Comprehensive Outline of Drugs Commonly Abused

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Lynn Riemer
720-480-0291
trainings@actondrugs.org
www.actondrugs.org
Facebook/ACTonDrugs

ABUSE and ADDICTION

- **Definitions**

  Drug abuse is the use of illegal drugs, prescription drugs or over-the-counter supplements and medications in ways other than recommended or intended. Drug addiction is a chronic disease characterized by drug seeking and use that is compulsive or difficult to control despite harmful consequences.

- **Addiction and the brain**

  The brain functions by transmitting information from one brain cell to another. Brain cells do not touch one another but communicate across a space between cells called a synapse. Chemicals, called neurotransmitters are released at the tip of one cell and picked up by the tip of the next cell thus transmitting a signal from one cell to the other. One brain cell may make this connection with multiple brain cells.

  Nearly every addictive drug target synapse's in the brain's reward system by flooding the synapses that are a part of that system with the neurotransmitter dopamine (Franken, IHA, EU J Pharm,2005,526, 199-206). When the reward system is overwhelmed with dopamine the brain adapts 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 and (2) subsequently higher and higher doses of the abused drug are needed to achieve the same "high" that occurred when the drug was first used. This is the basis of "drug tolerance" (Haefly W, Pharmopsychiatry, 1986,5:353-61) and compels the addict to increase drug consumption in order to increase dopamine production leading to physiologic addiction and more intense cravings for the drug. A normal functioning reward system is what makes individuals feel good about themselves and ultimately helps guide behavior.

- **Behaviors that indicate drug abuse**

  1. Changes in behaviors and personalities may be a good indicator of illicit drug use. Recognizing early clues may provide an opportunity to intervene and prevent addiction. Pay attention to:

What you see? Look at the person; Are their eyes red and are they having problems focusing? 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? Have they developed nosebleeds indicative of cocaine use? Are they wearing long sleeves even in the middle of summer to hide track marks from intravenous drug use? Is there a change in social behavior? Do their stories that don't add up? Have there been changes in social circles? Is schoolwork going downhill. Is the person lying? Are household items missing (stolen and sold)? Is money missing from your wallet or purse? Is school truancy a problem?

What you smell? Marijuana, cigarettes, inhalants (glue or paint sniffing) and alcohol all have tell tales odors. Is the odor on the breath or clothes and is it a reason to be alarmed? Do not be afraid to follow your nose. Excessive "pleasant" smells, like breath 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 you hear? Listen to the clues the person is giving 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 you may be able to identify which behaviors are the results of bad days, mood swings or something more serious. Are words being slurred? Are they speaking with a low and raspy voice or high pitched and fast? Are they able to follow the conversation? Are they taking a long time to answer?

2. Specific indicators of substance abuse in teens (also see section on Marijuana) should be suspected if the following signs are present:

    a. Extreme isolation in the bedroom
    b. Atypical problems at school or school avoidance
    c. Changes in friends
    d. Changes in behavior including irritability, aggression, hyperactivity and mood changes including unusual elation
    e. Exaggerated efforts to keep family away from personal belongings or missing gifts or valuable possessions, i.e. gaming devices, computer equipment
    f. Abrupt disinterest in usual activities
    g. Sleeplessness followed by long periods of sleep
    h. Changes in appearance including increased perspiration, flushing, red eyes, nosebleeds, intense vomiting
    i. Poor body hygiene

- **Consequences of addiction: Changes in 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:

1. Delayed maturation and development of the immature brain (brain development continues to about age 25 years)

2. Cognitive impairment with learning problems and limited or decreasing IQ
3. Behavioral disorders, including aggression, impulsive behavior, and a variety of mental health problems
4. Changes in short term memory, recall, attention
5. Changes in control of heart rate, blood pressure, body temperature

- **Ways in which these drugs may be used**

1. Ingestion
2. Snorting
3. Smoking (Vaping)
4. Transdermal
5. Injection
6. Contact with mucus membranes

ALCOHOL ABUSE

Alcohol affects vision, judgment, reaction time, and memory. The effects vary from person to person, some become quiet or depressed while others become aggressive and argumentative. Long-term users can develop tolerance. 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, damages brain cells resulting in cell injury or cell death (Hernandez JA, Oxid Med Cell Longev,2016:1543809. doi).

Alcohol intoxication is the primary contributor to motor vehicle accidents, which are the leading cause of adolescent death, and are 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 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 depressed respiratory rate and death.

- **Specific indicators of alcohol use**

1. Difficulty in recalling instructions
2. Shortened attention span
3. Thick, slurred speech
4. Sluggish, sleepy and slowed reactions
5. Uncoordinated & unsteady gait
6. Faulty judgment
7. Greatly impaired driving ability

- **Alcohol candy and “butt chugging"**

1. Alcohol-containing candy

A trick popular with teens is to soak Gummy Bears or Candy Worms in alcohol. Vodka has less alcohol odor than other alcohols and is favored. The Bears or Worms are placed in a dish and covered with alcohol. The candy absorbs the alcohol. The candies are initially sticky but when they dry out they look the same as untreated candy. They are then eaten as ordinary candy - only with a buzz!

2. Tampon dipping "boofing" and "butt-chugging"

   A new craze at high school and college campus parties is "butt-chugging" in which participants receive an alcohol enema. The mucosal absorption of ethanol leads to rapid intoxication without producing a significant alcohol breath-odor. "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 (BAC). Alcohol is a drying agent so sores to the rectum may occur.

- **Vaporization**

  1. Alcohol Without Liquid (AWOL) is becoming popular. 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 a very high BAC that occurs much rapidly than drinking alcohol thus making it more dangerous.

  2. People may make their own AWOL device using a plastic bottle, plastic or rubber tubing and a hand-held air pump. A small hole is punched in the lid of a 1 or 2 liter plastic bottle. An inflation-pin typically used for inflating basketballs is inserted through the hole in the lid. About a ¼ 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 alcohol is converted into a vapor which escapes through the pin hole in the bottle cap and is inhaled. The user quickly becomes intoxicated.

- **Drinking 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 (Forrester MB, Int J Adolesc Med Health, 2015;27:69-72). The gelling agent precipitates and the clear liquid is then decanted and consumed. Once separated, the alcohol content may range from 120-170 proof and rapidly intoxicate the user. Ethanol in hand sanitizers may be denatured with chemicals, isopropyl alcohol, or methyl alcohol, all of which may pose significant medical hazards if ingested. The label on the hand sanitizer does not always indicate if these other types of alcohol have been added or how much has been added.

- **Alcohol consumed with other drugs to get a more rapid or sustained "high"**

1. Alcohol and caffeine

Abuse of the combination of alcohol and caffeine is dangerous and may be deadly (Kristjansson AL, J Stud Alcohol Drugs, 2015;76(3):397-405). Commercially available energy drinks with 12% alcohol are popular 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 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 to achieve the same results.

2. Alcohol and Adderall (ADDYS)

The combination of Adderall and alcohol is often described as a "safe" replacement for cocaine and alcohol but combining them may have deadly consequences. This mixture is used as a party drug-cocktail that allows users to extend their partying. Users may snort or smoke the "Addys" to get a quicker high. 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 Adderall masks the depressive feelings induced by alcohol and users may drink excessive amounts of alcohol resulting in physical harm. The combination may cause nausea, vomiting, weight loss, heart palpitations, and headaches. Prolonged or chronic use may cause convulsions, irregular heartbeats, fever, malnutrition, tremors, and muscle twitching.

- **Complications of Alcohol Abuse**

1. Alcohol Withdrawal and DT's

Withdrawal may occur in both 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.

2. 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. FAS is one of the leading causes of birth defects and the most common cause of preventable mental retardation. Each year in the US 5,000 to 15,000 babies are born with this condition (Fetal Alcohol Spectrum Disorders, CDC Data and Statistics; CDC.gov). 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 may or may not harm the developing baby. There is no cure or specific treatment for FAS.

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; the same ingredients used in vapes (see below).

- **Hookah**

Using hookah is not a safer alternative to cigarette smoking. Tobacco isn't less toxic smoked in a water pipe and water does not remove nicotine. Flavored nicotine tobacco carries the same health risks as any cigarette. In fact, Hookah smoking may be more dangerous than cigarette smoking because of the amount of smoke inhaled. A typical hour hookah smoking session can involve about 90,000 ml of smoke being inhaled, compared to about 20 puffs or 500-600 ml of cigarette smoke inhaled (https://cdc.gov>tobacco_industry>hookahs, retrieved 06/25/2021). Hookah pipes used in hookah bars and cafes may not be cleaned properly risking the spread of infectious diseases. There is an increased concern about health risks in Hookah smokers as the charcoal used to heat the hookah products releases large amounts of carbon monoxide, toxic metals and other cancer-causing agents. Tobacco-based shisha and "herbal" shisha may also contain toxic agents.

