

**HEADS UP
REAL NEWS
ABOUT DRUGS
AND YOUR BODY**

METHAMPHETAMINE Toxic. Addictive. Devastating. Get the Facts!

Also known as “**meth**” or “**ice**,” this highly addictive and brain-altering drug is a serious threat to individuals, families, and communities.

Big Heads Up: Across the United States, methamphetamine is leaving widespread damage in its path.

Make no mistake: this is a highly toxic, addictive, and devastating substance that poses serious health risks both to individuals who use it and to those who never do. Families, neighbors, communities, innocent children, the environment— all are affected by methamphetamine and the highly toxic chemicals that are used to produce it.

Heads Up: Methamphetamine Alters the Brain's Structure

Researchers have established that methamphetamine abuse causes changes in brain structure. The most affected areas are those that control memory, emotion, and reward.

From the image at right, we can see differences in the amount of change in a methamphetamine abuser's brain as compared with a nonuser's:

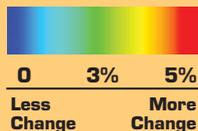
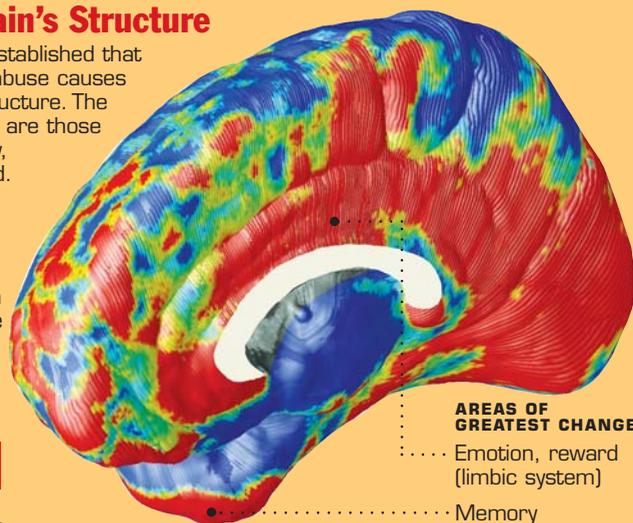


Photo credits: brain map courtesy of Paul Thompson, Kiratree Hayashi, Arthur Toga, and Edythe London/UCLA; rock methamphetamine ©DEA/AP Wide World; methamphetamine-making device ©The Grundy County Herald, C.E. Jones/AP Wide World.

1 lb of methamphetamine = 5 lbs of toxic waste

WHAT DOES IT LOOK LIKE?

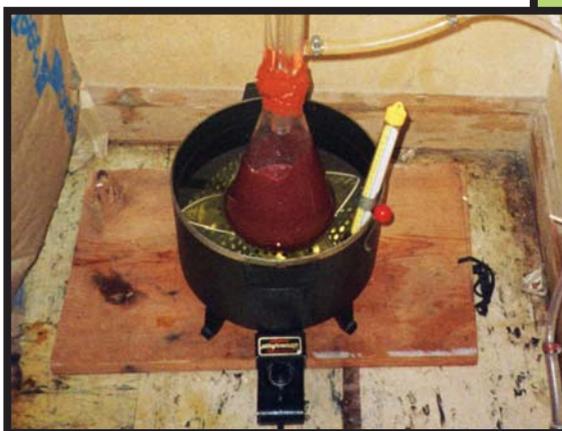
Often referred to as “meth,” methamphetamine can be a white powder that easily dissolves in water. Another form of the drug, in clear chunky crystals, is called “crystal meth” or “ice.” The drug can also come in the form of small, brightly colored tablets known by the name “yaba.” Methamphetamine abusers inject, snort, smoke, or swallow the drug.



Methamphetamine as a rock crystal—“ice.”

