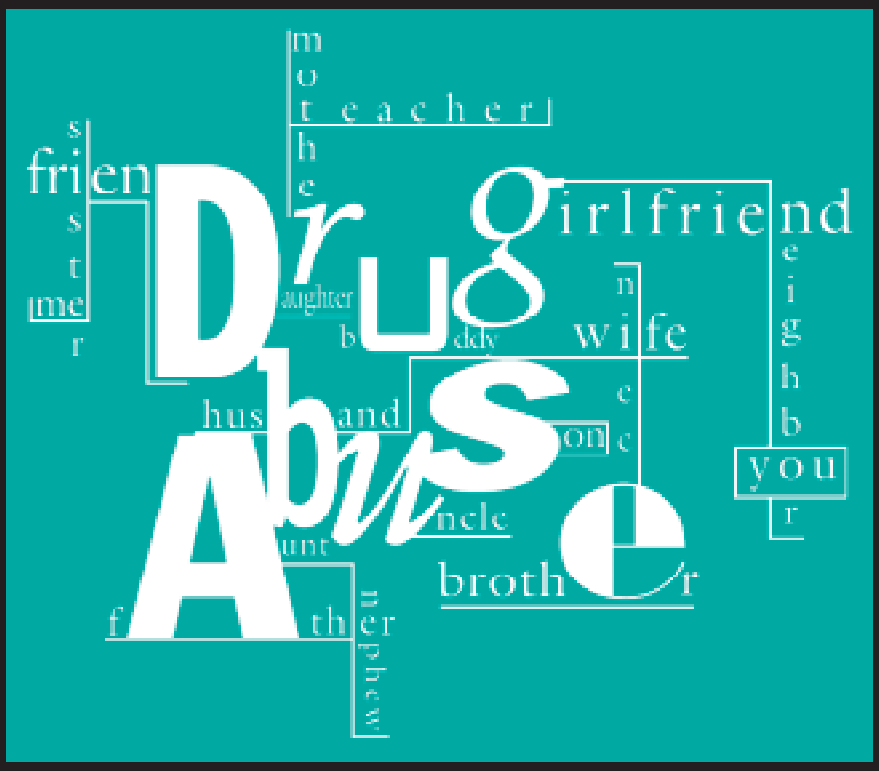
NIDA
NATIONAL INSTITUTE
ON DRUG ABUSE

DRUG ABUSE AND ADDICTION



MEDIA GUIDE

NATIONAL INSTITUTE ON DRUG ABUSE
NATIONAL INSTITUTES OF HEALTH
DEPARTMENT OF HEALTH AND HUMAN SERVICES

PILB

Public Information and Liaison Branch

NIDA's Link to the Media

An important component of NIDA's mission is the rapid dissemination of research information in order to facilitate its implementation into policy and practice.

NIDA's Public Information and Liaison Branch (PILB) plays a vital role in providing policymakers, health care professionals, and the public with the information they need.

All of NIDA's press releases and many of its publications, reports, notices of upcoming conferences, and other public information materials can be found on the Institute's Web site at *www.drugabuse.gov.*

We encourage members of the media who need information on a specific topic or who wish to arrange an interview with one of NIDA's many experts to call the NIDA Press Office at 301-443-6245.

media guide

Introducing the NATIONAL INSTITUTE ON DRUG ABUSE

Recent scientific advances have revolutionized our understanding of drug abuse and addiction. The majority of these advances, which have dramatic implications for how to best prevent and treat addiction, have been supported by the National Institute on Drug Abuse (NIDA). NIDA supports more than 85 percent of the world's research on the health aspects of drug abuse and addiction. NIDA-supported scientific studies address the most fundamental and essential questions about drug abuse, ranging from the molecule to managed care, from cost-effectiveness to community outreach research.

NIDA not only is seizing upon unprecedented opportunities and technologies to further understand how drugs of abuse affect the brain and behavior, but also is working to ensure the rapid and effective transfer of scientific data to policymakers, drug abuse practitioners, other health care providers, and the general public. The scientific knowledge that is generated through NIDA research is a critical element in improving the overall health of the Nation. Our goal is to ensure that science—not ideology or anecdote—forms the foundation for all of our Nation's drug abuse reduction efforts.

NIDA was established in 1974, and in October 1992, it became part of the National Institutes of Health (NIH), Department of Health and Human Services (DHHS). Like most of the other components of NIH, NIDA supports research in both the basic and behavioral sciences. NIDA's scientific research program addresses the most fundamental and essential questions relevant to drug abuse, ranging from its causes and consequences to its prevention and treatment. Specifically, its research program encompasses

- Basic neuroscience and behavioral research;
- Clinical neuroscience and etiology of drug abuse and addiction;
- AIDS and other medical/health consequences of drug abuse and addiction;
- Treatment research and development, including medications development;
- Epidemiology and etiology;
- Prevention; and
- Health services research.

NIDA PROGRAMS AND INITIATIVES

To augment and to implement its research programs, the Institute supports a number of specialized programs and initiatives, including

The Clinical Trials Network (CTN)—Neuroscience and behavioral research have provided substantial evidence that drug addiction is a chronic and, for many people, a recurring disease. Effective treatments for addiction do exist, and more have been developed in recent years. However, the efficacy of these new approaches to treatment has been demonstrated primarily in specialized treatment research settings, with somewhat restricted patient populations. As a consequence, few are being applied widely in real-life practice settings. To address this issue, NIDA has established the National Drug Abuse Treatment Clinical Trials Network. The CTN provides a research infrastructure to test the effectiveness of new and modified treatment components in real-life settings and with diverse patient populations.

***Monitoring the Future (MTF) Study*—**This annual study tracks alcohol and drug use by students in the 8th, 10th, and 12th grades as well as college students and young adults. It is an ongoing study of the behaviors, attitudes, and values of American students. Each year, some 50,000 8th-, 10th-, and 12th-grade students are surveyed (12th-graders since 1975 and 8th- and 10th-graders since 1991). In addition, for a number of years after their initial participation, annual follow-up questionnaires are mailed to some members of each graduating class.

Transdisciplinary Tobacco Use Research Centers—Tobacco-related disease causes more than 450,000 deaths each year, including 170,000 cancer deaths. In an aggressive effort to address this problem, the National Cancer Institute (NCI) and NIDA have awarded seven academic institutions across the country grants totaling $14.5 million to create the Transdisciplinary Tobacco Use Research Centers. The Centers study new ways to combat tobacco use and its consequences. The Robert Wood Johnson Foundation (RWJF) has committed an additional $14 million over 5 years to complement NCI's and NIDA's efforts to improve the understanding of policy and of the communications practices of the tobacco research teams. The funds will be used for the first year of a 5-year project to foster unique collaborations among scientists across many disciplines and to focus on areas—such as adolescent smoking—in which significant gaps in knowledge exist.

With each center organized around an individual theme, researchers will tackle a wide range of studies that include culture, genetics, animal models of behavior, innovative treatments, and tobacco policy. Investigators also will study the prevention of tobacco use, the initiation of tobacco use, and nicotine addiction.

PRISM Awards—Presented annually under the auspices of the Entertainment Industries Council, in partnership with RWJF and NIDA, the PRISM Awards are the entertainment industry's annual recognition of the accurate depiction of the dangers of drug, alcohol, and tobacco use and addiction in movies, television, video, music, interactive media, and comic book entertainment.

Club Drugs Initiative—As part of a national effort, NIDA and four national organizations have launched a multimedia public education initiative designed to alert teens, young adults, parents, educators, and others to the dangers of club drugs, such as ecstasy, gamma-hydroxybutyrate (GHB), and flunitrazepham (Rohypnol), which are often used at all-night "raves" or dance parties and have potentially life-threatening effects. This initiative has its own Web site, *www.clubdrugs.org.*

Anabolic Steroids Initiative—NIDA and several partners have announced a national multimedia public education initiative to alert the public to the dangers of anabolic steroids. Concerns about body image and athletic performance may be leading teens (as well as adult men and women) to use anabolic steroids, in spite of the serious side effects of these drugs. The initiative was sparked by 1999 MTF survey findings that anabolic steroid use by 8th- and 10th-graders had increased and that 12th-graders' perceived risk regarding steroids had declined.

Prescription Drug Initiative—NIDA and several national organizations are sponsoring a public health initiative to raise awareness about recent trends in the use of prescription drugs in the United States. The initiative is intended to inform the public, physicians, pharmacists, and others about the potential misuse and abuse of prescribed medications and to promote additional research on the subject. The initiative was prompted by findings that prescription drug abuse is a problem in all age groups. More than 17 percent of adults over 60 may be affected by prescription drug abuse, and prescription drug abuse has dramatically increased among young people between 12- and 25-years-old. Additional information about prescription drug abuse and the initiative can be found on the NIDA Web site, *www.drugabuse.gov.*

Conferences and Meetings—Throughout the year, in Washington, DC, and at sites around the country, NIDA sponsors scientific conferences and meetings, where researchers focus on cutting-edge science and participate in seminars and workshops on topics ranging from nicotine addiction to drug use among street kids. Most meetings are open to the press. Watch the NIDA Web site, *www.drugabuse.gov,* for notice of upcoming meetings and events.

RESEARCH ACCOMPLISHMENTS

Over the past two decades, NIDA's exploration of the biomedical and behavioral foundations of drug abuse has led to many accomplishments. NIDA-supported research has

- Identified the molecular sites in the brain where every major drug of abuse—opiates, cocaine, phencyclidine (PCP), and the active ingredient in marijuana—delta-9-tetrahydrocannibinol (THC)—has its initial effect. These discoveries, together with computer-aided drug design, are paving the way to development of novel medications that will help break the cycle of addiction;
- Produced a neurobehavioral model to explain drug-using behavior, which someday will improve treatment and rehabilitation methods;
- Supported the development of two medications for the treatment of opiate addiction—levo-alpha-acetyl-methadol (LAAM) and naltrexone—through the approval process by the Food and Drug Administration (FDA);
- Supported the development and evaluation of pharmacologic treatment for newborns withdrawing from exposure to narcotics;
- Defined nicotine addiction and the scientific basis for therapy using nicotine gum and skin patches;
- Pioneered innovative community-based research on AIDS prevention efforts, which demonstrated that drug users will change AIDS risk behaviors and thus reduce their susceptibility to HIV infection and AIDS;
- Demonstrated that participation in methadone treatment significantly reduces HIV seroconversion rates and decreases high-risk behaviors;
- Demonstrated that successful drug abuse treatment reduces criminality as well as relapse to addiction;
- Demonstrated the value of treating drug abusers' depression and other mental disorders in order to improve the results of addiction therapy;
- Measured the positive impact of comprehensive research-based community drug-prevention strategies that involve the media, schools, families, neighborhoods, and the workplace;
- Used advanced imaging techniques to identify the specific brain circuits that are involved in craving, euphoria, and other sequelae of drug addiction. These studies will provide the foundation for the development of new, targeted medications that will block the effects of individual drugs;
- Used molecular genetic technologies to clone the genes for the major receptors for virtually every abusable drug, thus providing scientists with the tools necessary to study in fine detail how drugs of abuse exert their many behavioral effects;
- Produced genetically engineered animals in which a particular drug receptor was eliminated, or "knocked out." This research is providing unprecedented insight into how drugs exert their many effects in the brain;
- Demonstrated that prenatal exposure to cigarettes and marijuana have long-term effects on cognitive performance; and
- Successfully immunized rats against the psychostimulant effects of cocaine, thus opening the possibility of developing a vaccination against cocaine addiction.

NIDA'S FUTURE

As the 21st century begins, NIDA marks more than 26 years of research that has provided tremendous progress in the understanding of drug abuse and addiction. These advances—coupled with new biomedical technologies—provide unlimited possibilities to develop new strategies for preventing and treating drug abuse and addiction and their health and social consequences.

Some of NIDA's research goals in the coming years are to

- Gain a greater understanding of the genetic and environmental risk and protective factors that can prevent or lead to drug abuse and addiction;
- Expand research on the patterns and origins of drug abuse and addiction in all racial/ethnic populations; produce estimates of racial disparities on the incidence and prevalence of drug use and addiction in those groups, looking at risk and protective factors;
- Provide communities with effective research-based tools that will enhance the assessment of drug abuse problems;
- Translate research-based prevention principles so that they better meet the specific needs of local communities;
- Develop effective, culturally specific drug-abuse prevention strategies for minority populations who are at increased risk;
- Determine the link between drug abuse and infections such as HIV and hepatitis in order to help reduce the local impact of these devastating illnesses;
- Identify and examine issues of health disparities in drug abuse and associated infectious diseases, particularly HIV/AIDS, within racial/ethnic populations, including analyses by gender;
- Identify the short- and long-term effects that drug use, abuse, addiction, and violence have on the overall health of men, women, and children of all racial and ethnic populations;
- Translate basic neurobiological and behavioral research into new treatments;
- Understand the medical consequences of drug abuse and addiction, and use that knowledge to develop new pharmacological and behavioral strategies for dealing with these consequences;
- Ensure that science-based treatments are translated for use in community settings;
- Increase the number of treatment research studies that focus on racial and ethnic differences and improve dissemination of study results;
- Use scientific methods to examine traditional, community-based treatments for addiction, and to identify and standardize the "active ingredients" of those treatments;
- Develop science-based educational materials, presenting research findings and their implications in plain English;
- Disseminate materials broadly to reach as wide an audience as possible with information that is useful, usable, and used; and
- Improve ways to disseminate research findings within and across minority groups.

DRUG ABUSE AND ADDICTION: A MAJOR PUBLIC HEALTH PROBLEM

UNDERSTANDING DRUG ABUSE AND ADDICTION

Many people view drug abuse and addiction strictly as a social problem. Parents, teens, older adults, and other members of the community tend to characterize people who take drugs as morally weak or as criminal. They believe that drug abusers and addicts would be able to "just stop" taking drugs if they were willing to change their behavior. These myths have stereotyped not only those with drug-related problems, but also their families, their communities, and the health care professionals who work with them.