- **E-Cigarettes and vaping**

  New forms of electronic smoking, hookah pens and E-cigarettes, are very popular. These products are filled with liquids called E-drops, E-liquid, or E-juice and are battery powered to heat and convert the liquid to a vapor resembling cigarette smoke which is then inhaled. These liquids may contain nicotine, flavorings, marijuana (dabs) 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 are safer alternatives to cigarettes.

  Some brands of E-cigarettes contain propylene glycol which is added to create thicker smoke to mimic cigarette smoke. The data regarding the hazards of inhaling large amounts of propylene glycol are not known (https://ncbi.nih.gov>books>NBK 507184, retrieved 6/20/2021). Various chemicals and ultrafine particles known to be carcinogenic and/or to cause respiratory or cardiac disease have been identified in e-cigarette aerosols, cartridges, refill liquids and environmental emissions. Diacetyl 2,3-pentanedioneand acetoin have been identified in more than 75% of flavored e-cigarettes and are linked to cases of severe respiratory disease (Allen JG, Environ Health Perspect. 2016 Jun 124(6)733). Two other potentially harmful compounds are also found in many of the tested flavors, including varieties that appeal to young

people such as Cotton Candy, Fruit Squirts, and Cupcake.

Vaping is the inhaling of a vapor created by an e-cigarette filled with a liquid that may contain nicotine, flavorings and other chemicals. The liquid is heated into a vapor by a self-contained battery and inhaled. JUUL vapes and JUUL pods are extremely popular vapes with teens. They have a sleek design that allows the vapes to be hidden within a closed fist vape during school classes. JUUL pods are filled with a proprietary blend that contains nicotine.

Disposable vapes are popular and look similar to a JUUL. They are small and easily fit inside the palm of the hand and are easy to hide. These products contain 300 – 1500 puffs per device. The amount of nicotine in 300 puffs equals that of 2-3 packs of cigarettes. Due to the large intake of nicotine an increased number of teens may develop nicotine poisoning. Symptoms of nicotine poisoning (Nic sick) include nausea, vomiting, dizziness, tremors, sweating and quickened heart rate. In severe cases nicotine poisoning can cause seizures and death. There are other risks in teens exposed to excess nicotine. The adolescent brain is extremely sensitive to the effects of nicotine which interferes with memory, attention processing, learning, mood, and impulse control. Using nicotine in adolescence may also increase risk for future addiction to other drugs.

In mid-2019, a new respiratory illness was described in vaping teens. It is been labeled EVALI (e-cig/vaping associated lung injury) (Kalininskiy A. Lancet Respir Med, 2019 Dec; 7(12):1017) Vitamin E acetate found in vaping substances is strongly linked to many of the EVALI outbreaks and has been isolated from lung fluid samples in EVALI patients from geographically diverse states (Lal A. Am J Med 2020 May;133(5): e204). Vitamin E acetate has not been found in the lung fluid samples of people that do not have EVALI. As of February 2020, the Centers for Disease Control and Prevention tallied over 2807 cases of vaping related illnesses with 68 confirmed deaths (https://cdc.gov>e-cigarettes>severe-lung-disease, retrieved 05/18/2021). Over 82% of hospitalized patients report vaping THC, with 33% exclusively using THC (*www.cdc.gov*. 28 October 2019. Retrieved June 19, 2020). Over 80% of deaths were from vaping THC. Vitamin E acetate, a vape-juice thickener, has been associated with previous respiratory illnesses and deaths and was found in post-mortem lung tissue samples of EVALI patients. Vaping vitamin E acetate produces a vapor of ultra-fine heated oil particulates that are absorbed deep into lung tissue causing inflammation of the lining of the lungs. The inflammation interferes with oxygenating the blood resulting in significant breathing problems. Many ill teens require mechanical ventilators until the inflammation subsides.

Vapes, e-cigs, and hookah pens are used to smoke marijuana concentrates (hash, wax, oil, shatter, and dabs), "bath salts" and most other drugs. Many states have banned vapes and vaping products for everyone under the age of 21. Teens using e-cigarettes in these states may be charged with possession of drug paraphernalia.

ABUSED OVER-THE-COUNTER (OTC) MEDICATIONS AND SUPPLEMENTS

- **Phenibut: Synthetic gamma aminobutyric acid (GABA)**

Phenibut is a non-regulated synthetic GABA sold OTC as a dietary supplement. It has a calming effect

and acts like a benzodiazepine (Xanax). It is known on the street as a mood enhancer, sleep aid, exercise-recovery-booster, and a "smart drug. The label recommends it be used to treat anxiety, fear, insomnia, tension, stress, fatigue, post-traumatic stress disorder (PTSD), depression, alcoholism, and irregular heartbeat. It is also recommended for improving memory, learning, and thinking.

Phenibut is unsafe for most people to use and causes dizziness, nausea, poor balance and fatigue. In large doses it may cause trouble breathing, unconsciousness and death. (Jouney EA. Curr Psychiatry Rep, 2019;21:23). Acute intoxication with Phenibut is characterized by rapid heart-beat, visual hallucinations, tremor, nausea and vomiting (Kupats E. Pharmacopsychiatry 2020 Sept;53(5):2010). Chronic use of Phenibut may lead to dependence/tolerance with related withdrawal symptoms that often require treatment (Hardman HI. Bosn J Basic Med Sci 2019 May 20;19(2):125) Withdrawal signs/symptoms can occur 3-4 hours after use and may also include visual and auditory hallucinations, psychomotor agitation, derealization, depersonalization, increased light and sound sensitivity, muscle pain/twitches, tachycardia, nausea, tremor and insomnia. Phenibut is a central nervous system depressant. When mixed with other CNS depressants (alcohol, sedatives, or opioids) the risk of overdose is much higher. Phenibut may be addictive and should not be abruptly discontinued. Quitting Phenibut requires medical assisted treatment and supervised tapering of the substance (similar to Xanax).

- **Antihistamines: Diphenhydramine (Benadryl) and Dimenhydrinate (Dramamine)**

OTC antihistamines are safe when used as directed but when abused may cause hallucinations, hyper-stimulation, increased heart rate and blood pressure, sweating, vomiting, panic, and agitation. The Benadryl challenge is a new social media fad which encourages teens to take as much allergy medicine as it takes to trip out (hallucinate). There is also potential for fatal heart rhythm disturbances when antihistamines are combined with other medications.

Dramamine is used to treat motion sickness, nausea and vomiting and as a sleep aid. Misuse of the drug may induce euphoria and hallucinations (Halpert AG. Neuroscience and Behav Rev 2002; 26:61). Symptoms of over-dose include severe drowsiness, seizures, and widened pupils. In children, mental/mood changes such as restlessness, irritability, hallucinations may occur before drowsiness. Dramamine is one of the most common drugs abused by teens and young adults and is often referred to on the street as Dime or Drams (Canadian Agency for Drugs and Technologies in Health. Dec 1,2015, CADTH Rapid Response Reports)

- **Dextromethorphan (DXM) and Robo-Tripping**

The recreational use of cough syrups containing DXM is called "Robo-Tripping" (Ritter D. Am J Emerg Med. 2020;38(4):839). DXM is sold as a liquid, pill, tablet and powder. The typical therapeutic dose of DXM (Robitussin DM) is 10 to 20-30 mg every six hours. A single recreational dose can range from 240 to 1500 mg. Heavier users have been known to ingest up to 3 or 4 bottles of liquid a day. Some internet sites suggest to quickly drink the syrup in order to absorb enough DXM prior to the onset of vomiting which will occur as a result of the ingestion of the large volume of syrup required for intoxication. Powders may be snorted, smoked or injected and may be easily overdosed resulting in death. Powders and pills have an effect similar to syrups without the need to consume large quantities of the substance. 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 the active ingredient.

At high doses DXM may cause powerful psychedelic effects. It is sometimes compared to phencyclidine (PCP) and ketamine. Liquid DXM may be boiled resulting in a gooey substance with a higher concentration of DXM that may be heated on aluminum foil, vaporized and inhaled or put into capsules. Ingesting the high concentration capsules may cause symptoms similar to those caused by 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 vary depending on the amount of DXM ingested and whether it is used in combination with other drugs.

