but to a smaller extent than EtOH (even at EtOH levels lower than 0.025). Impairment of safe driving and task performance is not clearly defined in the article.</td>
</tr>
<tr>
<td>Braun (1998), Marijuana use and medically attended events. Ann Emerg Med.</td>
<td>Cohort study</td>
<td>Random sample of 4462 health plan members with baseline self-reported marijuana use data followed for 3 yrs to document medical visits for injuries. Chart abstractors blinded to marijuana use. No difference between marijuana users and nonusers with regard to medically attended injuries. Self-reported use may have caused degree of misclassification.</td>
</tr>
<tr>
<td>Brookoff (1998), Marijuana and injury: is there a connection? Ann Emerg Med.</td>
<td>Editorial</td>
<td>Commentary on Braun paper—Notes some of the study limitations and that there is a “pressing need for high-quality research on the potential connection between marijuana use and injury. Very few police departments are equipped to test impaired drivers for marijuana, and the value of toxicological testing for marijuana remains controversial.</td>
</tr>
<tr>
<td>Chait (1989), Delta-9-tetrahydro-cannabinol content and human marijuana self-administration. Psychopharmacol (Berl),</td>
<td>Cohort study</td>
<td>Small study of 10 regular marijuana smokers, each of whom was allowed to self-administer marijuana of low, medium, or high THC content freely over 30-min period. No differences among the three potencies of marijuana in postsmoking CO boost. Tolerance was observed over course of the study to the heart rate increasing effect of marijuana. Results indicate that subjects failed to regulate their intake of marijuana smoke in response to substantial (4-fold) changes in marijuana THC content.</td>
</tr>
<tr>
<td>Downey (2013), Effects of marijuana and EtOH on driving simulators. Accid Anal Prev.</td>
<td>Case–control study</td>
<td>Double-blinded counterbalanced placebo-controlled study of the effects of a combination of EtOH and cannabis on simulated driving. Noted that simulated driving was more impaired with EtOH and blood level of THC higher with EtOH.</td>
</tr>
<tr>
<td>Elvik (2012), Risk of road accident associated with the use of drugs: a systematic review and meta-analysis of evidence from epidemiological studies. Accid Anal Prev.</td>
<td>Systematic review, meta-analysis of literature</td>
<td>Good-quality review that analyzed 66 studies looking at a variety of different drugs. In general, found modest effects in comparison with EtOH. Publication bias detected for some drugs. Higher-quality studies tend to show lower estimates of risk. Associations cannot be established as causal.</td>
</tr>
<tr>
<td>Favrat (2005), Two cases of “cannabinoid acute psychosis” following the administration of oral cannabis. BMC Psych.</td>
<td>Case report</td>
<td>Report of 2 cases of 8 healthy male occasional but regular cannabis users without psychiatric history who developed transient psychotic symptoms (depersonalization, paranoid feelings, derealization) following oral administration of cannabis conducted under experimental conditions. Authors concluded that while oral route of administration achieves only limited blood concentrations, significant psychotic reactions may occur.</td>
</tr>
<tr>
<td>Fletcher (1996), Cognitive correlates of long-term cannabis use. Arch Gen Psych.</td>
<td>Cohort study</td>
<td>Long-term cannabis users compared with demographically comparable nonusers on a variety of memory/attention tests. Long-term users performed more poorly on short-term memory, working memory, and attention tests. May have been certain biases in subject selection; difficult to generalize these results. Relevance to this position paper limited.</td>
</tr>
<tr>
<td>Hartman (2013), Cannabis effects on driving. Clin Chem.</td>
<td>Review</td>
<td>Comprehensive literature review on relationship of cannabis and driving: cannabis consumption associated with motor vehicle accident usually not significant. Driving under the influence of cannabis significant. Urine level not significant. Adjusted OR = 8.6 for &gt;5 ng/mL marijuana users for driving fatalities. Drivers claiming regular cannabis use had less impairment than occasional users for given THC level. Presents a summary of literature on which tests are affected by marijuana use.</td>
</tr>
<tr>
<td>Heishman (1997), Comparative effects of alcohol and THC on mood, memory, performance. Pharm Biochem Behav.</td>
<td>Cohort study</td>
<td>Five subjects given different concentrations of EtOH and marijuana concentrations and placebo. Tests of memory and dexterity. Both tests had effects on digit symbol substitution and word recall. Too small a study to use beyond pilot-level information.</td>
</tr>
<tr>
<td>Heishman (1990), Acute and residual effect of marijuana; profiles of plasma THC levels, physiologic, subjective, and performance measures. Pharm Biochem Behav.</td>
<td>Cohort study</td>
<td>Three subjects inhaled marijuana and physiological parameters measured over 48 h. Impairment in cognition, recall and physiological effects (tachycardia) were impaired for up to 24 h. Too small a study to use beyond pilot-level information.</td>
</tr>
</tbody>
</table>
TABLE A2. (Continued)

<table>
<thead>
