

New Trends in Substance Abuse Youth Substance Abuse Symposium Grand Junction 11/2013

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The Physiologic Basis of Addiction

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

Addiction and how it Affects the Brain

Nearly all substances of abuse, including marijuana and the new synthetic designer drugs, affect the activity of neurotransmitters that play an important role in connecting one brain cell to another. Interruption of this process may result in:

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

These issues will be reviewed with each of the drugs discussed in today's presentation.

Indicators of Drug or Alcohol Abuse or Misuse:

Behavioral

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- Withdrawn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

Physical

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

Speech

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

Performance

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

Alcohol Abuse

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

metabolic byproduct of ethanol, acetaldehyde, can be found in the brain. Acetaldehyde damages brain cells, affecting the function of these cells and resulting in cell injury or cell death.

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

New trends in consuming alcohol

1. Alcohol-containing candy

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

2. Tampon dipping and "butt-chugging"

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

3. Vaporization

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

Teens may make their own AWOL device using a plastic bottle, plastic or rubber tubing and a hand held air pump. A 1-2 liter plastic bottle is fitted with a stopper. An inflation-pin typically used for inflating basketballs is inserted through the stopper. A tire pump is connected to the pin and air is pumped into the bottle until the bottle is firm. The stopper is pulled and vaporized alcohol, typically vodka, flowing from the opened bottle is inhaled. The user quickly becomes intoxicated.

4. Hand Sanitizers

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

Alcohol consumed with other drugs

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

1. Alcohol and caffeine

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

2. Alcohol and Adderall (ADDYS)

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

Alcohol Withdrawal

Withdrawal may occur in chronic users and in binge drinkers and is due to an imbalance of two neurotransmitters: reduced GABA (inhibitory) and increased glutamate (excitatory). 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

Marijuana

Marijuana is one of the most underestimated drugs of abuse. It is used for its mildly tranquilizing, mood and perception altering effects. The active ingredient in Marijuana is THC (Delta-9-Tetrahydrocannabinol), but Marijuana contains hundreds of chemicals called “cannabinoids.” The Marijuana on the streets today is unlike the Marijuana in the 60’s, 70’s, 80’s, 90’s, or early 2000’s - it is a dangerous and addictive drug cultivated to maximize its psychoactive effect. Marijuana is grown specifically for a high THC content, and the THC in Marijuana continues to rise all the time. In the 60’s, 70’s, and 80’s THC content in Marijuana ranged from 2-7%. Today it is around 23-28%, however, in some places you can get Marijuana with a THC content of 50% and higher. Everyone needs to get educated about Marijuana, because it is a very different drug today and should not be looked at as ‘just marijuana.’

Forms of marijuana

Marijuana concentrate, hashish and “Butane hash oil” (BHO), has become very popular. The concentrated THC oil is extracted from the plant buds by using butane or other chemical solvents. This liquid substance is mixed with butter and then is known as “budda.” It is used to make marijuana edibles: cookies, cakes, brownies, pies, yogurt, ice cream, candy, and chocolates. However, residue from butane, isopropyl alcohol, or chloroform left on the product may damage the lungs.

Hashish can be a greenish brown solid substance, or a brownish tan waxy substance known as “wax”, “earwax” or “dabs” on the street. This wax is usually smoked in vaporizers that are similar to electronic cigarettes. The vaporizers can look like pens or inhalers. They have a section that contains a scented liquid that is used to mask the odor of marijuana. Teens can also smoke “dabs” or “wax” on a paperclip. The paper clip is heated and a “dab” of wax is dropped on it. When the wax hits the hot paperclip it vaporizes and the vapors are inhaled through a straw.

Marijuana joints can be laced with other drugs such as PCP, cocaine, ecstasy, meth, heroin, or embalming fluid. The names of Marijuana often dictates what is laced in, i.e.; black ice = laced with meth white rhino = laced with cocaine or the strand is white wet sticks or sherm = laced with embalming fluid.

