

Cocaine hydrochloride cannot be smoked because of its high melting point and must be converted to another form with a lower melting point to be used in this manner. Street cocaine is treated with ammonia to remove the hydrochloric acid and then dissolved in ether. Once the ether evaporates, the *freebase* cocaine is left as a residue. It is then placed into a special pipe, heated with a cigarette lighter or similar source of ignition, and then smoked. The high produced by smoking cocaine has a very rapid onset, more intense than any other form of use, and an extremely short duration. Due to the flammability of ether, many serious injuries resulted from freebase use, the most notable being comedian Richard Pryor

Absorption of cocaine into the bloodstream is through the lungs and then directly to the brain. It is a much more efficient and rapid method of use than either inhalation or injection. The onset of effects is less than 10 seconds and the duration of effects is only 10-15 minutes on average. The high is so strong and intense that the repetitive use of cocaine which is common leads to physical and psychological problems.

Crack cocaine is a further refinement of freebasing. It is made without using the volatile chemicals (ether, etc.) associated with freebase manufacture. Freebase cocaine and crack cocaine are identical, i.e., base cocaine. The only difference is in the manufacturing process. Freebase cocaine uses highly volatile chemicals while crack is made from cocaine combined with baking soda (sodium bicarbonate) and water. The baking soda separates the hydrochloride from the cocaine leaving cocaine base dissolved in the water. This mixture is then heated to the melting point of cocaine base at which time the base turns to an oil. When the oil cools it forms a solid or crack cocaine. Often the mixture is placed in an oven or microwave to speed the drying process.

HALLUCINOGENS

The term "hallucinogen" refers to a group of drugs which affect the central nervous system producing perceptual alterations in which time, self-consciousness, and vision of the physical world change. Various types of auditory, visual, and tactile hallucinations may appear as a result of use and are largely dose related. These drugs do not produce either analgesia or sedation and while tolerance to some of these drugs develops, physical addiction does not occur.

The most significant effect of these substances is the emotional change in the individual. The emotions of a user can range from despair ("bad trip") to ecstasy ("good trip"). A "bad trip" may consist of having psychotic reactions in various degrees and severity while a "good trip" is normally a pleasant experience. In some cases, psychotic effects may continue long after drug use has stopped. Perhaps the greatest single hazard to use of any of the hallucinogenic substances is that the results of use in any one individual at any time are unpredictable.

Hallucinogenic drugs are usually synthesized forms of naturally occurring chemicals found in plants although the actual plant material itself may be ingested. Of the more than 600,000 plant species known, it is estimated that only one in ten thousand contains chemicals able to produce a hallucinogenic reaction in humans. With the advent of "designer drugs" or "controlled substances analogs," new synthetic compounds are frequently created in laboratories resulting in a non-controlled mind-altering drug.

There have been several other terms used to describe these substances, such as *psychedelic* and *psychotomimetic*. *Psychedelic* was a term coined in the 1960s and used to describe drugs that "expanded the mind." This mind expansion concept was not necessarily correct in terms of drug action but it did accurately reflect the site of the drug action that took place. *Psychotomimetic* is used by some to describe the ability of these drugs to mimic in some manner a psychotic episode.

This group of drugs includes lysergic acid diethylamide (LSD); the hallucinogenic "amines" such as MDMA, DMA, DMT; mescaline, the psychoactive ingredient of the peyote cactus; various hallucinogenic mushrooms, and other substances. Both cannabis and phencyclidine can be included as hallucinogens based on their type of action but are treated as separate topics because of their unique properties. LSD is the most important hallucinogenic drug and the effects of all other similar substances are compared with LSD.

LYSERGIC ACID DIETHYLAMIDE (LSD):

LSD was first discovered in 1938 in a laboratory in Switzerland (Sandoz Laboratories) by Dr. Albert Hoffman. At the time, Dr. Hoffman was experimenting on derivatives of ergot alkaloids. Ergot fungus grows on various grains and grasses and historical literature records episodes of "St. Anthony's Fire," a disease which occurs when bread made from infected grain

is ingested. This disease resulted in gangrene of the extremities, spontaneous abortions in pregnant women, and psychotic behavior. The ergot fungus contains a number of chemicals including ergotamine which may be used to contract the uterus after childbirth and for treatment of migraine headaches. Ergotamine is also a precursor chemical used in the manufacture of LSD. Author Robin Cook, in his book *Acceptable Risk*, discusses the discovery of a drug similar to LSD as a historical explanation for the Salem Witchcraft Trials of the 1600s. As a result of Hofmann's research, LSD appeared to be inactive remained untouched for nearly five years.

In 1943, Hofman decided to further reasearch LSD and in doing so accidentally ingested a small quantity of the compound (lysergic acid plus diethylamide) and experienced a series of visual hallucinations which lasted for several hours. The experience was not at all unpleasant and several days later Dr. Hoffman deliberately ingested 250 micrograms (about 5 times the normal dose) of the drug and again experienced hallucinations. Dr. Hoffman later reported that colorful images occurred and sounds became transformed into objects, changing shape and color.

In 1949, LSD was introduced as an experimental drug into the United States for use as a psychotherapeutic agent in patients with mental and emotional problems. Because of its "depersonalization effect", it was believed if the person could "step outside himself" and see himself as others did, his problems could be solved. After experiments, it was found that LSD was not effective in treating alcoholism. It was also tested on addicts, schizophrenics, and other "maladjusted people" but LSD was equally ineffective in treating these conditions as well. From 1956 to 1967, without the knowledge and consent of the patients, several U.S. government agencies conducted experiments with LSD on humans. In 1965, LSD was restricted by the Federal government and by 1966, Sandoz laboratories withdrew its sponsorship of LSD research due in part to the large amount of clandestine LSD on the market.

Timothy Leary, a psychology lecturer at Harvard, began experimentation with LSD. As a result, he became convinced that LSD could "expand consciousness" and began to promote its use for that reason. Leary, among others, was convinced that LSD could induce the brain to be more effective and creative. As with all of the psychoactive drugs, LSD is not capable of producing a more intelligent and creative being.

LSD is the most powerful of the hallucinogenic drugs. Colorless, odorless, and tasteless, its potency is measured in micrograms (1/1,000,000th of a gram). One ounce of pure LSD will contain enough psychoactive material for about 300,000 doses, at an average dose of 50 to 100 micrograms. The onset of effects begin in about 45 minutes and last 6-12 hours from a single oral dose; the most common dosage forms today are "blotter acid" and "window pane." Physical effects are similar to those produced by the CNS stimulants and include dilated pupils, flushed face, increased heart rate and blood pressure, sweating, and nausea. Psychological effects triggered by LSD ingestion are subjective and depend on the user's mood, anxieties, dosage, and the conditions under which used ("set and setting"). Studies have shown that the sequence of the psychological changes caused by LSD ingestion are in the following order: mood changes, abnormal body sensations, changes in color perception, space and time disorientation, and hallucinations.

Vivid hallucinations are experienced with confusion and blurring of the senses (sight, sound, smell, touch). This "mixing" of the senses is referred to as synesthesia. There may be a loss of depth and time perception and the user's ability to perceive danger and effectively act to reduce that danger is decreased. Controls over emotions disappear and feelings ranging from euphoria to terror may exist from a single use. Although not physically addictive, tolerance does develop to frequent LSD use with initial dose levels ineffective after several days of continued use. Recovery from LSD use is rapid and tolerance does not appear to develop when use is sporadic. Cross tolerance occurs between LSD, mescaline, and psilocybin.

Death as a direct result from LSD use (toxicity) has not occurred but there are adverse reactions to its use. Part of the difficulty is that there is no accurate way to measure either amount used or purity of the drug. Thus there is no way to predict a pleasant (a good trip) or an unpleasant reaction (a bad trip) in any single user. One of the significant adverse reactions caused by LSD use is called "flashback" which is actually a recurring psychotic episode without re-use of the drug. These recurring hallucinations can occur days, weeks, or months after the last use.

There are numerous myths about LSD use. Artistic creativity is not enhanced with use of any psychoactive or "mind-expanding" drugs, LSD included. LSD has been used in alcohol treatment programs, however after a period of months there is no difference in the results with use of LSD and other types of treatment. One of the most serious credibility gaps in knowledge of LSD actions was in the area of alleged chromosome damage and possible birth defects with LSD use. There has been no conclusive study which has indicated that this in fact occurs.