The reality, however, is that drug abuse and addiction are the central components of a public health problem that affects many Americans and has wide-ranging and often quite damaging social consequences. It is NIDA's goal to help the public abandon the myths and long-held false beliefs about drug abuse and addiction by offering scientific evidence that addiction is a chronic, relapsing, and treatable disease.

Addiction indeed begins when an individual makes a conscious choice to use drugs, but addiction is not just "a lot of drug use." Recent scientific research provides overwhelming evidence that not only do drugs interfere with normal brain functioning—creating powerful feelings of pleasure—but also they have long-term effects on brain metabolism and activity. At some point, changes occur in the brain that can turn drug abuse into addiction—a chronic, relapsing illness. Those addicted to drugs suffer from compulsive drug craving, drug seeking, and use. They cannot "just quit" by themselves. Treatment is needed to end this compulsive behavior.

A variety of approaches to help patients deal with cravings and avoid drug relapse are used in treatment programs. Through treatment that is tailored to individual needs, patients can learn to control their condition and live normal lives. And treatment can have a profound effect not only on drug abusers, but on society as a whole, by significantly improving individual social and behavioral functioning, decreasing related criminality and violence, and reducing the spread of AIDS. It also can reduce dramatically the costs of drug abuse to society.

Understanding drug abuse also has helped us understand how to prevent drug use in the first place. NIDA-funded prevention research has shown that comprehensive prevention programs involving families, schools, communities, and the media are effective in reducing drug abuse.

NIDA's work is intended to change the public's negative view of drug abuse and addiction, and the wealth of scientific data NIDA has amassed clearly documents the fact that addiction is a treatable brain disease. Overcoming misconceptions and replacing ideology with scientific knowledge is the best hope for bridging the "Great Disconnect": the gap between the public perception of drug abuse and addiction and the scientific facts.

EXTENT OF THE PROBLEM—NATIONWIDE TRENDS

An important component of NIDA's mission is to track drug use trends. To accomplish this goal, the Institute sponsors several surveys and epidemiological studies. The findings from NIDA and other Federal studies and surveys are published each year and posted on NIDA's and other Web sites. The major sources of data regarding the extent of drug use in the United States include the following:

Monitoring the Future (MTF) Study *(www.monitoringthefuture.org)*—MTF is an annual survey on drug use and related attitudes of America's adolescents that began in 1975. The survey is conducted by the University of Michigan's Institute for Social Research and is funded by NIDA. Copies of the latest survey are available from the National Clearinghouse for Alcohol and Drug Information (NCADI) at 1-800-729-6686.

Community Epidemiology Work Group (CEWG) *(www.nida.nih.gov/CEWG/CEWGHome.html)*—CEWG is a NIDA-sponsored network of researchers from more than 20 major U.S. metropolitan areas and selected foreign countries who meet semiannually to discuss the current epidemiology of drug abuse. CEWG's most recent reports are available on the CEWG Web site.

National Household Survey on Drug Abuse (NHSDA) (*www.samhsa.gov/oas/nhsda*)—NHSDA is an annual survey conducted by the Substance Abuse and Mental Health Services Administration (SAMHSA). Based on a representative sample of the U.S. population aged 12 and older—including persons living in households and in some group facilities such as dormitories and homeless shelters—it provides estimates of the prevalence of illicit drug, alcohol, and tobacco use in the United States and monitors the trends in use over time. The national trends in substance use presented in the 1999 report are based on data from a sample of 13,000 respondents using paper questionnaires similar to those used in prior years. Copies of the latest survey are available from NCADI at 1-800-729-6686.

Drug Abuse Warning Network (DAWN) *(www.samhsa.gov/oas/dawn)*—The DAWN report, also prepared by SAMHSA, provides information regarding the impact of drug use on hospital emergency departments in the United States. It reports the number of episodes in which visits to the emergency department were related directly to the use of an illegal drug or nonmedical use of a legal drug. DAWN is not a measure of prevalence of use but instead offers information complementary to the prevalence data found in the NHSDA.

Cocaine

Monitoring the Future Study

The proportion of high-school seniors who have used cocaine at least once in their lifetime has increased from a low of 5.9 percent in 1994 to 9.8 percent in 2000. However, this is lower than its peak of 17.3 percent in 1985. Current (past month) use of cocaine by seniors decreased from a high of 6.7 percent in 1985 to 2.6 percent in 2000. Also in 2000, 6.9 percent of 10th-graders had tried cocaine at least once, up from a low of 3.3 percent in 1992 but down from 2000's 7.8 percent. The percentage of 8th-graders who had ever tried cocaine has increased from a low of 2.3 percent in 1991 to 4.5 percent in 2000.

Percentage of Students Who Have Used Cocaine : Monitoring the Future Study, 2000

	8th-Graders	10th-Graders	12th-Graders
Ever Used	4.5	6.9	8.6
Used in Past Year	2.6	4.4	5.0
Used in Past Month	1.2	1.8	2.1

Community Epidemiology Work Group

Although demographic data continue to indicate that most cocaine users are older, inner-city crack addicts, isolated field reports have identified new groups of users: teenagers smoking crack with marijuana in some cities; Hispanic crack users in Texas; and in the Atlanta area, middle-class suburban users of cocaine hydrochloride and female crack users in their 30s with no prior drug use history.

National Household Survey on Drug Abuse

In 1998, about 1.7 million Americans were using cocaine at least once a month, and 437,000 used crack. The total number of once-monthly cocaine users represents approximately 0.8 percent of the population aged 12 and older. The rate of current cocaine use in 1998 was highest among Americans aged 18 to 25 (2 percent). The rate of use for this age group was significantly higher in 1998 than in 1997, when it was only 1.2 percent.

Marijuana

Monitoring the Future Study

After decreasing for more than a decade, marijuana use among students began to increase in the early 1990s. From 1998 to 2000, use of marijuana at least once (lifetime use) increased among 12th- and 10th-graders, continuing the trend seen in recent years. The seniors' rate of lifetime marijuana use was higher than any year since 1987, but all rates remained well below those seen in the late 1970s and early 1980s. Past-year and past-month marijuana use did not change significantly from 1999 to 2000 in any of the three grades, suggesting the sharp increases of recent years may be slowing. Daily marijuana use in the past month increased slightly among all three grades as well.

Percentage of 8th-Graders Who Have Used Marijuana: Monitoring the Future Study, 2000										
	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Ever Used	10.2	11.2	12.6	16.7	19.9	23.1	22.6	22.2	22	20.3
Used in Past Year	6.2	7.2	9.2	13.	15.8	18.3	17.7	16.9	16.5	15.6
Used in Past Month	3.2	3.7	5.1	7.8	9.1	11.3	10.2	9.7	9.7	9.4
Daily Use in Past Month	0.2	0.2	0.4	0.7	0.8	1.5	1.1	1.1	1.4	1.3

Percentage of 10th-Graders Who Have Used Marijuana: Monitoring the Future Study, 2000										
	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Ever Used	23.4	21.4	24.4	30.4	34.1	39.8	42.3	39.6	40.9	40.3
Used in Past Year	16.5	15.2	19.2	25.2	28.7	33.6	34.8	31.1	32.1	32.1
Used in Past Month	8.7	8.1	10.9	15.8	17.2	20.4	20.5	18.7	19.4	19.7
Daily Use in Past Month	0.8	0.8	1.0	2.2	2.8	3.5	3.7	3.6	3.8	3.8

Percentage of 12th-Graders Who Have Used Marijuana: Monitoring the Future Study, 2000												
	1979	1985	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Ever Used	60.4	54.2	36.7	32.6	35.3	38.2	41.7	44.9	49.6	49.1	49.7	48.8
Used in Past Year	50.8	40.6	23.9	21.9	26	30.7	34.7	35.8	38.5	37.5	37.8	36.5
Used in Past Month	36.5	25.7	13.8	11.9	15.5	19	21.2	21.9	23.7	22.8	23.1	21.6
Daily Use in Past Month	10.3	4.9	2.0	1.9	2.4	3.6	4.6	4.9	5.8	5.6	6.0	6.0

Community Epidemiology Work Group

In 1998, marijuana indicators continued an upward trend in most CEWG metropolitan areas. The number of emergency department mentions of marijuana increased significantly in seven sites, with the largest increases occurring in Dallas (to 63.9 percent), Boston (to 44.1 percent), Denver (to 40 percent), San Diego (to 35.1 percent), and Atlanta (to 31.7 percent). The highest percentage increase in emergency department mentions between the first half of 1997 and the first half of 1998 was among 12- to 17-year-olds.

The rates of treatment for primary abuse of marijuana increased in six CEWG sites and remained stable elsewhere. Marijuana treatment admissions were highest in Denver (41 percent of all admissions), Miami (30 percent), New Orleans (22 percent), and Minneapolis/St. Paul (20 percent). Half of the individuals admitted for treatment of marijuana abuse in Minneapolis/St. Paul were younger than 18.

In six of the CEWG sites, juvenile arrestees testing positive for marijuana ranged from a low of 40.3 percent in St. Louis to a high of 63.7 percent in Phoenix. More than 50 percent of juvenile arrestees in Los Angeles, Denver, and Washington, DC, and 48.9 percent in San Diego tested positive for marijuana. Among all arrestees, only women in Seattle were more likely than men (37.9 percent vs. 35.4 percent) to test positive for marijuana.

National Household Survey on Drug Abuse

Marijuana remains the most commonly used illegal drug in the United States. An estimated 2.1 million people started using marijuana in 1998. According to data from the 1998 NHSDA, more than 72 million Americans (33 percent) 12 years of age and older have tried marijuana at least once in their lifetimes, and almost 18.7 million (8.6 percent) had used marijuana in the past year. In 1985, 56.5 million Americans (29.4 percent) had tried marijuana at least once, and 26.1 million (13.6 percent) had used marijuana within the past year.

Cigarettes and Other Nicotine Products

Monitoring the Future Study

Prevalence rates for smoking among young people remain high, in spite of the demonstrated health risk associated with smoking. Since 1975, cigarettes consistently have been the substance that the greatest number of high-school students use daily.

Between 1999 and 2000, however, past-month smoking decreased significantly among 8th-graders, from 17.5 percent to 14.6 percent, among 10th-graders from 25.7 percent to 23.9 percent, and among seniors from 34.6 percent to 31.4 percent. Lifetime use also declined somewhat in all categories, from 44.1 percent to 40.5 percent in 8th-graders, from 57.6 percent to 55.1 percent in 10th-graders, and from 64.6 percent to 62.5 percent in 12th-graders. Lifetime use of smokeless tobacco declined only slightly in all categories.

Percentage of Students Using Tobacco Products: Monitoring the Future Study, 2000

	8th-Graders	10th-Graders	12th-Graders
Ever Used	40.5	55.1	62.5
Used in Past Month	14.6	23.9	31.4
Pack + per Day	2.3	6.2	11.3

National Household Survey on Drug Abuse

In 1998, an estimated 60 million Americans, or 28 percent of all Americans aged 12 and older, were current smokers. Approximately 18 percent (4.1 million) of youths 12 to 17 years old were current smokers in 1998. The 1998 survey showed that current smokers are more likely to drink heavily and use illegal drugs than are nonsmokers.

Heroin

Monitoring the Future Study

According to the 2000 MTF survey, rates of heroin use remained relatively stable and low through the late 1970s and into the 1980s. After 1991, however, use began to rise slightly among 10th- and 12th-graders, and after 1993, among 8th-graders. Although the annual prevalence rates for heroin use remained relatively low in 1999, these rates are approximately two to three times higher than those reported in 1991, and a slight increase in lifetime use (from 2 percent to 2.4 percent) was noted among 12th-graders.

Percentage of Students Using Heroin: Monitoring the Future Study, 2000

	8th-Graders	10th-Graders	12th-Graders
Ever Used	1.9	2.2	2.4
Used in Past Year	1.1	1.4	1.5
Used in Past Month	0.5	0.5	0.7

Community Epidemiology Work Group

In June 2000, CEWG reported that heroin indicators showed mixed trends. Mortality figures indicated that the number of heroin-related deaths had increased, most notably in Austin, Detroit, Minneapolis/St. Paul, and Phoenix. But the number of these types of deaths declined in Miami, Philadelphia, St. Louis, San Diego, and Seattle. Statistics regarding emergency department admissions also were mixed, with 10 cities showing decreases (significant in San Francisco and Washington, DC) and 10 showing increases (most notably in Baltimore and Miami). Heroin continued to account for a substantial proportion of treatment admissions in some CEWG areas (47.8 percent in Baltimore, 43 percent in New York, and 32 percent in Detroit). Heroin injection characterized a large proportion of primary heroin treatment admissions.

During the second quarter of 1999, the highest purity levels were found in Philadelphia (71 percent), New York (63.6 percent), Boston (61.4 percent), Atlanta (57.8 percent), and San Diego (57.6 percent). Purity levels in other CEWG areas ranged from 11.8 percent in Dallas to 46.7 percent in Detroit.

Injecting is on an upward trend among younger users in Baltimore, Boston, Minneapolis/St. Paul, Newark, New York, and Seattle. In Boston, Chicago, Denver, Miami, and Washington, DC, snorting seems to be increasing and is often the starting route for new users.

National Household Survey on Drug Abuse

The lifetime prevalence for heroin use for people aged 12 and older was 1.4 percent: 0.4 percent were aged 12 to 17; 1.8 were aged 18 to 25; and 1.4 percent were aged 26 and older.

Methamphetamine

Monitoring the Future Study

Recent data obtained through the MTF study include the following:

- In 1997, 4.4 percent of high-school seniors had used methamphetamine at least once in their lifetimes—an increase from 2.7 percent in 1990.
- A total of 2.3 percent of seniors reported past-year use of methamphetamine in 1997—an increase from 1.3 percent in 1990.

