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Methamphetamine Research

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Response to Escalating Methamphetamine Abuse Builds on NIDA-Funded Research

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NIDA-funded scientists are providing research crucial to the Nation's response to increasing methamphetamine abuse and addiction. Methamphetamine, also called "meth," is a potent form of amphetamine. It is a synthetic, highly addictive stimulant that is cheaper and longer lasting than cocaine.

Methamphetamine comes in many forms and can be smoked, snorted, orally ingested, or injected. The drug is a white, odorless, bitter-tasting crystalline powder that can be dissolved in water or alcohol. When made in clandestine labs, it is often in the form of a coarse powder or chunks that are off-white to yellow. Other nicknames include "speed," "crank," and "zip." The smokable form of the drug may be called "ice" or "crystal." The drug is addictive, and users can escalate quickly to larger and more frequent doses. Chronic abuse can lead to violent behavior. (For more information, see [Facts About Methamphetamine](#))

The growing abuse of the drug is linked to its increasing availability and the fact that it can be easily manufactured from readily available chemical ingredients. Congress last summer passed the Comprehensive Methamphetamine Control Act establishing new controls over volume sales of the chemical ingredients used to produce the drug.

NIDA's [Community Epidemiology Work Group \(CEWG\)](#), a network of epidemiologists and researchers from 20 major U.S. metropolitan areas that provides frontline surveillance of the nature and extent of drug abuse, confirms that methamphetamine use has been prevalent in west coast cities and in western and southwestern communities, including many rural areas. Abuse of the drug now is being reported in urban settings in widening areas of the West, Midwest, and elsewhere. Methamphetamine is the dominant illicit drug problem in San Diego, according to CEWG data that include records of hospital emergency room admissions, drug-related deaths, and police drug seizures; and local observations of street buys and drug-trafficking patterns. Honolulu and San Francisco also have substantial methamphetamine-using populations, according to CEWG data. Recent reports indicate increasing patterns of methamphetamine use in Denver, Los Angeles, Minneapolis, Phoenix, Seattle, and Tucson as well.

Until recently, the drug's manufacture generally was dispersed so that small quantities were produced in rural areas. There are indications that methamphetamine now is being manufactured on a larger scale by organized groups operating out of Mexico and southern California. Methamphetamine of Mexican origin is now found along newly extended trafficking routes in several States, including Arizona, Colorado, Iowa, Missouri, Nebraska, and Texas, according to CEWG. Clandestine labs have produced the drug in rural and desert areas where the telltale odors of the production process are less likely to be detected. Mobile labs in campers and vans have been reported in Washington.

A NIDA-funded study in Seattle confirmed that methamphetamine use was widespread among the city's homosexual and bisexual populations. Members of these groups using methamphetamine reported they practice sexual and needle-use behaviors that place them at heightened risk of contracting and transmitting HIV, the virus that causes AIDS. NIDA also supports basic research examining the neurobio-logical mechanisms involved in methamphetamine's action in the brain, seeking knowledge necessary for long-term solutions to abuse of the drug. Research has shown that methamphetamine releases high levels of the neurotransmitter dopamine, which stimulates brain cells, causing enhanced mood and increased body movement.

Animal studies show that high doses of methamphetamine damage nerve cells. In rats, one high dose of methamphetamine is enough to cause damage. Prolonged dosage seems to make it worse.

Another major research focus is on methamphetamine's neurotoxicity, specifically its action in damaging brain cells that contain dopamine and serotonin, another neurotransmitter. Scientists think that methamphetamine abuse over time may cause reduced levels of dopamine, which can cause symptoms like those of Parkinson's disease, a severe movement disorder.