Marijuana is a fat-soluble drug and can be detected in the urine for 10 - 60 days depending on frequency of use. Because THC is fat-soluble and therefore stays in the brain and other organs much longer than other drugs, most people do not go through withdrawal within days of quitting. It takes a few days for the brain to realize THC quantities are depleted and then withdrawal begins; anxiety, tremor, aches and pains, sleep problems and craving of the drug.

Marijuana Indicators:

- Uncharacteristically relaxed inhibitions
- Increased appetite
- Distinct odor of Marijuana
- Irritated mucous membranes
- Lack of motor coordination
- Lack of motivation and flattening of emotions
- Difficulty concentrating
- Errors in judgment
- Reddened eyes
- LOC present (can't cross eyes)
- Impaired memory and attention
- Distorted perception of time

Marijuana and the Brain

It is known that THC acts on the brain and affects memory and decision-making by altering normal regulation of communication between brain cells. Recent animal studies confirm that THC causes inflammation in the brain and brain damage by activating immune cells in the brain that damage or destroy brain cells. This damage affects learning and coordination. (Ozaita et al, JCI, July 2013)

Complications

There is a significant and consistent relationship between marijuana use and the development of schizophrenia and related disorders. Schizophrenia is considered by psychiatrists to be the most devastating of mental illnesses. Patients who suffer from it often experience auditory or visual hallucinations, severe social withdrawal, and cognitive impairment. Many require frequent and prolonged hospitalization in psychiatric wards. The results of scientific studies showing an association between marijuana use and schizophrenia and other psychiatric disorders are alarming. A 2004 article in the British Journal of Psychiatry reviewed 4 large studies, all of which showed a significant and consistent association between consumption of marijuana (mostly during teenage years or early 20s) and the later development of schizophrenia. The review concluded that marijuana is a "causal component" in the development of schizophrenia and other psychotic disorders.

Some people have a genetic predisposition to develop schizophrenia or chronic depression after using marijuana. They have an abnormal *COMT* gene (1:4000 live births). Up to 25% of these people will develop psychiatric symptoms by the age of 25. The occurrence rate is increased if they smoke marijuana. (Pelayo-Terán JM, Curr Pharm Des 2012;18(32):5024-35)

Teens who are chronic users have reduced problem-solving skills and exhibit "cognitive inflexibility." There is evidence that long-term use impairs memory. Large epidemiological studies have shown that chronic use of marijuana results in a loss of IQ (average 8 points). (Kuehn BM, JAMA. 2012;308(12);1196)

Amendment 64 – legalization in Colorado

In November 2012, Amendment 64 passed in Colorado allowing the sale and use of recreational marijuana in the state. Under this amendment anyone 21 years of age or older can:

- Possess, use, transport or purchase up to one ounce of marijuana.
- Allows for the growing of no more than 6 plants, 2 of which can be mature at a time
- Transfer one ounce without payment to another individual 21 years of age or older

- Allows for the possession of 1 ounce of THC oil, or edibles
- **However**, the Amendment clearly states that marijuana cannot be used out in plain view, in areas open to the general public, or in a manner that endangers others.

Under Colorado’s Medical Marijuana Law and Amendment 64, employers do not have to accommodate the use of Marijuana in the workplace, whether it is for medicinal use or otherwise. Many marijuana users have been fired after going to work under the influence, or testing positive after a random or employer required drug test. According to the Bell & Pollock Law Firm website, the following pertains to Amendment 64 regarding employment and driving:

- “The Amendment does not change the ability of employers to maintain their current employment policies, nor does it prevent them from creating whatever policies they see fit. If employers do not currently allow marijuana use by employees, they can continue to prohibit it.”
- “The Amendment does not change existing law regarding driving under the influence of marijuana. It is currently illegal to drive while impaired by marijuana, and it remains illegal. Legislature maintains the ability to develop new driving-related policies as it sees fit.”

Abuse of Prescription Opiates (Pain Killers)

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

Signs of Addiction

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

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

Opiate pain relief

Opioids act by attaching to opioid-receptors that are found in the brain, spinal cord, gastrointestinal tract, and other organs in the body. When these drugs attach to their receptors, they block the perception of pain (and cause brain injury, see below). In addition to relieving pain, opioids produce drowsiness, mental confusion, nausea, and constipation. Some people experience a euphoric response to opioid medications, since these drugs also affect the brain regions involved in reward.

