



National Institute
on Drug Abuse

DrugFacts

www.drugabuse.gov

Methamphetamine

What is methamphetamine?

Methamphetamine is a stimulant drug usually used as a white, bitter-tasting powder or a pill. Crystal methamphetamine is a form of the drug that looks like glass fragments or shiny, bluish-white rocks. It is chemically similar to amphetamine [a drug used to treat attention-deficit hyperactivity disorder (ADHD) and narcolepsy, a sleep disorder].

Other common names for methamphetamine include *chalk*, *crank*, *crystal*, *ice*, *meth*, and *speed*.



Crystal methamphetamine
Photo by DEA/1.usa.gov/1WpNtno

How do people use methamphetamine?

People can take methamphetamine by:

- inhaling/smoking
- swallowing (pill)
- snorting
- injecting the powder that has been dissolved in water/alcohol

Because the "high" from the drug both starts and fades quickly, people often take repeated doses in a "binge and crash" pattern. In some cases, people take methamphetamine in a form of bingeing known as a "run," giving up food and sleep while continuing to take the drug every few hours for up to several days.

How does methamphetamine affect the brain?

Methamphetamine increases the amount of the natural chemical dopamine in the brain. Dopamine is involved in body movement, motivation, and reinforcement of rewarding behaviors. The drug's ability to rapidly release high levels of dopamine in reward areas of the brain strongly reinforces drug-taking behavior, making the user want to repeat the experience.

Short-Term Effects

Taking even small amounts of methamphetamine can result in many of the same health effects as those of other stimulants, such as cocaine or amphetamines. These include:

- increased wakefulness and physical activity
- decreased appetite
- faster breathing
- rapid and/or irregular heartbeat
- increased blood pressure and body temperature

How Do Manufacturers Make Methamphetamine?

Manufacturers make most of the methamphetamine found in the United States in "superlabs" here or, more often, in Mexico. But some also make the drug in small, secret labs with inexpensive over-the-counter ingredients such as pseudoephedrine, a common ingredient in cold medicines. To curb production, the law requires pharmacies and other retail stores to keep a purchase record of products containing pseudoephedrine. A person may only buy a limited amount of those products on a single day.

Methamphetamine production also involves a number of other very dangerous chemicals. Toxic effects from these chemicals can remain in the environment around a lab long after the lab has been shut down, causing a wide range of health problems for people living in the area. These chemicals can also result in deadly lab explosions and house fires.

What are other health effects of methamphetamine?

Long-Term Effects

People who inject methamphetamine are at increased risk of contracting infectious diseases such as HIV and hepatitis B and C. These diseases are transmitted through contact with blood or other bodily fluids. Methamphetamine use can also alter judgment and decision-making leading to risky behaviors, such as unprotected sex, which also increases risk for infection.

Methamphetamine use may worsen the progression of HIV/AIDS and its consequences. Studies indicate that HIV causes more injury to nerve cells and more cognitive problems in people who have HIV and use methamphetamine than it does in people who have HIV and don't use the drug.¹ Cognitive problems are those involved with thinking, understanding, learning, and remembering.

Long-term methamphetamine use has many other negative consequences, including:

- extreme weight loss
- severe dental problems ("meth mouth")
- intense itching, leading to skin sores from scratching
- anxiety
- confusion
- sleeping problems
- violent behavior
- *paranoia*—extreme and unreasonable distrust of others
- *hallucinations*—sensations and images that seem real though they aren't



"Meth mouth"

Photo by Dozenist/CC BY-SA/
bit.ly/1WCZhmR

In addition, continued methamphetamine use causes changes in the brain's dopamine system that are associated with reduced coordination and impaired verbal learning. In studies of people who used methamphetamine over the long term, severe changes also affected areas of the brain involved with emotion and memory.² This may explain many of the emotional and cognitive problems observed in those who use methamphetamine.

Although some of these brain changes may reverse after being off the drug for a year or more, other changes may not recover even after a long period of abstinence.³ A recent study even suggests that people who used methamphetamine have an increased risk of developing Parkinson's disease, a disorder of the nerves that affects movement.⁴

Are there health effects from exposure to secondhand methamphetamine smoke?

Researchers don't yet know whether people breathing in secondhand methamphetamine smoke can get high or have other health effects. What they do know is that people can test positive for methamphetamine after exposure to secondhand smoke.^{5,6} More research is needed in this area.

Can a person overdose on methamphetamine?

Yes, a person can overdose on methamphetamine. An overdose occurs when the person uses too much of a drug and has a toxic reaction that results in serious, harmful symptoms or death.

