NIDA
NATIONAL INSTITUTE
ON DRUG ABUSE

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NewsScan

NIDA ADDICTION RESEARCH NEWS

NEWS UPDATE

Research News

Study of Twins Reveals That Changes in Attention and Motor Skills Persist at Least a Year after Heavy Stimulant Abuse

In a study supported by the National Institute on Drug Abuse (NIDA), researchers found that heavy stimulant abuse can result in changes in attention and motor skills that can persist for at least a year.

The investigators studied 50 pairs of twins; in each pair, one twin had a history of abusing cocaine and/or methamphetamine and the other had no history of drug abuse. Thirty-one monozygotic (identical) and 19 dizygotic (fraternal) adult male twin pairs were tested for attention and motor skills, executive functioning, intelligence, and memory at least one year after the drug-using twin's last-reported use of stimulants.

The researchers, led by Dr. Rosemary Toomey from Massachusetts General Hospital, found that the twin with a history of stimulant abuse performed significantly worse on several tests of attention and motor skills than did the sibling who had never used drugs.

However, abusers outperformed their non-drug-using twin on visual vigilance, a test measuring the ability to pay attention over time.

- **WHAT IT MEANS:** This study provides evidence that stimulant abuse can result in long-term residual neuropsychological effects.

The study was published in the March 2003 issue of the journal *Archives of General Psychiatry*.

Environmental Cues Associated with Heroin Use May Decrease Immune Function

Scientists have long known that some drugs, such as heroin and morphine, can cause changes in the immune systems of drug abusers that make them more susceptible to infection. However, Dr. Donald Lysle and Stephanie Ijames from the University of North Carolina at Chapel Hill have now found that in rats, the environmental cues associated with drug use also may induce alterations in immunity. Their study is the first to demonstrate that cues associated with heroin use cause a reduction in the enzyme, inducible nitric oxide synthase (iNOS), which affects nitric oxide production by cells of the immune system. Nitric oxide plays a key role in the ability of immune cells to fight and kill microorganisms and tumor cells.

The researchers conditioned male rats to associate heroin administration with placement in a new environment by administering the drug to the rats as soon as they were placed in that environment. On the test day, the rats were re-exposed to the environment in the absence of heroin and then given an injection of lipopolysaccharide (LPS), which induces iNOS production by immune cells. Six hours later, the rats' spleens, lungs, and livers were analyzed for the expression of iNOS messenger ribonucleic acid (mRNA) and iNOS protein. Control groups were used to determine if any step in the conditioning process, such as the injection procedure, re-exposure to the conditioning environment, or a combination of injection of heroin and exposure to the environment, contributed to alterations in iNOS production. The researchers also used an unmanipulated control group to provide a general comparison for all the control groups, as well as the experimental group.

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The researchers found that exposure to the environmental cues associated with heroin administration resulted in a dramatic reduction in the expression of iNOS mRNA and iNOS protein in the conditioned rats' spleen, lung, and liver tissues.

- **WHAT IT MEANS:** These findings suggest that environmental cues associated with drug use may contribute to alterations in susceptibility to infection.

This study, funded by the National Institute on Drug Abuse, was published in the December 2002 issue of *Psychopharmacology*.

Increased Depression During Treatment May Make It Harder for Women to Quit Smoking

Researchers from the University of Pittsburgh found that women smokers who experienced an increase in depressive symptoms during smoking-cessation treatment may be more likely to relapse. However, a history of major depressive disorder (MDD) before treatment was not predictive of failure to quit smoking.

The researchers recruited 219 women smokers who were highly motivated to quit. Their history of depression was assessed and they were classified as being positive (MDD+) or negative (MDD-) for major depressive disorder. All the women received a standard group-based smoking cessation treatment consisting of 10 90-minute sessions over a seven-week period. At each treatment session, the women reported their symptoms of depression and the number of cigarettes they had smoked since the previous session. Their depression was also assessed one, three, six and 12 months after the treatment period.

Overall, about 85 percent of the women relapsed to smoking within one year following treatment. There were no differences in the overall relapse rate among women with or without a history of depression; however, MDD+ women were more likely to relapse prior to the end of the 7-week treatment. Of those that relapsed, about 60 percent of the MDD+ women relapsed during treatment compared to 40 percent of MDD- women. Additionally, MDD+ women were more likely to drop out of treatment before the quit date compared to MDD- women.

Women who successfully quit smoking reported significant decreases in depressive symptoms from pre- to post-treatment, while those who had relapsed reported an increase in depressive symptoms. However, this change in depressive symptoms during treatment was not predictive of continuous abstinence three, six or 12 months after quitting.

- **WHAT IT MEANS:** Women smokers who are depressed have more difficulties getting through treatment. They may require different treatment approaches that address their depression.

Drs. Michele Levine, Kenneth Perkins, and colleagues published this study in the February 2003 issue of *Nicotine and Tobacco Research*. It was funded by the National Institute on Drug Abuse.

Concurrent Use of Tobacco and Marijuana May Hamper Cigarette Smoking Cessation Efforts

Tobacco smokers who also smoke marijuana may be less likely to quit smoking tobacco and less likely to try to quit than those who do not smoke marijuana, according to a study by researchers at The Johns Hopkins University. Dr. Daniel Ford and colleagues interviewed 431 adults who had reported being current tobacco smokers in a study conducted 13 years earlier. In the baseline interview, more than 40 percent of the participants reported having smoked marijuana, with more than 25 percent reporting using it within the previous 30 days (recent use) and 9 percent reported daily use for two weeks or more. At the 13-year follow-up, 79 percent of participants who had reported smoking tobacco at baseline were still smoking it.

