

Comprehensive Outline of Substances Commonly Abused by Youth

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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 targets synapses 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 telltale 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? Is there irrational behavior and repeating things that don't make sense?

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, eg 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
- **Classification of illicit drugs according to effects on the Central Nervous System (CNS) and signs of abuse for each class of drugs**
 1. CNS depressants
 - a. Alcohol
 - b. Barbiturates
 - c. Benzodiazepines
 - d. Many sleeping pills
 - e. Opioids
 - f. GHB/ Rohypnol

General signs of abuse of CNS depressants include reduced heart rate, slow breathing, confusion or memory loss poor judgement, blue lips or fingertips, clammy or cold skin.

2. CNS stimulants
 - a. Amphetamines and methamphetamine
 - b. Cocaine
 - c. Nicotine
 - d. Caffeine
 - e. Khat

General signs of abuse of CNS stimulants include dilated pupils, restlessness and hyperactivity, loss of appetite, weight loss, deceptive behavior, having excessive energy, flight of ideas, racing thoughts, increased sense of well-being or confidence.

3. CNS psychoactive drugs
 - a. LSD
 - b. Psilocybin and mescaline
 - c. Cannabis and synthetic cannabis
 - d. Bath salts and similar “Designer Drugs”
 - e. Volatile substances (gasoline, paints, glue)
 - f. Ecstasy, Molly and similar drugs

General signs of abuse of CNS psychoactive drugs include a sense of euphoria, elevated mood, relaxation, altered sense of visual, auditory and taste perception, hallucinations, paranoia, extreme agitation, confusion, elevated heart rate and blood pressure.

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 requiring more and more alcohol to achieve the same effect. 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 one of the leading causes of adolescent death and is associated with suicide attempts, depression, anxiety, mood disorders and ADHD. Alcohol use at an early age is a strong predictor of future alcohol-related problems. Early age use of alcohol is 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 include difficulty in recalling instructions, shortened attention span, slurred speech, sluggish, sleepy and slowed reactions, unsteady gait, poor judgement and impaired ability to drive. Alcohol may be consumed several ways:

- **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 odor than other alcohols and is favored. The candies are placed in a dish and covered with alcohol. The candy absorbs the alcohol. The candies are initially sticky but when they dry they look the same as untreated candy. They are then eaten as ordinary candy - only with a buzz!

2. Tampon dipping 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).

- **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 air 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 more rapidly than drinking alcohol thus making it more dangerous.

2. Teens 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 1-2 liter plastic bottle. An inflation-pin typically used for inflating basketballs is inserted through the hole in the lid. About a half a cup of Vodka or some other type of alcohol is poured into the bottle. A tire pump is connected to the pin and air is pumped into the bottle until the bottle is firm. The pump is removed causing a pressure change in the bottle. The alcohol is converted to 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. 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 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 the combination of 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 “Addy’s” to get a quicker high. Adderall is a CNS 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 mother's use of alcohol during pregnancy. It is not clear how much alcohol needs to be consumed to cause FAS and 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 centuries ago and is known in the Middle East region 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 from several cigarettes (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 that Hookah smokers may suffer lung damage as the charcoal used to heat the hookah products releases large amounts of carbon monoxide and cancer-causing agents.

- **E-Cigarettes and vaping**

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. 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.

Other forms of electronic smoking, hookah pens and E-cigarettes, are also 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, that is 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.

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, and refill liquids. Diacetyl 2,3-pentanedione and acetoin has 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.

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 areas. (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) Vitamin E acetate is 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.

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

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

Phenibut is a non-regulated synthetic sold over-the-counter 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 social media fad which encourages teens to take as much allergy medicine as it takes to trip out (hallucinate). This may lead to fatal heart rhythm disturbances when 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 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 dissolved and 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 online instructions on how to extract DXM from syrups and gel capsules thus enabling them to inject or orally consume the active ingredient and minimize vomiting.

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 often misuse high doses of dextromethorphan to relieve withdrawal symptoms. Because dextromethorphan may increase serotonin levels, these patients may be particularly

susceptible to DXM 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.gov/pmc/articles/PMC6663275/>, Retrieved May 2021). Naloxone may reverse the CNS depressive effects of loperamide.

HALLUCINOGENIC AND DISSOCIATIVE (PSYCHOTROPIC) 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". These drugs 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 tranquilizer Xanax. It contains apomorphine and is hallucinogenic producing 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 liquid from the mouth 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 which is the primary psychoactive substance 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) which makes 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 secretes 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 to 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 may 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:**

1. *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.

2. Geranium Extract (methylhexanamine) or synthetic dimethylamylamine

Geranium plant extract is marketed as "Pump-It Powder" or "Jacked 3D". Dimethylamylamine (DMAA) is a synthetic 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. 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

3. Mushrooms (Shrooms, 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 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.

4. Cacti (Peyote buttons)

Peyote is a small spineless cactus that 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. Peyote is illegal except for use in registered “traditional Indian religious ceremonies which use the peyote sacrament”.

- **Hallucinogenic/Dissociative drugs**

1. Phencyclidine (PCP)

PCP, known as Angel Dust on the street, is an illegal hallucinogenic recreational drug. It was very popular in the 1970’s and there has been a recent resurgence and popularity in the use of PCP. It is a dissociative anesthetic (similar to Ketamine) with mild opioid effects and is used for its mind-altering effects. The drug is typically a white powder made into tablets. It may be smoked, snorted, given IV or swallowed. It is often mixed with marijuana.

Effects vary by dosage but the actual amount taken by a user is unpredictable since the concentration varies. The drug is addictive. High doses cause a drop in blood pressure and heart rate, blurred vision, drooling, loss of balance, violence and suicide. Treatment of intoxication is

to provide clinical support. About 25% of users who experience hallucinations will go on to eventually develop schizophrenia.

2. Dextromethorphan (DXM) and Robo-Tripping (see above description)

3. LSD (acid)

LSD is illegal and has a high potential for abuse. It has no currently accepted medical use but there has been a resurgence of interest in potential therapeutic uses of LSD for treatment of alcoholism, depression and PTSD. In pure form LSD is clear or white in color and has no odor. It is produced in liquid or crystalline form and may be mixed with other inactive ingredients or diluted and sold as a liquid for oral use. It has a slightly bitter taste and is usually sold on the streets -

- as LSD dripped onto sheets of absorbent blotter paper and cut into small, individual dosage units
- as thin squares of LSD-infused gelatin squares commonly referred to as window panes
- as small tablets known as Microdots or in capsules
- as a liquid on sugar cubes

Effects typically include altered thoughts, feelings, and increased awareness of one's surroundings. Many users have visual or auditory hallucinations, dilated pupils, increased blood pressure and increased body temperature. Effects typically begin within half an hour and can last for up to 20 hours. LSD is used mainly as a recreational drug or for spiritual reasons. LSD does not appear to be addictive but frequent use can cause acute tolerance, requiring much larger doses to feel an effect. Adverse psychiatric reactions are possible, including anxiety, paranoia and delusions. Distressing flashbacks might occur in spite of no further use.

SYNTHETIC CANNABINOIDS (SPICE AND K2)

Synthetic cannabinoids are chemicals that act similar to THC. Like the THC in marijuana, synthetic cannabinoids bind to cannabinoid receptors in the brain (Castaneto MS. Drug Alcohol Depend 2014 Nov1:144:12). Normal brain function and maturation are modulated by the human endocannabinoid system. Exogenous natural and synthetic cannabinoids interrupt the endocannabinoid system and impair brain function and brain growth. More than 200 synthetic cannabinoids have been identified but only a few have been declared a controlled substance in the United States.

