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***Review Paper***

# Illicit Drugs and their Assessment: A Brief Review

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## Abstract

*A lot of drug abuse treatment centers and health care providers have implemented special education programs for individuals who inject illicit drugs. The recent reports conclude that drug abuse is on the rise. These drugs are moving into a mainstream category and are being used as frequently as drinking beer. The purpose of this article is to provide a brief outline on the assessment of these types of illicit drugs. Besides this it envisages specific drug classes like stimulants, sedatives, inhalants, Narcotic agents, Central Nervous System Stimulants etc., their unpleasant effects and structures.*

**Keywords:** Illicit drugs, drug abuse, narcotic agents, central nervous system stimulants, psychomimetic agents.

## Introduction

Research involving the administration of abused drugs to humans has a long and scientifically productive history[1]. It has been responsible for a number of important discoveries that have significantly improved our ability to influence the drug abuse problem. At the basic research level, it has enhanced our understanding of the behavioral, pharmacological, and physiological mechanisms that underlie drug abuse. These include mechanisms responsible for drug intoxication, tolerance, reinforcement, dependence and withdrawal. It has also contributed significantly to the discovery of specific brain areas that mediate drug euphoria and craving and to the identification of risk factors that are responsible for individual differences in drug abuse vulnerability[2].

Among the women in drug treatment, alarmingly high rates of exposure to physical and sexual abuse are reported. Some studies demonstrate that up to half of them have experienced abuse at same time in their lives[3-8] compared to about one third of women in the general population[9,10]. According to the Regulations on Prohibition against Narcotics, approved by the Standing Committee of the National People's Congress in 1990, three levels of lawful penalty can be applied to illicit drug users. First-time drug users may be fined and/or placed in detention at local jails for up to 15 days. Those who use illicit drugs regularly and develop drug dependence are placed in residential compulsory rehabilitation centers for 1–6 months for detoxification[11].

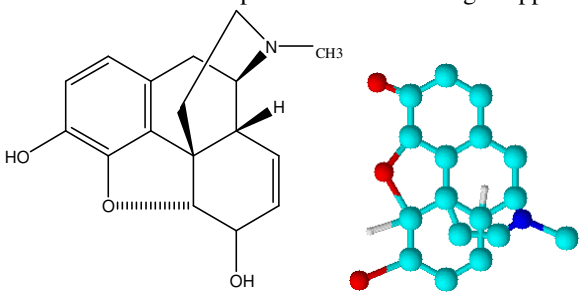
Most important problem facing because of illicit drugs are terrorism, wars, safety, economic issues, environmental issues, Health (drugs and drug abuse), Social issues, Government and human issues.

Most striking perhaps is that the declining trends appear to be most pronounced in younger School-age groups. The recent cannabis use among the school students has halved since 1996 and similarly European trends indicate stable or decreasing cannabis use among 15-year-old school students in most EU countries since the early 2000's (figure 1)[12].

## Narcotic Agents: Narcotic Analgesic Drugs and Narcotic Antagonists

The term narcotic originally referred medically to any psychoactive compound with sleep-inducing properties. In the United States of America it has since become associated with opioids, commonly morphine and heroin. The term is, today, imprecisely defined and typically has negative connotations[13].

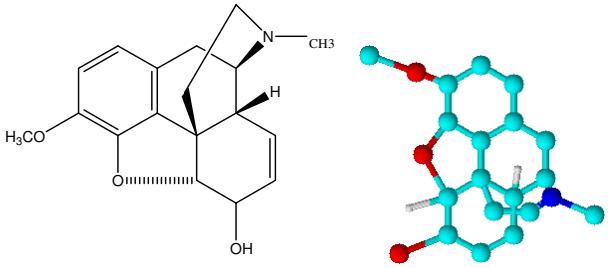
**Morphine:** Morphine exerts a narcotic action manifested by analgesia, drowsiness, changes in mood, and mental clouding. The major medical action of morphine sought in the CNS is analgesia. Opiates suppress the "cough center" which is also located in the brainstem, the medulla. Such an action is thought to underlie the use of opiate narcotics as cough suppressants.




