

Methamphetamine

Methamphetamine is a central nervous system stimulant drug that is similar in structure to amphetamine. Due to its high potential for abuse, methamphetamine is classified as a Schedule II drug and is available only through a prescription that cannot be refilled. Although methamphetamine can be prescribed by a doctor, its medical uses are limited, and the doses that are prescribed are much lower than those typically abused. Most of the methamphetamine abused in this country comes from foreign or domestic superlabs, although it can also be made in small, illegal laboratories, where its production endangers the people in the labs, neighbors, and the environment.

How Is Methamphetamine Abused?

Methamphetamine is a white, odorless, bitter-tasting crystalline powder that easily dissolves in water or alcohol and is taken orally, intranasally (snorting the powder), by needle injection, or by smoking.

How Does Methamphetamine Affect the Brain?

Methamphetamine increases the release, and blocks the reuptake, of the brain chemical (or neurotransmitter) dopamine, leading to high levels of the chemical in the brain—a common mechanism

of action for most drugs of abuse. Dopamine is involved in reward, motivation, the experience of pleasure, and motor function. Methamphetamine's ability to rapidly release dopamine in reward regions of the brain produces the intense euphoria, or "rush," that many users feel after snorting, smoking, or injecting the drug.

Chronic methamphetamine abuse significantly changes how the brain functions. Noninvasive human brain imaging studies have shown alterations in the activity of the dopamine system that are associated with reduced motor skills and impaired verbal learning.¹ Recent studies in chronic methamphetamine abusers have also revealed severe structural and functional changes in areas of the brain associated with emotion and memory,^{2,3} which may account for many of the emotional and cognitive problems observed in chronic methamphetamine abusers.

Repeated methamphetamine abuse can also lead to addiction—a chronic, relapsing disease, characterized by compulsive drug seeking and use, which is accompanied by chemical and molecular changes in the brain. Some of these changes persist long after methamphetamine abuse is stopped. Reversal of some of the changes, however, may be observed after sustained periods of abstinence (e.g., more than 1 year).⁴

What Other Adverse Effects Does Methamphetamine Have on Health?

Taking even small amounts of methamphetamine can result in many of the same physical effects as those of other stimulants, such as cocaine or amphetamines, including increased wakefulness, increased physical activity, decreased appetite, increased respiration, rapid heart rate, irregular heartbeat, increased blood pressure, and hyperthermia.

Long-term methamphetamine abuse has many negative health consequences, including extreme weight loss, severe dental problems (“meth mouth”), anxiety, confusion, insomnia, mood disturbances, and violent behavior. Chronic methamphetamine abusers can also display a number of psychotic features, including paranoia, visual and auditory hallucinations, and delusions (for example, the sensation of insects crawling under the skin).

Transmission of HIV and hepatitis B and C can be consequences of methamphetamine abuse. The intoxicating effects of methamphetamine, regardless of how it is taken, can also alter judgment and inhibition and can lead people to engage in unsafe behaviors, including risky sexual behavior. Among abusers who inject the drug, HIV and other infectious diseases can be spread through contaminated needles, syringes, and other injection equipment that is used by more than one person. Methamphetamine abuse may also worsen the progression of

HIV and its consequences. Studies of methamphetamine abusers who are HIV-positive indicate that HIV causes greater neuronal injury and cognitive impairment for individuals in this group compared with HIV-positive people who do not use the drug.^{5,6}

What Treatment Options Exist?

Currently, the most effective treatments for methamphetamine addiction are comprehensive cognitive-behavioral interventions. For example, the Matrix Model—a behavioral treatment approach that combines behavioral therapy, family education, individual counseling, 12-step support, drug testing, and encouragement for non-drug-related activities—has been shown to be effective in reducing methamphetamine abuse.⁷ Contingency management interventions, which provide tangible incentives in exchange for engaging in treatment and maintaining abstinence, have also been shown to be effective.⁸ There are no medications at this time approved to treat methamphetamine addiction; however, this is an active area of research for NIDA.

How Widespread Is Methamphetamine Abuse?

