UNDERSTANDING AND TREATING CANNABINOID ADDICTION

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HONEY OIL

• Known as “honey oil,” Butane hash oil (BHO) “hash oil,” “dabs,” “earwax,” “butter” or “shatter,” among other names, homemade marijuana concentrates have caught on quickly because of the popularity and availability of e-cigarettes and vaporizer pens, which offer an easy, discreet way to use the drug.
VAPING AND DABBING

• New Forms of Marijuana:

**Oil:**
Refined version of marijuana resembling honey. It is created using liquids and gases such as water, butane, alcohol and carbon dioxide.
THC: 60-80%

**Shatter:**
Created using the same methods as oil repeated multiple times. The extra filtration and purification process increase the potency.
THC: 75-90%

**Wax:**
Created by a process similar to that of oil. However, the final step of this procedure involves stirring or “whipping” the liquid state to produce the final product.
THC: 60-80%
SHATTER
DABBING

• “Dabbing” is the consumption of highly concentrated THC that’s extracted and then “dabbed” into a smoking device such as a “nail” or a “dome” that is attached to a “rig.”
VAPING AND DABBING

The new forms of marijuana concentrates are inhaled in two primary ways: vaping or dabbing:

One way to get the desired effect from the THC is to vape, or vaporize the drug before breathing it in. The drug is heated by hot air passing over it just prior to breathing it in.

Dabbing requires heating the THC concentrate with an open flame until it turns to smoke. This smoke is collected by the device and is breathed in by the user.

THC oil is the most commonly used form in the vaporizer pens while wax and shatter are typically used as dabbing products.
CANNABINOID EFFECTS

- **APPETITE**, feeding behavior and body weight
- **REWARD AND MOTIVATION**
- **MOOD AND ANXIETY**
- **PAIN**
- **MEMORY**
CANNABINOID EFFECTS

• Act on the endogenous cannabinoid (endocannabinoid) system in the brain and other body tissues by binding to two different types of cannabinoid receptors on cell membranes: $CB1$ and $CB2$

• $CB1$ receptors are located primarily in pre-synaptic neurons of the CNS and are responsible for the acute psychological and cardiovascular effects of cannabis.
CANNABINOID EFFECTS

• CB2 receptors are located largely in the periphery and modulate immune function and inflammatory response

• Endocannabinoids (endogenous ligands at CB receptors) such as anandamide serve as retrograde neuromodulators of synaptic activity. They are released postsynaptically by a variety of stimuli upon demand, travel across the synaptic cleft, and then activate presynaptic CB receptors. A membrane transporter actively takes anandamide into the cell. Anandamide is then broken down by fatty acid amide hydrolase (FAAH)
How does THC affect behavior? It depends on where the CB receptors are in the brain.

<table>
<thead>
<tr>
<th>Brain Structure</th>
<th>Regulates</th>
<th>THC Effect on User</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amygdala</td>
<td>emotions, fear, anxiety</td>
<td>panic/paranoia</td>
</tr>
<tr>
<td>Basal Ganglia</td>
<td>planning/starting a movement</td>
<td>slowed reaction time</td>
</tr>
<tr>
<td>Brain Stem</td>
<td>information between brain and spinal column</td>
<td>antinausea effects</td>
</tr>
<tr>
<td>Cerebellum</td>
<td>motor coordination, balance</td>
<td>impaired coordination</td>
</tr>
<tr>
<td>Hippocampus</td>
<td>learning new information</td>
<td>impaired memory</td>
</tr>
<tr>
<td>Hypothalamus</td>
<td>eating, sexual behavior</td>
<td>increased appetite</td>
</tr>
<tr>
<td>Neocortex</td>
<td>complex thinking, feeling, and movement</td>
<td>altered thinking, judgment, and sensation</td>
</tr>
<tr>
<td>Nucleus Accumbens</td>
<td>motivation and reward</td>
<td>euphoria (feeling good)</td>
</tr>
<tr>
<td>Spinal Cord</td>
<td>transmission of information between body and brain</td>
<td>altered pain sensitivity</td>
</tr>
</tbody>
</table>