The final cannabinoid-containing product is produced by adding raw synthetic cannabinoids to various types of dried plant material. Synthetic cannabinoid powder is 98-100% pure and dissolved in acetone or alcohol and sprayed onto dried plant material. Synthetic cannabinoids may be marketed as "herbal incense" or "potpourri" and are sold as products which are labeled "not for human consumption" in order to evade regulatory scrutiny. Abusers typically smoke or ingest the products. Many of the

suspected synthetic cannabinoid packages use marijuana nomenclature on their labels such as “420,” “Cush,” “Hydro,” and “Chronic” which are readily identified by drug users as being related to THC. These products are often displayed with drug paraphernalia such as pipes, dugouts, grinders, bong, and hookahs. When inhaled, as little as 1 mg of synthetic THC can produce intoxication.

Liquid cannabinoids are also available as e-drops and e-liquids for use in electronic cigarettes or hookah pens. They are sold as K2, eLIQUIDS, Cloud 9, Hookah Relax, Crown, Bizarro, Shisha and Mad Hatter. These designer liquids often contain a potent bath salt (2C-P described below). Effects of the combination may result in psychotic behavior.

- Physical and emotional effects of synthetic cannabinoids

The desired effects of synthetic cannabinoids are similar to those produced by marijuana: elevated mood, relaxation, and altered perception. In some cases, the effects are even stronger than those of marijuana (Chase PB. *Clin Toxicol (Phila)* 2016;54(1):14). Synthetic cannabinoid products may cause dry mouth, red eye, loss of appetite, agitation, high blood pressure, paranoia, very rapid heart rate, anxiety, tremors, seizures, drowsiness, slurred speech, dilated pupils, vomiting, chest pain, and heart palpitations. Some users who previously had no known psychiatric history may develop drug-induced psychosis. It is not well understood why some users present with florid psychosis and others do not. Not all synthetic cannabinoids are the same and therefore the side effects are variable.

The side effects may be more pronounced than those of marijuana and may result in the user requiring immediate Emergency Medical Care. Synthetic cannabinoids have been implicated in the deaths of teenagers and young adults (Darke S. *Clin Toxicol(Phil)* 2020 May;58(5):368). Acute kidney injury due to synthetic marijuana has been reported and some patients require short-term dialysis. Synthetic THC may also cause reduced blood supply to the heart and a few cases of heart attack have been reported. Regular users experience withdrawal symptoms after stopping synthetic cannabinoids. Symptoms include loss of appetite, vomiting and diarrhea, extreme sweating, inability to sleep, intense cravings, depression and loss of motivation, psychotic episodes and suicidal thoughts.

- Effects of synthetic marijuana on the brain

Smoking or ingesting marijuana may cause panic attacks and psychosis. Some users have a significantly increased risk of developing chronic depression or schizophrenia. The same is true in people who use synthetic marijuana and synthetic marijuana users often present with paranoia, agitation, confusion, hallucinations and even seizures. The effects of synthetic THC on the brain are more pronounced than the effects of natural THC since the affinity of synthetic THC for cannabinoid receptors in the brain is 5 times greater than that of natural THC (Sachdev S. *Br J Pharmacol* 2019 Dec;176(24):4653). There have been no long term scientific studies of the effects of synthetic cannabinoids on the human brain but it is known that the synthetic cannabinoid compounds effect recent memory and decision-making.

- **Synthetic THC and pregnancy**

The use of synthetic THC during pregnancy may have profound effects on the developing baby. The human endocannabinoid system plays a role in brain maturation and the development of emotional responses. Epidemiological studies have shown that some babies born to women who used synthetic THC during their pregnancies display altered responses to visual stimuli, increased tremulousness, and have a high-pitched cry which may indicate problems with neurological development.

SYNTHETIC DESIGNER DRUGS

The illegal status of cocaine, ecstasy, opioids, and methamphetamine has encouraged users to seek newer “designer” drugs that offer the advantages of being legal and less expensive. The term “designer drugs” is an informal term describing synthetic psychoactive drugs that mimic the chemical structure and activity of psychoactive drugs such as methamphetamine, cocaine, morphine, or cannabis. They are typically manufactured in concealed locations and/or home labs by using chemicals that are legally available. The final products have different chemical structures than the actual drug and therefore may be legal when manufactured. The most common and widely used families of synthetic drugs are (1) synthetic cannabinoids, (2) synthetic cathinones with substituted phenethylamines and (3) amphetamines. These new “designer drugs” are synthetic substances produced for recreational use and are readily available in smoke shops, convenience stores and online.

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

- **Synthetic Psychoactive Substances: “Bath salts”**

These drugs are part of a group of synthetic drugs named New Psychoactive Substances (NPS) by public health experts. They are unregulated mind-altering drugs made to mimic the effects of controlled substances like amphetamines and cocaine and are typically produced in illicit laboratories. They are developed and marketed in rapid succession to dodge law enforcement. Most are sold online or in head-shops. Many have been banned including methylenedioxypyrovalerone (MDPV), mephedrone and methylone, but even these may be purchased online as “research chemicals” or cleaning products labeled “not for human consumption” in order to avoid law enforcement.

There are 2 chemical classes of NPS, cathinones and phenethylamines (PEA’s), and each has somewhat different properties and effects. Both classes are referred to as “bath salts” (not to be confused with Epsom salt). The synthetic cathinones are similar to the natural controlled cathinone found in Khat plant (Valente MJ. Arch Toxicol 2014 Jan;88(1):15). The phenethylamines (PEA’s), are more powerful and act like amphetamines. PEA’s are psychotropic/hallucinogenic drugs (Karila I. Curr Neuropharmacol 2015 Jan;13(1):12).

Bath salts have become increasingly popular among recreational drug users, especially those who join “Raves”. They are manufactured and sold as a white or brown crystal-like powder in small plastic or foil packages labeled “not for human consumption”. They may be ingested, snorted or injected and act like amphetamines, cocaine or mescaline. Some forms may be 10 times more powerful than cocaine. The drug triggers an intense compulsive urge to use the drug again. Frequent consumption induces tolerance, dependence, and strong withdrawal symptoms.

PEA’s produce effects similar to amphetamines and are more potent and longer lasting than Ecstasy. These compounds are structurally similar to mescaline and Ecstasy and have been sold as a “legal” substitute for Ecstasy. Street names include Smiles, Tootsie, Blue Mystic, 7-up, Bees, Nexus, Frank, and Tripstacy. These drugs are ingested, smoked, snorted or inserted rectally and produce intense effects lasting anywhere from 4-24 hours. Common side effects include rapid heart rate, high blood pressure, dilated pupils, dangerously high body temperature, paranoia, hallucinations, chest pain, suicidal ideation, violence, and seizures. These substances have been linked to a number of deaths from prolonged spasm of arteries (vasoconstriction). The vasoconstrictive effect may persist for days and result in sudden death from coronary (heart) artery constriction. Injection of the drug may lead to limb gangrene. Other complications include agitation, hallucinations, seizure, liver failure, or kidney failure. Toxicity may be dose related and when mixed with other drugs such as alcohol, Ecstasy, or cocaine can be lethal. PEA’s may be labeled and sold as methyline (MDMC, Explosion, bk-MDMA), Naphyrone (NRG-1, 4-total), Mephedrone (Drone, M-Cat, Meow-meow, Bubbles, 4-MMC), MDPV (methylenedioxypropylvalerone), Alpha-PVP (Cloud 9, Magic, Black Rob, Super Coke), and buphedrone.

