



INFORMATION FOR PROFESSIONALS

# Hallucinogens

## Introduction

Hallucinogens, the best known of which is LSD, are drugs that dramatically affect perception, emotions (mood), and mental processes (thought). They distort the senses and can cause hallucinations (seeing or hearing things that are not actually there). More often, however, they cause lesser distortions of real objects and events. Because these disturbances of perception (visual hallucinations) and behaviour cannot be classified as either sedative or stimulant effects, hallucinogens are sometimes called psychotomimetics.

Hallucinogens such as peyote and psilocybin have been used in religious or spiritual ceremonies for thousands of years, dating back as far as 1600 B.C.E. (Before Common Era). Hallucinogens continue to be used by groups such as the Native American Church, which uses peyote as part of its spiritual practices. Although there was some interest during the 1960s and 1970s in the use of hallucinogens as an aid to psychiatric treatment, there is no currently accepted medical use for hallucinogens.

Hallucinogens made synthetically include LSD, PCP, and DMT. Some hallucinogens, including MDA, MDMA (Ecstasy), and STP (DOM), have a chemical structure related to amphetamine.

Hallucinogens obtained from plants include mescaline from the peyote cactus, and psilocybin from “magic” mushrooms. Other plants containing hallucinogens include morning glory seeds, jimsonweed and nutmeg. Cannabis (marijuana) is not usually included in this group of drugs, but in very large doses it can produce hallucinations.

There is considerable deception in the sale of hallucinogens. Users can never be certain what drug or how much of a particular drug they are taking (for example, magic mushrooms sold by dealers are frequently cheaper, grocery-store varieties of mushrooms laced with LSD or PCP). Also, because hallucinogens are usually prepared in illegal, “underground” labs specifically for the illicit drug market, they can be contaminated with other very toxic chemicals.

Hallucinogens are usually taken orally, but are sometimes smoked, sniffed or injected.

## Drug effects: *General*

The effect of any drug depends on the amount, how it is taken, what the user expects, previous exposure of the body to this and other drugs, the physical and social setting, the user’s mental state, and other drugs being used.

For more information, contact your local AADAC office, or call 1-866-33AADAC, or visit our website at [www.aadac.com](http://www.aadac.com).

**AADAC** Alberta Alcohol and Drug Abuse Commission  
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The effect of taking a hallucinogen can be extremely variable, and a user's response can range from ecstasy to terror. During one episode, the user is likely to experience a variety of psychic and emotional reactions.

Hallucinations are most common at high doses, whereas low doses tend to produce changes in mood and lesser changes in perception. Thinking and concentration may become difficult, and short-term memory may be impaired. Hearing, smell, and vision may be intensified or merged, and the user's sense of time and space may also be affected. Users may experience depersonalization, feeling like they are outside themselves observing what is happening, or even feeling like they are off the earth, on a so-called "cosmic trip." Some users describe a sense of mind expansion or insight, while others report aesthetic experiences or even mystical or spiritual sensations. These experiences may be pleasant for some users; at other times, the same users may find the effects of hallucinogen use very unpleasant, and these effects may cause considerable distress and even panic. The resulting "bad trip" may in part be due to the great variation in the content of illicit drugs, but it can also occur when the same dose of a pure drug is taken. "Trips" are often taken in the company of experienced users who can help deal with any unpleasant reactions that may occur. However, for some users "bad trips" can result in prolonged serious depression, anxiety, and even psychotic reactions.

"Flashbacks" (recurrences of the previous drug experience without taking the drug again) can occur days, weeks, or even months after use. They can be pleasant or very disturbing. While flashbacks usually do not continue for longer than six months, users often describe almost any unusual sensation they experience, even long after taking a hallucinogen, as a flashback.

### **Drug effects: Specific**

#### *LSD (lysergic acid diethylamide, "acid," "blotter")*

LSD is a very potent hallucinogen. It can be made from lysergic acid, which is found in ergot, a fungus that grows on rye and other grains. Most street LSD, however, is prepared synthetically in illicit labs.

