NIDA
NATIONAL INSTITUTE
ON DRUG ABUSE

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NewsScan
NIDA ADDICTION RESEARCH NEWS

NEWS UPDATE

Research News

Therapists Don't Live By Treatment Manuals Alone

Participating in three days of seminars followed by supervised casework and using an instructional Website are more effective methods of teaching cognitive behavioral therapy techniques than merely reading an instruction manual, NIDA-funded researchers suggest.

These were the findings of Dr. Kathleen Carroll, of Yale University School of Medicine, and her colleagues who divided 78 community-based therapists into groups to assess the relative efficacy of the three training techniques.

Among their observations: those who attended the seminar/supervision sessions spent 33 hours training, while those who used the Website spent 26 hours. Participants who only read the manual spent 10 hours training. Upon assessing the skills learned, clinicians assigned to the seminars/supervision sessions exhibited the highest post-training scores and evaluation ratings, while clinicians who only read the manual had the lowest scores and ratings.

- **WHAT IT MEANS:** Although use of seminars/supervision sessions appeared to be the most effective training method, it is expensive and time-consuming, and may not be feasible for those who cannot sacrifice three days of work. But the findings do point to the promise of computer-based training as an alternative strategy for training clinicians in the use of novel treatments.

The scientists published the study in the February 2005 issue of the *Journal of Consulting and Clinical Psychology*.

Mouse Study Reveals Promising Compound for Treating Cocaine Abuse

NIDA scientists have shown that JHW007, a chemical structurally similar to benztropine—a drug used to treat people with Parkinson's disease—can block the behavioral stimulant effects of cocaine in mice, and may one day serve as a treatment for cocaine abuse.

The researchers showed that JHW007 actively and effectively competes with cocaine for binding sites on the dopamine transporter, a protein that removes and therefore terminates the actions of dopamine, a brain chemical associated with pleasure and reward. The scientists also found that while occupying these binding sites, JHW007 produced little of the hallmark stimulant effects produced by cocaine.

The prevailing thought among researchers has been that all substances that bind to the dopamine transporter will have effects similar to those of cocaine. But this study shows that binding to the dopamine transporter does not invariably result in cocaine-like effects, and that some drugs that act at that site may block the effects of cocaine.

- **WHAT IT MEANS:** These findings suggest that chemical analogs of cocaine that attach to the same binding site can block the cascade of effects that ultimately result in addiction and compulsive drug-seeking behavior. Some of these compounds prevent the effects of cocaine and therefore show promise for development as treatments for cocaine abuse.

The study, led by Dr. Jonathan Katz of NIDA's Intramural Research Program, was published in the February 23, 2005 issue of the *Journal of Neuroscience*.

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Smoking Marijuana Alters Blood Flow in the Brain

A recent report shows that marijuana smokers experience changes in blood flow patterns in their brains, and these changes persist in heavy users of the drug even after a month of abstinence.

Scientists led by Dr. Ronald Herning of NIDA's Intramural Research Program measured blood flow through the anterior and middle cerebral arteries in 54 marijuana users (11 light, 23 moderate, and 20 heavy) and compared the results with observations of blood flow in 18 similarly aged adults who did not use the drug. They took measurements after 3 days of admission to the study, and after 28-30 days of monitored abstinence.

Results showed that the speed of blood flow through the arteries at the beginning and end of the study was significantly higher in all 3 groups of marijuana users than in the control group. Measurements taken at the beginning of the study also showed that marijuana users demonstrated higher resistance to blood flow through their brain arteries. This observation persisted in the heavy marijuana users during the 30 days of not smoking, while resistance to blood flow improved in the other 2 groups.

- **WHAT IT MEANS:** The findings suggest that smoking marijuana, the most commonly used illegal substance in the United States, may alter blood vessels in the brain. Future research is needed to determine whether the increased resistance to blood flow seen in heavy users of the drug is reversible and determines the health consequences. The findings from this study also could help explain the drug's effects on memory, learning, and problem solving.

The researchers published their findings in the February 8, 2005 issue of the journal *Neurology*.

Scientists Modify Fly Behavior Through Remote Control

By designing genetically encoded triggers in the brains of fruit flies that allow the insects' behavior to be controlled with pulses of light, scientists at Yale University School of Medicine have demonstrated a direct link between changes to specific neurons and specific behaviors.

The researchers genetically engineered photoreceptors in specific groups of brain cells in the fruit flies to respond to light with behaviors specific to those cells. Depending on which types of nerve cells were activated, the flies jumped, beat their wings or took flight. The scientists also remotely activated cells that produce the brain chemical dopamine, which changed the flies' walking and other movements. In the human brain, dopamine is involved in pleasure and reward pathways, but it also underlies the symptoms of Parkinson's disease.

- **WHAT IT MEANS:** Controlling the electrical activity of central neurons in freely moving animals can establish causal connections between the activities of specific neurons and the expression of particular behaviors. The approach will likely be used in future studies to examine how cell actions and connections are related to more complex behaviors and how nerve cells encode signals representing, for example, reward and punishment. Such signals are important in the development of drug abuse and addiction.

