

New Trends in Substance Abuse:
Marijuana 2014

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The attitudes about marijuana are changing. It is becoming legal in many States to use marijuana recreationally and medicinally. Proponents argue that it is safe or at least no more dangerous than alcohol. Opponents argue that it is dangerously addictive, causes brain damage, is a “gateway” to abusing other substances and that the health consequences are devastating, especially for the teen and young adult.

Over the past 3 years according to the Substance Abuse and Mental Health Services Administration (SAMHSA), the number of regular users of illegal marijuana has gone from 14.4million to 17.4 million people across the US. Medical marijuana users are included in this number. According to the World Health Organization 150 million people worldwide use marijuana.

What must be remembered is that marijuana affects different people differently. The short-term and long-term response of the user is dependent upon the dose and concentration of the product, the contents of the product, frequency of use, and the emotional/behavioral status of the user. Marijuana is a psychoactive drug that affects behavior and overall mental health. These effects are influenced by the social and behavioral environment and by the genetic traits of the individual. This makes it difficult to generalize as to how one individual may react after using marijuana, but nearly all experts (scientists) agree that the individual and societal effects of using marijuana are negative.

Marijuana Plants

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

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

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
- Cannot use marijuana in any form and operate a vehicle
- 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.”

Addiction to marijuana

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

Marijuana and brain development

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

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

Recreational marijuana

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

Marijuana concentrate (hashish, THC oil, wax, shatter) has become very popular. THC is extracted from the plant buds by using butane or other chemicals. Oil can be mixed with butter, known as “budda” on the street, and is used to make marijuana edibles: cookies, cakes, brownies, pies, yogurt, ice cream, chocolates, etc.

Hashish may 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, which may look like pens or inhalers. Vaporizers typically have a section that contains a liquid, sometimes flavored, that is used to reduce the odor or marijuana making smoking less detectable.

Marijuana joints can be laced with other drugs such as PCP, cocaine, ecstasy, methamphetamine, heroin, or embalming fluid. The street names of marijuana joints often describe what is laced in the joint, i.e.; “black ice” is marijuana laced with meth, “white rhino” is marijuana laced with cocaine, and wet sticks or “sherm” is marijuana laced with embalming fluid.

Indicators of marijuana use:

Relaxed inhibitions	Difficulty concentrating
Errors in judgment	Distorted perception of time
Distinct odor of marijuana	Impaired memory and attention
Lack of motor coordination	Flattening of emotions

Loss of eye convergence
Irritated mucous membranes

Lack of motivation
Dry mouth

Effects of using marijuana

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

The dangers of smoking marijuana are summarized as follows:

- Impaired perception
- Diminished short-term memory
- Loss of concentration and coordination
- Impaired judgment
- Increased risk of accidents
- Loss of motivation
- Diminished inhibitions
- Increased heart rate
- Anxiety, panic attacks, and paranoia
- Hallucinations
- Damage to the respiratory, reproductive, and immune systems
- Increased risk of cancer

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

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

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

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

Stillbirths: Exposure to marijuana, including exposure to second-hand marijuana smoke, during pregnancy has been shown to increase the risk of stillbirth (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)

Long-term health consequences of using marijuana

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

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

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

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

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

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

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

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

Colorado allows up to 5 nanograms of **active** THC/ml of blood, at five or higher people can be charged with a DUID. Active THC shows the active derivative 11-hydroxy-THC. Colorado requires a blood test to test for **active** THC only; THC can stay active in the

system for 2-20 hours depending on method of use, and how often smoked before getting into a vehicle. Active THC usually falls below the 5-nanogram limit within 24 hours. According to the National Highway Traffic Safety Administration, drugs other than alcohol (e.g., marijuana and cocaine) are involved in about 18 percent of motor vehicle driver deaths. A recent survey found that 6.8 percent of drivers, mostly under age 35, who were involved in accidents tested positive for THC; alcohol levels above the legal limit were found in 21 percent of such drivers.

