Lessons Learned from Experimental Driving Research on Cannabis

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Introductions

• Dr. Timothy Brown, Ph.D.
  – Human Factors modeling

• Dr. Andrew Spurgin, Pharm.D.
  – Pharmacokinetic/Pharmacodynamic modeling

• Dr. Gary Gaffney, M.D.
  – Child Psychiatry

• Dr. Gary Milavetz, Pharm.D.
  – Pharmacokinetic/Pharmacodynamic modeling

• D.J. Murry, Pharm.D.
  – Pharmacokinetic Analysis
General Approach

SIMULATOR STUDIES TO STUDY DRIVER IMPAIRMENT
Different Simulators For Different Problems

• Add Simulator Videos
Strengths

• Safe
• Customizable
• Repeatable
• Accepted
Limitations

• Not real life
• Data doesn’t directly address crash causation
• Biological specimens not gathered in real time
Our Approach

• A standardized, validated, impairment scenario
• At peak drug effect
• Biological specimens
• Drugs studied:
  – Diphenhydramine (Benadryl)
  – Caffeine
  – Alcohol
  – Mixed amphetamine salts (Adderall)
  – Alprazolam (Xanax)
  – Cannabis
Lesson 1

I’LL GET AS STONED AS I WANT TO...
Dose-Titration

- Inhalation
  - Still most popular route of administration
- Vaporization
  - More controlled
  - Less harmful
- *Ad librium* dosing
  - Naturalistic
- Huge variability in biologic THC concentrations

- Do users really know how “high” they want to get and manage their intake to achieve it?
Lesson 2

DRINKING INFLUENCES CANNABIS TITRATION
Controlled Cannabis Vaporizer Administration: Blood and Plasma Cannabinoids with and without Alcohol

• Significantly higher $C_{MAX}$ when co-administered with alcohol (BrAC~0.05 at end of drive)
• Metabolic?
• Behavioral?

• Does consuming alcohol keep users from managing their level of “high”?
Lesson 3

DRIVING UNDER THE ACUTE INFLUENCE OF CANNABIS IS DIFFERENT
Timing is everything

• Changes in driving performance
  – Between 25 min and 80 min
  – Lateral control
  – Longitudinal control
• No gross changes in driving performance
  – Between 120 min and 170 min

• What is the cut off for general changes in driving performance?

• Just because we don’t see changes does that mean there is no safety effect?
Lesson 4

NOT ALL DRIVERS RESPOND THE SAME
Between Subject Variability

• Why are the effects different?
  – Is it biological?
  – Is it experiential?
Lesson 5

IF I TAKE MY TIME YOU WON’T KNOW I’M STONED
Longitudinal Control

• Insert data once published
Lesson 6

I DRIVE BETTER WHEN I’M STONED AND CAN PROVE IT
Participant Mentality

- Participants wanted to prove they could safety drive impaired
- Attempts to “game the system”

- Why do they think they drive better?
- Are there some people who actually drive better?
Making Allowances

- Slowing down when feeling impaired provides more time to respond.

- More focus is good... hey did you see that coming from your periphery?

- What about the effect on other traffic?

- Is the compensation enough?
Lesson 7

ACUTE EFFECTS MAY NOT LAST AS LONG AS YOU THINK