Methamphetamine is an addictive central nervous system (CNS) stimulant with limited medical value. The United States Drug Enforcement Administration (DEA) lists methamphetamine as a Schedule II drug, which means it has high abuse potential and must be prescribed by a prescription that cannot be refilled.

Demographics
The national Monitoring the Future survey of 2008 found that in 2007, about 1.3 million Americans had used methamphetamine, a decrease from 1.9 million in 2006. This survey found that 2.3% of 8th graders, 2.4% of 10th graders, and 2.8% of 12th graders had tried methamphetamine at some time in their lives.

In the United States, methamphetamine use peaks in white men 30–40 years old; however, according to the Monitoring the Future survey, the average age of first use in 2007 was 19.1 years. In addition, methamphetamine use is highest in western states. Internationally, methamphetamine use is highest in Eastern Europe and Southeast Asia.

Description
Methamphetamine was first synthesized in Japan in 1919 and was used as a drug therapy in asthma inhalers in the 1930s. Amphetamines of all kinds were used during World War II by both sides to increase the alertness and prolong wakefulness of soldiers. After the war, the government developed stricter regulations for the manufacture and use of amphetamines, but they remained popular among people who wanted to stay awake for long periods (e.g., students, long-haul truck drivers) and were commonly used by people who wanted to lose weight. In 1970, more restrictions were put on methamphetamine, so that today it is a Schedule II drug. Despite this, methamphetamine remains a popular drug of abuse.

Methamphetamine is produced illegally in many countries, including the United States, and can be synthesized with readily available materials. The drug's misuse is deemed to be a major societal problem. Methamphetamine is addictive. It goes by the street names of “ice,” “chalk,” “crystal,” “crystal meth,” “speed,” “crank,” and “glass.”

Methamphetamine is similar to other CNS stimulants, such as amphetamine (its parent drug), methylphenidate, and cocaine, in that it stimulates dopamine reward pathways in the brain. Consistent with its stimulant profile, methamphetamine causes increased activity and talkativeness, decreased appetite and fatigue, and a general sense of well-being. Compared to amphetamine, methamphetamine is more potent and longer-lasting, and it has more harmful effects on the brain. In animals, a single high dose of methamphetamine has been shown to damage nerve terminals in the dopamine-containing regions of the brain.

Methamphetamine is a white, odorless, bitter-tasting crystalline powder that easily dissolves in water.
or alcohol. Misuse occurs in many forms, as methamphetamine can be smoked, snorted, injected, or taken orally. When smoked or injected, methamphetamine enters the brain very rapidly and immediately produces an intense, but short-lived, rush that many abusers find extremely pleasurable. Snorting or oral ingestion produces euphoria—a feeling of being high—within minutes. As with other abused stimulants, methamphetamine is most often used in a binge-and-crash pattern. A “run” of repeated doses may be continued over the course of days (binge) before stopping (crash). Exhaustion occurs with repeated use of methamphetamine, involving intense fatigue and need for sleep after the stimulation phase.

Approved medical indications for the drug are the sleep disorder narcolepsy, attention deficit hyperactivity disorder (ADHD), and extreme obesity, but in each case methamphetamine is a second-line drug at best and is used only after other, less harmful drugs have failed to be effective.

A prescription form of methamphetamine (brand name Desoxyn) is used to treat ADHD. Desoxyn comes in the form of a small, white tablet, which is orally ingested. Dosing begins at 5 mg once or twice a day and is increased weekly until the lowest effective dose is attained. Desoxyn should not be taken with other stimulants (including caffeine and decongestants) or antidepressant drugs (especially monoamine oxidase inhibitors [MAOs], but also tricyclic antidepressants). Desoxyn should not be taken by patients with glaucoma, cardiovascular disease (including hypertension and arteriosclerosis), or hyperthyroidism.

**Meth labs**

Around the United States are homemade methamphetamine-producing operations, or “meth labs,” of various sizes. Meth labs are often run in residential dwellings like apartments, houses, and mobile homes. Often, meth labs are discovered when the volatile chemicals used in making methamphetamine combust unexpectedly, resulting in a fire, to which firefighters and other emergency personnel respond. The persons actually making the methamphetamine are obviously at great risk for health problems due to inhaling the toxic chemical vapors emitted by the methamphetamine creation process, however, those who live with or around them are also at risk. In addition to the danger of explosion, serious health problems can occur from exposure to chemicals produced during the manufacture of methamphetamine. When looking for a home or apartment, particularly in rural or western areas where meth use is prevalent, it is important for prospective buyers to have the home and property inspected.