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

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

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

Memory loss and changes in brain structure: Persistence use of cannabis in adolescents is associated with defects in both acute and long term memory. Researchers have suggested that these defects are related to changes in synaptic function within the cortico-basalganglio-thalamic circuits that play an important role in memory. This circuitry includes the striatum, globus pallidus and thalamus (S-GP-T). These areas contain a dense population of CB1 receptors. A recent controlled study of patients with poor memory function, who were part of a larger cross-sectional neurobiological study of schizophrenia, and who persistently smoked marijuana underwent MRI brain surface mapping. This unique study compared findings in 4 groups of patients with poor memory function documented by neuropsychological testing: the groups included 2 populations, one with schizophrenia and one without schizophrenia. The groups were subsequently divided into 2 subsets, those who were addicted to smoking marijuana (but did not use marijuana for the preceding 6 months), and those who never used marijuana. It is known that patients with schizophrenia exhibit structural changes in the S-GP-T. These same changes were present in study patients who did not have schizophrenia but chronically smoked marijuana and were most severe in schizophrenic patients who smoked marijuana (Smith MJ et al., *Schizophrenia Bulletin* 2014;40:287-299).

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

Effects of prenatal exposure to marijuana on infants and children

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

Long-term effects of prenatal exposure on infants and children: Prenatal exposure to marijuana has been associated with numerous problems in the infant. Infants may have a “high pitched cry” of the type potentially associated with developmental delay. Some research suggests that infants may also have a T-cell immune defect. The developing fetal endocannabinoid system is vulnerable to maternal marijuana. A recent scientific study links fetal exposure to an increased risk for aggressive behavior and attention problems as early as 18 months of age. (Marroun EL. *Drug Alcohol Depend* 2011; 118(2-3):470-474). The relationship between prenatal marijuana exposure and long-term school achievement has also been examined. As a group prenatally exposed children performed below non-exposed peers on standard intelligence tests at age 6 years, showed attention problems and depression at age 10 years and performed poorly on standardized tests to measure reading, spelling, and mathematics reasoning at age 14 years. (Goldschmidt L. *Neurotoxicol Teratol* 2012; 34(1):161-167)

Natal Exposure/Breast Feeding: Current evidence indicates that cannabis use during breastfeeding adversely affects the infants’ neurodevelopment and impacts neuropsychiatric, behavioral, and executive functioning. The effects on learning and behavior may influence future adult productivity and outcome. Women using cannabis during lactation should be advised about what is known and encouraged to stop using. (Jaques et al, *J. Perinatol* 2014, doi 10.1038/jp.2013.180)

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

Medical Marijuana

Marijuana sold for medicinal purposes is available in 19 states and the District of Columbia and more States are planning to legalize medical marijuana. The State of Colorado began accepting applications for the use of medical marijuana in June 2001. As of mid-2013, over 190,000 applications have been received and 108,000 people have received medical marijuana cards. Interestingly, the majority (56%) of recipients is young adults who live in the metro-Denver area and 68% of all recipients are male. The majority of recipients have “severe pain” (94%). The second most common medical condition is muscle spasm (17%). The numbers do not add up to 100% because some users have more than one medical complaint. Is there a message in the demographics?

The potential medicinal properties of marijuana have been the subject of significant research and heated social/political debate. There are numerous reports in the medical literature regarding the pros and cons of medical marijuana. Either point of view can be supported by the results of “studies”. However, most of these “studies” and reports are not scientifically sound and the results are questionable. Yet, even the results of many well-designed and carefully performed studies are inconclusive or conflicting and many authors conclude that more studies need to be done.

The cannabis plant contains active ingredients with therapeutic potential for relieving pain, controlling nausea, stimulating appetite, and decreasing ocular pressure in people with glaucoma. For the most part the evidence comes from small studies and anecdotal case reports characterized by short-term outcome assessments, comparisons to outdated standards of care, and lack of consideration or measurement of benefit to harm relationships associated with long term inhaled marijuana use. The paucity and poor quality of the evidence make it difficult to compare marijuana with current pharmaceutical drugs that have been tested under much more rigorous experimental conditions. However, the results of scientifically sound studies may also be conflicting because the chemical composition of marijuana is not consistent. The contents and concentration cannabinoids in marijuana varies from

plant to plant and is affected by the time at which the plant is harvested. In addition, female varieties have higher levels of THC than male varieties.