Community Epidemiology Work Group

Methamphetamine use is the dominant illegal drug problem in San Diego. San Francisco and Honolulu also have substantial methamphetamine-using populations. Patterns of increasing use have been noted in Denver, Los Angeles, Minneapolis, Phoenix, Seattle, and Tucson. New trafficking patterns have increased the availability of the drug in Missouri, Nebraska, and Iowa.

National Household Survey on Drug Abuse

According to the 1996 NHSDA, 2.3 percent of the population aged 12 and older (4.9 million people) had tried methamphetamine at least once in their lifetimes. These figures do not indicate a statistically significant increase from the 4.7 million people (2.2 percent) who in the 1995 NHSDA reported using methamphetamine at least once in their lifetimes.

Anabolic Steroids

Monitoring the Future Study

Because of growing professional and public concern over the abuse of anabolic steroids by adolescents and young adults, questions regarding anabolic steroid use were added to the MTF study in 1989. Between 1989 and 1999, lifetime prevalence of anabolic steroid use among 12th-graders fluctuated between a 3 percent high in 1989 and a 1.9 percent low in 1996.

According to the 2000 survey, 3 percent of 8th-graders and 3.5 percent of 10th-graders reported that they had taken anabolic steroids at least once in their lives. Among 10th-graders in 1999, 3.5 percent had used anabolic steroids at least once in their lifetimes, up from 2.7 percent in 1999 and 2 percent in 1998. The rates of change for past-year and past-month use from 1999 to 2000 were insignificant, with the exception of past-year use by 10th-graders, which increased from 1.7 percent to 2.2 percent.

Percentage of Students Using Anabolic Steroids: Monitoring the Future Study, 2000

	8th-Graders	10th-Graders	12th-Graders
Ever Used	3.0	3.0	2.5
Used in Past Year	1.7	2.2	1.7
Used in Past Month	0.8	1.0	0.8

Inhalants

Monitoring the Future Study

NIDA's national survey of drug use among high-school students provides estimates of the percentage of seniors using inhalants since 1976. In 1997, 21 percent of 8th-graders and 18.3 percent of 10th-graders had used inhalants at least once in their lives; 11.8 percent of 8th-graders and 8.7 percent of 10th-graders had used inhalants in the past year. Since 1997, these rates have begun a slow but steady decline. In 1998, 20.5 percent of 8th-graders reported lifetime use of inhalants; in 1999, that number had decreased to 19.7 percent and in 2000, to 17.9. In 1998, 18.3 percent of 10th-graders reported lifetime use of inhalants; by 1999, that number had decreased to 17 percent and in 2000, to 16.6. In 1998, 15.2 percent of high-school seniors had tried inhalants; that number increased to 15.4 in 1999 but decreased to 14.2 percent in 2000.

Percentage of Students Using Inhalants: Monitoring the Future Study, 2000

	8th-Graders	10th-Graders	12th-Graders
Ever Used	17.9	16.6	14.2
Used in Past Year	9.4	7.3	5.9
Used in Past Month	4.5	2.6	2.2

National Household Survey on Drug Abuse

Data from the NHSDA show that in 1996, 1.3 million adolescents (5.9 percent) reported use of inhalants at least once in their lifetimes, and 900,000 (4 percent) reported using inhalants in the past year.

Depressants

Use of GHB in the club scene is becoming more widespread throughout the country, most notably in Atlanta, Detroit, Honolulu, Miami, New York, Phoenix, and Texas. Ketamine ("Special K") use also has been reported in several cities. A mixture of GHB, ketamine, and alcohol—called "Special K-lude" because it produces effects similar to those produced by methaqualone (Quaaludes)—has become popular in New York. Rohypnol use continues in many areas of the country (excluding the Northeast) and is increasing in Texas and Florida. Its widespread availability has declined, however, since the Federal ban on its importation. Other medications from the same manufacturer are now being sold and abused as "roofies" in Miami, Minnesota, and Texas. These drugs include clonazepam, (a pharmaceutical benzodiazepine, marketed in Mexico as Rivotril and in the United States as Klonopin), which has the same distinguishing manufacturer's imprint as flunitrazepam. Clonazepam also is used by addicts to enhance the effects of methadone and other opiates.

Hallucinogens

According to field reports in numerous areas, such as Texas, Boston, Chicago, New York, Philadelphia, St. Louis, and Washington, DC, PCP is often used in combination with other drugs. A frequently reported combination is marijuana mixed with or dipped into PCP and rolled into "joints" or "blunts." In other cities, such as Los Angeles and New Orleans, PCP is commonly purchased as a predipped cigarette. In New York, PCP is combined with crack in "spaceballs." PCP emergency department mentions increased in 10 cities, but rates remain relatively low. Lysergic acid diethylamide (LSD) remains widely available in most CEWG cities, especially in suburban and rural areas. Use of psilocybin mushrooms also has been reported among adolescents and young adults in Boston, Minneapolis/St. Paul, and Philadelphia.

COMMONLY ABUSED DRUGS

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Substances: Category and Name	Examples of *Commercial* and Street Names	DEA Schedule*/ How Administered**	*Intoxication Effects*/Potential Health Consequences
Cannabinoids			*euphoria, slowed thinking and reaction time, confusion, impaired balance and coordination/cough, frequent respiratory infections; impaired memory and learning; increased heart rate, anxiety; panic attacks; tolerance, addiction*
hashish	*boom, chronic, gangster, hash, hash oil, hemp*	I/swallowed, smoked	
marijuana	*blunt, dope, ganja, grass, herb, joints, Mary Jane, pot, reefer, sinsemilla, skunk, weed*	I/swallowed, smoked	
Depressants			*reduced pain and anxiety; feeling of well-being; lowered inhibitions; slowed pulse and breathing; lowered blood pressure; poor concentration/confusion, fatigue; impaired coordination, memory, judgment; respiratory depression and arrest, addiction*
barbiturates	*Amytal, Nembutal, Seconal, Phenobarbital:* barbs, reds, red birds, phennies, tooies, yellows, yellow jackets	II, III, V/injected, swallowed	*Also, for barbiturates—sedation, drowsiness/depression, unusual excitement, fever, irritability, poor judgment, slurred speech, dizziness*
benzodiazepines (other than flunitrazepmam)	*Ativan, Halcion, Librium, Valium, Xanax;* candy, downers, sleeping pills, tranks	IV/swallowed	*for benzodiazepines—sedation, drowsiness/dizziness*
flunitrazepam***	*Rohypnol;* forget-me pill, Mexican Valium, R2, Roche, roofies, roofinol, rope, rophies	IV/swallowed, snorted	*for flunitrazepam—visual and gastrointestinal disturbances, urinary retention, memory loss for the time under the drug's effects*
GHB***	*gamma-hydroxybutyrate:* G, Georgia home boy, grievous bodily harm, liquid ecstasy	under consideration/swallowed	*for GHB—drowsiness, nausea/vomiting, headache, loss of consciousness, loss of reflexes, seizures, coma, death*
methaqualone	*Quaalude, Sopor, Parest:* ludes, mandrex, quad, quay	I/injected, swallowed	*for methaqualone—euphoria/depression, poor reflexes, slurred speech, coma*
Dissociative Anesthetics			*increased heart rate and blood pressure, impaired motor function/memory loss; numbness; nausea/vomiting*
ketamine	*Ketalar SV;* cat Valiums, K, Special K, vitamin K	III/injected, snorted, smoked	*Also, for ketamine—at high doses, delirium, depression, respiratory depression and arrest*
PCP and analogs	*phencyclidine;* angel dust, boat, hog, love boat, peace pill	I, II/injected, swallowed, smoked	*for PCP and analogs—possible decrease in blood pressure and heart rate, panic, aggression, violence/loss of appetite, depression*
Hallucinogens			*altered states of perception and feeling; nausea/chronic mental disorders, persisting perception disorder (flashbacks)*
LSD	*lysergic acid diethylamide;* acid, blotter, boomers, cubes, microdot, yellow sunshines	I/swallowed, absorbed through mouth tissues	*Also, for LSD and mescaline—increased body temperature, heart rate, blood pressure; loss of appetite, sleeplessness, numbness, weakness, tremors*
mescaline	buttons, cactus, mesc, peyote	I/swallowed, smoked	*for psilocybin—nervousness, paranoia*
psilocybin	magic mushroom, purple passion, shrooms	I/swallowed	
Opioids and Morphine Derivatives			*pain relief, euphoria, drowsiness/respiratory depression and arrest, nausea, confusion, constipation, sedation, unconsciousness, coma, tolerance, addiction*
codeine	*Empirin with Codeine, Fiorinal with Codeine, Robitussin A-C, Tylenol with Codeine;* Captain Cody, Cody, schoolboy; (with glutethimide) doors & fours, loads, pancakes and syrup	II, III, IV/injected, swallowed	*Also, for codeine—less analgesia, sedation, and respiratory depression than morphine*
fentanyl	*Actiq, Duragesic, Sublimaze;* Apache, China girl, China white, dance fever, friend, goodfella, jackpot, murder 8, TNT, Tango and Cash	II/injected, smoked, snorted	*for heroin—staggering gait*
heroin	*diacetylmorphine;* brown sugar, dope, H, horse, junk, skag, skunk, smack, white horse	I/injected, smoked, snorted	
morphine	*Roxanol, Duramorph:* M, Miss Emma, monkey, white stuff	II, III/injected, swallowed, smoked	
opium	*laudanum, paregoric:* big O, black stuff, block, gum, hop	II, III, V/swallowed, smoked	
Stimulants			*increased heart rate, blood pressure, metabolism; feelings of exhilaration, energy; increased mental alertness/rapid or irregular heart beat; reduced appetite, weight loss, heart failure*
amphetamine	*Biphetamine, Dexedrine:* bennies, black beauties, crosses, hearts, LA turnaround, speed, truck drivers, uppers	II/injected, swallowed, smoked, snorted	*Also, for amphetamine—rapid breathing; hallucinations/tremor, loss of coordination; irritability, anxiousness, restlessness, delirium, panic, paranoia, impulsive behavior, aggressiveness, tolerance, addiction*
cocaine	*Cocaine hydrochloride:* blow, bump, C, candy, Charlie, coke, crack, flake, rock, snow, toot	II/injected, smoked, snorted	*for cocaine—increased temperature/chest pain, respiratory failure, nausea, abdominal pain, strokes, seizures, headaches, malnutrition*
MDMA (methylenedioxymethamphetamine)	*DOB, DOM, MDA:* Adam, clarity, ecstasy, Eve, lover's speed, peace, STP, X, XTC	I/swallowed	*for MDMA—mild hallucinogenic effects, increased tactile sensitivity, empathic feelings, hyperthermia/impaired memory and learning*
methamphetamine	*Desoxyn;* chalk, crank, crystal, fire, glass, go fast, ice, meth, speed	II/injected, swallowed, smoked, snorted	*for methamphetamine—aggression, violence, psychotic behavior/memory loss, cardiac and neurological damage; impaired memory and learning, tolerance, addiction*

*Schedule I and II drugs have a high potential for abuse. They require greater storage security and have a quota on manufacturing, among other restrictions. Schedule I drugs are available for research only and have no approved medical use; Schedule II drugs are available only by prescription (unrefillable) and require a form for ordering. Schedule III and IV drugs are available by prescription, may have five refills in 6 months, and may be ordered orally. Most Schedule V drugs are available over the counter.

**Taking drugs by injection can increase the risk of infection through needle contamination with staphylococci, HIV, hepatitis, and other organisms.

***Associated with sexual assaults.

Substances: Category and Name	Examples of *Commercial* and Street Names	DEA Schedule*/ How Administered**	*Intoxication Effects*/Potential Health Consequences
Stimulants (continued)			
methylphenidate	*Ritalin*, JIF, MPH, R-ball, Skippy, the smart drug, vitamin R	II/injected, swallowed, snorted	*for methylphenidate*—*increase or decrease in blood pressure, psychotic episodes*/digestive problems, loss of appetite, weight loss
nicotine	bidis, chew, cigars, cigarettes, smokeless tobacco, snuff, spit tobacco	not scheduled/smoked, snorted, taken in snuff and spit tobacco	*for nicotine*—additional effects attributable to tobacco exposure – adverse pregnancy outcomes; chronic lung disease, cardiovascular disease, stroke, cancer; tolerance, addiction
Other Compounds			
anabolic steroids	*Anadrol, Oxandrin, Durabolin, Depo-Testosterone, Equipoise*; roids, juice	III/injected, swallowed, applied to skin	*no intoxication effects*/hypertension, blood clotting and cholesterol changes, liver cysts and cancer, kidney cancer, hostility and aggression, acne; adolescents, premature stoppage of growth; in males, prostate cancer, reduced sperm production, shrunken testicles, breast enlargement; in females, menstrual irregularities, development of beard and other masculine characteristics
inhalants	*Solvents (paint thinners, gasoline, glues), gases (butane, propane, aerosol propellants, nitrous oxide), nitrites (isoamyl, isobutyl, cyclohexyl)*; laughing gas, poppers, snappers, whippets	not scheduled/inhaled through nose or mouth	*stimulation, loss of inhibition; headache; nausea or vomiting; slurred speech, loss of motor coordination; wheezing*/unconsciousness, cramps, weight loss, muscle weakness, depression, memory impairment, damage to cardiovascular and nervous systems, sudden death

Principles of Drug Addiction Treatment

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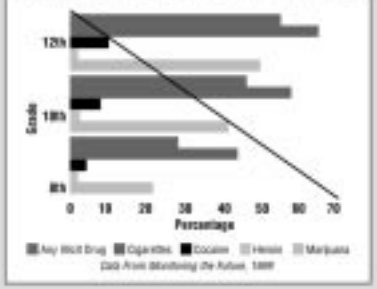
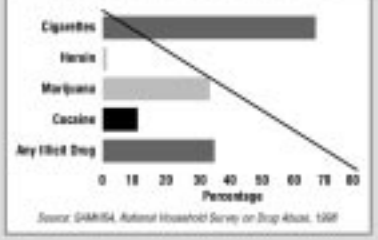
More than two decades of scientific research has yielded a set of 13 fundamental principles that characterize effective drug abuse treatment. These principles are detailed in NIDA's *Principles of Drug Addiction Treatment: A Research-Based Guide*.