**Causes and symptoms**

Short-term effects of methamphetamine relate to its stimulation of the brain and the cardiovascular system. Euphoria and rush, alertness, increased physical activity, and decreased sleep and appetite occur from an increase in available dopamine in the brain. Any or all of these effects can lead to compulsive use of the drug that characterizes addiction. In addition, methamphetamine causes rapid heart beat (tachycardia), increased respiration, and increased blood pressure (hypertension), and with very high doses, increased body temperature (hyperthermia) and convulsions can occur.

Chronic use of methamphetamine can result in two hallmark features of addiction: tolerance and dependence. Tolerance to the euphoric effects in particular can prompt abusers to take higher or more frequent doses of the drug. Withdrawal symptoms in chronic users include depression, anxiety, fatigue, and an intense craving for the drug. Users who inject methamphetamine risk contracting life-threatening viruses such as HIV and hepatitis through the use of dirty needles.
Methamphetamine

**Short-term effects:**
- Increased alertness
- Rapid and irregular heartbeat
- Rise in blood pressure and body temperature

**Long-term effects:**
- Anxiety and feelings of confusion
- Dental problems
- Increased risk of contracting diseases such as HIV/AIDS and hepatitis
- Insomnia
- Mood disturbances
- Violent behavior

In 2008, 850,000 Americans aged 12 and older had abused methamphetamine at least once in the past year, 11% of whom were younger than 18.


**Consequences of methamphetamine abuse.** *(Table by PreMediaGlobal. Reproduced by permission of Gale, a part of Cengage Learning.)*

With repeated use, methamphetamine can cause anxiety, insomnia, mood disturbances, confusion, hallucinations, psychosis, and violent behavior. Psychotic features sometimes emerge, such as paranoia, hallucinations, and delusions, and can last well after methamphetamine use has stopped. **Stroke** and weight loss are other long-term effects.

Other symptoms experienced by methamphetamine addicts include:
- Increased body temperature—methamphetamine can cause an individual's body temperature to rise, leading to unconsciousness or death.
- “Crank bugs”—a sensation that bugs or something similar are crawling on or under an individual's skin.
- “Meth mouth”—ongoing methamphetamine use causes the user's teeth to become stained, rotten, and even broken. This is aggravated by the tendency of meth addicts to consume sweet foods and drinks, grind their teeth, and have dry mouth.

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Aged appearance—meth addicts tend to age rapidly. Addicts' highly agitated and active state, poor nutrition, and drastic weight loss tend to make them look sick and/or old. Addicts often have shaky hands, a dulled sunken appearance, and the presence of sores on their bodies.

**Diagnosis**

Methamphetamine use may be suspected by the symptoms described previously and confirmed with a urine drug screening test.

**Treatment**

For acute intoxication accompanied by psychosis, patients may be calmed by reassurance and a quiet setting, but sometimes antipsychotic drugs or sedatives are administered. Substances that prevent absorption from the gastrointestinal tract (e.g., activated charcoal) may be used if the drug was taken orally. Additional care is given as needed (e.g., keeping the airways open, treatment of seizures.) Individuals with methamphetamine intoxication may be violent, agitated, and a danger to themselves and others.

The most effective treatment for methamphetamine addiction is cognitive-behavioral intervention, such as counseling, but may also include family education, drug testing, and group support in a twelve-step program. The goal of these modalities is to modify the patient's thinking, expectancies, and behaviors to increase coping skills in the face of life's stressors. Contingent management is a promising behavioral intervention, where incentives are provided in exchange for staying clean and for participating in treatment. Residential programs and therapeutic communities may be helpful, particularly in more severe cases.

Antidepressant drugs such as bupropion (Wellbutrin) can be a useful treatment aid, but as of 2012, there are no FDA-approved medications specifically for the treatment of stimulant addiction.

**Prognosis**

Addiction is a complex disorder, and prospects for individual addicts vary widely. Chronic methamphetamine use causes changes in brain and mental function. While some effects are reversible, others are very long-lasting and perhaps permanent. Methamphetamine is addictive. Relapses are common, and cravings may continue for a long time after drug use has stopped.

