

New Trends in Substance Abuse

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Indicators of Drug or Alcohol Abuse or Misuse:

Behavioral

- Abnormal behavior
- Exaggerated behavior
- Boisterous or argumentative
- Withdrawn
- Avoidance
- Changing emotions & erratic behavior

Speech

- Slurred or slow speech
- Nonsensical patterns
- Confusion
- Impaired driving ability

Physical

- Breath or body odor
- Lack of coordination
- Uncoordinated & unsteady gait
- Unnecessary use of arms or supports for balance
- Sweating and/or dry mouth
- Change in appearance

Performance

- Inability to concentrate
- Fatigue & lack of motivation
- Slowed reactions

The physiologic factors predisposing to addiction

Nearly every addictive drug targets the brain's reward system by flooding the circuit with the neurotransmitter, dopamine. Neurotransmitters are necessary to transfer impulses from one brain cell to another. The brain adapts to the overwhelming surges in dopamine by ultimately producing less dopamine and by reducing the number of dopamine receptors in the reward circuit. As a result, two important physiologic adaptations occur: (1) the addict's ability to enjoy the things that previously brought pleasure is impaired because of decreased dopamine, and (2) higher and higher doses of the abused drug are needed to achieve the same "high" that occurred when the drug was first used. This compels the addict to increase drug consumption to increase dopamine production leading to physiologic addiction with more and more intense cravings for the drug.

The effects of addiction on the brain

Nearly all substances of abuse affect the activity of neurotransmitters that play an important role in connecting one brain cell to another. Interruption of this process may result in:

- Delayed maturation and development of the immature brain (brain development continues to about age 25 years)
- Cognitive impairment with learning problems and limited or decreasing IQ
- Behavioral disorders, including aggression, impulsive behavior, and a variety of mental health problems

ALCOHOL ABUSE

Alcohol affects vision, judgment, reaction time, and memory. The effects of alcohol vary from person to person, some become quiet or depressed while others become aggressive and argumentative. Long-term users can develop tolerance. The physical signs of misuse may not be easily identified. Alcohol in the blood rapidly enters every organ and every cell. It directly affects the brain and is most toxic to the developing adolescent brain. The toxic metabolic byproduct of ethanol, acetaldehyde, can be found in the brain. Acetaldehyde damages brain cells, affecting the function of these cells and resulting in cell injury or cell death.

Alcohol intoxication is the primary contributor to motor vehicle accidents (the leading cause of adolescent death) and is associated with suicide attempts, depression, anxiety, mood disorders, and ADHD. Alcohol use at an early age is a strong predictor of future alcohol-related problems. Early age use of alcohol is also associated with greater sexual risk taking, academic problems, other substance abuse, and delinquent behavior. Binge drinking is becoming more common among teens and college students. Binge drinking is particularly dangerous because of the risk of alcohol poisoning leading to suppressed gag reflex, depressed respiratory rate, and death.

Indicators for Alcohol:

- Difficulty in recalling instructions
 - Shortened attention span
 - Thick, slurred speech
 - Sluggish, sleepy
 - Slowed reactions
 - Uncoordinated & unsteady gait
 - Faulty judgment
 - Lack of coordination
 - Greatly impaired driving ability
- ❖ **(Hangover indicators)** headaches, nausea, dehydration, unclear thinking, unsettled digestion, aching muscles, slow moving, unmotivated

New trends in consuming alcohol

Alcohol-containing candy

A trick popular with teens is to soak Gummy Bears or Worms in alcohol. Vodka and Everclear have less alcohol odor than other alcohols and are favored. The Bears or Worms are placed in a dish and covered with alcohol. They absorb all the liquid. The candies are initially sticky and look the same as untreated candy. They are then eaten as ordinary candy - only with a buzz!

Tampon dipping and "butt-chugging"

A new craze at high school and college campus parties is "butt-chugging" which requires a device for giving an alcohol enema. The mucosal absorption of ethanol leads to rapid intoxication without producing a significant breath-odor of alcohol. "Tampon dipping" (tampons soaked in vodka) is another craze with similar results and are used by both men (rectal insertion) and women (vaginal insertion). Both can cause extremely high Blood Alcohol Content.

Vaporization

A new device, Alcohol Without Liquid (AWOL), is becoming popular. The device vaporizes alcohol so that it may be inhaled. The AWOL device consists of two components: an oxygen generator and a hand-held vaporizer. Tubes from the generator attach to the vaporizer. Alcohol (typically vodka) is poured into the vaporizer and mixes with oxygen producing an alcohol-mist. The mist is inhaled resulting in rapid absorption of alcohol from the lungs and immediate intoxication. Vaporization causes very high blood alcohol content much quicker than drinking alcohol does, thus making it more dangerous.

Teens may make their own AWOL device using a plastic bottle, plastic or rubber tubing and a hand held air pump. A hole is put in the lid of a 1-2 liter bottle. An inflation-pin typically used for inflating basketballs is inserted through the hole in the lid. About a half a cup of Vodka or some other type of alcohol is poured into the bottle. A tire pump is connected to the pin and air is pumped into the bottle until the bottle is firm. The pump is pulled; causing a pressure change in the bottle and the liquid is converted into vapors and is then inhaled through the hole in the lid. The user quickly becomes intoxicated. A small air compressor can also be used.

Hand Sanitizers

Drinking hand sanitizers is popular. The gelling agents are "salted out" by adding a pinch of table salt to the bottle of hand sanitizer. The gelling agent precipitates out and the clear liquid is then decanted, and consumed. Once separated, the alcohol can be anywhere from 120-170 proof, thus getting one drunk rather fast. The ethanol in hand sanitizers may be adulterated (denatured) with chemicals, isopropyl alcohol, or methyl alcohol, all of which may pose significant medical hazards if ingested. The label on the hand sanitizer may not always indicate if these other types of alcohol have been added, or how much has been added.

Alcohol consumed with other drugs

In an attempt to get more “high” or to experience a longer lasting “high” users may mix alcohol with other substances. Combination use is most common among adolescents and college-age students.

Alcohol and caffeine

Abuse of the combination of alcohol and caffeine is dangerous and may be deadly. Commercially available energy drinks with 12% alcohol are sold in liquor stores and are showing up at teen parties. These drinks are sold in bright colored cans and marketed to underage drinkers. Brand names include Four Loko, Joose, Jilt, and Tilt. Alcohol may be mixed with high-caffeine energy drinks (i.e. Amp & Everclear, Jager & Redbull) to achieve the same effects. Caffeine masks the effects of alcohol and the user keeps drinking, often until he/she passes-out. Recently, a caffeine-containing inhaler (Aero Shots) has hit the market and is being used in combination with alcohol.

Alcohol and Adderall (ADDYS)

The combination of Adderall and alcohol is often described as a “safe” replacement to cocaine and alcohol but combining these may have deadly consequences. Many people are using this mixture as a party drug cocktail that allows them to extend their partying. People will snort or smoke the pills to get “high” quicker. Adderall acts as a stimulant to people who do not suffer from attention disorders and counteracts the depressive effects of alcohol. When Adderall and alcohol are combined, a number of things happen. Because Adderall masks the depressive feelings induced by alcohol, many users drink excessive amounts of alcohol resulting in physical harm. Prolonged use of this drug cocktail can lead to paranoia, anxiety, and severe depression. Physically, it can cause nausea, vomiting, weight loss, heart palpitations, and headaches. If used over a long period of time, users may experience convulsions, irregular heartbeats, fevers, malnutrition, tremors, and muscle twitching.

Alcohol Withdrawal

Withdrawal may occur in chronic users and in binge drinkers. Common symptoms are headache, nausea and vomiting, sweating and hypertension. In more severe cases, confusion, hallucinations, delirium tremors (DT's), and seizures may occur. DT's are particularly dangerous. The death rate is 5% in treated individuals and 35% if untreated.

Effects on the fetus, infant, and children: Fetal Alcohol Syndrome (FAS)

Fetal alcohol syndrome is a cluster of related problems and birth defects that result from a women's use of alcohol during pregnancy. In the US, it is one of the leading causes of birth defects and the most common cause of preventable mental retardation. Each year 5,000 to 15,000 babies are born with this condition. Signs of FAS include:

- Distinctive facial feature
- Heart defects
- Deformities of joints, limbs and fingers
- Slow growth before and after birth, small head size
- Vision and hearing problems
- Mental retardation and delayed development,
- Hyperactivity, poor impulse control, short attention span

Because there is no known safe amount of alcohol to drink, women should not drink if they are pregnant or trying to get pregnant. Women who drink 4-5 alcoholic drinks/day greatly increase the risk of FAS. A woman who drinks only lightly or occasionally before she realizes she is pregnant might or might not harm the developing baby. There is no cure or specific treatment for FAS.

Powdered Caffeine

Caffeine occurs naturally in over 60 plants, like tea, coffee beans, and cacao. However, Pharmaceutical grade powdered caffeine has hit the streets in the US, and is extremely dangerous. This powder is 100% pure, and the FDA is warning consumers to avoid these products. The FDA is particularly concerned about the pure powder being sold on the internet. For about \$10, people can purchase 100,000 milligrams (100 grams) of pure caffeine powder online. This equals the caffeine found in 1,000 cans of Red Bull in one packet. It is marketed online to help you wake up and boost your energy. It is being glamorized to youth on YouTube as many videos promoting its benefits are available for viewing.

Pure caffeine is a very strong stimulant and small amounts can quickly cause an overdose. A serving size is listed as 1/16 of a teaspoon = 200mg of caffeine and ¼ teaspoon = 756mg of caffeine. It is very hard to accurately measure pure powdered caffeine with common kitchen utensils so users can easily consume lethal amounts. Symptoms of caffeine toxicity can include vomiting, diarrhea, rapid or dangerously erratic heartbeat, stupor, disorientation, seizures, and death. The symptoms of caffeine overdose are much more severe than symptoms from drinking too much, coffee, tea or soda. Multiple deaths have occurred, as well as an increase in ER visits across the nation.

Caffeine powder is being marketed as a dietary supplement and is unregulated, unlike the caffeine added to soda is. The FDA doesn't have the legal authority to just remove such substances off the shelves; so the agency is building a legal case against companies who are marketing it in bulk in an attempt to persuade them to stop.

Hookah and E-cigarettes

Hookah originated in Persia and India many centuries ago and is known as narghile, argileh, shisha, hubble-bubble, and goza. Hookah is the water pipe used to smoke flavored tobacco (shisha), other "non-tobacco" herbal substances, and liquids such as E-drops, E-liquid, or E-juice.

Smoking hookah (flavored tobacco) is not a safer alternative to cigarette smoking. Tobacco isn't less toxic when you put it in a water pipe, and it still contains nicotine. Flavored tobacco carries all the same health risks and cancer causing agents that cigarette smoking causes. Many studies suggest Hookah smoking may be more dangerous than cigarette smoking because of the amount of smoke inhaled. A typical hour hookah smoking session can involve 200 puffs, about 90,000 ml of smoke being inhaled, compared to about 20 puff or 500-600 ml of cigarette smoke inhaled. Hookah pipes used in hookah bars and cafes may not be cleaned properly, risking the spread of infectious diseases as well.

According to studies by the American Lung association, Hookah smokers may be at risk for some of the same diseases as cigarette smokers. These include:

- Oral cancer
- Lung cancer
- Stomach cancer
- Cancer of the esophagus
- Reduced lung function
- Decreased fertility

Carbon monoxide, a chemical in tobacco has long been linked to heart disease. There is an increased concern about health risks as the charcoal used to heat the hookah products releases large amounts of carbon monoxide, metals and cancer causing agents. Studies now show that tobacco-based shisha and "herbal" shisha show that smoke from both preparations contain carbon monoxide and other toxic agents known to increase the risks for smoking-related cancers, heart disease, and lung disease. (Shihadeh A, Food and Chemical Toxicology 2012;50(5):1494–8).

Secondhand smoke from hookahs poses a serious risk for nonsmokers; it contains smoke not only from the tobacco but also from the charcoal. Hookah smoke contains high levels of toxic compounds, including tar, carbon monoxide, heavy metals, and cancer-causing chemicals (carcinogens).

New forms of electronic smoking, hookah pens and E-cigarettes, are becoming very popular. These products are filled with liquids such as E-drops, E-liquid, or E-juice, battery powered to convert the liquid to a vapor that resembles cigarette smoke, which is then inhaled. These liquids contain nicotine, flavorings, and other chemicals. Many labels and ads for these products often claim that users can enjoy the same taste without the harmful effects of tobacco. This is not true, there are no studies showing that E-cigarettes or hookah pens are a safer alternatives to cigarettes. When the FDA analyzed samples of two popular brands, they found variable amounts of nicotine and traces of toxic chemicals and metals, including known cancer-causing substances (carcinogens). The World Health Organization (WHO) states that as of July 2013, they recommend that "consumers should be strongly advised not to use" electronic cigarettes until a reputable national regulatory body has found them safe and effective. Many states have banned the use and sale of E-cigarettes over the last few years.

Many of these products come from China and other countries. The US government does not regulate, test, or monitor any chemicals put in them. It is important to read the labels as some contain only water, others contain nicotine, some contain chemicals that mimic the effects of nicotine, and some contain propylene glycol (antifreeze family). Propylene glycol is used to create a thicker smoke, and thus mimics cigarette smoking. Hazards of smoking large amounts of propylene glycol are not known. Propylene glycol is considered safe to consume in small quantities by the Food and Drug Administration (FDA), but little long term data on it when in vapor form in the lungs. Early studies are saying it can damage the lungs because these chemicals are converted to small heated particulates, which absorb deep into lung tissue. More studies are being done.

There are over 7,000 e-cigarette flavors currently marketed, and hundreds of brands. A new study released in December or 2015 by the Harvard School of Public Health found some concerning chemicals in these e-drops. Their objective was to determine if the flavoring chemical diacetyl, and two other high-priority flavoring chemicals 2,3-pentanedione, and acetoin, are present in a convenience sample of flavored e-cigarettes. What they found was more than 75% of flavored electronic cigarettes and refill liquids tested by researchers contained Diacetyl. Diacetyl is a flavoring chemical linked to cases of severe respiratory disease. The chemical gained notoriety in the early 2000's when inhalation exposure of the flavoring chemical diacetyl was found to be associated with a disease that became known as "Popcorn Lung." Two other potentially harmful related compounds were also found in many of the tested flavors, which included varieties with potential appeal to young people such as Cotton Candy, Fruit Squirts, and Cupcake.

E-cigarettes and hookah pens can also be used to smoke Marijuana concentrates, (known as hash, wax, oil, shatter, and dabs), "bath salts" and other drugs. In March of 2016, the FDA announced they are banning these for everyone under the age of 18. They will be controlled like cigarettes. **Teens get charged with possession of paraphernalia which can show up on their background if colleges or businesses check it.**

JUUL vapes and JUUL pods are extremely popular with teens. They have a sleek design that allows them to vape during classes, because they can be hidden within a closed fist. The pods are traded and sold on school property. The pods are sold filled with a proprietary blend that contains nicotine. **The nicotine in each pod is equivalent to 1 pack of cigarettes.**

Dextromethorphan –DXM (Robo-Tripping)

Users of products containing DXM are those that adhere to the manufacturer's suggested guidelines for dosages. Users consuming DXM-containing cough syrups (such as Robitussin) for medical reasons typically ingest 10 to 20 mg every four to six hours or 30 mg every six to eight hours. On the other hand, a single dose for recreational users can range from 240 to 1500 mg. Heavier users have been known to ingest up to 3 or 4 bottles a day—an amount that can induce a multitude of negative side effects. According to the DEA, Internet sites inform young users to "drink the syrup expeditiously in order to absorb enough DXM from the drink prior to the impending incidence of vomiting which will occur as a result of the ingestion of the large volume of syrup required for intoxication." In addition to traditional syrup forms, there is also evidence that DXM is being sold over the Internet in powder, and pill forms. These powders can be snorted, smoked or injected. Five recent deaths have been reported from abusing the powder. Powders and pills have an effect similar to syrups without the need to consume large quantities of the substance in a small time period. Users can also find instructions on how to extract DXM from syrups and gel capsules on the Internet, thus enabling them to inject or orally consume this active ingredient.

