

Higher Roads Ahead: A Closer Look at Marijuana and Driving Impairment

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Serving the Leaders of Today, Developing the Leaders of Tomorrow





Drugged Driving



- ✓ An under-recognized highway safety problem
- ✓ Elevated to national stage by dedicated leadership
- ✓ Exact impact on highway safety not exactly known
- ✓ National efforts to address the problem



Some Turning Points



- 2007 NHTSA National Roadside Survey
- 2010 National Drug Control Strategy (ONDCP)
- 2011 NIDA Drugged Driving Research: *Drugged Driving: A White Paper*
- Expanded approval of marijuana for “medical” uses
- Legalization of marijuana (AK, CO, DC, OR, WA)





Marijuana: 2013 – 2014 Roadside Survey

THC – had the largest increase in weekend nighttime prevalence of drivers tested.

12.6% of all drivers tested were positive for THC (Up from 8.6% in 2007) – represents a 48% increase.

Marijuana and Driving



- Old drug with new challenges
- Understanding / recognizing impairment is critical
- Legalization equates to more impaired drivers



Colorado and Washington Experiences – Some Expectations

Colorado: 6.4% of DUI-Drug arrests made by CO SP involved THC alone. 12.2% included THC with other substances (2014)

Washington: THC involved in 24.9% of all DUID cases (2013)



Contributing Problem: Potency

From “Ditch Weed” to “Super Weed”

- Once considered a harmless Hippy “love drug”
- THC potency was approximately 3% at best
- Very little association with driving impairment





Contributing Factor....

Today's marijuana potency increasing -

- 1960 – 70's: approximately 3% THC
- 2012: approximately 12% THC
- Today: averaging about 20% (high as 36% THC)
- Infused and edible forms of marijuana elevating THC to dangerous levels



Source: University of Mississippi Marijuana Potency Monitoring

“Stoned-to-the-Bone” Cannabis

- Hash oil
- Budder
- Honey Oil
- Wax or Ear Wax
- Smoked in oil rig
- 1 dab = 5 joints*

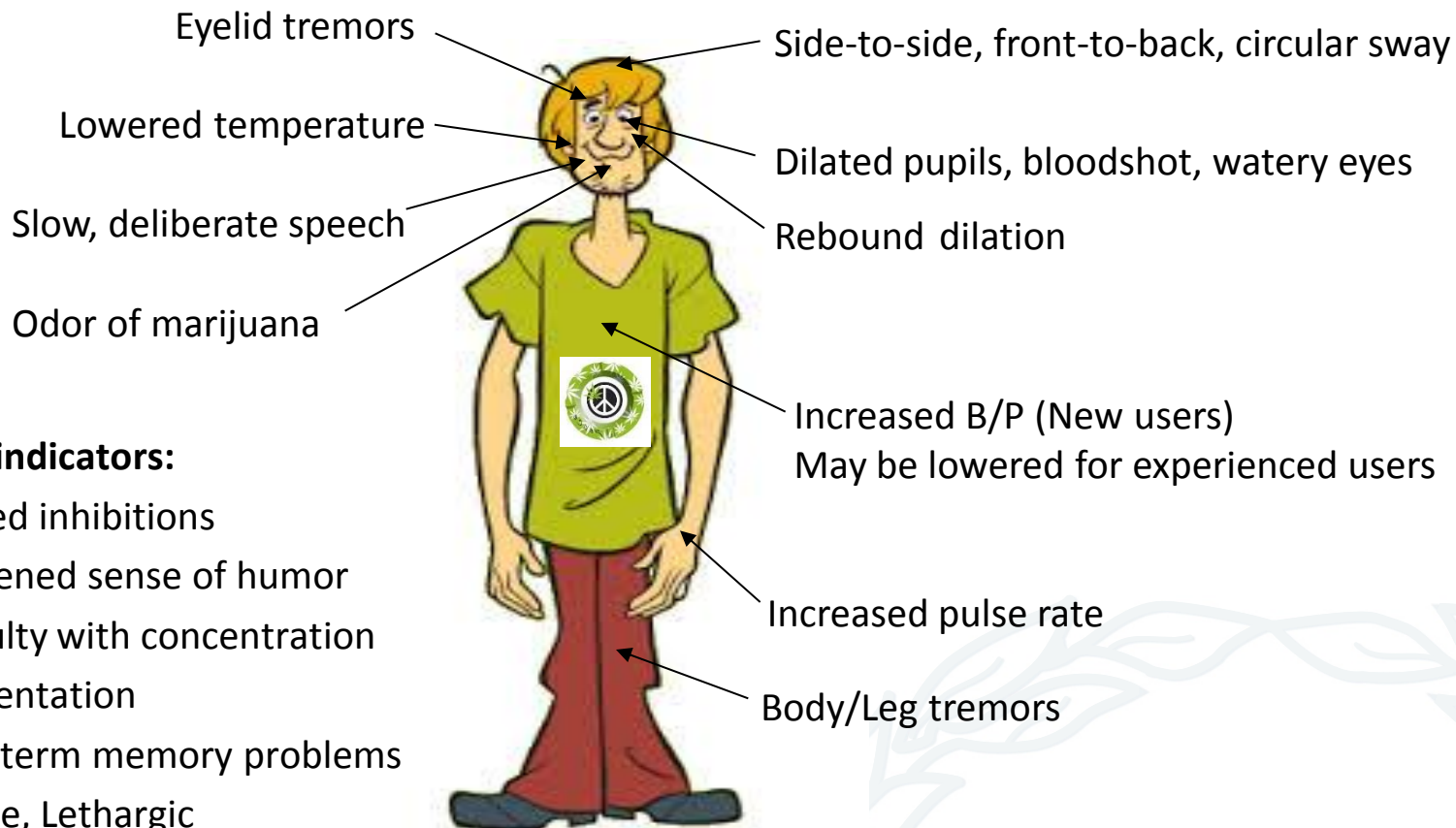


Unique Effects of Today's Cannabinoids



- Share some effects with other psychoactive drugs (depressants, stimulants and hallucinogens)
- Possess a distinct pattern of “Reality Distorting” effects that distinguishes them as a unique pharmacological drug class

Cannabis Impairment



Other indicators:

- Relaxed inhibitions
- Sharpened sense of humor
- Difficulty with concentration
- Disorientation
- Short-term memory problems
- Fatigue, Lethargic
- Altered time and space perception

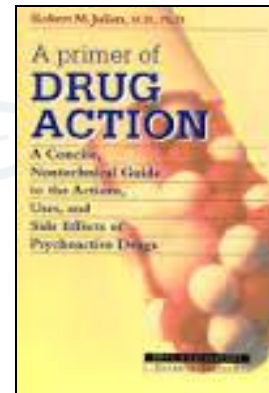


Extended MJ Impairment

“During marijuana intoxication, however, the impairment persists for 4 – 8 hours, well beyond the time that the subjective effects of the drug have dissipated. The impairment is apparent to trained observers.”

