

BEYOND THE BASICS

Magic Mushrooms

What are magic mushrooms?

Magic mushrooms or “shrooms,” as they are known on the street, are of the mushroom species *Psilocybe mexicana* and contain the active compounds psilocin and psilocybin, which resemble lysergic acid diethylamide (LSD) in their effects.¹

Botanical hallucinogens have been used for thousands of years. Historically, use was generally reserved for social, religious or spiritual rituals.^{2,3} As hallucinogens became readily accessible to Western populations in the 1960s for recreational purposes of experimentation, relaxation and thrill-seeking, they became, and continue to be, drugs of abuse.³

Psychedelic drugs can be classified in a variety of ways; however, most experts focus on their structural similarity to various neurotransmitters (acetylcholine, noradrenaline, dopamine and serotonin). Thus, three classes of hallucinogens are based on their chemical structures, while a fourth class affects a separate neurotransmitter receptor (the NMDA group of glutamate receptors). The specific hallucinogen categories include:

- anticholinergic psychedelics (atropine, hyoscyamine, scopolamine).
- catecholamine-like psychedelics (mescaline, synthetic amphetamine derivatives), which are also known as “entactogens” or “empathogens.”
- serotonin-like psychedelics (LSD, psilocybin/psilocin, mescaline, dimethyltryptamine), which are also known as “classic hallucinogens.”
- Dissociative anesthetics (PCP, ketamine, nitrous oxide, salvinorin A), which are believed to act at the NMDA receptor.^{1,3}

Psilocybin, like other hallucinogens or “psychedelics,” induces major sensory alterations, causing distortions of reality and hallucinations.^{3,4}

Classified among the classic hallucinogens, psilocybin can cause a person to think, communicate or behave irrationally because their perception of reality may be significantly distorted. People using this drug may see images, hear sounds and feel sensations that, while seeming quite real, do not in fact exist. The resulting behaviours may be bizarre and even dangerous. Their moods may swing quite wildly, in part because they may be frightened by what they are experiencing.²

In addition to the immediate effects of use, users of certain hallucinogens, including psilocybin, may experience psychotic-like episodes long after they take the drug.²

Medical Use

Psilocybin is not currently approved for any medical use.

Research was conducted in the United States in the 1960s into psilocybin’s potential medicinal value; however, research was stopped due to government rulings in the 1970s, which stated the drug had no legitimate medical use. Research resumed in the 1990s to determine psilocybin’s effects on the emotional challenges faced by terminal cancer patients. Research continues to determine the drug’s effectiveness in fighting depression and physical pain, specifically “cluster” headaches.⁵

Prevalence of Use

A 2007 survey of Manitoba middle and high school students conducted on behalf of the Addictions Foundation of Manitoba (AFM) found psilocybin is a commonly used hallucinogen. The results were consistent with previous years’ studies, with 6% of students reporting its use.⁶

The Canadian Alcohol and Drug Use Monitoring Survey conducted in 2008 revealed overall use of hallucinogens at 2.1% of the population, with men being more likely to have used this group of drugs than women. Youth and young adults between the ages of 15 to 24 showed the highest rates of use at 10.2%.⁷

Continued...

Research from the United States indicates that use of hallucinogens in general is less prevalent than other substances of abuse, with this group responsible for much less morbidity and mortality. The prevalence of disorders related to use of hallucinogens remains largely unknown.³

Pharmacokinetics

Psilocybin can be distributed as dried mushrooms or in capsules containing powder of any colour. The mushrooms themselves can be ingested or smoked. The powder can be sniffed, smoked or injected. A common approach to preparing the drug for use is to mix the powder with fruit juice or mix it with food. A typical oral dose ranges from one mg to 20 mg.⁴

Effects of psilocybin are felt within approximately 30 minutes and last three to 18 hours following a low to moderate dose or several days following a high dose.⁴

Pharmacodynamics

Psilocybin exerts its effects by sympathomimetic actions on the central nervous system.³

The chemical compound psilocybin is structurally similar to serotonin (5-HT) and produces an effect by disrupting normal function of nerve cells within the serotonin system, which is involved in the control of behaviour, perception and regulatory systems, including mood, hunger, body temperature, sexual behaviour, muscle control and sensory perception.^{2,3}

Studies suggest that these drugs act on certain 5-HT₂ serotonin receptors, primarily located in the cerebral cortex, where mood, cognition and perception are managed, and in the locus coeruleus, where sensory signals are received from all areas of the body.²