Monitoring the Future Survey[†]

According to the 2008 Monitoring the Future survey—a national survey of 8th-, 10th-, and 12th-graders—methamphetamine abuse among students has shown a general decline in recent years; however, it remains a concern. Survey results show that 2.3

percent of 8th-graders, 2.4 percent of 10th-graders, and 2.8 percent of 12th-graders have used methamphetamine in their lifetime. In addition, 0.7 percent of 8th-graders, 0.7 percent of 10th-graders, and 0.6 percent of 12th-graders were current (past-month) methamphetamine abusers. Past-year use of methamphetamine remained steady across all grades surveyed from 2007 to 2008.

Methamphetamine Use by Students 2008 Monitoring the Future Survey			
	8th Grade	10th Grade	12th Grade
Lifetime ^{††}	2.3%	2.4%	2.8%
Past Year	1.2%	1.5%	1.2%
Past Month	0.7%	0.7%	0.6%

National Survey on Drug Use and Health (NSDUH)^{†††}

The number of individuals aged 12 years or older reporting past-year methamphetamine use declined from 1.9 million in 2006 to 1.3 million

in 2007. An estimated 529,000 Americans were current (past-month) users of methamphetamine (0.2 percent of the population). Of the 157,000 people who used methamphetamine for the first time in 2007, the mean age at first use was 19.1 years, which is down from the mean age of 22.2 in 2006.

Other Information Resources

For more information on the effects of methamphetamine abuse and addiction, visit www.drugabuse.gov/drugpages/methamphetamine.html.

To find publicly funded treatment facilities by State, visit www.findtreatment.samhsa.gov.

For street terms searchable by drug name, street term, cost and quantities, drug trade, and drug use, visit www.whitehousedrugpolicy.gov/streetterms/default.asp.

Data Sources

[†] These data are from the 2008 Monitoring the Future survey, funded by the National Institute on Drug Abuse, National Institutes of Health, Department of Health and Human Services, and conducted by the University of Michigan’s Institute for Social Research. The study has tracked 12th-graders’ illicit drug abuse and related attitudes since 1975; in 1991, 8th- and 10th-graders were added to the study. The latest data are online at www.drugabuse.gov.

^{††} “Lifetime” refers to use at least once during a respondent’s lifetime. “Past year” refers to use at least once during the year preceding an individual’s response to the survey. “Past month” refers to use at least once during the 30 days preceding an individual’s response to the survey.

^{†††} NSDUH (formerly known as the National Household Survey on Drug Abuse) is an annual survey of Americans age 12 and older conducted by the Substance Abuse and Mental Health Services Administration. Copies of the latest survey are available at www.samhsa.gov and from NIDA at 877-643-2644.

References

- ¹ Volkow ND, Chang L, Wang GJ, et al. Association of dopamine transporter reduction with psychomotor impairment in methamphetamine abusers. *Am J Psychiatry* 158(3):377–382, 2001.
- ² London ED, Simon SL, Berman SM, et al. Mood disturbances and regional cerebral metabolic abnormalities in recently abstinent methamphetamine abusers. *Arch Gen Psychiatry* 61(1):73–84, 2004.
- ³ Thompson PM, Hayashi KM, Simon SL, et al. Structural abnormalities in the brains of human subjects who use methamphetamine. *J Neurosci* 24(26):6028–6036, 2004.
- ⁴ Wang GJ, Volkow ND, Chang L, et al. Partial recovery of brain metabolism in methamphetamine abusers after protracted abstinence. *Am J Psychiatry* 161(2):242–248, 2004.
- ⁵ Chang L, Ernst T, Speck O, Grob CS. Additive effects of HIV and chronic methamphetamine use on brain metabolite abnormalities. *Am J Psychiatry* 162(2):361–369, 2005.
- ⁶ Rippeth JD, Heaton RK, Carey CL, et al. Methamphetamine dependence increases risk of neuropsychological impairment in HIV infected persons. *J Int Neuropsychol Soc* 10(1):1–14, 2004.
- ⁷ Rawson RA, Marinelli-Casey P, Anglin MD, et al. A multi-site comparison of psychosocial approaches for the treatment of methamphetamine dependence. *Addiction* 99(6):708–717, 2004.
- ⁸ Roll JM, Petry NM, Stitzer ML, et al. Contingency management for the treatment of methamphetamine use disorders. *Am J Psychiatry* 163(11):1993–1999, 2006.