Physical and Psychological Effects of DXM

DXM is a dissociative anesthetic that at high doses can create powerful psychedelic effects. It is sometimes compared to PCP and ketamine, which are also dissociative anesthetics. People are concentrating down the liquid resulting in a goeey substance that they smoke on aluminum foil, or put into capsules, then the user acts like they are on PCP. The effects caused by DXM use vary depending on the dose. Users often describe dose-dependent 'plateaus' that range from a mild stimulant effect with distorted visual perceptions to a sense of complete dissociation from one's body. Effects generally last for 6 hours, but will ultimately vary depending on the amount of DXM ingested and if it is used in combination with other drugs or chemicals. Other effects can include:

- | | |
|--|--------------------------|
| Impaired judgment and mental functioning | Paranoia |
| Loss of coordination | Panic or anxiety attack |
| Visual and auditory hallucinations | Sweating |
| Lethargy | Hyperactivity |
| Nystagmus (rapid eye movement) | Rashes, red blotchy skin |

Tachycardia (racing, pounding heart)
Slurred speech
Hot flashes – leading to hyperthermia
Increase heart rate and blood pressure
Seizures
Dissociative state
Visual disturbances
Sensitive to light

Euphoria
Confusion
Numbness in fingers and toes
Nausea & vomiting
Tactile hallucinations
Altered perception of time
Feelings of floating
“Horrible Feeling”

Tolerance, Dependence & Withdrawal

The level and likelihood of experiencing tolerance and dependence will ultimately depend on the dose and frequency of use. When it is abused regularly, DXM can actually cause some of the symptoms (i.e., insomnia and dysphoria) that it is designed to cure. In addition, high-dose chronic use of DXM can lead to the development of toxic psychosis - a mental condition characterized by a loss of contact with reality along with a confused state - as well as other physiological and behavioral problems. It is unknown, however, what effect infrequent use of low doses has upon the user, although anecdotal reports of prolonged use describe DXM as a drug with moderate physical dependence and tolerance. Most users that display symptoms of withdrawal will experience some form of anxiety, restlessness, insomnia, diarrhea, vomiting, severe weight loss, and upset stomach.

Dextromethorphan (Robitussin and other over the counter cough preparations) acts as a hallucinogen when taken in large doses. Dosing instructions are available online. Large doses also cause nausea and vomiting, loss of coordination, hot flashes, numbness, and a “horrible feeling” in users, yet repeated abuse is common. Effects may last for several hours. Robo-tripping has been implicated as a “gateway” to using other hallucinogenic drugs. If the cold medication contains Tylenol, or any other brand of acetaminophen, liver damage may occur.

Loperamide (Imodium AD)

Loperamide is an anti-diarrheal, sold over-the-counter, that is available in liquid, capsule, or tablet form. It is recommended to be taken orally in 2–4-mg doses for 24–48 hours. It is sold under brand names such as Imodium®, Kaopectate 1-D®, Maalox® Anti-Diarrheal, and Pepto® Diarrhea Control. These products are safe when used as directed, but high doses are fatal. People consume 50-300 tablets and get the effects of Opiates. Loperamide has μ -opioid agonist activity like morphine, heroin, oxycodone and other opioids. Users will consume a large amount to help with withdrawal symptoms, or to get high if they cannot find their opioid of choice. Excessive doses of Imodium A-D can lead to heart problems, kidney and liver failure, and even death. The National Poison Center data recorded a 71% increase in calls related to Loperamide abuse/misuse from 2011 to 2014. The Annals of Emergency Medicine reported case findings in their May 2016 issue.

Hallucinogenic and psychoactive plants

Exotic plants

These plants are smoked or ingested and are not indigenous to the US. They are available from drug dealers or the internet. Blue Lotus grows along the Nile River and is sold online and in head shops as a concentrated tablet that looks like and acts like the tranquilizer Xanax. It may be smoked or ingested.

Khat grows in the Horn of Africa (Djibouti, Eritrea, Ethiopia, and Somalia) and the Arabian Peninsula. Chewing Khat is a social custom dating back thousands of years. Khat contains cathinone, a stimulant like meth, and causes excitement, loss of appetite and euphoria. Khat is illegal in the US, however, it is still being seen. When Khat is sent from Africa it often dries out and when it does Cathinone breaks into its byproducts and now is not illegal. Law Enforcement has a very difficult time prosecuting because it is no longer scheduled. The plant material is still active even though it has dried, and users will chew large amounts. When they chew it, a white alkaloid dries around their lips. They get stimulated and can become aggressive, especially if they mix it with alcohol.

Kratom

Kratom is a plant common to Southeast Asia & Thailand and can act as both a stimulant and a narcotic. At a low dose the user becomes talkative, energetic, alert, and excited. At a high dose the user's pupils constrict, they are in a calm and dreamy state, less sensitive to pain, have a dry mouth, may itch, and can have nausea. At high doses this plant has an opioid-like effect and users may exhibited psychotic symptoms, including hallucinations, delusion, and confusion. The plant material is widely available online and

legal. Kratom is available in pills, and as loose plant material, which is used to make a “tea.” People use it as a substitute for Opioids and to help with Opioid withdrawal. It is addictive, has no recognized medical use, has caused many deaths across the US, and DEA is looking at making it a schedule I drug.

Geranium Extract (methyhexanamine or dimethylamylamine, sold as “Pump-It Powder” or Jacked 3D”)

Dimethylamylamine (DMAA) is made synthetically in a lab and was originally used as a nasal decongestant. Today it is sold as a dietary supplement used for ADHD, weight loss, improving athletic performance, and bodybuilding. Supplements that contain this ingredient list: rose geranium, geranium oil, or geranium stems on the label. DMAA has also been marketed extensively as a dietary supplement but its safety has been questioned as a number of adverse events and at least 5 deaths have been associated with DMAA-containing supplements. DMAA is sold as an “enhanced plant vitamin” but labeled “not for human consumption.” It may be smoked, ingested, or snorted and its effects may last 4-6 hours. It has amphetamine-like effects including:

- Psychotic symptoms
- Triggers DAR signs and symptoms consistent with CNS stimulants & hallucinogens
- Heart rate, body temp, internal clock accelerated
- Pupils dilated and may exhibit sluggish response to direct light
- Piloerection (gooseflesh)
- Sensory distortions
- Gross paranoia
- High 4-6 hours, can be 12 hours and longer
- Dose dependent

“DESIGNER DRUGS”

Designer drugs is an informal term for psychoactive drugs that were initially discovered through the research of, and experimentation upon, the structure and activity of existing psychoactive drugs. They are created in concealed locations and/or homemade labs. A designer drug generally mimics the effects of well-known drugs such as ecstasy, meth, cocaine, morphine, or cannabis, by using chemicals that are legally available on the market. The resulting drugs have similar effects to the well-known drugs, but their chemical structures are different.

Designer drugs are also known as club drugs, because they tend to be abused by teens and young adults at bars, nightclubs, concerts, and parties. Depending upon the drug taken, a user may experience feelings of exhilaration and closeness to others, feelings of love and acceptance, prolonged periods of wakefulness, decreased appetite, extreme relaxation, amnesia and feelings of detachment. Unwanted effects might include hallucinations, panic attacks, aggressive behavior, or feelings of paranoia. In addition, there may be physical effects like nausea, significant changes in blood pressure, seizures, slurred speech, and blackouts. These drugs can even cause coma and death.

The illegal status of the classical recreational substances, such as marijuana, cocaine, opioids, and methamphetamine, has encouraged teens and adults to seek newer “designer” drugs that offer the advantages of being legal and less expensive. These new “designer drugs” are synthetic substances produced for recreational use. They are readily available in smoke shops, convenience stores, gas stations, and online. Parents and other caregivers need to be aware of the emerging trends in substance abuse and knowledgeable about some of the most popular “designer drugs”: synthetic marijuana, “bath salts” and the new synthetic amphetamines. The new amphetamines are generally pure and may contain chemicals not listed on the label. Users are often unaware of what or how much they are taking.

Synthetic designer drugs have stimulatory (ecstasy-like) effects and/or hallucinogenic properties. The internet sale and distribution has made the drugs easily available. As these substances are banned or regulated by State and/or Federal agencies, producers simply alter the product’s chemical structure and sell the product under a new name. The new substance is often more potent than the old product, marketed until limited by legal regulations and then changed again. There are a wide variety of synthetic drugs available in smoke shops and the internet. Most are legal and available without a prescription. The most common and widely used families of synthetic drugs are the synthetic cannabinoids, synthetic phenethylamines, synthetic cathinones (“Bath Salts”) and synthetic amphetamines.

Synthetic Cannabinoids: Spice, K2 and similar marijuana-like substances

Synthetic cannabinoids are chemicals that are similar to delta-9 tetrahydrocannabinol (THC), the primary cannabinoid in marijuana. Like the THC in marijuana, synthetic cannabinoids bind to receptors in the brain, which is part of the human endocannabinoid system. Normal brain function and maturation are partially modulated by the endocannabinoid system. This system controls pain-sensation, mood, and memory. Natural and synthetic cannabinoids interrupt the endocannabinoid system, impair brain function, and brain growth. More than 200 synthetic cannabinoids have been identified but only a few have been declared a controlled substance in the United States.

The final product sold in stores and online is produced by adding raw synthetic cannabinoids to various types of dried plant material. The synthetic cannabinoids are a powder 98-100% pure, they are dissolved in acetone or alcohol and the mixture sprayed onto dried plant material. These products may be marketed as “herbal incense” or “potpourri” and are sold as products “not for human consumption” in order to evade regulatory scrutiny. Abusers typically smoke or ingest the products. These drugs are generally sold in 1,3,5 and 10 gram packages. Three-gram package prices range from \$5 to \$50. Many of the suspected synthetic cannabinoid packages display marijuana nomenclatures on the labeling such as “420,” “Cush,” “Hydro,” and “Chronic” which are commonly known to, and readily identified by drug users. These products are often displayed inside glass cases that also contain drug paraphernalia such as pipes, dugouts, grinders, bongs, and hookahs. When inhaled, as little as 1 mg of synthetic THC can produce intoxication.

Effects of synthetic cannabinoids

The desired effects are similar to those produced by marijuana—elevated mood, relaxation, and altered perception—and in some cases the effects are even stronger than those of marijuana are. Teens that use synthetic cannabinoid products may experience dry mouth, red eye, loss of appetite, agitation, high blood pressure, paranoia, very rapid heart rate, anxiety, tremors, seizures, drowsiness, slurred speech, dilated pupils, vomiting, chest pain, and heart palpitations. Some users who previously had no known psychiatric history may develop drug-induced psychosis. It is not well understood why some users present with florid psychosis and others do not. The side effects may be more pronounced than those of marijuana, and may result in the user requiring immediate medical attention in an Emergency Room. The ways synthetic cannabinoids affect human health or how toxic they may be is not completely known. The composition of synthetic cannabinoids is inconsistent and therefore the side effects are variable. Synthetic cannabinoids have been implicated in the deaths of several teenagers and young adults.

Acute kidney injury due to synthetic marijuana has been reported in teen patients in several different states. Some patients have required short-term dialysis. The responsible agent or agents have not been identified.

Synthetic THC may also cause reduced blood supply to the heart and a few cases of heart attack have been reported. Regular users experience withdrawal. Emergency rooms report side effects ranging from convulsions and anxiety attacks to dangerously elevated heart rates, increased blood pressure, vomiting, and disorientation. In 2012, there were more than 11,000 ER visits associated with the use of synthetic marijuana. Of these, 75% were adolescents and young adults: 77.5% of these were males.

Liquid synthetic cannabinoids

Liquid cannabinoids are showing up on the street. They look like e-drops / e-liquids used in electronic cigarettes or hookah pens. On the street they are sold as; K2 eLIQUIDS, Cloud 9, Hookah Relax, Crown, Bizarro, Shisha and Mad Hatter. These designer liquids have a greater number of other chemicals mixed in. Many samples have contained a potent bath salt, 2C-P. These liquids are then smoked via e-cigarettes, hookah pens, or vapes. The vaping of these designer cannabinoids are on the rise across the country. Effects are similar to synthetic cannabinoids sprayed on plant material, however, may include more psychotic behaviors when bath salts and other chemicals are added in. Withdrawal from Synthetic Cannabinoids may include:

- Loss of appetite
- Vomiting and diarrhea
- Dehydration
- Kidney failure or damage
- Extreme Sweating
- Inability to sleep
- Intense cravings
- Depression
- Loss of motivation
- Psychotic episodes

- Suicidal thoughts
- Inability to care about consequences

Effects of synthetic marijuana on the brain

Recent animal studies confirm that synthetic and natural THC cause inflammation in the brain by activating microglial cells (immune cells) in the brain that destroy brain cells effecting learning and coordination. In this short-term study, the effects were reversible. (Ozaita et al, JCI, July 2013)

Smoking or ingesting marijuana may cause panic attacks and psychosis. Users who have an abnormal *COMT* gene (1:4000 live births) have a significantly increased risk of developing chronic depression or schizophrenia. There is reason to believe the same is true in people who use synthetic marijuana since synthetic marijuana users often present with paranoia, agitation, confusion, hallucinations and even seizures.

The effects of synthetic THC on the brain are more pronounced than the effects of natural THC since the THC found in synthetic marijuana is more potent than natural marijuana. The affinity of synthetic THC for cannabinoid receptors is 5 times greater than that of THC. There have been no scientific studies of the effects of synthetic cannabinoids on the human brain, but it is known that the synthetic cannabinoid compounds act on the same receptors as THC. Normal brain functions, like memory and decision-making, rely on neurons communicating with each other. When cannabinoids attach to the receptors normal regulation of communication in the brain is disrupted.

Teens that chronically use marijuana have reduced problem-solving skills and exhibit “cognitive inflexibility”. Large epidemiological studies have shown that chronic use of marijuana results in a loss of IQ (average 8 points). It has not been confirmed if these problems occur in chronic users of synthetic marijuana.

Synthetic THC and pregnancy

The use of synthetic and natural THC during pregnancy may have profound effects on the developing baby. The human endocannabinoid system plays a role in brain maturation and the development of emotional responses. Epidemiological studies have shown that some babies born to women who used THC during their pregnancies display altered responses to visual stimuli, increased tremulousness, and a high-pitched cry, which could indicate problems with neurological development. In school, marijuana-exposed children are more likely to show gaps in problem solving skills, memory, and the ability to remain attentive.

Synthetic Bath Salts

Novel synthetic “designer” drugs with ecstasy-like properties have become increasingly popular among recreational drug users. Cathinone is a Schedule I controlled substance that occurs naturally in the Khat plant. The majority of “Bath Salts” are chemically classified as substituted cathinones, meaning they have a phenethylamine core with various additional substitutions. These drugs act at multiple brain receptor sites and either increase dopamine or act as the neurotransmitter serotonin. Ingestion or injection of phenethylamines results in the release of dopamine at a rate 10x that of cocaine. The drug triggers intense cravings (or a compulsive urge to use the drug again). Frequent consumption may induce tolerance, dependence, and strong withdrawal symptoms. Many designer drugs have now been banned because of the Synthetic Drug Abuse Prevention Act of 2012.

