



National Institute
on Drug Abuse

DrugFacts

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Methamphetamine

What is methamphetamine?

Methamphetamine is a powerful, highly addictive stimulant that affects the central nervous system. 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 *blue*, *crystal*, *ice*, *meth*, and *speed*.

How do people use methamphetamine?

People can take methamphetamine by:

- 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 binging known as a "run," giving up food and sleep while continuing to take the drug every few hours for up to several days.



Crystal methamphetamine

Photo by

DEA/<https://www.dea.gov/galleries/drug-images/methamphetamine>

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?

Currently, most methamphetamine in the United States is produced by transactional criminal organizations (TCOs) in Mexico. This methamphetamine is highly pure, potent, and low in price. The drug can be easily made in small clandestine laboratories, with relatively inexpensive over-the-counter ingredients such as pseudoephedrine, a common ingredient in cold medications. To curb this kind of production, the law requires pharmacies and other retail stores to keep a purchase record of products containing pseudoephedrine, and take steps to limit sales.

Methamphetamine production also involves a number of other very dangerous chemicals. Toxic effects from these chemicals can remain in the environment 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 that can remain on drug equipment. 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 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
- addiction
- severe dental problems ("meth mouth")
- intense itching, leading to skin sores from scratching
- anxiety
- changes in brain structure and function
- confusion
- memory loss
- 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/
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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 seen 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 time.³ A recent study even suggests that people who once used methamphetamine have an increased the 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.

In 2017, about 15 percent of all drug overdose deaths involved the methamphetamine category, and 50 percent of those deaths also involved an opioid, with half of those cases related to the synthetic opioid fentanyl. (CDC Wonder Multiple Causes of Death—see #42 on Meth RR.) It is important to note that cheap, dangerous synthetic opioids are sometimes added to street methamphetamine without the user knowing.

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 is methamphetamine addiction treated?

While research is underway, there are currently no government-approved medications to treat methamphetamine addiction. The good news is that methamphetamine misuse can be prevented and addiction to the drug can be treated with behavioral therapies. 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 likely to trigger drug use.
- motivational incentives, which uses vouchers or small cash rewards to encourage patients to remain drug-free

Research also continues toward development of medicines and other new treatments for methamphetamine use, including vaccines, and noninvasive stimulation of the brain using magnetic fields. People can and do recover from methamphetamine addiction if they have ready access to effective treatments that address the multitude of medical and personal problems resulting from long-term use.

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 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 addiction; risk of contracting HIV and hepatitis; severe dental problems ("meth mouth"); intense itching, leading to skin sores from scratching; violent behavior; and paranoia.
- Methamphetamine can be highly addictive. When people stop taking it, withdrawal symptoms can include anxiety, fatigue, severe depression, psychosis, and intense drug cravings.
- Researchers don't yet know if people breathing in secondhand methamphetamine smoke can get high or suffer 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.
- 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](#)

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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.