1. **No single treatment is appropriate for all individuals.** Matching treatment settings, interventions, and services to each patient's problems and needs is critical.
2. **Treatment needs to be readily available.** Treatment applicants can be lost if treatment is not immediately available or readily accessible.
3. **Effective treatment attends to multiple needs of the individual, not just his or her drug use.** Treatment must address the individual's drug use and associated medical, psychological, social, vocational, and legal problems.
4. **At different times during treatment, a patient may develop a need for medical services, family therapy, vocational rehabilitation, and social and legal services.**
5. **Remaining in treatment for an adequate period of time is critical for treatment effectiveness.** The time depends on an individual's needs. For most patients, the threshold of significant improvement is reached at about 3 months in treatment. Additional treatment can produce further progress. Programs should include strategies to prevent patients from leaving treatment prematurely.
6. **Individual and/or group counseling and other behavioral therapies are critical components of effective treatment for addiction.** In therapy, patients address motivation, build skills to resist drug use, replace drug-using activities with constructive and rewarding nondrug-using activities, and improve problem-solving abilities. Behavioral therapy also facilitates interpersonal relationships.
7. **Medications are an important element of treatment for many patients, especially when combined with counseling and other behavioral therapies.** Methadone and levo-alpha-acetylmethadol (LAAM) help persons addicted to opiates stabilize their lives and reduce their drug use. Naltrexone is effective for some opiate addicts and some patients with co-occurring alcohol dependence. Nicotine patches or gum, or an oral medication, such as buproprion, can help persons addicted to nicotine.
8. **Addicted or drug-abusing individuals with coexisting mental disorders should have both disorders treated in an integrated way.**
9. **Medical detoxification is only the first stage of addiction treatment and by itself does little to change long-term drug use.** Medical detoxification manages the acute physical symptoms of withdrawal. For some individuals it is a precursor to effective drug addiction treatment.
10. **Treatment does not need to be voluntary to be effective.** Sanctions or enticements in the family, employment setting, or criminal justice system can significantly increase treatment entry, retention, and success.
11. **Possible drug use during treatment must be monitored continuously.** Monitoring a patient's drug and alcohol use during treatment, such as through urinalysis, can help the patient withstand urges to use drugs. Such monitoring also can provide early evidence of drug use so that treatment can be adjusted.
12. **Treatment programs should provide assessment for HIV/AIDS, hepatitis B and C, tuberculosis and other infectious diseases, and counseling to help patients modify or change behaviors that place them or others at risk of infection.** Counseling can help patients avoid high-risk behavior and help people who are already infected manage their illness.
13. **Recovery from drug addiction can be a long-term process and frequently requires multiple episodes of treatment.** As with other chronic illnesses, relapses to drug use can occur during or after successful treatment episodes. Participation in self-help support programs during and following treatment often helps maintain abstinence.

Teenagers Who Have Ever Used Illicit Drugs



Percentage of U.S. Population (Aged 12 and Over) Who Have Ever Used Drugs of Abuse



MARIJUANA

Marijuana is a green or gray mixture of dried, shredded flowers and leaves from the hemp plant *Cannabis sativa.* More than 200 slang terms for marijuana are used, including "pot," "herb," "weed," "boom," "Mary Jane," "gangster," and "chronic." It is usually smoked as a cigarette (called a "joint" or a "nail") or in a pipe or bong. In recent years, marijuana has appeared in "blunts," which are cigars that have been emptied of tobacco and refilled with marijuana, often in combination with another drug, such as PCP. Some users also mix marijuana into foods or use it to brew tea.

The active chemical in marijuana is delta-9-tetrahydrocannabinol (THC). In 1988, researchers discovered that the membranes of certain nerve cells contain protein receptors that bind THC. Once securely in place, THC kicks off a series of cellular reactions that ultimately lead to the high that users experience when they smoke marijuana. The short-term effects of marijuana use include problems with memory and learning; distorted perception; difficulty in thinking and problemsolving; loss of coordination; increased heart rate; anxiety; and panic attacks.

Scientists have found that whether an individual has positive or negative sensations after smoking marijuana can be influenced by heredity. A recent study demonstrated that identical male twins were more likely than fraternal male twins to report similar responses to marijuana use, indicating a genetic basis for their sensations. Identical twins share all of their genes, and fraternal twins share about half.

Environmental factors—such as the availability of marijuana, expectations about how the drug would affect them, the influence of friends and social contacts, and other factors that differentiate identical twins' experiences—also were found to have important effects; however, the twins' shared or family environment before age 18 appears to have had no influence on their response to marijuana.

Health Hazards

Effects of Marijuana on the Brain

Researchers have found that THC changes the way in which sensory information enters and is processed by the hippocampus. The hippocampus is a component of the brain's limbic system, which is crucial for learning, memory, and the integration of sensory experiences with emotions and motivations. Investigations have shown that neurons in the information processing system of the hippocampus and the activity of the nerve fibers in this region are suppressed by THC. In addition, researchers have discovered that learned behaviors, which depend on the hippocampus, also deteriorate via this mechanism. Recent research findings also indicate that long-term use of marijuana produces changes in the brain similar to those seen after long-term use of other major drugs of abuse.

Effects of Marijuana on the Lungs

Individuals who smoke marijuana regularly may experience many of the same respiratory problems—daily cough and phlegm, symptoms of chronic bronchitis, and more frequent chest colds—as tobacco smokers. Continued marijuana use can lead to injured or destroyed lung tissue and thus to abnormal functioning of the lungs.

Regardless of the THC content, the amount of tar inhaled by marijuana smokers and the level of carbon monoxide absorbed are three to five times greater than among tobacco smokers. This may be due to the fact that marijuana users inhale more deeply, holding the smoke in the lungs, and because marijuana smoke is unfiltered.

Effects on Heart Rate and Blood Pressure of Marijuana Used in Conjunction with Cocaine

Recent findings indicate that smoking marijuana while injecting cocaine has the potential to cause severe increases in heart rate and blood pressure. In one study, experienced marijuana and cocaine users were given marijuana alone, cocaine alone, and then a combination of both. Each drug alone produced cardiovascular effects; when they were combined, the effects were greater and lasted longer. The heart rates of the subjects in the study increased an average of 29 beats per minute with marijuana alone and 32 beats per minute with cocaine alone. When the drugs were given together, the heart rates increased by an average of 49 beats per minute, and the increased rate persisted for a longer time. The drugs were given with the subjects sitting quietly. In normal circumstances, an individual may smoke marijuana and inject cocaine and then do something physically stressful that may increase significantly the risk of overloading the cardiovascular system.

Effects on Pregnancy

Any drug of abuse can affect a mother's health during pregnancy, interfering with proper nutrition and rest, which in turn can affect proper functioning of the immune system. Some studies have found that babies born to mothers who used marijuana during pregnancy were smaller than those born to mothers who did not use the drug; in general, smaller babies are more likely to develop health problems.

A nursing mother who uses marijuana passes THC to her baby via her breast milk. Research indicates that the use of marijuana by a mother during the first month of breastfeeding can impair the infant's motor development (control of muscle movement).

Addictive Potential

A drug is addicting if it causes compulsive, often uncontrollable drug craving, seeking, and use, even in the face of negative health and social consequences. Marijuana meets this criterion. Each year, more than 120,000 people enter treatment for marijuana addiction. In addition, animal studies suggest that marijuana causes physical dependence, and some people report experiencing withdrawal symptoms when they stop using the drug.

Effects of Heavy Marijuana Use on Learning and Social Behavior

A study of college students has shown that critical skills related to attention, memory, and learning are impaired among people who use marijuana heavily, even after its use is discontinued for at least 24 hours. Researchers compared 65 "heavy users," who had smoked marijuana an average of 29 times in the past 30 days, to 64 "light users," who had smoked a median of once in the past 30 days. After a closely monitored 19- to 24-hour period of abstinence from marijuana, other illegal drugs, and alcohol, the undergraduates were given several standard tests measuring aspects of attention, memory, and learning. Compared to the light users, heavy marijuana users made more errors and had more difficulty sustaining attention, shifting attention to meet the demands of changes in the environment, and in registering, processing, and using that information. These findings suggest that the greater impairment among heavy users probably is caused by an alteration of brain activity produced by marijuana.

Longitudinal research on marijuana use among people younger than college age indicates that those who use marijuana have lower achievement levels than non-users; tend to be more accepting of deviant behavior; are more likely to display delinquent behavior, aggression, and rebelliousness; are more likely to have poor relationships with their parents; and have more associations with delinquent and drug-using friends.

Research also shows more anger and more regressive behavior (such as thumb-sucking and temper tantrums) in toddlers whose parents use marijuana than among the toddlers of non-using parents.

CIGARETTES AND OTHER NICOTINE PRODUCTS

Nicotine is one of the most heavily used addictive drugs in the United States. Cigarette smoking has been the most popular method of ingesting nicotine since the beginning of the 20th century. In 1998, 60 million Americans (28 percent of all Americans aged 12 and older) smoked cigarettes, and 4.1 million were between the ages of 12 and 17 (18 percent of youth in this age bracket).

In 1989, the U.S. Surgeon General issued a report concluding that cigarettes and other forms of tobacco—such as cigars, pipe tobacco, and chewing tobacco—are addictive and that nicotine is the drug in tobacco that causes addiction. In addition, the report determined that smoking was a major cause of stroke and the third leading cause of death in the United States.

Health Hazards

Nicotine, which works on the central nervous system (CNS) as both a stimulant and a sedative, is highly addictive. The ingestion of nicotine results in an almost immediate "kick," because it causes a discharge of epinephrine from the adrenal cortex. This stimulates the CNS and other endocrine glands, which causes a sudden release of glucose. Stimulation is then followed by depression and fatigue, leading the abuser to seek more nicotine. Nicotine is absorbed readily from tobacco smoke in the lungs, and it does not matter whether the tobacco smoke is from cigarettes, cigars, or pipes.

Research has shown that stress and anxiety have powerful effects on nicotine tolerance and dependence. The stress hormone corticosterone reduces the effects of nicotine; therefore, more nicotine must be consumed to achieve the same effect. Studies in animals have shown also that stress can directly cause relapse to nicotine self-administration after a period of abstinence.

Most people experience withdrawal symptoms when they try to stop smoking. One study found that when chronic smokers were deprived of cigarettes for 24 hours, they displayed increased anger, hostility, aggression, and loss of social cooperation. Individuals who are going through nicotine withdrawal also take longer to regain emotional equilibrium after stressful events. During periods of abstinence and/or craving, smokers have shown impairment across a wide range of psychomotor and cognitive functions, such as language comprehension.

Women who smoke are more likely to experience earlier menopause. If women—especially women older than 30—smoke cigarettes and also take oral contraceptives, they are more prone to cardiovascular and cerebrovascular diseases than are other smokers.

Pregnant women who smoke cigarettes run an increased risk of having stillborn or premature infants or infants with low birthweights. Children of women who smoked during their pregnancies are at an increased risk for developing conduct disorders. In addition, national studies of mothers and daughters have found that maternal smoking during pregnancy increases the probability that female children will become addicted to cigarettes.

Adolescent smokeless tobacco users are more likely than non-users to become cigarette smokers. Behavioral research is beginning to explain how social influences, such as observing adults or other peers smoking, affect whether adolescents begin to smoke cigarettes. Unfortunately, research has shown that teens generally are resistant to many kinds of antismoking messages.

In addition to nicotine, cigarette smoke contains a dozen gases (principally carbon monoxide) and tar. The tar in a cigarette—which varies in amount from about 15 mg in a regular cigarette to 7 mg in a low-tar cigarette—increases the user's risk of developing lung cancer, emphysema, and bronchial disorders. The carbon monoxide in the smoke increases the chance of developing cardiovascular diseases.

Finally, the Environmental Protection Agency has concluded that secondhand smoke causes lung cancer in adults and greatly increases the risk of sudden infant death and respiratory illnesses in children.

Promising Research

Research has shown that nicotine—like cocaine, heroin, and marijuana—increases the level of the neurotransmitter dopamine, which affects the brain pathways that control reward and pleasure. Scientists have pinpointed a particular protein in the brain—the beta-2 (b2) subunit of the nicotine cholinergic receptor—as a critical component in nicotine addiction. Mice that lack this protein fail to self-administer nicotine, implying that without the b2 protein, the mice do not experience the positive reinforcing properties of nicotine. This new finding identifies a potential site for targeting the development of antinicotine addiction medications.

Other researchers have found that individuals have greater resistance to nicotine addiction if they have a genetic variant that decreases the function of the enzyme CYP2A6. The decrease in CYP2A6 slows the breakdown of nicotine and protects individuals against nicotine addiction. Understanding the role of this enzyme in nicotine addiction provides a new opportunity to develop more effective medications to help people stop smoking. Eventually, medications might be developed that can inhibit the function of CYP2A6, thus providing a new approach to preventing and treating nicotine addiction.

Another study has found that dramatic changes occur in the brain's pleasure circuits during withdrawal from chronic nicotine use. These changes are comparable in magnitude and duration to changes observed during withdrawal from other abused drugs such as cocaine, opiates, amphetamines, and alcohol. Scientists found significant decreases in the sensitivity of the brains of laboratory rats to pleasurable stimulation after nicotine administration was stopped abruptly. These changes lasted several days and may correspond to the anxiety and depression experienced by humans for several days after they quit "cold turkey." The results of this research may help in the development of better treatments for the withdrawal symptoms that may interfere with an individual's attempts to quit smoking.