Pure LSD is a white, odourless powder. The usual dose or "hit" of LSD is in the range of 50 to 150 micrograms, but can be as high as 700 micrograms. (There are 1000 micrograms in a milligram, 1000 milligrams in a gram, and approximately 30 grams in an ounce). Thus, LSD is the most potent (effective at lowest doses) of the hallucinogens. Because a single hit of LSD is almost invisible, it is mixed with other substances such as sugar and sold in capsules, tablets or liquid. It can also be dissolved in liquid and spotted on gelatin sheets or blotting paper, hence the street names "window pane" and "blotter."

LSD is usually taken orally, but can be inhaled or injected. As with any injection, use of needles that are not sterile can result in infections, and sharing needles with others can spread hepatitis and HIV/AIDS (acquired immune deficiency syndrome).

#### *LSD effects*

LSD is the hallucinogen about which the most is known. The description above of the general effects of hallucinogens applies particularly to LSD. In discussing the other hallucinogens, LSD will serve as the prototype.

LSD binds to serotonin (5HT<sub>2A</sub>) receptors in the brain; the resulting loss of cortical inhibition may underlie LSD's hallucinogenic effects. The effects of LSD usually begin within an hour and last up to 12 hours. Physical effects appear first, and may include numbness, muscle weakness and trembling; increased blood pressure, heart rate, and temperature; dilated pupils; impaired motor skills and co-ordination; nausea; and (rarely) seizures.

In addition to acute effects on perception, thought, and mood, chronic LSD use may result in prolonged depression and anxiety.

Although no deaths are known to have been caused by the direct effects of LSD in humans, suicides and accidental deaths related to LSD use have been reported.

#### *PCP (phencyclidine, "angel dust," "horse tranquilizer," "hog")*

PCP was first used as an anesthetic for surgery in humans, then as an animal anesthetic and tran-

quillizer. It is no longer used for those purposes and is now produced only in illicit labs. Despite the fact that it is one of the most dangerous and unpredictable hallucinogens, it continues to be a frequently encountered street drug. The incidence of use is unknown, as it is usually included with other hallucinogens in surveys of drug use.

Pure PCP is a white powder. It is sold on the street as a powder, liquid, capsule or tablet and is often passed off as LSD, THC, mescaline, or other drugs. A dose of one mg to five mg is enough to cause a high; when analyzed, street samples have contained from 1.3 mg to 81 mg. PCP is usually mixed with tobacco, marijuana or dried parsley, and the mixture is then smoked. PCP may also be sniffed, swallowed or injected.

#### *PCP effects*

The effects of PCP can vary greatly even when comparable doses are taken. In addition, the strength of street samples is extremely variable, so the amount taken can also vary greatly. When it is presumed to be some other drug with relatively mild effects such as mescaline or peyote, the stronger and more unpredictable effects of PCP can be distressing for the user.

The short-term effects of low doses of PCP appear soon after taking a single dose and disappear within a few hours or days. The effects of high doses, however, have lasted from ten days to two weeks.

The physical effects of low doses of PCP (five mg or less) include rapid breathing, increased blood pressure and heart rate, a marked rise in temperature, and numbness of the arms and legs. Doses of 10 mg or more may cause a rapid drop in blood pressure, heart rate, and respiration, along with nausea, vomiting, blurred vision, dizziness, and decreased awareness of pain. Larger doses can cause convulsions, coma, and death.

Psychological effects include impairment of the user's ability to concentrate, think logically and speak. Marked changes in perception, thought, and mood similar to those produced by LSD can occur. Many users experience euphoria; others feel threatened, and may behave violently because of fear, anxiety, or panic.

The effects of higher doses include delusions, hallucinations (mainly auditory), and a sensation of distance from one's environment. Severe psychological disorganization and acute toxic psychosis can result. Deaths linked to the psychological effects have included accidental drownings, suicides, homicides, and car crashes.

The long-term effects of using PCP are not well documented, as it is not often used on a regular basis. As with other hallucinogens, flashbacks can occur. Persistent speech problems, memory loss, severe anxiety and depression, and social withdrawal may follow prolonged use.

#### *MDA (methylenedioxyamphetamine)*

The structure of MDA is similar to both mescaline and the amphetamines. A brown or white powder, MDA is sold loose, in capsules, or as an amber liquid. The common dose is 100 mg, which is usually swallowed. Other drugs such as PCP are frequently sold as MDA.

