Inhalants

Inhalants are a class of drugs that are sniffed or huffed by users. Inhalants are usually legal substances that when inhaled, lead to an immediate high. Most abused inhalants depress the central nervous system, causing a euphoric feeling to the user. In laboratory studies, inhalants have been shown to produce neurobehavioral reactions similar to alcohol and sedatives. Toluene, a solvent found in many abused inhalants like glue, paint sprays, and nail polish remover, seems to react with the dopamine system in the brain. It activates this system, like many other drugs of abuse, which may have a part in the pleasurable feelings associated with inhalant use.

Inhalants are used in a variety of ways. Sniffing or snorting fumes through the nasal passage is one common method of using inhalants. In this process, some people soak a paper bag with the product and then inhale it through the nose and mouth for an increased effect. Some inhalant users spray aerosols directly into the nose or mouth. Huffing occurs when an inhalant-soaked rag is stuffed in the mouth, then inhaled so the fumes reach the lungs. Balloons filled with nitrous oxide can also be inhaled for a high.

Intoxication from inhalants only lasts a few minutes. To prolong the pleasurable feelings, some abusers of inhalants repeatedly inhale the chemical vapors over the course of several hours. With continuous inhalations in one setting, abusers can lose consciousness or die from asphyxiation, suffocation, choking, or sustain fatal injuries in accidents occurring during intoxication. Chances of suffocation are greatly increased when fumes are deliberately inhaled from a paper or plastic bag or in a closed area. During prolonged sessions of using inhalants, the heart can suffer from a rapid and irregular increase in heartbeat, leading to death within minutes. This syndrome is known as "sudden sniffing death" and can occur from one session of inhalant abuse. It is typically associated with the abuse of butane, propane, and chemical aerosols.

Short-term effects
Short-term effects of inhalant abuse include dizziness, inability to coordinate movements, nausea, vomiting, depressed reflexes, belligerence, impaired judgment, confusion and delirium. If large amounts of inhalants are used in a short period of time, anesthesia, loss of sensation and unconsciousness can be produced.

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**Long-term effects**

Prolonged use of inhalants can lead to headaches, muscle weakness, abdominal pain, decrease or loss of smell. Some people experience an involuntary passing of urine or feces. Impairment to the liver and kidneys can occur, typically when using toluene (spray paints, glues, dewaxers) and chlorinated hydrocarbons (correction and dry-cleaning fluids). Also, lung function and oxygen levels in the bloodstream can be affected over time.

Chronic abuse of inhalants can lead to permanent damage to the brain and other parts of the nervous system. Some studies have found damage to the protective covering around certain nerve fibers in the brain and peripheral nervous system. This damage is similar to the damage experienced in multiple sclerosis and can result in limb spasms. Using hexane (glues, gasoline) and nitrous oxide (whipping cream, gas cylinders) have been linked to this type of damage. Also, prolonged inhalant effects can include damage to parts of the brain, including areas that control cognition, movement, and vision. Hearing loss is associated with toluene use. Bone marrow damage can occur with the use of certain inhalants, such as benzene (gasoline).

**What are Inhalants?**

Most products used as inhalants are commonly found around the home or in the work place. Inhalants are usually classified into the following categories:

**Solvents** are a type of inhalant often found in the home. Solvent-containing products include paint thinners, paint removers, degreasers, dry-cleaning fluids, gasoline and glue. Art or office supplies like correction fluids (*White-Out*), fluids in felt-tip markers or electronic contact cleaners are also solvents used as inhalants.

**Gases** are another primary source of inhalants. Butane lighters, propane tanks and refrigerant gases are used to produce a high. Another common inhalant is “whippets,” or the gas received from whipping cream aerosol dispensers. Other aerosols used as inhalants include spray paints, fabric protector sprays and hair or deodorant sprays.

**Nitrites** are the final category of inhalants. The most easily obtained nitrite is most likely cyclohexyl nitrite, which is found in room deodorizers. Amyl nitrite, which is intended for medical purposes, is discussed on the back page. Butyl nitrite, an illegal substance is also used as an inhalant. It was previously used to manufacture perfume and antifreeze.

Since most inhalants are products that are sold for commercial purposes in the work place or household, they are typically not viewed as drugs. However, young children and adolescents can easily obtain these products, which is the age group most likely to abuse the substances. However, inhalants are not limited to adolescents. In 2002, the National Survey on Drug Use and Health (NSDUH) administered by the Substance Abuse and Mental Health Services Administration (SAMHSA) found that 71% of inhalant users were in the age range of 12 to 25. Even though it is usually assumed that using inhalants is a trend in adolescence, this type of drug abuse can extend into adulthood.
Facts related to Inhalant Abuse
Research sponsored by the National Institute on Drug Abuse (NIDA), National Institutes of Health (NIH), and the Department of Health and Human Services found the most commonly abused inhalants reported by participants were glue, shoe polish, and gasoline. The study also concluded that no gender differences were found in the prevalence of inhalant abuse or dependence, but there were some differences in gender concerning the types of inhalants used. For girls, the most common products used were glue, shoe polish, spray paints, correction fluids, and aerosol sprays. Boys were more likely to inhale nitrous oxide or gasoline.