People intoxicated from bath salts present with the syndrome known as “excited delirium” accompanied by dehydration, breakdown of skeletal muscle and kidney failure. Bath salts cause the release of large amounts of the neurotransmitter, serotonin, resulting in “serotonin syndrome.” Onset is often rapid often occurring within minutes. Mild symptoms of the serotonin syndrome may only consist of increased heart rate, shivering, sweating, dilated pupils, intermittent tremor, or twitching and over-responsive reflexes. Moderate intoxication includes additional abnormalities such as high blood pressure, and elevated body temperature. Temperature may rise to above 106.0 °F in life-threatening cases. Mental status changes include hypervigilance and agitation. Severe symptoms include suicidal ideation, violence, seizures, and death. Intoxication has proved fatal in several instances. The dangers of bath salts are compounded by the fact that these products may contain other unknown ingredients that have their own harmful effects. The different chemical structures of the different bath salts result in some functional differences between bath salts but all of them are strong psycho-stimulants and all share the same health consequences. Bath salts include:

1. Alpha-PVP (Flakka)

A popular substituted cathinone is alpha-PVP (alpha-pyrrolidinovalerophenone) known on the street as “Flakka” or Gravel, Cloud 9, Magic, or α -PVP. It is a stimulant and is structurally similar to MDPV (see below) and acts like MDPV. Alpha-PVP has been reported to be the cause of deaths from suicide and polydrug overdoses. Alpha-PVP can be snorted, swallowed, injected, and or smoked in e-cigarettes or vapes. Using additional “Flakka” when already high (snacking) or

combining it with other drugs may result rapid heart rate, extreme agitation, paranoia, aggression, and psychosis.

2. Mephedrone

Mephedrone is a stimulant drug and is marketed as a plant fertilizer or a “research chemical” and comes as a white powder, crystals, capsules or pills. Street names include Meph, Meow, Drone and Bubbles and it is sniffed, snorted or swallowed. There is no safe level of the drug. It produces a rush of intense pleasure and the user becomes very talkative and has a strong desire to re-dose. Injecting mephedrone causes soft tissue damage and damages blood vessels. Overdose causes tingling of the extremities, cyanosis (turning blue), seizures and respiratory distress. The effects of using mephedrone with other drugs is unpredictable and dangerous. Withdrawal occurs in chronic users and results in anxiety, depression, irritability and poor concentration.

3. MDPV (methylenedioxypropylvalerone)

MDPV is a relatively new drug that is becoming very popular. It is not “Molly” but is often sold on the street as “Molly”. It is used for its stimulant properties and in low doses its effects are similar to meth and cocaine. MDPV has a high potential for abuse and is addictive. It causes the user to crave the drug and use multiple doses. High doses may result in extreme paranoia, violence, increased heart rate and blood pressure, panic attacks and convulsions. These effects can last about 3-4 hours with negative side effects lasting 8-48 hours. Severe depression may last for 5-7 days.

4. Methylone (MDMC, Explosion, bk-MDMA)

Methylone is advertised and sold as a “room deodorizer”. The package label states that the product should not be consumed. However, it is consumed and used as a substitute for Ecstasy. Its effects include euphoria, stimulation, increases in sociability, emotional distress, insomnia, restlessness, depression, hallucinations, and psychosis. It may cause increased heart rate and blood pressure, sweating, dilated pupils, bruxism (grinding of the teeth), nausea and vomiting.

5. 25I-NBOMe (N-Bomb)

25I-NBOMe is a very potent illegal bath salt considered by users to be a version of LSD. It is sold as a liquid placed on blotter paper which is then placed under the tongue and absorbed. The drug is inactivated if swallowed. It may also be vaporized and inhaled. The onset of effects is rapid, plateau in 2-4 hours and can last 6-10 hours or longer depending on the dose. Side effects may last up to 7 days. Users experience visual hallucinations with color shifts, euphoria, dilated pupils, changes in perception of time, increased awareness, feelings of love and empathy and mental and physical stimulation. Undesired side effects include confusion, scrambled communication, paranoia, panic, and seizures, tachycardia, hypertension, agitation, aggression, visual and auditory hallucinations, seizures, and high fever.

6. Bromo-Dragon Fly

This is an extremely potent psychedelic drug, is highly toxic and known on the street as 7-up, Blue Mystic, Lucky 7, and Tripstasy. It is readily available online and sold as a “research chemical”. It can be smoked, ingested and injected. Side effects include rapid heart rate, high blood pressure, dilated pupils, dangerously high body temperature, paranoia, hallucinations, chest pain, suicidal ideation, violence, and seizures. It is a long-acting vasoconstrictor and, when injected, can cause gangrene below the injection site resulting in amputation. Symptoms of overdose are very violent and can result in terrifying hallucinations, massive seizures, spewing of blood, and death.

7. Benzofurans (Benzo Fury)

Benzo Fury is gaining in popularity in the United States. Benzo Fury is an illegal PEA and acts like Ecstasy and amphetamines. It can be purchased online and is a popular party drug. It is taken orally in tablets, capsules or as a powder. The powder may be wrapped in cigarette paper and smoked (Bombing). Benzo Fury effects the brain in the same way as amphetamine or Ecstasy and it is addictive. Immediate effects include hallucinations accompanied by increased heart, chest pain, and elevated blood pressure and temperature. Effects start within 2 hours and last another 2 hours. It has strong vasoconstriction and jaw clenching effects. After-effects include sweating, tingling of extremities, euphoria, insomnia and depression.

- **Synthetic Psychoactive Substances: Designer Amphetamines**

Designer amphetamines are synthetic drugs derived from amphetamines. Like other designer drugs they are often created to avoid regulation but they are illegal in the US. These drugs produce many of the same effects as amphetamines. They induce psychedelic effects with altered perceptions, hallucinations, poor coordination and risk-taking behaviors. Serious health problems associated with the use of these drugs include dangerous elevation of body temperature that can shut down the brain, heart, liver and kidneys.

Tolerance to amphetamines is common and the user finds it almost impossible to stop taking the drug. When the drug is stopped the user will experience severe withdrawal including anxiety, depression, paranoia, sleep problems and violent nightmares. Long term abuse leads to significant health and lifestyle problems. The most devastating may be “amphetamine psychosis” with hallucinations and paranoia, altered immune system, aggressive and violent behavior, heart and kidney problems and stroke.

1. Ecstasy

Ecstasy (3-4-methylendioxy-N-methamphetamine or MDMA) is a synthetic psychedelic amphetamine with both hallucinogenic and stimulant properties and is a chemical cousin to methamphetamine. It is unique in that it causes hallucinations as well as feelings of exhilaration and

excitement. Ecstasy is usually in tablet or powder form. The tablets come in all colors and have various types of logos or images on them. The color and the logo may refer to the intensity of the reaction. Many pills on the street labeled as Ecstasy contain cocaine, BZP (see below), heroin, LSD, ketamine, and/or methamphetamine. Users need to know the jargon that goes along with using Ecstasy so they have a better idea of what they might be using. Indicators of use include relaxed inhibitions, profuse sweating, rapid continuous speech, tremors, heightening of senses, confusion, and paranoia.

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

2. “Molly”: The new Ecstasy

Molly is marketed as pure MDMA (the new Ecstasy). However, it is typically not pure and is often adulterated with caffeine, methamphetamine, ephedrine, ketamine, LSD, talcum powder or aspirin. Molly is sold as a gentler, more approachable drug than Ecstasy but the opposite is true. Molly is a white crystalline powder similar to sugar. It can be ingested in a capsule or paper, dissolved in liquid, smoked, snorted, or injected. Some people do “swirlies” where the powder is placed under the tongue and on the gums. It is rapidly absorbed and takes only about 15 minutes to enter the bloodstream and reach the brain. About 45 minutes later, the user experiences the “high.” For most people, a “hit” of Molly lasts for 3 to 6 hours. People who use Molly may feel very alert or “hyper” at first, then lose a sense of time and experience changes in perception. Others may become anxious and agitated. Sweating or chills may occur, and people may feel faint or dizzy. Molly can cause muscle tension, nausea, blurred vision, and increased heart rate and blood pressure. Forceful clenching of the teeth can occur and individuals at club-parties often chew on pacifiers to relieve some of the tension. Even if a person takes only one pill, the side effects of Molly—including feelings of sadness, anxiety, depression, and memory difficulties—may last for several days to a week or longer in people who use MDMA regularly.