MESCALINE

Mescaline is the primary psychoactive ingredient of the peyote cactus which grows in the Southwestern U.S. and northern Mexico. The peyote cactus was used by the various Indian peoples of the area in their religious ceremonies. The entire cactus plant contains mescaline, but only the upper portion is sliced into "mescal buttons" or "peyote buttons" for use. Peyote buttons are 1-2 inches in diameter, brown in color, and resemble a dried mushroom. Drugs sold on the street as mescaline are usually another drug misrepresented as mescaline, most commonly PCP. Mescaline chemically is *3,4,5 trimethoxyphenylethylamine* and is one of the hallucinogenic "amines" which can be manufactured in a clandestine laboratory.

Because of peyote's association with Native American religious beliefs, the Native American Church, first chartered in Oklahoma in 1918, was granted an exemption from the law and permitted the use of peyote in its religious ceremonies. This exemption has been modified by the U.S. Supreme Court in April 1990 in the case of *Oregon Department of Human Resources v. Smith* [485 U.S. 660; 99 L.Ed 753]. The Court decided that the First Amendment guarantee of freedom of religion does not prohibit a state from applying its criminal laws to those persons whose religion permits sacramental use of peyote. One of the justices wrote that a religious exemption for peyote would impair the government's interest in prohibiting possession of peyote.

It is important not to confuse "mescal buttons" with either mescal liquor which is made from the agave cactus or mescal beans which are dark red in color and come from a shrub. Mescal beans contain *cystine* which is highly toxic; its effects closely resemble nicotine and may cause nausea, convulsions, hallucinations, and death from respiratory failure.

Mescaline is ingested orally but because of its poor ability to pass the blood brain barrier, high doses are required to achieve a psychoactive effect. Where the average dose of LSD is about 1 1/2 micrograms per kilogram (2.2 pounds) of body weight, mescaline's average dose is 5-7 milligrams per kilogram. Although LSD is many times more effective than mescaline, the effects are similar. Beginning about an hour after use and lasting as long as twelve hours, blurred vision, nausea, tremors, dilated pupils precede the perceptual and psychic changes. Use of peyote was depicted in the film "*Young Guns*" by actor Lou Diamond Phillips.

Synesthesia is produced where the user "sees" sounds and "hears" colors as well as other perceptual changes similar to LSD. In contrast to LSD users, individuals under the influence of mescaline are usually aware that the perceptual changes are a result of the drug and have no basis in fact. Not physically addictive, tolerance does develop to mescaline use, although slower than LSD, and cross-tolerance to LSD and psilocybin exists.

PSILOCYBIN AND PSILOCIN

Psilocybin is an ingredient of several types of mushrooms, notably the *Psilocybe mexicana* and *Psilocybe cubensis*. "Magic mushrooms" as they were known, were used in Central America and Mexico by the Indian populations for centuries. Largely unknown until the 1950s, Dr. Hoffman (the creator of LSD) isolated the active ingredient psilocybin which is contained in trace amounts from these mushrooms. During the process, Dr. Hoffman also identified psilocin, found in smaller amounts, but equally active. Psilocybin is unstable and is converted to psilocin by the body when used; it is believed that the psychoactive properties associated with psilocybin are actually caused by psilocin.

A range of effects similar to those produced by LSD and mescaline result from use. The potency of psilocybin is between LSD and mescaline; with about 225 micrograms of psilocybin required to equal a dose of 1.5 micrograms of LSD. As with LSD and mescaline, tolerance develops although not as quickly as with LSD. Cross-tolerance with LSD and mescaline exists and physical addiction has not been identified.

Psychoactive effects are dose related and usually a pleasant experience is reported with psilocybin use. The onset of effect is in about 15 minutes, with a peak in 90 minutes, and duration of 5-6 hours. The hallucinogenic effects of LSD, mescaline, psilocybin and psilocin are identical.

HALLUCINOGENIC "AMINES"

MDA (3,4 Methylenedioxyamphetamine): MDA is chemically related to mescaline, the amphetamines, and many of the other hallucinogenic "amines." The user will often demonstrate some of the characteristics of amphetamine abuse because of the close chemical relation. When orally used, the onset of effects is about 40-60 minutes, with a peak in about 2 hours. Duration lasts about 8 hours. Unless taken in high doses, MDA users will not experience marked perceptual alteration and temporary amnesia after the "trip" is common.

MDMA (Ecstasy): Also known as "XTC", "Adam", or "Love Drug", it is closely related to MDA. MDMA was originally developed as an appetite suppressant with similar effects to the amphetamines but never marketed. MDMA also produces some perceptual alterations but actual visual hallucinations as with the other hallucinogenic amines is are. Advocates of MDMA use in medicine claim it "improves communication" between couples or therapist. Users can function normally and claim MDMA deepens empathy for others, increases senses, and enhances self-awareness. Oral use of 75-150 mg takes effect within 30 minutes and will peak within the next hour. All effects of use are gone in about 3 hours.

As a powder, MDMA may be either inhaled, ingested, or injected. Some have characterized the effects of MDMA as similar to cannabis, low levels of MDA, or psilocybin without the hallucinations. Unlike some of the other hallucinogenic drugs, there is some preliminary evidence that MDMA may cause some brain damage. Laboratory studies in animals have shown a selective destruction of serotonin, one of the primary neurotransmitters,

DMT (Dimethyltryptamine): One of the most important naturally occurring hallucinogenic substances found in many different plants. Many of the effects of DMT are similar to LSD but the total duration of effect is about an hour. The dose of DMT is about 1 mg per kilo of body weight with the average dose 80 mg. DMT is usually smoked as it is ineffective when taken orally. It is not widely used in the U.S. because of the short duration of action.

STP (2,5 Dimethoxy-4-methylamphetamine): Also known by its slang terms of "DOM" and "serenity," "tranquility," and "peace," it is chemically similar to both the amphetamines and mescaline. In terms of strength, STP is about 100 times more potent than mescaline but only 1/30th of LSD. Doses above 3 mg will generally produce hallucinations while lower doses only a mild euphoria. Effects of STP are dose related and are similar to those produced by LSD and the other hallucinogenic drugs.

2C-B (4-bromo-2,5-dimethoxyphenylethylamine): Often called "Nexus", "bromo", or "toonies", 2C-B has emerged as one of the "club drugs" often sold and used at "rave" parties. Touted as a natural drug derived from a fictional ingredient in the khat plant, it developed a following as a healthy, natural drug. Normally taken orally or snorted in 10-20 mg doses, it produces visual effects and a euphoria lasting several hours at low dose and hallucinations similar to LSD at high dose.

MISCELLANEOUS HALLUCINOGENS

Bufotenine: Bufotenine is derived from glandular secretions of certain species of toads as well as found in the cohoba bean, a shrub found in the parts of South America and West Indies. Chemically, it is related to DMT. The toads, when agitated, will give off secretions that contain this drug and are used as part of their natural defense mechanism against predators. Individuals " have either licked the toad skin" or smoked the dried skin as a route of ingestion.

Morning Glory Seeds: A psychoactive plant originally from Mexico whose seeds contain small amounts of d-lysergic acid amide which is about 1/10th as active as LSD. About 100 morning glory seeds are equal to 100 micrograms of LSD. The seeds may be chewed or brewed as a "tea" for their psychoactive effect. In addition to the hallucinations produced, nausea (which includes vomiting and diarrhea) and dizziness often accompanies use of these seeds.

"Angel Trumpet": A member of the plant family known as *datura* of which there are over 20 different species. The leaves, seeds, flowers, and roots contain atropine, scopolamine, and hyoscamine in various concentrations. Scopolamine has been used recently in combination with heroin and has resulted in several severe overdose cases. Use of this plant material can cause intoxication, delirium, mental confusion, hallucinations, drowsiness, and memory loss. Datura abuse has been documented since the 1970s, including several deaths.

MARIJUANA

Marijuana (or marihuana) is the term used for the leafy material obtained from the plant known as *Cannabis sativa L.* The plant grows wild in most temperate and tropic regions and genetic factors control the ability of the plant to manufacture chemicals unique to cannabis, called *cannabinoids*. The plant is known throughout most of the world by the term *cannabis* but in the United States as *marijuana*.