***Morphine***

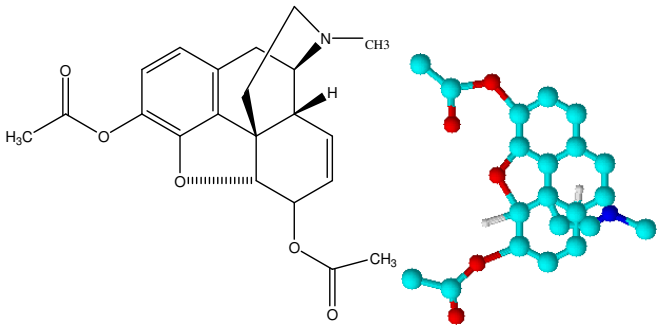
**Codeine:** Codeine appears to be particularly effective in this action and is widely used for this purpose. Narcotic analgesics

cause an addictive physical dependence. If the drug is discontinued, withdrawal symptoms are experienced.




**Codeine**

**Heroin:** Heroin is synthesized from morphine by a relatively simple esterification reaction of two alcohol (phenol) groups with acetic anhydride (equivalent to acetic acid). Heroin is much more potent than morphine but without the respiratory depression effect. A possible reason may be that heroin passes the blood-brain barrier much more rapidly than morphine.




***Heroin***

According to US Government at international level in 2005 and 2009, different Heroin producer countries (in Metric Tons) were Afghanistan, Burma, Columbia, Laos, Maxico and Pakistan. The production rate of heroin was found maximum in Afghanistan during year 2005 and 2009. In the two new countries Columbia and Laos the heroin production was almost same in both the years. The production of heroin in Pakistan was nil in 2009 compared to 2005. (figure 2).