Treatment

Research suggests that smoking cessation should be a gradual process because withdrawal symptoms are less severe in those who quit gradually than in those who quit "cold turkey." Rates of relapse are highest in the first few weeks and months and diminish considerably after 3 months. Studies have shown that pharmacological treatment combined with behavioral therapy—including psychological support and skills training to overcome high-risk situations—results in the highest long-term abstinence rates.

Behavioral economic studies find that alternative rewards and reinforcers can reduce cigarette use. One study found that the greatest reductions in cigarette use were achieved when smoking cost was increased along with the availability of alternative recreational activities.

Nicotine chewing gum is one medication approved by the FDA for the treatment of nicotine dependence. As a nicotine replacement, the gum helps smokers by reducing withdrawal symptoms. The success rates for smoking cessation treatment with nicotine chewing gum vary considerably, but evidence suggests that it is a safe means of facilitating smoking cessation if used according to instructions and restricted to patients who are under medical supervision.

Another approach to smoking cessation is the nicotine transdermal patch, which delivers a relatively constant amount of nicotine to the individual wearing it. A research team at NIDA's Intramural Research Program studied the safety, mechanism of action, and abuse liability of the patch that was consequently approved by FDA. Both nicotine gum and the patch, as well as other nicotine replacements such as sprays and inhalers, are used to help people quit smoking by reducing their withdrawal symptoms and preventing relapse while they undergo behavioral treatment.

Another tool in treating nicotine addiction is a medication that goes by the tradename Zyban. Zyban is not a nicotine replacement, like the gum and patch. Rather, it is an antidepressant that impacts levels of dopamine in brain reward pathways.

CRACK AND COCAINE

Cocaine is a powerfully addictive drug of abuse. The major methods of administration of cocaine are sniffing or snorting, injecting, and smoking (including free-base or use of crack cocaine). Snorting is the process of inhaling cocaine powder through the nose and absorbing it into the bloodstream through the nasal tissues. Injecting involves using a needle to release the drug directly into the bloodstream. The injecting drug user is at risk for transmitting or acquiring HIV infection/AIDS if needles or other injection equipment are shared. Smoking involves inhaling cocaine vapor or smoke into the lungs; absorption into the bloodstream is as rapid as by injection.

"Crack" is the street name given to cocaine that has been processed from cocaine hydrochloride to a freebase for smoking. Rather than being processed with the volatile substance ether, crack cocaine is processed with ammonia or sodium bicarbonate (baking soda) and water and heated to remove the hydrochloride, which produces a form of cocaine that can be smoked. The term "crack" refers to the crackling sound the mixture makes when it is smoked, presumably when the sodium bicarbonate is heated. It appears that compulsive cocaine use may develop even more rapidly if the substance is smoked rather than snorted. Smoking allows extremely high doses of cocaine to reach the brain very quickly and brings an intense and immediate high.

Health Hazards

Cocaine is a strong CNS stimulant that interferes with the reabsorption process of dopamine, a chemical messenger associated with pleasure and movement. Dopamine is released as part of the brain's reward system and is involved in the high that characterizes cocaine consumption.

Physical effects of cocaine use include constricted peripheral blood vessels, dilated pupils, and increased temperature, heart rate, and blood pressure. The duration of cocaine's immediate euphoric effects—which include hyperstimulation, reduced fatigue, and mental clarity—depends on the route of administration. The faster the absorption, the more intense the high. On the other hand, the faster the absorption, the shorter the duration of action. The high from snorting may last 15 to 30 minutes, while the high from smoking may last 5 to 10 minutes. Increased use can reduce the period of stimulation.

Some users of cocaine report feelings of restlessness, irritability, and anxiety. Many users eventually develop an appreciable tolerance to the drug, and many addicts report that they seek but fail to achieve as much pleasure from long-term use as they did from their first exposure. Scientific evidence suggests that the powerful neuropsychological reinforcing property of cocaine is responsible for an individual's continued use in spite of harmful physical and social consequences. In rare instances, sudden death can occur with the first use of cocaine or unexpectedly thereafter. However, no one can determine which individuals are more prone to sudden death.

High doses of cocaine and/or prolonged use can trigger paranoia. Smoking crack cocaine can produce particularly aggressive paranoid behavior. Often, when addicted individuals stop using cocaine, they become depressed, which may lead to relapse in order to alleviate this depression. Prolonged cocaine snorting can result in ulceration of the mucous membrane of the nose and can damage the nasal septum enough to cause it to collapse. Cocaine-related deaths often are a result of cardiac arrest or seizures followed by respiratory arrest.

Further, when people mix cocaine and alcohol, they are compounding the danger each drug poses and unknowingly conducting a complex chemical experiment within their bodies. NIDA-funded researchers have found that the human liver combines cocaine and alcohol and manufactures a third substance—cocaethylene—that intensifies cocaine's euphoric effects, while possibly increasing the risk of sudden death.

Treatment

The widespread abuse of cocaine has resulted in extensive efforts to develop treatment programs to address its abuse. One of NIDA's top research priorities is to find a medication to block or greatly reduce the effects of cocaine, to be used as one part of a comprehensive treatment program. NIDA-funded researchers also are looking into medications that may help alleviate the severe craving that people in treatment for cocaine addiction often experience. Several medications currently are being tested for their safety and efficacy in treating cocaine addiction.

In addition to treatment medications, behavioral interventions (particularly cognitive behavioral therapy) can be effective in decreasing drug use by patients in treatment for cocaine abuse. Providing the optimal combination of treatment services for each individual is critical to successful treatment outcome.

HEROIN

Heroin is a highly addictive drug, and its use is a serious problem in the United States. Current estimates suggest that nearly 600,000 people require treatment for heroin addiction. Recent studies suggest a shift from injection as a preferred method of ingesting heroin to snorting or smoking, because of increased purity of the drug and the misconception that these forms of use will not lead to addiction.

Heroin is processed from morphine, a naturally occurring substance extracted from the seed pod of the Asian poppy plant. Heroin usually appears as a white or brown powder. Street names associated with heroin include "smack," "H," "skag," and "junk." Other names may refer to types of heroin produced in a specific geographical area, such as "Mexican black tar."

Health Hazards

Heroin abuse is associated with serious health conditions, including fatal overdose, spontaneous abortion, collapsed veins, and infectious diseases, including HIV/AIDS and hepatitis. The short-term effects of heroin abuse appear soon after a single dose and disappear in a few hours. After using heroin, an individual feels a surge of euphoria (commonly called a "rush") accompanied by a warm flushing of the skin, dry mouth, and a sensation of heaviness in the extremities. After the initial euphoria, the user goes "on the nod," an alternately wakeful and drowsy state. Mental functioning becomes clouded because of depression of the CNS.

Long-term effects of heroin use include collapsed veins, infection of the heart lining and valves, abscesses, cellulitis, and liver disease. Pulmonary complications, including various types of pneumonia, may result from the poor health of the abuser, as well as from heroin's depressing effects on respiration.

In addition to the effects of the drug itself, street heroin may include additives that do not dissolve readily and thus can block the blood vessels that lead to the lungs, liver, kidneys, or brain. This can cause infection or even death of small patches of cells in vital organs.

Reports from SAMHSA's 1995 Drug Abuse Warning Network, which collects data on drug-related hospital emergency room episodes and drug-related deaths from more than 20 metropolitan areas, rank heroin as the second most frequently mentioned drug in overall drug-related deaths. From 1990 through 1995, the number of heroin-related episodes doubled. Between 1994 and 1995, there was a 19 percent increase in heroin-related emergency department episodes.

Tolerance, Addiction, and Withdrawal

With regular heroin use, tolerance develops. In other words, abusers must use more heroin to achieve the same intensity or effect they felt when they first began using the drug. As dosage levels increase over time, users become physically dependent. When an individual becomes physically dependent on heroin, it means his or her body has adapted to the presence of the drug, and withdrawal symptoms may occur if use is reduced or stopped. Withdrawal symptoms, which in regular abusers may begin as early as a few hours after the last administration of the drug, include craving, restlessness, muscle and bone pain, insomnia, diarrhea and vomiting, cold flashes with goose bumps (thus the term "cold turkey"), and kicking movements ("kicking the habit"). Major withdrawal symptoms peak between 48 and 72 hours after the last dose and subside after about a week. Sudden withdrawal by heavily dependent users who are in poor health is occasionally fatal, although heroin withdrawal is considered much less dangerous than alcohol or barbiturate withdrawal.

Treatment

Numerous treatment options for heroin addiction are available to users, including medications and behavioral therapies. Science has demonstrated that when medication treatment is integrated with other supportive services, patients often are able to stop heroin (or other opiate) use and return to more stable and productive lives.

In November 1997, NIH convened a Consensus Panel on Effective Medical Treatment of Heroin Addiction. The panel of national experts concluded that opiate drug addictions are diseases of the brain and medical disorders that indeed can be treated effectively. The panel strongly recommended (1) broader access to methadone maintenance treatment programs for people who are addicted to heroin or other opiate drugs and (2) elimination of Federal and State regulations and other barriers impeding this access. The panel also stressed the importance of providing substance abuse counseling, psychosocial therapies, and other supportive services to enhance retention and successful outcomes in methadone maintenance treatment programs. The panel's full consensus statement is available by calling *1-888-NIH-CONSENSUS (1-888-644-2667)* or visiting the NIH Consensus Development Program Web site at *www.consensus.nih.gov.*

Methadone, a synthetic opiate medication that blocks the effects of heroin for about 24 hours, has a proven record of success when prescribed at a high enough dosage level. LAAM, also a synthetic opiate medication for treating heroin addiction, can block the effects of heroin for up to 72 hours. Other approved medications are naloxone, which is used to treat opiate overdose, and naltrexone, which blocks the effects of morphine, heroin, and other opiates. Several other medications also are under study.

Many behavioral treatments are effective in addressing heroin addiction, including residential and outpatient approaches. Several new behavioral therapies are showing particular promise for heroin addiction. Contingency management therapy employs a voucher-based system, through which patients earn "points" based on negative drug tests that they then can exchange for items that encourage healthful living. Cognitive-behavioral interventions are designed to help modify the individual's thinking, expectancies, and behaviors and to increase his or her skills in coping with various life stressors.

According to data from the State Alcohol and Drug Abuse Profiles, a survey of State resources, services, and needs related to alcohol and drug abuse, heroin abuse accounted for the second largest number of all publicly funded drug treatment admissions in 1995. In California, Connecticut, Maryland, Massachusetts, New Jersey, Puerto Rico, Rhode Island, and Washington, heroin was the primary drug of abuse reported in publicly funded drug treatment admissions.

CLUB DRUGS

Ecstasy, Rohypnol, GHB, and ketamine are popular among teens and young adults who are part of the nightclub, bar, "rave," or "trance" scenes. "Raves" and "trance" events are night-long dances, often held in warehouses. Many who attend these events do not use drugs, but those who do may be attracted to the generally low cost, seemingly increased stamina, and intoxicating highs that are said to deepen the "rave" or "trance" experience. Recent research, however, has shown that these drugs can cause serious damage to several parts of the brain.

Many users tend to experiment with a variety of club drugs in combination, and combinations of any of these drugs with alcohol can lead to unexpected adverse reactions and death. Club drugs are an increasing challenge for treatment programs. Many teens and young adults enter treatment dependent on a number of these drugs as well as on alcohol, rather than on a single drug.

Club drug use appears to be increasing in many cities around the country, with Atlanta, Seattle, Chicago, Detroit, Miami, and Newark reporting widespread use at "raves" and in clubs. A recently completed survey in the Seattle area found that 20 percent of young, gay men reported using ecstasy. GHB is the drug of choice among white, gay males in New Orleans' French Quarter and is popular among high school and college students.

Ecstasy

The drug 3,4-methylenedioxymethamphetamine (MDMA), called "Adam," "ecstasy," or "XTC" on the street, is a synthetic, psychoactive drug with hallucinogenic and amphetamine-like properties. Many problems that MDMA users encounter are similar to those found with the use of amphetamines and cocaine. Psychological difficulties can include confusion, depression, sleep disruption, severe anxiety, and paranoia. Physical problems can include muscle tension, involuntary teeth clenching, nausea, blurred vision, faintness, and chills or sweating. Use of the drug also has been associated with increases in heart rate and blood pressure, a special risk for people with circulatory or heart disease. Finally, recent research links ecstasy use to long-term damage to those parts of the brain critical to thought and memory.

Rohypnol, GHB, and Ketamine

Rohypnol, GHB, and ketamine are predominantly CNS depressants. Because they are often colorless, tasteless, and odorless, they easily can be added to beverages and ingested unknowingly. Thus, these drugs have come to be known as "date rape" drugs. Because of concern about increasing use of these drugs, Congress passed the "Drug-Induced Rape Prevention and Punishment Act of 1996" in October 1996. This legislation increased Federal penalties for use of any controlled substance to aid in sexual assault. Rohypnol has been of particular concern for the last few years because often it is used in date rape and can be lethal when ingested with alcohol.

Rohypnol

Illegal use of Rohypnol began in Europe in the 1970s, and the drug started appearing in the United States in the early 1990s, where it became known as "rophies," "roofies," "roach," and "rope." Rohypnol is not approved for use in the United States, and its importation is banned. In addition to sedative-hypnotic effects such as muscle relaxation and amnesia, Rohypnol can produce physical dependence. When mixed with alcohol, Rohypnol can incapacitate a victim and can even be lethal. In Miami—one of the earliest sites of Rohypnol abuse—poison control centers have reported an increase in withdrawal seizures. Another, similar drug—clonazepam, marketed in the United States as Klonopin and in Mexico as Rivotrilis—is now being sold as "roofies" in Miami, Minnesota, and Texas. It is sometimes used to enhance the effects of heroin and other opiates. From emergency room admission information, Boston, San Francisco, Phoenix, and Seattle appear to be experiencing the highest use rates of clonazepam.