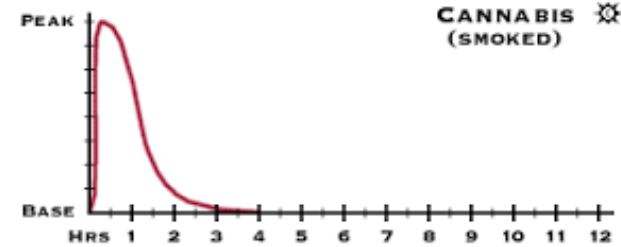
Dr. Robert Julien, MD, PhD.

A Primer of Drug Action, 8th Edition





Expected THC Effects



Smoked

- Peak: 0-30 minutes
- High experience: 1-3 hours
- Effects return to baseline: 3-6 hours
- Residual effects: Up to 24 hours

Oral/Edible

- Peak: 1-3 hours
- High experience: 4-8 hours
- Effects return to baseline: dose dependent
- Residual effects: dose dependent



Subjective and Behavioral Effects

Four stages of MJ effects (*The Science of Marijuana*, L. Iversen, 2000):

- **“Buzz,”**
 - Light-headedness, dizziness, tingling sensations
- **“High”**
 - Euphoria, disinhibition, heightened sense of humor
- **“Stoned”**
 - Calm, relaxed, changes in sense of time, difficulty maintaining thought process
- **“Come-down”**
 - Listless, weak feeling, hunger (“Munchies”)



Immediate Effects of Marijuana

- ✓ Altered sense of time
- ✓ Bloodshot, red eyes
- ✓ Body tremors
- ✓ Carefree attitude
- ✓ Difficulty w/coordination
- ✓ Dizziness
- ✓ Dry mouth and throat
- ✓ Eyelid tremors
- ✓ Lethargic actions
- ✓ Increased heart rate
- ✓ Mood changes
- ✓ Short-term memory loss
- ✓ Sharpened sense of humor
- ✓ Watery eyes



THC Short-Term Memory Effects

- Also referred to as “working memory”
- Short-term maintenance of information needed for complex tasks (Driving, SFSTs)
- Can last up to 3-4 hours after marijuana use





Arizona Pot Smoking Mother Drives With Baby on Car Roof



Phoenix, AZ, June 2, 2012 –

A mother was arrested after smoking marijuana and driving with her five-week-old son in a child safety seat on the roof of her vehicle.

The baby fell off the car roof into the middle of an intersection and was later found uninjured after the mother had arrived at her destination.

An Arizona DRE confirmed Cannabis impairment. A blood toxicology confirmed 8.2ng/mL THC almost 4 hours after her arrest.



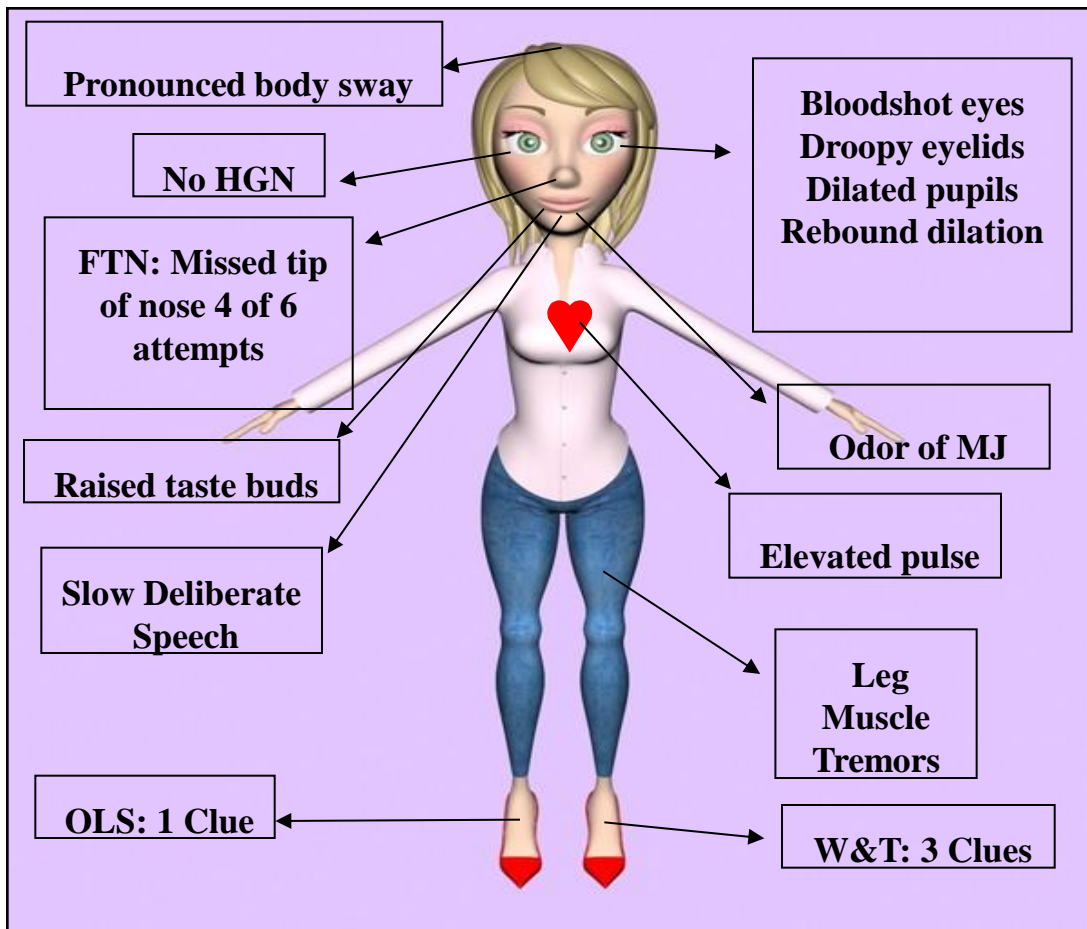
Catalina Clouser Signs of Impairment



Admitted smoking
MJ with friends prior
to driving.

