Marijuana
A Briefer for Reefer

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Modified from Robin H. Barnes, Chief Resident Immersion Training, 2006
NEVER BEFORE SUCH EXCITING FRANKNESS
A DARING THEME!
ADULTS ONLY

REEFER MADNESS
ADULTS ONLY
Rap> Country> Hip-Hop/R&B>Rock

Snoop Dogg, Three 6 Mafia (Academy Award, 2006), Ella Fitzgerald (Wacky Dust, i.e. cocaine), Lynrd Skynrd (That Smell), Black Sabbath (Sweet Leaf), Ray Charles (Lets Go Get Stoned) 
Primack Archives Ped & Adol Med. 2008; 162(2): 169-175:
Fact or Fiction?

- Marijuana use among teens is increasing
- Marijuana is safe
- Marijuana is a “gateway” drug
- Marijuana causes psychosis
- You can’t overdose on marijuana
US love-hate relationship with MJ

• Introduced to US by Mexican immigrant workers end 19th-early 20th C.
• Violence, seen as menace to American society
• 1937: complete ban
• Growing use 1950’s by Beat & jazz artists
• 1970’s widespread use; 10 states decriminalize
• 1980’s “Say no to drugs.” Severe penalties for trafficking
• Mid-1990’s to present: increasing use by adolescents, young adults
• Federal campaigns vs selected state initiatives

History summarized by Robin Barnes, CRIT 2006
Agent - Marijuana

Delta-9-tetra-hydrocannabinol

$\Delta^9$-THC
Marijuana

- Available as marijuana, hashish, hash oil \textsc{NIDA}
- Potency: 1 joint (10 mg in 1970s $\rightarrow$ 150+ mg in 1990s)
- Fairly easy or very easy to get: 67\% of 10\textsuperscript{th} graders in 2008 (78\% in 1998) \textit{Monitoring the Future}
- Bioavailable in seconds after smoking
- 30 days to fully eliminate
- Binds CB1 receptor
When we do the numbers...

<table>
<thead>
<tr>
<th></th>
<th>Dose</th>
<th>Unit Cost</th>
<th>Usual 24 hour Use</th>
<th>24 hour Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Cigarettes</strong></td>
<td>One cig</td>
<td>$0.25</td>
<td>10</td>
<td>$2.50</td>
</tr>
<tr>
<td><strong>Alcohol</strong></td>
<td>One drink</td>
<td>$1.00</td>
<td>1-5</td>
<td>$1.00 to $5.00</td>
</tr>
<tr>
<td><strong>Marijuana</strong></td>
<td>One joint (0.5-1.0 gm)</td>
<td>$0.50 to $1.00</td>
<td>1-3</td>
<td>$0.50 to $3.00</td>
</tr>
</tbody>
</table>

NYC College Senior, 2005
Acute Effects of Smoked Marijuana

- Euphoria, relaxation
- Intensity of perception
- Distortion of time and space
- Appetite stimulation, “munchies”
- Pain reduction in central pain (e.g. MS) and in some HIV peripheral neuropathy
- No death by overdose

What’s happening here?

Major sites of marijuana action in central nervous system
THC infusion -> greater glucose metabolism increase in chronic users (adapted from Volkow, 1996; cited in Chang, 2007)
Endogenous Cannabinoid System

- Receptors in CNS (CB1) and immune cells (CB2)
  - CB1 - Neurons “fine tune” incoming inputs

- Pharmacological effects - appetite and feeding, memory, nociception, motor coordination *Pertwee, 2005*

- ECS noted in diseases - ALS, multiple sclerosis, cardiogenic shock, obesity, embryonic implantation, hemorrhagic cystitis (rat models), prostate cancer (?) *Pertwee, 2005*
Epidemiology

• Lifetime use
• Changes over 10-15 years
• Changes in Abuse/Dependence
Marijuana Use in Lifetime, Past year, Past month by age

National Survey on Drug Use and Health, 2007
Past-Month MJ Use, 12th Graders

http://www.monitoringthefuture.org/data/08data/pr08t17.pdf
Annual Numbers of New Users of Marijuana: 1965-2003

