THC
A New Perspective
TOPICS OF DISCUSSION

- Legalization
- THC
- New Use
- Cannabis Products
LEGALIZATION
STATE LEGALIZATION

- Medicinal
  - 22 States

- Recreational
  - 8 States plus District of Columbia

Marijuana Legalization Status

- Medical marijuana broadly legalized
- Marijuana legalized for recreational use
- No broad laws legalizing marijuana

VARIATIONS IN STATE LAWS

Medicinal Laws

- Limited use under certain circumstances (majority of states)
  - Specific medical conditions will vary
- Only use cannabis-infused products
  - Oils or pills
  - West Virginia and Louisiana
- Quantity possessed
- How marijuana can be obtained

FEDERAL LAWS

- Schedule I
- State laws do not protect you from Federal Laws
- Misdemeanor possession: one year in prison, $1000 fine
- Distribution: up to 5 years in prison, up to $250,000 fine
- Rohrabacher-Farr Amendment
  - Passed in 2014
  - Prevents the DOJ from spending funds to interfere with the implementation of state medical cannabis laws.
  - Must be renewed every fiscal year.
FEDERAL LAWS IMPACTING DAILY LIFE

- Employment
- Housing
- Taxes
- Right to Bear Arms
- Banking
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MEDICAL MARIJUANA IN AZ

- How to get a card: STEP 1
  - $150 annual fee ($75 if on food stamps)
  - Qualify
    - 18 years or older
    - Valid AZ driver’s license or ID card
    - AZ residential address
  - Medical Condition
    - Cancer
    - Glaucoma
    - HIV
    - ALS
    - Crohn’s
    - Agitation of Alzheimer’s disease
    - Chronic or debilitating disease/condition that causes
      - Wasting syndrome, chronic pain, severe nausea, seizures, muscle spasms, PTSD
MEDICAL MARIJUANA IN AZ

- How to get a card: STEP 2
  - Meet with medical marijuana doctor
  - They will approve you and submit documentation
  - Card will arrive in 10 business days
MEDICAL MARIJUANA IN AZ

WARNING:

Marijuana use can be addictive and can impair an individual's ability to drive a motor vehicle or operate heavy machinery. Marijuana smoke contains carcinogens and can lead to an increased risk for cancer, tachycardia, hypertension, heart attack, and lung infection. KEEP MARIJUANA OUT OF REACH OF CHILDREN AND ANY UNAUTHORIZED INDIVIDUAL.

Call the Poison Control Hotline at 1-800-222-1222 if you have concerns.

Arizona Department of Health Services | Will Humble, Director
www.azdhs.gov

Caregiver ID Card

Back of ID Cards

OBTAINING MEDICAL MARIJUANA IN AZ

- **Dispensaries**
  - 126 in the state (1 for every 10 pharmacies)

- **Patients**
  - Patients can “donate” to other patients

- **Cultivation**
  - 25 miles away from dispensary
  - 12 plants

- **Possession Amount**
  - 2.5 ounces every two weeks
  - Possess up to 2.5 ounces at any time

*This is what an ounce looks like.*
OTHER MEDICAL MARIJUANA LAWS IN AZ

- Caregiver Law
  - Provide medical marijuana up to 5 patients
  - Cultivate up to 12 plants per patient (25 mile rule)

- Tourists
  - AZ will accept cards from other states
  - Cannot legally purchase marijuana from dispensary

- DUI Law
  - Cannot be prosecuted unless the driver is impaired at the time
CANNABIS PLANTS

- *Cannabis Indica*: physically sedating
- *Cannabis Sativa*: more invigorating effects
- Hybrid
- Marijuana buds are collected from female plants

ANATOMY

- Long skinny stems with large iconic fan-shaped leaves
- Flower
  - Cola: bud sites where female flowers bloom
  - Calyx: female flower
  - Pistil: red-orange hairs that extend out from calyx
  - Trichome: mushroom-shaped glands that secrete cannabinoids and terpenes
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CANNABIS PLANTS – POTENCY