GHB

Since approximately 1990, GHB has been abused in the United States for sedative and anabolic (body-building) effects. It is a CNS depressant that was widely available over the counter in health food stores during the 1980s, purchased largely by bodybuilders to aid fat reduction and muscle building. GHB has been associated with sexual assault in cities throughout the country.

GHB has not been sold over the counter in the United States since 1992. However, products containing gamma butyrolactone (GBL), a chemical that is converted by the body into GHB, are used in a number of dietary supplements available in health food stores and fitness clubs.

Reports from Detroit indicate liquid GHB is being used in nightclubs to produce effects similar to those of Rohypnol. Futhermore, it is commonly used in the club scenes of Phoenix, Honolulu, and Texas, where it is known as "liquid ecstasy," "somatomax," "scoop," "Georgia home boy," or "grievous bodily harm." In Miami, poison control center calls have reflected problems associated with increased GHB use, including loss of consciousness. In New York, there have been reports of widespread GHB use among those in the fashion industry. It is available in some gyms and reputed to be widely accessible at some gay male party venues. A poison control center in Denver reported that in 1998, 33 of its calls involved GHB, and almost half of these cases were considered life threatening. GHB has been involved in an increasing number of sexual assault cases in Los Angeles and overdose deaths involving drug combinations.

Coma and seizures can occur after the use of GHB and, when used in combination with methamphetamine, GHB can produce nausea, difficult breathing, and increased risk of seizure. Discontinuing use of GHB may produce withdrawal effects, including insomnia, anxiety, tremors, and sweating.

Ketamine

Ketamine is another CNS depressant abused as a "date rape" drug. Ketamine, or "special K," is a rapid-acting general anesthetic. It has sedative-hypnotic, analgesic, and hallucinogenic properties. It is marketed in the United States and a number of foreign countries for use as a general anesthetic in both human and veterinary medical practice. It is similar to PCP, although ketamine has a more rapid onset and is less potent. Depending on the dose, ketamine induces everything from feelings of pleasant weightlessness to out-of-body or near-death experiences. Ketamine can be injected or snorted.

Ketamine abuse has been reported in many cities around the country. Reportedly, it has been stolen from veterinary supply sources in Minnesota, Louisiana, and Michigan. In Miami, ketamine has been diverted from shipments intended for other countries. Ketamine is widely available in New York, where it sells for about $20 a dose. A small but stable market for ketamine has been established in suburban areas outside Baltimore. Three ketamine deaths were reported in New Orleans in 1998, and the Detroit Poison Control Center reported six ketamine contacts in early 1999.

ANABOLIC-ANDROGENIC STEROIDS

Anabolic-androgenic steroids are synthetic substances related to male sex hormones. "Anabolic" refers to muscle-building, and "androgenic" refers to increased masculine characteristics. "Steroids" refers to the class of drugs. These drugs are available legally only by prescription and are used by physicians to treat conditions that occur when the body produces abnormally low amounts of testosterone—a condition that can delay puberty and cause some types of impotence—and to treat body wasting in patients with AIDS and other devastating diseases. Abuse of anabolic steroids can lead to serious health problems, some of them irreversible. Today, athletes and others abuse anabolic steroids to enhance their performance and to improve their physical appearance.

Anabolic steroids are taken orally or injected, typically in cycles of weeks or months, rather than continuously, in patterns called "cycling." "Cycling" involves taking multiple doses of steroids over a specific period of time, stopping for a period, and then starting again. Users frequently combine several different types of steroids to maximize their effectiveness while at the same time minimizing negative effects. This process is known as "stacking."

Health Hazards

Reports indicate that the use of anabolic steroids promotes lean muscle mass, strength, and ability to train longer and harder. However, steroid abuse creates significant and sometimes irreversible health hazards. In addition, people who inject anabolic steroids run the risk of contracting or transmitting hepatitis or HIV, the virus that causes AIDS.

The major side effects of anabolic steroid abuse include liver tumors and cancer, jaundice (yellowish pigmentation of skin, tissues, and body fluids), fluid retention, high blood pressure, and high cholesterol. Other side effects include kidney tumors, severe acne, and trembling. In addition, there are some gender-specific and age-specific side effects:

- For men—shrinking of the testicles, reduced sperm count, infertility, baldness, enlargement of breasts, increased risk for prostate cancer.
- For women—growth of facial hair, male-pattern baldness, changes in or cessation of the menstrual cycle, enlargement of the clitoris, deepened voice.
- For adolescents—prematurely halted growth as the result of premature skeletal maturation and accelerated puberty changes.

Scientific research also shows that aggression and other psychiatric side effects may result from the abuse of anabolic steroids. Many users report feeling "good about themselves" while on anabolic steroids, but researchers report that users experience extreme mood swings, including manic symptoms that can lead to violence. Depression often occurs when the use of anabolic steroids is discontinued and may contribute to dependence on the drugs. Researchers also report that users may suffer from paranoid jealousy, extreme irritability, delusions, and impaired judgment stemming from feelings of invincibility.

METHYLPHENIDATE (RITALIN)

Methylphenidate is a medication that is prescribed for individuals (usually children) who have an abnormally high level of activity or attention-deficit hyperactivity disorder (ADHD). According to the National Institute of Mental Health, approximately 3 to 5 percent of the general population has the disorder, which is characterized by agitated behavior and an inability to focus on tasks. Occasionally, methylphenidate also is prescribed for narcolepsy.

Health Effects

Methylphenidate is a central nervous system (CNS) stimulant. It has a noticeably calming effect on hyperactive children and a "focusing" effect on those with ADHD. Recent research at the Brookhaven National Laboratory may begin to explain how methylphenidate helps people with ADHD. The researchers used a noninvasive brain scan called positron emission tomography (PET) to confirm that administering normal therapeutic doses of methylphenidate to healthy, adult men increased their dopamine levels. The researchers speculate that methylphenidate amplifies the release of dopamine, a neurotransmitter, thereby improving attention and focus in individuals who have dopamine signals that are weak, such as individuals with ADHD.

When taken as prescribed, methylphenidate is a valuable medication. Research shows that people with ADHD do not become addicted to stimulant medications when they are taken in the form and at the dosage levels prescribed. Another study found that ADHD boys treated with stimulants such as methylphenidate are significantly less likely to abuse drugs and alcohol when they are older than are non-treated ADHD boys. Because of its stimulant properties, however, in recent years, there have been reports of abuse of methylphenidate by people who use it not as a medication but instead abuse it for its stimulant effects: appetite suppression, wakefulness, increased focus/attentiveness, and euphoria. Abusers take methylphenidate tablets by mouth or crush and snort them. Some abusers dissolve the tablets in water and inject the mixture—complications can arise from this method of use because insoluble fillers in the tablets can block the flow of blood through the small blood vessels.

Trends in Ritalin Abuse

At their June 2000 meeting, members of NIDA's Community Epidemiology Work Group (CEWG) provided the following information.

- The abuse of methylphenidate has been reported in Baltimore, mostly among middle and high schools students; in Boston, especially among middle and upper-middle class communities; and in Detroit; Minneapolis/St. Paul; Phoenix; and Texas.
- In 1999, 165 methylphenidate-related poison calls were made in Detroit; 419 were reported in Texas, with 114 of those involving intentional misuse or abuse.
- On Chicago's South Side, some users inject methylphenidate (this is referred to as "west coast"). Also, some mix it with heroin (a "speedball") or in combination with both cocaine and heroin for a more potent effect.

Because stimulant medicines such as methylphenidate do have potential for abuse, the U.S. Drug Enforcement Administration (DEA) has placed stringent Schedule II controls on their manufacture, distribution, and prescription. For example, DEA requires special licenses for these activities, and prescription refills are not allowed. In the future, States may impose further regulations, such as limiting the number of dosage units per prescription.

METHAMPHETAMINE

Methamphetamine is an addictive stimulant drug that activates certain systems in the brain. Methamphetamine is closely related chemically to amphetamine, but its CNS effects are greater. Both drugs have some medical uses, primarily in the treatment of obesity, but their therapeutic use is limited.

Methamphetamine is made in illegal laboratories and has a high potential for abuse and addiction. Street methamphetamine is referred to by many names, such as "speed," "meth," and "chalk." Methamphetamine hydrochloride—clear chunky crystals resembling ice, which can be inhaled in smoke—is referred to as "ice," "crystal," and "glass."

Health Hazards

Methamphetamine releases high levels of the neurotransmitter dopamine, which stimulates brain cells, enhancing mood and body movement. It also appears to have a neurotoxic effect, damaging brain cells that contain dopamine and serotonin, another neurotransmitter. Over time, methamphetamine appears to cause reduced levels of dopamine.

Methamphetamine is taken orally or intranasally (snorted), by intravenous injection, or by smoking. Immediately after smoking or intravenous injection, the methamphetamine user experiences an intense sensation—called a "rush" or "flash"—that lasts only a few minutes and is described as extremely pleasurable. Oral or intranasal use produces euphoria—a high, but not a rush. Users may become addicted quickly and use the drug with increasing frequency and in increasing doses.

Animal research going back more than two decades demonstrates that high doses of methamphetamine damage neuron cell endings. Dopamine- and serotonin-containing neurons do not die after methamphetamine use, but their nerve endings ("terminals") are cut back, and regrowth appears to be limited. The CNS actions that result from the use of even small amounts of methamphetamine include increased wakefulness, increased physical activity, decreased appetite, increased respiration, hyperthermia, and euphoria. Other CNS effects include irritability, insomnia, confusion, tremors, convulsions, anxiety, paranoia, and aggressiveness.

Hyperthermia and convulsions can result in death. Methamphetamine causes increased heart rate and blood pressure and can cause irreversible damage to blood vessels in the brain, producing strokes. Other effects of methamphetamine include respiratory problems, irregular heartbeat, and extreme anorexia. Its use can result in cardiovascular collapse and death.

A Seattle study confirmed that methamphetamine use was widespread among the city's homosexual and bisexual populations. Of these groups, members using methamphetamine reported that they practice sexual behaviors and needle use practices that place them at risk of contracting and transmitting HIV infection.

INHALANTS

Inhalants are breathable chemical vapors that produce psychoactive (mind-altering) effects. Although Americans are exposed to volatile solvents and other inhalants in the home and in the workplace, many do not think of inhalable substances as drugs because most of them were never meant to be used in that way.

Young people are most likely to abuse inhalants, in part because inhalants are readily available and inexpensive. Sometimes, children unintentionally misuse inhalant products that are found in household products. Parents should see that these substances are monitored closely so that they are not inhaled by young children.

Inhalants fall into the following categories:

- Solvents
  - Industrial or household solvents or solvent-containing products, including paint thinners or solvents, degreasers (dry-cleaning fluids), gasoline, and glues; and
  - Art or office-supply solvents, including correction fluids, felt-tip-marker fluid, and electronic contact cleaners.
- Gases
  - Gases used in household or commercial products, including butane lighters and propane tanks, whipping cream aerosols or dispensers (whippets), and refrigerant gases;
  - Household aerosol propellants and associated solvents in items such as spray paints, hair or deodorant sprays, and fabric protector sprays; and
  - Medical anesthetic gases, such as ether, chloroform, halothane, and nitrous oxide (laughing gas).
- Nitrites
  - Aliphatic nitrites, including cyclohexyl nitrite, which is available to the general public;
  - Amyl nitrite, which is available only by prescription; and
  - Butyl nitrite, which is now an illegal substance.

Health Hazards

Although different in makeup, nearly all abused inhalants produce effects similar to anesthetics, which act to slow down the body's normal functions. When inhaled via the nose or mouth into the lungs in sufficient concentrations, inhalants can cause intoxicating effects. Intoxication may last only a few minutes or for several hours if inhalants are used repeatedly. Initially, users may feel slightly stimulated; with successive inhalations, they may feel less inhibited and less in control. Finally, a user may lose consciousness.

Sniffing highly concentrated amounts of the chemicals in solvents or aerosol sprays can directly induce heart failure and death, especially if the substances being abused are fluorocarbons and butane-type gases. High concentrations of inhalants also cause death from suffocation, by displacing oxygen in the lungs and then in the CNS so that breathing ceases. Other irreversible effects caused by inhaling specific solvents include

- Hearing loss—from toluene (paint sprays, glues, dewaxers) and trichloroethylene (cleaning fluids, correction fluids);
- Peripheral neuropathies or limb spasms—from hexane (glues, gasoline) and nitrous oxide (whipping cream, gas cylinders);
- CNS or brain damage—from toluene (paint sprays, glues, dewaxers); and
- Bone marrow damage—from benzene (gasoline).

Serious but potentially reversible effects include

- Liver and kidney damage—from toluene-containing substances and chlorinated hydrocarbons (correction fluids, dry-cleaning fluids); and
- Blood oxygen depletion—from organic nitrites ("poppers," "bold," and "rush") and methylene chloride (varnish removers, paint thinners).

Death from inhalants usually is caused by the inhalation of a high concentration of fumes. Deliberately inhaling from an attached paper or plastic bag or in a closed area greatly increases the chances of suffocation. Even when using aerosols or volatile products for their legitimate purposes (such as painting and cleaning), it is wise to do so in a well-ventilated room or outdoors.

Most inhalant abusers begin using inhalants as youngsters. Some young people may view inhalants as a cheap, accessible substitute for alcohol. Research suggests that chronic or long-term inhalant abusers are among the most difficult addicts to treat, and they may experience multiple psychological and social problems.

NIDA RESOURCES

A wealth of material regarding various aspects of drug abuse and addiction is available, free of charge, from NIDA. Many of the following materials are available via the NIDA Web site, *www.drugabuse.gov.* In addition to these publications, many reports—such as the director's report to NIDA's National Advisory Council and the Institute's 5-year strategic plan—are available online. The following materials are among those available from NIDA.

