Marijuana and Driving
DRE Cannabis Impairment Correlation Study

Chuck Hayes
International Association of Chiefs of Police
Serving the Leaders of Today, Developing the Leaders of Tomorrow

IACP Drug Evaluation and Classification (DEC) Program

- International program oversight
- DRE credentialing agency
- Set standards for DRE training, certification, recertification, and decertification
- Coordinate of DRE Technical Advisory Panel (TAP)
- Coordinate IACP Annual Training Conference on Drugs, Alcohol, and Impaired Driving

Marijuana and Driving

- Old drug with many challenges (old and new)
- Understanding / recognizing impairment is critical
- Expanded roadside detection training needed
- Legalization equates to more impaired drivers
Some Recent Turning Points

- 2013-2014 NHTSA National Roadside Survey
- Virginia Beach Crash Study (NHTSA)
- Expanded approval of marijuana for “medical” uses
- Legalization of marijuana (AK, CO, DC, OR, WA)
- More states to follow

Colorado and Washington – 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: THC Potency

From “Ditch Weed” to “Super Weed”

- 1970’s - THC potency was approximately 3 - 4%
- 2012 – Approximately 13% THC
- Today – Averaging about 20% (Reported high of 37.2%, California 2008)

Source: Drug Identification Bible 2014/2015
**Cannabis Impairment Effects**

- Eyelid tremors
- Lowered temperature
- Slow, deliberate speech
- Dilated pupils, bloodshot, watery eyes
- Rebound dilation
- Increased B/P (New users)
- May be lowered for experienced users
- Increased pulse rate
- Body/leg tremors
- Dilated pupils
- Bloodshot, watery eyes
- Rebound dilation
- Lowered temperature
- Slow, deliberate speech
- Odor of marijuana

**Other indicators:**
- Relaxed inhibitions
- Sharpened sense of humor
- Difficulty with concentration
- Disorientation
- Short-term memory problems
- Lethargic actions
- Altered time and space perception

**THC Short-Term Memory Effects**

- Short-term maintenance of information needed for complex tasks (Driving, SFSTs, etc.)
- Also referred to as “working memory”
- 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 marijuana with friends prior to driving.

Around 4 hours later incident. No HGN.

Results of a 0.2 ng/mL THC four hours after arrest.

THC and Driving Impairment

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


Marijuana Impairment Research

Typically three types of studies to assess risk:
- Cognitive (examines cognitive process effects)
- Experimental (driving and simulator studies)
- Epidemiological (risk studies – case control)

DRE involved case study needed
**300 DRE Cannabis Case Study**
- Cannabis only DRE evaluations analyzed
- Delta-9-THC blood toxicology cases only (9 states)
- No other drugs or alcohol involved or reported
- Identified driving actions and impairment indicators
- Examined above and below 5 ng/mL THC cases

**Study Objectives**
- Determine if cannabis impairs psychomotor and cognitive performance using actual DRE investigations
- Determine if there is a relationship between performance impairment and cannabis blood levels
- Corroborate the major and general cannabis impairment indicators used in ARIDE and DRE training
- Identify other cannabis impairment indicators
- Publish the findings

**300 DRE Cannabis Case Study**
- Delta-9-THC blood ranges: 1.0 to 47.0 ng/mL
- Mean THC level: 8.1 ng/mL
- 114 cases below 5 ng/mL THC (38%)
- 186 cases at 5 ng/mL THC and above (62%)
- Average age of case subjects: 23.9 years
- White males largest group (58%)
**Reason for the Traffic Stop**

<table>
<thead>
<tr>
<th>Reason</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Crash</td>
<td>9.3</td>
</tr>
<tr>
<td>Speed</td>
<td>27.3</td>
</tr>
<tr>
<td>Drowsiness</td>
<td>19.3</td>
</tr>
<tr>
<td>Drowsiness</td>
<td>7.7</td>
</tr>
<tr>
<td>Dilated pupils</td>
<td>7.0</td>
</tr>
<tr>
<td>Drug influence</td>
<td>3.3</td>
</tr>
<tr>
<td>Drug influence</td>
<td>10.0</td>
</tr>
<tr>
<td>Drug influence</td>
<td>3.7</td>
</tr>
<tr>
<td>Drug influence</td>
<td>2.3</td>
</tr>
<tr>
<td>Carefree attitude</td>
<td>11.3</td>
</tr>
</tbody>
</table>