The level and likelihood of experiencing tolerance and dependence ultimately depends on the dose and frequency of use. High-dose chronic use of DXM can lead to the development of toxic psychosis as well as other physiological and behavioral problems. It is unknown what effect infrequent use of low doses has upon the user although anecdotal reports of prolonged low-dose use suggest that DXM is associated with physical dependence and tolerance. Withdrawal symptoms include anxiety, restlessness, insomnia, diarrhea, vomiting, severe weight loss and upset stomach. Robo-tripping has been implicated as a "gateway" to using other hallucinogenic drugs.

Opioid-dependent patients on maintenance therapy often misuse high doses of dextromethorphan to relieve symptoms. Because dextromethorphan may increase serotonin levels, these patients may be particularly susceptible to dextromethorphan enhanced psychiatric symptoms and serotonin syndrome leading to assault, suicide, or homicide (Windhab LG. Clin Neuropharmacology. 2020 Sept/Oct; 43(5):127).

- **Loperamide (Imodium AD)**

Loperamide contains a weak opioid which acts like morphine, heroin, oxycodone and other opioids. Coined as the "poor man's methadone" abuse of loperamide is becoming a growing problem. Loperamide is marketed as an anti-diarrheal medication and sold over the counter. It is available in liquid, capsule, or tablet form. It is recommended to be taken orally in 2–4-mg doses for 24–48 hours and sold under brand names Imodium, Kaopectate, Maalox Anti-Diarrheal, and Pepto Diarrhea Control. These products are safe when used as directed but high doses may be fatal. Consuming 50-300 tablets results in opiate-like effects. Opioid users may consume large amounts to help with opioid withdrawal symptoms or to get high if they cannot find their opioid of choice. Excessive doses of can lead to heart problems, kidney and liver failure, and even death. Signs of loperamide abuse or toxicity include fainting, gastrointestinal complications nausea, vomiting, constipation (paralyzed intestine) and unresponsiveness, EKG changes such as prolonged QT interval associated with heart arrhythmias and cardiac arrest (https://www.ncbi.nlm.nih.goc> articles>PM6663275, Retrieved May 2021). Naloxone may reverse the CNS depressive effects of loperamide.

HALLUCINOGENIC AND DISSOCIATIVE (PSYCHOTROPHIC) DRUGS AND PLANTS

Hallucinogenic substances can be found in some plants and mushrooms (or their extracts) or can be man-made. They are commonly divided into two broad categories: classic hallucinogens (such as LSD,

psilocybin) and dissociative drugs (such as PCP, DXM, mescaline and Salvia). When under the influence of either type of drug, people often report rapid, intense emotional swings and seeing images, hearing sounds, and feeling sensations that seem real but are not. These drugs work by temporarily disrupting communication between neurotransmitter systems throughout the brain that regulate mood, sensory perception, sleep, hunger, body temperature, sexual behavior, and muscle control.

Hallucinogenic drugs are associated with psychotic-like episodes that can occur long after a person has taken the drug, and dissociative drugs can cause respiratory depression, heart rate abnormalities, and a withdrawal syndrome. The good news is that use of hallucinogenic and dissociative drugs among U.S. high school students has remained relatively low in recent years. However, the introduction of new hallucinogenic and dissociative drugs may change all of that.

Dissociative drugs distort perception of sight and sound and produce feelings of detachment or dissociation from the environment and/or self. The dissociative drugs act by altering distribution of the neuro- transmitter glutamate which is involved in perception of pain, responses to the environment and memory. Although many kinds of drugs are capable of such action, dissociative drugs are unique in that they do so in such a way that they also produce hallucinogenic effects, including sensory deprivation, hallucinations and dream-like states. Many of these drugs have general depressant effects and can produce sedation, respiratory depression, analgesia, anesthesia, unsteady gait, cognitive and memory impairment and amnesia. But these mind- altering effects are not hallucinations.

Hallucinogens and dissociative drugs have street names like acid, angel dust, and vitamin K. They distort the way a user perceives time, motion, colors, sounds, and self and disrupt a person's ability to think and communicate rationally, or even to recognize reality, sometimes resulting in bizarre or dangerous behavior. Hallucinogens such as LSD, psilocybin, peyote, DMT, and ayahuasca cause emotions to swing wildly and real-world sensations to appear unreal, sometimes frightening. Dissociative drugs like PCP, ketamine, dextromethorphan, and *Salvia Divinorum* may make a user feel out of control and disconnected from their body and environment. In reality, it may be very difficult to classify the action of the drug as hallucinogenic or dissociative. A more encompassing term to describe these drugs may be "psychotropic drugs or psychoactive drugs". It should not be used on combination with cannabis or alcohol

- **Hallucinogenic/dissociative exotic plants not indigenous to the US but available in the US**

    1. 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 tranquillizer Xanax. It contains apomorphine and is a hallucinogenic plant that produces a "high" with a gentle euphoria. It is not illegal and is allowed to be cultivated and sold. It is typically made into a tea but may be smoked or vaped. It should not be used in combination with alcohol or cannabis. It is also sold as an aphrodisiac.
    2. Khat grows in the Horn of Africa and the Arabian Peninsula. Chewing Khat is a social custom dating back thousands of years. Khat contains cathinone, a stimulant like methamphetamine that causes excitement, loss of appetite and euphoria. Khat is illegal in the US, however, it is still being sold. When Khat is sent from Africa it often dries out and when it does cathinone breaks down into its byproducts. However, the plant material is still active and users chew large amounts to feel its

effects or make it into a tea. When chewed, a white alkaloid dries around the lips providing a telltale sign of use. Effects include hallucinations, over-stimulation and aggressive behavior, especially when combined with alcohol. The dose needed to overdose is not known but the drug can cause suicidal depression.

3. Kratom

   Kratom is a plant common to Southeast Asia and acts 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 and they enter a calm and dreamy state, are less sensitive to pain, have a dry mouth, may itch, and have nausea. At high doses the plant has an opioid-like effect and users may exhibit psychotic symptoms, including hallucinations, delusion, and confusion. The plant material is widely available online and is legal. Kratom is available in pills and as loose plant material which is used to make a "tea." Kratom may be used as a substitute for opioids and to ease opioid withdrawal. It is addictive, has no recognized medical use, and has caused many deaths.

4. Poppy Tea

   Poppy plants (*papaver somniferum*) are illegal to grow in the US but dried poppy seed pods can be purchased in hobby stores or online (Amazon.com) for ornamental use. It is illegal to cut the pods open but cutting holes in the pods to extract the seeds is not illegal. Poppy tea is brewed from the seeds or pods of the poppy. The seeds and pods contain raw opiates including morphine, thebaine, codeine, papaverine and noscapine and are brewed in very hot water to produce an addictive tea. The tea can be very strong and drinking it may result in overdose. The darker the tea the more potent. The tea is very bitter and some users add a flavoring to counteract the bitter taste. The tea may be allowed to evaporate creating a concentrated solid that may be crushed to form a powder. It may take 20-60 minutes after drinking the tea to feel its effects. Tolerance occurs within 1-2 weeks of daily use.

5. Ayahuasca (DMT or 5-Meo-DMT)

   DMT, known as the "Spirit Molecule" or "Dream Drug", is a psychedelic compound that 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 monoamine oxidase Inhibitor (MAOI), making DMT orally active. Without the natural MAOI the tea would not produce hallucinogenic effects. DMT produces a long lasting, slow, deep metaphysical experience similar to that of psilocybin mushrooms.

   Natural and synthetic tryptamine (DMT) is hallucinogenic and is illegal in the United States. However, its analog, 5-Meo-DMT is neither scheduled nor controlled and is easily purchased online. 5-MEO-DMT is known on the street as "Dimitri" and "The Businessman's High." It is more potent than DMT, is generally smoked, and produces an intense high of short duration with hallucinations. The Sonoran Desert Toad naturally secrets 5 Meo-DMT and there are many

reports of people licking the toad to get high. They also get very sick and vomit for hours after licking the toad.

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.

6. Kava

Kava, also called kava-kava root and *Piper methysticum* is a plant from the South Pacific with psychotropic and sedative effects similar to Xanax and other benzodiazepines. Typically consumed as either a beverage or extract, kava is considered to be non-alcoholic but psychoactive. Kava is becoming a great social drink and people use it loosen up, relax and enjoy a happy and relaxed mood. Kava Bars are popping up all over the US. Drinking Kava may result in a good night's sleep without the problem of having a morning hangover. Its popularity is currently on the rise and it is gaining momentum as a better, healthier alternative to alcoholic drinks.