NIDA NOTES

NIDA NOTES, published bimonthly, is the Institute's major vehicle for relaying research findings to the field in a timely manner. It covers the areas of treatment and prevention research, epidemiology, neuroscience, behavioral research, health services research, and AIDS. The publication reports on advances in the drug abuse field, identifies resources, promotes an exchange of information, and seeks to improve communication among clinicians, researchers, administrators, and policymakers. Current and past issues are available on the NIDA Web site.

PUBLIC INFORMATION MATERIALS

NIDA's public education and science education campaigns convey drug abuse messages to a variety of audiences through such media as pamphlets and flyers, posters and print ads, video documentaries, and public service announcements for radio and television. Many of the print and audio/video materials for public education are produced in both English and Spanish.

- Print materials—Posters, print ads, fliers, and other printed items are available in a variety of sizes, and they address a range of topics. Most are printed in color, and some are available in both Spanish and English. Limited numbers of copies may be ordered, or users may reproduce as many copies as they need.
- Videocassettes—Short films are produced in VHS format for home, school, or office use.
- School programs—In the "Mind Over Matter" series, "Sara Bellum" takes young teens on a journey to explore the brain's response to drugs. This series of oversized colorful magazines prompts 5th- through 9th-grade students to think about the effects of specific drugs on the brain and discourages the use of these drugs. An underlying message of this series is that anyone can become a scientist and work to find out more about the mysteries in us all. Each of the eight magazines in the series includes a striking poster designed to inspire students to pursue a career in science.

RESEARCH REPORT SERIES

The Research Report Series simplifies the science of research findings for the educated lay public, legislators, educational groups, and practitioners. The series reports on research findings of national interest. Topics of the reports in the series to date are anabolic steroids, cocaine, inhalants, heroin, nicotine, club drugs, methamphetamine, and hallucinogens.

COMMUNITY DRUG ALERT BULLETINS

NIDA periodically produces Community Drug Alert Bulletins to keep the science community, drug abuse professionals, and the public informed about new and emerging drug abuse issues that warrant special attention. Current topics include club drugs, anabolic steroids, methamphetamine, and hepatitis C.

FACT SHEETS

NIDA's Infofax service provides accurate information developed by NIDA as fact sheets on drug abuse and addiction. Available by fax, mail, or online, these fact sheets are updated regularly and include information about the health effects of specific drugs (such as crack and cocaine, PCP, and ecstasy), survey data, news releases, and grants and funding opportunities. Infofaxes are available in English and Spanish and may be ordered by calling *1-888-NIH-NIDA (644-6432)*. They also are available on the NIDA Web site, *www.drugabuse.gov.*

EPIDEMIOLOGIC REPORTS

NIDA conducts epidemiological studies to assess the extent of drug abuse in this country. Produced twice per year, the publication entitled *Epidemiologic Trends in Drug Abuse* documents the proceedings from the June and December meetings held each year by CEWG, which assesses recent drug abuse trends and pinpoints populations at risk here and abroad. The proceedings present common data collected at the community level and identify emerging trends and specific risk factors in the area of substance abuse. The CEWG reports are distributed by NIDA to individuals who request them and are also available online at the NIDA Web site.

WEB SITE

Many of NIDA's publications are posted on NIDA's Web site, *www.drugabuse.gov.* Special features include "What's New," a link to the latest NIDA materials available online. Also, NIDA news releases are posted, as is information about upcoming NIDA-sponsored meetings and conferences, including information about NIDA's series of ''Blending Research and Practice" meetings scheduled across the Nation each year.

In addition, NIDA's Web site provides a link to international activities concerning research on drug abuse and addiction, details of NIDA organizational units and funding information, and Web sites hosted by other Federal agencies and private organizations that offer reliable online information about drug abuse and addiction.

OTHER RESOURCES

The following are NIDA constituent organizations, grantees, and Government sites of interest, listed in alphabetical order with their URLs and descriptions of content.

Agency for Healthcare Research and Quality (*www.ahrq.gov*)

Formerly called the Agency for Health Care Policy and Research, the Agency for Healthcare Research and Quality (AHRQ) sponsors and conducts research to provide evidence-based health information for patients, health care providers, and policymakers alike. The agency's Web site makes it easier to find a variety of information in areas ranging from children's health to choosing a health plan.

Alliance Project (*www.defeataddiction.com*)

The Alliance Project is an effort by a broad cross-section of organizations that share common concerns about the devastating disease of alcohol and drug addiction and the dramatic lack of public response to this growing health crisis.

American Academy of Addiction Psychiatry (*www.aaap.org)*

The American Academy of Addiction Psychiatry was formed to promote excellence in clinical practice of addiction psychiatry to educate the public to influence public policy about addictive illness, promote accessibility of high-quality treatment for all patients, to provide continuing education for professionals in the field of addiction psychiatry, to disseminate new information in the field of addiction psychiatry, and encourage research on the etiology, prevention, identification, and treatment of addiction.

American Academy of Child and Adolescent Psychiatry (*www.aacap.org*)

The American Academy of Child and Adolescent Psychiatry is the leading national professional medical association dedicated to treating and improving the quality of life for children, adolescents, and families affected by psychiatric disorders.

American Academy of Family Physicians (*www.aafp.org*)

The American Academy of Family Physicians is a national nonprofit medical association of more than 85,000 family physicians, family practice residents, and medical students.

American Academy of Pediatrics (*www.aap.org*)

The American Academy of Pediatrics is committed to the attainment of optimal physical, mental, and social health for all infants, children, adolescents, and young adults.

American Association for the Advancement of Science (*www.aaas.org*)

The American Association for the Advancement of Science (AAAS) is a nonprofit professional society dedicated to the advancement of scientific and technological excellence across all disciplines, and to the public's understanding of science and technology. AAAS, founded in Philadelphia in 1848, is among the oldest societies in America.

American Foundation for AIDS Research (*www.amfar.org*)

The American Foundation for AIDS Research is the Nation's leading nonprofit organization dedicated to the support of basic biomedical and clinical AIDS research, education for AIDS prevention, and sound AIDS-related public policy development.

American Psychiatric Association (*www.psych.org*)

The American Psychiatric Association is a national medical specialty society whose 40,500 physician members specialize in the diagnosis and treatment of mental and emotional illnesses and substance use disorders.

American Psychological Association (*www.apa.org/divisions/div28*)

"Division 28" This is the home page for the Division of Psychopharmacology and Substance Abuse of the American Psychological Association (APA). The APA College of Professional Psychology Web site *(www.apa.org/college)* may be of interest to psychologists practicing in the drug abuse field.

American Psychological Society (*www.psychologicalscience.org*)

The American Psychological Society advances the scientific discipline of psychology in the public interest.

American Public Health Association (*www.apha.org*)

The American Public Health Association (APHA) is the oldest and largest organization of public health professionals in the world, representing more than 50,000 members from more than 50 occupations in the field of public health. APHA and its members have been influencing policies and setting priorities in public health since 1872.

American Society of Addiction Medicine (*www.asam.org*)

The American Society of Addiction Medicine is the Nation's medical specialty society dedicated to educating physicians and improving the treatment of individuals suffering from alcoholism or other addictions

Brain Disorders Network (*www.brainnet.org*)

The Brain Disorders Network is sponsored by the National Foundation for Brain Research.

Center for Alcohol and Addiction Studies (*www.caas.brown.edu*)

The Center's mission is to promote the identification, prevention, and effective treatment of alcohol and other drug use problems in our society through research, publications, education, and training.

Center for Education and Drug Abuse Research (*http://cedar.pharmacy.pitt.edu/main.html*)

The Center for Education and Drug Abuse Research serves to elucidate the factors contributing to variation in the liability to drug abuse and determine the developmental pathways culminating in drug abuse outcome, normal outcome, and psychiatric/behavioral disorder outcome. The Center is a consortium between the University of Pittsburgh and St. Francis Medical Center.

Center for Interventions, Treatment, and Addictions Research (*www.med.wright.edu/citar*)

The Center for Interventions, Treatment, and Addictions Research in Dayton, OH, is the focal point for substance abuse-related services, academic research, and services research in the Wright State University School of Medicine. The Center's work focuses on substance abuse issues in small and mid-sized cities and surrounding suburban and rural communities.

Center for Prevention Research at the University of Kentucky (*www.uky.edu/RGS/PreventionResearch*)

The Center for Prevention Research at the University of Kentucky was established in October 1987 with funding from the National Institute on Drug Abuse, the first such Center funded by NIDA.

Center for Substance Abuse Research (*www.cesar.umd.edu*)

The Center for Substance Abuse Research at the University of Maryland provides a weekly fax service on drug abuse-related topics.

Center for the Neurobiological Investigation of Drug Abuse (*www.bgsm.edu/physpharm/cnida*)

The purpose of the Center for the Neurobiological Investigation of Drug Abuse is to provide a research environment that allows investigators with major interests in substance abuse to work together on research projects that utilize the broad research expertise of each individual. The internationally recognized faculty—with research, training, and service interests related to the actions of drugs of abuse on the brain and the biological basis of drug addiction—is the focus of this Center.

Center for Treatment Research on Adolescent Drug Abuse (*www.med.miami.edu/ctrada*)

The University of Miami Center for Treatment Research on Adolescent Drug Abuse was established to conduct psychosocial treatment research on adolescent drug abuse from treatment development to mechanisms, evaluation, and dissemination.

Centers for Disease Control and Prevention (*www.cdc.gov*)

The Centers for Disease Control and Prevention (CDC), in Atlanta, GA, is an agency of the U.S. Department of Health and Human Services. Its mission is to promote health and quality of life by preventing and controlling disease, injury, and disability. CDC's National Prevention Information Network *(www.cdcnpin.org)* is designed to facilitate sharing of HIV/AIDS, STD, and TB information and resources.

Coalition of Hispanic Health and Human Services Organizations (http://*latino.sscnet.ucla.edu/community/cossmho.html*)

The mission of the Coalition of Hispanic Health and Human Services Organizations is to improve the health and well-being of all Hispanic communities throughout the United States. This is the sole organization focusing on the health, mental health, and human services needs of the Nation's diverse Hispanic communities.

College on Problems of Drug Dependence (*http://views.vcu.edu/cpdd*)

The College on Problems of Drug Dependence serves as an interface among governmental, industrial, and academic communities maintaining liaisons with regulatory and research agencies, as well as educational, treatment, and prevention facilities in the drug abuse field. It also functions as a collaborating center of the World Health Organization.

Community Anti-Drug Coalitions of America (*www.cadca.org*)

Community Anti-Drug Coalitions of America is the premier national membership organization of more than 5,000 community coalitions, State associations, and prevention experts working at the local level to reduce substance abuse and related violence.

Drug Abuse Treatment Outcome Study (*www.datos.org*)

The Drug Abuse Treatment Outcome Study is NIDA's third national evaluation of treatment effectiveness. This evaluation is based on more than 10,000 admissions from 1991 to 1993 to 96 community-based treatment programs in 11 large U.S. cities.

Drug Strategies (*www.drugstrategies.org*)

Drug Strategies is a nonprofit research institute that promotes more effective approaches to the Nation's drug problems by supporting private and public initiatives that reduce the demand for drugs through prevention, education, treatment, law enforcement, and community coalitions.

Entertainment Industries Council (*www.eiconline.org*)

In 1983, the Entertainment Industries Council, Inc., was founded by leaders in the entertainment industry to provide information about major public health and social issues among the entertainment industry and to audiences at large. The Annual PRISM Awards and Commendations, sponsored by NIDA with the Council and the RWJF, are presented in recognition of outstanding contributions for the accurate depiction of drugs, alcohol, and tobacco abuse and addiction.

FedWorld (*http://fedworld.gov*)

In November 1992, the National Technical Information Service introduced FedWorld to help with the challenge of accessing U.S. Government information online. In an age in which more and more Government agencies are racing to get online, FedWorld provides a comprehensive central access point for locating and acquiring Government information.

Friends Research Institute, Inc. (*www.friendsresearch.org*)

Friends Research Institute, Inc., seeks "personal and societal health and well-being through research and education for the prevention and treatment of illness." It provides efficient, personal, and comprehensive services in the administration of research funds.

Healthfinder (*www.healthfinder.gov*)

Healthfinder is a gateway consumer health information Web site from the U.S. Government.

Health On the Net Foundation (*www.hon.ch*)

The Health On the Net Foundation is a nonprofit organization, the mission of which is to build and support the international health and medical community on the Internet, so that the potential benefits of this new communications medium may be realized by individuals, medical professionals, and health care providers. The site includes a complete list of hospitals on the Web, Internet medical support communities (listservs, newsgroups, and FAQs), medical sites search engines, and so forth.

HHS Pages for Kids (*www.hhs.gov/kids*)

YouthInfo, a new information resource developed by DHHS, provides visitors with the latest information about America's adolescents. YouthInfo is part of the "For Parents" section of this Web site, which provides information not only for kids and parents but for teachers as well.

HIV InSite (*http://hivinsite.ucsf.edu*)

HIV InSite is a project of the University of California, San Francisco, AIDS Program at San Francisco General Hospital, and the UCSF Center for AIDS Prevention Studies.

Indian Health Service (*www.ihs.gov*)

The Indian Health Service is an agency of DHHS that provides a comprehensive health services delivery system for American Indians and Alaska Natives with opportunity for maximum tribal involvement in developing and managing programs to meet their health needs. The goal of IHS is to raise the health status of American Indian and Alaska Native people to the highest possible level.

Institute of Behavioral Research (*www.ibr.tcu.edu*)

The Institute of Behavioral Research conducts evaluations of drug abuse and addiction services. Special attention is given to assessing and analyzing individual functioning, treatment delivery and engagement process, and their relationships to outcomes. Treatment improvement protocols emphasize cognitive and behavioral strategies for programs in community-based as well as criminal justice settings. A variety of data collection forms are available for downloading.