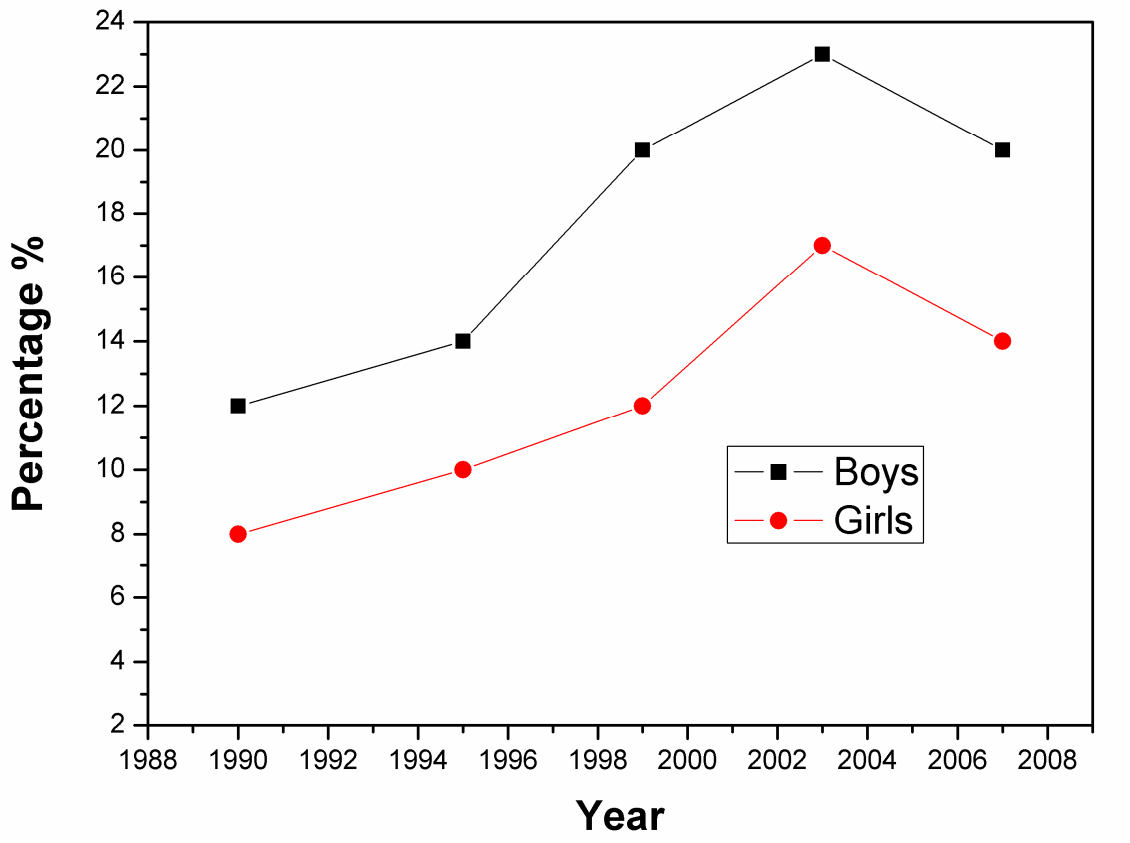



**Figure-1**
**Lifetime use of cannabis by gender 1995-2007, percentage averages for 20 European countries**

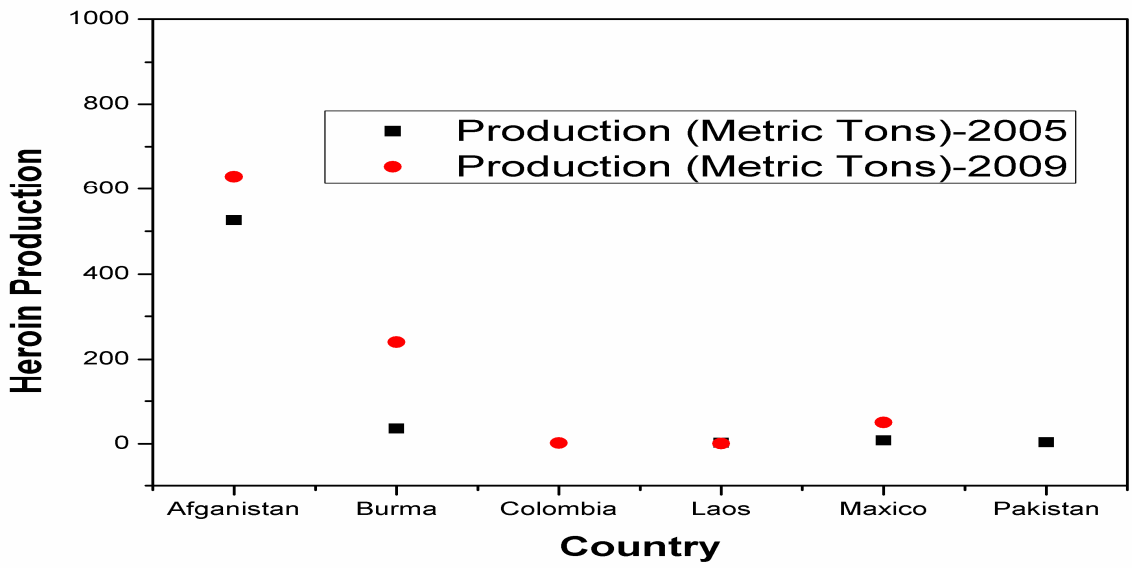
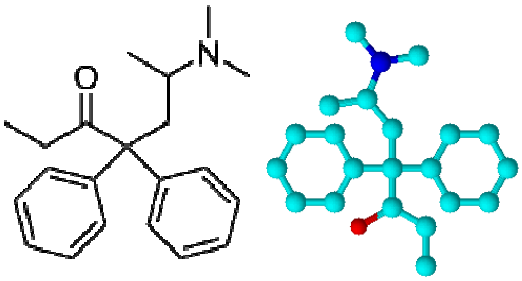


