



2011, an estimated 18.1 million Americans had used it in the past month. Between 2007 and 2011, the rate of use increased from 5.8 to 7.0%, and the number of users increased from 14.5 million to 18.1 million. Nearly 5.0 million persons used marijuana on a daily or almost daily basis over a 12-month period. Marijuana and hashish are among the drugs most commonly used by adolescents, with approximately one half of 12th graders admitting use at least once and 20% reporting that they are current users. Most of their pharmacologic effects come from metabolites of  $\delta$ -9-tetrahydrocannabinol, which bind to specific cannabinoid receptors located in the CNS, spinal cord, and peripheral nervous system. The primary mode of use is smoking, with mood-altering and intoxicating effects noted within 3 minutes and peak effects in approximately 1 hour. The acute physiologic effects are dose-related and often include increased heart rate, conjunctival congestion, dry mouth, fine tremor, muscle weakness, and ataxia. Psychoactive effects include euphoria, enhanced perception of colors and sounds, drowsiness, inattentiveness, and inability to learn new facts. Tolerance and physical dependence occur, and chronic users may experience mild withdrawal symptoms of irritability, restlessness, anorexia, insomnia, or mild hyperthermia. Rarely, acute psychosis with panic reactions occurs. The treatment of withdrawal is supportive and includes reassurance; benzodiazepines may be used in severely agitated patients. Cannabinoids have been used as antiemetic agents in patients with cancer receiving chemotherapy, for weight stimulation (in patients with cancer or HIV infection), and in the treatment of glaucoma.

Synthetic marijuana is a psychoactive designer drug composed of a mixture of herbs, spices, or shredded plant material that is sprayed with synthetic chemicals that mimic the effects of cannabis when smoked or prepared as a tea. They have been sold widely in “head shops” as well as through the internet and are best known by the brand names K2 and Spice. Spice products are popular among young people; of the illicit drugs most used by high school seniors, they are second only to marijuana. Synthetic cannabis can precipitate acute psychosis or a worsening of previously stable psychotic disorders; they also may trigger a chronic (long-term) psychotic disorder among vulnerable individuals, such as those with a family history of mental illness. K2 ingestion has been associated with myocardial infarction and death. Regular users may experience withdrawal and addiction symptoms.

### Hallucinogens and Dissociative Drugs

*Hallucinogens* (drugs that cause hallucinations) include lysergic acid diethylamide (LSD), mescaline, psilocybin, and ibogaine. *Dissociative drugs* distort perceptions of sight and sound and produce feelings of detachment (dissociation) without causing hallucinations. They include phencyclidine (PCP), ketamine, salvia, and dextromethorphan (a widely available cough suppressant).

LSD is the most potent of the hallucinogenic drugs. Although it is known to interact with serotonin receptors in the cerebral cortex and *locus ceruleus*, its precise psychoactive mechanism is unknown. Within 30 minutes of its oral ingestion, sympathomimetic effects appear, including mydriasis, hyperthermia, tachycardia, elevated blood pressure, diaphoresis, dry mouth, increased

alertness, tremors, and nausea. Within 2 hours, the psychoactive effects become apparent, with heightened perceptions (highly intensified colors, smells, sounds, and other sensations), body distortions, mood variations, and visual hallucinations. An acute panic reaction may occur, sometimes leading to self-injury or suicide. After approximately 12 hours, the syndrome begins to subside, but fatigue and tension may persist for another day. Flashbacks (brief recurrences of the hallucinations) may occur days or even weeks after the last dose but tend to disappear without treatment. Acute panic reactions are best treated in a supportive environment; benzodiazepines can be given to severely agitated patients.

PCP is a potent, addictive hallucinogen that produces a prompt stimulant effect similar to that of amphetamines, with feelings of euphoria, power, and invincibility. Patients may have hypertension, tachycardia, hyperthermia, bidirectional nystagmus, slurred speech, ataxia, hallucinations, extreme agitation, and rhabdomyolysis. With more severe reactions, patients may be brought to medical attention in a coma-like state, with open eyes and pupils that are partially dilated, a decreased pain response, brief periods of excitation, and muscle rigidity. On occasion, PCP users may have hypertensive urgency, seizures, and bizarre (often violent) behavior, which lead to suicide or extreme violence toward others. Tolerance and mild withdrawal symptoms have been seen in daily users, but the major problem is drug craving. Treatment entails a quiet environment, sedation with benzodiazepines, hydration, haloperidol for terrifying hallucinations, and suicide precautions. Continuous gastric suction and acidification of the urine with intravenous ammonium chloride or ascorbic acid may aid in the drug's excretion, but acidification may increase the risk of renal failure if rhabdomyolysis is present.

Ketamine is a rapidly acting general anesthetic; unlike most anesthetics, it produces only mild respiratory depression and appears to stimulate the cardiovascular system. Adverse effects, including delirium and hallucinations, limit its use as a general anesthetic in humans. Similar to PCP, ketamine is a dissociative anesthetic. In addition, it has both analgesic and amnesic properties and is associated with less confusion, irrationality, and violent behavior than PCP. Ketamine is one of the club drugs that have been implicated in date rape.

### Inhalants

The inhalants may be classified as (1) *organic solvents*, including toluene (airplane glue and spray paint), paint thinners, kerosene, gasoline, carbon tetrachloride, shoe polish, acetone (nail polish removers and Liquid Paper), xylene (permanent markers), and degreasers (dry cleaning fluids); (2) *gases*, such as butane, propane, aerosol propellants, and anesthetics (ether, chloroform, halothane, and nitrous oxide); and (3) *nitrites*, such as cyclohexyl nitrite, amyl nitrite, and butyl nitrite (room deodorizer). These substances are most often inhaled by children or young adolescents, after which they produce dizziness and intoxication within minutes. Prolonged exposure or daily use may lead to hearing loss, bone marrow depression, cardiac arrhythmias, cerebral degeneration, peripheral neuropathies, and damage to the liver, kidneys, or lungs. A characteristic “glue sniffer's rash” around the nose and mouth is sometimes seen after prolonged use. In rare