These drugs are known as psychedelic stimulants, meaning they fire up the central nervous system like amphetamine or cocaine and cause hallucinations similar to LSD, ecstasy (MDMA) and mescaline. Some of the substituted cathinones are; Methylone (MDMC, Explosion, bk-MDMA), Naphyrone (NRG-1, 4-total), Mephedrone (drone, M-Cat, Meow-meow, bubbles, 4-MMC), MDPV (methylenedioxypropylvalerone), Alpha-PVP (cloud 9, magic, black rob, super coke), and Buphedrone. Some of these brands have chemicals in them that have a half-life of four days (half of the chemical is removed from the body in four days) thus causing effects lasting multiple days. Clinical features include agitation, tachycardia, anxiety, confusion, chest pain, hallucinations, and nausea. They typically have little or no odor and are sold as a white, off-white, or yellowish powder, in tablet form, pellet form, capsules or in crystal form. These drugs sell for \$5 to \$60 a package and each package contains 300-500 mg of the powdered chemical and are often sold as “plant food” or “plant fertilizer.”

These drugs are man-made (synthetic) and are extremely pure, anywhere from 98-100%. They are typically ingested, snorted, and can be injected with effects lasting hours to days. Most users assume that 300-500 mg is a normal dose, but in fact, 10 mg or less is an effective dose. This unintentional overdose may result in severe hallucinations and serious side effects. The desired effects from these substituted cathinones are euphoria, increased alertness, energy and concentration, and aphrodisiac effects. However, many side effects occur from using too much; bruxism (teeth grinding), sweating and dehydration, increased heart rate and blood

pressure, anxiety and panic attacks, temporary erectile dysfunction in males, hallucinations, psychosis, and depression. Deaths have occurred. Many of these are According to the American Association of Poison Control Centers, calls to poison control centers for exposure to “bath salts” increased from 303 cases in 2010 to 4,137 in 2011 (1,300 % increase).

The 2-C series of phenethylamines are relative newcomers to the club scene and are very potent and dangerous. They are known as psychedelic phenethylamines and are more potent and longer lasting than ecstasy. Most of the currently known 2C compounds were first synthesized by Alex Shulgin in the 1970s and 1980s, and published in his book, PiHKAL (*Phenethylamines I Have Known And Loved*) A love story. These compounds are structurally similar to mescaline and ecstasy, and have been sold as a “legal” substitute for ecstasy in raves for years. This family of drugs includes 2C-E, 2C-I, 2C-B, 2C-T, 2C-N, 2C-D, 2C-G, 2C-G-3, 2C-O, and 2C-T-7. Some street names include smiles, tootsie, blue mystic, 7-up, bees, nexus, and tripstasy. They are sold online as a white crystalline powder, tablets, or pellets and can be very pure, 98-100%. These drugs are ingested (pill or tablet form), smoked, snorted and used rectally. The high can last anywhere from 4-24 hours with affects similar to ecstasy, but more intense. Common side effects include rapid heart rate, high blood pressure, dilated pupils, dangerously high body temperature, paranoia, hallucinations, chest pain, suicidal ideation, violence, and seizures. These substances have been linked to a number of deaths from serotonin syndrome and prolonged vasoconstriction. The vasoconstrictive effect may persist for days and result in sudden death from coronary artery constriction. Injection of the drug may lead to limb gangrene. Other complications include agitation, hallucinations, seizure, liver failure, or kidney failure. Toxicity may be dose related, and when mixed with other drugs such as alcohol, ecstasy, or cocaine can be lethal.

MDPV (methylenedioxypropylvalerone)

MDPV is a relatively new drug that is becoming very popular, and is often sold as “Molly” on the street. Many people use it for its stimulant properties. In low doses, it is similar to Meth and Cocaine and acts as a norepinephrine-dopamine reuptake inhibitor. MDPV has a high potential for abuse, and can be addictive as it causes the user to crave the drug and use multiple doses. High doses have adverse ‘bath salt’ type effects; extreme paranoia, violence, increased heart rate and blood pressure, panic attacks and mild convulsions, Affects can last about 3 ½ hours with negative side effects lasting 8-48 hours. Severe depression for 5-7 days after use has been reported. It will test in a specialized urine test using GC/MS, however, it should be noted that it can sometimes trigger false positives for PCP in a standard 12 panel drug test. Because these drugs are relatively new, the short- and long-term effects are not known.

The abuse of 3,4-methylenedioxypropylvalerone (MDPV) is a growing public health concern, yet little is known about its pharmacology. Four documented deaths have been reported due to MDPV intoxication, and multiple studies have been released. One study shows MDPV is at least 10 times more potent than cocaine at producing locomotor activation, tachycardia, and hypertension in rats. Their data shows that MDPV is a monoamine transporter blocker with increased potency and selectivity for catecholamine’s when compared with cocaine. The robust stimulation of dopamine transmission by MDPV predicts serious potential for abuse and may provide a mechanism to explain the adverse effects observed in humans taking high doses of ‘bath salts’ preparations. (Baumann MH, *Neuropsychopharmacology*. 2013 Mar 13;38(4):552-62.)

This case study is that of a 39-year-old male who died of cardiac arrhythmia after use of MDPV. Postmortem concentrations of MDPV were measured in various tissues. (Wyman JF, et al. “Postmortem Tissue Distribution of MDPV Following Lethal Intoxication by “Bath Salts”.” *J Anal Toxicol*. Feb 18, 2013)

One of the first documented cases of MDPV resulting in death was a 40-year-old male who injected and snorted “bath salts” which contained MDPV. The male became aggressive, very agitated, and had a heart attack. After resuscitation he developed hyperthermia, rhabdomyolysis, coagulopathy, acidosis, anoxic brain injury, resulting in death. (Murray BL, et al. “Death following recreational use of designer drug “bath salts” containing 3,4-Methylenedioxypropylvalerone (MDPV)” *J Med Toxicol*. Mar 2, 2012;8(1):69-75.)

Alpha-PVP (alpha-pyrrolidinovalerophenone)

Known on the street as “flakka”, gravel, cloud 9, magic, α-PVP, or super coke it’s mechanism of action is unknown. It was created in 1960 as a stimulant in the Cathinone family, and is structurally similar to MDPV. It is believed to act similar to MDPV which is a norepinephrine – dopamine uptake inhibitor. Alpha-PVP has been reported to be the cause, or at least a contributor to deaths from suicide and poly drug overdoses. According to DEA, 614 cases involving “Flakka” (alpha-PVP) in 2014, and has been found in Ohio, Texas, Tennessee, and Florida, but is spreading across the US. Florida reported 126 deaths from synthetic Cathinone’s in 2013. On January 28, 2014, DEA listed alpha-PVP and nine other Cathinone’s as a Schedule I drug under federal law.

Most “bath salts” are manufactured in China, Pakistan, India, or New Zealand and repackage into gram packets in the US. Alpha –

PVP can be snorted, swallowed, injected, and is being smoked in e-cigarettes or vapes. “Flakka” is small crystal pebbles resembling gravel, another common street name for alpha-PVP. Taking additional “flakka” when already high (known as snacking), or combining it with other drugs can result in serious health effects such as rapid heart rate, extreme agitation, paranoia, aggression, and psychosis. Cathinone’s can cause hyperthermia, with body temperature of 105 degrees, excited delirium, rhabdomyolysis resulting in kidney failure, and adrenaline type strength. Once subjects are restrained they need immediate medical attention or they could die.

Methylone (MDMC, Explosion, bk-MDMA)

First synthesized in 1996 for use as an antidepressant, and chemically very similar to MDMA. In 2004 it was being sold as a liquid called “Explosion” and advertised as a “room odorizer vanilla” and stated the product should not be ingested and not to consume more than one bottle. Users report effects to be similar to MDMA (Ecstasy). The effects on the Central Nervous System can include; euphoria, stimulation, increases in sociability, emotional distress, insomnia, restlessness, depression, hallucinations, and psychosis. Some effects on the Sympathetic Nervous System include: increased heart rate and blood pressure, sweating, dilated pupils, bruxism (grinding of the teeth), nausea and vomiting.

25I-NBOMe & 25C-NBOMe

25I-NBOMe is a very potent psychedelic stimulant and considered by users to be a legal version of LSD. It is often in liquid form and put on blotter paper. They are active at very low doses (micrograms) and are generally administered on paper placed under the tongue. The drug is inactive if taken orally and swallowed. It may also be vaporized and inhaled. The onset of effects is rapid. Effects plateau in 2-4 hours, and can last 6-10 hours – sometimes much longer depending on dose. Side effects may last up to 7 days. Users experience visual hallucinations with color shifts, euphoria, dilated pupils, changes in perception of time, increased awareness, feelings of love and empathy and mental and physical stimulation. Undesired side effects include confusion, scrambled communication, paranoia, panic, and seizures. Clinical features included tachycardia, hypertension, agitation, aggression, visual and auditory hallucinations, seizures, hyperpyrexia, clonus, elevated white cell count, elevated creatine kinase, metabolic acidosis, and acute kidney injury. (Hill SL, *Clin Toxicol (Phila)*. 2013 Jun 4.) Deaths have been reported. 25i is now a scheduled I drug and is known as 25i, the bomb, dimes, or Nbome, cheap acid, designer acid, or research.

Note: The abuse of this drug presents as sepsis, causing death. However, no bacteria are detected in the blood.

Bromo-DragonFLY

This is an extremely potent psychedelic drug and is highly toxic. Known on the street as 7-up, blue mystic, lucky 7, and tripstasy, it is easily ordered online as a research chemical. It can be smoked, ingested in capsules, and injected. It has very similar effects to the substituted phenethylamines (2C family of drugs) and includes rapid heart rate, high blood pressure, dilated pupils, dangerously high body temperature, paranoia, hallucinations, chest pain, suicidal ideation, violence, and seizures. It is different from the 2C family in that Bromo-DragonFLY is a long acting vasoconstrictor and can cause gangrene and amputation. Overdose is believed to be very violent and can result in terrifying hallucinations, massive seizures, spewing of blood, and death. This drug is illegal and should be avoided at all costs.

Intoxication with Bath Salts

Users may present with the syndrome known as “excited delirium” accompanied by dehydration, breakdown of skeletal muscle and kidney failure. Intoxication from synthetic cathinones has proved fatal in several instances. The dangers of bath salts are compounded by the fact that these products may contain other unknown ingredients that may have their own harmful effects.

Bath salts cause the release of large amounts of the neurotransmitter, serotonin, resulting in “serotonin syndrome.” Symptom onset is usually rapid often occurring within minutes. Mild symptoms may only consist of increased heart rate, shivering, sweating, dilated pupils, intermittent tremor, or twitching and over-responsive reflexes. Moderate intoxication includes additional abnormalities such as high blood pressure, and elevated body temperature. Temperature may rise to above 41.1 °C (106.0 °F) in life-threatening cases. Mental status changes include hypervigilance, and agitation. Severe symptoms include suicidal ideation, violence, seizures, and death.

“Molly” : The new Ecstasy

Ecstasy is known for inducing feelings of euphoria, closeness, and diminished anxiety and is frequently used at raves. As demand for ecstasy increased, so did the adulterants in each pill (caffeine, speed, ephedrine, ketamine, LSD, talcum powder and aspirin) and by 2000 ecstasy’s reputation had soured. Then sometime in the last decade, it returned to clubs as Molly, a pure powder or

crystalline form of MDMA. Other designer drugs in the phenethylamine/cathinone family are being substituted or mixed with MDMA, sold as “Molly”, and causing overdoses and death across the country.

Molly is marketed as a gentler, more approachable drug than ecstasy and has found a following in the Now-Generation. Much as marijuana enthusiasts of an earlier generation sang the virtues of Mary Jane, Ecstasy enthusiasts believe that Molly is natural and harmless. The opposite is true.

The popularity of Molly is attributed largely to hip hop. Many rap songs released in the last year have references to Molly. In “Mercy,” Kanye West says “something ‘bout Mary she gone off that Molly.” In “All Gold Everything” Trinidad James raps “popped a Molly, I’m sweatin.” Lil Durk and Wiz Khalifa released a track called “Molly Girl.” Madonna recently referred to the drug at one of her concerts and received a standing ovation after saying “Molly.”

For most people, a “hit” of Molly lasts for 3 to 6 hours. Molly is a white crystalline powder similar to sugar. It can be ingested in a capsule or paper, dissolved in soda or liquid, smoked, snorted, or injected. Some people do “swirlies” where they rub the powder under their tongue and on their gums. It takes only about 15 minutes for MDMA to enter the bloodstream and reach the brain after ingestion. About 45 minutes later, the person experiences the “high.” People who use MDMA might feel very alert or “hyper” at first. Some lose a sense of time and experience other changes in perception, such as an enhanced sense of touch. Others experience negative effects right away. They may become anxious and agitated. Sweating or chills may occur, and people may feel faint or dizzy.

Molly can cause muscle tension, nausea, blurred vision, and increased heart rate and blood pressure. Forceful clenching of the teeth can occur and individuals at clubs often chew on pacifiers to relieve some of the tension. Even if a person takes only one pill, the side effects of Molly—including feelings of sadness, anxiety, depression, and memory difficulties—can last for several days to a week or longer in people who use MDMA regularly.

Molly also causes users to become dehydrated through vigorous activity in a hot environment (club). It interferes with the body’s ability to regulate its temperature resulting in dangerous overheating. This can lead to serious heart and kidney problems or, rarely, death. Molly can be extremely dangerous in high doses or when multiple small doses are taken within a short time period to maintain the high. High levels of the drug in the blood stream can increase the risk of seizures and affect the heart’s ability to maintain its normal rhythms.

Researchers that study the brain think that Molly may affect the way that nerve cells communicate with each other by altering the effects of the serotonin. The serotonin system plays a direct role in controlling our mood, aggression, sexual activity, sleep, and sensitivity to pain. Memory loss is a problem among regular users of Molly.

Ecstasy

Ecstasy (3-4-methylenedioxy-N-methamphetamine or MDMA) is a psychedelic amphetamine with both hallucinogenic and stimulant properties created in the early 1900’s. Ecstasy is a chemical cousin to Meth – its Methamphetamine plus a hallucinogen so you will also see indicators similar to meth. It is unique in that it causes hallucinogens as well as feeling of exhilaration and excitement. Ecstasy is usually in tablet form; however, it can be in powder form. The tablets come in all colors and have various types of logos or images on them. The color and the logo have meaning as to what is in them and the intensity of the reaction. Many pills on the street today do not have just MDMA in them; they have Cocaine, BZP, Heroin, LSD, Ketamine, and/or Methamphetamine in them as well. Users need to know the lingo or jargon that goes along with Ecstasy so they know what they are getting. Molly is pure MDMA and is in white crystalline form. It can be smoked, snorted, injected, put into Gatorade or any drink and sipped all day long, or put into capsules. Some kids will do “swirlies” where they lightly wet a finger, dip it in the substance, and smear it on their gums.

Ecstasy Indicators:

- Reduced inhibitions
- Sweating
- Elevated Vitals
- Happy and Friendly
- Continuous Speech
- Tremors

- Heightening of senses
- Nausea & vomiting
- Blurred Vision
- Confusion
- Paranoia
- Grinding Teeth (Bruxism)

Adverse effects

Side effects are common and include poor concentration, jaw clenching, lack of appetite and dry mouth/thirst. Hyperthermia (elevated body temperature up to 110 degrees) may occur along with dehydration. In the long term, the drug may cause insomnia, aches and pains, anxiety and paranoia, impaired long-term memory, depression and irritability, and chronic fatigue. These problems may continue even after stopping the drug. Long-term use can deplete serotonin (a neurotransmitter) and result in mood swings, sleep disorders, altered thought processes, sexual dysfunction, and loss of sensitivity to pain.