Short-term Effects

The high, or “trip” as it is known among users of hallucinogenic drugs, including psilocybin, is unpredictable and can include both pleasant and/or unpleasant effects. The dosage size and the user’s state of mind may directly affect the nature of the high.² The degree and content of the distortions or hallucinations resulting from use of any hallucinogenic substance, including psilocybin, are typically reflective of the user’s state of mind, his or her own psychodynamics, and the setting in which the person takes the drug and experiences its effects.³

Depending on the dosage, users may experience intensified or altered perceptions of colours, objects, time and distance. Users may experience synesthesia, a state in which sensory inputs

appear to become transposed and a person may hear or feel colours and see sounds. The altered perceptions may extend to their own body and may result in sensations of relaxation or fatigue, separation from one’s surroundings, or a sense of heaviness or lightness. Thinking and concentration become difficult and short-term memory is impaired. Users may experience extreme mood swings, including joy, inspiration, depression, anxiety and terror. As a result, aggression can occur.⁴

While not always the case, some users may experience physiological effects, such as abdominal discomfort, increased blood pressure and heart rate, dizziness, loss of appetite, dry mouth or numbness of the mouth, sweating, nausea and tremors.^{2,4}

Long-term Effects

There are two significant long term effects of the classic hallucinogens, including psilocybin: persistent psychosis and hallucinogen persisting perception disorder (HPPD).²

Persistent psychosis is characterized by devastating psychological effects that transpire with use of the drug and persist after the effects of the drug have physically diminished, producing a psychotic-like state that can last for years. Effects of this state may include dramatic swings in mood from mania to severe depression, as well as visual disturbances and hallucinations similar to those experienced in the drug induced state. These effects can manifest in individuals who have no prior history of symptoms of a psychological disorder.²

HPPD, also known by users as “flashbacks,” results in spontaneous, repeated and sometimes ongoing recurrences of some of the sensory distortions or hallucinations originally produced by the hallucinogenic drug taken. Like persistent psychosis, this condition is also enduring and may occur years after the individual stops using the drug.²

Toxic Effects

There are no known deaths directly caused by psilocybin overdose, but drug-induced confusion has caused accidental deaths.⁴

Individuals who use hallucinogens and also have major psychiatric illness may exacerbate their condition.³

Serious liver and kidney damage, as well as accidental poisoning deaths, may occur if individuals harvest wild mushrooms that do not contain psilocybin, but instead are a similar looking poisonous species.⁸

Tolerance and Dependence

Use of psilocybin, as with other substances identified as classic hallucinogens (LSD, mescaline and ibogaine), will quickly result in a high degree of tolerance for not only the drug being used but for other hallucinogens in the same class. After repeated use, the user requires larger doses to produce similar effects to those experienced initially; however, tolerance is also quickly diminished – the user needs only to stop taking the drug (or similar drugs) for several days to re-experience the drug's full effects.²

Chronic users may become psychologically dependent on use of the drug; however, psilocybin is not known to cause physical dependence.⁴

Withdrawal

There is no evidence that psilocybin produces physical withdrawal symptoms when chronic use stops.²

Legal Issues

In Canada, psilocybin is among the hallucinogens governed by the *Controlled Drugs and Substances Act, Schedule III*. Possession is a criminal offence punishable by imprisonment for up to three years and a fine of up to \$1,000 or imprisonment for up to six months, or both. Subsequent offences are punishable by a fine of up to \$2,000 or imprisonment for up to one year, or both. Trafficking, or possession for the purpose of trafficking, possession for the purpose of exporting, production, import and export offences are punishable by imprisonment for up to eighteen months, or on indictment, by imprisonment for up to ten years.⁴

In addition, the Criminal Code of Canada contains offences related to driving while impaired by alcohol or other drugs. Manitoba has also enacted legislation to address drug-impaired driving.⁹

Risks & Other Harms

Because psilocybin is an illicit drug and distributed illegally, there are no regulations that ensure purity and strength, or even any assurance that purchasers are receiving psilocybin. These factors make it extremely difficult to predict toxicity and the potential consequences of use. Often, individuals believe they are purchasing psilocybin, when in reality the active drug is PCP or LSD.⁴

In addition, abusers who inject the drug expose themselves to other risks, including contracting human immunodeficiency virus (HIV), hepatitis B and C and other blood-borne viruses.

As is the case in any abuse of licit and illicit drugs, there are potential adverse consequences related to the law, a person's financial situation, family relationships, and generally putting oneself at risk by participating in unsafe behaviours while under the influence of the drug.

Pregnancy & Lactation

Psilocybin has not been found to be teratogenic in pregnant mice. There are no human case reports or research regarding the teratogenicity of this substance.¹⁰

The absence of research into the effects of psilocybin on the fetus, and the additional risk factors individuals may be exposed to through its use, creates an imperative to strongly discourage women from using this or any type of hallucinogen during pregnancy or while breast feeding to prevent harm to the fetus or infant.