Of the participants interviewed, approximately 9% of them reported using inhalants at some point in their lives. This was a 14% increase from 2002 to 2003, and also the only increase reported of any substance in the survey. Of the participants reporting inhalant use, 60% also reported using more than one type of inhalant.

The study also concluded that adolescents who start using inhalants at ages 13 and 14 were six times more likely to be dependent on inhalants than adolescents starting at ages 15 and 17. Having a history of foster care resulted in a greater likelihood of being dependent on inhalants. Also, adolescents treated for other mental health problems and adolescents that reported abuse or dependence of at least two other drugs, were more likely to be diagnosed with inhalant abuse or dependence.

In 2003, the Monitoring the Future Survey, NIDA’s national annual survey of drug use in 8th, 10th, and 12th grade students in the United States found an increase in inhalant use among 8th grade participants. Use of inhalants increased 8.7% in 2003, which is the first increase seen in this drug category since 1995. The Drug Abuse Warning Network (DAWN) found emergency room mentions of inhalant use increased 187% from 2001 to 2002.

Chronic Inhalant Abuse and the Brain
Research has continually found an association between chronic use of inhalants and pervasive brain damage and cognitive abnormalities. These impairments can range from mild problems to severe dementia. A new study sought to compare the effects of long-term solvent abuse to chronic cocaine use on the brain. Brain damage and intellectual functioning were found to be significantly impaired for both groups. By examining cognitive functions of the brain through several different tests, it was found that both groups of drug abusers performed below the general population averages. However, the group of chronic inhalant abusers was found to have more brain abnormalities, more extensive brain damage, and more impairment on tests of memory, attention, planning, and problem solving than the group of chronic cocaine abusers.

Using magnetic resonance imaging (MRI) scans to examine brain structure, researchers discovered both groups had high proportions of abnormal brain images, indicating major changes in brain structure. Of the two groups, chronic inhalant abusers were more likely to have changes in their brain structures than chronic cocaine users. The abnormalities were found in four areas of the brain: thalamus, basal ganglia, pons, and cerebellum. These structures of the brain have significant involvement in receiving sensory information from the peripheral nervous system and the spinal cord. They also are central to the process of relaying messages to different areas of the brain that control and coordinate functions such as voluntary and involuntary movements. Extensive damage to the white matter of the brain was also found in solvent abusers. The damage to these nerve tissues was associated with greater cognitive impairment, measured by verbal IQ scores. Of the inhalant abusers showing damage to the white matter, their verbal scores were 20% lower than the already low average score of the rest of the group.
The cognitive damage and neurological dysfunction that can occur with long-term inhalant abuse make this substance abuse disorder one of the most difficult to treat. Along with the brain damage, many people who use inhalants for extended periods of time also experience multiple psychological and social problems.

**Amyl Nitrites**

Amyl Nitrite is a vasodilator that quickly causes relaxation of vascular smooth muscle. Amyl Nitrite is a clear, yellowish liquid with a fruity odor. It is distributed in thin glass capsules and is administered by crushing the capsule and then inhaling the fumes. The drug is prescribed for the prevention or relief of angina, chest pains associated with heart disease. The process of taking the drug has given amyl nitrite the nickname of “poppers.” Possessing amyl nitrite without a doctor’s prescription is illegal in the United States.

The effects of poppers are felt within a few seconds, and last for only one to two minutes. As a vasodilator, poppers work by causing muscles around blood vessels to relax. This results in increased heart rate, and oxygen-rich blood heads to the brain, resulting in a “rushing” sensation. Amyl nitrite also causes other smooth muscles in the body to relax, such as muscles in the anus or vagina. Since it has this effect, amyl nitrite is often used to heighten sexual experiences. Therefore, older adolescents and adults may more likely abuse this class of inhalants. The use of amyl nitrite may result in headaches, dizziness, and flushing of the face. Some people report adverse reactions such as cold sweat, vomiting, nausea, sensations of spinning or falling, loss of erection, and involuntary passing of urine of feces. Using amyl nitrite results in a reduction of immune system functioning for several days. Amyl nitrite is very flammable, and should not be used around cigarettes, candles or other flames.