Effects on the fetus

There are a small number of reports of fetal problems, including clubfoot in females, possible increase in the rate of congenital heart disease, and major defects of the abdominal wall resulting in infants being born with their intestines outside the abdomen.

Synthetic Amphetamines

PMA (para-methoxyamphetamine)

PMA looks like and is usually sold as an ecstasy tablet. It is known on the street as Red Mitsubishi, Killer, Death, Dr. D., Pink Ecstasy, and Chicken Powder. PMA shares the same initial buzz and hallucinogenic qualities of Ecstasy but can cause a fatal rise in temperature in some users. PMA has been associated with numerous adverse reactions including death. Effects of PMA ingestion include many of the side effects of other amphetamines including accelerated and irregular heartbeat, blurred vision, and a strong feeling of intoxication that is often unpleasant. PMA is reportedly euphoric at low doses but at higher doses has unpleasant effects such as nausea, vomiting, dangerously high body temperature, and hallucinations. These effects quickly overpower any pleasurable effects. The effects of PMA also seem to be much more unpredictable and variable between individuals than those of Ecstasy and sensitive individuals may die from a dose of PMA that a less susceptible person tolerates.

There are approximately twice as many deaths caused by PMA as by Ecstasy or Molly even though the actual amount of PMA on the streets is only a fraction of that of Ecstasy. PMA alone may cause significant toxicity, however the drug is often mixed with Ecstasy and the combination is extremely hazardous. Since PMA has a slow onset of effects, several deaths have occurred when individuals have taken PMA soon followed by MDMA thinking that the first pill was not active.

PMA overdose can be a serious medical emergency that may occur at doses only slightly above the usual recreational dose range, especially if PMA is mixed with other stimulant drugs such as cocaine or MDMA. Characteristic symptoms are a severe increase in body temperature, rapid heart rate, and high blood pressure along with agitation, confusion, and seizures. Complications sometimes include more serious symptoms such as muscle breakdown and bleeding into the brain requiring emergency surgery.

MDA (methylenedioxyamphetamine)

Known on the street as "sass," "Mandy," or "sass-a-frass," this is another psychedelic designer drug that has been used since the 1960's. Even though it is illegal (sch I, it can be purchased on line as a research chemical). MDA is related to MDMA, but is more potent in its psychedelic effects and can overstimulate the central nervous system and cardiovascular system. Symptoms include agitation, sweating, increased heart rate, and blood pressure, dramatic increase in body temperature, convulsions, and death.

3,4-CTMP (methylphenidate family ADHD drugs)

It is known to be 7X more potent than Ritalin, and cause mild stimulation, increased heart rate, reduced appetite, and insomnia. 3,4-CTMP has no medicinal use and is sold online as a research chemical, "not for human consumption."

Benzo Fury (Benzofurans: amphetamine-like)

Benzo Fury is one of the most popular "legal highs" in Britain and is gaining in popularity in the United States. Benzo Fury is an entactogenic compound like ecstasy and amphetamine. It is a popular party drug and is available over the Internet. The risks of

taking this substance are not known but it affects the brain in the same way as amphetamine or ecstasy and it is addictive. It has strong vasoconstriction and jaw clenching effects, as well as increased heart rate, sweating, tingling of extremities, euphoria, insomnia, dilated pupils, and depression. Some of the Benzo's out there are 5-MAPB, 5-APB, 6-APB, 5-EAPB, and 5-API.

Other “Recreational” Synthetic Substances

There are a variety of other psychoactive substances that have been synthesized, that are easily available online and are used to mimic the psychoactive effects of prescription medications sought by addicts and recreational drug users. Many of these substances are legal.

Piperazines

Piperazines are synthetic and not present in nature. The most popular one is Benzylpiperazine known as A-2, BZP, Frenzy, or Nemesis on the street. BZP has become an alternative to Methamphetamine and Ecstasy. It is a Central Nervous System stimulant similar to the Amphetamines; however, users claim it is less desirable due to the many side effects from the drug. The effects are similar to amphetamines: dilated pupils, increase BP and heart rate, anxiety, blurred vision, and dizziness. Some chronic users reporting effects that include: irregular heartbeat, delusions, hallucinations, and paranoia. The high can last 6-8 hours and is similar to the high from Ecstasy. TFMPP is another synthetic piperazine often combined with BZP. BZP can be in pill form or a powder put into capsules.

Tryptamines

DMT, known as the “Spirit Molecule”, is a psychedelic compound in the tryptamine family and can be found naturally in many plants. The native people of Amazonian Peru consume DMT as the primary psychoactive in “Ayahuasca Tea” a brew used for divinatory and healing purposes. The vines of the plant used in the making of this tea have a natural MAO Inhibitor, thus allowing DMT to be orally active. When taken orally with an MAOI, DMT produces a long lasting, slow, deep metaphysical experience similar to that of psilocybin mushrooms.

Natural tryptamines are derived from tryptophan, serotonin, psilocybin, and melatonin. DMT occurs naturally in our brains and is known as the “Dream Drug.” Natural and synthetic tryptamines are hallucinogenic. Clinical effects of DMT include hallucinations and vomiting. DMT is a schedule 1 drug and illegal in the United States. However, its analog, 5-Meo-DMT is neither scheduled nor controlled and is easily purchased online. It is more potent than DMT, is generally smoked, and produces an intense high of short duration with hallucinations. The Sonoran Desert Toad naturally secretes 5 Meo-DMT and there have been many reports of people licking the toad to get high, they also get very sick and vomit for hours.

It is not uncommon for people to have psychological and mental difficulties lasting several weeks after taking too large a dose of 5-Meo-DMT. Too much can cause intense hallucinations, loss of connection to reality, disorientation, panic attacks, anxiety, sweating, and nausea. 5-MEO-DMT is known on the street as “Dimitri” and “The Businessman’s High.”

There are a number of designer tryptamines being sold online as a research chemical; they are AMT, 5-MEO-BFE, 5-MEO-DALT, NMT, DALT, and 5-MEO-DIPT (known on the street as foxy methoxy, foxy, fake ecstasy).

Phenazepam (Xanax, benzodiazepines, “Zannie”)

Phenazepam was developed in Russia in 1974 and has recently gained popularity as a recreational drug in the United States. Phenazepam is a benzodiazepine with anxiolytic, euphoric, anticonvulsant, amnesic, muscle relaxant, and hypnotic (sleep-inducing) effects. The oral dose is 0.5-5.0 mg and effects last over 60 hours. Its extreme potency makes overdose common and overdose symptoms may last many days or weeks.

Side effects include hiccups, dizziness, loss of coordination, drowsiness, and amnesia. As with other benzodiazepines, when abruptly discontinued following prolonged use, severe withdrawal symptoms may occur including restlessness, anxiety, insomnia, seizures, convulsions and death. Fatalities have been reported when the drug is taken with prescription opioid analgesic drugs and alcohol. Phenazepam is currently listed as a Schedule I drug, but manufacturers circumvent this regulation by selling the product online.

Phenazepam is sold as a “research chemical” (RC) and comes as an air freshener known as “Zannie.” They spray Zannie into the mouth as one of the routes of administration, with deaths being reported from use. When used with antidepressants, sleep medications, pain medications, or alcohol, it can prove fatal. Another benzo type RC sold on line is Etizolam known as “Etizzy” on

the street. This currently a prescription medication (benzo) sold in Japan, India, and Italy, and is emerged on the illicit drug market in Europe and the United States. It can be bought as a powder, pills, or on blotter, and can be used anyway. This benzo does not currently have any accepted medical use in the United States, and it is 6-10 times more potent than valium. Effects are: sedation, muscle relaxation incoherent (lethargy), physical euphoria, motor control loss, dizziness, confusion, psychosis, agitation, aggression, and depression. With all benzodiazepines, they should be not stopped abruptly. People need to step down slowly off these as withdrawal can cause a seizure resulting in death. People need to be in a medical detox when withdrawing from all benzodiazepines.

Marijuana

Marijuana Plants

Marijuana plants and the plant material that is smoked or ingested contain a variety of chemical substances. The known active ingredients are “cannabinoids,” and each plant contains about 100 different cannabinoids. There are over 600 other substances in the plant. However, the effects of only 6-8 of the plants cannabinoids are known. These cannabinoids are: delta-9 tetrahydrocannabinol (THC), its sister compound cannabinal (CBN), delta-9 tetrahydrocannabivarin (THCV), cannabigerol (CBG), cannabadiol (CBD), delta-9 tetrahydrocannabinolic acid (THCA) and cannabadiolic acid (CBDA).

THC is the main psychoactive component. CBN also has psychoactive properties but is about 50X less potent than THC. CBD and THCV are much less psychoactive and cause more sedation. There are 2 species of marijuana plants: *Cannabis sativa* (high in THC) and *Cannabis indica* (more CBD, less THC).

Addiction to marijuana

Nearly every addictive drug, including marijuana, targets the brain’s reward system by flooding the circuit with the neurotransmitter, dopamine. Neurotransmitters are necessary to transfer impulses from one brain cell to another. The brain adapts to the overwhelming surges in dopamine by ultimately producing less dopamine and by reducing the number of dopamine receptors in the reward circuit. As a result, two important physiologic adaptations occur: (1) the addict’s ability to enjoy the things that previously brought pleasure is impaired because of decreased dopamine, and (2) higher and higher doses of the abused drug are needed to achieve the same “high” that occurred when the drug was first used. This compels the addict to increase drug consumption in order to increase dopamine production leading to physiologic addiction and intense cravings for the drug.

Marijuana and brain development

The human body produces trace amounts of cannabinoids that play an important part in the development and maturation of the brain. Human cannabinoids act at the cellular level by combining with receptors on the surface of the cell allowing the cell to communicate with other cells. This interaction between the cannabinoid, the receptor, and the cell is referred to as the human “endo-cannabinoid system.” The trace amounts of human cannabinoids that are produced are immediately degraded and are only active for a very, very short time. The prolonged presence of cannabinoids in the blood, and therefore at the cellular level, resulting from exposure to marijuana, has deleterious effects on cell growth and communication between cells and may result in inflammation and delayed maturation, and injury or death of the cell. Cannabinoid-induced inflammation in the brain has been shown to cause brain-cell death. (*Cutano et al. J Clin Invest. 2013;123(7):2816-2831*). These effects occur and the in the fetus, infant, child and young adult and the resulting functional defects may persist for years or even a life time.

Exposure to cannabinoids present in marijuana affects nearly all other neurotransmitters through the action of prolonged activation of the cannabinoid receptors in brain cells. This results in delayed maturation and development of the immature brain (brain development continues to about age 25 years); cognitive impairment with learning problems and limited or decreasing IQ; and behavioral disorders, including aggression, impulsive behavior, and a variety of mental health problems

Recreational marijuana

Marijuana is used for its mildly tranquilizing, mood and perception altering effects. The psychoactive ingredient in marijuana is THC (delta-9-tetrahydrocannabinol). The marijuana on the streets today is unlike the marijuana in the 60’s, 70’s, 80’s, 90’s, or early 2000’s - it is a potent addictive drug cultivated to maximize its psychoactive effect. The THC content of marijuana continues to increase. In the 60’s - 80’s the THC content ranged from 2-7%. Today it is around 23-28%. However, in some places the THC content may be of 50% or higher. Today’s marijuana should not be looked at as “just marijuana.”

Marijuana concentrate (hashish, honey oil, THC oil, wax, dabs, shatter, BHO) has become very popular. THC is extracted from the plant buds by using butane or other chemicals. These products are extremely potent and can be 50-90% THC. The extract may be a brownish tan liquid. It can be thickened into a gooey substance which is a brownish tan or yellowish waxy substance, known as "wax", "earwax" or "dabs" on the street. This wax is usually smoked in vaporizers, which may look like pens or inhalers. Vaporizers typically have a section that contains a liquid, sometimes flavored, that is used to reduce the odor of marijuana making smoking less detectable. Butane extraction is volatile and has caused vapes to blow up if the butane is left in the product. There is a new "wax" on the street that is translucent (it looks like a blob of super glue) and is 98% THC. The edibles contain the potent THC oil. THC oil can be mixed with butter, known as "buddah" on the street, and is used to make marijuana edibles: cookies, cakes, brownies, pies, yogurt, ice cream, chocolates, etc.

Marijuana joints can be laced with other drugs such as PCP, cocaine, ecstasy, methamphetamine, heroin, or embalming fluid. The street names of marijuana joints often describe what is laced in the joint, i.e.; "black ice" is marijuana laced with meth, "white rhino" is marijuana laced with cocaine, and wet sticks or "sherm" is marijuana laced with embalming fluid. Adderall pills (ADHD pills known as Addy's on the street) is being crushed and sprinkled onto joints and then smoked. Street name is "god mode" or "madderall." When smoked users get extremely agitated and aggressive or paranoid with anxiety issues.

Indicators of marijuana use:

Relaxed inhibitions	Difficulty concentrating
Errors in judgment	Confusion
Distinct odor of marijuana	Impaired memory and attention
Lack of motor coordination	Anxiety and panic attacks
Loss of eye convergence	Lack of motivation
Psychosis - suicidal ideation	Nausea and vomiting

Agitation and aggression

Increased heart rate- stimulant type effects

"Dabbing out – incoherent, pass out, wake up scared because they can't remember what happened, then get psychotic, and anxious, possible vomiting

Indicators of Edibles consumed by young kids:

- Lack of coordination, unsteady gait
- Dizziness
- Increased blood pressure and pulse rate
- Dry mouth
- Confusion, lack of focus
- Sleepy, lethargic, lack of activity
- Slowed breathing

Effects of using marijuana

Immediate effects: The physical effects of using marijuana include euphoria, rapid heart rate, increased blood pressure, and rapid respirations. Other physical changes include red eyes, dry mouth and increased appetite or "the munchies." One of the main problems is slowed reaction. Because marijuana impairs judgment and motor coordination and slows reaction time, an intoxicated person has an increased chance of being involved in and being responsible for an accident.

Secondhand smoke: Exposure to marijuana, including exposure to second-hand marijuana smoke, during pregnancy has been shown to increase the risk of stillbirth (Varner M. *Ob Gyn* 2014;123(1):113-125). The study documented that blood THC levels even below the 3 ng/ml threshold of "intoxication" is detrimental to the unborn child. Blood levels of THC above 3.5ng/ml have been repeatedly documented in people exposed to second-hand marijuana smoke for at least 3 hours. (Rohrich J. *J Anal Toxicol* 2010;34(4):196-203)

Emotional health: According to the National Institute on Drug Abuse, the main effects of marijuana on mood include euphoria, calmness, anxiety, and/or paranoia. Other short-term psychological effects include a distorted sense of time, magical or "random" thinking, short-term memory loss, and depression. These psychological problems generally ease after a few hours but residual effects can last for days.

Seizures: In most users, THC is a pro-seizure drug inducing new onset of seizures. However, this is a very controversial issue and the results of scientific studies are mixed: some report that smoking marijuana may precipitate seizures while others report that marijuana suppresses seizures. There may not be a clear answer to this question because of the variability of the contents and concentration of psychoactive substances in marijuana and the psychological differences between people.