The cannabis plant has been used as a drug for centuries and historical literature on the plant provides various theories for its spread into Europe, South America, Africa, and what is now the Middle East. Marco Polo reported the existence of a religious cult which committed political murders with the promise of "paradise" for completing the act. Visions of "paradise" for this group were provided through the use of *hashish*, the concentrated resin of the cannabis plant. This cult was known as "hashishiyya", the word from which *assassin* is derived.

Cannabis is also known as hemp and was introduced into the American Colonies in the early 1600s in Virginia. Until after the Civil War, the hemp plant was a part of colonial and national economic policy and was grown even by George Washington and Thomas Jefferson. Although cultivation declined after the Civil War, it never went away and increased during World War II at the request of the Department of Agriculture to help meet the shortage of imported hemp. Cannabis still grows in many areas of the U.S. as a "weed" which also is a street name for cannabis.

In the early 19th Century, several accounts of the use of hashish appear in literature. One of the earliest of these is Alexander Dumas' *The Count of Monte Cristo* (1844). During the same period of time, a group of artists and writers met in the Latin Quarter of Paris to use drugs. A member of this group, wrote a book entitled *Le Club de Hachischins* which described their drug experience. This group was responsible for some of the better descriptions of cannabis (hashish) intoxication. In addition to Dumas, Baudelaire wrote of his observations of hashish intoxication in the book *Artificial Paradises*.

Marijuana was readily available in the United States throughout the 19th and 20th Centuries. Recreational marijuana use became widespread in the 1920s when a series of New Orleans newspaper articles appeared linking marijuana use and crime. Articles in magazines such as *Scientific American* and *Popular Science* attributed the cause of violent crime to the use of marijuana. However, the link of marijuana and violent crime was poorly documented and the evidence supporting this theory weak at best. By 1936, all 48 states had laws regulating sale, use, and possession of marijuana.

In 1937, the Federal Bureau of Narcotics (FBN) under Commissioner Harry Anslinger supported a bill that later became the Marijuana Tax Act of 1937. Patterned after the Harrison Narcotic Act of 1914, it banned only the non-medical and untaxed possession or sale of the

drug. Marijuana was not made illegal by this legislation. In 1969, the U. S. Supreme Court overturned the conviction of Timothy Leary (of LSD fame) under the Marijuana Tax Act and declared the law unconstitutional as it required self incrimination in violation of the Constitution.

Laws concerning sale, possession, and use of marijuana remained strict until the mid 1960s. The arrest of several prominent individuals for possession and use of marijuana placed state legislatures under pressure to review the legal penalties associated with it. Federal law placed marijuana in Schedule I among such substances as heroin and LSD. By 1972, the National Commission on Marijuana and Drug Use recommended that personal possession be decriminalized. The following year Oregon became the first state to abolish criminal penalties for the possession of one ounce or less. California made the possession of an ounce of marijuana or less a citable misdemeanor in 1975 with a maximum \$100.00 fine. By 1978, a total of eleven states had decriminalized marijuana possession. However, one state, Alaska, as a result of a ballot initiative in 1990, again made marijuana illegal.

More than fifty years of restrictive laws concerning the use, possession, and sale of marijuana have not eradicated its use. Cannabis today is one of the major cash crops of American agriculture, ranking among corn, soybeans, and wheat. It is the second most commonly used recreational substance in the United States after alcohol and is the most commonly used psychoactive drug. Nearly 70 million Americans have used marijuana at least once.

PLANT CHARACTERISTICS

The cannabis plant is often referred to as either marijuana or hemp, a term associated with the cannabis plant that is grown for its fiber content. The plant is native to the mountains of central and south Asia and has been used for more than 6,000 years. Besides the psychoactive properties, cannabis can be used for rope fiber, livestock food, cooking oil, bird seed, paper, and medication. The plant grows well in a wide variety of terrain, climate, and temperature but prefers the equatorial areas because of the higher temperatures, moisture, and longer growing season. Cannabis is a very hardy plant which can withstand light frost and days without water.

Cannabis plants are either male or female, but a small number of plants have both male and female flowers. The male plant produces the pollen and quickly dies; the female plant produces the seeds after pollination and remains alive until the seeds mature. Genetic composition of the plant will determine such things as size, drug potency, and longevity. In addition to plant genetics, the most important factor in growth is the amount of available sunlight with soil, moisture, and fertilizer being less significant.

There is a wide variation in plant height, color, and number of leaves (leaflets). The fuzzy appearance of cannabis is due to the presence of *cystolithic hairs* which are found on all parts of the plant but are more numerous on the flowers and upper leaves. A mature plant can range from 2-18 feet in height and the growing period may last anywhere from 7 to 26 weeks. Plant and leaf color is normally dark green and the larger leaves are found at the top of the

plant. Each plant leaf (leaflet) is normally palmate in configuration and contains an odd number of "fingers," ranging from 3 to 17 with 5 to 7 the normal number. Single and pennate leaflet configurations also occur but usually in cannabis grown in Southeast Asia. There is a central vein in each leaflet which runs the entire length; leaflet edges are serrated.

The principal psychoactive ingredient in cannabis is THC (Delta-9 tetrahydrocannabinol) and is one of more than 400 compounds which have been isolated from the plant's resin. Of these numerous compounds, 61 are known as *cannabinoids* which occur only in cannabis. These agents collectively are responsible for the psychoactive effect of the plant.

Sex of the cannabis plant cannot be determined until flowers appear. The male flower (staminate) appears in groups about six inches in length near the tops of the branches. It consists of five stamens loosely enclosed by five sepals and develops about 3-4 weeks ahead of the female flower. Once the pollen is produced and blown by the wind, the male plant begins to die. The life span of the male plant is about 14 weeks. The female (pistillate) flower appears in dense clusters near the top of the plant and has a single pistil with two long white stigmata connected to one ovary. Female flowers usually occur in pairs within dense spikes along a branch. Once fertilized the seed begins to form. The seed (fruit) is normally greenish yellow to light brown in color, mottled in appearance, oval in shape and divided into two segments by a prominent ridge.

The plant stalk is thick and is the source of hemp for the manufacture of rope. THC potency varies in the plant but in the past few years cannabis grown for its drug effect has a very high potency level often up to 30%, especially in *sensimilla*, the unpollinated female plant. *Sensimilla* is at the same time a growing technique, a term for high potency marijuana, and a female marijuana plant. The roots and seeds do not contain THC.

PHARMACOLOGY

Cannabis is a plant with a complex chemical composition. Isolation, extraction, and identification of the active ingredient(s) are extremely difficult. Additionally, pure THC is an extremely unstable compound. For these reasons drugs sold on the street as "cannabinol" or "synthetic THC" are always some other substance, usually PCP or LSD. THC was first isolated from cannabis in 1964 and is the most psychoactive of all the ingredients.

Ingestion of cannabis is mainly by smoking although hasish and marijuana can be "baked into "cookies or brownies" and eaten. Oral ingestion of cannabis requires a larger amount of plant material than is used by smoking and the onset of action is slower but does last longer. Cannabis is not water soluble which makes either injection or inhalation impossible. As with all substances absorbed through the respiratory tract, it is rapidly absorbed by the brain. Psychological and cardiovascular effects occur about the same time, usually within 5-10 minutes. THC, like many other drugs, is fat soluble and stored in the fatty tissue throughout the body for later release. Once absorbed into the body, THC produces more than 40 metabolites, the most important of which is 11-hydroxy-THC. Because of this fat solubility, a *single dose of THC and*

its metabolites may take up to 30 days to be eliminated by the body. As a result, frequent use of cannabis products results in a buildup of THC level in the body. The lethal dose of cannabis, if any, is unknown despite widespread animal studies and no human deaths have been traced directly to cannabis toxicity.

MEDICAL USE OF CANNABIS

Medical use of the cannabis plant has never reached a level equal to that of the opium poppy. Chinese literature reports medicinal use as early as 2700 B.C. and it was recommended to be mixed with wine as a surgical anesthetic in 200 A.D. India and the Near East saw extensive medicinal use of cannabis but there was no reported medical use in Europe until the 1800s. An article entitled *On The Preparations of the Indian Hemp or Gunjah* published in 1839, cited the nontoxic nature of cannabis and its effectiveness as an anti-convulsant, muscle relaxant, and of value in the relief of rheumatism pain. It was this article that began the controversial use of cannabis in medicine in both Europe and the U.S.