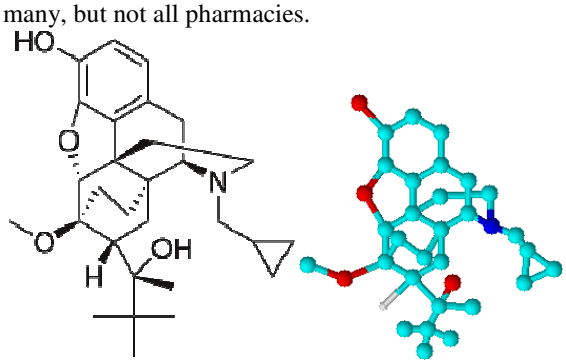

**Figure-2**
**Heroin Production in Metric Tons in 2005 and 2009**

**Methadone:** Methadone is more active and more toxic than morphine. It can be used for the relief of many types of pain. In addition it is used as a narcotic substitute in addiction treatment because it prevents morphine abstinence syndrome.




**Methadone**

**Buprenorphine:** Buprenorphine, an analgesic originally used as iv for pre/post surgical analgesia and related, was approved not many years ago for opiate addiction treatment (brand names Subutex and, with naxolone added to help reduce iv abuse, Suboxone. It is provided as a sublingual tablet, available at many, but not all pharmacies.

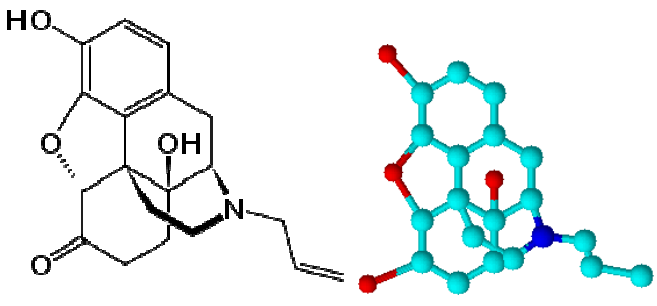



***Buprenorphine***

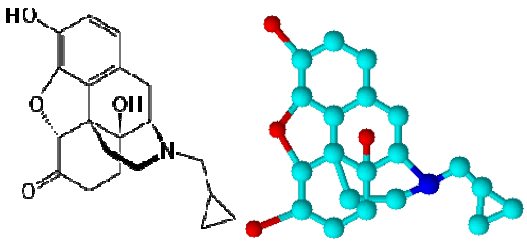
**Naloxone and Naltrexone:** Nalorphine precipitates withdrawal symptoms and produces behavioral disturbances in addition to the antogonism action. Naloxane is a pure antagonist with no morphine like effects. It blocks the euphoric effect of heroin when given before heroin.

Naltrexone became clinically available in 1985 as a new narcotic antagonist. Its actions resemble those of naloxone, but naltrexone is well absorbed orally and is long acting, necessitating only a dose of 50 to 100 mg. Therefore, it is useful in narcotic treatment programs where it is desired to maintain an individual on chronic therapy with a narcotic antagonist.

In individuals taking naltrexone, subsequent injection of an opiate will produce little or no effect. Naltrexone appears to be particularly effective for the treatment of narcotic dependence in addicts who have more to gain by being drug-free rather than drug dependant.




***Naloxone***




***Naltrexone***

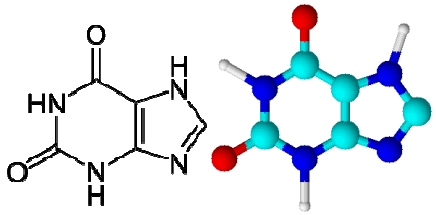
## Central Nervous System Stimulants

Stimulants (also called psychostimulants) are psychoactive drugs which induce temporary improvements in either mental or physical function or both. Examples of these kinds of effects may include enhanced alertness, wakefulness, and locomotion, among others. Due to their effects typically having an "up" quality to them, stimulants are also occasionally referred to as "uppers". Depressants or "downers", which decrease mental and/or physical function, are in stark contrast to stimulants and are considered to be their functional opposites. Stimulants are widely used throughout the world as prescription medicines and as illicit substances of recreational use or abuse.