Red-eye and vision problems: The eye tissues contain cannabinoid receptors and exposure to cannabinoids induces corneal vasodilatation resulting in “red eye”. Cannabinoid exposure also has short-term and long-term effects on visual acuity and causes alterations in color discrimination and an increase in sensitivity to light. (Kiplinger et al. *Clin Pharm & Therapeutics* 1971;12:650-657). Long term-marijuana users, even after abstaining for as long as 10 years, tend to have an increase in sensitivity to light and a decrease in dark adaptation, color matching and visual acuity. (Dawson et al. *Invest Ophthalmol Vis Sci* 1977;16:689-699)

Stillbirths: Exposure to marijuana, including exposure to second-hand marijuana smoke, during pregnancy has been shown to increase the risk of stillbirth (*Vanner M. Ob Gyn* 2014;123(1):113-125). The study documented that blood THC levels even below the 3 ng/ml threshold of “intoxication” is detrimental to the unborn child. Blood levels of THC above 3.5ng/ml have been repeatedly documented in people exposed to second-hand marijuana smoke for at least 3 hours. (Rohrich J. *J Anal Toxicol* 2010;34(4):196-203)

Long-term health consequences of using marijuana

Dental health: Using marijuana is associated with the development of periodontal dental disease. This effect occurs in people who smoke marijuana; ingest marijuana, and who only use the drug occasionally. The periodontal effects are related to the negative systemic effects of cannabis on the immune system. (Ashton CH. *Br J Psychiatry* 2001;178:101-106) High frequency users have more severe periodontal disease causing inflammation of the gums leading to loosening of the teeth from the gums and underlying bone resulting in early loss of teeth. (Thompson et al. *JAMA*, 2008;299(5):525-531) Cannabis use has also been linked to several other oral and dental problems including fiery-red gingivitis, gingival overgrowth, inflammation of the uvula and benign and cancerous oral tumors.

Cardiovascular events: There have been an increased number of reports of cardiovascular complications in young people. There are multiple case reports of atrial fibrillation in children and adults following exposure to cannabis (Singh et al. *Pediatrics* 2014;133(2):e443-446, Korantzopoulos et al, *Am J Card* 2014;113(6):1085-1086). In addition, cannabis use is associated with cardiovascular complications. A recent report from France, where reactions to substance abuse must be reported, revealed that from 2006-2010 1.8% of all cannabis-related sequella were cardiovascular, including acute coronary syndromes, peripheral arteriopathies (Buerger-like diseases {thromboangiitis obliterans}) and cerebral complications (Jouanjus et al, *J Am Heart Assoc.* 2014;3:e000638).

Emphysema and spontaneous pneumothorax: The known consequences of chronic marijuana smoking include chronic cough, sputum production, wheezing and high frequency of acute bronchitis (Taylor et al, *Addiction* 2000;95:1669-1677). Spontaneous pneumothorax has also been reported to be the presenting symptom of bullous emphysema in otherwise healthy asymptomatic young adults who chronically smoke marijuana but not tobacco. The bullae appear at the apex of the lung with no signs of emphysema of the entire lung. Chronic marijuana use should now be included in the differential diagnosis of pneumothorax (Beshay M et al, *European Journal of Cardio-Thoracic Surgery*, 2007; 32:834-838).

Hyperemesis syndrome: The cannabinoid hyperemesis syndrome may occur following frequent use of marijuana for several months or years. Essential clinical criteria for the diagnosis include 1) history of regular cannabis use, 2) severe nausea, 3) vomiting that recurs in a cyclic pattern over months and 4) resolution of symptoms after stopping cannabis use. Supporting features for the diagnosis include (1) compulsive hot baths with symptom relief, (2) colicky abdominal pain, and (3) no evidence of gall bladder or pancreatic inflammation. (Simonetto, DA et al. *Mayo Clinic Proceedings* 2012;87(2):114-9).

Risks to family, job, and safety as a result of using marijuana: Inadvertent exposure to THC either through exposure to second hand smoke, accidental ingestion of marijuana-edibles or contact with marijuana buds during the drying process may pose a significant health threat to innocent by-standers. As noted, exposure to second hand smoke results in increased blood levels of THC with all the consequences of inhaling or ingesting marijuana. There are numerous reports in the medical literature about accidental childhood THC poisoning resulting in hospitalization, including the necessity of ICU care. (Wang, GS. *JAMA Pediatr* 2013; 167(7):630-633 and Molly C. *Arch Pediatr.* 2012; 19(7):729-732). Family members and friends, especially children, who have a history of asthma, are prone to severe asthma attacks following exposure to marijuana smoke by either inhalation or contact with contaminated clothing. THC in marijuana buds is volatile (forms a gas) and exposure to buds during the drying process can result in increased blood levels of marijuana. (Ross SA. *J Nat Prod* 1996; 59(1):49-51)

Marijuana may be detected in the urine for at least 30 days after using marijuana or after exposure to second-hand smoke. The more often someone smokes, the longer THC stays in one's system. The THC detected in urine for employment testing is for the metabolite of THC, known as THC-COOH and is non-active. There is an allowable amount of 50 nanograms of the THC metabolite before someone has failed the drug test. Employers have the right to perform random drug tests on employees. Positive tests may cause a person to be unemployable.

The National Highway Traffic Safety Administration (www.NHTSA.gov) has extensively studied the effects of marijuana on driving. Marijuana impairs driving for up to 3 hours after use and results in:

- Decreased car handling performance
- Increased reaction times
- Impaired time and distance estimation
- Motor in-coordination
- Decrease vigilance

Mental health disorders- chronic depression and schizophrenia: Short-term psychological effects include a distorted sense of time, magical or "random" thinking, short-term memory loss, and depression. These psychological problems generally ease after a few hours but residual effects can last for days. There is a significant and consistent relationship between marijuana use and the development of schizophrenia and chronic depression. The results of scientific studies showing an association between marijuana use and these mental disorders are alarming. A prevalence rate of persistent depression as high as 40% in chronic marijuana smokers has been reported (Brook JS. *Psychol Rep* 2011; 108(2):339-357). A 2004 article in the *British Journal of Psychiatry* reviewed 4 large studies, all of which showed a significant and consistent association between consumption of marijuana, mostly during teenage years or early 20s, and the later development of schizophrenia. The review concluded that marijuana is a "causal component" in the development of schizophrenia and other psychotic disorders. (Caspi et al., *Biol Psychiatry*, May 2005.) The mechanism of action is not clear but some studies implicate sudden depletion of dopamine or alterations in the dopamine receptor. (Strejilevich SA et al. *Med Hypotheses* 2012;78(1):107-112) In addition, a number of well-designed scientific studies have shown an association between chronic marijuana use and increased rates of chronic depression and schizophrenia in people with abnormalities of the *COMT* gene. Variations in the *COMT* gene are present in 1:4000 live births (Zammit et al. *Br J Psychiatry* 2011; 199(5):380-385).

Learning problems and school performance/job performance: Early initiation and continued use of marijuana affects memory, attention and ability to think clearly, making it difficult to concentrate, learn new things, and make sound decisions (Dougherty DM et al, *Psychopharmacology* 2013;226(2):307-319). As a result, school performance is impaired, increasing number of absences and increasing the risk of dropping out of school. In Washington State, the Healthy Youth Survey results for 2012 found that high school students who used marijuana were more likely to get lower grades in school (Cs, Ds, or Fs) compared to those that do not use. While it is difficult to distinguish whether this is due to learning difficulties, lack of motivation, or because marijuana users mix with peers who may be involved in a range of risk taking behaviors, using marijuana at an early age is independently associated with learning problems. (Crean RD et al. *J Addict Med.* 2011;5(1):1-8).

Loss of IQ: Recent reports show that fewer teens and young adults believe that cannabis is harmful to health. Concomitantly they are beginning to use cannabis at a younger age and more frequently (daily cannabis). In view of this change in behavior a long-term epidemiological study was performed using data collected on over 1000 participants over a 38 year period. The results revealed that users had more cognitive problems and a decline in IQ over the study period (average 8 points). The problems were more severe in users who started marijuana during adolescence and in more persistent users. (Meier M. *Proc Natl Acad Sci USA* 2012;109(40):E2657-2664). Other studies have confirmed that teens who are chronic marijuana users have reduced problem solving skills and exhibit "cognitive inflexibility." (Egerton A et al. *Neuropsychopharmacology* 2005;30(10):1895-18905).

Memory loss and changes in brain structure: Persistence use of cannabis in adolescents is associated with defects in both acute and long term memory. Researchers have suggested that these defects are related to changes in synaptic function within the cortico-basalganglio-thalamic circuits that play an important role in memory. This circuitry includes the striatum, globus pallidus and thalamus (S-GP-T). These areas contain a dense population of CB1 receptors. A recent controlled study of patients with poor memory function, who were part of a larger cross-sectional neurobiological study of schizophrenia, and who persistently smoked marijuana underwent MRI brain surface mapping. This unique study compared findings in 4 groups of patients with poor memory function documented by neuropsychological testing: the groups included 2 populations, one with schizophrenia and one without schizophrenia. The groups were subsequently divided into 2 subsets, those who were addicted to smoking marijuana (but did not

use marijuana for the preceding 6 months), and those who never used marijuana. It is known that patients with schizophrenia exhibit structural changes in the S-GP-T. These same changes were present in study patients who did not have schizophrenia but chronically smoked marijuana and were most severe in schizophrenic patients who smoked marijuana (Smith MJ et al., Schizophrenia Bulletin 2014;40:287-299).

Withdrawal: THC is a fat-soluble drug and therefore stays in the body fat much longer than other drugs. Withdrawal symptoms include anxiety, tremor, aches and pains, sleep problems and craving of the drug. Restlessness, irritability, and insomnia can occur in heavy users.

Effects of prenatal exposure to marijuana on infants and children

Acute effects: Exposure to marijuana, including exposure to second-hand marijuana smoke, during pregnancy has been shown to increase the risk of stillbirth 2-fold. (Varner M. Ob Gyn 2014;123(1):113-125). The study documented that blood THC levels even below the 3 ng/ml threshold of "intoxication" are detrimental to the unborn child. Blood levels of THC above 3.5ng/ml have been repeatedly documented in people exposed to second-hand marijuana smoke for at least 3 hours. (Rohrich J. J Anal Toxicol 2010; 34(4):196-203).

Long-term effects of prenatal exposure on infants and children: Prenatal exposure to marijuana has been associated with numerous problems in the infant and child. A recent scientific study links fetal exposure to an increased risk for aggressive behavior and attention problems as early as 18 months of age. (Marroun EL. Drug Alcohol Depend 2011; 118(2-3):470-474). The relationship between prenatal marijuana exposure and long-term school achievement has also been examined. As a group prenatally exposed children performed below non-exposed peers on standard intelligence tests at age 6 years, showed attention problems and depression at age 10 years and performed poorly on standardized tests to measure reading, spelling, and mathematics reasoning at age 14 years. (Goldschmidt L. Neurotoxicol Teratol 2012; 34(1):161-167)

There is very strong circumstantial evidence, based on the principles of teratology and fetal malprogramming, suggesting that marijuana use during pregnancy damages the fetal endogenous cannabinoid system adversely modulating neurodevelopment and continuing this role into adulthood. (Richardson et al., Prenatal Cannabis Exposure- the "first hit" to the endocannabinoid system. Neurotoxicol Teratol.2016 Dec; 58:5-14). Because THC plays a crucial regulatory role in brain development, cannabis use during pregnancy negatively affects brain structure and function of the fetus. Prenatal exposure to cannabis evokes long lasting functional alterations on developing brain cells. (de Salas-Quiroga et al., Proc Natl Acad Sci U S A. 2015 Nov 3;112(44):13693-8.)

Perinatal exposure to THC also has a profound effect on the developing immune system as evidenced by a decrease in the size of the thymus and marked alterations in T cells numbers (decreased) and function in exposed fetuses. (Lombard C. Perinatal exposure to Δ9-tetrahydrocannabinol triggers profound defects in T cell differentiation. J Pharmacol Exp Ther. 2011 Nov;339 (2):607-17)

Natal Exposure/Breast Feeding: There are insufficient data to evaluate the effects of marijuana use on breastfeeding infants. In the absence of such data, marijuana use is discouraged during lactation. (American College of Obstetricians and Gynecologists Committee on Obstetric Practice. July 2015). However, contemporary marijuana products have higher quantities of THC than in the 1980s and early 2000's when much of the marijuana research was completed and the effects on pregnancy and fetus may therefore be different than those previously seen. (Metz TD. Marijuana use in pregnancy and lactation: a review of the evidence. Am J Obstet Gynecol. 2015 Dec;213(6):761-78.) There is some evidence suggesting that cannabis use during breastfeeding adversely affects the infants' neurodevelopment and impacts neuropsychiatric, behavioral, and executive functioning. (Jaques et al, J. Perinatol 2014, doi 10.1038/jp.2013.180)

Accidental intoxication in infants and children: Infants and children may be accidentally exposed to THC through exposure to second hand smoke, volatilization of THC during drying of the marijuana plant (buds) or ingestion of marijuana edibles. In February 2013, the National Institute on Drug Abuse published statistics confirming an increase in marijuana use among teens which is now at a 5 year high. More worrisome is the report by Wang and colleagues in July 2013. Medical toxicologist George Wang and his colleagues at the Rocky Mountain Poison and Drug Center in Denver published a study about pediatric marijuana poisonings. "We are seeing increases in exposure to marijuana in young pediatric patients, and they have more severe symptoms than we typically associate with marijuana," Wang said "We hadn't seen these exposures before the big boom of the medical marijuana industry." At children's hospital there were a total of 1378 patients younger than 12 years evaluated for unintentional ingestions during the retrospective study group from January 2005 to the end of 2011. Of those cases, there were 0 of 790 cases due to ingestion of marijuana prior to the law's change and 14 of 588 cases after the law changed on Sept. 30, 2009. (Wang et al, JAMA Pediatrics. 2013;167(7):630-633).

The use of cannabis as both a therapeutic agent and recreational drug is common, and its availability is increasing as a result of legalization in many countries. Among older children, the manifestations of cannabis intoxication are numerous and include both neurological and systemic manifestations that are frequently non-specific. There have been only a few reports detailing cannabis intoxication in infants and toddlers. We describe three infants who presented to the emergency department with encephalopathic signs without prominent systemic manifestations. During the initial interview of caregivers, no history of exposure to neurotoxic agents was obtained. All three patients were subsequently diagnosed with cannabis intoxication based on urine toxic screens for delta-9-tetrahydrocannabinol (THC). The infants recovered with supportive care that included fluids and monitoring. The non-specific symptomatology of cannabis intoxication in infants together with the wide differential for unexplained acute onset encephalopathy may delay diagnosis and lead to inappropriate procedures and interventions such as antimicrobial treatments and imaging studies. Healthcare personnel of emergency rooms, urgent care centers, and general clinics should be aware of the potential risk of cannabis ingestion in young infants. A thorough medical history and toxic screen are warranted in all infants with unexplained decreased sensorium. (Lavi E. et al., Sudden onset unexplained encephalopathy in infants: think of cannabis intoxication. Eur J Pediatr. 2016 Mar;175(3):417-20.)