The brain structures illustrated above all contain high numbers of CB receptors.
Adults seeking treatment have typically been cannabis smokers for over 10 years with repeated attempts to quit. They report:

- Relationship problems
- Financial difficulties
- Low self-esteem
- Frustration with their level of productivity
- Sleep and memory problems
- Decreased life satisfaction

Stephens RS et al. *Addiction* 2002; 97 (Suppl. 1); 109-124.
CANNABIS

• Teens entering treatment do not readily admit life problems but their use puts them at risk for…
  – *Risky sexual behavior*
  – *Sexually transmitted infections*
  – *Unplanned pregnancies*
  – *Low educational achievement*
  – *School drop out*
  – *Legal difficulties*

CANNABIS

• SHORT-TERM HEALTH EFFECTS
  – Cognitive (Intoxication Syndrome)
    • Euphoria
    • Enhanced perception of novelty
    • Distractedness
    • Decreased processing speed
    • Loss of short-term memory
CANNABIS

• CAR ACCIDENTS
  – Marijuana doubles the risk of car accidents when people try to drive soon after using it
  – In comparison, driving while legally drunk (0.08% BAL) increases the risk by five times
  – Columbia University study found that marijuana contributed to 12% of traffic deaths in 2010
  – Marijuana causes more traffic accidents than any other illicit drug
CANNABIS

• CAR ACCIDENTS
  - The East Coast calls it getting “twisted.” The West Coast calls it getting “crossfaded.”
  - Cannabis plus alcohol is one of the most frequently detected drug combinations in car accidents, yet the interaction of these two compounds is still poorly understood. A study shows for the first time that the simultaneous use of alcohol and cannabis produces significantly higher blood concentrations of cannabis's main psychoactive constituent, THC, as well as THC's primary active metabolite than cannabis use alone.

DOI: 10.1373/clinchem.2015.238287
LONG-TERM HEALTH EFFECTS

- Heavy marijuana use predicts impairments in executive functioning and learning (Gruber SA et al, *Psychol Addict Behav* 2012; 26(3):496-506)

- Persistent users of marijuana particularly those who started in adolescence had significant decreases in IQ. There was a dose-response relationship (Meier MH et al, *Proc Natl Acad Sci USA* 2012; 109(40):E2657-E2664)

- Loss of 8 IQ points with heavy smoking during teen years (http://www.drugabuse.gov/publications/drugfacts/marijuana)
Effects of THC on the Brain

Prefrontal cortex Temporal Lobes

Normal

4x a week for 2 years
CANNABIS

• LONG-TERM HEALTH EFFECTS


  – Risk among youth is significantly higher (Winter KC and Lee CY, *Drug Alcohol Depend* 2008;92 (1-3): 239-247)

  – 1.5-2.0 increase in risk of psychotic disorders (Moore TH et al, *Lancet* 2007; 370 (9584): 319-28)

  – Relationship between use and depression and anxiety disorders remains unclear
CANNABIS

• LONG-TERM HEALTH EFFECTS
  – Exposing adolescent rats to THC (tetrahydrocannabinol) –the primary psychoactive ingredient in marijuana—can lead to molecular and behavioral alterations in the next generation of offspring, even though progeny were not directly exposed to the drug.
  – Male offspring showed stronger motivation to self-administer heroin during their adulthood and molecular changes in the glutamatergic system, which is the most important excitatory pathway for neurotransmission in the brain.
CANNABIS

• LONG-TERM HEALTH EFFECTS
  – Damage in the glutamate pathway, which regulates synaptic plasticity, has been linked to disturbances in goal-directed behavior and habit formation.
  – Future studies are now being explored to determine whether THC effects continue to be transmitted to even the subsequent grandchildren and great-grandchildren generations

CANNABIS USE DISORDER AND SOCIAL ANXIETY DISORDER

- Significant portion of individuals with CUD also have SAD, and showed that comorbid SAD is associated with greater severity of cannabis-related problems. Moreover, almost all individuals with both CUD and SAD had at least one additional clinically significant psychiatric disturbance.
- Over 80 percent of the NESARC respondents with CUD–SAD comorbidity reported that their SAD preceded their CUD, and 15 percent reported CUD onset before SAD onset.
Those who develop CUD as a result of relying on cannabis to manage their anxiety may benefit from skills to help them better manage their anxiety. In contrast, those who develop SAD as a result of CUD-related impairment may benefit first from strategies to help them better manage their social difficulties and other cannabis-related problems.