In the 1800s, articles appeared in various medical journals and texts reporting the successful use of cannabis in the treatment of various disorders. The difficulty that arises with the use of cannabis in medicine is that the product varies in terms of active ingredient strength. The Marijuana Tax Act of 1937 acted to withdraw all cannabis preparations from the marketplace and in 1941 cannabis was eliminated from the *National Formulary* and the *U.S. Pharmacopeia*. This decline can be attributed to (1) better drugs available to treat most illnesses; (2) unreliable strength of active ingredients; (3) THC's insolubility in water; and (4) delayed onset of action from oral ingestion for as long as 2 hours.

There is a constant reevaluation of the therapeutic effects of cannabis. A 1949 study reports that it was an effective anti-convulsant in cases where Dilantin did not work. Cannabis was also found to be effective by some for relief from tension/migraine headaches. In 1972, a report indicated that cannabis, i.e., smoking marijuana, was able to reduce eye pressure associated with glaucoma. Further, a 1975 report stated that THC was able to reduce the severe nausea associated with some cancer drugs. Finally, a 1985 report from the National Academy of Sciences stated that cannabis has shown promise in treating several disorders, including glaucoma, asthma, nausea and vomiting associated with cancer chemotherapy, and several nervous system disorders. Contrary opinions hold that there are other modern drugs which are more effective.

The Food and Drug Administration (FDA) in 1985 licensed the manufacture of *Marinol*, a THC containing drug which is taken orally by patients experiencing severe nausea in their cancer treatment. NORML has continued to push for movement of marijuana from Schedule I and states that by smoking marijuana, the dose is better controlled and smoking is safer.

In March 1992, the Administrator of DEA published a decision paper on marijuana in the Federal Register (Vol 57, No 59, March 26, 1992). The decision stated that marijuana has

no currently accepted medical use and denied the petition of NORML to move marijuana from Schedule I to Schedule II. The DEA Administrator carefully documented the case against rescheduling of marijuana. Cited in the reasoning for the rejection were (1) that not one American medical association has accepted marijuana as a medical treatment; in fact it had been *formally rejected as treatment* by the American Medical Association, (2) there were other pharmaceutical drugs available which were better for the conditions indicated, (3) it was virtually impossible to control dose amounts when marijuana was smoked; no currently accepted medicine is administered by smoking it; (4) the presence of over 400 individual chemicals, many of which were biotransformed upon smoking into something else; this makes it impossible to determine which chemical is responsible for the resulting effect; and (5) numerous nationally recognized experts have rejected medical use of marijuana.

Despite this rejection, the crusade for rescheduling and medical use of marijuana continues. Psychiatrist Lester Grinspoon in 1993 published *Marijuana: The Forbidden Medicine* which is the authoritative reference for the movement to permit medicinal use of marijuana. Grinspoon and an associate, attorney James Bakalar, have also published an article in JAMA: The Journal of the American Medical Association in June 1995 titled *Marijuana as Medicine: A Plea for Reconsideration* which discusses a similar theme.

EFFECTS OF CANNABIS USE

Smoking cannabis affects the mood, emotions, senses, and thought processes of the user. These changes are dose related and also are influenced by "set and setting," the expectation of the user as well as the location and surroundings where the drug is used. In low dose use, a mild sense of well-being is experienced along with relaxation and some distortion of time. All users have indicated that they have a craving for food shortly after cannabis use. This effect is believed to be caused by the action of THC which decreases blood sugar levels.

Moderate users experience the same effects only they are more intense. Such effects as dulling of attention, thought fragmentation, memory impairment, changing emotions, and preoccupation with insignificant details are common. Still higher dose levels distort body images, a loss of personal identity is suffered, and fantasy and hallucinations may occur. These changes may last up to 2 weeks but will disappear totally when all THC is eliminated from the body.

Other observable symptoms of cannabis use are confusion in speech and inappropriate uncontrolled laughter which may become uncontrolled. Bloodshot or puffiness around the eyes may be an individual reaction to cannabis as some users never exhibit this symptom. Lowering of inhibitions also may be experienced. Individuals will unhesitatingly participate in various acts without self-consciousness or fear of censure. Both heart rate and pulse show an increase and many users complain of a dry mouth and throat. Heavy users experience a dry, hacking cough (smokers' cough). Higher doses may produce anxiety or panic and are influenced by events, either real or perceived. As the drug leaves the body, these feelings disappear. Violence with cannabis use is rare.

HEALTH CONSEQUENCES

Mental and behavioral effects are most easily recognized with marijuana abuse. Mental concentration, motor coordination and memory are all affected. Memory can be impaired for months after use is stopped. Chronic users indicate that motivation to succeed is lessened and several laboratory models have indicated abnormal changes in brain cells, blood flow to the brain, and brain wave changes. Psychotic behavior can occur with frequent high potency marijuana use.

Severe respiratory difficulties are associated with marijuana use with double to triple the concentrations of tar, carbon monoxide, and known carcinogens that are found in tobacco. Marijuana smoke is more deeply inhaled and held longer in the lungs to achieve the maximum psychoactive effect from use. Lung function of users is often impaired with cell abnormalities (pre-cancerous) found earlier than with tobacco. Although there is no direct link between marijuana use and various forms of cancer, a strong possibility exists of such a connection. Additionally, marijuana is often contaminated with various types of bacteria and fungi which are inhaled along with the smoke.

Exposure to marijuana during pregnancy can lead to abnormal birth weight and a smaller sized infant on birth. Animal studies have found THC to effect the reproductive hormones in both males and females. In some male users, production of testosterone is altered and sperm count and chromosome structure is changed. Additionally, secondary male sex characteristics can be suppressed. In females, estrogen production is altered which may lead to the appearance of undesirable male characteristics. However, these effects seem to reverse once use of marijuana is stopped. There have been no known birth defects associated with use of marijuana.

Marijuana use has been determined to impact on various immune system functions. The user's ability to fight infection is documented in laboratory research. Cancer patients on chemotherapy as well as AIDS patients both have suppressed immune systems. To further use a psychoactive drug which is known to impair an intact immune system may well not be in the best interests of the individual, despite the claims of NORML and similar organizations.

FORMS OF CANNABIS

Three of the most significant forms of cannabis are *sinsemilla*, *hashish*, and *hashish oil*. Other forms which are available and go by names such as Colombian, Mexican, Thai Sticks, "Maui Wowie," Kona Gold, Acapulco Gold, Panama Red, etc. These are in fact indicators of where the cannabis plant was grown; in some cases it may indicate THC strength. However, once the cannabis has been harvested, it is very difficult, if not impossible, to tell visually where it was grown.

SINSEMILLA: Sinsemilla is a Spanish word for "without seed," is the cultivation of unfertilized female cannabis plants. This form of cultivation is especially prevalent in California and Hawaii and involves allowing the female plant to mature without pollination by the male.

When the female cannabis plant is isolated from the male, it produces more resin, which contains THC, in an effort to attract pollen. The average THC content of sensimilla ranges from 8-14% but has been found as high as 30%. This is a significant increase in psychoactive content over "regular marijuana" and over the marijuana of the 1960s. The higher potency of today's cannabis reflects improved cultivation techniques such as hydroponics and plant cloning.

HASHISH: Hashish is the concentrated resin produced by the cannabis plant. A logical assumption can be made that the THC content of hashish is related to the cannabis from where obtained. A good basic rule is that hashish on average is 8-10 times more potent than cannabis. Hashish is solid and chunky in form and ranges in shades of brown from light to dark, almost black. Some forms of hashish have a yellowish cast to the color. As noted, potency of hashish varies and color is no indication of THC content despite the many myths and rumors. Hashish is preferred by many users because of the quicker and more intense high. In some individuals, hallucinations occur similarly to many of the hallucinogenic drugs.

HASHISH OIL: Hashish Oil, also called "Honey Oil" is highly concentrated cannabis with a purity that may reach 60%, 30-40 times stronger than cannabis and up to 4 times as strong as hashish. It is produced by continual extraction of the resin by use of a solvent into a dark liquid resembling motor oil. Because of its concentration of THC, "hash oil" is the closest to pure THC available to users. Hashish oil can be added to regular tobacco products and smoked; like hashish it can be orally ingested. A process known as "percolation," similar to that by which coffee is made, creates hashish oil. Chopped cannabis or hashish is placed in a basket which is then suspended over a solvent such as alcohol, ether, or ethanol. Copper tubing is arranged within the container above the basket of cannabis and cold water circulates through it. Heating the solvent causes the vapors to rise to the top, passing through the cannabis. When the vapors contact the copper tubing, condensation occurs. The continued heating and recirculation removes all of the THC from the cannabis plant. Level of purity is related to the sophistication of the process used.