The effects of MDA occur in 30 to 60 minutes and last about eight hours. Users report a sense of well-being along with heightened tactile sensations and emotions. Higher doses produce effects similar to those of LSD, including hallucinations or sensory distortions. Physical effects resemble those of amphetamines and include dilated pupils, high blood pressure, and dry nose and throat. Overdoses can cause death.

#### *MDMA (3,4-methylenedioxymethamphetamine, "Ecstasy," "XTC")*

MDMA is similar in structure to MDA and is sold as a white or off-white powder. It is usually taken orally in doses of 75 to 100 mg. MDA and MDMA have both stimulant and psychedelic effects. The effects of MDMA are similar to MDA, but are somewhat milder and of shorter duration.

#### *STP (DOM) (2,5-dimethoxy-4-methylamphetamine)*

STP is similar to MDA but more potent (usual dose three to ten mg) and longer acting (16 to 24 hours). However, because it has a reputation for creating "bad trips," STP is rarely encountered on the street anymore.

*PMA (paramethoxyamphetamine)*

Although rare, PMA is one of the most dangerous hallucinogens. Sold as a beige, white or pink powder, PMA is often misrepresented as MDA. However, at doses considered safe for MDA, PMA is highly toxic.

The hallucinogenic effects of PMA are similar to those of LSD. Physical effects of PMA include racing pulse, high blood pressure, increased and laboured breathing, high fever, erratic eye movements, muscle spasm, and vomiting. At high doses, convulsions, coma and death can result.

*Mescaline or Peyote (3,4,5-trimethoxyphenethylamine)*

Mescaline is prepared from the Mexican peyote cactus or synthesized chemically. Mescaline is usually taken orally, but can also be inhaled by smoking ground peyote "buttons," or (more rarely) injected. The usual dose is 300 to 500 mg. Much of the so-called mescaline sold on the street actually contains PCP, LSD or other substances.

Physical effects of mescaline ingestion include dilated pupils, fever, nausea and vomiting. High doses can cause headache, dry skin, low blood pressure, and slowing of heart rate and breathing.

Psychological effects similar to those of other hallucinogens appear slowly, and last for 10 to 18 hours. Reports of mystical or religious experiences are common.

*Psilocybin ("magic mushrooms")*

Psilocybin and the related chemical psilocin are the active ingredients in several species of mushrooms and other fungi that grow throughout Canada. Most belong to the genus *Psilocybe*. Psilocybin is chemically related to both LSD and DMT.

Psilocybin is sold as mushrooms or in capsules containing powder of various colours. The common dose is from five mg to 60 mg taken orally.

The effects of psilocybin are usually felt after about half an hour, and last for several hours. Low doses produce mild psychic effects; larger doses cause LSD-like effects. As with mescaline, users often report mystical or religious experiences. Physical effects can

include dizziness, light-headedness, abdominal discomfort, numbness of the tongue and mouth, nausea, anxiety and shivering.

*DMT (dimethyltryptamine)*

A chemical resembling psilocin, DMT occurs naturally in certain plants. Most street DMT, however, is prepared synthetically in illicit labs. Marijuana or parsley are often soaked in a solution of DMT, then dried and smoked.

The effects of DMT occur rapidly, but unlike those of other hallucinogens, they last for only 30 to 60 minutes—hence the street name "businessman's lunch." Anxiety reactions and panic states tend to be quite common, possibly because of the rapid onset of the drug's potent effects.

*Other hallucinogens (morning glory seeds, nutmeg, jimsonweed)*

A variety of other plants contain hallucinogens. Morning glory seeds contain lysergic acid amide, which is chemically related to LSD, but less potent. Effects similar to those of LSD begin 30 to 90 minutes after 100 or more of the seeds are chewed. However, most seeds are now coated with insecticides and/or herbicides that can cause considerable discomfort if ingested.

Nutmeg powder, the common household spice, is eaten and sometimes "snorted" for its psychedelic effects. Low doses can produce mild euphoria, light-headedness, and stimulation. Larger doses can cause rapid heartbeat, agitation, vomiting and hallucinations. Recovery is slow and often involves an unpleasant hangover. Although readily available, nutmeg is generally used only when other hallucinogens are not available.