Stimulants (Analeptics) produce a variety of different kinds of effects by enhancing the activity of the central and peripheral nervous systems. Common effects, which vary depending on the substance in question, may include enhanced alertness, awareness, wakefulness, endurance, productivity, and motivation, increased arousal, locomotion, heart rate, and blood pressure, and the perception of a diminished requirement for food and sleep. Many stimulants are also capable of improving mood and relieving anxiety, and some can even induce feelings of euphoria.

It should be noted, however, that many of these drugs are also capable of causing anxiety and heart failure, even the ones that may paradoxically reduce it to a degree at the same time. Stimulants exert their effects through a number of different pharmacological mechanisms, the most prominent of which include facilitation of norepinephrine (noradrenaline) and/or dopamine activity (e.g., via monoamine transporter inhibition or reversal), adenosine receptor antagonism, and nicotinic acetylcholine receptor agonism.

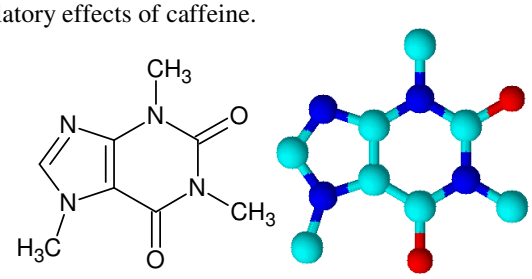
**Xanthines:** Xanthine (3,7-dihydro-purine-2,6-dione), is a purine base found in most human body tissues and fluids and in other organisms. A number of mild stimulants are derived from xanthine. Derivatives of xanthine, known collectively as xanthines, are a group of alkaloids commonly used for their effects as mild stimulants and as bronchodilators, notably in treating the symptoms of asthma. In contrast to other, more potent stimulants, they only inhibit the actions of sleepiness-inducing adenosine, making them somewhat less effective as stimulants than sympathomimetic amines.




***Xanthines***

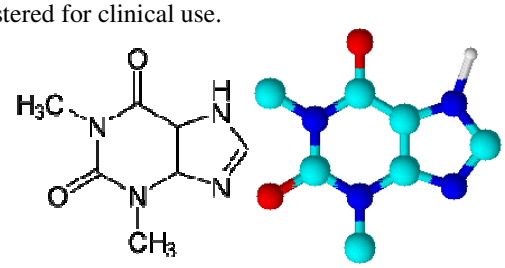
Due to widespread effects, the therapeutic range of xanthines is narrow, making them merely a second-line asthma treatment. The therapeutic level is 10-20 micrograms/mL blood; signs of toxicity include tremor, nausea, nervousness, and tachycardia/arrhythmia.

**Caffeine:** The action of caffeine is to block adenosine receptors as an antagonist. As caffeine has a similar structure to the adenosine group. This means that caffeine will fit adenosine receptors as well as adenosine itself. It inhibits the release of neurotransmitters from presynaptic sites but works in concert with norepinephrine or angiotensin to augment their actions. Antagonism of adenosine receptors by caffeine would appear to promote neurotransmitter release, thus explaining the stimulatory effects of caffeine.




***Caffeine***

**Theophylline:** Theophylline, also known as dimethylxanthine, is a methylxanthine drug used in therapy for respiratory diseases such as COPD and asthma under a variety of brand names. Because of its numerous side-effects, the drug is now rarely administered for clinical use.