CURRENT TRENDS

Marijuana continues to be a commonly used psychoactive drug among teenagers and young adults. Many areas report that the most common user of marijuana is a white male under age 20. "Blunts", cigar-like marijuana cigarettes, can be made with marijuana, crack, or PCP, are popular in many areas of the US. Recently in Chicago, a marijuana cigarette laced with PCP and known as "Ozone" was popular and many users were surprised when urine screens showed positive for the presence of PCP. Prices for marijuana vary greatly depending upon area and whether or not it was "locally grown" or imported. Many of the local varieties, such as sensimilla or those hydroponically grown in greenhouses which contain higher levels of THC cost more than their imported counterpart.

PHENCYCLIDINE

Phencyclidine (PCP) or as it is chemically known, 1-[1-phenylcyclohexyl] piperidine, is a unique drug which has varying effects at different dose levels. At different times in the same individual, PCP can be a stimulant, a depressant, produce psychotic effects and analgesia (pain relief). Because of these varying effects, PCP cannot be placed in one drug category; it is the only drug which can fit in all three major drug groupings. Because of this, PCP is considered by many to be the "worst" psychoactive drug found. PCP has numerous analogs, chemically similar in structure, which can produce the same effect. The only source of the drug today is a clandestine laboratory.

This substance was initially developed in the 1950's in the search for a surgical anesthetic that was not a narcotic or sedative-hypnotic preparation. Following laboratory studies on animals, clinical trials began on humans with PCP in 1957 under the trade name *Sernyl*. Unlike other anesthetics, PCP produces both analgesia and anesthesia and *increases* respiration, blood pressure, and heart rate. At a dose level of 20 mg intravenously, PCP (*Sernyl*) was effective as a surgical anesthetic. However, it was found to produce significant side effects in some individuals. These patients experienced extreme agitation, delirium, visual disturbances and disorientation which included depersonalization, body-image changes, and isolation. A significant number reported the experience frightening, unpleasant, and suffered anxiety/insomnia for up to five days. Some patients reported that they could not remember events for up to five hours after administration of *Sernyl*. The altered state of consciousness produced was found to be very close to a clinical picture of schizophrenia.

The serious side effects of PCP use resulted in the manufacturer requesting withdrawal of permission to conduct human clinical trials in 1965. An outgrowth of PCP synthesis did produce *Ketamine* (known as "*Special K*"), a related chemical which is used today as an anesthetic and can produce some of the effects of PCP. *Ketamine's* duration of action is shorter than PCP, has more of a depressant effect, and fewer psychological problems. By 1967, PCP was marketed under the name *Sernylan* as an animal anesthetic and because of the wide safety margin and rapid action, *Sernylan* was used to immobilize large animals. PCP is no longer manufactured legitimately as of 1978.

Illicit use of PCP first began in the San Francisco area in the late 1960s, marketed in tablet form and sold as the "PeaCe Pill." Due to the side effects, PCP began to be sold as other street drugs such as LSD, mescaline, cocaine, or synthetic THC (cannabinol). Laboratory analysis of many street drugs purchased or seized confirmed the presence of PCP as the psychoactive ingredient present in many of the samples. Due to adverse reactions, PCP disappeared as a street drug for a brief period and later resurfaced on the East Coast about 1968. Even in the early 1970s little was known about PCP but use increased and spread to many urban areas of the country. It is sold under many different names and is often substituted for other drugs such as LSD, mescaline, psilocybin, or synthetic THC (cannabinol).

Throughout the 1970s, the use/abuse of PCP was associated with many stories of violence and psychotic behavior. Television shows such as "60 Minutes," congressional hearings, magazine articles, and news reports all discussed PCP use in these terms. Stories of "super human" strength, aggravated violence, bizarre behavior, and death associated with PCP use appeared almost daily throughout the 1970s and into the early 1980s. PCP is not a harmless drug; it produces hallucinations, mood swings, paranoid impulses, aggressive behavior, and feelings of depersonalization to name but a few. Many of the individuals who are the basis for the stories of PCP abuse are in fact polydrug users with a long history of experimental, social, or binge use of psychoactive drugs.

Although PCP is classified as a hallucinogenic drug, it possesses the properties of all the other major drug groups, stimulant, depressant, and analgesic. It is more properly classified as a "dissociative anesthetic" in which physical sensations are not properly interpreted by the brain. Individuals are aware of their surroundings but do not feel a part of it. There are numerous analogs of PCP, most of which are now classified in Schedule I under Federal law, and have the same effect on a user as PCP.

EFFECTS OF PCP USE

Phencyclidine is a fat soluble substance, widely distributed to all parts of the body, metabolized by the liver, and passed from the body unchanged in the urine. The effects of PCP are dose related, beginning within an hour if taken orally. Smoking, inhalation, or injection of PCP can produce effects in as little as five minutes. By far the most common method of use is smoking. Low doses (1-10 mg) use is similar to alcohol intoxication with a mild euphoria and numbness. Nystagmus, muscle rigidity, gait ataxia, increased blood pressure, increased deep tendon reflexes, and absence of pupillary constriction (mydriasis) are diagnostic signs. Larger doses (20 mg) produce muscle rigidity, hypertension, non-communicative stare, comas with the eyes remaining open, and analgesia. Still larger doses (70 mg or above) result in convulsions, coma, and respiratory depression.

Psychological effects of PCP abuse are very significant. Most important among these are the behavioral disorders such as bizarre or violent actions, repetitive motor movements to include facial grimacing, impulsiveness, unpredictability, impaired judgement, and impaired social and/or occupational functioning. A PCP induced psychosis often results and consists of hallucinations and/or delusions which can last for an undetermined time. This psychosis is in many cases indistinguishable from schizophrenia and may be permanent. Physical signs and symptoms of PCP use are *nystagmus*, increased blood pressure and heart rate, diminished response to pain (analgesia), and the inability to coordinate muscle movements. Respiratory rate of PCP users is slightly increased and the body temperature is raised. Commonly observed in most PCP users are: nystagmus, gait ataxia, muscle rigidity, blank stare appearance, facial grimacing, grinding of teeth, profuse sweating, and a non-communicative stare.

PCP can produce both vertical and horizontal nystagmus; vertical nystagmus is virtually diagnostic for PCP abuse. It should be noted that alcohol also will produce nystagmus in some

users but vertical nystagmus is produced only when the blood alcohol level is extremely high. Some of the sedative-hypnotics and tranquilizers have the ability to produce nystagmus but not at the normally prescribed dose.

The frequency of PCP use is important in determining the length of action on the body. Chronic users are normally defined as 3 or uses per week for a period of about 6 months. Studies have shown that after drug use stopped, problems associated with PCP use remain such as speech, memory loss, and concentration. Chronic PCP abusers normally are under the influence for 4 to 6 hours after the usual street dose and the effects of the drug normally last several days. One of the problems associated with PCP abuse is an effect called by some as a "recurring psychotic episode" also known as a "flashback." These "flashbacks" can produce an experience and effect similar to use of PCP without additional intake of drug material. They are caused by the fat solubility of PCP which stores it in the body's fat tissue. Several days are required for the body to totally eliminate a single use of PCP as it is slowly released from these storage sites. As the drug continues to recycle through the body, episodes of bizarre or violent behavior occur without warning. A complication is that many users of PCP have also used LSD in the past. This leads to a question of whether the "flashback" is caused by PCP or LSD alone or the combination of the two.

"Flashbacks" are unpredictable as to who will have them, when they will occur, and the type of experience that will result. The only sure fact in this regard is that the longer the PCP use, the more certainty that a "flashback" *will occur*.

METHODS OF USE

PCP may be used by smoking, inhalation, injection or oral ingestion. A common method is dipping commercially made cigarettes, usually with the darker and heavier paper, into a liquid PCP solution ("Sherms"). As with all abused substances, PCP may be used by itself or in combination with other psychoactive drugs. PCP may also be encountered sprayed or sprinkled on mint leaves and smoked in a manner similar to cigarettes. It may be also applied as either a liquid or powder on numerous leafy substances such as oregano, parsley, or even marihuana. Use by inhalation, injection, and oral ingestion follow the pattern of use for other drugs. Substance abusers are limited only by their imaginations in the ways to use drugs.