ASSESSMENT AND DSM-5

• Cannabis Withdrawal
  – Three (or more) of the following signs and symptoms develop within approximately 1 week:
    • Irritability, anger, or aggression.
    • Nervousness or anxiety.
    • Sleep difficulty (e.g., insomnia, disturbing dreams).
    • Decreased appetite or weight loss.
    • Restlessness.
    • Depressed mood.
    • At least one of the following physical symptoms causing significant discomfort: abdominal pain, shakiness/tremors, sweating, fever.
• Cannabis Withdrawal
  – Most symptoms have their onset within the first 24–72 hours of cessation, peak within the first week, and last approximately 1–2 weeks. Sleep difficulties may last more than 30 days. Cannabis withdrawal has been documented among adolescents and adults. Withdrawal tends to be more common and severe among adults, most likely related to the more persistent and greater frequency and quantity of use among adults.
## Incidence and Severity of Perceived Withdrawal Symptoms

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<th>None</th>
<th>Mild</th>
<th>Moderate</th>
<th>Severe</th>
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</thead>
<tbody>
<tr>
<td>Shaky/Tremulous</td>
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<td>1</td>
<td>2</td>
<td>3</td>
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<tr>
<td>Depressed Mood</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
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<tr>
<td>Decreased Appetite</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Nausea</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
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</table>
# Incidence and Severity of Perceived Withdrawal Symptoms

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<th>Symptom</th>
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<tbody>
<tr>
<td>Irritability</td>
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<td></td>
<td></td>
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<tr>
<td>Sleep Difficulty</td>
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<td>3</td>
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<tr>
<td>Sweating</td>
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<tr>
<td>Craving</td>
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<td>3</td>
</tr>
<tr>
<td>Restlessness</td>
<td>0</td>
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<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Nervousness/Anxiety</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Increased Aggression</td>
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## INCIDENCE AND SEVERITY OF PERCEIVED WITHDRAWAL SYMPTOMS

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<tr>
<td>HEADACHES</td>
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<td>STOMACH PAINS</td>
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<tr>
<td>STRANGE DREAMS</td>
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<tr>
<td>INCREASED ANGER</td>
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<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>OTHER</td>
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CANNABIS WITHDRAWAL-PHARMACOTHERAPY

• Symptoms of withdrawal (mood, sleep problems, cravings, etc.) were all improved compared to placebo

• Only 36% of the original 50 patients completed the trial but attrition was equal in both groups

• *Gabapentin* was well tolerated with only one patient dropping out due to an adverse event (headache)
CANNABIS USE DISORDER—NATURAL METHODS

• Drink cranberry juice to help purify and cleanse the body.
• Drink plenty of water and clear liquids.
• Eliminate fat from the diet until digestion is better.
• Exercise not only helps depression and other unpleasant emotions, it helps the body speed up the healing process.
• Greatly reduce or eliminate caffeine until the sleep pattern is more normal or restlessness is gone.
TREATING CANNABIS ADDICTION

• The following three interventions can be utilized singularly or in combination:
  – **MOTIVATIONAL ENHANCEMENT THERAPY (MET)**
  – **COGNITIVE-BEHAVIORAL THERAPY (CBT)**
  – **ABSTINENCE-BASED CONTINGENCY MANAGEMENT (CM)**
In an adult population overall effectiveness of these therapies is difficult to summarize across studies.