Abuse of Prescription Opiates (Pain Killers)

Identifying Narcotic Abuse: Signs of Abuse

- The warning signs of addiction to prescription drugs include the following:
- Using more than the recommended amount of the medication
- Using prescription pills prescribed for others
- Complaining of vague symptoms to get more medication
- Lack of interest in treatment options other than medications
- Mood swings
- Seeing several doctors and/or pharmacies to get more pills

Opioids are commonly prescribed for pain-relief and include morphine, tramadol, opium, codeine, hydrocodone, methadone, hydromorphone, oxycodone, and codeine. Prescription pain-killers within this class include morphine, codeine, hydromorphone (Dilaudid), tramadol (Ultram), oxycodone (OxyContin, Roxicodone, Percodan, Percocet), hydromorphone (Opana), and hydrocodone (Vicodin). Opiates also act as depressants. The popular prescribed painkillers are addictive and abusers may exhibit any of the following:

Signs of Addiction

Constricted pupils	Drowsiness & excessive yawning
Lack of energy/motivation	Become more isolated or alone
Skin cool to touch	Itching of face, arms, and body
Ptosis - "on the nod"	Lack of coordination
Slurred, slowed raspy speech	Inability to concentrate
Slow/shallow breathing	Depression, apathy, & withdrawal
Slowed reaction time	Sweating
Impaired mental function and alertness	Dry mouth
Flushing of neck and face	Drooping eyelids

Women are 2-3 times more likely to be prescribed these drugs and are about 2 times more likely to become addicted. Seniors take more of these drugs than the rest of the population, increasing their odds of becoming addicted. However, recent national studies show that the sharpest increase in users of prescription drugs for non-medical purposes is the 12 to 25 year age group. Those who abuse opioids may intensify their experience by taking the drug in ways other than those prescribed. For example, OxyContin is an oral medication but may be snorted or injected, thereby increasing their risk for serious medical complications, including overdose.

Opiate pain relief

Opioids act by attaching to opioid-receptors that are found in the brain, spinal cord, gastrointestinal tract, and other organs in the body. When these drugs attach to their receptors, they block the perception of pain (and cause brain injury, see below). In addition

to relieving pain, opioids produce drowsiness, mental confusion, nausea, and constipation. Some people experience a euphoric response to opioid medications, since these drugs also affect the brain regions involved in reward.

Short Term Effects

Short-term administration of prescription drugs produce euphoria, sedation and a feeling of tranquility. Repeated administration rapidly produces tolerance (increasing the dose, reducing intervals between doses or both) and intense physical dependence. Overdose causes respiratory depression. Continued use of opiates makes the body rely on the presence of the drug to maintain rewarding feelings and other normal behaviors. The person is no longer able to feel the benefits of natural rewards (food, water, sex) and cannot function normally without the drug present.

Long Term Effects

Opiates are considered extremely addictive and this addiction affects the structure and function of the brain, especially motivation and emotions. The ways in which the nerve cells communicate are changed because of damage to neurotransmitters and to the shapes of brain cells. The damage alters the way people behave.

Drug interaction poses another risk. If the physician or pharmacist is not aware of everything that a person is taking they may prescribe a medication that will interact with the illicit drug and result in serious side effects. Vitamins and herbal remedies fall into this category. The combination of alcohol and prescription drugs can affect the central nervous system, leading to respiratory distress or failure, or even death.

Commonly abused prescription opiates

Of the 7 million people abusing prescription drugs, 5 million are abusing opiate painkillers. With the reformulation of OxyContin limiting abuse, the prevalence of other prescription painkillers is increasing.

Oxycodone - Percocet & Roxicodone: Oxycodone is among the fastest growing of all prescription drugs people abuse in the United States. Percocet is the brand name of a painkiller containing oxycodone and acetaminophen (Tylenol). Overdose can cause, abdominal pain, dark urine, clay-colored stools, liver damage, and jaundice. Percocet known as Perc's on the street, can be smoked, snorted, and injected. Percocet taken in large doses, or when the tablet is crushed for snorting, smoking or injecting (destroying the time-release mechanism) and can cause a "high" similar to using heroin.

Roxicodone is a painkiller in the oxycodone family with a high potential for abuse. It is in an immediate-release form and acts more quickly than the timed-release forms of opiate pain-killers. Addicts and treatment providers state that 30mg of Roxicodone when abused by snorting, smoking, or injecting is the painkiller that produces effects most similar to heroin. On the street it is known as Blues, OxyIR, Blueberry, Thirties, OC, or Roxys.

Oxymorphone – Opana: Opana became more sought after once OxyContin was reformulated. Opana is an extended release opiate painkiller in the oxymorphone family. Many think oxymorphone has less potential for abuse than OxyContin (oxycodone), however oxymorphone is metabolized oxycodone. Opana is extremely potent with many experts claiming it is more addictive than cocaine or heroin. Opana can be snorted, smoked, or injected.

In 2011, Indiana's state health department investigated an increase in Hepatitis C cases in a county in southeastern Indiana. As more Opana users transitioned to injection, hepatitis C spread quickly through sharing of syringes. The CDC estimated that between 2010 and 2012, new hepatitis C infections rose 75%, to about 23,000 new cases a year. In January 2015, the Indiana State Health Department began an ongoing investigation of a rise in HIV cases in this county. Of the 135 confirmed cases of HIV, 108 cases report dissolving and injecting Opana as their drug of choice. This is the first documented HIV outbreak in the United States associated with injection of a prescription painkiller. (CDC, *Morbidity & Mortality Weekly Report*, April 2015)

In August 2012, three cases of unexplained thrombotic thrombocytopenic purpura (TTP), a rare but serious blood disorder, were reported by a nephrologist to the Tennessee Department of Health (TDH). By the end of October, 15 such cases had been reported. A case-control study was conducted, and investigators determined that the cases of TTP-like illness were associated with dissolving and injecting tablets of Opana ER. Seven of the 15 were treated for sepsis and TTP-like illness, 12 patients reported chronic hepatitis C or had a positive test for anti HCV antibodies. Health care providers and pharmacists who prescribe or dispense Opana ER should inform patients of the risks associated with the drug being used in ways other than being prescribed. Health care providers should ask patients with TTP like illness of unknown origin about any IV drug use. (CDC, *Morbidity & Mortality Weekly Report*, Jan 2013)

Signs of Opana overdose:

- Suppression of breathing
- Cold or clammy skin
- Muscle flaccidity
- Stupor
- Coma
- Chest pain
- Drop in blood pressure & heart rate
- Numbness in arms and legs
- Circulatory collapse
- Cardiac Arrest
- Death

Dilaudid & Fentanyl Abuse:

Dilaudid on the street is known as “Big D” “M-80’s” and “Peaches”. Dilaudid is a schedule II drug and often used to manage moderate to severe pain. Dilaudid is hydromorphone hydrochloride and is a very powerful semi-synthetic opioid narcotic painkiller considered to be almost 10 times stronger than morphine. Dilaudid is often used as an alternative to morphine. Dilaudid takes effect within 15 minutes and lasts for longer than six hours. It can be addictive like all other opiates. Tolerance and dependence can occur within a couple weeks of use. Dilaudid can be ingested, smoked, snorted or injected.

Common indicators of Dilaudid abuse:

Physical Indicators:

Nausea and vomiting
Respiratory depression
Stomach Pain
Difficulties urinating
Dizziness/lightheadedness
Track marks on arms, legs, between toes
Circulatory collapse
Heart attack
Stroke
Coma
Seizures

Psychological Indicators:

Worsening of emotional wellbeing
Exacerbation of mental illness symptoms
Delusions
Hallucinations
Paranoia

Mood indicators:

Depression
Anxiety
Mood swings
Agitation
Irritability

Fentanyl is one of the strongest opiate drugs on the market. It is a synthetic drug, is 50-100 times more potent than morphine, and 15 times more potent than Heroin. It is used to treat severe pain in individuals with injuries or chronic illness, after surgery or prescribed for individuals who are tolerant to other opiates. It can be powdered out, liquid, pill, lollipop, or gel patch form. It can be ingested, smoked, snorted, injected, or addicts will chew on the patch. Fentanyl is often stolen from hospitals, pharmacies, and home hospice care.

Fentanyl is often added to Heroin on the street when Heroin is dirty or of poor quality. Powdered fentanyl is indistinguishable from heroin so users have no way of knowing if it's mixed in heroin or being sold in replacement of heroin (china white). This potent drug can be used alone or in combination with another substance and just one use, can kill you. More and more states are seeing death from fentanyl overdose alone, indicating it is being sold as heroin or being used as its replacement.

Indicators of Fentanyl abuse:

Dizziness and lightheadedness
Dry mouth
Retention of urine
Suppression of breathing

Difficulty seeing
Depression
Hallucinations
Bad dreams

Severe constipation
Itching or hives
Nausea and vomiting
Loss of appetite
Weight loss

Insomnia
Sweating
Tremors
Swelling of arms and legs
Headaches

****Note, “fake” or “mock” Xanax pills laced with Fentanyl have been found on the street causing overdoses and death across the nation.**

Poppy Tea

Poppy tea is generally brewed from the seeds, pods, and/or straw of the opium poppy (*papaver somniferum*), grown in Mexico, South America, and Asia. The Poppy seeds and pods contain opiates, including morphine, thebaine, codeine, papaverine, and noscapine, with the pods containing the largest concentration of opiates. The pods can be ordered online, or purchased at hobby stores where they are sold for flower arrangements. Users crush the seeds, pods, and stems (known as straw) then brew in very hot water creating a tea more potent and potentially more likely to cause an opiate-related overdose than brewing the seeds alone. The tea is very bitter, and the darker the color, the more potent it is. Some users add a flavoring to counteract the bitter taste. Some users will evaporate the liquid into a concentrate, and powder it out. They will put the concentrated liquid and/or powder into gel caps to ingest. The pods, straw, powder and liquid concentrates are a controlled schedule II drug by the DEA.

Upon ingestion of the tea, it can take from 20-60 minutes to start to feel the effects, and last about four to eight hours. Since this mixture contains opiates it can be addictive with tolerance building up within a week or two of daily use. Effects are similar to opiates and include: warming sensation throughout body, constricted pupils, euphoria, nausea and vomiting, constipation, stomach and abdominal discomfort, drowsiness, and loss of concentration. Adverse effects, which increase with dosage, can include sleepiness, mild stomachache, lethargy, itching, slowed breathing, and nausea. At high doses, death can occur through respiratory depression. A number of deaths have been reported across the US from the ingestion of poppy tea. The tea has also been known to be mixed with benzodiazepines, increasing the negative effects and resulting in death.

Prescription Codeine: Codeine is an opiate used for managing pain and cough. Teens and young adults are abusing large amounts of liquid cough medications containing codeine in drinks known on the street as Syrup, Lean, Sizzurp, Texas Tea, Memphis Mud, or Purple Drank. This drink contains prescription strength cough medicine with codeine and promethazine (antihistamine) mixed with sugary candy, soda, or Arizona Tea to make it sweet and palatable. The combination is illegal and dangerous. The amount of cough syrup consumed can exceed up to 25 times the recommended dose.

The consumption of large amounts of this drink is glamorized in Hip-Hop music on the internet and on YouTube. There have been a number of arrests and deaths related to this drug combination. Most famously, rapper Lil Wayne talks and raps about use of this drink – he recently spent days in a coma from abusing it. It is also glamorized by the group Three Six Mafia. At least three hip hop rappers or producers have died, including DJ Screw and musician Big Hawk, both from Houston. This concoction is very dangerous since promethazine is a CNS depressant and codeine is a respiratory depressant. If the drink is combined with alcohol or other drugs, the risk of death is even more likely.

Signs of use include: slurred speech, blurred vision, euphoria, dissociation from one's body, impaired motor skills, lethargy, sedation, and drowsiness. Effects of Purple Drank include:

- Constricted pupils that do not respond well to light
- Rough, raspy voice
- Slow, slurred speech
- Uncontrolled eye movement
- Droopy eyes
- Slowed heart rate
- Drowsiness & weakness
- Loss of balance & coordination
- Paleness
- Constipation
- Urinary tract infection

- Dental problems
- Addiction
- Death (fatal respiratory depression)

Designer Opiates

Acetyl Fentanyl: Acetyl fentanyl is a new and lethal drug and is becoming more popular among narcotic abusers. The drug looks similar to heroin and is being sold as heroin. Numerous deaths among intravenous users of this drug have been reported across the US. In fact, the drug came to the attention of authorities after several deaths of narcotic addicts were investigated and the drug was identified in blood samples by ELISA testing (using antibodies) but not detected by GC/MS (detects chemical molecules). The drug is not available by prescription and said not to be available in the US. However, the drug is available online and sold without questions as a “research chemical.” Overdoses are treated the same as any opiate overdose. However, the drug is 15X more potent than heroin and larger doses of rescue medications are often necessary.

Carfentanil: This new opiate was first created by Janssen Pharmaceuticals in 1974 and is an analogue of Fentanyl. It is marketed under the trade name *Wildnil* and used as a general anesthetic for large animals, i.e. elephants, rhino’s, hippo’s and bears. It is extremely potent, and claimed to be 10,000 times more potent than Morphine. It is a white powder that can be used anyway, and sold on the street as Heroin. It can be added in Heroin to make it more potent, and can be mixed with Cocaine as a “speed ball.” It is causing deaths across the nation.

U-47700: Known as “pink” on the street, it has been a problem since beginning of 2016. It is a designer opiate being made in drug labs in China. The U in the name stands for Upjohn, a pharmaceutical manufacturer that developed the drug in the mid-1970s. Scientists were looking for a synthetic alternative to morphine. Effects are similar to Tramadol. It is about 8X more potent than Morphine, and can be used any way - injected, snorted, smoked or put in pills and swallowed. Some people have “plugged” it, meaning dissolving it in a little water and using rectally, it will absorb very quickly like a suppository. U-47700 works as a selective μ -opioid receptor. The drug is sold in pill, powder and liquid form, and can be bought online for less than \$40 for a bottle of pills. It has been linked to 50 deaths across the nation. It is mixed with Heroin, sold as Heroin, and can be mixed with Cocaine.

Effects from use can be: Muscle aches, nausea & vomiting reported, irritable, mood swings, euphoria, pain relief relaxation, constipation, itching, difficulty urinating, constricted pupils, respiratory depression, death, anxiety suppression, depression. Short duration of effects can cause double dosing. It is corrosive to mucous membranes, and vaporizing the substance can damage the lungs. Sublingual administration is likely to damage the skin in the mouth.

At least three states — Ohio, Wyoming and Georgia — already have taken action to ban U-47700 after it was connected to overdoses. Wisconsin has banned it - it is illegal to buy or possess. A spokeswoman for the U.S. Drug Enforcement Administration said that the agency is studying the opioid but hasn’t yet moved to control it. Since Sept of 2016, 15 fatalities have been confirmed. Belgium had a death from U-47700 being mixed with Fentanyl.

Furanyl Fentanyl: This is an illicit designer version of fentanyl being mass-produced in clandestine labs in China - then smuggled into the United States via traditional distribution routes through Mexico. It was first described in patent literature in 1986 and has no approved medical use, and it has also not been approved by the FDA for human consumption. Research shows it to be 5X more potent than fentanyl - has an ED50 value of 0.02 mg/kg in mice.

It has been encountered as a single substance as well as in combination with other substances of abuse, including heroin, fentanyl, butyryl fentanyl, and U-47700. This potent drug has killed hundreds of people throughout Europe and the former Soviet republics, and the US has confirmed 128 fatalities associated with furanyl fentanyl in 2016. It was detected in 24 states in 2016, and is still available across the country. DEA reports use of powder can cause seizures, and treatment centers report users are not responding to normal protocol when trying to get someone off of these powerful drugs - requires higher doses of methadone for detox.

W-18: This designer opiate is likely coming from Chinese drug labs where little-known drugs and analogues of known drugs are mass-produced and sold online. It is 100 times more powerful than fentanyl and 10,000 times more powerful than morphine. It is known on the street as W-18, “beans” or “shady 80’s” - a play on 80mg OxyContin pills. This drug can be in powder form and it can

also come as little green round pills looking similar to 80mg OxyContin. Close examination reveals they are not Oxy pills. Recently it has been seen on the street sold as Fentanyl pills. The powder has been mixed with heroin, and found cut with Cocaine.

This drug was first synthesized in 1980 at the University of Alberta where scientists were looking at new analgesic drugs, where studies in animals showed it had pain-killing activity in mice. It has no therapeutic use, and due to potency is causing deaths all over Canada and the USA.