Arrested 4 hours
after incident.

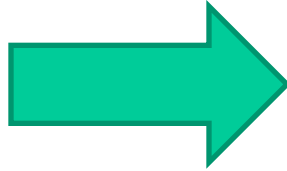
Tox result of 8.2
ng/mL THC four
hours after arrest.





THC and Impaired Driving

Changes in
perception,
short-term
memory,
attention,
and reaction
time



- Difficulty with speed variability, following distance, lane position (drifting/weaving)
- Passing time issues (larger distances required)
- Difficulty with secondary tasks and divided attention tasks
- Visual field and tracking issues

Source: Hartman & Huestis. (2013). *Clinical Chemistry*.



Marijuana Impairment Research

Typically three types of studies done to assess risk:

- Cognitive (examines cognitive process effects)
- Experimental (driving and simulator studies)
- Epidemiological (risk studies – case control)

“Real world” DRE involved study needed!



Marijuana Effects On Driving

302 DRE Cannabis Case Study





302 DRE Cannabis Case Study

- ✓ Cannabis only DRE evaluations (AZ, CA, CO, MT, NM, TX, PA, WA, WI)
- ✓ THC blood toxicology cases only
- ✓ No other drugs or alcohol involved or reported
- ✓ Identified driving actions and common impairment signs and symptoms
- ✓ Examined above/below 5 ng/mL THC indicators
- ✓ THC levels ranged from 1.2 ng/mL to 47 ng/mL THC

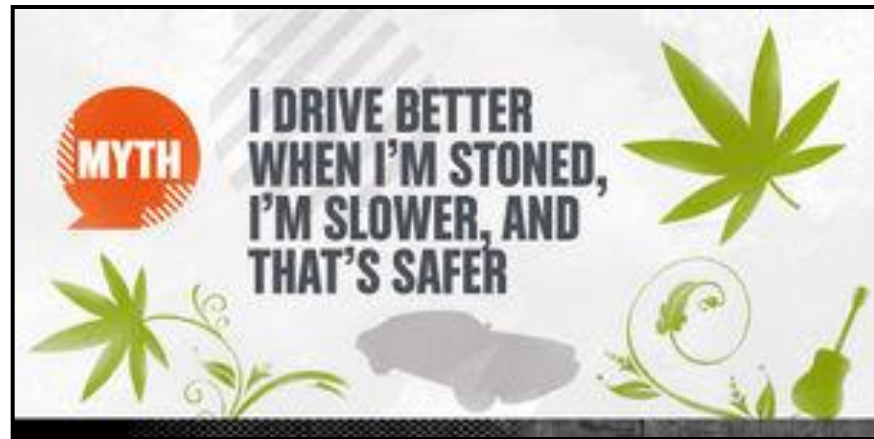


Study Objectives



- ✓ Determine if cannabis impairs psychomotor, cognitive, and driving performance using actual DRE investigations
- ✓ Determine if there is a relationship between performance impairment and cannabis blood concentrations
- ✓ Corroborate the major and general cannabis impairment indicators used in ARIDE and DRE training
- ✓ Identify other cannabis impairment indicators

Myth or Fact?