- Most strains average 12-20% THC
- More potent variety 30%
- Some strains are rich in Cannabidiol (CBD)
- 4% CBD is considered high concentration and it acts as antianxiety balancing the anxious effect you might feel from THC

△9-THC

- THCA – tetrahydrocannabinolic acid is THC precursor
- THCA is non-psychoactive
- Found in raw plant material
- THCA converts to THC when it is decarboxylated
PHARMACOLOGY

- Δ9-THC is the main psychoactive compound
- THC activity occurs at CB1 receptors in the brain and CB2 receptors in certain peripheral tissues
- THC has mild to moderate analgesic properties and can be used to treat pain; mechanisms not fully understood
- Other effects may include relaxation, euphoria, altered senses, anxiety, confusion, fatigue, appetite stimulation, and anti-nausea
ABSORPTION

- Inhalation
  - 18-50% drug delivery (cigarette)
  - Reaching peak plasma concentrations within 10 minutes

- Oral
  - 6-18% bioavailability
  - Dose is typically between 10-15 mg
  - Peak plasma concentration between 1-8 hours
  - Effects occur later and are lower in magnitude
METABOLISM

- THC is metabolized predominantly to 11-hydroxy-Δ9-THC, which is further oxidized to 11-nor-Δ9-carboxy-THC
- Over 100 THC metabolites may appear in urine
- 11-OH-THC and THC-COOH are the dominating metabolites (30-50%)
SCREENING TESTS

- Many commercial Cannabinoid tests on the market are enzyme immunoassays (EIA)

- Point of Care and Lab-based tests are optimized to detect THC-COOH

- Commercial screening tests may react to other THC metabolites, not just THC-COOH
CONFIRMATION

- Accurate THC-COOH concentrations are determined by GCMS analysis

- The toxicology industry typically only quantifies THC-COOH for urine samples

- GCMS provides a higher concentration range that can be determined - usually up to 300-500 ng/mL

- GCMS levels are more accurate because calibration is linear
NEW USE
THC DETECTION PERIOD

THC metabolites are fat-soluble, and may be retained in fatty tissue depending upon dosage and recent usage history

- May take time to produce consistent negative urine samples
  - Casual users: 1-5 days
  - Chronic users: 3-6 weeks
THC ELIMINATION

THC Half-Life

- Urinary THC excretion half-life is 1-10 days depending on usage history (mean half-life is 3.0 ± 2.3 days)‡
  - 1 day for infrequent/casual users
  - 10 days for heavy/chronic users

THC Elimination - Usage Comparison

THC Concentration (ng/mL) vs. Days Since Abstention

- Chronic User
- Casual User

EIA Cutoff
GCMS Cutoff
NORMALIZE???

- THC:Creatinine (THC:CRE) ratios are commonly used to normalize sample dilution effects.

- The ratios can be used directly to monitor THC abstention and elimination, or to determine the probability of a new usage event.

- Most effective when interpreting GCMS results.
THC:CREATININE RATIO

Ratio is calculated as:

\[
\text{THC (ng/mL)} \times 100 = \text{THC:Cre (ng/mg)}
\]

Creatinine (mg/dL)
DETERMINING A USAGE EVENT

Medical-Legal Method by Manno, et. al. (1984)‡

If THC:Creatinine ratio between samples increases ≥ 50%, new usage on or between these dates is suspected

False Positive/Interpretation Rate: 0.1%
False Negative/Interpretation Rate: 24%

THC Concentration vs. THC:Creatinine Ratio

Normal Hydration

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<th>THC (GCMS)</th>
<th>Creatinine</th>
<th>THC:Cre</th>
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<td>99</td>
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</table>
THC Concentration vs. THC:Creatinine Ratio

Diluted Example

New Use

Diluted

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THC: A New Perspective
THC Concentration vs. THC:Creatinine Ratio