National Survey Drug Use & Health, 2002

Compton WM. JAMA; 2004: 291: 2114-2121
Acute Effects of Smoked Marijuana

- Euphoric effects
- Acute dysphoria *Fant, 1998*
Cognition, brain function

- Transient acute effects on episodic memory & learning *Curran, Psychopharm 2002*
- Motor & Visual tracking (driving) x 2-5 hrs *O’Kane 2002*
- Effects of longer-term use on cognition
  - Adolescents: slower psychomotor speed, complex attention, planning/sequencing after abstinence x 3 weeks *Medina 2007*
Cannabis and psychosis

• Biologically plausible (DA release)
• Multiple epidemiologic cohort studies:
  – risk for symptoms & schizophrenia

But:
  – Base rate low
  – Risk nonuniform: prior psychotic sx, genetic risk, early adolescent use  *Semple, J Psychopharm 2005*
  – If prevalence rose 5x since 1970, why didn’t schizophrenia rise 5x?  *MacLeod Lancet 2005*
Cannabis and Other Effects

- Pulmonary: Tar has carcinogens/tar; appears to cause symptoms of bronchitis, but not pulmonary function decline *(Tetrault 2007)*
- Depressive symptoms: modest data
- Reproductive effects clearly adverse in males (hormonal alterations, adverse sperm function effects)
Can It Be *Medically Useful*?

- **Possible:** Anti-emetic, Appetite stimulant, Pain control (central), Anxiolytic, Glaucoma —mild decrease intraocular pressure, ?ALS
  - Research small in quantity or quality
- Dronabinol (Marinol) is legal, but its relative effects vs marijuana is greatly contested
- The federal government *may* prosecute in any state, regardless of whether there is a medical marijuana law *(U.S. Supreme Court, 2005)*

http://medicalmarijuana.procon.org/viewresource.asp?resourceID=000884
Dependence and Withdrawal

- Withdrawal is real
  - Insomnia, craving, anorexia, irritability, anxiety
  - Onset 8-10 hours after d/cing drug; 4-14 days’ duration \textit{Budney, 2003}

- Conditional dependence:
  - 9% for mj, vs 17% for cocaine

- Chronic use $\rightarrow$ tolerance (noted to be protective in alcohol intoxication) \textit{Wright, 2002}
Early life use, later problems?

- The DEBATED Gateway to other drugs  
  - Sequence (Yes),
  - Association (Yes),
  - Causation (Maybe)
  - Even if NO causation, policy/clinical focus on young marijuana users as being at risk remains relevant

- Psychosis
- Educational Attainment, Other Drug Use  
  - High quality cohort studies (n=16)
  - Alcohol and tobacco had similar associations
Drug Treatment: Primary substance of abuse at admission TEDS 1996-2006

http://wwwdasis.samhsa.gov/teds06/teds2k6aweb508.pdf
Age at Treatment Admission by Primary Substance
(Males, 2006, TEDS data)

Substance Abuse and Mental Health Services Administration, Treatment Episode Data Set (TEDS), Data received through 10.9.07
Admissions by primary substance of abuse

15-19 yrs (n=187,534) 35-39 yrs (n=234,773)

- Alcohol
- Opiates
- Cocaine
- Marijuana
- Stimulants
- Other

SOURCE: Office of Applied Studies, Substance Abuse and Mental Health Services Administration, Treatment Episode Data Set (TEDS). Data received through 10.9.07.
# Treatment Referral Sources

<table>
<thead>
<tr>
<th>Substance</th>
<th>Referred by Criminal Justice</th>
<th>Referred by Self</th>
</tr>
</thead>
<tbody>
<tr>
<td>Marijuana</td>
<td>58%</td>
<td>15%</td>
</tr>
<tr>
<td>Alcohol</td>
<td>36-43%</td>
<td>28-32%</td>
</tr>
<tr>
<td>Cocaine</td>
<td>28-36%</td>
<td>30-38%</td>
</tr>
<tr>
<td>Methamphetamine</td>
<td>55%</td>
<td>21%</td>
</tr>
</tbody>
</table>

SOURCE: Office of Applied Studies, Substance Abuse and Mental Health Services Administration, Treatment Episode Data Set (TEDS). Data received through 10.9.07.
What can you tell your patients?

• Use rose from early 90s nadir, and levelled
• Use is not so safe
  – Addiction is real; conditional dependence low
  – Cognitive, Respiratory, Reproductive effects
• Medical complications can happen
• The gateway association is present (?causal)
• There is a psychosis risk, esp in adolescence
• Death by OD is not reported

Fact or Fiction

• Teen MJ use is increasing
• Marijuana is safe
• Marijuana is a “gateway” drug
• Marijuana causes madness