The Challenge of Cannabis-Impaired Driving

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Cannabis Constituents

- **Cannabinoids** (> 100 cannabinoids)
  - Δ-9 THC: psychoactive (impairing)
  - CBD: non-intoxicating cannabinoid
  - “Minor” cannabinoids

- **Terpenoids**: aroma, modulate how cannabinoids interact with receptors

- **Flavonoids**: color of plant, anti-oxidants, anti-inflammatory?
Cannabis (THC) and driving

- **Cognition**: Reduced learning, attention, processing speed, psychomotor abilities

- **Controlled on-road/simulator studies**
  - Delayed reactions (brake latency)
  - Poor lane tracking (standard deviation of lateral position)
  - Reduced judgment of speed and distances
  - Dose dependent

- **Epidemiology**
  - Modest increased crash risk (~ two-fold)
  - State experience unclear
    - No increase in fatal crashes
    - 6% increase in insurance/police reported crashes

- Amplified by consumption of **alcohol**

- Cannabis users judge selves to be more impaired; more cautious (allow more headway; drive more slowly; avoid passing other cars)
How to Identify Cannabis-Impaired Drivers

- **Observation of driving behavior**
  - Driving slow, speeding, inattentive (driving through intersections)

- **Standardized Field Sobriety Test (SFST)**
  - One-leg stand, Walk and Turn, Horizontal Gaze Nystagmus, Lack of Convergence, Finger-to-Nose

- **Drug Recognition Expert (DRE) Evaluations**
  - SFSTs, plus additional tests, vital signs, etc. (a “mini” neurologic exam)

- **Biological assays for THC**
  - Whole blood (delays in acquiring samples)

- **Other roadside approaches in development**
  - Oral fluid
  - Breathalyzers
  - Tablet-based assessments of cognition
  - Eye movement instruments
Poor correlation of being “high” and blood concentrations of THC

Counter-clockwise Hysteresis (M. Huestis)
Assessing Cannabis-related Driving Impairment
California Assembly Bill 266
(Bonta/Cooley/Jones-Sawyer/Lackey)

Aims: 1) effect of THC dose (plant composition)
2) time course of impairment
3) utility of oral fluid and breath
4) ability of iPad-based tests to augment SFSTs

- **Smoke (191 healthy participants)**
  - 0% THC (n = 62)
  - 5.9% THC (n = 66)
  - 13.4% THC (n = 63)

- **Assess throughout the day**
  - Driving Simulations
  - Standardized Field Sobriety Test/DRE assessment
  - Blood, Saliva, Breath (THC, other cannabinoids/metabolites)
  - Tablet-based (iPad) cognitive/motor performance
Smoking and Driving Protocols

**Smoking**

“*Smoke the joint/cigarette the way you do at home to get high*”

- Must take at least 4 puffs
- May take up to 10 minutes

**Driving Simulations**

- 25-minutes
- Divided attention/lane tracking
- Car following
- Yellow light dilemma
- Left-hand turns across traffic
- Freeway merging and exiting
- Crash avoidance
Global Drive Score
Change from Pre- to 30 minute Post-smoking

\[ p = .0003 \]
Global Drive Score
Change from Baseline

Placebo
5.9%
13.4%

Better than Baseline
Worse than Baseline

30m 1h 30m 3h 30m 4h 30m

*** *** +
Self-perception vs. Performance

Perceived impairment

Reduced performance

Time
Future Directions

- **Determinations of impairment**
  - Components of the DRE/SFSTs
  - Biological measures (oral fluid, breath)
    - Likely to inform regarding time since use, not impairment
  - Cognitive measures (e.g., tablet-based)
- **Administration methods**
  - Polysubstance use (alcohol, interactions with prescription and OTC medications)
  - Vaping, edibles, dabbing, drinks
- **Populations of interest**
  - Infrequent/naïve users
  - Vulnerable populations (older adults, comorbid conditions)

*(Also, see CHP California Impaired Driving Task Force report pending)*
New Studies (CHP-funded)

- **Impact of alcohol and cannabis on driving**
  - Driving simulator
  - BrAC 0, .05, .08
  - Full independent DRE evaluations

- **Cannabis effects during “on-road” driving**
  - Collaboration with DMV (lead agency)
  - CHP test track in Sacramento
  - Officers follow participants/rate impairment
  - Smoked and edibles
Research Team

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