In view of the conflicting data and inconclusive study results, should inhaled marijuana be prescribed to treat health problems or should treatment be withheld until its efficacy is proven? There are two sides to this argument: (1) marijuana is “safe”, treatment is harmless and therefore should not be withheld, v. (2) marijuana is not safe to use and should not be prescribed until more scientific data is available. The latter approach seems to be the most wise, especially after understanding how the safety and therapeutic benefit of all prescribed medications is determined.

Should inhaled marijuana be prescribed to treat health problems or should treatment be withheld until its efficacy is proven? There are two sides to this argument: (1) marijuana is “safe”, treatment is harmless and therefore should not be withheld, v. (2) marijuana is not safe and should not be prescribed until more scientific data is available. The latter approach seems to be the wisest but more and more physicians are recommending inhaled marijuana for medicinal use. In a recent survey of approximately 2000 physicians conducted by the New England Journal of Medicine, 76% were in favor of using marijuana for medicinal purposes. Many of the responders pointed out the danger of using narcotic pain relievers and felt that inhaling marijuana to relieve suffering is a better alternative. (Adler JN, NEJM 2013;368;22)

Pure THC has been synthesized and is available by prescription to treat all the disorders for which marijuana is recommended (chronic pain, spasticity due to neurodegenerative disorders including multiple sclerosis, PTSD, depression, glaucoma and nausea/vomiting associated with intestinal disorders, HIV/AIDS and chemotherapy). It is available in liquid form, as a spray, as tablets or as a film-tab that dissolves upon contact with the tongue. At present, only one standardized form of natural marijuana is available (high CBD content) and is being used in a FDA approved clinical study to determine efficacy in treating intractable seizures in children (Orin Devinsky, MD).

Marijuana smoke contains 50 -70 % more carcinogenic hydrocarbons than does tobacco smoke and has the potential to injure the respiratory tract and to cause cancer of the lungs. The technique of deep inhalation when smoking marijuana has been shown to damage the respiratory tract. (Megarbane et al. Chem Biol Interact. 2013;206(3):444-51)

CBD may be useful in treating severe seizures in children. A federally funded clinical trial is underway using pure CBD prepared by a British pharmaceutical company since it is still illegal to produce in the US.

Prescription cannabis preparations

Marinol® (dronabinol): Synthetic THC, 2 mg, 5 mg and 10 mg capsules for the treatment of pain and emesis.

Cesamet® (Nabilone): Synthetic THC 1 mg capsules prescribed for fibromyalgia, chronic emesis, and pain-relief.

Sativex® (nabiximols): Mixture of cannabis compounds from plants and contains a 1:1 ratio of TCH: CBD (2.7 mg THC and 2.5 mg CBD); not a mono-molecular synthetic drug; standard composition, formulation and dose. Produced by GW Pharmaceuticals and Bayer, available soon in the US.

Detection in urine:

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

- Alcohol – 2-12 hours
- Amphetamines/Methamphetamine – 2-3 days
- Adderall / Ritalin – 2-5 days
- Bath salts – 4-7 days
- Barbiturates – 2-10 days
- Benzodiazepines – 1-6 weeks
- Cocaine – 2-10 days

- Benzoyllecgonine - 2-4 days
- Heavy use - up to 10 days
- Codeine – 2-4 days
- Ecstasy (MDMA) – 2-3 days
- Heroin - 1-3 days
- Morphine – 2-3 days
- LSD – 8 hours
- Marijuana
 - 1 time only – 5-8 days
 - 2-4 times month - 11-18 days
 - 2-4 times week – 23-35 days
 - 5-6 times week – 33-48 days
 - Daily use – 49-90 days
- Methadone – 2-3 days
- Phencyclidine (PCP) – 1 week
- Prescription Opiates – 3-5 days
- Suboxone – 2-7 days
- Synthetic Pot (K2 / Spice) – 4-7 days
- *OxyContin and other prescription opiates will not show up in a regular urine tox! You need to request the urine be quantified or request a five panel opiate test.