Molly also causes dehydration. It interferes with the body's ability to regulate temperature resulting in dangerous overheating, especially in the hot club-environment where it is typically used. This can lead to serious heart and kidney problems or, rarely, death. Molly can be extremely dangerous in high doses or when multiple small doses are taken within a short time period to maintain the high. High levels of the drug in the blood increase the risk of seizures and affect the heart's ability to maintain its normal rhythms. Memory loss is a problem among regular users of Molly.

3. 2 – CP

2-CP is sold as a “research chemical” and not for human consumption. It is a white powder or white crystal and when swallowed produces hallucinations. The onset of action may be very slow with peak

effects not occurring until 2-3 hours after ingestion but effects may last up to 20 hours. The safe dose cannot be determined since the range between what would be a mild dose versus an excessive dose varies by individual and users must titrate the dose that works for them. The amount of drug causing an overdose or death is unknown. This drug is potent and not for the casual user. It is dangerous and should never be used with or combined with other drugs.

4. PMA (para-methoxyamphetamine)

PMA looks like and is usually sold as an Ecstasy tablet. It is known on the street as Red Mitsubishi, Killer, Death, Dr. D., Pink Ecstasy, and Chicken Powder. PMA shares the same initial buzz and hallucinogenic qualities of Ecstasy but can cause a fatal rise in temperature in some users. PMA has been associated with numerous adverse reactions including death. Effects of PMA ingestion includes many of the side effects of other amphetamines including accelerated and irregular heartbeat, blurred vision, and a strong unpleasant feeling of intoxication. PMA causes euphoria at low doses but at higher doses has unpleasant effects such as nausea, vomiting, dangerously high body temperature, and hallucinations. These effects quickly overpower any pleasurable effects. The effects of PMA are much more unpredictable and variable between individuals than those of Ecstasy and sensitive individuals may die from a dose of PMA that a less susceptible person tolerates. There are approximately twice as many deaths caused by PMA as by Ecstasy or Molly even though the actual amount of PMA on the streets is only a fraction of that of Ecstasy. The drug is often mixed with Ecstasy and the combination is extremely hazardous. Since PMA has a slow onset of effects, several deaths have occurred when individuals have taken PMA followed by Ecstasy thinking that the first pill was not active. PMA overdose can be a serious medical emergency that may occur at doses only slightly above the usual recreational dose range, especially if PMA is mixed with other stimulant drugs. Characteristic symptoms are a severe increase in body temperature, rapid heart rate, and high blood pressure along with agitation, confusion, and seizures. Complications sometimes include more serious symptoms such as muscle breakdown and bleeding into the brain requiring emergency surgery.

5. MDA (methylenedioxyamphetamine)

Known on the street as “Sass,” “Mandy,” or “Sass-a-Frass,” is another psychedelic designer drug that has been used since the 1960’s. Even though it is illegal it can be purchased on line as a “research chemical” (not for human consumption). MDA is related to MDMA but has more potent psychedelic effects, can overstimulate the central nervous system and cardiovascular system. Symptoms include agitation, sweating, increased heart rate, and blood pressure, dramatic increase in body temperature, convulsions, and death.

- **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. 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 (prescription only), 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 (Etizy)

Another benzodiazepine type research chemical sold on line is etizolam. It recently emerged on the illicit drug market in the United States and sold as 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 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 20-30 pills/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)

Synthetic “Party Drugs” and “Date-Rape” drugs

1. Gamma Hydroxybutyrate (GHB) and butanediol (BDO)

GBH is a CNS depressant and an old drug that is making a comeback. Recreational use is illegal. However, it is easily available as a liquid on the street where it is known as Blue Nitro, Cherry Meth or Gamma G. The drug was synthesized in the 60’s and by the 80’s was marketed as a dietary supplement. By the 90’s it found its way into Raves and nightclubs. In small doses it induces relaxation, confusion and a state of sexual arousal. This is the basis of the drug being called a date-rape drug. The difference between causing confusion and euphoria and loss of consciousness is a matter of a few drops. Overdose may result in respiratory arrest and coma.

There is a substantially similar analog to GBH that may be purchased online called BDO (1,4 butanediol). It is sold as a cleaning agent and labeled “not for human consumption”. BDO is taken by mouth and once it enters the blood it is immediately converted to GBH. Both GBH and BDO are popular among gays and lesbians. Once starting to use either of these drugs it is hard to stop and withdrawal symptoms may occur within 6 hours of the last dose. Symptoms include delirium and hallucinations, renal failure and cardiac arrest. These drugs may be lethal when combined with alcohol or other CNS depressants.

2. Flunitrazepam (Rohypnol)

This synthetic drug is a powerful CNS depressant and is not legally sold in the US but is legal in many other countries. It comes as a white or green tablet and is easily dissolved in water or crushed and snorted. It is often sprinkled on marijuana and smoked. It is known on the street as “Mexican Valium”, “Ruffies” and “Roofies”. Signs of use include sedation and “Blackouts”. It produces a complete loss of memory, dizziness and disorientation and is a potent date-rape drug.

3. Benzo Fury: see above
4. Tianeptine (Tia)

Tianeptine is a synthetic atypical antidepressant. It is structurally similar to tricyclic antidepressants and also has opioid effects. Although it is not legal in the US it is sold online (not for human consumption) as a way to immediately reduce anxiety and as a “nootropic: or “smart drug”. It is supplied in tablet form or as a powder. The powder may be dissolved in water and injected. IV use is most common. Adverse effects include loss of consciousness, making it a date-rape drug and respiratory depression. Withdrawal rapidly occurs after stopping the drug. Overdose responds to treatment with naloxone.

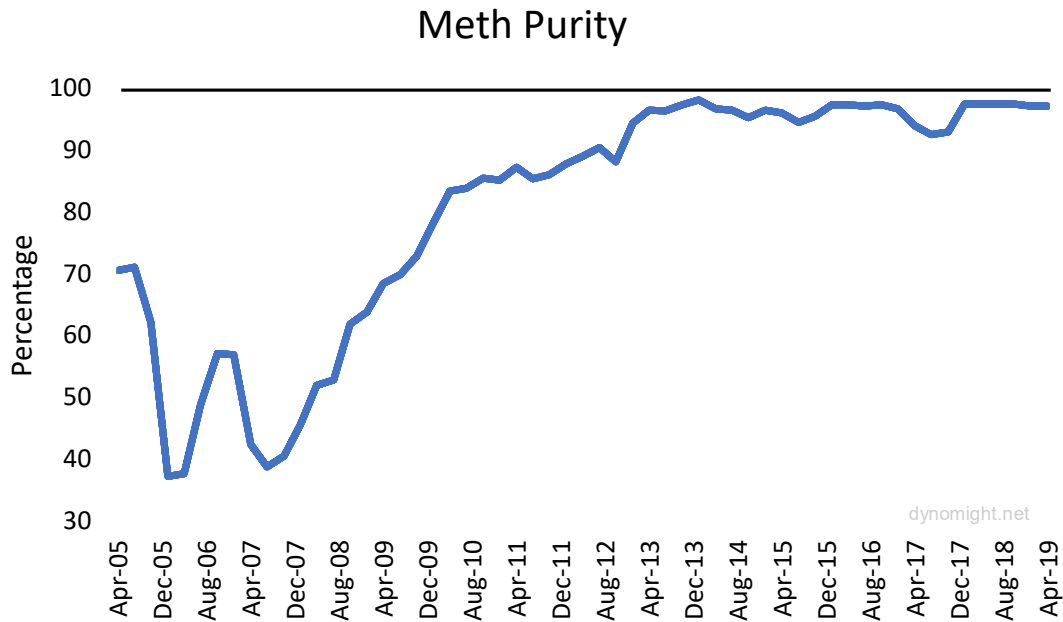
METHAMPHETAMINE: ephedrine-based and P2P-based

From the post WW II period to the 60'S prescribed amphetamines were used to treat a variety of health conditions. The illicit use of amphetamines followed wide spread prescribed treatment and became popular for reducing anxiety and inducing euphoria. The illegal manufacture and use of methamphetamine (meth) began in the 1970's when the legal use of prescribed amphetamines was limited, unintentionally creating a market for methamphetamine. Meth is a popular recreational drug and because it is now less expensive and more available than ever before it is even more popular.