This research, supported in part by NIDA and led by Dr. Gero Miesenböck, was published in the April 8, 2005 issue of the journal *Cell*.

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Long-Term Methamphetamine Abuse Impairs Selective Inhibition

Results from a NIDA-funded study indicate that long-term methamphetamine abuse impairs selective inhibition—the ability to filter distracting and conflicting information.

Dr. Ruth Salo and colleagues from University of California, Davis tested 34 long-term, but currently abstinent methamphetamine abusers to determine whether task-shifting and/or selective attention processes were impaired by long-term methamphetamine abuse.

Participants repeated word/number sequences while suppressing conflict and/or switching attention to specific word/number cues. Subjects were also given a series of repeat sequences and switched on every second trial (AABBAABB). Task performance was based on response time and error rate. The researchers observed that methamphetamine abusers committed more errors on trials containing built-in distractions and conflicting information. In contrast, methamphetamine abusers performed similarly to controls on tests requiring them to alternate between differing tasks.

- **WHAT IT MEANS:** The ability to pay attention is influenced by several distinct processes. This research suggests that long-term methamphetamine abuse impairs the ability to filter distracting and conflicting information. Because attention is a fundamental building block of many cognitive functions, impairments in selective inhibition should be taken into account when devising drug treatment programs.

The scientists published this study in the February 2005 issue of *Biological Psychiatry*.

Heavy Abuse of Marijuana Linked to Inferior Decision-making Skills, Altered Brain Activity

Men who smoke marijuana heavily are less successful than moderate smokers or nonsmokers on tasks requiring decision-making. This difference remains even after a brief period of abstinence, according to a study by Dr. Karen Bolla of The Johns Hopkins Medical Institutions.

She and her colleagues recruited 11 adult male marijuana smokers and 11 healthy male controls. When the marijuana smokers had been abstinent for 25 days, the scientists tested the participants to identify decision-making differences. Then, using positron emission tomography (PET), the researchers were able to see and record which brain regions the individuals used during the test.

The scientists noted that heavy marijuana abusers performed significantly worse than moderate marijuana abusers. PET scans showed that heavy marijuana abusers had less activation in regions of the right side of the brain that are involved in decision-making, and greater activation in areas on the left side of the brain. The scientists speculate that the brains of these individuals are recruiting other regions, like the left cerebellum, to compensate for the poorly functioning decision-making areas.

- **WHAT IT MEANS:** These findings suggest that heavy marijuana abuse has a harmful effect on key processes within the brain, and may make the individual more sensitive to immediate rewards, less sensitive to losses, and slow to learn from previous mistakes. Damage to areas of the brain associated with decision-making can significantly increase a person's vulnerability to addictive behaviors and make them more resistant to treatment.

The scientists published the study in the June 2005 issue of the journal *NeuroImage*.

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Funding Announcements

NIDA Encouraging Research on Inhalant Abuse (PA-05-099)

Data from NIDA's Monitoring the Future (MTF) survey and other epidemiologic studies show that inhalant abuse continues to be a major public health concern. Inhalants—volatile vapors that induce psychoactive or mind-altering effects when inhaled—are readily accessible, legal, and inexpensive. They tend to be abused by younger children in whom their highly toxic effects can be lethal.

Further research is needed to better understand the epidemiology of inhalant abuse and the behaviors and practices that lead to it. In addition, practitioners need to know prevention techniques and how these substances affect the brain and nervous system. Examples of research projects eligible for funding under this program announcement (PA) include:

- Identifying factors that lead to inhalant abuse, such as psychiatric disorders and other stressors, as well as vulnerabilities associated with gender, age, ethnicity, and socioeconomic status;
- Determining progressive consequences of long-term inhalant abuse;
- Developing and testing the efficacy of prevention strategies for high-risk youth in different cultural, demographic, and socioeconomic settings; and
- Characterizing methods for diagnosing, treating, and increasing physician awareness of inhalant abuse and its consequences.

For additional information, go to http://grants.nih.gov/grants/guide/pa-files/PA-05-099.html. The expiration date for this PA is July 2, 2008. Go to http://grants.nih.gov/grants/funding/submissionschedule.htm for information about application dates.

For more information about any item in this *NewsScan*:

- **Reporters**, call **Michelle Person** at 301-443-6245.
- **Congressional staffers**, call **Geoffrey Laredo** at 301-594-6852.

The National Institute on Drug Abuse (NIDA) is a component of the National Institutes of Health, U.S. Department of Health and Human Services. NIDA supports most of the world's research on the health aspects of drug abuse and addiction. The Institute carries out a large variety of programs to ensure the rapid dissemination of research information and its implementation in policy and practice. Fact sheets on the health effects of drugs of abuse and other topics are available in English and Spanish. These fact sheets and further information on NIDA research and other activities can be found on the NIDA home page at **http://www.drugabuse.gov**.

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