Animal studies going back more than 20 years show that high doses of methamphetamine damage neuron cell-endings, says Dr. Lewis S. Seiden of the University of Chicago, a NIDA-funded researcher who has studied methamphetamine for many years. "The damage is essentially permanent, although there may be some regrowth. The damage occurs in rats, guinea pigs, pigs, cats, and nonhuman primates. In rats, one high dose of methamphetamine is enough to cause damage. Prolonged dosage seems to make it worse," he says. Recent NIDA-funded studies by Dr. George A. Ricaurte at Johns Hopkins Medical Institutions in Baltimore and by other scientists indicate that neurotoxic effects are more pronounced in nonhuman primates than in rodents.

Dopamine- and serotonin-containing neurons do not die after methamphetamine use, but their nerve endings or terminals are cut back or "pruned" by use of the drug, Dr. Ricaurte says. "The question is, does the same thing occur in humans?" he asks. "To answer that question we have recently developed brain imaging techniques to study these effects in humans who have previously used methamphetamine." (See [NIDA-Supported Researchers Use Brain Imaging to Deepen Understanding of Addiction](#))

Another NIDA-funded researcher, Dr. Glen R. Hanson at the University of Utah, found evidence that dopamine-generated compounds called free radicals that appear following methamphetamine use can affect serotonin production in contrasting ways. He also reports that several neuropeptide systems linked to dopamine brain pathways are profoundly altered by administration of low to high doses of methamphetamine.

"Our results suggest that high and low doses of methamphetamine affect a peptide called neurotensin in very different ways," says Dr. Hanson. High doses of methamphetamine limit neurotensin's function, perhaps resulting in exaggerated dopamine responses to the stimulant. Low doses of methamphetamine increase neurotensin levels and function, which in turn appear to counteract behavioral response to the drug. These findings suggest that neurotensin perhaps could be used to prevent excessive and damaging dopamine responses to methamphetamine, he adds.

NIDA is also supporting research into treatment for methamphetamine abuse. Dr. Richard A. Rawson of the Matrix Institute in Beverly Hills, California, is conducting two out-patient studies with patients using both cocaine and methamphetamine.

One study concerns a small group of gay, methamphetamine-using males in Hollywood, California, where use of the drug is closely related to high-risk sexual behavior. Methamphetamine is the "drug of choice" among these homosexual men whether it is snorted, injected, or smoked, says Dr. Rawson. "They all talk about the interconnectedness of their sexual behavior and methamphetamine use."

Another study concerns 600 heterosexual methamphetamine abusers seeking treatment at a facility in a rural area of San Bernardino County, California. Methamphetamine abuse has been a problem in this area since the late 1980s. Users typically have also used cocaine but find methamphetamine longer lasting and more easily available; many of those in treatment say they can readily get the drug, even at their work sites or public places like truck stops, says Dr. Rawson.

"Treatment response was somewhat poorer among methamphetamine abusers than among cocaine abusers-fewer meth abusers could remain drug free," he says. "The methamphetamine abusers are twice as likely as cocaine abusers to require some kind of medical treatment," he says. "Methamphetamine abusers are more debilitated and show paranoia and hallucinations. There is more violence associated with methamphetamine abuse, according to the treatment staff."

Concern that methamphetamine abuse is a growing problem affecting many population groups has prompted the White House to launch a policy and planning approach called the President's National Strategy for Combating Methamphetamine Abuse. The White House Office of National Drug Control Policy sponsored a Western Regional Methamphetamine Conference last January in San Francisco and will sponsor a national methamphetamine conference in May in Omaha, Nebraska.

The Substance Abuse and Mental Health Services Administration, in collaboration with NIDA, in June sponsored a satellite meeting on methamphetamine abuse at the annual meeting of the College on Problems of Drug Dependence in Puerto Rico. This meeting involved more than 30 experts, many of them NIDA staffers and NIDA-funded researchers. (See [Recommendations to Advance Understanding of Methamphetamine](#), for a report on the meeting's recommendations.)

NIDA also sponsored a symposium, "Methamphetamine Abuse, Treatment, and Prevention," in San Francisco in December 1996 focusing on national and regional issues relating to methamphetamine abuse.

Sources

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