Interventions

If a patient presents with acute psychosis induced by hallucinogen use, the resulting anxiety can usually be controlled with a sedative agent such as diazepam. While antipsychotic agents (i.e. haloperidol) may seem appropriate in these circumstances, they should generally be avoided as they can lead to increased agitation. Just as important as appropriate medication is the need to create an environment that is very calming, with no aversive stimuli and, ideally, is supported through friends or family who can offer reassurance to the patient while he or she is still affected by the drug.¹

Persistent psychosis and HPPD produce symptoms that mimic other neurological disorders and may be difficult to diagnose. While there is no established treatment, some antidepressant drugs may help minimize the symptoms. If the patient is expressing fear over the symptoms, psychotherapy may help the person adjust to what he or she is experiencing.²

Any treatment strategy used with those abusing drugs must take into account the specific needs of the individual, as well as the particular substance being abused. This principle is the same for treatment of those who abuse either legal or illegal substances.

Substance Use & Mental Health

- Substance use and mental health problems can often occur together. This is commonly referred to as a co-occurring disorder.
- Substance use may increase the risk of mental health problems.
- People with mental health problems are at higher risk of developing substance abuse problems:
 - Sometimes they use alcohol and other drugs in an attempt to relieve themselves from mental health symptoms.
 - For most people alcohol and other substance use only covers up the symptoms and may make them worse.

Remember: A person's experience with any drug can vary. Here are a few of the many things that may affect the experience: the amount and strength of the drug taken, the setting, a person's mood and expectations before taking the drug, gender, overall health, past experience with that drug and whether more than one drug is being used at the same time. Using alcohol and other drugs at the same time can also be dangerous.

Sources

1. Fandrey, S. L. *Applied Aspects of Pharmacology*, Addictions Foundation of Manitoba, 2005.
2. National Institute on Drug Abuse (NIDA). *Research Report – Hallucinogens and Dissociative Drugs Including LSD, PCP, Ketamine, Dextromethorphan*, 2001. Available at <http://www.drugabuse.gov/ResearchReports/hallucinogens/hallucinogens.html> (accessed May 2010).
3. Marsch, L. A. & Bickel, W. K. in *Pharmacology and Treatment of Substance Abuse Evidence- and Outcome-Based Perspectives*, ed. L. M. Cohen (et al), Routledge Taylor and Francis Group, New York, 2009, p. 394-417.
4. Health Canada. *Straight Facts about Drugs and Drug Abuse*, 2009. Available at http://www.hc-sc.gc.ca/hc-ps/alt_formats/hecs-sesc/pdf/pubs/adp-apd/straight_facts-faits_mefaits/facts-faits-eng.pdf (accessed May 2010).
5. Boston University School of Public Health. *Medical Uses of Psychedelic Mushrooms Explored*, Join Together website, 2006. Available at <http://www.jointogether.org/news/headlines/inthenews/2006/medical-uses-of-psychedelic.html> (accessed May 2010).
6. Friesen, K., Lemaire, J. & Patton, D. *Alcohol and Other Drugs: Students in Manitoba 2007*, Report prepared for the Addictions Foundation of Manitoba, 2008.
7. Health Canada. *Canadian Alcohol and Drug Use Monitoring Survey, Summary Results for 2008*. Available at http://www.hc-sc.gc.ca/hc-ps/drugs-droques/stat/_2008/summary-sommaire-eng.php (accessed May 2010)
8. Addictions Foundation of Manitoba (AFM). *The Basics – Magic Mushrooms*, 2005.
9. Addictions Foundation of Manitoba (AFM). *Fast Facts on Drugs*, 2004.
10. Illinois Teratogen Information Service (ITIS) website. *The Effects of Hallucinogen Use During Pregnancy*, 2000. Available at <http://www.fetal-exposure.org/resources/index.php/2000/10/01/the-effects-of-hallucinogen-use-during-pregnancy/> (accessed May 2010).

The Addictions Foundation of Manitoba (AFM) offers a broad range of prevention and treatment services for alcohol, other drugs and gambling. These are designed to meet the needs of all Manitobans and include harm reduction and abstinence-based programs.

For more information, contact your local AFM office or visit our website: www.afm.mb.ca.

AFM Disclaimer: This information is not intended as a substitute for professional advice. Every effort has been made to ensure that the information was accurate at the time of publication.

Permission to reproduce is granted by AFM. If you wish to order multiple copies of this or other topics in *The Beyond the Basics Series*, please contact AFM Library at 204-944-6233 or library@afm.mb.ca.