MANAGEMENT OF THE PCP ABUSER

Because of the unique properties of PCP, it is appropriate to discuss management techniques, which are designed to minimize danger and injury. The basic rule, which is true when dealing with anyone suspected of substance abuse, is to *use caution*. PCP is always unpredictable in its effects at any time in any person. Users often misinterpret what they see. Periods of cooperation and aggressiveness alternate in the same abuser so avoid interacting with a suspected PCP user by yourself. To control a suspected PCP abuser, weight of numbers and not individual strength is most effective. If the arrest involves the use of force, do not assume the individual is not injured. PCP because of its analgesic properties often will mask injuries.

"Talk-down" techniques which have been effective with users of LSD do not work with PCP users.

Assume any irrational or bizarre behavior coupled with nudity as a possible PCP intoxication. One of PCP's effects is to increase body temperature and often the individual will remove all clothing in an effort to cool down. Reduce any auditory or visual stimulation which in turn will reduce their agitation. Due to PCP's analgesic effect, controls which are based on the infliction of pain are often ineffective.

PCP AND SCHIZOPHRENIA

Some individuals who have used PCP have been admitted to psychiatric hospitals as a result of a psychosis caused by their drug use. In a few cases, this psychosis has developed after a single use but most often it is the result of prolonged PCP use over a period of time. Low dose PCP use can produce a condition very similar to schizophrenia which is indicated by a psychotic reaction marked by withdrawal from reality and accompanied by behavioral and intellectual changes.

Individuals who already exhibit schizophrenic behavior and take PCP only increase their psychotic behavior. Some studies have indicated that a significant number of persons treated for a PCP induced psychosis return within a year for treatment of a schizophrenic psychosis *in the absence of PCP use*. These later episodes lacked the violence associated with PCP use and were with anti-psychotic drugs; however the typical personality disorders associated with schizophrenia remained.

INHALANTS

The inhalation of various substances is a method commonly used by individuals who use a wide variety of chemicals which have the ability to alter mood and produce euphoria. These chemicals or volatile substances vaporize into a gas at room temperature and produce intoxication when inhaled. The vast majority of these chemicals are commercial preparations and not controlled under Federal law. When these substances are used as intended by the manufacturer, there are no adverse effects.

Inhalation is the most effective method of rapidly moving psychoactive drugs to the brain. The appearance of inhalants or volatile substances is a product of both medical science and industrial technology. The first of the "modern" inhalants, *nitrous oxide* or "laughing gas," was discovered in 1772. It was found to be able to reduce a person's response to pain but was also found to have an intoxicating effect. Much of the early use of nitrous oxide was for recreation, especially among medical students. By the mid-1800s, it was widely used as a pain killer by dentists and is still in use today as a dental anesthetic and analgesic.

Another early inhalant was *chloroform* discovered in 1831 almost at the same time by the United States, Germany, and France. By 1847, it was used for anesthesia during childbirth as well as recreational use. However, due to numerous deaths, chloroform gradually lost acceptance to other less dangerous substances. As a result, chloroform use is rare today.

Ether was discovered about the same time as chloroform. Shortly after introduction, it was used in liquid form for a wide assortment of conditions. Use as a surgical anesthetic by dentists began about 1846 which also marks the beginning of inhalation anesthesia. Drinking and inhalation of ether became popular in the late 19th century and it was regarded as a cheap alcohol substitute, producing relief of anxiety, euphoria, and sleep. During the Prohibition Era, soft drinks were often "spiked" with ether and numerous cases of dependence resulted.

There are over 1400 different substances capable of being abused as inhalants. These include such items as airplane glue, cooking spray, gasoline, paint thinner, butane lighters, disinfectants, air fresheners, bleach, aerosol whipped cream, ammonia, insecticides, hair spray, moth balls, nail preparations, oven cleaners, lighter fluid, turpentine, spray paints (especially metallics), typewriter correction fluid, and felt markers. Inhalant abuse is largely contained within the teenage population, with the typical abuser a male between 14 and 16 years old. Although there are some older users, the vast majority of the adult population is unaware of this potential hazard. Intensifying the problem is that most of these substances are not controlled or restricted and they are relatively inexpensive.

INHALANT PHARMACOLOGY

Inhaled substances are absorbed through the lungs into the bloodstream and then to the brain. The effects of "sniffing" are felt almost immediately and last about 15 minutes. These substances are fat-soluble, carried and stored by the body's own fatty substances known as "lipids" which are found throughout the brain and central nervous system. Inhalants are stored in the lipids until removed from the body through respiration, detoxification by the liver, and elimination by the kidneys. A single use of inhalants can be lifethreatening or leave permanent impairment.

The effects of inhalants vary with the amount ingested, number(s), and type(s) of chemicals used. At low dose, mood elevation, mild euphoria, reduction of inhibitions, and a feeling of increased sociability is common. Higher doses produce laughter, dizziness, distorted perceptions, hallucinations, confusion, blurred vision, slurred speech, and impaired motor coordination. An overdose may produce sedation, anesthesia, psychosis, and respiratory depression, stupor, and unconsciousness as well as abnormal liver and kidney functions.

Although toxic effects of most of the inhalants are believed to be transitory, some of these volatile substances present a severe health hazard. The most significant threat is what has been termed "*sudden sniffing death*" associated with the inhalation of aerosol fluorocarbons. These fluorocarbons increase the effect of the natural hormone, epinephrine (adrenaline), a heart stimulant. By increasing the effect of this hormone, erratic heart rates occur which may result in cardiac arrest and death. Other substances used such as benzene and carbon tetrachloride are highly toxic. Benzene can cause death when inhaled in high concentration and is believed to cause chromosome damage as well as leukemia. Carbon tetrachloride can cause death when inhaled in high concentration and also is suspected of causing liver and kidney damage.

Individuals who regularly inhale spray paint vapors or similar compounds run the risk of permanent brain damage. This damage, referred to as "*organic brain syndrome*," results in the inability to think, reason, remember, calculate, and engage in abstract thinking. Some of these products also dissolve the fatty protective layer around the nerves resulting in nerve damage which is irreversible. Simple neurologic acts became difficult for those with "*organic brain syndrome*."

Additional effects are: nausea, vomiting, loss of appetite, ringing in the ears, and abdominal pain or cramps. Severe damage can result to the kidneys and pregnant women abusing the inhalants have an increased risk of causing birth defects in the unborn child. Serious personality problems also result with previously stable individuals who become violent and aggressive with feelings of depression and suicide. There has not been an identifiable withdrawal pattern from the use of inhalants and at the present time these chemicals are considered not addictive.

As many of these chemicals and the fluorocarbons are either no longer used or their use is scheduled to end in commercial products, the problems associated with abuse will diminish or be eliminated. New compounds are being marketed as replacements for these abused volatile substances and their ability to produce intoxication or sudden death has not been measured.

NITRITE INHALANTS

The nitrites, *amyl*, *butyl*, and *isobutyl*, have been used medically for a long time. These substances dilate the blood vessels. Among the nitrites, *amyl nitrite* is the most potent and is often used in the treatment of angina. Because of the vasodilation action on the body, the nitrites have been sold in adult sex shops under a variety of names, including *Rush*, *Jock*, and *Belt*. As a group, they are called "poppers," being sold in small glass ampules which are broken under the nose and then inhaled.

When used, the nitrites cause dilation of the cerebral and coronary blood vessels producing a "rush," mild euphoria, and some distortion of time. Other changes experienced are a relaxation of smooth muscles and an increase in heart rate. Some individuals experience an increase of sexual feelings (libido) which may last up to 15 minutes depending on the amount used and the abuser's expectations of drug action. A large number of the individuals who use nitrites prefer *amyl nitrite* and frequently use it during sexual activity.

METHOD OF ABUSE

Volatile substances are abused by inhalation. In one method of use, the substances are sprayed on a piece of cloth and then placed to the mouth and nose and inhaled. Another method is to spray the inside of a bag, paper or plastic, to concentrate the fumes and then inhale using a deep breath.