<tr>
<th>Author (Year), Title, Journal</th>
<th>Study Type</th>
<th>Summary of Findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Huestis (2007), Human cannabinoid pharmacokinetics. <em>Clin Chem.</em></td>
<td>Review</td>
<td>Comprehensive review of effects marijuana on being in a motor vehicle accident (MVA). Serum sample obtained occurs 4 h after accident—many results negative at that time. DUIC within an hour of THC inhalation produces more twice the risk of MVA as controls. OR of Risk for MVA is dose dependent on the level of THC. When blood THC concentration was 5 ng/mL, the OR for MVA increased to 6.6—similar to that of a 0.15% blood alcohol concentration (BAC). Study of 456 Norwegian suspected impaired drivers showed a mean of 2 ng/mL THC but assessment showed 54% of drivers were impaired. Review of specific skill tests that THC use impaired presented. Discussion on synergism of EtOH and marijuana.</td>
</tr>
<tr>
<td>Kalant (2004), Adverse effects of THC on health. <em>Prog Neuro-Psychopharmacol Biological Psych.</em></td>
<td>Review</td>
<td>Discusses difficulty in obtaining serum testing as practical test for THC. Cites a number of case–control studies that imply an association to the increase in car accidents with TCH use. Also looks at literature for more chronic disease and mental health problems associated with marijuana use.</td>
</tr>
<tr>
<td>Kelly (2004), Review of drug use and driving. <em>Drug Alc Rev.</em></td>
<td>Review</td>
<td>Comprehensive review article looks at the prevalence of drugs and driving, effects on driving performance, and risk factors associated with drug driving. Marijuana effects last for 4 h, which results in driving impairment in testing. Cited 3 studies that state that effects of THC are potentiated by EtOH.</td>
</tr>
<tr>
<td>Kuypers (2012), A case–control study estimating accident risk for alcohol, medicines and illegal drugs. <em>PLOS One</em></td>
<td>Population-based case-controlled study</td>
<td>Samples obtained from 337 injured drivers sent to hospital. Drug levels compared to 2726 control drivers randomly selected by police in the same geographic area. OR for significant difference in accidents with THC detectable is 6 for 1 to 2 ng/mL THC and 24.83 for 2 to 5 ng/mL (13 OR overall for marijuana use).</td>
</tr>
<tr>
<td>Leirer (1991), Marijuana carry-over effects on pilot performance. <em>Aviat Space Env Med.</em></td>
<td>Cohort study</td>
<td>Too specific a test population (9 currently active pilots) to be relevant to general population.</td>
</tr>
<tr>
<td>Musshoff (2006), Blood, urine levels of THC and impairment. <em>Ther Drug Monitor.</em></td>
<td>Review</td>
<td>Good review of pharmacokinetics of THC and metabolites. THC levels are usually less than limit of quantification at 5 to 7 h, &lt;0.5 ng/mL.</td>
</tr>
<tr>
<td>O’Kane (2002) Cannabis and driving. <em>Emerg Med.</em></td>
<td>Review</td>
<td>Impairment from marijuana use can persist greater than 5 h after inhalation after blood levels are &lt;2 ng/mL. Marijuana can significantly exacerbate driving impairment caused by EtOH.</td>
</tr>
<tr>
<td>Pope (2001) Neuropsychological performance in long-term cannabis users. <em>Arch Gen Psychiatry.</em></td>
<td>Case-controlled study</td>
<td>Study of long-term cognitive effects of marijuana use—3 groups all 30 to 55 years: (1) 63 current heavy users who smoked daily and at least 5000 times lifetime at study entry; (2) 45 former heavy users who smoked at least 5000 times but &lt;12 times in last 3 months; and (3) 72 controls who smoked ≤ 50 times lifetime. A 28-day washout monitored by observed urine samples. Authors concluded that “some cognitive deficits appear detectable at least 7 days after heavy cannabis use but appear reversible and related to recent cannabis exposure rather than irreversible and related to cumulative lifetime use.” Controls not matched—not directly addressed in the current paper.</td>
</tr>
<tr>
<td>Pope (1996), The residual cognitive effects of heavy marijuana use in college students. <em>JAMA.</em></td>
<td>Single-blinded comparison study</td>
<td>Two samples of college undergraduates: 65 heavy users smoked marijuana a median of 29 days in past 30 days (range, 22 to 30 days) and displayed cannabinoids in urine, and 64 light users, who smoked a median of 1 d in the last 30 d (range, 0 to 9 d) and displayed no urinary cannabinoids. The study found heavy use associated with residual neuropsychological effects even after a day of supervised abstinence. “However, the question remains open as to whether this impairment is due to a residue of drug in the brain, a withdrawal effect from the drug, or a frank neurotoxic effect of the drug.” (continues)</td>
</tr>
</tbody>
</table>
### TABLE A2. (Continued)

<table>
<thead>
<tr>
<th>Author (Year), Title, Journal</th>
<th>Study Type</th>
<th>Summary of Findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pope (1995), Residual effects of THC. <em>Drug Alc Depend.</em></td>
<td>Review</td>