Short Term Effects

Short-term administration of prescription drugs produce euphoria, sedation and a feeling of tranquility. Repeated administration rapidly produces tolerance (increasing the dose, reducing intervals between doses or both) and intense physical dependence. Overdose causes respiratory depression. Continued use of opiates makes the body rely

on the presence of the drug to maintain rewarding feelings and other normal behaviors. The person is no longer able to feel the benefits of natural rewards (food, water, sex) and cannot function normally without the drug present.

Long Term Effects

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

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

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

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

“DESIGNER DRUGS”

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

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

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

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

Effects of synthetic cannabinoids

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

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

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

Synthetic Bath Salts

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

These drugs are known as psychedelic stimulants, meaning they fire up the central nervous system like amphetamine or cocaine and cause hallucinations similar to ecstasy (MDMA) and mescaline. Some of the substituted cathinones are; Methylone (MDMC, Explosion, bk-MDMA), Naphyrone (NRG-1, 4-total), Mephedrone (drone, M-Cat, Meow-meow, bubbles, 4-MMC), MDPV (methylenedioxypropylvalerone) four times more potent than Ritalin or Concerta (ADHD drugs), Alpha-PVP (cloud 9, magic, black rob, super coke), and Buphedrone. Some of these brands have chemicals in them that have a half-life of four days (half of the chemical is removed from the body in four days) thus causing effects lasting multiple days. Clinical features include agitation, tachycardia, anxiety, confusion, chest pain, and nausea. They typically have little or no odor and are sold as a white, off-white, or yellowish powder, in tablet form, capsules or in crystal form. These drugs sell for \$5 to \$60 a package and each package contains 300-500 mg of the powdered chemical and are often sold as “plant food” or “plant fertilizer.” These drugs are man-made (synthetic) and are extremely pure, anywhere from 98-100%. They are typically ingested or snorted with peak effects from 2 hours and lasting about 8 hours. They may also be injected resulting in more rapid onset of action but shorter duration. Most users assume that 300-500 mg is a normal dose, but in fact, 10 mg or less is an effective dose. This unintentional overdose may result in severe hallucinations and serious side effects. The desired effects from these substituted cathinones are euphoria, increased alertness, energy and concentration, and aphrodisiac effects. However, many side effects occur from using too much; bruxism (teeth grinding), sweating and dehydration, increased heart rate and blood pressure, anxiety and panic attacks, temporary erectile dysfunction in males, hallucinations, psychosis, and depression. Deaths have occurred. Many of these are According to the American Association of Poison Control Centers, calls to poison control centers for exposure to “bath salts” increased from 303 cases in 2010 to 4,137 in 2011 (1,300 % increase).

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

25I-NBOMe

25I-NBOMe is a very potent psychedelic stimulant and considered by users to be a legal version of LSD. It is often in liquid form and put on blotter paper. They are active at very low doses (micrograms) and are generally administered on paper placed under the tongue. The drug is inactive if taken orally and swallowed. It may also be vaporized and inhaled. The onset of effects is rapid. Effects plateau in 2-4 hours, and can last 6-10 hours – sometimes much longer depending on dose. Side effects may last up to 7 days. Users experience visual hallucinations with color shifts, euphoria, dilated pupils, changes in perception of time, increased awareness, feelings of love and empathy and mental and physical stimulation. Undesired side effects include confusion, scrambled communication, paranoia, panic, and seizures. Death has been reported. This substance is now a scheduled I drug and is known as 25i, dimes, or smiles.

Bromo-DragonFLY

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

Intoxication with Bath salts

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

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

“Molly”

Molly is believed to be 100% pure Ecstasy (MDMA), got its name from “molecule” or “molecular,” and is in crystalline form like sugar. However, currently Molly is considered to be a mixture of other designer drugs in the phenethylamine/cathinone family, which act like Ecstasy, and is causing overdose and death. The composition of Molly on the street is unknown and can vary. Ecstasy is known for inducing feelings of euphoria, closeness, diminished anxiety, increased body temperature (sweating), and is frequently used at raves.