- Approximately...
  - 5-10% of patients are abstinent at six month following treatment with MET
  - 15-25% with CBT or MET/CBT
  - 25-45% with CBT/MET/CM
TREATING CANNABIS ADDICTION

- The largest clinical trial for CUD evaluated five manualized, empirically-based outpatient treatments for teens (Dennis M et al, *J Subst Abuse Treat* 2004; 27: 197-213)
  - *MET/CBT5* (two individual and three groups)
  - *MET/CBT12* (two individual and ten groups)
  - *MET/CBT12 plus family support network* (six parent education sessions, four home visits and case management)
  - *Community Reinforcement Approach* (10 individual and four parent sessions)
  - *Multidimensional Family Therapy* (six individual, three parent sessions and six with both patient and family)
TREATING CANNABIS ADDICTION

• Dennis M et al, J Subst Abuse Treat 2004; 27: 197-213 (continued)
  – **Significant decreases in cannabis use and symptoms of dependence were observed across treatments**
  – **No between-treatment differences were clearly observed**
  – **Nearly two-thirds of teens continued to report significant problems**
- Motivational Enhancement Therapy (MET) and Cognitive Behavioral Therapy (CBT)*
- Contingency Management (CM)
- Brief Strategic Family Therapy*
- Multidimensional Family Therapy*

*=Free
TREATMENT MANUALS

• ADULT
  – Motivational Enhancement Therapy (MET) and Cognitive Behavioral Therapy (CBT)*
    • http://1.usa.gov/1181MDe
  – Contingency Management (CM)
    • http://bit.ly/12RPuKp
In the addictions field, the search for critical conditions that are necessary and sufficient to induce change has led to the identification of six critical elements (Miller & Rollnick, 1991):

- Feedback regarding personal risk or impairment
- Emphasis on personal responsibility for change
- Clear advice to change
- A menu of alternative change options
- Therapist empathy
- Facilitation of client self-efficacy or optimism.
The MET approach is further grounded in research on processes of change. Prochaska and DiClemente (1984) describe five stages of change that people progress through in modifying problem behaviors (the stages of precontemplation, contemplation, determination, action, and maintenance). The MET approach assists clients in moving through the stages toward action and maintenance.
Cognitive behavioral therapy (CBT) is designed to remediate deficits in skills for coping with antecedents to marijuana use. Individuals who rely primarily on marijuana (or other substances) to cope have little choice but to resort to substance use when the need to cope arises. The goal of this intervention is to provide some basic alternative skills to cope with situations that might otherwise lead to substance use. Skill deficits are viewed as central to the relapse process; therefore, the major focus of the CBT groups will be on the development and rehearsal of skills.
The focus of CBT treatment is on teaching and practicing overt behaviors, while attempting to keep cognitive demands on clients to a minimum. Repetition is essential to the learning process in order to develop proficiency and to ensure that newly acquired behaviors will be available when needed. Therefore, behavioral rehearsal will be emphasized, using varied, realistic case examples to enhance generalization to real life settings. During the rehearsal periods, clients are asked to identify cues that signal high-risk situations, indicating their recognition of when to employ newly learned coping skills.
Research has demonstrated the effectiveness of treatment approaches using contingency management (CM) principles, which involve giving patients tangible rewards to reinforce positive behaviors such as abstinence. Studies conducted in both methadone programs and psychosocial counseling treatment programs demonstrate that incentive-based interventions are highly effective in increasing treatment retention and promoting abstinence from drugs.
TREATMENT-CM

• To Reduce Unwanted Behavior
  – Present something undesirable (additional chores)
    • “Positive Punishment”
  – Keep something desirable (restrict access to video games)
    • “Negative Punishment”

• To Increase Desired Behavior
  – Provide something desirable (borrow the car)
    • “Positive Reinforcement”
  – Remove or reduce aversive conditions
    • “Negative Reinforcement”
PARENTAL MONITORING

• Parental monitoring (when the parents know where their children are, who they are with, and what they are doing) has been seen as attenuating a number of negative adolescent behaviors, including gambling, sexual activity, and drug use.

• **Strong, reliable link between parental monitoring and decreased marijuana usage in adolescents. In addition, the strongest effects were seen in the female-only studies.**

Association for Psychological Science (2009, November 17). The straight dope: Studies link parental monitoring with decreased teen marijuana usage.