STEROIDS

Steroids are naturally produced by endocrine glands which are part of a complex system that regulates important body functions. Steroids can be divided into three main groups: (1) the primary male sex hormones; (2) the primary female sex hormones; and (3) adrenal cortex steroids produced by both male and female. The abused steroids are normally synthetic derivatives of the male sex hormone *testosterone*. Both males and females naturally manufacture a certain amount of testosterone, but in the female, testosterone is not the predominate hormone. Testosterone controls several important body functions, which can be classified into two types of action: anabolic and androgenic. In its anabolic action, testosterone builds muscle mass, increases size of various organs, controls distribution of body fat, and increases protein synthesis. The androgenic action of testosterone promotes the growth male sex characteristics in both men and women. This includes such things as growth of male sex glands, deepening of the voice, and growth of body hair. Only anabolic steroids, or more properly, anabolic-androgenic steroids (AAS), are controlled substances.

The Anabolic Steroid Control Act of 1990 was effective February 27, 1991, and placed anabolic steroids into Schedule III of the Controlled Substances Act. The act legally defined anabolic steroids as any drug or hormonal substance that is chemically and pharmacologically related to testosterone. Steroids were placed into Schedule III because there is an accepted medical use but abuse may lead to low or moderate physical and/or high psychological dependence. Currently there are more than twenty different types of steroids, either oral or injectable, under control. Certain steroids manufactured for veterinary use in horses or beef cattle are also very popular with steroid abusers.

HISTORY OF STEROID ABUSE

While the abuse of steroids has received widespread attention in recent years, the use of drugs to enhance physical activity predates the ancient Greek Olympians. Modern use of enhancement drugs in athletics can be traced to the late 1940's and early 1950's. The most often cited account of the first known widespread usage of anabolic steroids is that of the Soviet weight lifting team in the early 1950's. At the 1954 world weight lifting championships in Vienna, the U.S. team physician, Dr. John Ziegler, was told by his Soviet counterpart that the Soviets were taking testosterone. Dr. Ziegler returned to the United States and began experimenting on himself and a few weight lifters with testosterone and other steroids. After several of these early users reached championship status, information on the benefits of these drugs spread by word of mouth to other strength-intensive sports and from there to the endurance sports such as long-distance running and swimming. Thus, was born anabolic steroid abuse; since then the use of steroids to build muscle mass has grown worldwide. Various performance enhancement drugs have been used by athletes over the years in order to get "that winning edge."

Due to the lack of satisfactory screening techniques, anabolic steroids were not banned by the IOC until 1975. At the 1976 Montreal Games, mandatory testing was initiated. With the increased usage of steroids by college athletes, the National Collegiate Athletic Association (NCAA) began testing for steroids at championship events and bowl games in 1986. As a note, in announced drug testing by the U.S. Olympic Committee from 1984 to 1988, less than 1% of the athletes tested "positive" for anabolic steroids. However, when unannounced drug tests were performed, with no punitive results for Olympic sports, approximately 50% of the athletes tested positive for anabolic steroids. Currently, there are more than 100 substances banned by the International Olympic Committee (IOC), including several anabolic-androgenic steroids and related compounds.

A contributing factor in the scheduling of anabolic steroids as a controlled substance was use by college, high school, and junior high school athletes for performance enhancement. At the time the act was passed, an estimated quarter million high school students were at risk. The effects of long-term steroid use are often irreversible and even more drastic in teenagers and young adults.

PHARMACOLOGY

Anabolic steroids are synthetic compounds similar in structure and effect to testosterone, a natural hormone produced by the endocrine glands. The difference between testosterone and the synthetic steroid is that the drug structure of the synthetic is manipulated to enhance the anabolic characteristics and minimize the androgenic effects. As with the use of any drug, synthetic steroids affect the body's natural functions. In the case of steroids, when the synthetic drug is introduced to the body, natural hormone production is affected, resulting in both physical and psychological effects to the user. When used over a long period of time, many of these effects are irreversible.

There are several legitimate medical uses for steroids. Among these are treatments of severe anemia, certain skin disorders, tissue wasting diseases, osteoporosis, and growth retardation in children. However, other medications and treatments are currently more popular for these conditions than steroids since these other drugs do not have the negative side effects.

Abusers of anabolic steroids tend to disregard the potential adverse effects. These users are looking for particular desired effects including increased muscle mass, speed, and strength, decreased recovery time, aggression, rapid healing in the event of injury, accelerated fat breakdown, increased lean body weight, and the psychological feeling of obtaining an edge on the competition. A high intake of anabolic steroids combined with intensive exercise will result in some of these effects such as increased body weight, lean muscle mass, and increased strength. However, steroid abusers will often self-administer quantities of these drugs in amounts 10 to 40 times the therapeutic dose in order to obtain these results. Unfortunately, the potential negative side effects of steroid abuse are many and outweigh any beneficial effect.

Use of anabolic steroids in high doses has been associated with physical and mental adverse effects. Some of the physical adverse effects are: premature closing of growth plates in users who have not attained full growth and thus limiting their adult height; cysts in the liver; high blood pressure; acne and baldness; in males, testicular atrophy, impotence, and development of feminine breasts. Female steroid abuse is also cause for concern as a small amount of these drugs can cause many masculine tendencies to occur such as increased muscle mass, menstrual irregularity, decreased breast size, increase the growth of facial and body hair, and deepening of the voice. In the case of injectable steroids, the user is also at risk for HIV (AIDS), hepatitis, or any other blood borne disease if the users share needles.

The mental effects of steroid abuse are considered as serious as the physical effects and include:

Addiction - Psychological addiction seems to develop to steroids in some users. The abuser becomes obsessed with the size of his or her body and realizes that their physique can be maintained only by continued steroid use.

Depression - This most often occurs when the user is "off cycle" or in a drug free period. When the body is not on artificial steroids, it returns to its natural abilities. Because the user feels less than perfect, depression sets in.

Paranoia - The user begins to doubt friendships and relationships. Also, since the user believes that all of the competitors are using steroids, use must continue to successfully compete.

Violence - While increased aggression is often sought after by the steroid user, this can turn to uncontrollable irritability and violent behavior, often termed "roid rage."

Mood Swings - Moods can range from euphoria to depression. The change in moods is most often associated with on-cycles (euphoria) and off-cycles (depression). These mood swings often interfere with social relationships.

Hallucinations - Some steroid abusers have reported auditory hallucinations.

STEROID ABUSER TERMINOLOGY

As with any drug culture, steroid users have a certain vocabulary. The following list is not considered to be all inclusive and terminology may vary among geographic areas and users.

Juice - Steroids, particularly injectable steroids.

Cycling - This refers to alternating steroid use and drug-free periods. This is done to enhance the anabolic effects of steroids during on-cycles, along with reducing the chance for detection at testing. A user will cycle on a steroid regimen in order to achieve optimum performance at competition.

Stacking - This refers to the use of two or more steroids at the same time in order to achieve optimum benefit.

Stacking the Pyramid - This is a method of use where there is a progressive increase in doses and types of steroids.

Shotgunning - The use of several different steroids at the same time.

Masking Agent - A drug taken to hide the presence of steroids.

"Roid Rage" - Steroid induced anger or violence.

Bigorexia - A strong desire to get larger even though the individual is already large. It is the opposite of anorexia.

STEROID SOURCES

There are four sources of anabolic steroids in the illicit market: counterfeit, diverted, clandestine, and smuggled.

Counterfeit steroids are products which are clandestinely manufactured, but have no active ingredient. Many of the "steroids" available on the street are simply vials of vegetable oil or other inactive liquid. Counterfeit tablets are also available composed strictly of binders and fillers, with no active steroid. Unfortunately, at this time there is no field test for steroids and positive identification is available only through laboratory testing.

Diverted steroids are pharmaceutically manufactured products which have been diverted from the legitimate market. Steroids may be diverted through doctors or pharmacists who provide the drugs illegally or stolen from the inventories of manufacturers and wholesalers. Prior to the passage of the Anabolic Steroid Control Act, diversion was a major source of steroids. However, with the passage of the law, diversion has drastically decreased due to the increased physical security and record keeping requirements imposed by law.

Some steroids available in the illicit market are clandestinely produced. Synthesis of active anabolic steroids is a difficult process and to date no manufacturing labs have been found in the United States. Instead, pharmaceutical bulk products, either liquid or powder, are obtained and clandestinely packaged. These packaging labs are difficult to detect because only minimal equipment is necessary and there are no chemical hazards or telltale odors often associated with clandestine laboratories.