**Roadside and Evaluation Observations**

**Most frequent observations:**
- Odor of marijuana (on person / in vehicle)
- Red, bloodshot, watery eyes
- Dilated pupils
- Difficulty performing SFSTs
- Eyelid tremors
- Body tremors
- Carefree attitude

**Impairment Observations**

**Other common indicators/observations:**
- Slow, lethargic movements
- Difficulty with concentration
- Difficulty following instructions
- Greenish coating on tongue
- Raised taste buds on tongue
- Dry mouth
**DRE Evaluation Criteria Used**

- Modified Romberg Balance Test
- Walk and Turn
- One Leg Stand
- Finger to Nose Test
- Vital Signs (Pulse rate, B/P, Body temperature)
- Pupil size (Room light, Near total darkness, Direct light)
- Other eye indicators

**Psychophysical Testing**

- Testing both mind and body functioning
- Tests Divided Attention (Concentrating on two or more tasks at the same time)

**Walk and Turn Test Clues**

- Too Soon: 9.0
- Lost Balance: 34.3
- Stops: 41.3
- Heel to Toe: 41.3
- Off Line: 29.7
- Arms: 44.7
- Steps: 21.3
- Turn: 57.3
**Finger to Nose Clues**

Number of fingertip to tip of nose misses

<table>
<thead>
<tr>
<th>Number of Misses</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>1.3%</td>
</tr>
<tr>
<td>1</td>
<td>4.0%</td>
</tr>
<tr>
<td>2</td>
<td>7.3%</td>
</tr>
<tr>
<td>3</td>
<td>15.0%</td>
</tr>
<tr>
<td>4</td>
<td>17.3%</td>
</tr>
<tr>
<td>5</td>
<td>16.7%</td>
</tr>
<tr>
<td>6</td>
<td>38.3%</td>
</tr>
</tbody>
</table>

**Eye Indicators**

“Windows to the Soul”

**Tremors**

Percent

<table>
<thead>
<tr>
<th>Condition</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eyelid</td>
<td>85.7%</td>
</tr>
<tr>
<td>Body</td>
<td>30.7%</td>
</tr>
<tr>
<td>Both</td>
<td>27.7%</td>
</tr>
<tr>
<td>None</td>
<td>11.3%</td>
</tr>
</tbody>
</table>
Eyelid Tremors

Eye Indicators

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%)
Vital Signs

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

Distribution of Mean Pulse

“Booze” vs “Bud” Impairment

In many ways, not the same......
- Can NOT equate 0.08 alcohol to equal 0.08 THC
- Marijuana effects the body and brain in different ways than alcohol.... even more differently when combined with alcohol or other drugs
Cannabis and the SFSTs

- Some subjects under the influence of cannabis may not demonstrate severe SFST impairment
- Reinforces the importance of observations at time of the traffic stop and arrest
- Reinforces the importance of utilizing a DRE

Roadside Testing

In addition to SFSTs other tests to consider -
- Finger to Nose
- Modified Romberg Balance (Body sway, time estimation, eyelid/body tremors)
- Alphabet (Different starting/stopping points)
- Counting (Finger counting test, or using different starting/stopping points)
Evidence Gathering

- Driving behaviors observed (Phase 1)
- Physical signs / Admissions (Phase 2)
- SFSTs / Divided Attention indicators (Phase 3)
- DRE involvement
- Toxicology collection (Get that sample!)

Our Challenges

- Recognizing MJ impairment at roadside
- Associating Cannabis impairment with driving risk
- Improved roadside detection methods
- Prosecutor and toxicology support
- Educating law makers and public on the dangers of MJ and driving
- Collecting and reporting MJ DUI data

Questions - Comments?

Contact Information:

Chuck Hayes
International Association of Chiefs of Police
DEC Program Regional Operations Coordinator
503-585-0055
hayes@theiacp.org