

TOXICOLOGY AND THC  
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IMPAIRED DRIVING TASK FORCE

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Bureau of Forensic Services.

All Information provided is for educational purposes only.



# Purpose of presentation

- Provide a simplified overview of THC metabolism
- Collection of blood
  - How do these Impact per se'

# Pharmacokinetics

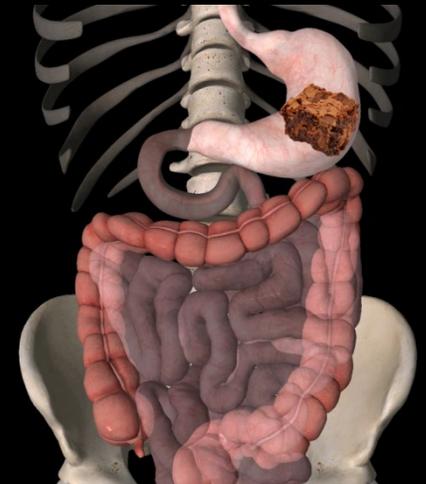
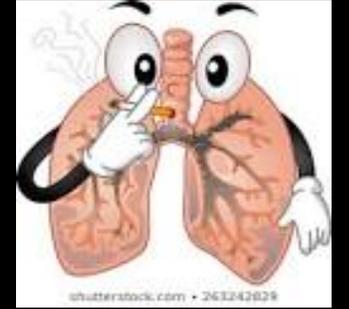
What the body does to the drug. Is the process by which a *drug* is *moved* through the human body.

- Absorption
- Distribution
- Metabolization
- Elimination

# Absorption

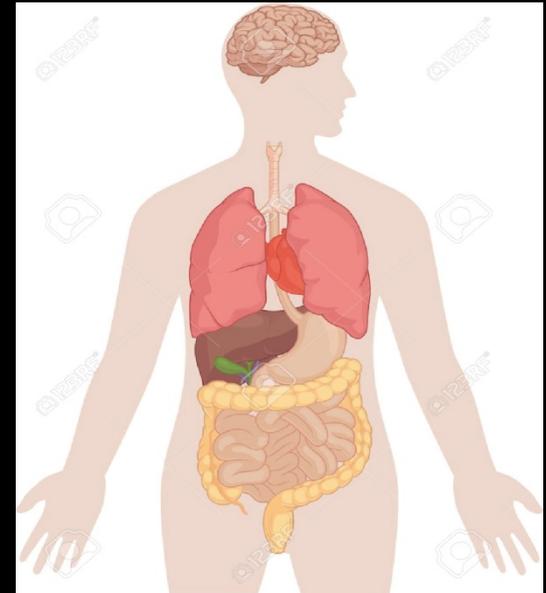
- **Routes of Administration**

- **Inhaled – Quick absorption and rapid delivery to brain**
- **Oral – Slow absorption (30-120 min)**
- **Oral mucosal/sublingual – Fast (30 min)**
- **Rectal – Fast (15 min)**



# Distribution

- **Distribution of THC into tissues – decrease of THC in blood**
- **THC is highly lipophilic (likes fatty tissue) – such as heart, lungs, brain, liver and adipose tissues**



# Metabolism

- delta-9-THC is broken down by liver into....



- 11-OH-THC (active metabolite)



- COOH-THC (inactive metabolite)

- Other compounds
  - Cannabinol (CBN)
  - Cannabidiol (CBD)
  - Cannabigerol (GBG)

# Elimination

- **THC is stored in fat cells**
  - **Slowly eliminates back into blood**
    - **Mechanism for baseline levels of THC in chronic users**
  
- **Eventually eliminated in urine and feces**
  - **COOH-THC most common metabolite in urine**

# EFFECT OF COLLECTION TIME ON BLOOD THC CONCENTRATIONS

- **Hartman et al 2016 *Clinical Chemistry***
- **delta-9-THC decreases by 73 % in first 30 minutes**
- **delta-9-THC decreases by 90% 1.4 h post dose**
- **The average blood collection is 1.5-4 hours after stop/crash.**
- **Recommend to get blood before starting DRE**

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# Effect of Blood Collection Time on Measured $\Delta^9$ -Tetrahydrocannabinol Concentrations: Implications for Driving Interpretation and Drug Policy

Rebecca L. Hartman,<sup>1</sup> Timothy L. Brown,<sup>2</sup> Gary Milavetz,<sup>3</sup> Andrew Spurgin,<sup>3</sup> David A. Gorelick,<sup>1,4</sup> Gary R. Gaffney,<sup>5</sup> and Marilyn A. Huestis<sup>1\*</sup>

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**BACKGROUND:** In driving-under-the-influence cases, blood typically is collected approximately 1.5–4 h after an incident, with unknown last intake time. This complicates blood  $\Delta^9$ -tetrahydrocannabinol (THC) interpretation, owing to rapidly decreasing concentrations immediately after inhalation. We evaluated how decreases in blood THC concentration before collection may affect interpretation of toxicological results.

**CONCLUSIONS:** Forensic blood THC concentrations may be lower than common per se cutoffs despite greatly exceeding them while driving. Concentrations during driving cannot be back-extrapolated because of unknown time after intake and interindividual variability in rates of decrease.

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# WHAT'S THE MEAN/MEDIAN THC LEVEL IN CURRENT CALIFORNIA APPREHENDED DRIVERS ?

- Data delta-9-THC levels in cases (data from 7 public labs years 2009-2016).
  - 60% of cases - levels are below 5 ng/mL\*\*
  - DOJ data reveals the average delta-9-THC level is around 5 ng/mL from July 2017 – July 2018. More than 50% of cases are below 5 ng/mL

\*\*Data collected by OCCL through a survey

# REFERENCES

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- ▶ Human Cannabinoid Pharmacokinetics, Dr. Marilyn A. Huestis, Chemistry and Drug Metabolism, Chem Biodivers: 2007 August; 4(8): 1770 – 1804
- ▶ Sharma, P., Murthy, P., & Bharath, M. M. (2012). Chemistry, metabolism, and toxicology of cannabis: clinical implications. *Iranian journal of psychiatry, 7(4), 149-56.*

graphics:

- ▶ <https://depositphotos.com/141395260/stock-illustration-cute-cartoon-stomach-character.html>/[www.shutterstock.com/search/lung+cartoon](http://www.shutterstock.com/search/lung+cartoon)
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