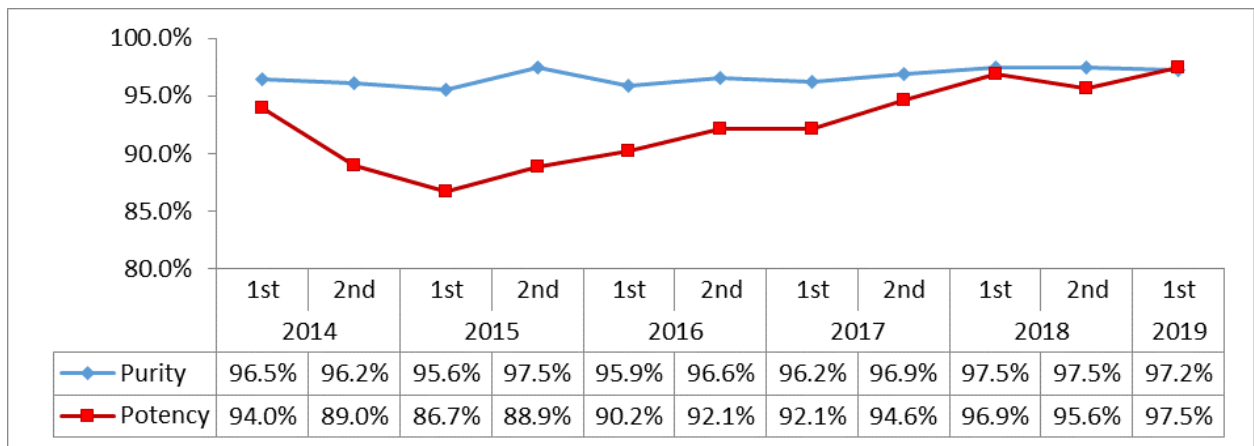
Meth is a central nervous system stimulant. It may be in powder or crystalline form (crystal meth). The powder may be white, tan, pink, red or brown depending on the method used to produce the drug. Meth may be smoked, snorted, ingested or injected after dissolving the powder in water or alcohol.

From the 60's to the mid-2020's meth was produced in home-laboratories and in larger labs in Mexico for shipment to the US using cold medications containing ephedrine. Eventually the sale of ephedrine was limited in the United States and outlawed in Mexico. As a result, meth producers re-invented the process for manufacturing meth using legally purchased phenyl-2-propanone (P2P) and other easily available chemicals. The vast majority of meth on the market today is derived from P2P. It is cheaper, less contaminated, purer and more potent than ephedrine-based meth (2020 National Drug Threat Assessment, March 2021, DEA-DCT-Dir-008-21), making the drug more dangerous.

Purity: Ephedrine Meth (Prior to early 2009) vs. P2P Meth (After 2009)



P2P Meth Purity and Potency



During the production of complex chemicals, like methamphetamine, the structure of the chemical compound may “flip” creating stable versions of the same compound. These versions are called isomers and each isomer may have different effects on the body. Two isomers are produced during the manufacture of P2P methamphetamine, d-meth and l-meth. The latter isomer does not have psychotropic effects and was present in significant amounts in early P2P. However, by 2019 the manufacturers learned to remove l-meth so that today’s P2P is about 97%-99% pure psychoactive d-meth.

Using meth produces an intense rush (flash) that appears immediately after smoking or injecting the drug. The “flash” is extremely pleasurable but lasts only a few minutes. Snorting or ingesting the drug results in euphoria without a flash, starting 3-5 minutes after taking the drug and lasting 15-20 minutes. Following the “flash” users experience an immediate euphoria and rush accompanied by increase alertness, wakefulness and physical activity. The “high” from the drug starts quickly and fades quickly inducing people to take repeated doses in a binge pattern, giving up food and sleep for several hours or several days resulting in a “crash”.

The effects of P2P meth may be different. The purer and more potent d-isomer present in P2P meth may create severe mental illness, schizophrenia and other psychoses and the desire to self-isolate or be left alone. On the street, this new meth is less expensive than in the past and tends to be laced with other addictive drugs, like fentanyl. As a result, users may require very prolonged detoxification. The other effects of P2P meth are similar to those of ephedrine-based meth. (S Quinones, Atlantic, November 2021. theatlantic.com)

The compelling effects of methamphetamine are related to its chemical effect on the brain resulting in the release of huge amounts of dopamine effecting the reward-region of the brain, creating extreme pleasure and reinforcing drug taking behavior. Repeated release of large amounts of dopamine is the basis for rapid addiction to this drug. As a result of the huge amount of dopamine released by exposure to methamphetamine it is not unusual that one dose of methamphetamine may result in addiction. Besides addiction, prolonged use of the drug results in weight loss, anxiety and confusion, sleep problems, violent behavior, hallucinations and psychosis.” Meth mouth” is a common problem. Continued use of methamphetamine affects coordination, learning, emotions and memory.

1. Signs of using methamphetamine

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

2. Effects

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

3. Complications

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

4. Withdrawal

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

5. Effects on Infants and children

Methamphetamines damages the fetus resulting in permanent brain abnormalities with subsequent delay in language skills and aggressive behavior. Prenatal exposure leads to future self-control problems in early school-age children, including poor attention, poor self-regulation skills, and poor problem-solving skills; all due to changes in the frontal cortex of the brain. Poor growth through 3 years of age has been documented. The newborn is often born premature and small for gestational age. At the time of birth there may be placental abruption or rupture of the uterus. Infants exposed to prenatal meth also have poor suck, smaller head size, shorter length and more often require intensive care. Laboratory studies have shown that meth impairs mineral uptake in the developing cartilage thus affecting growth. Meth-mothers more often have psychiatric/emotional problems and these infants/children are more likely to be abused or neglected.

MARIJUANA

Marijuana plants contain a variety of chemical substances. The known active ingredients are called “cannabinoids” and each plant contains about 100 different cannabinoids. However, only 2 of the cannabinoids are commonly used, delta- 9 tetrahydrocannabinol (THC) and cannabidiol (CBD). There are 2 species of marijuana plants. *Cannabis sativa* is high in THC and *Cannabis indica* is high in CBD.

Marijuana is the most common recreational drug in the US. Only the flower (bud) of the female *C. Sativa* plant has psychotropic properties and typically 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. Dab or wax preparations may contain 90+% THC.

Addiction to THC is not rare and is defined as the persistent use of THC despite negative consequences. Nearly every addictive drug, including marijuana, targets the brain’s reward system flooding the circuit with the neurotransmitter, dopamine. The brain adapts to the overwhelming surges in dopamine by ultimately producing

less dopamine. 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.