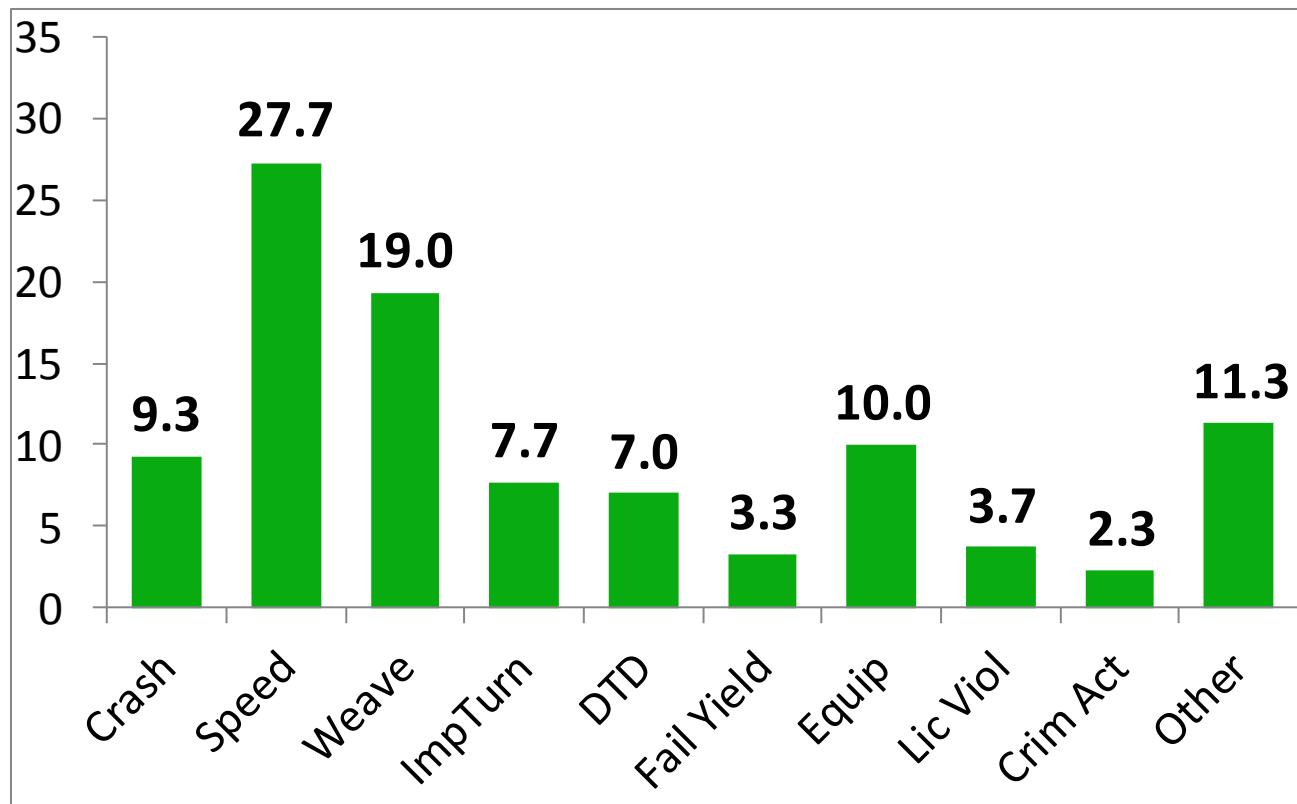


Users, as well as some researchers, have reported that MJ users may be aware of their impairment and take appropriate precautions to compensate for the impairing effects.





Reason for the Traffic Stop

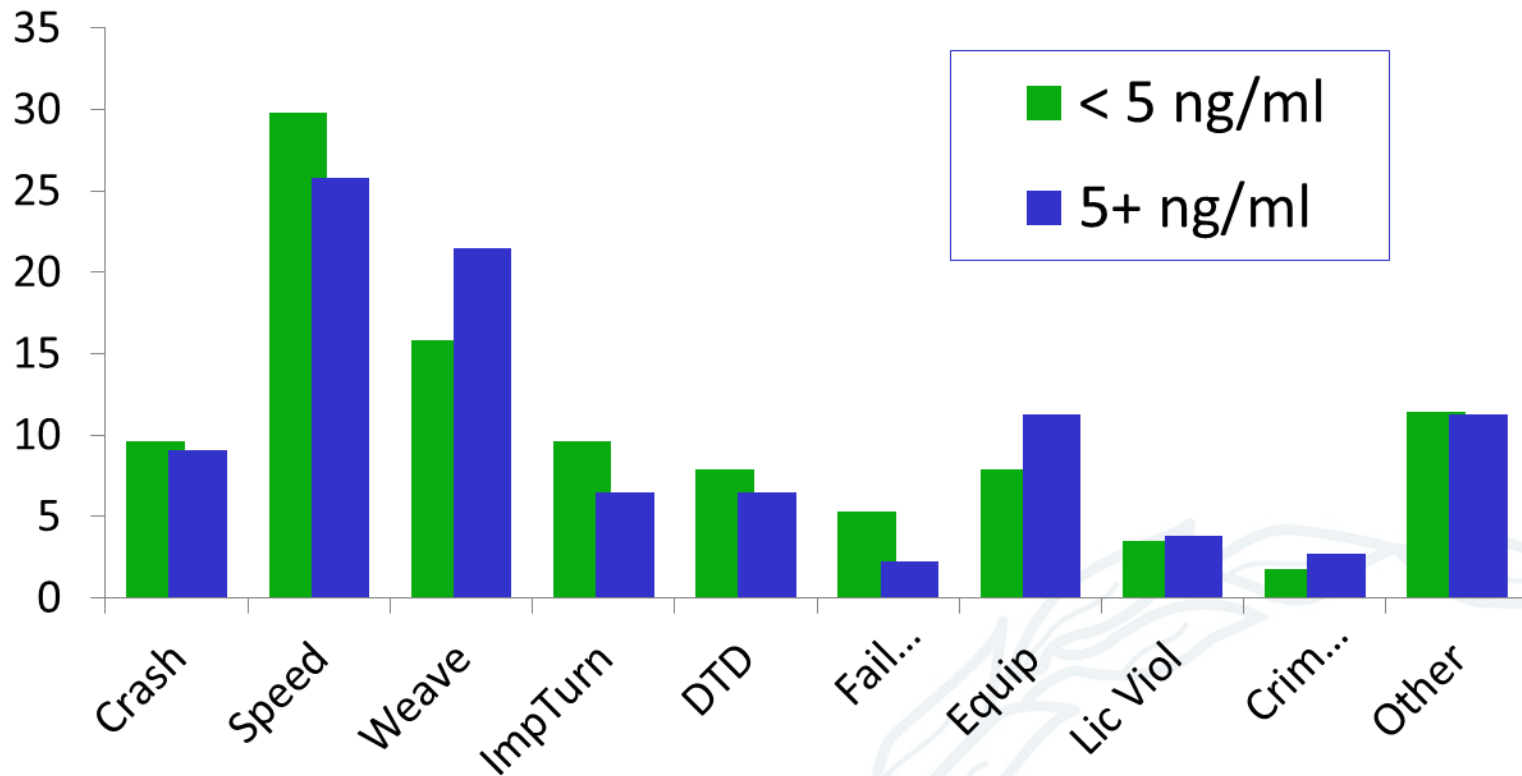


72% of cases involved one or more moving violations. DTD – Disobeyed Traffic Device



Reason for Traffic Stop

Percent



Cognitive Functions and Driving

Key cognitive driving processes:

- ✓ Speed of information processing
- ✓ Divided and sustained attention
- ✓ Reaction time
- ✓ Problem solving
- ✓ Working memory
- ✓ Psychomotor functioning





302 DRE Cannabis Case Study

Common roadside indicators/observations:

- ✓ Odor of marijuana
- ✓ Red bloodshot eyes
- ✓ Dilated pupils
- ✓ Difficulty with SFSTs
- ✓ Body tremors
- ✓ Carefree attitude
- ✓ Divided attention issues
- ✓ Eyelid tremors



302 DRE Cannabis Case Study

Other common indicators/observations:

- ✓ Slow, lethargic actions
- ✓ Problems with concentration
- ✓ Difficulty following instructions
- ✓ Greenish coating on tongue
- ✓ Raised taste buds on tongue
- ✓ Dry mouth
- ✓ Counting errors





The 5 ng/mL THC Debate



How did we get 5 ng/mL of THC?