***Theophylline***

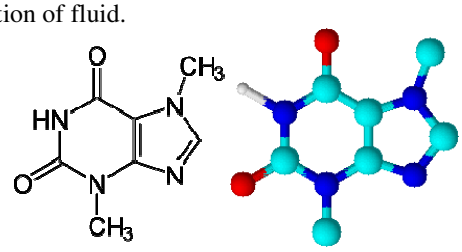
The main actions of theophylline involve: i. Relaxing bronchial smooth muscle, ii. Increasing heart muscle contractility and efficiency; as a positive inotropy, iii. Increasing heart rate: positive chronotropy, iv. Increasing blood pressure, v. Increasing renal blood flow, vi. Some anti-inflammatory effects, vii. Central nervous system stimulatory effect mainly on the medullary respiratory center.

**Theobromine:** Theobromine, also known as xantheose, is a bitter alkaloid of the cacao plant, found in chocolate, as well as in a number of other foods, including the leaves of the tea plant, and the kola or cola nut. It is in the methylxanthine class of chemical compounds.

The amount of theobromine found in chocolate is small enough that chocolate can, in general, be safely consumed by humans. However, theobromine poisoning may result from the chronic or acute consumption of large quantities, especially in the elderly[14].

While theobromine and caffeine are similar in that they are related alkaloids, theobromine is weaker in both its inhibition of cyclic nucleotide phosphodiesterases and its antagonism of adenosine receptors[15]. Therefore, theobromine has a lesser impact on the human central nervous system than caffeine. However, theobromine stimulates the heart to a greater degree[16]. While theobromine is not as addictive, it has been cited as possibly causing addiction to chocolate[17]. Theobromine has also been identified as one of the compounds contributing to chocolate's reputed role as an aphrodisiac[18].

As it is a myocardial stimulant as well as a vasodilator, it increases heartbeat, yet it also dilates blood vessels, causing a reduced blood pressure[19]. However, a recent paper published suggested that the decrease in blood pressure may be caused by flavanols[20]. Furthermore, its draining effect allows it to be used to treat cardiac failure, which can be caused by an excessive accumulation of fluid.




***Theobromine***

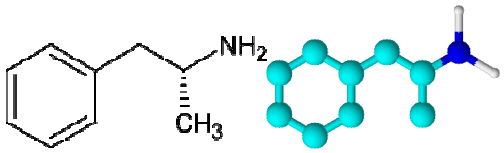
**Amphetamines: Levoamphetamine (Benzedrine) and Dextroamphetamine (Dexedrine):** Amphetamine (USAN) or amfetamine (INN) is a psychostimulant drug of the phenethylamine class that is known to produce increased wakefulness and focus in association with decreased fatigue and appetite. Amphetamine is chemically related to methamphetamine and lisdexamfetamine, a class of potent drugs that act by increasing levels of dopamine and norepinephrine in the brain, inducing euphoria [21,22]. The class includes prescription CNS drugs commonly used to treat attention-deficit hyperactivity disorder (ADHD).

It is also used to treat symptoms of traumatic brain injury (TBI) and the daytime drowsiness symptoms of narcolepsy, postural orthostatic tachycardia syndrome (POTS) and chronic fatigue syndrome (CFS). Initially, amphetamine was more popularly used to diminish the appetite and to control weight.

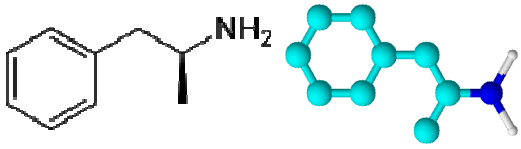
Physical effects of dextroamphetamine can include anorexia, hyperactivity, dilated pupils, blood shot eyes, flushing, restlessness, dry mouth, bruxism, headache, tachycardia, bradycardia, tachypnea, hypertension, hypotension, fever, diaphoresis, diarrhea, constipation, blurred vision, aphasia, dizziness, twitching, insomnia, numbness, palpitations, arrhythmias, tremors, dry and/or itchy skin, acne, pallor, convulsions, and with chronic and/or high doses, seizure, stroke, coma, heart attack and death can occur[23,24,25].