1. Recreational marijuana

THC is used for its mildly tranquilizing, mood and perception altering effects. 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 by increasing the THC content of the buds. In the 60's – 90's the THC content ranged from 2-7%. Today, the concentration of THC in the buds about is 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, Butane Hash Oil or BHO) has become very popular. THC is extracted from the plant buds by using butane or similar solvents. These products are extremely potent and have a concentration of 50% - 90+% THC. The liquid extract is thickened and becomes a brownish tan or yellowish waxy substance known as "wax" or "dabs". This wax is heated to vaporize and the fumes are inhaled. Vaporized wax or oil produces less odor than smoking marijuana joints. Commercial vaporizers often include a section that holds a flavored liquid that is also vaporized and 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 oil or wax is referred to as "Dabbing Out". The user often becomes incoherent, passes out and then wakes up feeling frightened because they can't remember what happened and may have a psychotic-break.

Illicit sellers 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.

2. Physical and emotional signs of acute 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 affects 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.

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 Ophthalmol Vis Sci* 1977;16:689-699).

Long-term health consequences of using marijuana:

- **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.
- **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. About 1.8% of all cannabis-related complications affect the heart and blood vessels including acute coronary syndromes (chest pain), peripheral arteriopathies (blockage of blood vessels) and cerebral complications (Jouanjus et al, *J Am Heart Assoc.* 2014;3: e000638)
- **Lung Damage:** Lung damage caused by smoking marijuana includes chronic cough, sputum production, wheezing and a high frequency of acute bronchitis (Taylor et al, *Chronic Addiction* 2000;95:1669-1677). Marijuana smoking causes inflammation of the large airway, increased airway resistance, and lung hyperinflation. Those who smoke marijuana have more symptoms of chronic bronchitis than those who do not smoke and have more outpatient medical visits for respiratory problems than those who do

not smoke (Polen MR. West J Med. 1993;158(60):596). Smoking marijuana may also reduce the respiratory system's immune response, increasing the likelihood of the smoker acquiring respiratory infections and pneumonia. (Owen KP Clin Rev Allergy Immunol 2014;46(1):65)

Spontaneous pneumothorax (internal tearing of the lung) resulting in severe chest pain and trouble breathing is the presenting symptom of bullous emphysema in otherwise healthy 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 is a recognized cause of rupture of the lung (pneumothorax). (Beshay M et al, European Journal of Cardio-Thoracic Surgery, 2007; 32:834-838)

- Hyperemesis (vomiting) syndrome: The cannabinoid hyperemesis syndrome may occur following frequent use of marijuana 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.
- 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, especially children. 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 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.
- 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 and decreased vigilance
- Memory: Chronic use of cannabis is associated with defects in both short-term and long-term memory and with changes in the structure of the areas of the brain important for memory. The structural changes are related to alterations in the way that brain cells communicate with each other (synaptic function) in the circuits of the brain which are important for memory. These areas also contain a dense population of cannabis-receptors. (Smith MJ et al., Schizophrenia Bulletin 2014;40:287-299 and Ashtari M. J Psychiatric Res 2011).

Delta THC and its derivatives (see section on synthetic THC which follows) acutely impair short-term memory and verbal recall. These effects may last for days or several weeks after stopping the drug. (Pope HG, Arch Gen Psychiatry, 2001). Long-term heavy users of cannabis have been shown to have "false memories" and are often unable to distinguish between truth and illusions. These memory errors may last for weeks after

the drug is discontinued and share the characteristics of age-related cognitive decline. (Riba J. *Molecular Psychiatry*, 2015) This lingering disability may create medical and legal problems. In legal situations, long-term cannabis users or cannabis-intoxicated persons may have to be treated as a vulnerable group, similar to child or elderly witnesses/suspects. (Kloft L. *PNAS*, 2020)

- **Marijuana and brain development:** The human body produces trace amounts of cannabinoids that play an important role 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. Using marijuana results in the prolonged presence of external cannabinoids in the blood and at the cellular level has deleterious effects on brain cell growth and cell communication. The presence of exogenous THC results in inflammation, delayed maturation of the brain and injury or death of the brain cell. These effects occur in the fetus, infant, child and young adult exposed to THC 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.
- **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. 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.
- **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. An 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.
- **Changes in executive function:** Executive function is a set of mental skills that include working memory, flexible thinking, self-monitoring and self-motivation, 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 than 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. The rate of persistent depression in marijuana users is as high as 40% in chronic marijuana smokers. (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 and is considered 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) Cases of schizophrenia associated with cannabis-use disorder have increased 3 to 4-fold during the past 2 decades and the increase may be associated with increases in the use of use and potency of cannabis. (Hkorthoj C. *JAMA Psychiatry* July 2021. Doi:10.1001/jamapsychiatry.2021.1471)

New findings suggest that a large number, perhaps 50%, of people who experience acute cannabis-induced psychosis convert to schizophrenia. (Arendt M. *Br J Psychiatry* 2005; 187:510-515) Users who develop schizophrenia often have a family history of substance abuse and their chronic symptoms typically start at an older age than people with primary schizophrenia. (Canton CLM. *Arch Gen Psychiatry* 2005; 62:137-145) A large Danish study (Kejser Starzer MS. *AM J Psychiatry* 2018; 175:343-350) reported that the 20-year conversion rate to either schizophrenia or bipolar disorder is 47.4% in patients who experience acute cannabis-induced psychosis. The risk of schizophrenia decreased with increased-age at the time of acute cannabis-induced psychosis. Cannabis-induced psychosis occurring between age 16-25 years carried the highest risk of developing schizophrenia. The risk of converting to schizophrenia is increased in youth who also have preexisting substance use disorder, personality disorder or eating disorder.

- "Dabbing"

Dabs are concentrated doses of cannabis that are made by extracting THC from marijuana buds. These concentrates are also commonly referred to as wax, shatter, budder, or butane hash oil (BHO) and are used by placing them on a hot surface and then inhaling the vapors or using a commercial vape. Smoking dabs has been around for at least a decade, but the advent of more advanced production methods have led to a flood of concentrates and have boosted the popularity of dabbing.

Dabs may be made in home labs but extraction of the oil is tricky and dangerous. Online videos provide instructions on how to make BHO at home. The process of making BHO at home is referred to as “blasting” since the combination of flammable gases (butane), heat and poor ventilation can result in explosion. “Blasting” involves passing butane through a steel or glass tube packed with dried cannabis buds. THC and other compounds in the vegetation dissolve in the butane. The butane –THC solution is then passed through a filter and collected in a dish or tray. Because butane is very volatile it evaporates leaving an oily or a waxy substance in the dish or tray. Sometimes the process works and sometimes it explodes leaving the maker in a burn unit or worse.

Even when home extraction goes well, there’s no way to know the quality or purity of the finished product. “Dirty” oil may contain chemical contaminants and excessive amounts of residual solvents that present health hazards when consumed. In a study published in 2015 over 80 percent of home-brewed BHO extracts were contaminated with pesticides or poisonous solvents left over from the extraction process (Raber JC. J Toxicol Sci 2015 Dec;40(6):797).

Clean and commercially tested concentrates have advantages over smoking marijuana. Properly manufactured cannabis extracts may be easier on the lungs than smoking burned plant material which produces resin and hot smoke. Extracts eliminate most of this unwanted material while still delivering a high concentration of THC. Using concentrates results in swift and powerful effects. However, dabbers need to consider the high potency of cannabis extracts (60%-90%) and recognize that it is easy to overdose. The long-term effects of dabbing cannabis wax and other concentrates are not well-known.

- Withdrawal from dabbing

Dabbing may lead to early tolerance, dependence and rapid onset of withdrawal symptoms. Cannabis withdrawal syndrome isn’t likely to be life-threatening or medically dangerous but withdrawal symptoms from using high concentration THC (dabbing) are harsh and include a combination of physical, emotional and mental symptoms which may last a month or more. Withdrawal symptoms 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 Butane Hash oil (BHO)

The process of making BHO requires heating the product to high temperatures to release about 75% of the THC content, 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).