Research suggests that setting a cutoff level at less than 5 ng/mL THC for blood would fail to identify many drivers who smoked cannabis because THC is rapidly cleared from the blood.

Source: DuPont, *Drugged Driving Research*, 13



“Seattle Green Light Toker”



- 26 year-old Seattle driver stopped at green traffic light
- Officer behind suspect and activated siren
- Suspect proceeded through light and struck curb
- Odor of MJ in car with Bong between legs
- Admitted being “high as a kite”
- Admitted being a daily user of MJ
- Blood THC: 2.5 ng/mL (2.5 hours after arrest)

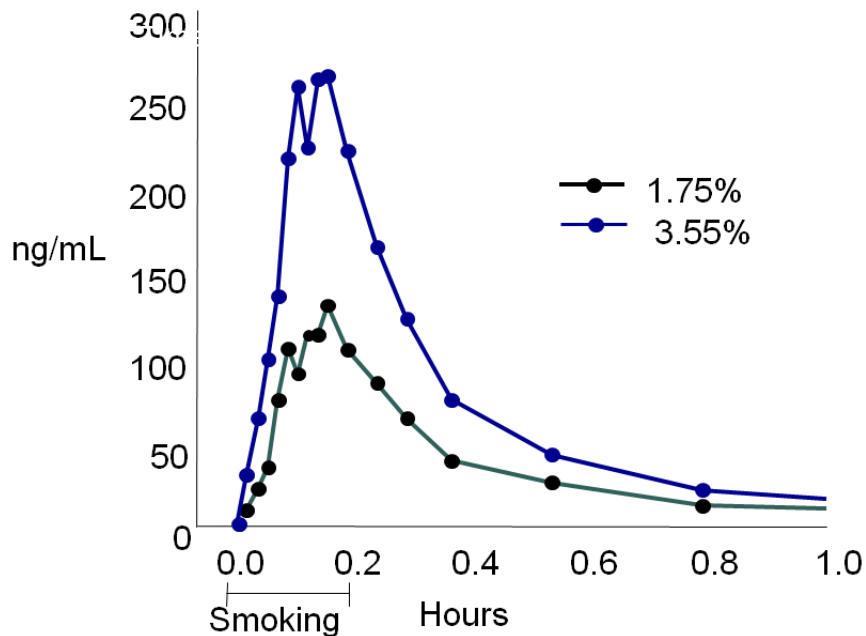


“Wrong-Way Driver Head-On Crash”

- 18 year old female driver and had just purchased \$54K vehicle and four different strains of MJ
- Smoking a blunt in vehicle with 14 year-old cousin
- Driving in wrong lane on uphill grade and collided with motorcycle head-on
- Carefree and admitted being an everyday user
- SFST's: 3 clues on W&T, 2 clues on OLS
- Blood THC: 4.0 ng/mL (1.5 hours after arrest)



THC Dissipation



THC concentrations fall:

To about 60% of their peak within 15 minutes after the end of smoking.

To about 20% of their peak 30 minutes after the end of smoking.