Methamphetamine overdose can lead to stroke, heart attack, or organ problems—such as kidney failure—caused by overheating. These conditions can result in death.

How can a methamphetamine overdose be treated?

Because methamphetamine overdose often leads to a stroke, heart attack, or organ problems, first responders and emergency room doctors try to treat the overdose by treating these conditions, with the intent of:

- restoring blood flow to the affected part of the brain (stroke)
- restoring blood flow to the heart (heart attack)
- treating the organ problems

Is methamphetamine addictive?

Yes, methamphetamine is highly addictive. When people stop taking it, withdrawal symptoms can include:

- anxiety
- fatigue
- severe depression
- psychosis
- intense drug cravings

How can people get treatment for methamphetamine addiction?

The most effective treatments for methamphetamine addiction so far are behavioral therapies, such as:

- cognitive-behavioral therapy, which helps patients recognize, avoid, and cope with the situations in which they are most likely to use drugs
- motivational incentives, which uses vouchers or small cash rewards to encourage patients to remain drug-free

While research is under way, there are currently no government-approved medications to treat methamphetamine addiction.

Points to Remember

- Methamphetamine is usually a white, bitter-tasting powder or a pill. Crystal methamphetamine looks like glass fragments or shiny, bluish-white rocks.
- Methamphetamine is a stimulant drug that is chemically similar to amphetamine (a drug used to treat ADHD and narcolepsy).
- People can take methamphetamine by inhaling/smoking, swallowing, snorting, or injecting the drug.
- Methamphetamine increases the amount of dopamine in the brain, which is involved in movement, motivation, and reinforcement of rewarding behaviors.
- Short-term health effects include increased wakefulness and physical activity, decreased appetite, and increased blood pressure and body temperature.
- Long-term health effects include risk of contracting HIV and hepatitis; severe dental problems ("meth mouth"); intense itching, leading to skin sores from scratching; violent behavior; and paranoia.
- Researchers don't yet know whether people breathing in secondhand methamphetamine smoke can get high or have other health effects.
- A person can overdose on methamphetamine. Because methamphetamine overdose often leads to a stroke, heart attack, or organ problems, first responders and emergency room doctors try to treat the overdose by treating these conditions.
- Methamphetamine is highly addictive. When people stop taking it, withdrawal symptoms can include anxiety, fatigue, severe depression, psychosis, and intense drug cravings.
- The most effective treatments for methamphetamine addiction so far are behavioral therapies. There are currently no government-approved medications to treat methamphetamine addiction.

Learn More

For more information about methamphetamine, visit our:

- [Methamphetamine webpage](#)
- [Commonly Abused Drugs chart](#)

This publication is available for your use and may be reproduced **in its entirety** without permission from the NIDA. Citation of the source is appreciated, using the following language:

Source: National Institute on Drug Abuse; National Institutes of Health; U.S. Department of Health and Human Services.

Updated June 2018

References

1. Chang L, Ernst T, Speck O, Grob CS. Additive effects of HIV and chronic methamphetamine use on brain metabolite abnormalities. *Am J Psychiatry*. 2005;162(2):361-369. doi:10.1176/appi.ajp.162.2.361.
2. Volkow ND, Chang L, Wang GJ, et al. Association of dopamine transporter reduction with psychomotor impairment in methamphetamine abusers. *Am J Psychiatry*. 2001;158(3):377-382. doi:10.1176/appi.ajp.158.3.377.
3. Wang G-J, Volkow ND, Chang L, et al. Partial recovery of brain metabolism in methamphetamine abusers after protracted abstinence. *Am J Psychiatry*. 2004;161(2):242-248. doi:10.1176/appi.ajp.161.2.242.
4. Curtin K, Fleckenstein AE, Robison RJ, Crookston MJ, Smith KR, Hanson GR. Methamphetamine/amphetamine abuse and risk of Parkinson's disease in Utah: a population-based assessment. *Drug Alcohol Depend*. 2015;146:30-38. doi:10.1016/j.drugalcdep.2014.10.027.
5. Bassindale T. Quantitative analysis of methamphetamine in hair of children removed from clandestine laboratories--evidence of passive exposure? *Forensic Sci Int*. 2012;219(1-3):179-182. doi:10.1016/j.forsciint.2012.01.003.
6. Farst K, Reading Meyer JA, Mac Bird T, James L, Robbins JM. Hair drug testing of children suspected of exposure to the manufacture of methamphetamine. *J Forensic Leg Med*. 2011;18(3):110-114. doi:10.1016/j.jflm.2011.01.013.