3. Consequences of Using high concentration THC: “Substance Abuse Disorders (SUD)”

The concentration of THC in marijuana buds increased 3-fold between 1995 and 2014 (EISOHLY 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>). The long-term risk of developing SUD’s among adolescents who first used marijuana vs alcohol vs nicotine had nearly double the prevalence (10.7%) one year later compared to the use of alcohol (5.6%) or nicotine (6.6%). After 3 years the addiction rate in the cannabis group was 20.1%. High concentration THC cannabis is also associated with a high risk of youth 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.

4. Health consequences of prenatal/natal exposure to THC

- 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).
- 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 in older children. (Paul SE, *JAMA Psy* 2021) 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, *Am Acad Child Adolesce Psychiatry*, 2008) There is very strong

circumstantial evidence suggesting that marijuana use during pregnancy damages the fetal endogenous cannabinoid system adversely modulating neurodevelopment into adulthood.(Jaques SC et al, J Perinatology, 2014) 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.

- **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 or other concentrates can be passed from a mother to her infant through breast milk. To limit potential risk to the infant, breastfeeding mothers should be advised not to use marijuana products in any form while breastfeeding.
- **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 big boon in childhood intoxication since the legal use of medical and recreational marijuana has expanded.

The non-specific symptomatology of cannabis intoxication in infants with acute onset encephalopathy may delay diagnosis and lead to inappropriate procedures and interventions. Healthcare personnel in 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.)

5. 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 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.

SYNTHETIC PSYCHOACTIVE THC'S DERIVATIVED FROM CBD

These drugs are much different than the synthetic drugs that have cannabinoid effects described in the previous section titled SYNTHETIC CANNABINOIDS

1. Isomers of delta 9 THC derived from hemp

Hemp is a variety of *Cannabis sativa*. The plant produces several cannabinoids including delta 9 THC and CBD. However, hemp does not produce enough delta 9 THC to be intoxicating and is therefore legally sold in all States. By Federal Law (Farm Bill 2018) the amount of delta 9 THC in cultivated hemp is limited to 0.3% or less. The amount of CBD in hemp is not limited and most CBD on today's market is derived from hemp.

Two isomers of THC may be chemically derived from CBD, delta 8 THC and delta 10 THC. Isomers are two or more molecules with the same molecular formula but which have slightly different structures. The difference in structure results in different biologic effects. Delta 8 and delta 10 are synthetic drugs not present in nature. In general, these isomers of THC test "positive" on urine drug screens for THC. Under federal law delta 8 THC and delta 10 may be legal, but their legality is being challenged in many States and at the Federal level. Their legality falls into a gray area.

- **Delta 8 THC isomer**

Nearly all the delta 8 THC on the market is derived from CBD and is sold online and in head shops. Delta 8 is typically made in commercial laboratories, but can also 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 is about 50% - 60% as potent as delta 9 THC. Its effects include euphoria, happiness, and uplifting feelings. It is often used to relieve chronic pain and inflammation. 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.

- **Production, marketing and sale of delta 8 THC**

Delta 8 THC is sold online and in local shops. It is available in bulk quantities, edibles, joints 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. By early 2021, delta 8 THC became the fastest growing segment of products derived from hemp threatening the profitability of the marijuana industry.

- Medicinal uses of delta 8 THC
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 NSAID’s, may inhibit the cause of the inflammation. This drug is being evaluated in human studies for treatment of cystic fibrosis, lupus and other chronic inflammatory disorders (Motwani MMP. Clin Pharmacol Ther 2018).

- Delta 10 THC isomer derived from Hemp

Delta 10 THC is also extracted from CBD but the process is dangerous, requiring the use of highly flammable chemicals. Only minimal amounts of delta 10 are extracted with each chemical reaction. Delta 10 THC is usually produced in commercial labs because the process is so dangerous.

- Effects of delta 10 THC
Delta 10 helps relieve stress and tension. It produces an uplifting feeling and relaxation without inducing paranoia or stress. Users may experience euphoria, become more alert, creative and energetic. The “high” users experience is said to be less intense than that which occurs after using delta 8 or delta 10. Delta 10 is less potent than delta 8 and has fewer side effects than delta 8.
- Marketing and sale of delta 10
Delta 10 is not as common as delta 8, but can be found. It is sold as an oil or tincture to be used in vapes and topicals. It may also be present in edibles. Delta 10 is sprayed onto hemp buds (Zkittles) and smoked and sold online. This preparation contains a combination of delta 10 and CBD and is marketed as an aid to help the user “relax”.

- Delta 8 versus delta10
Choosing whether to use either delta 8 or delta 10 depends on the outcome the user desires. Delta 10 produces relaxation and has a calming effect. Delta 8 is best used to reduce pain and inflammation. The effects of delta 8 last longer than those of delta 10. Delta 10 is reported to cause fewer side effects.

2. TCH-O acetate: a synthetic drug derived from delta 8 THC

TCH-O is a synthetic cannabinoid derived from hemp but is not an isomer. It is most commonly made from delta 8 THC extracted from CBD derived from hemp. The delta 8 is treated with a gas, called an acetate, to produce TCH-O acetate, simply referred to on the street as TCH-O (pronounced THC-oh).

During production the gas is burned off leaving a food-grade substance free of acetates that may cause dangerous side effects. (Ahmed SA, J Nat Prod, 2008)

Since TCH-O is relatively new on the market, there is a lack of research on the drug and not much is known about the consequences of using the drug. There are wide variations in the quality of the product. It is known that THC-O is a “prodrug” which means that the compound is not activated until it has been metabolized in the body. The metabolites take about 20-30 minutes to produce effects. It is important for users to know this so they don’t assume the drug is not working and take an additional dose.

TCH-O is used in vapes which may create more hazards since heating or burning the product can activate other chemical reactions. It is sold as gummies and added to buds or flowers for smoking. The flower form may be up to 3X more potent than delta 9 THC and produces psychoactive effects. There is a risk of death from overuse of THC-O due either to the active THC or from contaminants in the product. As with other THC derivatives of hemp it is not clear whether the drug is legal. Until THC-O and other hemp derivatives become regulated, consumers need to weigh the risks and benefits of these compounds for themselves.

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.

1. 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 drug 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.

2. Indicators 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

3. 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

4. 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 device 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.

5. Commonly prescribed opiate pain killers

- 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.

- Roxycodone 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. Roxycodone (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.

- 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) 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 overdose and die. The heroin-fentanyl mixture has resulted in a dramatic increase in overdose death.

There are several fentanyl analogs on the street including acetylfentanyl, furanylfentanyl, and carfentanil. They are similar in chemical structure to fentanyl and may be detected in the urine using specialized toxicology testing. 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.

Fentanyl may be injected, smoked or taken by mouth. ***Fentanyl vapes, sometimes mixed with nicotine, are becoming popular, especially among teens. Exposure and intoxication by secondary smoke (vapors), along with several deaths, have been reported.***

1. 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.
2. 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”.

3. 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.
4. Furanyl Fentanyl: This designer version of fentanyl is mass-produced in clandestine labs in China and smuggled into the United States. It has no approved medical use and 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 drugs including 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.
5. 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.
6. Isotonitazene: Isotonitazene 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, a schedule 1 drug in the US. Illicitly using the drug will very likely lead to addiction. It is available on the illicit drug market and mixed with cocaine is deadly.
7. Brorphine (Purple Heroin): Brorphine is 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 the 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.

