

Amphetamines

Profile

Amphetamines are a group of synthetic psychoactive drugs called central nervous system (CNS) stimulants.¹ The collective group of amphetamines includes amphetamine, dextroamphetamine, and methamphetamine.² Amphetamine is made up of two distinct compounds: pure dextroamphetamine and pure levoamphetamine. Since dextroamphetamine is more potent than levoamphetamine, pure dextroamphetamine is also more potent than the amphetamine mixture.³ Medications containing amphetamines are prescribed for narcolepsy, obesity, and attention deficit/hyperactivity disorder.⁴ Prescription names for these medications include Adderall®, Dexedrine®, DextroStat®, and Desoxyn®.⁵ The basic molecule of amphetamine can be modified to emphasize specific actions, such as appetite suppressant, CNS stimulant, and cardiovascular actions, for certain medications, including diethylpropion, fenfluramine, methylphenidate (commonly known as the prescription drugs Ritalin® or Concerta®), and phenmetrazine.⁶ Both methylphenidate and amphetamine have been in Schedule II of the Controlled Substances Act since 1971.⁷ In medical use, there is controversy over whether the benefits of amphetamines prescribed for ADHD and weight loss outweigh the drug's harmful side effects. There is agreement, however, that prescription amphetamines are successful in treating narcolepsy.⁸ “Look-alike” drugs, which imitate the effects of amphetamines, and contain substances legally available over-the-counter, including caffeine, ephedrine, and phenylpropanolamine are sold on the street as “speed” and “uppers.”⁹

History

When amphetamine was first synthesized in 1887, by the German chemist L. Edeleano, the stimulant effects were not noticed. In the early 1930s, when amphetamine's CNS stimulant properties and use as a respiratory stimulant were discovered it was marketed as an inhaler for nasal congestion (Benedrine®). At this time, medical professionals recommended amphetamine as a cure for a range of ailments—alcohol hangover, narcolepsy, depression, weight reduction, hyperactivity in children, and vomiting associated with pregnancy. The use of amphetamine grew rapidly because it was inexpensive, readily available, had long lasting effects, and because professionals purported that amphetamine did not pose an addiction risk.¹⁰ Oral and intravenous preparations of amphetamine derivatives, including methamphetamine, were developed and became available for therapeutic purposes. During World War II, the military in the United States, Great Britain, Germany, and Japan used amphetamines to increase alertness and endurance and to improve mood.¹¹ Abuse began rising during the 1960s and 1970s with the discovery that the intravenous injection of amphetamines (particularly methamphetamine) produced enhanced euphoric effects with a more rapid onset than oral administration. Although structurally similar to amphetamine, methamphetamine has more pronounced effects on the CNS.¹² Between 1986 and 1989, law enforcement and treatment admission professionals in Hawaii reported that abuse of a concentrated form of methamphetamine (known as “ice,” “glass,” and “crystal”) was increasing.¹³

Methods of Use

Amphetamine and methamphetamine pills can be ingested orally, crushed and snorted, dissolved in water and injected, or smoked (inhalation of the vaporized drug). “Glass” and “ice” (pure methamphetamine, which look like clear crystalline rock) is most often smoked (vaporized and

inhaled) in a glass pipe, allowing for quick absorption into the bloodstream without the risks of injecting the drug. “Crystal” the powder form of methamphetamines, is consumed orally, injected, or inhaled.¹⁴

Amphetamine’s Effects on the Brain

When amphetamines are used, the neurotransmitters dopamine and norepinephrine are released from nerve endings in the brain and their reuptake is inhibited. This influx causes the buildup of neurotransmitters at synapses in the brain. When nerve cells in the brain and spinal cord are activated by amphetamine, the mental focus, the ability to stay awake, and the ability to concentrate is improved, which is helpful for those with hyperactivity disorders or narcolepsy. Although the physiological experience of using amphetamines and cocaine is very similar, the effects of amphetamines can last several hours whereas the effects of cocaine generally last less than one hour.¹⁵ When mixed with alcohol or other drugs, the effects of prescription amphetamines are enhanced.¹⁶ The onset of effects from injecting methamphetamines occurs immediately. When this drug is snorted, effects occur within 3 to 5 minutes; when ingested orally, effects occur within 15 to 20 minutes.¹⁷

Disorders Medically Treated with Amphetamines

- Obesity
- Parkinson’s disease
- Attention deficit hyperactivity disorder
- Narcolepsy (uncontrolled episodes of sleep)¹⁸

Short-Term Effects

- High body temperature
- Cardiovascular system failure
- Hostility or paranoia
- Irregular or increased heart rate/ heart beat¹⁹
- Increased diastolic/ systolic blood pressure
- Increased activity/ talkativeness
- Euphoria
- Heightened sense of well-being
- Decreased fatigue/ drowsiness
- Decreased appetite²⁰
- Dry mouth
- Dilated pupils
- Increased respiration
- Heightened alertness/ energy²¹
- Nausea
- Headache
- Palpitations
- Altered sexual behavior
- Tremor/ twitching of small muscles²²

- Release of social inhibitions
- Unrealistic feelings of cleverness, great competence, and power²³

Long-Term Effects

Prolonged amphetamine abuse or abuse in high doses can cause a number of other problems including:

- Toxic psychosis
- Physiological and behavioral disorders²⁴
- Dizziness
- Pounding heartbeat
- Difficulty breathing
- Mood or mental changes
- Unusual tiredness or weakness²⁵
- Cardiac arrhythmias
- Repetitive motor activity
- Convulsions, coma, and death²⁶
- Ulcers
- Malnutrition
- Mental illness
- Skin disorders
- Vitamin deficiency
- Flush or pale skin
- Loss of coordination and physical collapse²⁷

