Marijuana Abuse / Dependence and Its Treatment

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Today’s Plan

• Show how research on marijuana can and has lead to improved treatments?

• Progress and Limitations:
  – My and others NIDA-funded research

• Discuss current and future directions that will provide continued, important advancements
US Treatment Admissions by Primary Substance

Illustrates the increase in treatment enrollment for marijuana over the last 15-20 yrs (NIDA Household Survey, 2009)
What We Have Learned From Treatment Research?
Specific Behavioral Treatments Work

- Coping Skills Training; Enhance Motivation
  - Deal with cravings
  - Handle peer pressure and social situations
  - Manage moods and stress
- Engage Social Support
- Develop Prosocial Alternatives
- Provide Motivational Incentives
Marijuana Treatment Project (2004)
Dose of Treatment Matters
Reduction in Days of MJ Use

% Days of Use (past 90 Days)

Baseline 4 Months 9 Months 15 Months

DTC session MET-2
session MET/CBT-9
Dose of Treatment Matters
Increased Abstinence From Marijuana

% Participants Abstinent

- DTC
- MET
- MET/CBT

% Participants Abstinent

4 Months 9 Months 15 Months

Dose of Treatment Matters
Increased Abstinence From Marijuana
Motivational Incentives Improve Outcomes Contingency Management (CM)

Budney et al. (2006)
Incremental Improvements with Behavioral Innovations Across Multiple Studies

% of Participants Abstinent

- MET
- MET/CBT
- MET/CBT/CM

- ETX
- 6 month
- 12 month

Months Post Treatment
What about Adolescents?

Specific Behavioral Treatments Work

Family-based and group / individual behavioral treatments

- Waldron et al. -- FFT, CBT, CBT/FFT
- Liddle et al. -- MDFT
- Henggeler et al. -- MST
- Dennis et al. -- MET/CBT, ACRA. FSN
- Santisteban et al. -- BSFT
- Stanger, Budney et al. (2009) -- MET/CBT+CM
Cannabis Youth Treatment Study
Treatments Reduce Marijuana Use

Days of Marijuana Use (out of 90)

Months from Intake

0 3 6 9

MET/CBT5  ACRA  MDFT  MET/CBT12  MET/CB12+ FSN
Cannabis Youth Treatment Study
Treatments Engender Marijuana Abstinence
% Abstinent at Discharge
Add Motivational Incentives

Combine 2 Abstinence-Based CM Interventions
- Provide social and/or monetary-based incentives contingent on drug abstinence

A) Clinic-based incentives (same as adults)

B) Parent-based: home-based contract
- reward abstinence
- punish use
- low cost, long-term application, natural
CM (Incentives) Improves Outcomes for Adolescent Marijuana Abuse

Stanger, Budney et al. (2009)
Abstinence and Ethnicity/Race/SES
Arkansas Study

Main effect of ethnicity/SES on outcome
Current Status

We are developing effective treatments, but....

Room for Improvement in Outcomes
- Initiation of Abstinence
- Maintenance of Positive Effects

Limited Access and Availability
- efficacious treatments not available
- integrity/fidelity of treatment delivery
- cost (e.g., incentive programs, therapy)
- resistance to seeking treatment
How Do We Improve?

Behavioral Science and Neuroscience Provide a Number of Potential Targets

Better Understanding of Marijuana Dependence
- Marijuana Withdrawal Syndrome
- Endogenous Cannabinoid System
- Genetics
- Impulsivity
- Impact on Brain Function
- Innovative Incentive Programs
- Concurrent Tobacco Use
Marijuana Withdrawal
Withdrawal Discomfort Score
(Budney et al. 2003)
Marijuana and Tobacco Withdrawal: Similar Symptom Severity

(Vandrey et al., 2005; Vandrey et al. 2008, Budney et al., 2009)
Marijuana Withdrawal
Symptom List (proposed for DSM-V)

1) irritability, anger, or increased aggression
2) nervousness or anxiety
3) sleep difficulty (insomnia)
4) decreased appetite or weight loss
5) restlessness
6) depressed mood
7) at least 1 physical symptom causing significant discomfort (stomach pain, shakiness/tremors, sweating, fever, chills, headache)
Neurobiology of Marijuana Use and Abuse
Endogenous System / Cannabinoid Receptor
How Do We Improve?