Kava is legally sold in the U.S. as a dietary supplement and is marketed as a sleep aid and muscle relaxant. Despite the substance's legal status, the U.S. Food and Drug Administration released an advisory in 2002 that kava products are linked to potentially cause severe liver disease. The FDA cited reports from other countries of hepatitis, cirrhosis, and liver failure as a result of long-term kava use. These reports regarding liver problems led to regulation of the substance in Germany, France, Canada, Switzerland, and the UK.

7. Mixed Herbals: X-Rave

X-Rave is sold online to make the user "Feel a burst of energy and elevate your mood with X-Rave Caps!" X-Rave is a party capsule that is used to boost energy and bring on euphoria-like feelings. It is a formulation of several natural herbs. Allegedly, one capsule of X-Rave is "enough to tweak you out for hours". X-Rave party capsules act as a natural alternative to synthetic illegal drugs. These party capsules stimulate energy levels and are used to induce an ecstasy-like mental state. It works as a mood enhancer and mind and body stimulant.

- **Hallucinogenic/Dissociative plant substances indigenous to the US:**

8. Salvia (*Salvia divinorium*)

Salvia is a member of the mint family. The plant is hallucinogenic and has historically been used by indigenous people to achieve an altered state of consciousness. It is legally sold in the US and the leaves can be eaten or boiled in water to make a tea. The effects are intense but short-lived and cause changes in body sensations, visions and altered perceptions.

9. Geranium Extract (methylhexanamine) or synthetic Dimethylamylamine

Geranium plant extract is marketed as “Pump-It Powder” or Jacked 3D”. Dimethylamylamine (DMAA) is a synthetic, similar drug with the same physiologic activity and was originally sold as a nasal decongestant. Both the plant extract and DMAA may be smoked, ingested, or snorted and effects may last 4-6 hours. Today the plant extract and synthetic DMAA are sold as dietary-supplements used for treating ADHD, stimulating weight loss, improving athletic performance, and bodybuilding. The ingredient list on geranium package labels may list rose geranium, geranium oil, or geranium stems. DMAA has also been marketed as a dietary supplement but is not safe. A number of adverse events have been associated with DMAA including:

- Psychotic symptoms and paranoia
- Hallucinogens
- Increased Heart rate and body temp
- Dilated pupils and sluggish response to direct light
- Piloerection (gooseflesh)
- Sensory distortion

10. Mushrooms (Shrooms, Boomers, Magic Mushrooms, Mushies or Golden Tops)

Psilocybin mushrooms, commonly known as “magic mushrooms” are an informal group of fungi that contain psilocybin which turns into psilocin after ingestion. The mushroom has been used for hundreds of years by native peoples in North America for religious ceremonies. In modern times it has gained increasing popularity among youth and young adults. Mushrooms have been decriminalized in Denver, Colorado and Oakland, California but are illegal in other areas and States without a prescription or license. The mushrooms are eaten, cooked or made into a tea. Psilocybin mushrooms have not been known to cause physical or psychological dependence and addiction. The psychedelic effects tend to appear about 20 minutes after ingestion and last up to 6 hours. A negative environment can set the stage for a bad trip while a comfortable environment sets up a more pleasant trip. The effects are subjective and vary among individual users. Side effects include nausea and vomiting, euphoria, muscle weakness, drowsiness, lack of coordination, panic attacks and transient psychosis. Using mushrooms rarely results in any life-threatening symptoms. Long term users may experience flash-backs, occurring weeks or months after the last dose.

11. Cacti (Peyote buttons)

Peyote is a small spineless cactus which is native to the American Southwest and Mexico. Peyote contains a psychoactive alkaloid, mescaline, which is hallucinogenic. Peyote has been used worldwide for ritualistic and spiritual ceremonies. The above ground part of the cactus consists of disc-shaped buttons that are cut off and dried. The buttons are chewed or boiled in water to make a tea. Peyote is extremely bitter and most people get nausea before the onset of hallucinations. Because of the bitterness, the buttons may be ground up and placed in capsules and swallowed. The potency of dried buttons varies considerably and the onset of hallucinations is quite variable. Adverse reactions are rare, except for nausea and vomiting, and include elevated blood pressure, rapid heart rate and dilated pupils. Cognitive disabilities with chronic

use or “flash-backs” are rare. Associated psychotic-breaks are very rare except in people with pre-existing mental illness.

- **Other Recreational Synthetic Psychoactive Substances**

There are a variety of other synthetic psychoactive substances that are available online and mimic the psychoactive effects of prescription medications sought by addicts and recreational drug users. Many of these substances are legal.

1. Piperazines (BZP)

   Piperazines are synthetic drugs and not present in nature. They are a class of drugs originally prescribed to kill parasites. 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 and is banned by the FDA. Some people who think they are buying ecstasy (MDMA) may actually receive BZP labeled as Ecstasy. BZP is also added to Bath Salts. BZP is a central nervous system stimulant similar to the amphetamines, however it is less desirable due to its many side effects. The effects are dilated pupils, increase blood pressure and heart rate, anxiety, blurred vision, and dizziness. Chronic users report problems including irregular heartbeat, delusions, hallucinations, panic attacks and paranoia. The high can last 6-8 hours and is similar to the high from Ecstasy.

2. Tricyclic Antidepressants “Tia” “zaza”

   Tianeptine is a synthetic atypical antidepressant. It is structurally similar to tricyclic antidepressants and also has opioid effects. The drug activates mu and delta opioid receptors and may increase dopamine release. It is not legal in the US, it is sold online or in convenient stores as a way to immediately reduce anxiety and as a “nootropic” or “smart drug.” It is supplied in tablet or capsule form, or as a powder. The powder may be dissolved in water and injected. Oral and IV use is most common. Adverse effects include loss of consciousness, making it a date-rape drug and respiratory depression. A few cases of serotonin syndrome requiring intensive care have been reported. Withdrawal rapidly occurs after stopping the drug. Overdose may respond to treatment with naloxone.

3. Benzodiazepines

   - Phenazepam

     Phenazepam has gained popularity as a recreational drug in the United States. It is a benzodiazepine with anxiolytic, euphoric, anticonvulsant, amnestic, muscle relaxant, and hypnotic (sleep-inducing) effects. The effects of the oral dose 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 drugs and alcohol. Phenazepam is currently listed as a Schedule I drug, but manufacturers circumvent this regulation by selling the product online as a "research chemical" or as an air freshener known as "Zannie." Zannie is sprayed into the mouth. When used with antidepressants, sleep medications, pain medications, or alcohol, it can prove fatal.

- Etizolam (Etizzy)

  Another benzodiazepine type research chemical sold on line is etizolam. It is currently available by prescription in Japan, India, and Italy, and recently emerged on the illicit drug market in the United States. It can be a powder, pills, or a liquid placed on blotter paper. This drug does not currently have any accepted medical use in the United States, and it is 6-10 times more potent than Valium. Effects include sedation, muscle relaxation incoherent (lethargy), physical euphoria, motor control loss, dizziness, confusion, psychosis, agitation, aggression, and depression. As with all benzodiazepines, the drug should be not stopped abruptly. People need to step down slowly to prevent withdrawal seizures. Medical detoxification is required when withdrawing from all benzodiazepines.

- Alprazolam (Xanax)

  Xanax is a powerful benzodiazepine prescribed to treat anxiety, panic disorders and insomnia and is the number one psychiatric medication prescribed in the US. It is highly addictive and tolerance quickly develops. Some addicted users may take 20-30pills/day. It is implicated in 1/3 of intentional overdoses or suicide attempts. It is popular on the street because it is easily available and taking it produces a state of pleasure and euphoria. Withdrawal occurs quickly after stopping the drug and requires medical treatment. Symptoms are similar to those described for phenazepam. Xanax is known on the street as Xannies or Benzos or Blue Footballs. High doses produce confusion, dizziness, blurred vision, slurred speech and poor coordination. Signs of dependence may be very nonspecific and include a change in appearance and behavior that affects relationships and performance, insomnia and anorexia. Xanax, like all benzodiazepines, is also used as a "date-rape drug".

- Benzodiazepines and opioids (see section on opioids and heroin)

MARIJUANA

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 contain about 100 different cannabinoids. There are over 600 other substances in the plant. However, the two of the plants cannabinoids most commonly used are, delta- 9 tetrahydrocannabinol (THC) and cannabidiol (CBD). The 2 species of marijuana plants most known

are: *Cannabis sativa* (high in THC) and C*annabis indica* (high in CBD). The various strands have been genetically modified to create hybrids which can be very high in THC / CBD.