**Methamphetamine (Methedrine):** Methamphetamine is illicitly synthesized and then sold in a crystalline form resembling small shards of odorless, bitter-tasting crystals; leading to the colloquial nickname "crystal meth". Following a period of heavy use, also known as "binging", which typically last days or even weeks, a severe withdrawal syndrome lasting up to 10 days can occur, primarily consisting of depression, fatigue, excessive sleeping and an increased appetite. Chronic methamphetamine abuse may result in prolonged psychiatric disorders, cognitive impairment, as well as an increased risk of developing Parkinson's disease.

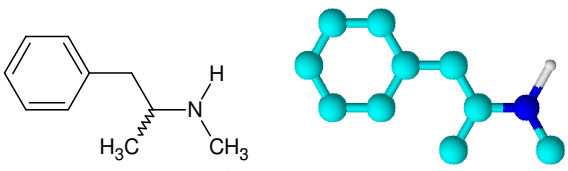
As a result of methamphetamine-induced neurotoxicity to dopaminergic neurons, chronic abuse may also lead to withdrawal symptoms which persist beyond the withdrawal period for months, and even up to a year[26]. Research has found that 20% of methamphetamine addicts experience a psychosis resembling schizophrenia which persists for longer than six months post-methamphetamine use; this amphetamine psychosis can be resistant to traditional treatment[27]. In addition to psychological harm, physical harm, primarily consisting of cardiovascular damage, may occur with chronic abuse or acute overdose[28, 29].




***Levoamphetamine***

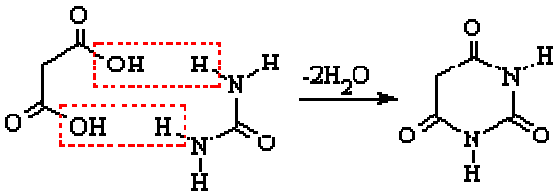



***Dextroamphetamine***

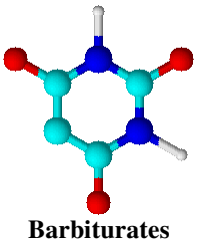



***Methamphetamine***

**Barbiturates:** Barbiturates produce a wide spectrum of effects, from mild sedation to total anesthesia. They are also effective as anxiolytics, as hypnotics, and as anticonvulsants. They have addiction potential, both physical and psychological. Barbiturates have now largely been replaced by benzodiazepines in routine medical practice - for example, in the treatment of anxiety and insomnia – mainly because benzodiazepines are significantly less dangerous in overdose. However, barbiturates are still used in general anesthesia, as well as for epilepsy. Barbiturates are derivatives of barbituric acid.




**Barbituric Acid (Malonylurea)**



**Barbiturates**

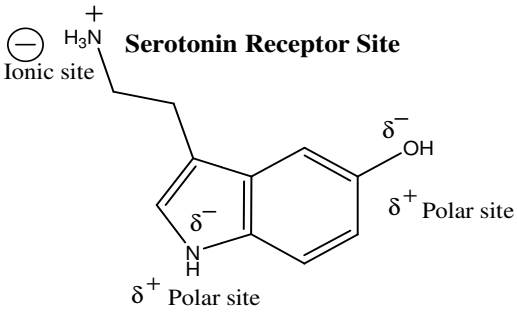
## Psychomimetic agents: Hallucinogenic Drugs

Hallucinogenic agents, also called psychomimetic agents, are capable of producing hallucinations, sensory illusions and bizarre thoughts. The primary effect of these compounds is to consistently alter thought and sensory perceptions. Some of these drugs are used in medicine to produce model psychoses as aids in psychotherapy. Another purpose is to investigate the relationship of mind, brain, and biochemistry with the purpose of elucidating mental diseases such as schizophrenia.