Source: Dr. Marilyn Huestis, Borkenstein Drug Course, 2012



Cannabis and the SFSTs

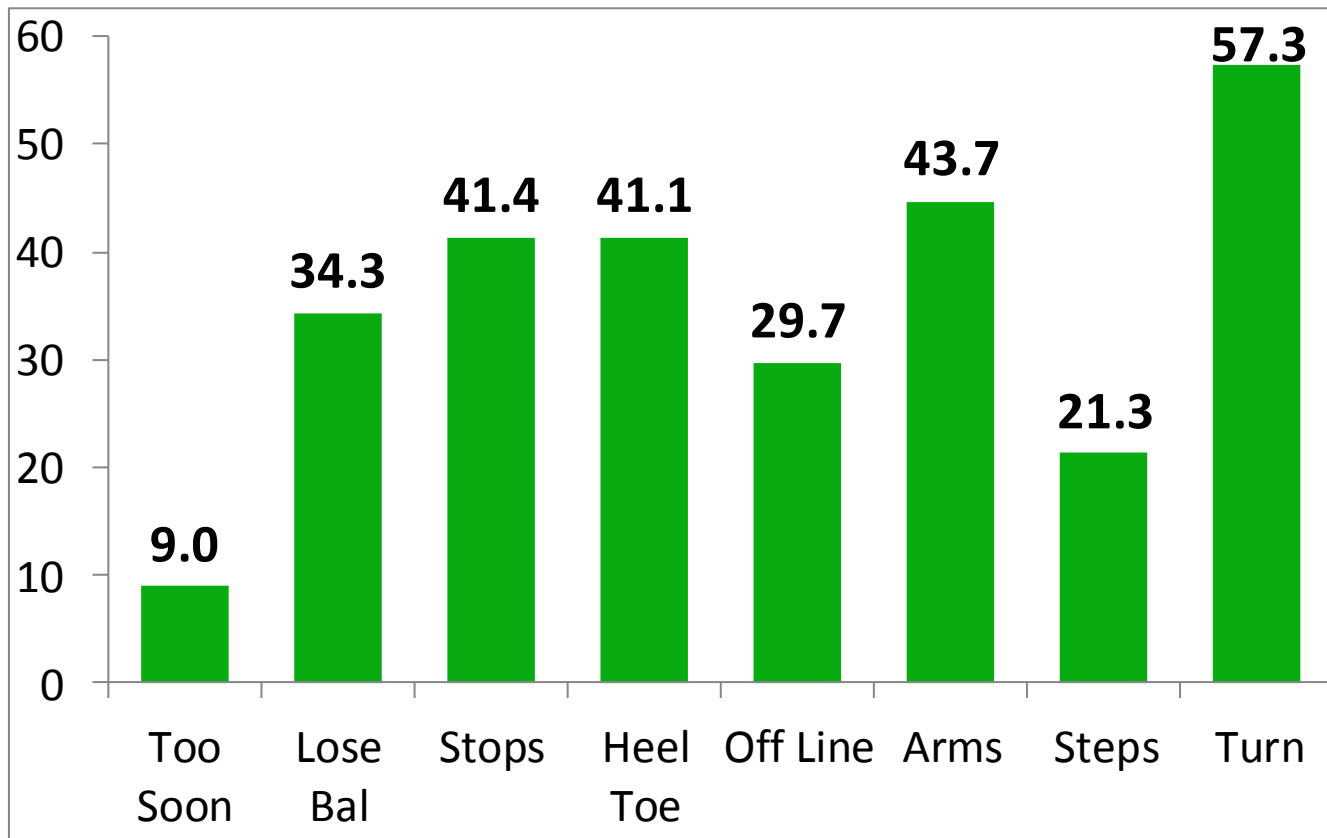


- Some cannabis impaired drivers may not demonstrate severe SFST impairment
- When SFST impairment is observed, the person is noticeably impaired
- Reinforces the importance of the observations at time of the traffic stop and arrest