Recent and daily use of marijuana at baseline were more predictive of continued tobacco smoking than use of marijuana more than a month prior to baseline. Participants who reported recent use were about twice as likely to continue to smoke tobacco 13 years later compared those who did not use marijuana within the preceding 30 days. Those who reported daily marijuana use were over three times more likely to still smoke tobacco. About 66 percent of recent marijuana users reported trying to quit tobacco during the following 13 years compared to 80 percent of those who had never used marijuana.

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- **WHAT IT MEANS:** These findings suggest that marijuana use may interfere with tobacco cessation attempts. However, there is no evidence that marijuana use can substitute for tobacco use.

This study, funded by the National Institute on Drug Abuse, was published in the August 2002 issue of *Drug and Alcohol Dependence*.

Research Accomplishments

Pain Control Bandage Now Available for Clinical Use

Physicians can now prescribe a non-invasive, non-drug device to relieve certain types of pain. The CT1 Pain Control Bandage, approved by the Food and Drug Administration (FDA), relieves pain by electrically stimulating nerves through the skin, a technology known as transcutaneous electrical nerve stimulation (TENS).

The CT1 is small, wireless, and attaches directly to the affected area to provide pain relief. It has minimal side effects and offers an effective alternative to narcotics and other commonly used drugs in the treatment of some types of pain.

The CT1 has a wide range of possible uses, including alleviating pain from arthritis, bursitis, and traumatic injuries; treating minor cuts where regular bandages are applied; and alleviating the pain of minor surgical procedures such as suturing and arthroscopic surgery.

The device was developed by Cyclotec Medical Industries, Inc., in Lauderhill, Florida with support from NIDA's Small Business Innovation Research (SBIR) Program. Under this program, small businesses compete for grants to develop promising ideas that meet specific research and development needs of Federal agencies such as NIDA. The device won *R&D Magazine's* 2002 100 Award as the one of the 100 best new science and medical technologies of the year. The R&D 100 Award is one of the most prestigious honors in applied research, having previously been given to technological breakthroughs such as the printer, the fax, and the automatic teller machine.

Upcoming Events

NIDA to Host Symposium on May 14–15 Honoring the Late Dr. Roger Brown

NIDA will host a two-day symposium– **Foundations and Innovations in the Neuroscience of Addiction**–on Wednesday, May 14, and Thursday, May 15, 2003 to honor the late Dr. Roger Brown.

At the time of his death in June 2002, Dr. Brown was NIDA's Associate Director of Neuroscience in the Division of Neuroscience and Behavioral Research. For more than 20 years he was instrumental in fostering the development of cutting-edge neuroscience research in the area of drug abuse and addiction. The programs he helped develop have made seminal contributions to the current understanding of neurobiological substrates for reinforcing effects of drugs of abuse, the transition to compulsive, uncontrollable patterns of use, and events that trigger relapse.

Nobel laureate Dr. Arvid Carlsson will deliver a keynote address. In addition, more than 20 prominent scientists studying motivation and reward, cognition, neurotoxicity, pain and analgesia, and neuroplasticity will highlight contemporary research findings.

The meeting will be held in the Natcher Auditorium on the campus of the National Institutes of Health, Bethesda, Maryland. More information will be posted on NIDA's web site — **www.drugabuse.gov** —as it becomes available.

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Educational Materials

New NIDA Science Education Materials For Second and Third Graders Available Online

The National Institute on Drug Abuse (NIDA) has released a new elementary school curriculum: *"Brain Power!* The NIDA Junior Scientists Program." Available online and designed for use in second-and third-grade classrooms, "Brain Power!" focuses on the biological effects of drug abuse on the body and the brain.

The goal of "*Brain Power!*" is to lay the foundation for future scientific learning and substance abuse prevention efforts by providing an early-elementary-school-age audience with a basis of knowledge and critical thinking skills. The curriculum consists of six modules; each includes a video, written materials for students, a newsletter for parents, and a guide for teachers.

The *Brain Power* modules include:

- **Module 1:** *Ooey Gooey! Making Sense of Scientific Inquiry*–introducing students to the steps of scientific inquiry.
- **Module 2:** *Brains in a Box: What Your Brain Can Do*–describing to students the functions of the four major parts of the brain.
- **Module 3:** *Sending and Receiving Messages*–introducing students to how nerve cells communicate with each other.
- **Module 4:** *Medicines and Drugs: What's Helpful, What's Harmful*–teaching students the differences between medicines and drugs.
- **Module 5:** *The Science Behind Smoking*–discussing nicotine, how it changes the brain, and how those changes may result in addiction to tobacco products.
- **Module 6:** *What Drugs Really Do*–serving as a culminating activity and learning assessment for the entire program.

NIDA is also developing materials for children in kindergarten and the first grade, as well as those in the fourth and fifth grades.

Brain Power! is available online from the NIDA web site, **www.drugabuse.gov**. Limited hard copies are available free of charge for second and third grade teachers. Publication # BPPACK can be ordered from the National Clearinghouse for Alcohol and Drug Information, P.O. Box 2345, Rockville, MD 20847-2345, or call (800) 729-6686.

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

- **Reporters**, call **Michelle Person** at 301-443-6245.
- **Congressional staffers**, call **Mary Mayhew** at 301-443-6071.

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 more than 85 percent 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**.