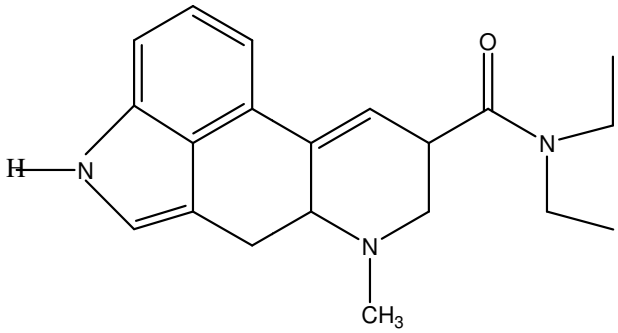
**Serotonin:** Serotonin (5-hydroxytryptamine or 5-HT) a monoamine neurotransmitter found in cardiovascular tissue, in endothelial cells, in blood cells, and in the central nervous system. The role of serotonin in neurological function is diverse, and there is little doubt that serotonin is an important CNS neurotransmitter.

**Mescalin and Psilocybin:** Mescaline is isolated from a peyote cactus. The natives of Central America first made use of these drugs in religious ceremonies, believing the vivid, colorful hallucinations had religious significance. The Aztecs even had professional mystics and prophets who achieved their inspiration by eating the mescaline-containing peyote cactus (Lophophora williamsii). Indeed, the cactus was so important to the Aztecs that they named it teo-nancacyl, or "God's Flesh". This plant was said to have been distributed to the guests at the coronation of Montezuma to make the ceremony seem even more spectacular.

**LSD (lysergic acid diethylamide):** LSD stimulates centers of the sympathetic nervous system in the midbrain, which leads to pupillary dilation, increase in body temperature, and rise in the blood-sugar level. LSD also has a serotonin-blocking effect[30].




**Serotonin**



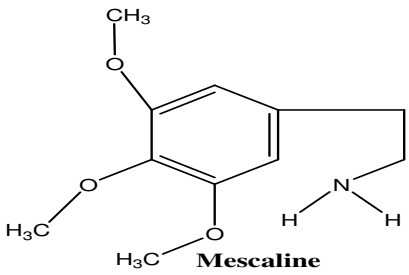

**LSD- Lysergic Acid Diethylamide**

## Conclusion

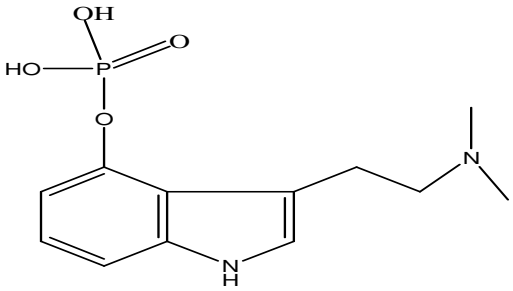
In conclusion, Narcotic Agents, Central Nervous System Stimulants and Psychomimetic agents are all extremely addicting and cause dependency over short and long periods of time. Teens need to ask themselves before taking drugs if a "thirty minute high" is worth (in some cases) the rest of their life. It is proven that drugs do kill and if not, cause permanent damage to our body and brain. Our brain is affected by drugs immediately and in most cases leaves permanent damage. Long-term use may result in changes in brain function that last long after the person stops using drugs. The withdrawal symptoms may last for months or even a year.

Some illicit drugs when withdrawn may produce psychosis resembling schizophrenia which may last up to six months. Unfortunately with illicit drugs such as cocaine and heroin, there is no place for a "warning" label. It is very likely that patterns and persistence of illicit drug use will change over the next decades as a generation used to the casual or compulsive consumption of illicit substances enters the later stage of life.

Much more research will need to be done, but geriatricians and physicians serving the now older baby boomers need to be aware of the hazards that are posed by the ongoing use of illicit drugs in the older adult population. The only way drug use will go down is with increased education and programs and implement these effectively.




**Mescaline**




**Psilocybin**

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