Marijuana is the most common recreational drug in the US. It is consumed in several different ways each of which effects the user in individual ways. Only the flower (bud) of the female plant has psychotropic properties. Some of the leaves (fan leaves) contain small amounts of THC but nowadays only the bud is used. Marijuana can be smoked as a cigarette (joint), cigar (blunt) or in a pipe. THC oil may be extracted from the bud (dab or wax) and smoked or mixed into edibles. Dabbing (smoking concentrates) is on the rise and concentrates may contain 90+% THC.

About 1 in 10 adults and 1 in 6 adolescents (<18 yo) will become addicted to marijuana. A working definition of cannabis addiction is persistent use despite negative consequences. 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 is used for its mildly tranquilizing, mood and perception altering effects. The psychoactive ingredient in marijuana is THC. The marijuana on the streets today is unlike the marijuana in the 60's to the 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 – 90's the THC content ranged from 2-7%. Today it is around 25%-35%. However, the THC content of wax or oil may be 90% 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 are 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" or "dabs" on the street. This wax is usually smoked in vaporizers, which may look like pens or inhalers. Vaporized wax or oil produce less odor that smoking marijuana and many vaporizers contain a section that holds a flavored liquid that reduces the odor even more. Marijuana edibles contain potent THC oil which is mixed with butter, known as "buddah" on the street, and is used to make cookies, cakes, brownies, pies, yogurt, ice cream, chocolates, etc. The onset of the effects of THC-edibles is typically delayed resulting in the user ingesting even more edible until he/she is intoxicated and has dangerous blood levels of THC. Exposure to an excessive (toxic) amount of THC may occur when using THC oil or wax, referred to "Dabbing Out". The user often becomes incoherent, passes out and then wakes up feeling frightened because they can't remember what happened. The user then becomes anxious and may have a psychotic-break.

Dealers may lace marijuana joints with other drugs such as PCP, cocaine, ecstasy, methamphetamine, heroin, or embalming fluid in order to hook the buyer and increase profit. 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 (formaldehyde). Adderall pills (Addy’s) are crushed and sprinkled onto joints and then smoked. The street name for this mixture is “God mode” or “madderall.” When smoked users get extremely agitated and aggressive, paranoid and extremely anxious.

- Physical and emotional signs of marijuana use/abuse in children and adults

  Immediate 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 automobile crash. Marijuana acutely effects emotional and behavioral health, alters mood and causes euphoria, 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. Teens who chronically use marijuana have reduced problem-solving skills and exhibit inflexibility thinking. 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.

- Typical physical and emotional signs of using marijuana are:

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	Stimulant type effects

  Red-eye and vision problems are also common. Eye tissues contain cannabinoid receptors and exposure to cannabinoids dilates corneal blood vessels 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 Opthalmol Vis Sci 1977;16:689-699).

- Long-term health consequences of using marijuana:

  1. Dental health: Using marijuana is associated with the development of periodontal dental disease and occurs in people who smoke marijuana, ingest marijuana and who only use the drug occasionally. The periodontal effects are related to damage to the immune system by cannabis. (Ashton CH. Br J Psychiatry 2001;178:101-106). High frequency users have more severe periodontal disease which causes 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.

2. Heart and blood vessel health: There have been numerous reports of cardiovascular complications in young people including 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). Cannabis use is also associated with cardiovascular complications in people of all ages. A 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).

3. Lung Damage: Lung damage caused by smoking marijuana includes chronic cough, sputum production, wheezing and a high frequency of acute bronchitis (Taylor et al, Addiction 2000;95:1669-1677).
   • Marijuana smoking is associated with large airway inflammation, increased airway resistance, and lung hyperinflation, and those who smoke marijuana regularly report more symptoms of chronic bronchitis than those who do not smoke. One study found that people who frequently smoke marijuana had more outpatient medical visits for respiratory problems than those who do not smoke (Polen MR. West J Med. 1993;158(60:596). Some case studies have suggested that, because of THC's immune-suppressing effects, smoking marijuana might increase susceptibility to lung infections, such as pneumonia, in people with immune deficiencies; however, a large AIDS cohort study did not confirm such an association (Tashkin DP. Ann Am Thorac Soc. 2013;10(3):239). Smoking marijuana may also reduce the respiratory system's immune response, increasing the likelihood of the person acquiring respiratory infections, including pneumonia. (Owen KP Clin Rev Allergy Immun0l 2014;46(1):65)

   • Spontaneous pneumothorax (internal tearing of the lung) resulting in severe chest pain and marked trouble breathing is 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 and burst open causing life-threatening symptoms. 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).

4. Cannabinoid Induced Hyperemesis (CIH - vomiting syndrome)*:* The cannabinoid hyperemesis syndrome may occur following frequent use of marijuana daily or over several months or years. 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. (Simonetto, DA et al. *Mayo Clinic Proceedings* 2012;87(2):114–9).

5. Risks to family*:* Inadvertent exposure to THC either through exposure to second hand smoke or accidental ingestion of marijuana-edibles poses a significant health threat to innocent by-standers. There are numerous reports 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)

6. Driving: The National Highway Traffic Safety Administration 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

7. Memory: Chronic use of cannabis in adolescents is associated with defects in both acute and long-term memory and with changes in the structure of the brain. The structural changes are related to alterations in synaptic function (brain cells communicating with each other)) within the cortico-basalganglio-thalmic brain circuits that play an important role in memory. This circuitry includes the areas of the brain called the striatum, globus pallidus and thalamus (S-GP-T). These areas contain a dense population of cannabis receptors. A very important controlled study of patients who smoked marijuana and had documented poor memory were part of a larger study of patients who had schizophrenia and underwent MRI brain surface mapping. This unique study compared findings in 4 groups of patients. The study groups included 2 populations, one with schizophrenia and one without schizophrenia. These 2 groups were subsequently divided into 2 subsets, those who chronically smoked marijuana 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). It has been shown that adolescents who use cannabis just once or twice show changes on brain MRI scans (Smith MJ et al., Schizophrenia Bulletin 2014;40:287-299).

8. 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 brain cells 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. After using marijuana there is a prolonged presence of external cannabinoids in the blood and at the cellular level which has deleterious effects on cell growth and cell communication. The presence of exogenous THC results in inflammation, delayed maturation, and injury or death of the brain cell. These effects occur in the fetus, infant, child and young adult and the resulting functional defects may persist for years or even a life time and 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; and behavioral disorders, including aggression, impulsive behavior, and a variety of mental health problems.

9. Learning problems and school performance/job performance: Early initiation and continued use of marijuana affects memory, learning, attention and ability to think clearly, making it difficult to concentrate, learn new things, and make sound decisions. As a result, school performance is impaired. (Dougherty DM et al, Psychopharmacology 2013;226(2):307-319) Teens in school have increased number of absences which increases the risk of dropping out of school. It is clear that using marijuana at an early age is independently associated with learning problems. (Crean RD et al. J Addict Med. 2011;5(1):1-8).

10. Loss of IQ**:** Many teens and young adults believe that cannabis is not harmful to health and therefore start using cannabis at a younger age and more frequently. A long-term epidemiological study was performed using data collected on over 1000 participants over a 38 year period. The results revealed that chronic 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).

11. Changes in executive function: Executive function is a set of mental skills that include working memory, flexible thinking, self-monitoring, planning, time management, organization and self-control. Poor executive function skills make it difficult to learn every day skills, difficult to focus and follow directions and handle emotions. These skills are lost in people who have ADHD, depression, learning disabilities and in people who are recurrently exposed to THC. Loss of executive skills is stronger in less experienced cannabis users then in those with established drug tolerance. However, chronic users are more likely to suffer these problems when they abstain from THC.

- Cannabis induced acute psychosis and risk of chronic, long-term psychosis

  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. Using cannabis can cause an acute psychosis, occurring with intoxication or with withdrawal lasting up to 48 hours. There may be a variety of symptoms and all are characterized by a break with reality. Common symptoms include paranoid delusions, suspiciousness, and a sense of grandiosity, hallucinations, dissociation or a feeling of detachment and unreality, disorganized and disturbed thought and disturbed emotional responses.