Potential for Abuse

The National Drug Intelligence Center reports that between two and four million children have been diagnosed with attention deficit/hyperactivity disorder and as a result been legally prescribed amphetamine, which can improve symptoms when used properly.²⁸ When prescription amphetamines are taken orally and in low doses, drug abuse and addiction is not a serious risk. However, drug addiction becomes a risk when prescription amphetamines are consumed at doses higher than those prescribed for medical treatment.²⁹ Abuse of amphetamines, which can lead to tolerance and physical and psychological dependence, is characterized by consuming increasingly higher dosages, and by the “binge and crash” cycle, when users attempt to maintain their high by overindulging on these drugs.³⁰ When binge episodes end, the abuser “crashes” and is left with severe depression, anxiety, extreme fatigue, and a craving for more drugs.³¹ The chronic abuse of amphetamine and methamphetamine is characterized by violent and erratic behavior, as well as a psychosis similar to schizophrenia, that can involve paranoia, picking at the skin, and auditory/visual hallucinations. All forms of methamphetamine are highly addictive and toxic.³²

Terminology

- Street amphetamine:

bennies, black beauties, copilots, eye-openers, lid poppers, pep pills, speed, uppers, wake-ups, and white crosses³³

- Street dextroamphetamine:
dexies
- Street methamphetamine:
chalk, chris, crank, cristy, crystal, crystal meth, go, go-fast, meth, speed, and zip³⁴
- Concentrated methamphetamine hydrochloride:
ice, crystal, and glass³⁵
- Combinations:
Amphetamines and barbiturates: goofballs
Methamphetamine and heroin: speedballs
- Use & Users:
Speed run: increasing doses of injectable methamphetamine taken over several days or weeks³⁶
Speeders or speed freaks: serial speed users³⁷; methamphetamine users who inject their drugs intravenously³⁸

Links

- [DEA: Methamphetamine](#)
- [DEA Drugs of Abuse: Stimulants](#)
- [In The Know Zone: Amphetamines](#)

¹ MEDLINEplus. (2004, November 8). Amphetamines (Systemic). Retrieved October 13, 2006, from <http://medlineplus.nlm.nih.gov/medlineplus/druginfo/uspdi/202031.html>.

² Drug Enforcement Administration: Methamphetamine. Retrieved October 13, 2006, from http://www.dea.gov/concern/meth_factsheet.html.

³ Brands, B., Sproule, B., and Marshman, J. (Eds.). (1998). *Drugs & Drug Abuse* (3rd ed.). Addiction Research Foundation.

⁴ National Drug Intelligence Center. (2002, August). Prescription Drug Abuse and Youth. In Information Brief Retrieved October 13, 2006, from <http://www.usdoj.gov/ndic/pubs1/1765/index.htm>; MEDLINEplus; Carson-DeWitt, R. (Ed.). (2001). *Encyclopedia of Drugs, Alcohol & Addictive Behavior* (2nd ed., Vol. 1 (A-D)). Durham, NC: Macmillan.

⁵ MEDLINEplus, (2004).

⁶ Carson-DeWitt, R. (2001).

⁷ DEA Congressional Testimony, by Terrance Woodworth (2000, May 10). Retrieved October 13, 2006, from <http://www.dea.gov/pubs/cngrtest/ct051600.htm>.

⁸ Carson-DeWitt, R. (2001).

⁹ Indiana Prevention Resource Center. Stimulants. Retrieved October 13, 2006, from <http://www.drugs.indiana.edu/resources/druginfo/drugs/stimulants.html>; Brands, B., (1998).

¹⁰ Carson-DeWitt, R. (Ed.). (2001); Brands, B., (1998).

¹¹ Carson-DeWitt, R. (Ed.). (2001).

¹² National Institute on Drug Abuse. (2002, January). Methamphetamine Abuse and Addiction. Retrieved October 13, 2006, from <http://www.nida.nih.gov/ResearchReports/methamph/methamph.html>.

¹³ Carson-DeWitt, R. (Ed.). (2001); Brands, B., (1998); Goldstein, A. (2001). *Addiction: from biology to drug policy* (2nd ed.). New York: NY: Oxford University Press.

¹⁴ Brands, B., (1998); National Drug Intelligence Center; DEA Congressional Testimony, by Terrance Woodworth; Carson-DeWitt, R. (Ed.). (2001); Indiana Prevention Resource Center; Goldstein, A. (2001).

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- ¹⁶ DEA Diversion Control Program. (2001, June). Stimulant Abuse By School Age Children: A Guide for School Officials Retrieved October 13, 2006, from http://www.deadiversion.usdoj.gov/pubs/brochures/stimulant/stimulant_abuse.htm; Brands, B., (1998).
- ¹⁷ National Institute on Drug Abuse, (2002).
- ¹⁸ National Drug Intelligence Center, (2002); Brands, B., (1998).
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- ²² Brands, B., (1998).
- ²³ Goldstein, A. (2001).
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- ³³ Indiana Prevention Resource Center; Brands, B., (1998).
- ³⁴ Carson-DeWitt, R. (Ed.). (2001); Goldstein, A. (2001).
- ³⁵ NIDA Info Facts. (2005, May). Methamphetamine. Retrieved October 13, 2006, from <http://www.nida.nih.gov/Infifax/methamphetamine.html>.
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- ³⁸ Brands, B., (1998); DEA: Stimulants.