Dehydrated Example

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<th>15</th>
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</tr>
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<td>THC (GCMS)</td>
<td>150</td>
<td>128</td>
<td>170</td>
<td>75</td>
<td>40</td>
<td>30</td>
</tr>
<tr>
<td>Creatinine</td>
<td>105</td>
<td>130</td>
<td>190</td>
<td>120</td>
<td>120</td>
<td>99</td>
</tr>
<tr>
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<td>98</td>
<td>89</td>
<td>63</td>
<td>33</td>
<td>30</td>
</tr>
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SUMMARY

- Most clients are testing negative by 1-3 weeks
- 99% of clients will test negative by 6 weeks
- THC:CRE ratios should decrease at least 50% every 5-10 days
- An increase in THC:CRE ratio of 50% suggests new usage
CANNABIS PRODUCTS
SYNTHETIC THC

- Dronabinol
- Brand Names: Marinol and Syndros
  - Marinol: capsules, 2.5, 5 or 10 mg
    ➢ Schedule III
  - Syndros: oral solution, 5 mg/mL
    ➢ Schedule II
- Increase appetite, suppress nausea and vomiting
CANNABIS PREPARATIONS

- Loose Cannabis
- Kilobricks
- Buds
- Sinsemilla
- Kief

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https://www.greencultured.co/cannabis-sex-sinsemilla-vs-seeded-plants-harvest/
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http://primomedicals.com/shop/concentrates/kief-1-gram/
CANNABIS CONCENTRATES

- Up to 80% in THC concentration
- Products with high concentrations of CBD
- Any product procured through an extraction process
CANNABIS CONCENTRATES

Hashish/Hash

- Compression of the plants resin
  - Use a series of micron screens to separate trichomes from plant material
  - Can then be compressed
  - Bubble hash uses ice, water and silk-screens to further purify

https://sunrisehouse.com/quit-abusing-marijuana/hashish/
CANNABIS CONCENTRATES

Butane Hash Oil (BHO)
- Use butane to extract cannabinoids
- More potent than Hashish
- Improperly purged BHO may contain butane
CANNABIS CONCENTRATES

CO₂ Oil

- Supercritical fluid extraction
- Pressure and carbon dioxide
- Use expensive botanical extractors

https://i.redd.it/i6r4rgdlv1dx.jpg
CANNABIS CONCENTRATES

Rosin

- Heat and pressure to extract
- Can use flower, kief, or hash

https://herb.co/marijuana/news/rosin

CANNABIS CONCENTRATES

Tinctures

- Alcohol extraction
- Placed under the tongue or added to food/beverages

https://greenz.ca/product/tincture-nu-thccbd-11-ethanol/
EDIBLES

- Concentrates are typically used to make edibles.
  - Absorbed in mouth - hard candies, gummies
  - Absorbed in stomach and passes through liver
    - Baked goods
    - Canna Oil
    - Cannabutter
    - Sauces

- A recommended dose is 10 mg.

- Golden Rule: start low and go slow

http://tkoedibles.com/home/
PRODUCT REGULATIONS

- States are putting regulations in place for marijuana testing
  - Cannabinoids
  - Terpenes
  - Microbial
  - Residual Solvents
  - Metals, Salts, and Minerals
  - Plant gender determination
  - Moisture Content
  - E-Liquid Analysis
  - Pesticides and Growth Regulators
  - DNA Profiling
OVERDOSE???

- Cannabinoid receptors (CB1) are located in the parts of the brain that control cognition and movement
- Overconsumption: sick, anxious, paranoid, hallucinations, mental confusion, panic attacks, rapid heart rate
  - Don’t panic!
  - Know your limits before consuming.
  - Hydrate
  - Consume black pepper which can have a calming effect.
  - Keep calm, rest and nap.
  - Go for a walk.
  - Take a shower or bath.
  - Distract yourself.
  - Try a high CBD strain or product
CASE STUDIES

- Cannabinoid Hyperemesis Syndrome
  - Nausea, vomiting, abdominal pain
- Cannabis Psychosis
  - Severe anxiety, panic attacks, paranoid delusions, depersonalization
- Ventricular Tachycardia
  - 200 beats/min
- Motor Vehicle Accidents
- Depression
  - Suicide
- Accidental Ingestion
  - Children and pets
THANK YOU!