A SPREADING THREAT:

Whether teens live in the city or in the country, they are increasingly likely to be faced with methamphetamine. Until recently, methamphetamine in the United States was concentrated in a few cities and towns, most of them in the West. But now, health and law-enforcement officials see methamphetamine spreading to rural areas, cities, and towns across the nation.



Squalid-looking device used for making methamphetamine.

WIDE DEVASTATION:

Few substances are as harmful as methamphetamine. From the ravages facing abusers whose bodies, brains, and actions become altered, to burns, explosions, and toxic spills resulting from the chemicals used to produce methamphetamine, this is one dangerous drug.

According to Dr. Nora D. Volkow, director of the National Institute on Drug Abuse (NIDA), methamphetamine is “a stimulant drug that can have devastating medical, psychiatric, and social consequences.”

Partly because of the spread of methamphetamine across the country, NIDA has stepped up its research relating to the drug. Scientists are working to understand how the drug affects abusers and how best to treat people suffering from the disease of methamphetamine addiction.

Manufacturing methamphetamine always produces toxic waste. Ingredients might include toluene, iodine, red phosphorus (used in road flares), sodium hydroxide, lithium/sodium metal, hydrochloric acid, anhydrous ammonia (a fertilizer), drain cleaner, battery acid, lye, pool acid, and antifreeze—many of which are severe eye, nose, and throat irritants or cause skin burns or breathing difficulty.

A “meth lab” is an illegal site where the drug is manufactured. Meth labs have been found in garages, kitchens, vehicles, hotel and motel rooms, storage lockers, campgrounds, abandoned dumps, restrooms, and mobile homes. Children who grow up in places where methamphetamine is manufactured are at risk for acid burns and respiratory problems from exposure to toxic chemicals.

One in five of these sites is discovered because of chemical explosions. Because of the possibility of explosions and direct contact with toxic fumes and hazardous chemicals, law-enforcement officers who raid clandestine drug labs are required to take

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special training to handle hazardous materials (HAZMAT). Firefighters who respond to fires at these sites also risk serious injury from toxic fumes and gases.

Toxic contamination remains behind from the manufacturing process on surfaces in the meth lab itself, including furniture, curtains, bedspreads, flooring, air vents, eating surfaces, and walls. Cleaning up a meth lab site requires hazardous waste protection and costs an average of \$3,000—but can cost more than \$100,000. In 2004 alone, there were more than 10,000 meth lab cleanups at a cost of \$18.6 million.

Leftover chemicals and by-product sludge from methamphetamine manufacture have been found along highways, in parks and forests, in the ground and groundwater, and in sewer systems. These solvents and other toxic by-products pose long-term hazards to communities because they can persist in soil and groundwater for years. Of particular concern are labs in agricultural areas, because the hazardous wastes are often dumped where crops are grown and in the water sources used to nourish those crops.

HOW IS METHAMPHETAMINE HARMFUL?

Scientists know that methamphetamine can change the structure of a person's brain; it can change behavior; and it can even change feelings and emotions—effects that can last a long time. It can also cause people to do risky, disastrous things—things they'd never do if they weren't under the influence of the drug. There's even something called "meth mouth," which results from methamphetamine constricting blood vessels in certain areas of the mouth. The reduced blood flow over time can weaken the teeth and lead to tooth decay.

Methamphetamine abusers can experience a wide range of other potentially devastating effects for themselves—and others. These include violent behavior as well as anxiety, depression, confusion, insomnia, paranoia, auditory hallucinations, and delusions.

BRAIN CHANGE:

Recently, Dr. Paul Thompson, a NIDA-sponsored researcher at the University of California, Los Angeles, used Magnetic Resonance Imaging (MRI) to look inside the

brains of long-term methamphetamine abusers.

"The methamphetamine abusers Thompson studied experienced structural changes in the limbic regions of their brains—this is the area responsible for feelings, emotions, and cravings," explains Dr. Steve Grant, acting chief of NIDA's Clinical Neuroscience Branch, Division of Clinical Neurosciences, Development and Behavioral Treatments. The hippocampus, responsible for making new memories, also showed structural changes. Not surprisingly, those addicted to methamphetamine scored very poorly on memory tests.