JAMA HIV/AIDS Information Center (*www.ama-assn.org/special/hiv/hivhome.htm*)

The JAMA HIV/AIDS Information Center is an easy-to-use, interactive collection of high-quality resources for physicians, other health professionals, and the public.

Join Together Online (*www.jointogether.org*)

Join Together Online is a resource center and meeting place for communities working to reduce the harms associated with the use of illicit drugs, excessive alcohol, and tobacco. Join Together Online helps communities raise money to support prevention and treatment activities and stay on top of the latest substance abuse news, technical assistance, and public policy developments. It also puts communities in direct contact with others seeking to develop comprehensive approaches to reducing the harm caused by drug abuse.

Knowledge Exchange Network (*www.mentalhealth.org*)

The Knowledge Exchange Network is a one-stop source of information and resources on prevention, treatment, and rehabilitation services for mental illness. The network is a service of the Center for Mental Health Services, SAMHSA. It offers information related to consumers/survivors, managed care, children's mental health, statistics, and upcoming conferences and events; and it provides an online database search of mental health resources around the country. It also offers an extensive catalog of free publications, many of which can be viewed at the site or downloaded. All of the publications can be ordered via on online order form.

National Alliance for Hispanic Health

See the Coalition of Hispanic Health and Human Services Organizations.

National Association of Alcoholism and Drug Abuse Counselors (*www.naadac.org*)

The mission of the National Association of Alcoholism and Drug Abuse Counselors is to provide leadership in the alcoholism and drug abuse counseling profession by building new visions, effecting change in public policy, promoting criteria for effective treatment, encouraging adherence to ethical standards, and ensuring professional growth for alcoholism and drug abuse counselors.

National Center on Addiction and Substance Abuse at Columbia University (*www.casacolumbia.org*)

The National Center on Addiction and Substance Abuse at Columbia University is a resource for research on addiction and substance abuse. The Center provides access to information, research, and commentary on tobacco, alcohol, and drug abuse issues including prevention, treatment, and cost.

National Clearinghouse for Alcohol and Drug Information (*www.health.org*)

The National Clearinghouse for Alcohol and Drug Information is the information service of the Center for Substance Abuse Prevention of DHHS. The Clearinghouse is the world's largest resource for current information and materials about alcohol and other drugs.

National Criminal Justice Reference Service (*www.ncjrs.org*)

The National Criminal Justice Reference Service is one of the most extensive sources of information on criminal and juvenile justice in the world, providing services to an international community of policymakers and professionals. The Service is a collection of clearinghouses supporting all bureaus of the U.S. Department of Justice, Office of Justice Programs (OJP), National Institute of Justice, Office of Juvenile Justice and Delinquency Prevention, Bureau of Justice Statistics, Bureau of Justice Assistance, Office for Victims of Crime, and the OJP Program Offices. It also supports the Office of National Drug Control Policy.

National Families in Action (*www.emory.edu/NFIA*)

National Families in Action is a private, nonprofit membership organization founded in 1977. It helped create and lead the parent movement, the first tier of the prevention movement that drove drug use down by two-thirds among adolescents and young adults between 1979 and 1992. Its goal is to help parents prevent drug abuse in their families and communities.

National Inhalant Prevention Coalition (*www.inhalants.org*)

Synergies, a nonprofit corporation based in Austin, TX, founded the National Inhalant Prevention Coalition in 1992, in an effort to promote awareness and recognition of the under-publicized problem of inhalant use. The Coalition is funded in part by RWJF.

National Institute of Justice (*www.ojp.usdoj.gov/nij*)

As the research agency of the U.S. Department of Justice, the National Institute of Justice (NIJ) supports research, evaluation, and demonstration programs relating to drug abuse in the contexts of crime and the criminal justice system.

National Library of Medicine (*www.nlm.nih.gov*)

The National Library of Medicine is the world's largest library dealing with a single scientific/professional topic. It cares for over 4.5 million holdings (including books, journals, reports, manuscripts, and audiovisual items) and sponsors MEDLINEplus, a source of up-to-date, quality health care information from the Library and NIH.

National Women's Health Information Center (*www.4women.gov*)

The National Women's Health Information Center is a national clearinghouse for women's health, sponsored by the Office on Women's Health within DHHS. It is the only Federal, commercial-free, combined women's health Web site and toll-free phone information center.

Nebraska Behavioral Biology Group (*http://cricket.unl.edu/NBBG.html*)

The Nebraska Behavioral Biology Group combines the resources in behavioral biology of three universities in eastern Nebraska (Creighton University, the University of Nebraska-Lincoln, and the University of Nebraska at Omaha). These combined resources provide outstanding opportunities for students to pursue graduate studies in a number of areas of behavioral biology.

Office of Justice Programs (*www.ojp.usdoj.gov*)

Since 1984, the Office of Justice Programs has provided Federal leadership in developing the Nation's capacity to prevent and control crime, improve the criminal and juvenile justice systems, increase knowledge about crime and related issues, and assist crime victims.

Office of National Drug Control Policy (*www.whitehousedrugpolicy.gov*)

The Office of National Drug Control Policy was established by an Act of Congress in 1988. It is organized within the Executive Office of the President and authorized to develop and coordinate the policies, goals, and objectives of the Nation's drug control program for reducing the use of illicit drugs. The Office engages in activities that both meet the requirements of its authorization and represent the values and commitments of the President and the Office's director.

Partnership for a Drug-Free America (*www.drugfreeamerica.org*)

Partnership for a Drug-Free America is a private, nonprofit, nonpartisan coalition of professionals from the communications industry. The organization's mission is to reduce demand for illicit drugs through media communication.

RAND's Drug Policy Research Center (*www.rand.org/centers/dprc*)

RAND's Drug Policy Research Center was established in 1989 to conduct empirical research, policy analysis, and outreach to help community leaders and public officials develop more effective strategies for dealing with drug problems. The Center builds on a long tradition of RAND research characterized by an interdisciplinary, empirical approach to public policy issues and rigorous standards of quality, objectivity, and independence. It is supported by the Ford Foundation, other foundations, Government agencies, corporations, and individuals.

The Reconstructors (*http://reconstructors.rice.edu*)

The Reconstructors is a problem-based adventure game engaging the player in the role of scientist, historian, geographer, and detective. Structured into several consecutive episodes, each with its own learning objectives, the game will help the player make better, more informed health choices when it comes to avoiding drugs of abuse.

Robert Wood Johnson Foundation Substance Abuse Policy Research Program (*www.phs.bgsm.edu/sshp/rwj/rwj.htm*)

The RWJF site includes project summaries, grant application information, and links to other sites relating to substance abuse. The goal of the program is to identify, analyze, and evaluate policies regarding tobacco, alcohol, and drug abuse.

SMART Recovery® (*www.smartrecovery.org*)

SMART Recovery® is an abstinence-based, nonprofit organization with a sensible self-help program for people having problems with alcohol and other drugs. It includes many ideas and techniques to help individuals change their lives.

Society for Prevention Research (*www.oslc.org/spr*)

The Society for Prevention Research is concerned with problems pertaining to the prevention of drug and alcohol abuse and associated social maladjustment, crime, and behavior disorders.

Substance Abuse and Mental Health Data Archive (*www.icpsr.umich.edu/SAMHDA*)

The Substance Abuse and Mental Health Data Archive's purpose is to increase the utilization of substance abuse and mental health databases and to encourage their use to help individuals understand and assess the extent of alcohol, drug abuse, and mental health disorders and the nature and impact of related treatment systems.

Substance Abuse and Mental Health Services Administration (*www.samhsa.gov*)

SAMHSA's mission is to assure that high-quality substance abuse and mental health services are available to the people who need them and to ensure that prevention and treatment knowledge is used more effectively in the general health care system.

UCLA Drug Abuse Research Center (*www.medsch.ucla.edu/som/npi/DARC*)

The Drug Abuse Research Center at UCLA is a diverse research organization that investigates psychosocial and epidemiological issues pertaining to drug use and conducts evaluations of interventions for drug dependence. The group's portfolio of studies has provided findings that have improved understanding of the complex nature of drug use and dependence.

Veterans Affairs Medical Center, Positron Emission Tomography Imaging Center (*www.pet.med.va.gov*)

The state-of-the-art Positron Emission Tomography (PET) Center at the Minneapolis Veterans Affairs Medical Center (VAMC) became operational in November 1991. The facility, which houses a 40 MeV Scanditronics cyclotron, a Siemens ECAT tomograph with retractable septa, and an extensive Sun computer network, is maintained and operated by the PET Imaging Service, which includes both VAMC and University of Minnesota staff.

Web of Addictions (*www.well.com/user/woa*)

The Web of Addictions is dedicated to providing accurate information about alcohol and other drug addictions and focuses on misinformation about abused drugs that is available on the Internet, particularly on some usenet news groups. The group offers a resource for teachers, students, and others who needed factual information about abused drugs.

DIAGNOSING DRUG ABUSE AND DRUG DEPENDENCE: CRITERIA FROM THE AMERICAN PSYCHIATRIC ASSOCIATION*

Diagnosis of substance abuse: A maladaptive pattern of substance use leading to clinically significant impairment or distress as manifested by one (or more) of the following occurring within a 12-month period, provided symptoms have not met the criteria for substance dependence:

- Recurrent substance use resulting in a failure to fulfill major obligations at work, at school, or at home
- Recurrent substance use in situations in which it is physically hazardous
- Recurrent substance-related legal problems
- Continued substance use in spite of persistent or recurrent social or interpersonal problems caused or exacerbated by the effects of the substance.

Drug dependence is diagnosed when three (or more) of the following occur at any time in the same 12-month period:

- Substance often taken in larger amounts or over longer period than intended
- Persistent desire or unsuccessful effort to cut down or control substance use
- A great deal of time spent in activities necessary to obtain the substance (e.g., visiting multiple doctors or driving long distances), use the substance (e.g., chain smoking), or recover from its effects
- Important social, occupational, or recreational activities given up or reduced because of substance abuse
- Psychological or physical problem that is caused or exacerbated by use of the substance.

Tolerance, as defined by either (a) need for markedly increased amounts of the substance in order to achieve intoxication or desired effect, or (b) markedly diminished effect with continued use of the same amount.

Withdrawal, as manifested by either (a) characteristic withdrawal syndrome for the substance, or (b) the same (or closely related) substance taken to relieve or avoid withdrawal symptoms.

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* American Psychiatric Association. *Diagnostic and Statistical Manual of Mental Disorders.* Fourth Edition. Washington, DC: APA, 1994.

GLOSSARY

Addiction: A chronic, relapsing disease, characterized by compulsive drug seeking and use and by neurochemical and molecular changes in the brain.

Adrenal glands: Glands located above each kidney that secrete hormones (for example, adrenaline).

Anabolic effects: Drug-induced growth or thickening of the body's nonreproductive tract tissues—including skeletal, muscle, bones, the larynx, and vocal cords—and decrease in body fat.

Analgesics: Medications that reduce pain.

Analog: A chemical compound that is similar to another drug in its effects but differs slightly in its chemical structure.

Androgenic effects: A drug's effects on the growth of the male reproductive tract and the development of male secondary sexual characteristics.

Antidepressants: A group of drugs used in treating depressive disorders.

Benzodiazepines: Drugs that relieve anxiety or are prescribed as sedatives; among the most widely prescribed medications, including Valium and Librium.

Central nervous system (CNS): The brain and spinal cord.

Cocaethylene: Potent stimulant created when cocaine and alcohol are used together.

Coca: The plant, Erythroxylon, from which cocaine is derived; also refers to the leaves of this plant.

Crack: Slang term for a smokable form of cocaine.

Craving: A powerful, often uncontrollable desire.

Detoxification: A process of allowing the body to rid itself of a drug while managing the symptoms of withdrawal; often the first step in a drug treatment program.

Dopamine: A neurotransmitter present in regions of the brain that regulate movement, emotion, motivation, and feelings of pleasure.

Emphysema: A lung disease (often caused by smoking) in which tissue deterioration results in increased air retention and reduced exchange of gases. The result is hampered breathing.

Hormone: A chemical substance formed in glands in the body and carried in the blood to organs and tissues, where it influences function, structure, and behavior.

Narcolepsy: A disorder characterized by uncontrollable attacks of deep sleep.

Nicotine: An alkaloid derived from the tobacco plant that is responsible for smoking's psychoactive and addictive effects; although toxic at high doses, it can be safe and effective as medicine at lower doses.

Neuron: A nerve cell in the brain.

Pharmacokinetics: The pattern of absorption, distribution, and excretion of a drug over time.

Physical dependence: An adaptive physiological state that occurs with regular drug use and results in a withdrawal syndrome when drug use is stopped; usually occurs with tolerance.

Placebo: An inactive substance used in experiments to distinguish between actual drug effects and effects that are expected by the volunteers in these experiments.

Psychosis: A mental disorder characterized by symptoms such as delusions or hallucinations, which indicate an impaired conception of reality.

Poly-drug user: An individual who uses more than one drug.

Rush: A surge of pleasure that rapidly follows administration of some drugs.

Serotonin: A neurotransmitter that has been implicated in states of consciousness, mood, depression, and anxiety.

Sex hormones: Hormones that are found in higher quantities in one sex than in the other. Male sex hormones are androgens, which include testosterone, and female sex hormones are estrogens and progesterone.

Tobacco: A plant widely cultivated for its leaves, which are used primarily for smoking; the tabacum species is the major source of tobacco products.

Tolerance: A condition in which higher doses of a drug are required to produce the same effect as during initial use; often leads to physical dependence.

Toxic: Detrimental to the functioning of an organ or group of organs.

Vertigo: The sensation of dizziness.

Withdrawal: Symptoms that develop when chronic drug use is reduced or stopped.

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