Walk and Turn Test Clues

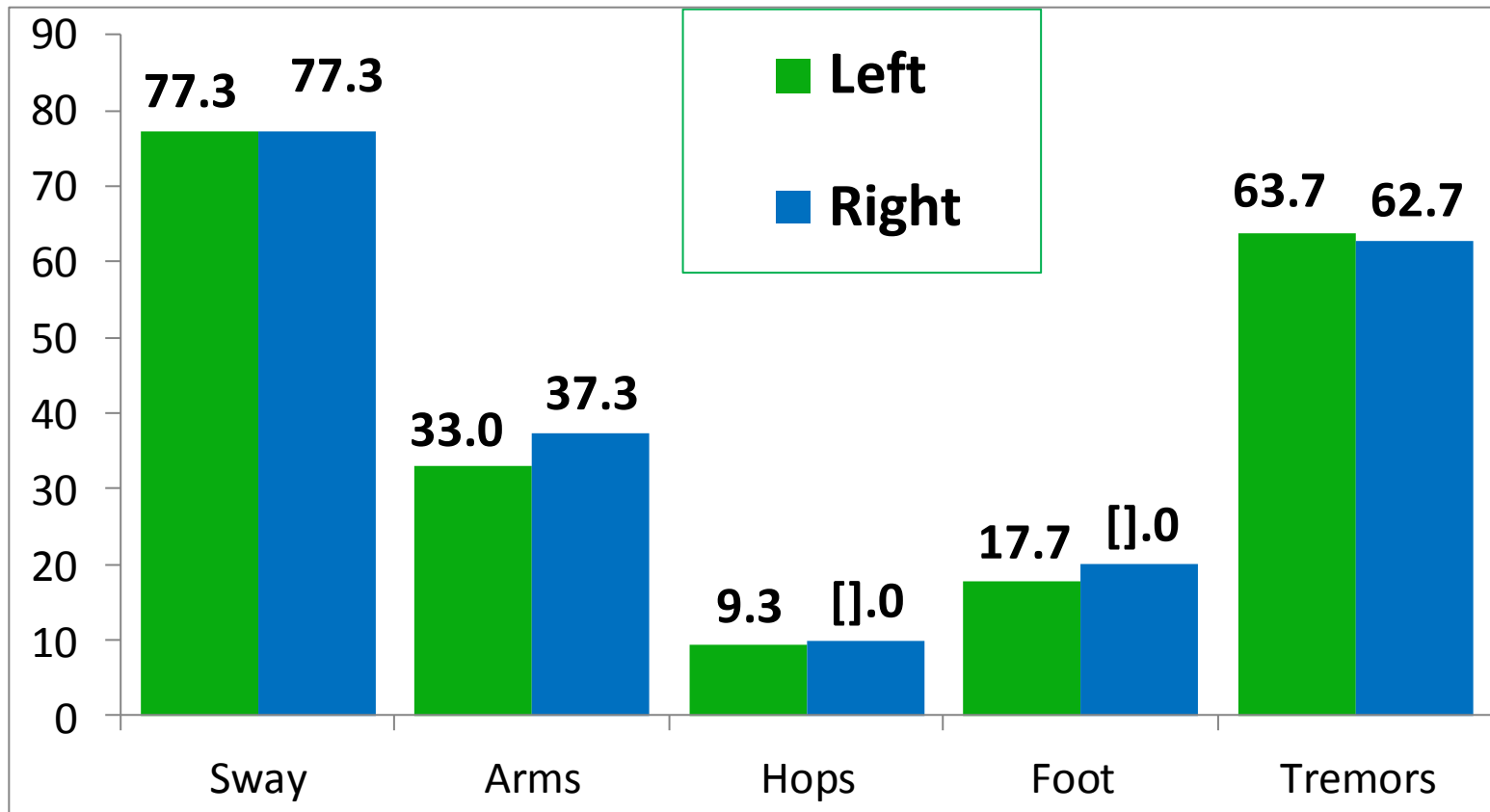
Percent





One Leg Stand Test Clues

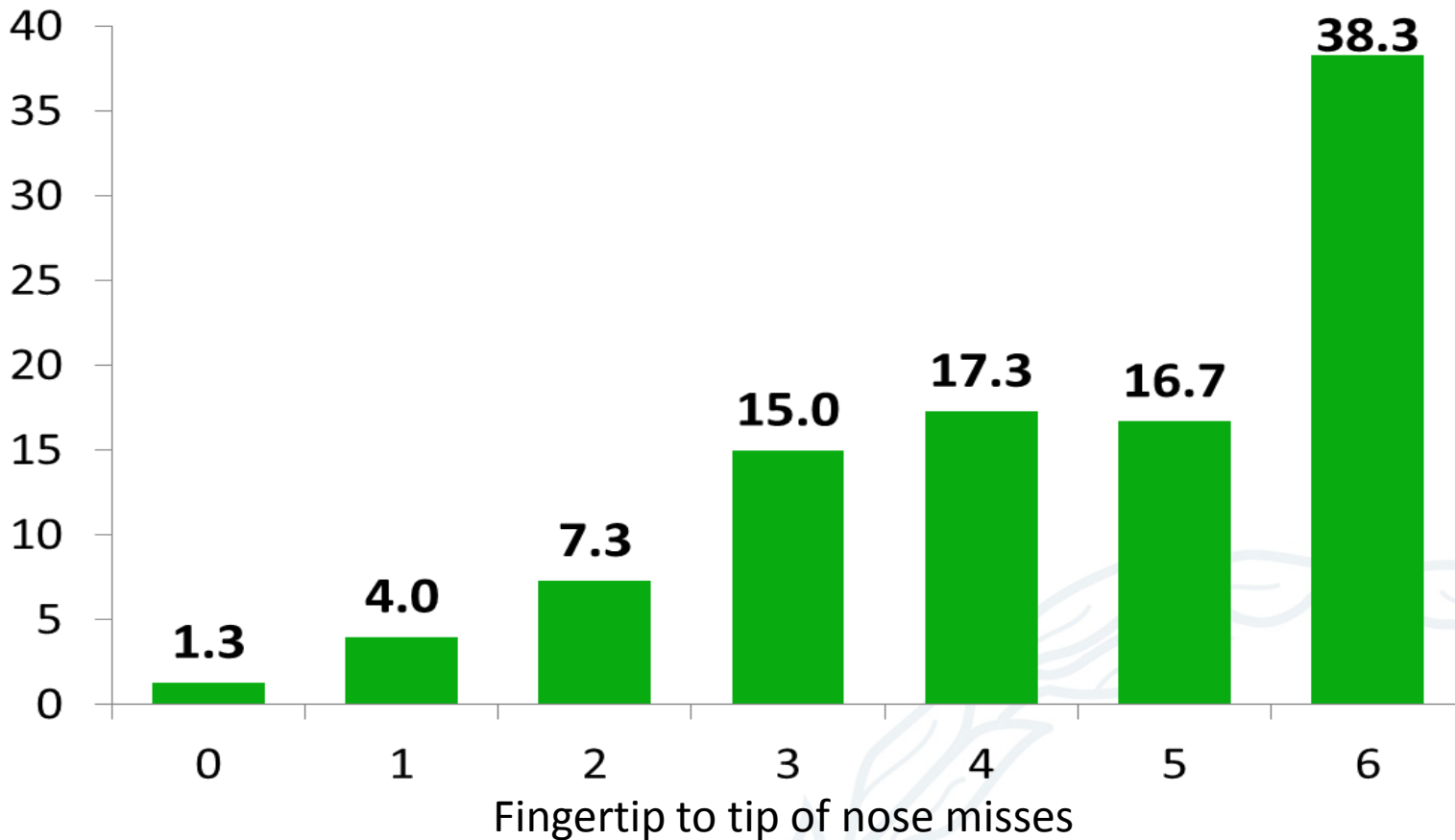
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Finger to Nose Test