Jimsonweed (*Datura stramonium*) and deadly nightshade (*Atropa belladonna*) both contain atropine and other belladonna alkaloids. Eating the leaves or berries of these plants causes marked dryness of the mouth, dilated pupils, hot and dry skin, blurred vision, raised body temperature, rapid heartbeat, constipation, and difficulty urinating. Larger doses produce intense stimulation of the nervous system including hallucinations, disorientation,

confusion, agitation, and sometimes convulsions. A variety of prescription drugs derived from this family of plants are used to decrease stomach motility and secretions, dilate the pupils, relax smooth muscles and treat the tremors associated with Parkinsonism.

### **Tolerance and dependence**

Tolerance to hallucinogens is not well understood. Tolerance as usually defined (that is, the need for more drug to produce the same effect) does not develop with repeated use of most hallucinogens. However, after daily use for as little as three or four days, no psychic effects will be experienced if any of these drugs are used. The effects return if no use occurs for several days. This is not a true pharmacological tolerance, as it cannot be overcome with larger doses of the drug (although LSD exhibits cross-tolerance to other hallucinogenic drugs). PCP may be an exception, since regular users often increase their intake in order to maintain the "high." Hallucinogens do not appear to cause physical dependence, as withdrawal reactions have not been observed even after long-term use. However, some regular users of hallucinogens become psychologically dependent on these drugs, and the desire to keep taking them becomes a compulsion.

### **Hallucinogens and pregnancy**

Regular LSD use during pregnancy is associated with spontaneous abortions or fetal abnormalities. However, in most cases, the mothers have also taken other drugs that could have caused these effects. Studies suggesting that LSD use causes chromosome damage have yet to be confirmed.

Little is known about the effects of using other hallucinogens during pregnancy.

### **Who uses hallucinogens?**

A 2002 survey of Alberta students (under age 18) found that 10.4 per cent had used magic mushrooms or mescaline, and that 3.9 per cent had used other hallucinogens at least once in the previous 12 months. There was comparatively less use of hallucinogens than cannabis (28 per cent) or alcohol (56 per cent).

In 1998, 12.4 per cent of Canadian university students reported using hallucinogens, including LSD and Ecstasy.

Among clients admitted to AADAC treatment centres in 2003/2004, 16 per cent reported using hallucinogens in the previous year. Four per cent of clients reported hallucinogens as their drugs of concern.

### **Hallucinogens and the law**

With a few exceptions, all of the hallucinogens are classified as "controlled substances" in Canada's Controlled Drugs and Substances Act. Morning glory seeds, nutmeg, and jimson weed are not subject to any legal restrictions in Canada.

Because hallucinogens are considered to have no known medical use, possession and sale are completely prohibited except for experimental purposes. Less serious charges of possession, tried by summary conviction, carry a penalty of a fine up to \$1,000 and/or six months' imprisonment for a first offence. For subsequent offences, the penalty is a fine of up to \$2,000 and/or one year's imprisonment. When the charges are considered more serious and are tried by indictment, the penalty for possession is up to three years' imprisonment.

Trafficking and possession for the purpose of trafficking carry a maximum penalty of 18 months' imprisonment if tried by summary conviction, or up to 10 years' imprisonment if tried by indictment.

Under the *Controlled Drugs and Substances Act*, unlawful possession of PCP is a criminal offence. The penalty for a first offence tried by summary conviction is a fine of up to \$1,000 and/or six months' imprisonment; for subsequent offences, the maximum penalty increases to \$2,000 and/or one year's imprisonment. If tried by indictment, unlawful possession of PCP carries a penalty of up to seven years' imprisonment.

Trafficking, importing, exporting, and producing PCP are all indictable offences punishable by up to life imprisonment.

**ADDITIONAL READING:**

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1. Inaba, D., & Cohen, W. (2000). *Uppers, downers, all arounders: Physical and mental effects of psychoactive drugs* (4th ed.). Ashland, OR: CNS Publications.
2. Alberta Alcohol and Drug Abuse Commission. (2003). *The Alberta Youth Experience Survey 2002* [Technical report]. Edmonton, AB: Author.
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4. Gliksman, L., Demers, A., Adlaf, E.M., Newton-Taylor, B., & Schmidt, K. (2000). *Canadian Campus Survey 1998*. Toronto, ON: Centre for Addiction and Mental Health.