Ways to cheat/beat drug tests

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

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

1. The whizzinator – a pouch with straps and a small hose that clamps off. People will put someone else’s urine in the pouch, strap it to their thigh, and wear it for 2-3 hours before the test. This gets the urine in the pouch to the same body temperature of the person. Then if no one watches them fill the cup, they can loosen the clamp, make dribbling sounds, and then re-clamp it off.
2. Elmer’s glue bottle – similar idea to the whizzinator above. They can leave the twist lid on, or take it off and attach small tubing to the top and clamp the tubing off. They put someone else’s urine in and strap it to their leg for 2-3 hours before the test. They can then squeeze the urine out, or open the clamp and release the urine.
3. Males will put someone else’s urine in small glass vials and roll it up under their scrotum. Sometimes they will tape it to get to body temperature; sometimes they do it right before they get to the collection site. If they are not watched or checked, the urine can easily be substituted for their urine.
4. Females will fill balloons with someone else’s, and insert them up their vagina for a couple hours. This gets the urine to match their body temperature, and they can pop the balloon releasing the urine.
5. Females take small thin prescription drug vials, put a hole in the lid, and cover it with duct tape. They fill the vial with someone else’s urine and insert it up their vagina. It gets to temperature, they pull off the tape, and the urine dribbles out.
6. Detox drinks – these drinks are sold at vitamin stores (GNC, Vitamin Shoppe, etc.), online, in smoke shops, and in marijuana dispensaries. Majority of the time they do not work, and some drug testing agencies can test for the flushing

agents. The testing agencies will list the flushing agents and state the sample is “dilute” which is considered a positive test.

7. Powdered and synthetic urine – these products are sold in smoke shops, marijuana dispensaries, and online. Some synthetic urine products come with their own small heating pad to put the bottle in. It heats the liquid to body temperature. If the drug testing agency tests for human antigens this will easily pop up as non-human, and some agencies will list the urine is synthetic.
8. Cranberry & Niacin pills- this seems to be working. People take high doses of cranberry pills and niacin alternating every 3 hours. Both can legally be purchased anywhere vitamins are sold (pharmacies, vitamin stores, grocery stores, drug stores, and health food stores).

Drug Paraphernalia

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

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

Ecstasy:

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

Cocaine:

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

Heroin:

- kits containing - spoons and lighters, syringes, turnicate, cotton pieces
- balloons, baggies, burnt aluminum foil, burnt spoons, bottle caps
- scales, razor blades with powder residue, cut straws, needles

Marijuana:

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

Methamphetamine:

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

Inhalants:

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

Things used to cover up the use of drugs:

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

Behaviors

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

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

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

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

Other signs that may indicate drug use:

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

Resources:

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

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

Feel free to contact Katie Wells, Manager of Adolescent Substance Use Disorder Programs for the Division of Behavioral Health, Substance Use Disorders Section, at (303) 866-7501 or by email katie.wells@state.co.us. Website for treatment: www.linkingcare.org

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

Multiple Locations:

- Denver - 2233 Champa, Denver, CO, 80205 #720-440- 9175
- Colorado Springs - 218 W Colorado Ave, Suite 102 Colorado Springs, CO, 80903 #719-434-3387
- Boulder 4735 East Walnut, Suite C Boulder, CO, 80301 # 303-440-0547

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/>

The National Suicide Prevention Lifeline - 1.800.273.TALK (8255) - a free, 24-hour hotline available to anyone in suicidal crisis or emotional distress. <http://www.suicidepreventionlifeline.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/>

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

WebMD is a site full of information around prescription drugs, drug interactions, and mental health <http://www.webmd.com/mental-health/abuse-of-prescription-drugs>

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