California Society of Addiction Medicine

"The Voice for Treatment"

YOUTH FIRST

Reconstructing Drug Policy, Regulating Marijuana, and Increasing Access to Treatment in California

A Report to the California Society of Addiction Medicine

From the Marijuana Policy Task Force

Co-Chairs:

Timmen L. Cermak, MD, President, CSAM

Peter Banys, MD, Past President, CSAM

TABLE OF CONTENTS

www.csam-asam.org

[This report was adopted by the CSAM Executive Council on October 14, 2011 and ratified by a vote of the CSAM membership on October 27, 2011. The report was submitted to the American Society of Addiction Medicine (ASAM) on October 28, 2011.]

EXECUTIVE SUMMARY

The California Society of Addiction Medicine (CSAM) *Youth First* Initiative is designed to reduce the harm to young Californians from marijuana use, from ineffective and punitive regulations, and to address the serious treatment needs of those adolescents who become harmfully involved with marijuana. Our position is largely consistent with principles articulated in the Report of the Global Commission on Drug Policy in 2011[1].

Children and adolescents in California have easy access to purchasing and using marijuana. California's current medical marijuana laws have not had significant impact on access, and have made physicians de facto gatekeepers for access to both medical and recreational cannabis. CSAM therefore recommends that the best course at this point is to replace the current system of medical marijuana dispensaries and physician recommendations with a more strictly regulated system in which physicians are no longer gatekeepers for access, and fees and taxes from marijuana sales preferentially support education, prevention, and intervention for youth with marijuana-related problems.

The *Youth First* Initiative proposes a new, more comprehensive framework that includes:

- Continued legal prohibition of possession for youth under 21,
- Constructive regulation of marijuana production and distribution,
- Taxation of marijuana products, and
- Sequestered tax income for youth prevention, education, intervention and treatment.

The goals of *Youth First* are to limit access to, and use of, marijuana for those under 21, to keep youth engaged in school, to provide schools with resources to identify and help students using marijuana, to construct a community-based intervention system to evaluate youth under 18 years of age who are using marijuana problematically and to provide educational and constructive interventions, including professional treatment, to youth who have become dependent on marijuana.

A system of constructive regulation will assure that individuals are never jailed solely for possession or use of marijuana (i.e., decriminalization), more youth will be kept in school through community-based education, prevention and early intervention; and, referral to treatment will occur when needed. *Youth First* directs dedicated funds from the regulation of marijuana sales to support our children and adolescents, the single most vulnerable population to marijuana's problematic effects. CSAM will support a system of marijuana regulation if sufficient funds from tax and fee revenues are sequestered and directed toward a multi-level *Youth First* program.

1. Constructive Regulation Framework – *Youth First*

Any reconstruction of drug policy must begin with the realities currently on the ground. After reviewing data outlined in this report, we came to accept the following facts as today's state of affairs in California:

1. **Current state law does not effectively regulate marijuana use in California.**
   Proposition 215 ("Medical Marijuana") in 1996 and decriminalization (possession as an infraction) in January 2011 have minimized the legal consequences of marijuana access in California[2].
2. **National and local anti-drug efforts have been largely ineffective.**
   Forty years of increasingly strict criminal sanctions have had little impact on widespread drug use, while creating conditions that encourage narco-trafficking.
3. **Incarceration of nonviolent drug offenders has substantially contributed to California's prison over-crowding crisis.**
   California is a world-leader in incarceration. Drug related arrests have helped drive the California prison population to intolerable (and hugely expensive) levels. Excessive reliance on incarceration places criminal justice in the position of "treating" what is largely a public health problem.
4. **Marijuana prohibition is not necessary for adult public health protection.**
   Approximately 9% of regular adult cannabis smokers meet the diagnostic criteria for marijuana dependence. Even so negative consequences are generally less severe than those from addiction to alcohol, other illicit drugs, and perhaps even tobacco[3]. Although smoked cannabis products are potentially harmful to lung health[4], this is best handled by public policies developed for cigarette smokers.