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

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

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

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

Synthetic Amphetamines

PMA (para-methoxyamphetamine)

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

There are approximately twice as many deaths caused by PMA as by Molly or Ecstasy, even though the actual proportion of PMA on the market is only a fraction of that of MDMA. While PMA alone may cause significant toxicity, the combination of PMA with MDMA has a combined effect that seems to be particularly hazardous. Since PMA has a slow onset of effects, several deaths have occurred where individuals have taken a pill containing PMA followed by a pill containing MDMA sometime afterwards due to thinking that the first pill was not active.

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

Other “Recreational” Synthetic Substances

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

MXE (Methoxetamine; Ketamine-like)

This synthetic “research chemical” mimics the effects of ketamine and has hallucinogenic and dissociative effects similar to ketamine. It is not scheduled and sold on the street as MXE, M-Ket, Kmax, and Mexxy. The packages say, “not for human consumption” but the drug induces euphoria and hallucinations. Users report feeling detached from the world. Little is known about the potential toxicity of methoxetamine, but people have been hospitalized after using the drug.

Piperazines

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

Tryptamines

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

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

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

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

Phenazepam (Xanax, benzodiazepines, “Zannie”)

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

Side effects include hiccups, dizziness, loss of coordination, drowsiness, and amnesia. As with other benzodiazepines, when abruptly discontinued following prolonged use, severe withdrawal symptoms may occur including restlessness, anxiety, insomnia, seizures, convulsions and death. Fatalities have been reported when the drug is taken with

prescription opioid analgesic drugs. Although phenazepam is currently not controlled, sale for human use remains illegal in the United States, but manufacturers circumvent this regulation by selling the product as "not for human use". Products not intended for human consumption are exempt from FDA control.

In the United States, phenazepam has been sold as an air freshener known as "Zannie." Spraying Zannie into the mouth is one of the routes of administration, and when used with antidepressants, sleep medications, pain medications, or alcohol, it can prove fatal. Its users have called Phenazepam benzo-relaxation.

Designer Opiates

Acetyl Fentanyl

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

AH-7921 (3,4-dichloro-N-(1-dimethylamino)cyclohexylmethylbenzamide)

This very new drug being sold online is another designer opiate. It targets the μ -opioid receptors in the human brain. It has around 80% the potency of Morphine when taken orally. It can easily be sold as Heroin on the street and is extremely pure. Some are calling this doxylam, but it has never been sold commercially for medicinal use. It has been recently reported that AH-7921 is the active ingredient used in the "synthetic cannabis" (spice, K2) that is being manufactured in Japan.

Hallucinogenic Plants

Indigenous plants

These plants, which include Morning Glory, Jimsonweed, Salvia, Angels Trumpet, Horned Poppy and Salvia, and may be growing in your garden. The most widely used and most popular plant is Salvia and it is available online in "concentrated" forms.

Salvia divinorum contains a very potent naturally occurring hallucinogen and is smoked, often in water pipes, or ingested as a tea. Its effects include stimulating the recall of past memories, such as revisiting places from childhood memories; sensations of motion, or being pulled, or twisted by forces; visions of membranes, films and various two-dimensional surfaces and merging with or becoming objects

Geranium Extract (methylhexanamine or dimethylamylamine, sold as "Pump-It Powder" or Jacked")

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

- Hallucinations
- Dilated pupils
- Psychotic symptoms
- Increased heart rate and temperature

Exotic plants

These plants are smoked or ingested and are not indigenous to the US. They are available from drug dealers or the internet.

Blue Lotus grows along the Nile River and is sold online and in head shops as a concentrated tablet that looks like and acts like the tranquilizer Xanax. It may be smoked or ingested.

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

Desomorphine ("Krokodil")

Desomorphine is an opiate analog invented in 1932 in the United States. It has sedative and analgesic effects, and is around 8-10 times more potent than morphine. It has a fast onset and a short duration of action, with relatively little nausea or respiratory depression compared to equivalent doses of morphine. Desomorphine attracted attention as a popular street drug in 2010 in Russia.