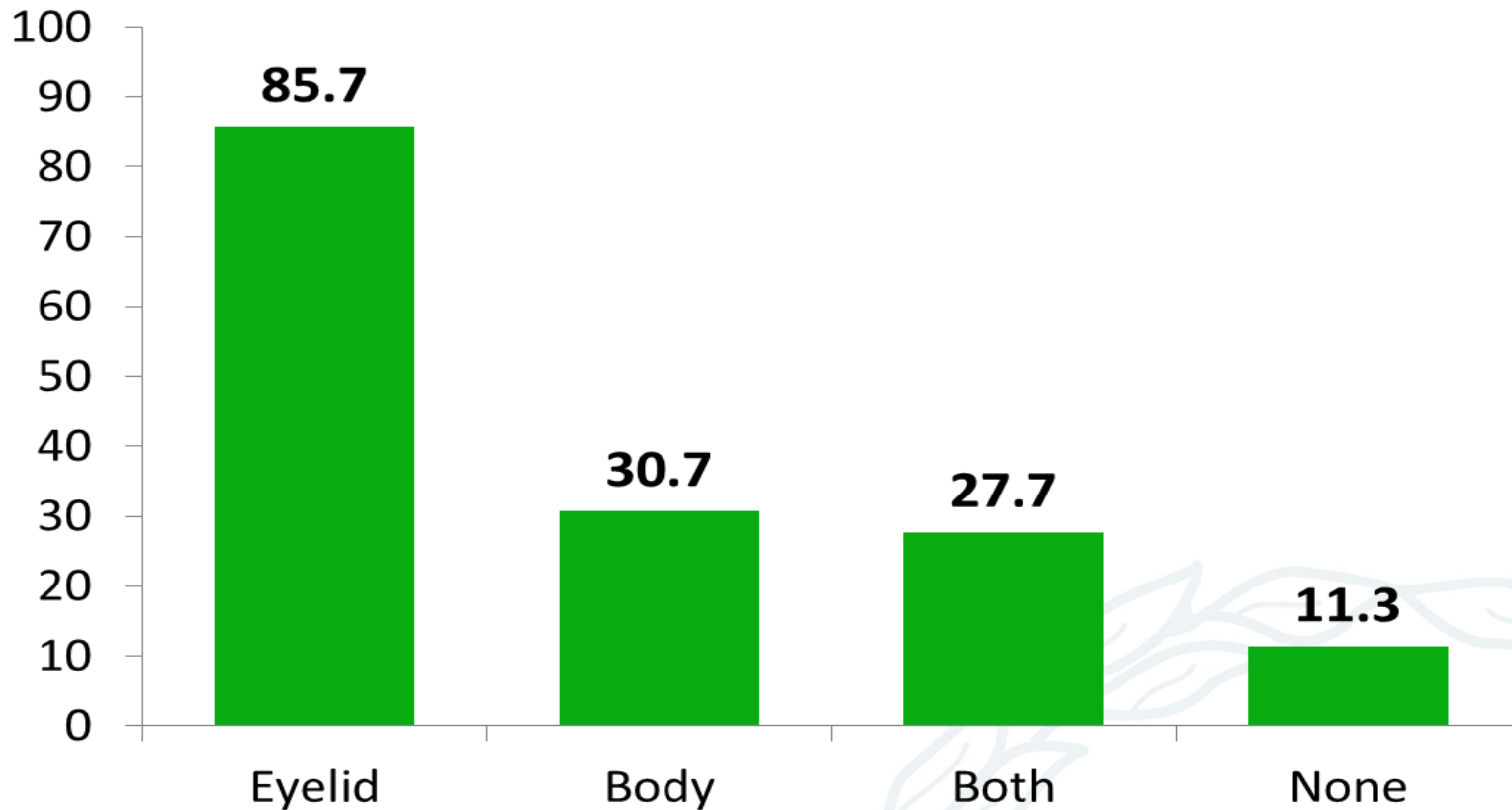
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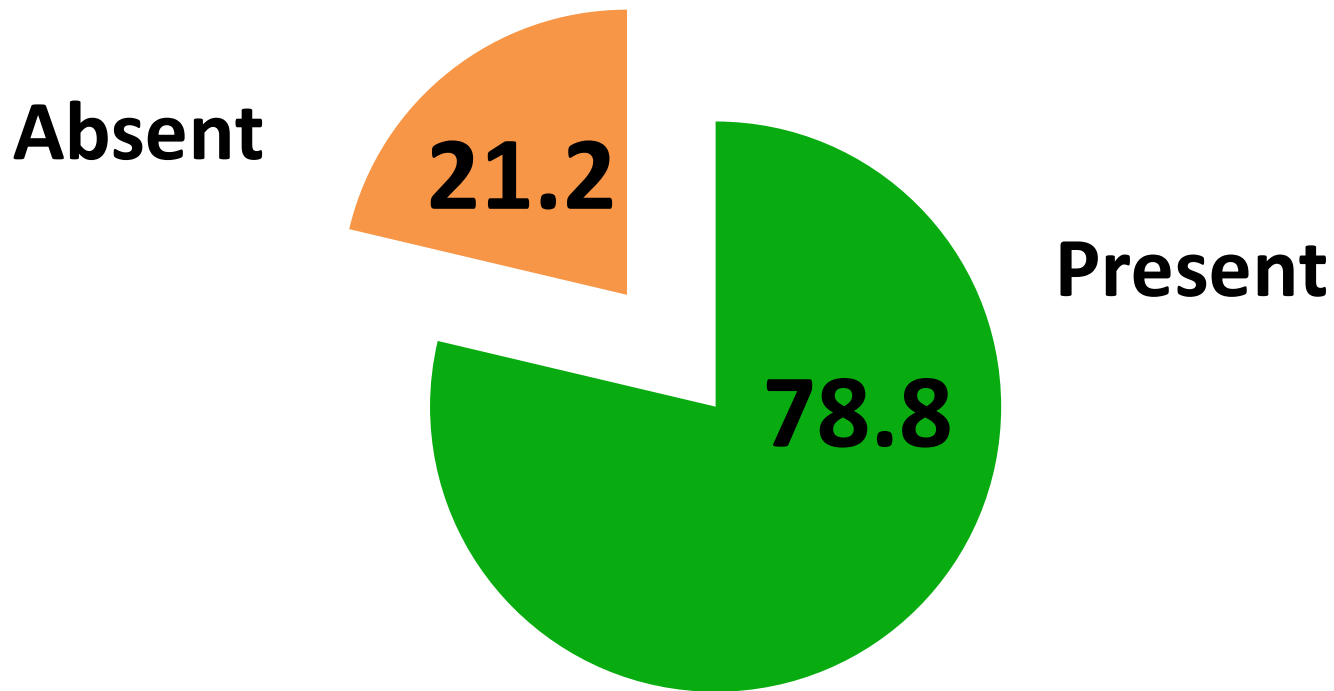


Tremors

Percent



Lack of Convergence





302 DRE Cannabis Case Study

Pupil Size –

- Room Light average: 5.5 mm (DRE average 2.5 – 5.0)
- NTD average: 8.0 mm (DRE average 5.0 – 8.0 mm)
- Direct Light average: 5.1 mm (DRE average 2.0 – 4.5)

Rebound Dilation –

- Observed in 213 of 300 suspects (71%)





302 DRE Cannabis Case Study

B/P, Pulse Rate and Temperature –

- ✓ Blood pressure average: 135 / 80
(DRE average range: 120 – 140 / 70 – 90)
- ✓ Pulse rate average: 91, 93, 90 Bpm
(DRE average range: 60 – 90 Bpm)
- ✓ Body temperature average: 97.2 degrees
(DRE average: 98.6 + / - 1 degree)



The Traffic Stop



- **Driving Behavior:** speeding, weaving, driving w/o headlights, crash, improper turn, disobeyed traffic device
- **Physical Signs:** red bloodshot eyes, dry mouth, dilated pupils, confused, slow- lethargic, carefree or paranoia
- **Physical Evidence:** odor of marijuana, possession of marijuana, drug paraphernalia, munchies material



Standard DUI Investigation

- Vehicle in motion (Phase 1)
- Stop
- Observations at window (Phase 2)
- SFSTs (Phase 3)
- Arrest decision
- Breath test (Under .08% plus impairment)
- DRE involvement
- Toxicology sample (Blood / Urine collection)



Cognitive Roadside FSTs

Other tests to consider -

- ✓ Finger to Nose (R-L-R-L-L-R)
- ✓ Modified Romberg Balance (Body sway, time estimation, eyelid/leg tremors)
- ✓ Alphabet (Different starting/stopping point)
- ✓ Counting tests (Finger counting test or use different starting/stopping point)





Our Challenges

Marijuana impairs driving ability –
but how much?



Marijuana impairment is not as obvious as alcohol impairment, but it does impair driving ability.

How can we identify marijuana impairment.



“Booze”



“Bud”

Misconception in the way some relate alcohol impairment with marijuana impairment....

- Can NOT equate 0.08 alcohol to equal 0.08 THC
- Marijuana effects the body and brain in different ways than alcohol
- MJ creates additional cognitive impairment



“Drug Recognition Expert (DRE) Examination Characteristics of Cannabis Impairment”

Hartman, Richman, Hayes, and Huestis





Questions - Comments?



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