- 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.
- Codeine: Codeine is an opiate used for managing pain and cough. Teens and young adults may drink large amounts of liquid codeine mixed in sugary drinks known on the street as Syrup, Lean, Sizzurp, Texas Tea, Memphis Mud, or Purple Drank. Additionally, Purple Drank often contains promethazine (antihistamine). 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 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 sniffing
- Needle marks on arms and/or legs, between toes, in groin area
- Sores on nostrils and top of lips from smoking heroin
- Constant "hacking" cough from smoking heroin off of tin foil
- Loss of appetite and dramatic weight loss
- Nodding off during day and inability to sleep at night
- Dark circles under eyes and constant sleepy or groggy expression
- Scratch marks all over body, especially neck and arms

3. Opioid addiction and withdrawal

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

Withdrawal symptoms 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. 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 an enhanced high. This 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.

2. Xylazine (TranQ on the street)

Xylazine 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 where 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. 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 (FAS)

1. Untreated maternal opioid use 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, 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 their 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 opioid addiction 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;280(22):1936) Both methadone and buprenorphine treatment during pregnancy stabilize fetal blood 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 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

COCAINE

Cocaine is a powerfully addictive drug. Once having tried cocaine a user may have difficulty controlling the extent to which he or she will continue to use the drug. Cocaine produces intense euphoria and alertness, makes users feel more energetic and reduces hunger. Cocaine's effects appear almost immediately after a single dose and disappear within a few minutes or hours. Psychological effects include feelings of well-being and a grandiose sense of power and ability mixed with anxiety and restlessness. Some users find that the drug helps them to perform simple physical and intellectual tasks more quickly while others experience the opposite effect. As the drug wears off these temporary sensations of mastery are replaced by intense depression. The abuser will then "crash", becoming lethargic and typically sleeping for several days. The duration of cocaine's immediate euphoric effects depends upon the route of administration. The faster the rate of absorption, the more intense the high, but the duration of action is shorter. Smoking crack is very addictive and has a very intense high, but the high only lasts 5 to 10 minutes. Short-term effects of cocaine abuse are runny nose/ nose bleeds due to damaged nasal cavity, dilated pupils, being excited and talkative and having increased alertness and self-esteem, difficulty in concentrating and visual impairment. Users may also exhibit compulsive behaviors (repeated hand washing, teeth grinding), be restless, agitated, combative and exhibit aggressive behavior. Paranoid hallucinations are common.

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

- Medical problems

Different routes of cocaine administration can produce different adverse effects. Regularly snorting cocaine can lead to loss of sense of smell, nosebleeds, problems with swallowing, hoarseness, and irritation or perforation of the nasal septum. Ingested cocaine can cause severe bowel gangrene due to constricted blood flow to the intestine. Persons who inject cocaine have puncture marks and "tracks" most commonly in their forearms and are at high risk of infection. Among cocaine users the risk of heart attack is increased by a factor of 24 during the first 60 minutes after consuming cocaine, unrelated to the amount ingested. Up to 25% of patients seen in Emergency Rooms for evaluation of chest pain have detectable amounts of cocaine in the urine.

There is a potentially dangerous interaction between cocaine and alcohol. Taken in combination the two drugs produce a sense of increased and prolonged euphoria. However, they may be converted in the body to cocaethylene (Andrews P. J *Addict Dis* 1997;16(3):75). Cocaethylene has a longer duration of action and is more toxic than either drug alone and in some people may cause severe heart and liver problems.

- Effect of the fetus

Cocaine has devastating effects on the fetus. The fetus exposed to cocaine by maternal use does not grow appropriately, is born prematurely, and is likely to have problems related to blockage of blood vessels: stroke, intestinal perforation or blockage or limb abnormalities. Addicted mothers are at risk of rupturing their uterus at the time of delivery. Older children typically have behavioral problems, poor

alertness, poor orientation, irritability, and symptoms of ADHD with prominent oppositional-defiant behavior. Cocaine abuse by fathers, separate from the well-established effects of cocaine use in mothers, may negatively impact cognitive development in their male offspring but the results of studies are not conclusive.

- Withdrawal

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

CRACK COCAINE

Crack cocaine is a hard crystalline-like substance and is a smokable form of coke. Crack produces a very intense high that lasts 2-3 minutes and is extremely addictive. The user chases this intense high over and over again with more cocaine, but never achieves the same intense feelings. Addicts will do whatever they have to do to obtain the drug or money for the drug, from prostitution, to crimes, to working for dealers. Addicts may be awake for days in a row bingeing on the drug.

- Symptoms of Crack addiction:

- Frequent infections
- Changes in sleep patterns
- Changes in attitude or mood
- Excessive burns or blisters on the fingers or lips
- Spending time avoiding family or friend
- Loss of interest in sex, food or other activities
- Irritability, anger and irrational behaviors
- Prostitution to pay for drugs
- Suffering legal problems as a result of drug use and still choosing to use drugs

- Short term effects of using cocaine

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

- Long term effects:

- Severe depression
- Irritability and mood disturbances
- Aggressive, paranoid behavior
- Delirium or psychosis
- Tolerance and addiction, even after just one use
- Auditory and tactile hallucinations
- Heart attack and heart disease
- Seizures and Stroke

INHALANTS

Inhalants, often referred to as whippets, laughing gas, huff or hippie crack, are volatile substances that vaporize at room temperature. When inhaled they produce short-lived, mind-altering effects. Inhalants include a wide variety of chemicals: (1) solvents such as paint thinners, cleaning fluids, gasoline, lighter fluid, glue and nail polish/polish remover, (2) aerosols such as spray paint, hair spray, vegetable oil sprays, and (3) gases such as butane from lighters, propane and nitrous oxide (laughing gas) which is commonly used as a propellant in Whipped Cream canisters. Inhalant abuse is less common than abuse of other drugs and most cases occur in isolated regions. Inhalant use is most prevalent among teenagers. The danger of an inhalant addiction shouldn't be overlooked just because it is less commonly used than other substances.

- Effects

People who are unable to control their inhalant use despite knowing the negative consequences and health effects are considered to have an addiction. Even those with an overwhelming desire to stop abusing inhalants may be unable to do so because of the easy availability of inhalants. Inhalant intoxication has been compared to alcohol intoxication and both result in impaired judgment and impaired motor function. Unlike alcohol, inhalants can cause a temporary hallucinatory state. The effects of inhalants only last for a few minutes and include excitability, euphoria, hallucinations and blacking out. The user may seem to be intoxicated with alcohol.

Inhalants are a CNS depressant and deep inhalation can result in a fatal overdose. This is usually preceded by the user losing touch with reality and experiencing nausea, vomiting and unconsciousness. A fatal overdose is generally the result of heart failure, asphyxiation or the drug causing the user to stop breathing on their own. Long term consequences include liver and kidney damage, damage to the bone marrow, nerve damage and brain damage, coma and even death

- Methods of using inhalants

1. Huffing: Soaking a rag with a liquid inhalant and holding the rag up to the mouth and/or nose, and then inhaling the vapors.
2. Sniffing or snorting the substance directly from its container

3. Bagging or inhaling the substance out of a plastic or paper bag or from balloons
 4. Spraying aerosols directly into the mouth
- Users often exhibit telltale signs of an inhalation addiction, including chemical odors on their breath or clothing; paint or stains on face, hands or cloths; hidden spray paint or solvent containers; chemical soaked rags; drunk or disoriented appearance with slurred speech and poor coordination, irritability and depression
 - Risks associated with inhalation include asphyxia and suffocation, seizures, choking, coma and death

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 of 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.

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, incense, potpourri to disguise or mask the odor of marijuana
- pipes –metal, colored blown glass, ceramic large bong
- brown dryer sheets – kids’ stuff them in an empty TP roll and exhale smoke into it

Methamphetamine:

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

Inhalants:

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

Things used to cover up the use of drugs:

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

Resources:

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

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

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

Parents Opposed to Pot: nationwide organization providing factual information about the 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>

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