The drug is easily made from codeine, iodine, and red phosphorus in a process similar to the manufacture of methamphetamine from pseudoephedrine. However, desomorphine is highly impure and contaminated with various toxic and corrosive byproducts including iodine, phosphorous and heavy metals that may cause very serious side effects. High concentrations of iodine disrupt the endocrine system and causes muscular disorders; high concentrations of phosphorus, weakens bones; and dangerous mixtures of heavy metals such as iron, zinc, lead and antimony cause disorders of the nervous system and inflammation of the liver and kidneys.

The street name in Russia for homemade desomorphine is "krokodil" (crocodile), reportedly because of the scale-like appearance of skin of its users. It is used as a cheaper alternative to heroin. Drug addiction often follows the first dose.

Desomorphine users suffer from an acute deterioration in their general health, including a weakened immune system and failing liver. Their circulation is so effected that their limbs gradually wither and die. Non-healing ulcers appear on the body and a person literally rots alive. Veins located near the injection sites "burn up." Krokodil" has become notorious for producing severe tissue damage, and gangrene sometimes requiring limb amputation in long-term users. The amount of tissue damage is so high that addicts' life expectancies are said to be as low as two to three years. The use of this drug is spreading worldwide.

Drug Paraphernalia

Most people consider drug paraphernalia to be pipes, bongs and syringes, but it can be many things. It can be ordinary items used to disguise or hide the drug or things used to consume the drug. Aluminum foil, small ziplock baggies, pill bottles, spoons, film canisters, cigarette packs, hide-a-cans, makeup kits, gum wrappers, mint tins, liquid breath mint containers, or small glass vials are types of paraphernalia. Parents need to be aware that these kinds of things are either used to conceal the drug or a way of using the drug. Paraphernalia means drug user.

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

Ecstasy:

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

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

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
- empty toilet paper roll full of dryer sheets

Methamphetamine:

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

Inhalants:

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

Things used to cover up the use of drugs:

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

Behaviors

Is your kid just having a bad day at school, or fighting with a friend, or is something else going on? When you notice behavioral changes in your child, you want to be able to identify if it is adolescent stress or typical growing pains or is it something else like drug use. When you are trying to figure out what your child has been up to it is important to use and trust your senses.

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

What do you smell? Marijuana, cigarettes, Inhalants (chemical odor), and alcohol all have tell tale odors. Whether you notice the odor on the breath or clothes, it is a reason to be alarmed; for teens, simply being around others who drink or smoke makes it more likely your child will try it. Do not be afraid to follow your nose. Excessive “pleasant” smells, like breathe mints, heavy perfumes, laundered clothing (for a child who never does their own wash) can be

tell-tale signs of them trying to cover up or mask odors. If you have teenagers, make sure you look in, and smell, their car – the smell of stale beer and marijuana can linger in the upholstery.

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

Other signs that may indicate drug use:

Stories don't add up and social circles change
Schoolwork or job performance goes downhill
Increased lying and stealing

Resources:

Urban Dictionary is a nice resource that you can get as an APP on phones or access on your desktop. When you hear terminology you think may be drug related (i.e. Molly = 100% pure MDMA Ecstasy) put it in Urban Dictionary. If it is a drug it will pop up within the top 3 responses and give all details about the word or terminology.

<http://www.urbandictionary.com/>

National Registry of Evidence-Based Programs and Practices - a searchable online registry of more than 160 interventions supporting mental health promotion, substance abuse prevention, and mental health and substance abuse treatment. <http://nrepp.samhsa.gov/>

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/>

Substance Abuse and Mental Health Services Administration, Helpful site for both Substance Abuse and Mental Health issues www.samhsa.gov

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Centennial Peaks Hospital. They are a 72-bed, Joint Commission-accredited behavioral health hospital serving adolescents and adults in a multidisciplinary treatment setting. We provide a modern, clean, and safe facility where patients receive customized care that meets their specific recovery needs. Our staff is available 24 hours a day, 7 days a week to provide complimentary, confidential assessments. Call us at 303.673.9990 <http://centennialpeaks.com/>