Due to the potency of these new designer opiates, Narcon (Naloxone) needs to be administered in high doses. Doctors and EMS across the country report using upwards of 10+ doses to an IV Narcon drip. Even with high doses, the lifesaving efforts often are resulting in death.

Pre-birth exposure to opiates and effects on the newborn

About 4%-10% of women admit taking opiates while pregnant, resulting in more than 500,000 newborns annually exposed to these drugs. The number of babies born with drug withdrawal symptoms tripled from 2000 to 2009 and hospital charges for their care increased from \$190 million to \$720 million. Fluctuations in an expectant mother's daily opiate use, because of voluntary abstinence or lack of access to the drug, may affect the fetus. Abrupt changes can precipitate the Fetal Abstinence Syndrome and increase the risk of premature delivery, low birth weight, and stillbirth.

Exposure to opiates decreases birth weight, birth length, and head circumference, but has not been associated with congenital malformations. Other associated problems include abnormally high muscle tone (stiffness and rigidity), inconsolability, irritability, sneezing, stuffiness, excessive sucking, poor sucking ability, Sudden Infant Death Syndrome (SIDS) and high-pitched cry. The high-pitched cry may signify a brain abnormality.

About 30% of exposed newborns are born prematurely and have a high mortality rate, either as a result of drug exposure, mother not taking care of herself or a combination of both. Babies may be born addicted to opiates (neonatal abstinence syndrome) and require treatment within the first few weeks of life. Methadone may be prescribed to pregnant women to facilitate withdrawal from opiate addiction and safe guard the newborn infant. Unfortunately, chronic use of methadone also results in neonatal addition and withdrawal problems. Methadone withdrawal may be more severe than withdrawal from heroin or narcotic pain-killers. Buprenorphine may be used to prevent the infant's withdrawal. Although withdrawal from buprenorphine may occur, the symptoms are very mild.

Naloxone (an opiate blocker) is given immediately after birth to any infant born to a mother who is known to be using opium, heroin, methadone, or hydrocodone. However, the mother's drug history may not be known until the infant develops symptoms after birth. Symptoms may start as early as 1 day or as late as 7 days after birth. Symptoms include tremors, irritability, sleep problems, seizures, yawning, stuffy nose, sneezing, unstable temperature, poor feeding, vomiting, and diarrhea.

Treatment includes keeping the infant swaddled and in a quiet, dark room, but most babies need medications. Morphine elixir and phenobarbital are the most commonly used drugs. Treatment may be required for 1-2 weeks or longer.

Mothers who are taking opiates should not breast-feed their infant.

Pre-birth exposure and the long-term consequences for older children

Children whose mothers used opiates during pregnancy have on-going neuro-developmental problems including short attention span, hyperactivity, sleep disturbances and mild memory and perceptual difficulties. Some studies have found evidence of delayed general cognitive function at 3 years of age with lower verbal ability, impaired reading skills, and impaired arithmetic skills. Opiate-exposed children are more likely to have ADHD or other disruptive behavior diagnoses at 10 years of age and 65% of opiate-exposed school age children repeat one or more grades or need special educational services. It is difficult to differentiate the impact of a poor postnatal environment and prenatal opiate exposure on children's long-term outcome and studies of prenatal opiate exposure and infants' early cognitive development yield mixed results. However, there is solid evidence linking exposure to behavioral problems, including ADHD and other disruptive behaviors. Long-term effects on growth have not been documented. (Pediatrics, Feb 2013)

Heroin Abuse

Heroin is an opioid drug synthesized from morphine. Heroin may be a white or brown powder or a black sticky substance known as "Black Tar Heroin." The drug can be smoked or vaporized and inhaled, snorted, sniffed (dissolved in nasal spray), or injected. When it enters the brain, it is converted back to morphine and binds to opioid brain receptors, especially those in the pain-perception and reward areas of the brain and in the brain-stem which controls wakefulness, blood pressure and breathing.

Moderate doses of heroin cause euphoria, a warm "rush" sensation, constricted pupils, and nausea. Higher doses result in restlessness, constipation, droopy eyelids (on the nod), shallow and slow breathing, depressed cough reflex, sweatiness, lethargy, slow heart rate, and sedation. Overdose results in respiratory failure and death. The drug is highly addictive and withdrawal symptoms (cold turkey) may begin within 6 to 24 hours of discontinuation of the drug. However, the time frame can fluctuate with the degree of tolerance as well as the amount of the last dose.

Withdrawal symptoms may include sweating, malaise, anxiety, depression, priapism, extra sensitivity of the genitals in females, general feeling of heaviness, cramp-like pains in the limbs, excessive yawning or sneezing, tears, runny nose, sleep difficulties (insomnia), cold sweats, chills, severe muscle and bone pain, nausea and vomiting, diarrhea, cramps, and fever.

Heroin abuse is associated with a number of serious health problems including fatal overdose, spontaneous abortion, and serious infectious diseases (HIV, Hepatitis C, sexually transmitted diseases). Pregnant women who are abusing heroin put the fetus at extreme risk. These problems are discussed in the section on the abuse of prescription-pain-killers.

What Are The Warning Signs Of Heroin Use?

- Lack of personal hygiene
- Tendency toward recklessness
- Withdrawal from family and friends
- Items of value being "lost or stolen"
- Burnt foil being present in car, room, or in personal effects
- Mood swings, intense rage, lying, and manipulation
- Sudden drop in grades and excessive ditching at school
- Finding evidence of prescription drugs
- Scratching hands and arms
- Strong craving for sweets, morning, noon, and night.
- Possession of drug paraphernalia (needles, burnt spoons, cotton balls, pens, cut-off water bottles, foil)
- Foil & toilet paper rolls are commonly used to smoke heroin

What Are The Physical Signs Of Heroin Use?

- Runny nose and constant sniffing
- Needle marks on arms and/or legs, between toes, in groin area
- Sores on nostrils and top of lips from smoking heroin
- Constant "hacking" cough from smoking heroin off of tin foil
- Loss of appetite and dramatic weight loss
- Nodding off during day and inability to sleep at night
- Dark circles under eyes and constant sleepy or groggy expression
- Scratch marks all over body, especially neck and arms

Treatment of opiate overdose of prescription drugs and heroin

Opioid-related disorders that require medical management include opioid intoxication, opioid overdose, opioid withdrawal, and treatment of acute pain in people already on maintenance therapy. Short-term and long-term treatment includes a combination of opioid agonist therapy (substituting one drug for another) and psychotherapy.

Deaths from abuse and overdose of these substances are becoming more and more common, especially among women and adolescents. Excessive doses, whether taken by mouth or injection, result in respiratory depression and asphyxiation. In this situation, rapid emergency treatment is imperative. Because overdose usually occurs in the presence of other people and because medical care is often not sought or sought too late, at-home naloxone programs have been piloted and have been found to save

lives. Naloxone prescription programs enable users to have kits on hand to administer intranasal naloxone to reverse the effects of narcotics.

For most addicts long-term treatment begins with detoxification, the controlled and medically supervised withdrawal from the drug. No single approach to detoxification is guaranteed to be best for all addicts. Medications used to detoxify the addict include methadone and buprenorphine or buprenorphine combined with naloxone (Suboxon®). Suboxone is often favored since abuse of this medication will cause withdrawal symptoms that addicts are trying to avoid. Maintenance medications used along with counseling include methadone, buprenorphine, or Suboxone or extended release naltrexone injections. Most addicts will resume taking the drug unless treatment includes long-term psychotherapy.

Opioid withdrawal in the adolescent

Withdrawal symptoms may occur even after short-term use. The symptoms are notoriously challenging and mild symptoms may mimic the flu. The process can be brutally painful and difficult to manage. Depending on the quantity, type, frequency, and duration of opioid use, the physical withdrawal symptoms may last for as little as 48-72 hours (for short-acting opioids such as hydromorphone and oxycodone) and as long as 30-60 days for long-acting opioids such as buprenorphine and methadone.

Symptoms of withdrawal from opiates include, but are not limited to:

Physical Symptoms	Behavioral Symptoms
Tremors	Dysphoria
Cramps	Malaise
Muscle and bone pain	Cravings
Chills	Anxiety/Panic attacks
Perspiration (sweating)	Paranoia
Priapism	Insomnia
Tachycardia (rapid heartbeat)	Depression
Itch	Flu-like symptoms

Heroin use during pregnancy and the effect on the fetus, newborn and child

Heroin abuse during pregnancy and its associated environmental factors have been associated with poor fetal growth, premature delivery, premature rupture of membranes, still birth and low birth weight (an important risk factor for developmental delay). Blood tests at birth have shown the infant's blood levels to be 50% - 100% of the mother's drug level. Using heroin also raises the baby's risk of contracting the HIV virus. Babies born to mothers using heroin while they are pregnant inherit their addiction and upon birth must go through withdrawal and treatment of withdrawal.

Low birth weight Babies born to addicted mothers have been shown to have many difficulties later in life, including:

- Language, visuo-motor, and other learning disabilities
- Behavior problems
- Children are more likely to be rejected by peers
- Performance in school may suffer and the children may need special education courses
- Behavioral problems with hyperactivity and short attention span
- The need for foster care placement

Cocaine

Cocaine is a powerfully addictive drug. Once having tried cocaine, an individual may have difficulty controlling the extent to which he or she will continue to use the drug. Cocaine produces intense euphoria and alertness, makes users feel more energetic, and reduces hunger. Cocaine's effects appear almost immediately after a single dose and disappear within a few minutes or hours. Psychological effects include feelings of well-being and a grandiose sense of power and ability mixed with anxiety and restlessness. Some users find that the drug helps them to perform simple physical and intellectual tasks more quickly, while others experience the opposite effect. As the drug wears off these temporary sensations of mastery are replaced by intense depression. The abuser will then "crash", becoming lethargic and typically sleeping for several days.

The duration of cocaine's immediate euphoric effects depends upon the route of administration. The faster the rate of absorption, the more intense the high, but the duration of action is shorter. Smoking crack is very addictive and has a very intense high, but the high only lasts 5 to 10 minutes. The short-term effects of cocaine include:

Physiologic (Functional) Changes

Increased energy
Decreased appetite
Increased alertness
Increased heart rate
Increased blood pressure
Constricted blood vessel
Elevated temperature
Feelings of strength and power
Euphoria
Excitement

Changes in Appearance

Cold sweats
Convulsions
Swelling and bleeding of gums
Restlessness and anxiety
Damaged nasal cavities
Vomiting
Malnutrition and weight loss
Dilated pupils

The long-term effects of cocaine include irritability, mood disturbances, restlessness, paranoia, and auditory hallucinations. Tolerance to cocaine may develop and addicts report that they do not experience as much pleasure with repeated doses as they did from their first dose. Users can become "sensitized" to the drug and develop seizures after taking their usual dose of cocaine. "Sensitization" may explain why some deaths occur after apparently low doses of cocaine.

Cocaine indicators:

- Dry mouth
- Runny nose/ nosebleeds
- Dilated pupils
- Excited and talkative
- Increased alertness and self-esteem
- Increased physical activity
- Difficulty in concentrating
- Visual impairment
- Mood swings
- Compulsive behaviors (repeated hand washing, teeth grinding)
- Restless and aggressive behavior
- Agitation and combativeness
- Paranoia and hallucinations

Medical complications of cocaine use

There are enormous medical complications associated with cocaine use. The risk of heart attack is increased by a factor of 24 during the 60 minutes after the use of cocaine, unrelated to the amount ingested. Up to 25% of patients seen in Emergency Rooms for evaluation of chest pain have detectable amounts of cocaine in the urine. Heart attack is a known complication.

Different routes of cocaine administration can produce different adverse effects. Regularly snorting cocaine can lead to loss of sense of smell, nosebleeds, problems with swallowing, hoarseness, and an overall irritation of the nasal septum. Ingested cocaine can cause severe bowel gangrene due to reduced blood flow to the intestine. Persons who inject cocaine have puncture marks and "tracks" most commonly in their forearms and are at high risk of infection.

There is a potentially dangerous interaction between cocaine and alcohol. Taken in combination the two drugs produce a sense of increased and prolonged euphoria. However, they are converted in the body to cocaethylene. Cocaethylene has a longer duration of action and is more toxic than either drug alone and in some people may cause severe heart and liver problems.

Withdrawal

There are no visible symptoms associated with cocaine withdrawal. Users do not experience vomiting or shaking, but will have intense cravings for the drug, irritability and delayed depression. About half the cocaine addicts have an underlying mental health disorder, e.g. ADD or depression, and the symptoms of these disorders are worse with withdrawal.

Crack Cocaine

Crack cocaine is a very hard substance, and is the smokeable form of coke. Crack has a very intense high that lasts 2-3 minutes and thus extremely addictive. This intense high is chased over and over. Addicts will do whatever they have to do to obtain the drug or money for the drug, from prostitution, to crimes, to working for dealers. Addicts can be up for days in a row binging on the drug.

Short term effects include:

- Increased blood pressure and heart rate
- Constricted peripheral blood vessels
- Increased rate of breathing
- Dilated pupils
- Hyper-stimulation
- Intense euphoria
- Decreased appetite
- Anxiety and paranoia
- Aggressive, paranoid behavior
- Depression
- Intense drug craving
- Sudden death - even one use can cause death

Long term effects include:

- Severe depression
- Irritability and mood disturbances
- Aggressive, paranoid behavior
- Delirium or psychosis
- Tolerance and addiction, even after just one use
- Auditory and tactile hallucinations
- Heart attack and heart disease
- Stroke
- Respiratory failure
- Brain seizures
- Sexual dysfunction (for both men and women)
- Reproductive damage and infertility (for both men and women)
- Increased frequency of risky behavior
- Death

Symptoms of Crack addiction includes:

- Frequent infections
- Changes in sleep patterns
- Changes in attitude or mood
- Excessive burns or blisters on the fingers or lips
- Spending time avoiding family or friends
- Loss of interest in sex, food or other activities
- Irritability, anger and irrational behaviors
- Prostitution to pay for drugs
- Suffering legal problems as a result of drug use and still choosing to use drugs
- Suffering relationship problems as a result of drug use and still choosing to smoke crack
- Suffering from financial ruin and consistently spending money on crack
- Stealing, cheating, lying or otherwise taking part in abnormal activities in order to get more crack

Effects on the fetus

Cocaine has devastating effects on the fetus. The exposed fetus does not grow appropriately, is born prematurely, and is likely to have problems related to blockage of blood vessels: stroke, intestinal perforation or blockage or limb abnormalities. Addicted mothers are at risk of rupturing their uterus at the time of delivery. Older children typically have behavioral problems, poor alertness, poor orientation, irritability, and symptoms of ADHD with prominent oppositional-defiant behavior.

Methamphetamine

Methamphetamine addiction is gripping the Nation. There are at least 1.5 million addicted users in the US. The "Monitoring the Future" survey of student drug use reports 4.5 % of high school seniors had used meth in their lifetimes, 4.1% of 10th graders, and 3.1% of 8th graders.

Methamphetamine is a very strong central nervous system stimulant that affects dopamine release in the brain. Its use fires up the central nervous system, constricts blood vessels, dilates the pupils and increases body temperature, heart rate and blood pressure. The user is put in a state of constant fight or flight. Dealing with someone high on meth is very dangerous. One hit of meth can keep the user high for 12 to 24 hours.

Methamphetamines may be smoked, snorted, injected or ingested. An intense rush (flash) appears immediately after smoking or injecting the drug. The flash is extremely pleasurable but lasts only a few minutes. Snorting or ingesting the drug results in euphoria without a flash, starting 3-5 minutes after taking the drug and lasting 15-20 minutes.