**Efforts and solutions**

Methamphetamine use became a national epidemic starting in the 1990s, particularly in western and rural areas. Many teens experiment with meth, sometimes overdosing on their first use. As a result of the widespread problem of methamphetamine abuse, many government and social institutions have implemented prevention programs.

**KEY TERMS**

**Central nervous system (CNS)**—

Part of the nervous system consisting of the brain, cranial nerves, and spinal cord. The brain is the center of higher processes, such as thought and emotion, and is responsible for the coordination and control of bodily activities and the interpretation of information from the senses. The cranial nerves and spinal cord link the brain to the peripheral nervous system, that is the nerves present in the rest of body.
Dopamine—
A neurochemical made in the brain that is involved in many brain activities, including movement and emotion.

Hallucination—
A false or distorted perception of objects, sounds, or events that seems real. Hallucinations usually result from drugs or mental disorders.

Psychosis—
A serious mental disorder characterized by defective or lost contact with reality often with hallucinations or delusions.

Teenagers and schools
Teenagers are a target group for prevention strategies as adolescence and young adulthood are associated with exposure to, and an inclination to experiment with, drugs. Drug education and prevention programs should begin early, and parents and teachers should be alert to the possibility of methamphetamine abuse. Many states have such programs or task forces in place, such as the Illinois Attorney General's office, which hosts “Meth Net,” a website with resources and strategies for fighting meth use, especially in schools.

Methamphetamine ingredients
Due to the relative ease with which methamphetamine can be produced, and the prevalence of dangerous home “meth labs,” ongoing efforts are being made to increase the difficulty of acquiring methamphetamine ingredients. One of the main ingredients in homemade varieties of meth is found in common over-the-counter cold medicines that contain pseudoephedrine or ephedrine. Someone planning to make methamphetamine might buy large quantities of such cold medicines. Though state laws vary, many states and retailers require photo identification to purchase such over-the-counter medicines, or limit and record the quantities that can be purchased, and some states input buyer information into a statewide database to help prevent abuse.

The Meth Project
In 2005, businessman Thomas M. Siebel founded the Meth Project, which is currently funded by the Thomas and Stacey Sibel Foundation. The Meth Project funds separate Meth Project programs in eight states. It attempts to reduce the meth epidemic through confrontational, research-based public service messages, as well as education and legislative advocacy. The Meth Project is known for its blunt and even graphic public service ads, which show the effects of methamphetamine abuse on the human body and brain, as well as social, sexual, familial, and legal effects. The Meth Project also hosts a website that contains public service messages, resources for addicts looking for help, resources for family and friends of addicts, and interactive modules demonstrating the effects of meth use.

Faces of meth
In 2004, the Multnomah County Sheriff’s Office started a program, which eventually became Faces of Meth. Multnomah County is in Oregon, which is a state that has been hit especially hard by the methamphetamine epidemic. The program, which is used as an educational tool, compares mug shots of detainees, usually one from before or early on in their methamphetamine use, and one from later. Sometimes the time span between the two photos is not great, but the subject's change in

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appearance is usually drastic, sometimes making him or her unrecognizable. The pictures on the Faces of Meth websites are free and available for educational purposes. Due to the success and popularity of the Faces of Meth project, the Multnomah County Sheriff’s Office developed a film *From Drugs To Mugs*, designed for educational use, that is available through its website.

**Resources**

**BOOKS**


**PERIODICALS**


**WEB SITES**


**ORGANIZATIONS**

- National Clearinghouse on Alcohol and Drug Information, P. O. Box 2345, Rockville MD 20847, (877) SAMHSA-7; Hablamos español: (877) 767-8432; TDD: (800) 487-4889, Fax: (240) 221-4292, *http://ncadi.samhsa.gov*.
- National Council on Alcohol and Drug Dependence, 244 East 58th Street 4th Floor, New York NY 10022, (212) 269-7797, 24-hour help line: (800) NCA-CALL, Fax: (212) 269-7510, national@ncadd.org, *http://www.ncadd.org*.
- Partnership for a Drug-free America, 405 Lexington Avenue, Ste 1601, New York NY 10174, (212)