Smuggling is a major source of steroids. Only the United States and a handful of other countries control anabolic steroids. Elsewhere steroids are available either over the counter or through prescription. Even when a prescription item, the control placed on steroids by these countries is minimal which enables the diversion from legitimate sources. The product is then

smuggled into the United States for distribution. It is often difficult to determine the exact source of illicit steroids without laboratory analysis. Many of the lab operators, both of counterfeit and clandestinely packaged steroids, go to great lengths to make their product look like the real thing. Pharmaceutically manufactured steroids are the drugs of choice and counterfeiters will copy the packaging of the legitimate manufacturers, including labels and package inserts. These illicit products can be so realistic that on one occasion a pharmaceutical steroid manufacturer accepted a return of a counterfeit shipment not realizing that it was not their own product.

TYPES OF ANABOLIC STEROIDS

Injectable

Nandrolone (Decadurabolin, Durabolin)
Methandrostenolone (Dianabol)
Methenolone (Primobolan)
Trenbolone (Parabolan)
Testosterone (Testosterone Cyprionate, Depo-Testosterone)

Tablets

Methandrostenolone (Dianabol)
Oxandrolone (Anavar)
Oxymetholone (Anadrol-50)
Methenolone (Primobolan)
Ethylestrenol (Maxibolan)

Veterinary Steroids

Boldenone (Equipoise)
Trenbolone (Finajet)
Stanozolol (Winstrol-V)
Mibolerone (Cheque)

For the above substances, the chemical name is listed first; the trade name(s) next.

DRUG ABUSE AND AIDS

In 1981, young homosexual men in New York and California were diagnosed with two rare diseases, *Kaposi's sarcoma* and *Pneumocystis carinii pneumonia*, not normally found in healthy individuals of their age group. Their immune systems were not functioning properly and thus began the age of AIDS (Acquired ImmunoDeficiency Syndrome), a modern day plague which at present has no cure nor a vaccine to prevent its spread. Since 1981, the number of HIV/AIDS patients has grown rapidly with over 700,000 diagnosed and over 400,000 deaths. Recent estimates from the Center for Disease Control estimate that approximately 1 in 100 Americans is HIV positive.

AIDS is a life-threatening disease process that results from severe damage to the body's immune system and is caused by the action of human immunodeficiency virus or HIV. HIV is a retrovirus which gradually destroys certain white cells in the blood (T-helper lymphocytes) which are responsible for the destruction of invading organisms. Once the body's immune system is rendered ineffective, numerous opportunistic infections which a healthy immune system can fight, begin to act on the human body. When the body is no longer able to resist these infections, the AIDS disease process begins.

HIV initiates an infection in the body in which outward signs and symptoms may take years to appear. Thus a person is capable of spreading the disease before it is apparent that he or she is infected (HIV positive). In over 50% of the cases, 10 years or more occurred between infection and onset of AIDS. With improved medical care and new drugs available to treat the various infections and attempt to stop the destruction of the immune system, survival time has been improved but still is only about 2 years.

Since the identification of AIDS as an infectious disease, studies have shown that HIV, the virus responsible for AIDS, is only transmitted by the passing of infected body fluids from one person to another. HIV cannot be transmitted by routine personal contact, other than sex, or by insects, food, water, inanimate objects, or other casual contact.

Substance abusers, especially those who inject any type of psychoactive drug, are at an extremely high risk for being infected with this disease and spreading it to others. Among IV drug users, transmission of HIV most often occurs by sharing needles and syringes ("outfit" or "works"). Small amounts of contaminated blood are left in the syringe, and as addicts do not normally clean their "equipment" and frequently share it, the virus is passed from user to user. IV users who visit "shooting galleries" where "equipment" is shared among several users, are at an especially high risk for HIV/AIDS. Needle exchange programs operating in many cities are one effort to slow the spread of the disease among the addict population. Recent estimates are that over 14% of all IV drug users are HIV positive with another 1.5% being infected each year. In New York City, 41% of all IV drug users are HIV positive.

The virus can also be transmitted through unprotected or unsafe sexual practices with someone who is infected. It is important to remember that an individual who is HIV infected does

not look different and may not even know he or she carries the virus. Non-IV drug users also are at risk for HIV/AIDS. Many individuals who are addicted to such drugs as crack, methamphetamine, etc. often will trade sex for money with which to support their addiction. Others who use alcohol or recreational drugs such as marijuana or flunitrazepam ("Roofies") often lose common sense and relax their restraint or behavior and engage in unsafe and unprotected sex when they would not normally do so.

Currently Washington D.C. has the highest HIV/AIDS rate among the US states and territories (185 cases per 100,000) with North Dakota the lowest (.8 per 100,000). By ethnic origins, African Americans had the highest rate of 92.6 cases per 100,000; Hispanics were 46.2, Caucasians 15.4, and Asians at 6.2. Following Washington D.C. was Puerto Rico, New York, Florida, and New Jersey in that order.

REFERENCES:

- Abadinsky, Howard. *Drug Abuse: An Introduction (2d Edition)*, Nelson-Hall Publishers, Chicago, 1993
- Anabolic Steroid Abuse, National Institute of Drug Abuse Research Monograph 102, 1990
- "A Special Report: ICE" (d-methamphetamine HCL), Drug Enforcement Administration, Office of Intelligence, October 1989
- "Answers To Common Questions About Marijuana", Drug Enforcement Administration Cannabis Investigation Section and Office of Public Affairs, 1993
- Brown, F. Christine, *Hallucinogenic Drugs*, Charles Thomas Publisher, Springfield, Illinois, 1972
- "Cannabis: A Select Primer for Law Enforcement Personnel", Drug Enforcement Administration 1987
- "Diagnostic and Statistical Manual of Mental Disorders (3d Edition Revised)", American Psychiatric Association, Washington D.C., 1987
- "Drug Recognition Expert Training Program", Los Angeles Police Department, Los Angeles, Ca.
- "Drug Use and Identification Study Guide", Rancho Santiago College, Santa Ana, Ca.
- "Drugs of Abuse 1996 Edition", Drug Enforcement Administration 1996
- Emboden, William, *Narcotic Plants*, Collier Books, New York, 1979
- Inaba, Darryl S. and Cohen, William S. *Uppers, Downers, All Arounders (2d Ed)*. CNS Productions Inc., Ashland, Or., 1993
- Inciardi, James. *The War On Drugs II: The Continuing Epic of Heroin, Cocaine, Crack, Crime, AIDS, and Public Policy*, Mayfield Publishing Co, Mountain View, Ca., 1992
- Linder, Ronald L., Lerner, Steven E., and Burns, R. Stanley. *PCP: The Devil's Dust Recognition, Management and Prevention of Phencyclidine Abuse*, Wadsworth Publishing Co., Belmont, Ca., 1981
- "Marijuana and Health-Ninth Report to the U.S. Congress", Secretary of Health and Human Services, NIDA, 1982
- "Marihuana Under The Microscope" (Reprint from Drug Enforcement Magazine), Drug Enforcement Administration, March 1980
- McAdams, Mary T., Linder, Ronald L., Lerner, Steven E., Burns, Richard S., *Phencyclidine Abuse Manual*, University of California Extension, Los Angeles and State of California Department of Alcohol and Drug Abuse, 1980
- "Methamphetamines" The Haight Ashbury Training Series, 1990
- Miller, Gary J. *Drugs and the Law: Detection, Recognition, and Investigation*, Gould Publications, Florida, 1992
- Novak, Allen and STASH Staff, "The Deliberate Inhalation of Volatile Substances", Journal of Psychedelic Drugs, Vol 12, No 2., April-June 1980

Oglesby, E. W., Faber, Samuel J., and Faber, Stuart J. *Angel Dust: What Everyone Should Know About PCP*, Lega Books, Los Angeles, Ca., 1979

Ray, Oakley and Ksir, Charles. *Drugs, Society, and Human Behavior (7th Ed)*, Times Mirror/Mosby, St. Louis 1996

Seymour, Richard B., "MDMA: Another View of Ecstasy", *Pharmchem Newsletter*, Vol 14, No 3., May-June 1985

Spence, W. R. "Pumping Trouble: The Problem of Steriod Use", M.D. Heath Edco, Waco, Tx, 1991

Staten, Clark., "Waiting to Exhale", *Emergency Medical Services*, Vol 25, No 5, May 1996

Tennant Jr., Forest S. *Identifying the PCP User (Phencyclidine)*, Veract Inc, West Covina, Ca., 1985

"The Identification and Control of Drugs in Correctional Institutions", State of California Department of Corrections