  There is a significant and consistent relationship between marijuana use and the development of schizophrenia and chronic depression. A prevalence rate of persistent depression as high as 40% in chronic marijuana smokers has been repeatedly reported (Brook JS. Psychol Rep 2011; 108(2):339-357). There is a significant and consistent association between consumption of marijuana, mostly during teenage years or early 20s, and the later development of schizophrenia. Marijuana is reported to be 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)

- Cannabis withdrawal and dabbing

  BHO may lead to early tolerance, dependence and rapid onset of withdrawal symptoms. Cannabis withdrawal symptoms after using concentrates are real. Cannabis withdrawal syndrome isn't likely to be life-threatening or medically dangerous. It occurs in chronic cannabis users since the natural receptors by which cannabis works in the body are craving stimulation in response to exposure to chronic external cannabis. When the external THC is withdrawn the body is starved of cannabis and forced to rely on natural stores of these chemicals (endocannabinoid system), but it takes time for the natural receptors to grow back to their baseline levels. In the mean-time the brain and the body are hungry for THC and other cannabinoids resulting in withdrawal symptoms.

  Withdrawal symptoms from using high concentration THC (dabbing) are harsher and include a combination of physical, emotional and mental symptoms which may last a month or more. Withdrawal symptoms may occur in 3 stages. The first stage begins about 24-72 hours after the last dose and includes decreased appetite, insomnia and night sweats. The second stage, typically days 3-6, results in irritability, anger and restlessness. These symptoms peak about day 4 and may take a few weeks to wear off. The last stage, which may persist for a month, includes insomnia, nervousness, depression, loss of appetite, restlessness, vivid dreams and irritability and anger.

- Lung Damage from inhaling BHO

  The process of making BHO requires heating the product to high temperatures. Heating BHO releases about 75% of THC, compared to 5–20% THC in traditional smoked cannabis. However, at the temperatures required to make BHO substances in marijuana called terpenes degrade into methacrolein and benzene. Methacrolein is a pulmonary irritant which causes acute lung injury and pulmonary edema which may be the mechanism of lung injury and acute respiratory failure reported to be associated with the inhalation of BHO (Anderson RP. Respir Med Case Rep 2019 Jan; 26:171).

- Using high concentration THC and future "Substance Abuse Disorders (SUD)"

  The concentration of THC in marijuana buds increased 3-fold between 1995 and 2014 (ElSohly MA. Biol Psychiatry 2016 Apr1; 79(7):613) and continues to increase. In the United States in 2020 the concentration of THC in buds sold in legal dispensaries was about 15% while the concentration in dabs and oils was 90% or even more (Cash MC. 2020 PLOS ONE, https://doi.org/10.1371/journal.pone.0230167). In March 2021, JAMA Pediatrics published a study comparing the risk of long-term risk of developing SUD's among adolescents who first used marijuana vs alcohol vs nicotine and reported that marijuana users between 12 and 17 had nearly double the prevalence (10.7%) one year after first using cannabis compared with adolescents who first used alcohol (5.6%) or nicotine (6.6%). After 3 years the addiction rate in the cannabis group was 20.1%.

In 2020 a report was published in JAMA Psychiatry confirming that the use of high concentration THC cannabis was associated with a high risk of developing anxiety disorders. (Hines LA. JAMA Psychiatry 2020 Oct1;77(10):1044). Using high-concentration THC dabs poses a greater threat to adolescents as compared to using low concentration THC products.

- Health consequences of prenatal/natal exposure to THC

1. 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).

2. Prenatal exposure to marijuana has been associated with numerous problems in the infant and child. Fetal exposure increases the risk for aggressive behavior and attention problems. (Marroun EL. Drug Alcohol Depend 2011; 118(2-3):470-474) Studies examining prenatal marijuana exposure and long-term school achievement have confirmed that prenatally exposed children perform below non-exposed peers on standard intelligence tests at age 6 years, have attention problems and depression at age 10 years and perform 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 suggesting that marijuana use during pregnancy damages the fetal endogenous cannabinoid system adversely modulating neurodevelopment 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 and 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.)

3. 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. There is some evidence suggesting that cannabis use during breastfeeding adversely affects the infants' neurodevelopment and impacts neuropsychiatric, behavioral, and executive functioning. Chemicals from marijuana in any edibles, oils, or other concentrates can be passed from a mother to her infant through breast milk. Some marijuana products, including cannabidiol (CBD) products, may contain pesticides, heavy metals, bacteria, and fungus that could be dangerous to a mother and her infant. To limit potential risk to the infant, breastfeeding mothers should be advised not to use marijuana or CBD products in any form while breastfeeding.

4. Accidental intoxication in infants and children: Infants and children may be accidentally exposed to THC through exposure to second hand smoke or by accidentally ingesting dabs or edibles that may be left in the open. Exposure of young pediatric patients to marijuana causes more severe symptoms than are typically seen in older patients. There has been a large increase in childhood intoxication since the legal use of medical and recreational marijuana has expanded.

5. 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.)

- Testing for Marijuana

  Marijuana testing is used to detect the presence THC or its breakdown products in urine. Most marijuana tests look for a metabolite of THC called THC carboxylase (THC-COOH) which stays in the body longer than THC itself. Both screening and confirmatory tests are interpreted based on a defined cutoff level (50 nanograms per milliliter for urine samples). If a drug is not present, or if the drug is present at a concentration below the test cutoff, the test will be reported as "undetected," "absent" or "negative." If a drug is present at a concentration equal to or above the cutoff, the test will be reported as "detected," "present", "presumptive positive" or "positive."

  A positive or detected initial THC screening result means that the person tested may have used marijuana. Since screening tests are not definitive, confirmatory testing is typically done to verify the results. A positive confirmatory test means the person had THC-COOH in their body when the sample was collected, but it does not confirm when THC was used or ingested.

  Testing urine for THC-COOH cannot be used to determine the source of THC, time of exposure, amount, or the person's level of impairment. A negative result does not necessarily mean that the person did not use marijuana. The person's THC levels may be below an established cutoff or the THC may have been already metabolized and eliminated from the body.

  Detection times for marijuana vary widely depending on an individual's metabolism, the dose, and frequency of use. Testing can indicate use anywhere from 3 days to more than 30 days prior to testing. Chronic heavy users of marijuana may test positive for even longer than 30 days after last use.

“Legal Marijuana”??: Delta 8 THC or “d8”

Hemp is a variety of *Cannabis sativa L*. The plant produces several cannabinoids including delta 9 THC and CBD. The amount of delta 9 THC in hemp is limited to 0.3% or less by federal law. The amount of CBD in hemp is not limited and most CBD on the market is derived from hemp.

Hemp growers and the hemp industry have refined CBD extracted from the plant into an isolate and synthesized (changing the chemical structure) the isolate into delta 8 THC. The Agricultural Hemp Farm Bill passed in 2018 made “all parts of the hemp plant legal” but delta 8’s legality is being challenged federally and in many States. Nearly all the delta 8 THC on the market is derived from CBD and is sold online, in head shops and in gas stations. Thirty-eight states are selling D8 as a “legal” product and have store fronts selling its products. Delta 8 is typically made in commercial laboratories, but if a vape-mailing ban goes into effect it is likely that most delta 8 will be made in home laboratories. The instructions for converting CBD to Delta 8 are readily available online. The market for delta 8 THC is exploding and it is perceived as a threat by the marijuana industry.

- Effects of delta 8 THC

  Consuming delta 8 THC will get the user "high" but not as high as using delta 9 THC. Delta 8 THC binds on the same receptors as delta 9 THC, thus causing similar effects. The effects include euphoria, happiness, and uplifting feelings. Side effects are similar to those produced by delta 9 THC and include dry mouth, red eyes, munchies, impaired short-term memory, paranoia and anxiety. Delta 8 metabolizes in the body exactly like delta 9 THC does, therefore, you will fail a drug test from use.

- Production, marketing and sale of delta 8 THC

  Delta 8 THC sales are skyrocketing until the feds decide to make a statement that it is illegal. Many states can charge the possession and distribution under their drug code stating, "substances that are isomers, derivatives, analogues, or salts of….." D8 is available in bulk quantities, edibles, joints, concentrates, and in vape cartridges. Some of the most popular edibles are "gummy bears". Consuming a gummy bear containing 25mg of delta 8 THC may be comparable to using 10 mg of delta 9 THC. Many D8 products contain large amounts of Delta 8 THC and CBD, with .3% delta 9 THC. By early 2021, delta 8 THC became the fastest growing segment of products derived from hemp threatening the profitability of the marijuana industry.

  The US Postal Service proposed a ban on sending vape products (delta 8 THC) through the mail but the ban has been postponed. All varieties of delta 8 THC may still be sent from manufactures by US mail. Delta 8 THC is also being produced in home laboratories by mixing CBD with an acid creating Delta 9 THC, then add another chemical to flip the double bond from the 9 carbon to the 8 carbon. However, home-production has resulted in an increased number of calls to Poison Centers.