Pharmacotherapy / Medications

- Withdrawal: mood, sleep, anxiety, irritability, restlessness
- Agonist substitution treatments
- Antagonist treatments (block the effects at the CB1 receptor site)
- Enzymatic targets (FAAH)

Meds: dronabinol, lofexedine, gabapentin, zolpidem...
Genetics and Outcomes
Ongoing Adolescent Study
Stanger, Budney et al., ongoing

Collecting saliva samples to genotype the adolescents who enter our treatment

Specific genes:
marijuana-related: CNR1, FAAH
respond to incentives: DRD4, 5-HTTLPR, CRHR1

Perform treatment x genotype interactions

Improve? Matching; Medications
Impulsivity

- Measure via a Delay Discounting procedure
  • Would you like $50 or $75 in one week?
  • Calculate a Discounting Rate (k)

... substance abusers are more likely to pick sooner rather than later amounts (higher k)

- impulsive decision making
- lack of future orientation
Appears to Hold for Adolescents

Discounting relates to Outcomes

Adolescent Treatment

Stanger, Budney et al., in preparation

Low Socioeconomic Status and Tobacco Dependence are associated with greater discounting

Greater Discounting related to poorer marijuana abstinence outcomes
Adolescent Impulsivity
(Stanger et al., ongoing)

k-values (discounting rates) are correlated with brain activity while doing a delay discounting task
What can we do to Improve?
Executive Function / Future Orientation Therapy

Train executive systems of the brain to bolster decision-making, future orientation, planning skills:

- Computerized Cognitive Training Programs and Therapeutic Games
  - working memory, decision making, impulse control
  - choice games: consequences are experienced
  - reward delayed choices
How Else Can We Improve?

Enhance Behavioral Treatments and Delivery Systems

- Develop and Apply Technology
- Innovative Incentive Programs
- Target Tobacco: 50% of marijuana treatment seekers smoke Tobacco
Computerized MET/CBT/CM
(Budney et al. in press)

% Participants Abstinent

Computer
Therapist

% Abstinent

> 4 Wks

> 8 Weeks

% Abstinent
Target Disadvantaged Minorities with Culturally-Based Behavioral Treatments

Topography of the Program

- Incentive or Consequence Program?
- Community-based (church or community center)
- Occur in the community
- Culturally relevant incentives?
- Access to recreational / learning center
- Parent programs occur in community
- Social RF from greater community…. 
- Treatment extenders: community health workers
Target: Marijuana-Tobacco Relationship

- 70% marijuana users report past month tobacco use
- 50% of marijuana treatment seekers smoke tobacco regularly
- Shared heritability

Enhances high?:
- Smoked as a mixture (blunts, spliffs)
- Use as a chaser

Makes quitting more difficult
- Tobacco use negative predictor of marijuana cessation outcome
- Marijuana use negative predictor of tobacco cessation outcome
- Why? cues related to smoking behavior, more reinforcing, brain reward systems
Making Excellent Progress, but We Need to Continue to Improve

Look to Neuroscience:
- Medication Development
- Genetics
- Brain Function / Impulsivity
  - executive function therapy
  - future orientation focus

Develop Behavioral Treatments and Delivery Systems
- Develop Technological Interventions
- Innovative Incentive Programs / Focus on the Disadvantaged
- Target Tobacco
- Chronic Care Models
END
Will or Has Medical Marijuana Controversy affected Perceived Risk and Prevalence of Use?

Monitoring the Future study
Synthetic Marijuana: K2, Spice…

Sprayed on plant materials: potent CB1 agonists

Effects??: similar to Marijuana / less reliable / more adverse effects

Internet, head shops, and other convenience stores