<td>Literature review comparing drug-administration studies in which known amounts of cannabis administered to volunteers, and naturalistic studies where heavy marijuana users tested after period of abstinence. Data support a “drug residue” effect on attention, psychomotor tasks, and short-term memory during 12- to 24-h period after use, “but evidence is as yet insufficient to support or refute either a more prolonged ‘drug residue’ effect, or a toxic effect on the central nervous system that persists even after drug residues have left the body.”</td>
</tr>
<tr>
<td>Ramaekers (2009), Neurocognitive performance in acute THC intoxication. <em>J Psychopharm.</em></td>
<td>Double-blinded, placebo-controlled study</td>
<td>Low-quality study. Attempted to assess neurocognitive performance during acute THC intoxication in 24 subjects: 12 occasional users and 12 heavy users. Authors concluded that cannabis use history strongly determines behavioral response to a single dose of THC.</td>
</tr>
<tr>
<td>Reeve (1983), Hemolyzed blood and serum levels of delta-9-THC: effects on performance of roadside sobriety tests. <em>J Forensic Sci.</em></td>
<td>Pilot study</td>
<td>Pilot study of 58 subjects and 69 blinded controls tested within 5 min of smoking marijuana cigarette (18-mg THC) and at 30-min intervals for 150 min. Subjects demonstrated a broad range of THC blood levels, which settled within 1 h. Subjective judgments of impairment exhibit adaptational effect.</td>
</tr>
<tr>
<td>Reeve (1983), Plasma concentrations of delta-9-tetrahydrocannabinol and impaired motor function. <em>Drug Alcohol Depend.</em></td>
<td>Pilot study</td>
<td>Follow-up to the aforementioned study: 59 volunteers smoked marijuana cigarettes until satisfactory level of “high” obtained. Then blood samples taken 5, 30, 90, and 150 min following smoking after which tested with roadside ST. Overall, 94% of subjects failed to pass test 90 min after smoking and 60% after 150 min, despite the fact that by then plasma concentrations were rather low. Authors surmise that establishing a clear relation between THC plasma concentrations and clinical impairment will be much more difficult than it has been for alcohol.</td>
</tr>
<tr>
<td>Robbe (1993), Marijuana and actual driving performance. <em>NHTSA.</em></td>
<td>Government report</td>
<td>Presents results of 1 pilot and 3 actual driving studies. Pilot study was to establish THC dose current marijuana users smoke to achieve desired “high.” Report results found THC’s adverse effects on driving performance appear relatively small.</td>
</tr>
<tr>
<td>Sewell (2009), The effect of cannabis compared with alcohol on driving. <em>Am J Addict.</em></td>
<td>Review</td>
<td>Three types of studies performed to assess risk of cannabis use and having fatal traffic accident. Cognitive studies show that attentiveness, vigilance, perception of time and speed, and use of acquired knowledge are all affected by THC. A meta-analysis of 60 studies concluded that marijuana impairs every performance area connected with safe driving. Marijuana and EtOH have additive or multiplicative effects on impairment. Experimental studies on driving skills or via simulator found that most THC-intoxicated drivers show only modest impairments on actual road tests, and experienced smokers show almost no functional impairment except when combined with EtOH. Maximal impairment 20 to 40 min after smoking, gone 2.5 h later in those who smoke 18-mg THC or less.</td>
</tr>
<tr>
<td>Subbaraman (2014), Can cannabis be considered a medication for alcohol? <em>Alcohol Alcohol.</em></td>
<td>Literature review</td>
<td>Not applicable. Looked at whether cannabis should be prescribed for alcohol-dependent people to attempt to reduce alcohol intake.</td>
</tr>
<tr>
<td>Verstraete (2011), Per se limits—methods of defining cut-off values for zero tolerance. <em>DRUID.</em></td>
<td>Review</td>
<td>Makes recommendations for establishing cutoff levels for drugs in per se legislation for DUI in European nations. THC half-life of 1.4 h (3 mg/mL of THC decreases to 0.68 ng/mL after 3 h). Two-tiered approach: Per se limits (for drugs with limits for zero tolerance) combined with an impairment approach. Generally, European countries use limits of detection of their official lab as per se limit for THC; those using two-tiered system use drug impairment level that equates to a 0.05 g% BAC impairment.</td>
</tr>
<tr>
<td>Volkow (2014), Adverse health effects of marijuana use. <em>N Engl J Med.</em></td>
<td>Review</td>
<td>Immediate use and long-term exposure to marijuana impair driving ability; marijuana most frequently DUID substance reported; blood THC concentration is correlated with performance in controlled driving-simulators; recent marijuana use and blood THC levels of 2 to 5 ng/mL associated with substantial driving impairment. Risk of impairment doubles when driving soon after using marijuana; persons positive for THC (&gt; 1 ng/mL), especially those with higher blood levels, were 3 to 7 times more likely to be deemed culpable for an MVA than nonusers. Notes THC potency of marijuana steadily increasing; raises question whether older studies of impairment due to less potent THC cigarettes are still valid.</td>
</tr>
</tbody>
</table>

BAC, blood alcohol concentration; CNS, central nervous system; DUI, driving under the influence; EtOH, ethyl alcohol; THC, delta-9-tetrahydrocannabinol.
Your opinion matters!
Please take a moment now to evaluate this session.

Thank You!