- Medicinal uses of delta 8 THC: anti-inflammatory effects

  Anabasum is a drug derived from delta 8 THC and has been studied in animals to treat chronic inflammatory diseases in place of using non-steroidal anti-inflammatory drugs (NSAID's). The drug has been shown to have anti-inflammatory effects and, unlike NASID's, resolve or inhibit the cause of the inflammation by binding to receptors. This drug is currently (June, 2021) being evaluated in human studies for treatment of cystic fibrosis, lupus and other chronic inflammatory disorders (Motwani MMP. Clin Pharmacol Ther 2018 OCT;104(4):675).

PRESCRIPTION OPIATES (PAIN KILLERS) AND HEROIN

Opioids act by attaching to opioid-receptors in the brain, spinal cord, gastrointestinal tract, and other organs in the body. When the opioid attaches to a receptor the perception of pain is blocked. As a side effect, taking opioids also results in drowsiness, mental confusion, nausea, and constipation. However, some people experience a euphoric response to opioid medications. Prescription opiate pain-killers include morphine, codeine, hydromorphone (Dilaudid, Opana), tramadol (Ultram), oxycodone (OxyContin, Roxicodone, Percodan, Percocet), and hydrocodone (Vicodin). 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, the sharpest increase in the number of users of

prescription drugs for non-medical purposes is the 12-25 year old age group (HHS.gov/opioids retrieved May 2021). Abusers 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 abuse and addiction

  Opioid addiction is a disorder of the brain's reward system characterized by compulsive drug seeking despite adverse consequences. Repeated and prolonged exposure to the opioids actually results in changes that adversely alters the function of the brain cell (Browne CJ. Biol Psychiatry 2020 Jan1;87(1):22). This occurs in an area of the brain called the hypothalamus and results in a lack of self-control to resist the drug. Repeated use of the drugs rapidly produces tolerance and the need to increase the dose and reduce the interval between doses resulting in intense physical dependence. Continued use of opiates makes the body rely on the presence of the drug to maintain normal behaviors. The person is no longer able to feel the pleasures of natural rewards (food, friends, sex) and cannot function normally without the drug present. Overdose is common resulting respiratory depression.

  Drug interaction poses another risk. If the physician or pharmacist is not aware of every medication or supplement that a person is taking they may prescribe something that will interact with the opioid and result in serious side effects. Vitamins and herbal remedies fall into this category. The combination of alcohol and opioids can also result in respiratory distress/failure and death.

  1. Signs of opioid abuse include:

     - Using more than the recommended amount of the medication
     - Using prescription pills prescribed to 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

  2. Physical signs of opioid abuse/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

3. Treatment of addiction and overdose

   Death from opioid overdose is due to suppression of the brain's mechanism for controlling breathing. The most important thing is to recognize that someone may be overdosed and to act right away. It may be difficult to recognize the difference between someone who is very "high" or someone who is overdosed. Therefore, it is best to assume the affected user is overdosed, call for help and administer nasal Naloxone (Narcan) (https://accessdata.fda.gov/drugsatfda). Naloxone reverses the symptoms by reversing the effects of opioids on brain cells. Compared to adults, adolescents often require larger doses of Narcan. An increasing number of States now allow the distribution of Narcan among drug users and their friends and family. Naloxone nasal spray is available in a sealed package. The devise in the package consists of a nozzle and a plunger containing the drug. The nozzle is placed in the patient's nose and the plunger pressed to spray the drug into the nose. An additional dose may be administered in the other nostril if the user is not breathing within 2-3 minutes.

- Commonly prescribed opiate pain killers
  1. Oxycodone - Percocet & Roxicodone:

     Oxycodone is among the fastest growing of all abused prescription drugs. 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 and can cause a "high" similar to using to heroin.

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

  3. Fentanyl

     Fentanyl is a synthetic opioid pain reliever used for treating severe pain and is 50 to 100 times more potent than morphine and 15 times more potent than heroin (Fentanyl Drug Facts, NIH Drug Abuse) It is prescribed in the form of transdermal patches and can be diverted for misuse and abuse. On the street, fentanyl or its analogs may be added to heroin making the mixture more powerful than heroin alone. Heroin addicts who are exposed to this mixture may not be aware of the fentanyl additive and as a result, users who have not developed tolerance to the fentanyl additive may be overdosed and die. The heroin-fentanyl mixture has resulted in a dramatic increase in overdose death.

  4. Fentanyl analogs

     There are several fentanyl analogs on the street including acetylfentanyl, furanylfentanyl, cyclopropylfentanyl, and carfentanil. They are similar in chemical structure to fentanyl but not routinely detected in the urine because specialized toxicology testing is

required. Carfentanil, the most potent fentanyl analog in the U.S. is estimated to be 10,000 times more potent than morphine (dea.gov. hq092216_attach.pdf) Due to the potency of these new designer opiates Narcon needs to be administered in doses upwards of 5-10+ the amount of Narcon used to treat the typical opioid overdose patient. Even with high doses the lifesaving efforts often fail.

- 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. The drug is available online and sold as a "research chemical." Overdoses are treated the same as any opiate overdose. However, larger doses of rescue medications are often necessary.

- Carfentanil: This drug 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 and sold on the street as heroin. It is often added to heroin to make it more potent. It can be mixed with cocaine and sold as a "speed ball".

- Furanylfentanyl*:* This designer version of fentanyl is mass-produced in clandestine labs in China and smuggled into the United States via traditional distribution routes through Mexico. It has no approved medical use. It is not approved for human consumption. It is 5X more potent than fentanyl. It has been encountered as a single substance as well as in combination with other heroin, fentanyl, butyryl fentanyl, and U-47700. This potent drug has killed hundreds of people throughout Europe and the US. Ingesting the powder may cause seizures. Treatment centers report that abusers do not respond to normal medical treatments. Higher doses of methadone are required to detoxify the user.

- U-47700*:* Known as "pink" on the street is about 8X more potent than morphine and can be injected, snorted or ingested. Some people have "plugged" it by dissolving it in water and inserting rectally. It is mixed with heroin and sold as heroin. The effects are short-lived typically resulting in dangerous double dosing. It is corrosive to mucous membranes and sublingual administration is likely to damage the mouth. Vaporizing the substance damages the lungs.

- W-18: This designer opiate 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 or in green round pills that look similar to 80mg OxyContin pills. It has been sold on the street as Fentanyl pills. The powder has been mixed with heroin and with cocaine. It has no therapeutic use and is causing deaths all over the USA.

- Isotonitazene**: "**Iso" is the most persistent and prevalent new opioid in the U.S. today. Isotonitazene is derived from a powerful opioid called etonitazene and is about 60 times more potent than morphine. When etonitazene became illegal the molecular structure of

etonitazene was altered creating Isotonitazene which is legal. Isotonitazene mixed with cocaine was detected in over a dozen overdose deaths in Illinois and Indiana.

- Brorphine (Purple Heroin): Brorphine is s a new synthetic opioid identified as “purple heroin”. Brorphine is sold both as a single substance of abuse or in combination with heroin and fentanyl. Multiple overdose deaths have been reported in US especially when this drug is mixed with heroin, methamphetamine, fentanyl, carfentanil, and a sedative known as etizolam. Symptoms of a “purple heroin” overdose are similar to any other opioid overdose.

5. Dilaudid

Dilaudid is a prescription pain killer known as “Big D” “M-80’s” and “Peaches” on the street. It is a very powerful semi-synthetic opioid narcotic painkiller considered to be almost 10 times stronger than morphine and is often used as an alternative to morphine. Dilaudid takes effect within 15 minutes and lasts for longer than six hours. Tolerance and dependence may occur within a couple weeks of use. The drug may be ingested, smoked, snorted or injected.

6.Codeine

Codeine is an opiate used for managing pain and cough. Teens and young adults abuse large amounts of liquid codeine mixed in drinks known on the street as Syrup, Lean, Sizzurp, Texas Tea, Memphis Mud, or Purple Drank. Purple Drank often contains codeine and promethazine (antihistamine) mixed with soda or Arizona Tea to make it sweet and palatable. The combination is 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. 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.

- Heroin

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, vaporized, 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 reflux, 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 discontinuing the drug. However, the time frame can fluctuate with the degree of tolerance as well as the amount of the last dose.

