



Clinical Trials Network

NIDA's National Drug Abuse Clinical Trials Network serves 34 states plus the District of Columbia and Puerto Rico. Researchers test the effectiveness of new and improved interventions in real-life community settings with diverse populations. The network recently demonstrated the efficacy of an incentive-based method for cocaine and methamphetamine abstinence. The network also stands ready to help NIDA respond to emerging public health needs. Academic medicine institutions affiliated with this network include:

- David Geffen
School of Medicine at UCLA
- Duke University
School of Medicine
- Johns Hopkins University
School of Medicine
- Medical University of South Carolina
- New York University
School of Medicine
- Oregon Health & Science University
- University of California,
San Francisco, School of Medicine
- University of Cincinnati
College of Medicine
- University of Colorado
School of Medicine
- University of Miami Miller
School of Medicine
- University of New Mexico
School of Medicine
- University of Pennsylvania
School of Medicine
- University of Pittsburgh
School of Medicine
- University of Texas Southwestern
Medical Center at Dallas
- University of Washington
School of Medicine
- Yale University School of Medicine

Drug Use and Abuse: Fighting the Destructive Grip of Addiction

Addiction is a developmental disease that begins in childhood and adolescence and is influenced by a tangle of factors involving genes, environment, and an individual's age at first substance use. Whatever the addiction—cigarettes, alcohol, illicit or prescription drugs—groundbreaking research conducted at the nation's medical schools and teaching hospitals and supported by the National Institutes of Health (NIH), has made it clear that addiction is a chronic and relapsing disease, yet treatable.

In 2004, approximately 22.5 million Americans age 12 or older needed treatment for substance (alcohol or illicit drugs) abuse and addiction. Of those, only 3.8 million people received it. The medical and social consequences of an untreated drug addiction can be devastating. Tobacco use kills nearly half a million Americans each year. Other chemical addictions boost the risk for HIV/AIDS, tuberculosis, fetal abnormalities and illness, and can lead to increases in crime and violence—problems that can impact individuals, families, and entire communities.

The NIH, principally through its National Institute on Drug Abuse (NIDA), supports research at the nation's medical schools and teaching hospitals to better understand the disease of addiction and develop more targeted strategies for its prevention and treatment. Examples of progress from this research are described below.

Genetics/Cause

Genetic factors and combined genetic-environmental interactions are estimated to account for 40 percent to 60 percent of the variability in addiction risk. Several susceptibility genes have been found for alcohol dependence and nicotine addiction. For example:

- Scientists at Washington University School of Medicine conducted a genome-wide association study in 2006 and identified several novel genes involved in nicotine dependence.
- In 2004, researchers at the Johns Hopkins University School of Medicine found a protein, called Arc, which may be a culprit in drug addiction. The protein helps the brain retain memories for longer than an hour or two.
- In 1994, scientists at the Oregon Health & Science University were the first to clone the mammalian gene for the D2 dopamine receptor. Dopamine is a brain neurotransmitter that is thought to be essential to the brain's response to drugs like opiates and psychostimulants.

The Criminal Justice System

A majority of prisoners (60 to 80 percent) in the U.S. criminal justice system were convicted on drug-related charges. Research demonstrates that providing treatment to these individuals decreases future drug use and criminal behavior. NIDA launched the Criminal Justice-Drug Abuse Treatment Studies (CJ-DATS) initiative in 2002 to bring new treatment models into the criminal justice system and improve outcomes for offenders with substance use disorders. Several of the nation's medical schools are involved in CJ-DATS, including:

David Geffen
School of Medicine at UCLA
University of Kentucky
College of Medicine
University of Miami Miller
School of Medicine
Virginia Commonwealth
University School of Medicine

- Johns Hopkins University School of Medicine researchers reported in 2006 that men's brains show evidence of up to three times the amount of the brain chemical dopamine as women's brains when exposed to amphetamines. This is the first clinical study that explains why more men than women abuse amphetamines and could lead to tailored treatments for drug abuse and neurological diseases.

Brain Studies

High-powered imaging techniques are revealing the harmful damage done by addiction. Recent scientific research provides overwhelming evidence that drugs interfere with normal brain functioning and have long-term effects on brain metabolism and activity. At some point, changes occur in the brain that can turn a drug abuse problem into an addiction. Those addicted to drugs suffer from a compulsive craving and often cannot quit using their drug of choice without professional help.

- In 2004, researchers at the David Geffen School of Medicine at UCLA used structural magnetic resonance imaging (MRI) and computational brain mapping to reveal structural abnormalities in the brains of chronic methamphetamine users.
- A 2005 study at the University of California, San Diego, School of Medicine showed that functional MRI might be used to predict relapse in substance-dependent individuals. A simple two-choice test correctly predicted 20 of 22 subjects who did not relapse and 17 of 18 subjects who did.

Prevention

The best approach to reducing the tremendous toll of substance abuse is to stop the damage before it occurs. Each dollar invested in prevention achieves a savings of up to seven dollars in areas such as substance abuse treatment and criminal justice system costs, according to NIDA. The positive impact of prevention messages is reflected in current NIDA statistics. As of December 2006, recent use of illicit drugs in the United States has dropped almost one quarter (23.2 percent) since 2001 among 8th, 10th, and 12th graders.

- An NIH-supported prevention program called Life Skills Training, developed at Weill Medical College of Cornell University, combines teaching of drug and alcohol resistance skills with social and personal skills, such as assertiveness and goal setting. A 2006 long-term evaluation of the program found that young adults who went through the program in grades 7 through 9 were not only less likely to use drugs and alcohol, but were also less likely to exhibit behaviors that put them at high risk for contracting HIV/AIDS.
- ATLAS (Athletes Training and Learning to Avoid Steroids) and ATHENA (Athletes Targeting Healthy Exercise and Nutrition Alternatives) are two highly successful school programs for male and female athletes that address steroid abuse and drinking and driving. The programs leverage the influence of coaches and peer groups and have been adopted by schools in 29 states and Puerto Rico, and endorsed by Congress as exemplary prevention programs. Scientists at the Oregon Health & Science University developed both programs.

Treatment

Addictions can be successfully treated, often with a combination of medication and behavioral therapy. Advances in pharmacogenomics are helping identify genetic factors that may predict which individuals may respond well to specific medications for addiction.

- Researchers at Yale University School of Medicine reported early success in 2005 with a vaccine that dulls cocaine's euphoric effects.
- In 2006, University of Pennsylvania School of Medicine scientists identified genetic variants that predict which patients are most likely to quit smoking using the drug bupropion and who will respond better to nicotine replacement therapy.
- In 2006, scientists at the Columbia University College of Physicians and Surgeons and the University of Pennsylvania School of Medicine collaborated to show the efficacy of a sustained-release, injectable drug called naltrexone as a treatment for opioid dependence.
- A 2005 study by researchers at the Johns Hopkins University School of Medicine indicated that providing incentives for patients leaving drug detoxification, such as rent payments, recreational activities, and job-skills training, leads to much higher short-term drug abstinence and large increases in days worked and wages.

For more information about how medical schools and teaching hospitals are fulfilling the promise of medical research, go to: www.aamc.org/research/ftp