TRICKING BRAIN CELLS:

Methamphetamine's effects—and some of the brain changes they ultimately cause—stem from the fact that the drug's chemical structure is similar to dopamine. Dopamine is the natural chemical released in certain areas of the brain in response to pleasurable experiences—like laughing with friends or dancing with a girlfriend

This law-enforcement officer wears a protective suit as he clears away bottles of toxic chemicals used to produce methamphetamine.



or boyfriend. Dopamine also helps the brain control movement, mood, and memory.

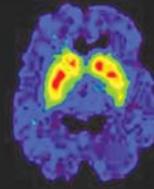
Methamphetamine tricks brain cells into pumping out very high, unnatural levels of dopamine. You won't be surprised to learn that these increases in dopamine make methamphetamine abusers feel great. But then comes a crash. This causes users to crave more of the drug—setting the stage for the chronic disease we call *addiction*.

Ironically, even though methamphetamine ups the amount of dopamine in the brain at first, it ultimately hinders the brain's ability to make and respond to dopamine.

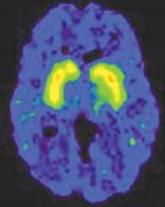
Brain imaging studies conducted by Dr. Volkow show that long-term methamphetamine abusers have lower-than-normal numbers of dopamine receptors and dopamine transporters in the brain. Receptors and transporters are important parts of normal brain communication.

This lower number of dopamine transporters results in not being able to perform simple actions as well. In one study, participants with the fewest transporter molecules had a tough time recalling simple word lists and were slower in walking a straight line. "In fact, the lower the levels of the dopamine transporter, the worse the performance," Dr. Volkow says. They had developed problems with the *striatum*, a part of the brain associated with control of movement, attention, motivation, and reward.

Wake-Up Call: Loss of Motor Skills and Memory



Normal Control



Methamphetamine Abuser
(1 month abstinent)

Researchers have found that long-term methamphetamine abuse is associated with a reduction in dopamine transporters, and that this damage appears to be linked to impaired motor skills and memory. The brain image on the left above is from a person who has never used methamphetamine. The brain on the right is from a methamphetamine abuser who abstained for 1 month. Yellow and red areas indicate the distribution of dopamine transporters (DATs), with red indicating higher distribution. Dopamine is released naturally in the brain in response to pleasure; it helps the brain control movement, mood, and memory. There is a slight recovery of DATs after 1 month of abstinence (see the light resurgence in red), and the researchers saw much more recovery after 14 months—but motor skills and memory had not returned to normal.

IMMUNE SYSTEM RISKS:

Immune system cells are the blood cells that help your body resist infections. Animal and test tube studies show that methamphetamine may suppress killer T cells, a type of white blood cell that fights off germs. On top of that, a recent long-term study found that, all other things being equal, people who abuse methamphetamine are twice as likely as nonusers to contract HIV if exposed to it.

IS JUST ONE USE SAFE?

The answer is **NO**.

To start with, people under the influence of methamphetamine may lose their normal inhibitions and sense of good judgment. As a result, they might take dangerous risks.

In animal studies, even a single high dose of methamphetamine can damage nerve terminals in

dopamine-containing regions of the brain. In humans, a big dose can raise your body temperature so high that your life can be in danger—it can lead to convulsions and coma. Also, says Dr. Volkow, a single dose of methamphetamine can cause "irreversible stroke-producing damage to small blood vessels in the brain."

SMART CHOICE:

All in all, for the sake of your brain cells, your immune cells, and all your other cells—as well as for the sake of your family, neighbors, children, and the environment—the smart choice is never to try methamphetamine. Not even once.

For help with a drug problem or to locate treatment centers, go to www.findtreatment.samhsa.gov or call the national hotline at 1-800-662-HELP.