Indicators of methamphetamine use

Dry Mouth	Exaggerated reflexes and tremors
Dilated pupils	Increased alertness and self-esteem
Profuse sweating	Hyper-excitability, restlessness
Excited and talkative	Panic and anxiety
Rapid respiration	Agitation and combativeness
Loss of appetite	Paranoia, hallucinations and depression
Inability to sleep	

Drug Effects

The short-term effects of the drug are increased wakefulness and increased physical activity, decreased appetite, increased libido, rapid heart rate, increased blood pressure and hyperthermia (elevated body temperature). Death may occur as a result of hyperthermia, convulsions or cardiac arrest. Long-term effects are psychosis, paranoia, hallucinations, repetitive motor activity, loss of memory, aggressive or violent behavior, severe dental problems and weight loss. Methamphetamine has become highly associated with risky sexual behavior, increasing the risk for contracting hepatitis B or C and HIV.

Complications

The major complication of meth addiction is the devastating effect the drug has on the addict and his/her friends/family. Rarely does the addict return to being the person he/she was before exposure to meth. Meth has been associated with 2 major cardiovascular problems: heart attack and aortic dissection (tearing).

Withdrawal

The symptoms of methamphetamine withdrawal are primarily fatigue, depression and increased appetite. Symptoms may last for days with occasional use and weeks or months with chronic use. The severity is dependent on the length of time and the amount of methamphetamine used. Withdrawal symptoms may also include anxiety, irritability, headaches, agitation, excessive sleeping, vivid or lucid dreams, and suicidal ideations.

Effects on Infants and children

Methamphetamines damage the fetus resulting in permanent brain abnormalities with subsequent delay in language skills and aggressive behavior. The newborn is often born premature and small for gestational age. At the time of birth there may be placental abruption and the mother is at risk of rupturing her uterus. Infants exposed to prenatal meth also have poor suck, smaller head size, shorter length and more often require intensive care. Prenatal exposure leads to future self-control problems in early school-age children, including poor attention, poor self-regulation skills, and poor problem solving skills; all due to changes in the frontal cortex of the brain. Long-term medical research studies regarding growth are ongoing, however poor growth through 3 years of age has been documented. Laboratory studies have shown that meth impairs mineral uptake in the developing cartilage thus affecting

growth. Poor growth may also be associated with the effects meth has on the mother including hypertension and placental abnormalities. Meth-mothers more often have psychiatric/emotional problems and these infants/children are more likely to be abused or neglected.

Drug Testing

Most laboratories use a 5 panel urine drug screen that checks for PCP, marijuana, cocaine, methamphetamines/amphetamines and opiates. This drug screen is most commonly used for regular workplace screening. Tests that detect a specific drug may be used for diagnosis and monitoring.

The standard U.S. National Institute of Drug Abuse (NIDA) urine test includes a one-step rapid assay for the detection of opiate and opiate metabolites. Heroin breaks down into codeine and morphine. Codeine breaks down into morphine. The opiate drug tests look for codeine, morphine, and 6-acetyl-morphine. The presence of 6-acetyl-morphine is relatively conclusive of recent heroin use, but is only detectable for a few hours after use. The presence of codeine can be the result of either heroin or codeine use. The presence of morphine can be the result of the use of heroin, codeine, or morphine. Relative levels of codeine and morphine can help determine their origin. Fentanyl does not show up in the 5-panel test and a specific test must be requested. Opiates may be detected in the urine for up to 4 days after use: opium for 1-2 days, heroin for 1-4 days and morphine for 3-4 days.

A number of substances may cause “false positive” tests, including poppy seeds, cough medicines containing dextromethorphan, Nyquil, kidney infection, kidney disease, diabetes, liver disease and various antibiotics.

Users can adulterate the test to mask the results by adding “Urine Luck” to the sample. This product contains a chemical (pyridinium chlorochromate) that alters the molecular structure of opiates (and THC). However, this agent is easy to detect. Instant drug-testing urine dip cards are available that test for the 5 drugs in the NIDA standard test and also detects oxidants and other agents that can cause the urine drug test to be negative.

Saliva drug testing can generally detect drug use that occurred in the last few days. This makes saliva drug testing excellent for post-accident drug testing, pre-employment testing and random testing. Most saliva drug tests are limited to the NIDA-5 i.e. cocaine, marijuana, opiates, amphetamines and barbiturates but when warranted saliva drug testing can be set up to detect any drug use. Saliva drug testing cannot be beat with conventional mouthwashes.

Detection in urine:

Drugs have certain “detection windows” meaning the amount of time after ingestion that evidence of their use can be detected by a drug test. Alcohol is absorbed and eliminated more quickly than other drugs; therefore, many employers have post-accident testing procedures that require testing for alcohol to occur within two hours of the incident. Other drugs are eliminated from the body at different rates and thus detectable for different periods of time, often long after the drug's effect has worn off. The following are estimates of the length of time that certain drugs are detectable:

- Alcohol – 2-12 hours
- Amphetamines/Methamphetamine – 2-3 days
- Adderall / Ritalin – 2-5 days
- Bath salts – 4-7 days
- Barbiturates – 2-10 days
- Benzodiazepines – 1-6 weeks
- Cocaine – 2-10 days
 - Benzoyllecgonine - 2-4 days
 - Heavy use - up to 10 days
- Codeine – 2-4 days
- Ecstasy (MDMA) – 2-3 days
- Heroin - 1-3 days
- Morphine – 2-3 days
- LSD – 8 hours
- Marijuana

- 1 time only – 5-8 days
- 2-4 times month - 11-18 days
- 2-4 times week – 23-35 days
- 5-6 times week – 33-48 days
- Daily use – 49-90 days

Methadone – 2-3 days

Phencyclidine (PCP) – 1 week

Prescription Opiates – 3-5 days

Suboxone – 2-7 days

Synthetic Pot (K2 / Spice) – 4-7 days

**OxyContin and other prescription opiates will not show up in a regular urine tox! You need to request the urine be quantified or request a five panel opiate test.*

Ways to cheat/beat drug tests

When something is at stake, people will find a way to cheat the system and drug testing is no different. It is important to know what your drug-testing agency provides. Do they watch someone urinate? Do they allow people to bring their urine to a designated location? Do they test the temperature or the urine? What drugs are in the panel they are using? What type of testing are they doing: blood, urine, oral swab, hair sample, saliva test? What are the parameters of the different tests? (Know oral swabs can be blown up by washing your mouth out with hydrogen peroxide before they swab. Hair sampling is a 90-day window of exposure; it does not tell you if the person is currently under the influence). Do they test for human antigens? Knowing all the parameters of the drug-testing agency can lessen the possibility of someone cheating the test.

Here are some of the most common ways people try to cheat drug tests:

1. The whizzinator – a pouch with straps and a small hose that clamps off. People will put someone else's urine in the pouch, strap it to their thigh, and wear it for 2-3 hours before the test. This gets the urine in the pouch to the same body temperature of the person. Then if no one watches them fill the cup, they can loosen the clamp, make dribbling sounds, and then re-clamp it off.
2. Elmer's glue bottle – similar idea to the whizzinator above. The can leave the twist lid on, or take it off and attach small tubing to the top and clamp the tubing off. They put someone else's urine in and strap it to their leg for 2-3 hours before the test. They can then squeeze the urine out, or open the clamp and release the urine.
3. Males will put someone else's urine in small glass vials and roll it up under their scrotum. Sometimes they will tape it to get to body temperature; sometimes they do it right before they get to the collection site. If they are not watched or checked, the urine can easily be substituted for their urine.
4. Females will fill balloons with someone else's, and insert them up their vagina for a couple hours. This gets the urine to match their body temperature, and they can pop the balloon releasing the urine.
5. Females take small thin prescription drug vials, put a hole in the lid, and cover it with duct tape. They fill the vial with someone else's urine and insert it up their vagina. It gets to temperature, they pull off the tape, and the urine dribbles out.
6. Detox drinks – these drinks are sold at vitamin stores (GNC, Vitamin Shoppe, etc.), online, in smoke shops, and in marijuana dispensaries. Majority of the time they do not work, and some drug testing agencies can test for the flushing agents. The testing agencies will list the flushing agents and state the sample is "dilute" which is considered a positive test.
7. Powdered and synthetic urine – these products are sold in smoke shops, marijuana dispensaries, and online. Some synthetic urine products come with their own small heating pad to put the bottle in. It heats the liquid to body temperature. If the drug testing agency tests for human antigens this will easily pop up as non-human, and some agencies will list the urine is synthetic.
8. Cranberry and Niacin pills – this seems to be working. People take high doses of cranberry pills and niacin alternating every 3 hours. Both can legally be purchased anywhere vitamins are sold (pharmacies, vitamin stores, grocery stores, drug stores, and health food stores).

Drug Paraphernalia

Most people consider drug paraphernalia to be pipes, bongs and syringes, but it can be many things. It can be ordinary items used to disguise or hide the drug or things used to consume the drug. Aluminum foil, small ziplock baggies, pill bottles, spoons, film

canisters, cigarette packs, hide-a-cans, makeup kits, gum wrappers, mint tins, liquid breath mint containers, or small glass vials are types of paraphernalia. Parents need to be aware that these kinds of things are either used to conceal the drug or a way of using the drug. Paraphernalia means drug user.

The following is paraphernalia associated with the use of specific drugs:

Ecstasy:

- pacifiers, lollipops, mouth guards for grinding of the teeth
- glow sticks, surgical masks and mentholated rubs to over stimulate the senses
- water bottles used to bring in alcohol or liquid drugs like GHB, LS

Cocaine:

- glass pipes for smoking crack
- small mirrors and razorblades, rolled dollar bills or cut straws for snorting
- spoons and lighters, syringes, turnicate, cotton pieces

Heroin:

- kits containing – spoons, bottle caps, lighters, syringes, turnicate, cotton pieces, small baggies
- balloons, baggies, burnt aluminum foil, burnt spoons, bottle caps
- scales, razor blades with powder residue, cut straws, needles
- toilet paper rolls filled with dryer sheets – absorb odor from smoking

Marijuana:

- rolling papers, small baggies, stash cans, film canisters, tins and roach clips
- deodorizers, incents, potpourri to disguise or mask the odor of marijuana
- pipes –metal, colored blown glass, ceramic large bong
- brown dryer sheets – kids' stuff them in an empty TP roll and exhale smoke into it

Methamphetamine:

- small plastic baggies
- small cosmetics bags (to keep paraphernalia in)
- pocket knives
- Q-tips
- Cut straws
- Pocket torches
- Glass pipes
- Razor blades
- Mirrors

Inhalants:

- tubes of modeling glue or super glue
- empty spray cans, small CO2 cartridges
- plastic & paper bags, balloons, tops cut off of liter bottles
- bottle or cans with pens or tubing punctured in the sides

Things used to cover up the use of drugs:

- mouthwashes, breathe sprays, mints
- eye drops to conceal bloodshot eyes
- breathe mint droppers and eye drop containers to conceal LSD and GHB
- wearing sunglasses at inappropriate times

Behaviors

People's behaviors and personalities change when things are happening in their lives, if someone is going thru a divorce or breakup, a child is ill, a family member passes away, they lose their job, etc. Supervisors and employers need to be able to determine if it a personal issue, a bad day, or possible substance abuse. The same goes for your children. Is your kid just having a bad day at school, or fighting with a friend, or is something else going on? When you notice behavioral changes in your child, you want to be able to identify if it is adolescent stress or typical growing pains or is it something else like drug use. When you are trying to figure out what your child has been up to it is important to use and trust your senses.

What do you see? Look at the person. Are their eyes red and having problems focusing? They may have been drinking. Are their pupils dilated or constricted? Are they agitated? Are they breathing normal? Is there a strange burn on their mouth or fingers? That could signify smoking something through a metal or glass pipe, or they are huffing Dust Off. Have they developed nosebleeds? This can be indicative of cocaine use. Are they wearing long sleeves even in the middle of summer? This is a way to hide track marks from intravenous drug use.

What do you smell? Marijuana, cigarettes, Inhalants (chemical odor), and alcohol all have tell tale odors. Whether you notice the odor on the breath or clothes, it is a reason to be alarmed; for teens, simply being around others who drink or smoke makes it more likely your child will try it. Do not be afraid to follow your nose. Excessive "pleasant" smells, like breathe mints, heavy perfumes, laundered clothing (for a child who never does their own wash) can be telltale signs of them trying to cover up or mask odors. If you have teenagers, make sure you look in, and smell, their car – the smell of stale beer and marijuana can linger in the upholstery.

What do you hear? Listen to the clues the person is giving you by the things being said, the things they laugh at or the fact they may not be saying anything at all. Silence can speak volumes about something going on in the person's life. By listening, over time you will be able to identify which behaviors are the results of bad days, mood swings or something more serious. Are they slurring their word? Are they speaking low and raspy or high pitched and fast? Are they able to follow the conversation? Are they taking a long time to answer? By using all your senses along with your gut instinct, you will be able to determine certain behavior as typical or indicative of drug use.

Other signs that may indicate drug use:

- Stories do not add up and social circles change
- Schoolwork goes downhill
- Increased lying and stealing

Resources:

Urban Dictionary is an app for smart phones, tablets and computers and is useful for defining drug related words and street terms. After entering a term or word, if the word is part of the drug-jargon, the meaning will pop up within the top 3 responses and give all details about the word or terminology. <http://www.urbandictionary.com/>

EcstasyData.org is an independent laboratory pill testing program run by Erowid Center, and co-sponsored by Dancesafe and Isomer Design. Launched in July 2001, its purpose is to collect, review, manage, and publish laboratory pill testing results from a variety of organizations. <https://www.ecstasydata.org/>

Pin Point Testing - leading pioneers and industry experts in the field of Synthetic Drug detection. <https://pinpointtesting.com>

Parents Opposed to Pot: nationwide organization providing factual information about the effects marijuana has on users, families, and society. They have testimonial from parents whose children have been affected by Marijuana. Their website is <http://www.poppot.org> Facebook: <https://www.facebook.com/poppotorg>

Moms Strong: A national group of moms who share their stories of addiction and marijuana <http://momsstrong.org/>

National Institute on Drug Abuse, the Science of Drug Abuse and Addiction. This site contains research about substance abuse and addiction. <http://www.drugabuse.gov/>

- For Curriculum about The Brain, Understanding Neurobiology through the study of Addiction <https://www.drugabuse.gov/publications/brain-understanding-neurobiology-through-study-addiction>

SAMSHA publication ordering, for free posters, brochures, handouts: <https://store.samhsa.gov/product/Tips-for-Teens-The-Truth-About-Cocaine/PHD640>

Dr. Christian Thurstone is one of fewer than three dozen physicians in the United States who are board certified in general, child and adolescent and addictions psychiatry. He is medical director of one of Colorado's largest youth substance-abuse-treatment clinics and an associate professor of psychiatry at the University of Colorado Denver, where he conducts research on youth substance use and addiction. <http://drthurstone.com/>

Phoenix Multisport fosters a supportive, physically active community for individuals who are recovering from alcohol and substance abuse and those who choose to live a sober life. Through pursuits such as climbing, hiking, running, strength training, yoga, road/mountain biking, socials and other activities, we seek to help our members develop and maintain the emotional strength they need to stay sober. **Scott Strode, Director** <http://www.phoenixmultisport.org/> Multiple Locations, google for locations outside of Colorado:

- Denver - 2233 Champa, Denver, CO, 80205 #720-440- 9175
- Colorado Springs - 218 W Colorado Ave, Suite 102 Colorado Springs, CO, 80903 #719-434-3387