1. 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
    - 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

2. Physical Signs of Heroin Use

    - Runny nose and constant sniffling
    - 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

- Opioid addiction and withdrawal

    Opioid-related disorders that require medical management include opioid intoxication, opioid overdose and opioid withdrawal. 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 death. 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 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 addict's 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 heroin unless treatment includes long-term psychotherapy.

Withdrawal symptoms may include sweating, malaise, anxiety, depression, priapism (sustained and painful erection), 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. 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.

- Mixing opioids and other drugs

1. Benzodiazepines (Xanax)

Opioid painkillers and benzodiazepines are two of the most frequently abused prescription drugs in the world. Benzodiazepines and opioids are often used in combination to achieve and enhanced high. Benzodiazepines enhance the effects of opioid painkillers but this drug combination has a high potential for abuse and deadly results. Every day more than 136 Americans die after overdosing with opioids. In 2019 the National Institute on Drug Abuse reported that 16% of deaths involving opioids also involved benzodiazepines (Retrieved at http://wonder.cdc.gov/mcd-icd10.html). Benzos and opioids have a modulatory effect on each other and when taken together the metabolism (break down) of the opioid is delayed thereby increasing opioid blood levels (Jones JD. Drug Alcohol Depend 2012 Sept1;125(1-2):8). Both drugs depress respirations resulting in the increase risk of overdose and death.

3. Xylazine (TranQ on the street)

Xyazine is a non-opioid sedative, muscle relaxant and analgesic for veterinary use but is also used to adulterate and potentiate the effects of heroin/fentanyl. Its use first emerged in Puerto Rico and has spread to mainland US. It is combined with heroin and Fentanyl. The combination may be swallowed, inhaled, snorted or injected and results in profound CNS depression and decreased blood pressure, respiratory rate and heart rate. It should be suspected when opioid overdose is accompanied by profound hypotension and very slow heart rate not responsive to naloxone. There is no antidote and intense supportive care is required and the death rate from overdose of this combination is said to be about 30%.

- Fetal exposure to opioids and effects on the newborn: Fetal Abstinence Syndrome

1. Untreated maternal opioid use disorder during pregnancy can have devastating effects on the fetus. The fluctuating levels of opioids in the blood of mothers misusing opioids expose the fetus to repeated periods of withdrawal, which can harm the function of the placenta and increase the risk of: fetal growth restriction, placental abruption ,preterm labor[101], intrauterine passage of meconium and fetal death. Babies born to mothers using opioids during pregnancy may be addicted at birth. Many exposed neonates go through withdrawal and require treatment of addiction. Medication is required in 50%-60% of opioid exposed newborns (Jansson LM. Pediatr Clin North Am 2019 April;66(2)353).

2. Children whose mothers used opiates during pregnancy have long-term neuro-developmental problems including short attention span, hyperactivity, sleep disturbances and mild memory and perceptual difficulties. 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 pre-natal exposure to behavioral problems, including ADHD and other disruptive behaviors.

3. Treatment with methadone has been used for pregnant women with OUD since the 1970s and has been recognized as the standard of care. However, buprenorphine has been suggested as an even better treatment option (National Consensus Panel, JAMA 1998:28n0(22):1936).
   - Both methadone and buprenorphine treatment during pregnancy stabilize fetal levels of opioids and reduce the incidence of repeated prenatal withdrawal and improve neonatal outcomes
   - A meta-analysis showed that, compared to single-dose methadone treatment, buprenorphine resulted in a 10 %lower incidence of NAS, an average 8.4 days shorter neonatal treatment period, lower amount of morphine used for treating NAS treatment and higher gestational age, weight, and head circumference at birth.
   - NAS still occurs in babies whose mothers have received buprenorphine or methadone, but it is less severe than it would be in the absence of treatment.

4. 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. Besides giving the infant medications treatment includes keeping the infant swaddled and in a quiet, dark room. Morphine elixir and phenobarbital are the most commonly used drugs to treat infant addiction and treatment may be required for 1-2 weeks or longer. Mothers who are taking opiates should not breast-feed their infant.

5. Long term effects of fetal exposure

    - 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

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. Specific drug tests must 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. 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, and cough medicines containing dextromethorphan. False positive may also result from kidney infection, kidney disease, diabetes, liver disease and various antibiotics.

Users can adulterate their urine and mask the results of testing 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 and drug testing centers may routinely check for this adulterant. Instant drug-testing urine dip cards are available that test for the 5 drugs in the NIDA standard test and also detect agents that 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 testing for 5 drugs: cocaine, marijuana, opiates, amphetamines and barbiturates. When warranted saliva drug testing can detect any drug. Saliva drug testing cannot be beat with conventional mouthwashes.

- Detection windows

  The presence of drugs or their metabolites have certain “detection windows” in the urine and the amount of time they can be detected varies depending on the drug. Alcohol is eliminated from the urine more quickly than other drugs and testing the urine should occur within two hours of last ingesting

alcohol. Other drugs are eliminated from the body at different rates and are therefore detectable for different periods of time long after the drug's effect has worn off. The following are estimates of the length of time that certain drugs are detectable:

1. Alcohol – 2-12 hours
2. Amphetamines/Methamphetamine – 2-3 days
3. Adderall / Ritalin – 2-5 days
4. Bath salts – 4-7 days
5. Barbiturates – 2-10 days
6. Benzodiazepines – 1-6 weeks
7. Cocaine – 2-10 days
8. Codeine – 2-4 days
9. Ecstasy (MDMA) – 2-3 days
10. Heroin - 1-3 days
11. Morphine – 2-3 days
12. LSD-8 hours
13. Marijuana
    - 1 time only - 5-8 days
    - 3 times/week - 11-18 days
    - 4 times/week - 23-35 days
    - 5-6 times/week - 33-48 days
    - Daily use - 49-90 days
14. Methadone – 2-3 days
15. Phencyclidine (PCP) – 1 week
16. Prescription Opiates – 3-5 days
17. Synthetic Pot (K2 / Spice) – 4-7 days

- Ways to cheat/beat drug tests

Before ordering a drug test it is important to know the procedures followed at the laboratory. 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? Some of the most common ways people try to cheat drug tests:

- The whizzinator is a pouch with straps and a small hose that clamps closed. Someone else's urine is added to the pouch, the pouch is strapped to their thigh, and worn for 2-3 hours before the test to warm the urine in the pouch to body temperature. The clamp is loosened and urine fills the specimen cup and then the tube is re-clamped.
- Elmer's glue bottle is used in a way similar to the whizzinator.
- Males will put someone else's urine in small glass vials and roll it up under their scrotum. It may be taped to the body to warm the sample to body temperature. If they are not watched or checked, the urine can easily be substituted for their urine.

- Females will fill balloons with someone else's urine and insert them into the vagina for a couple hours to warm, then pop the balloon releasing the urine.
- Females take small thin prescription drug vials, put a hole in the lid and cover the hole with duct tape. They fill the vial with someone else's urine and insert it in the vagina. The sample is allowed to warm, the tape is removed and the urine dribbles out.
- "Detox drinks" are sold at vitamin stores (GNC, Vitamin Shoppe, etc.), online, in smoke shops, and in marijuana dispensaries. The majority of the time they do not work and some drug testing agencies actually 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.
- Powdered and synthetic urine products are sold in smoke shops, marijuana dispensaries, and online. Some synthetic urine products come with their own small heating pad to warm the liquid to body temperature. The drug testing lab can test the sample for the presence of human antigens to detect synthetic urine.
- Cranberry and Niacin may be ingested and possibly produce a false negative test result. People take high doses of cranberry pills and niacin alternating every 3 hours for 6-12 hours before drug testing. Both can legally be purchased anywhere vitamins are sold
- Adding Sure Jell (Certo-Drug) to a bottle of Gatorade or juice and gulp it down to block detection of THC. Then drink one gallon of water before the drug test. Make sure to urinate 3 to 4 times before giving the sample to the lab to get rid of any contamination. Take a vit-B tablet one hour before getting tested so the urine has a yellow color. **How it works, THC metabolites become water-soluble will bind to bile. Fruit pectin binds to bile. As a result, the THC metabolites are forced out of the body via defecation instead of urination.**

DRUG PARAPHERNALIA

Drug paraphernalia may be pipes, bongs and syringes or many other ordinary items used to disguise or hide 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 as a way of using the drug. Finding paraphernalia means drug user. The following are 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, tourniquet, cotton pieces

Heroin:

- kits containing – spoons, bottle caps, lighters, syringes, tourniquet, 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 bongs
- 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

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 Dance safe 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 effect's 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/