5. **Treatment for substance use disorders works.**
   Research has demonstrated that treatment is more effective than prosecution and incarceration for decreasing harm from drugs and should be society's response to individuals dependent on cannabis. And, it is far cheaper for the state[5].
6. **Adolescents in California have virtually unlimited access to marijuana.**
   More important, there is virtually no system of early intervention and treatment to meet the needs of the minority in trouble.
7. **Children and adolescents are at significantly greater risk from marijuana use than adults.**
   Marijuana use when the brain is still maturing increases the risk and speed of developing dependence, and affects both the brain's structure and cognitive functions [6, 7].
8. **Sound drug policy protects public health.**
   Medical ethics dictate that individuals with substance use disorders be provided compassionate care.

Proposition 215: Proposition 215, The Compassionate Care Act of 1996, which created California's current framework for the medicinal use of marijuana, placed physicians in the role of gatekeepers for both medical and recreational access. Many observers believe that inadequate enforcement of standards for physician recommendations (as published by the Medical Board of California) and access via dispensaries has permitted medical marijuana to serve as a "Trojan horse" for widespread recreational use. Research has provided good evidence that several severe disorders and some neuropathic pain syndromes benefit from marijuana use; but, CSAM's concern remains that much "medical" marijuana is neither used, dispensed, nor monitored according to what would otherwise be considered medical or pharmaceutical standards.

Constructive Regulation: CSAM favors a system of constructive regulation of marijuana designed to reduce the harm currently being done to the residents of California, particularly to those under 21 years of age. Constructive regulation recognizes that adults form the backbone of the marijuana industry, from production to distribution/sales and consumption. But adolescents are disproportionally harmed by marijuana use due to their still-developing neurological systems. Therefore, the onus should be placed on adult marijuana users, who are primarily responsible for creating an "attractive nuisance" for youth, to pay for a system of youth education, early detection, and intervention and treatment for adolescents who have become harmfully involved with, or dependent on, marijuana.

Given the fact that California youth widely appear to have access to marijuana, *Youth First* proposes a framework of constructive regulation to achieve the following goals:

- Limit access to marijuana for those under 21;
- Keep youth in school;
- Provide schools with resources to identify and help students using marijuana;
- Construct a community-based evaluation and intervention system to address youth under 18 who are using marijuana;
- Provide treatment to youth who have become dependent on marijuana.

Under-Age Use: Toward these goals, marijuana possession and use should remain prohibited for individuals under 21, but society's response should be primarily therapeutic rather than punitive, and any sanctions should be civil, not criminal. Those under-aged individuals who violate the legal prohibition against possession and use of marijuana should be subject to no criminal penalties, nor should they accumulate employment- and education-damaging criminal records. Instead, they should be subject to a graded system of interventions, with increasing community-based sanctions (such as specialized drug education and public service) depending on the number of violations.

Public Education: Since adolescent use of marijuana varies inversely with the level of perceived risk, education/prevention programs aimed at youth should be developed to provide evidence-based information about the potential harm marijuana represents to youth. Many of the techniques that have successfully lowered the rate of tobacco smoking in California should be adopted to dissuade marijuana use. Public education needs to be seen as a continuous need rather than a time-limited campaign. As long as there are children entering adolescence in a state where marijuana is readily available to youngsters, there will be a need for public education/prevention programs. Fear mongering should be avoided. Providing information about the choices required to promote wellness is more effective in the long run. A website of important research regarding adolescent use of marijuana should be developed for public access and education.

School-Based Intervention Programs: School-based Early Intervention Programs should replace the "zero tolerance" and expulsion strategies currently employed. Schools need help to keep students in class and learning. To meet this need, *Youth First* recommends a School-Based Early Intervention Program. The focus is on school retention. Middle and high schools should develop Student Assistance Programs with counselors skilled in intervening on substance abuse. Rather than punishing students by expulsion for marijuana use, counselors should provide motivational interviewing and education. When indicated, parents should be informed by school counselors of an adolescent's marijuana use and school service required. CSAM strongly opposes the use of random toxicology screening, because it violates civil liberties and is, in any case, an ineffective way of identifying treatment needs and may have only a small impact on reducing use[8]. Referrals to the SAP counselors should be on the basis of use or possession on campus, drug-related behavior problems and/or psychological problems such as depression, decreased academic performance, and known histories of marijuana use.

Community Commissions: Communities need help supporting adolescents who are problematically involved with marijuana. *Youth First* provides for Community Youth Commissions, boards of local community leaders that include at least one professional with expertise in substance use disorders to represent each community's standards in ways that avoid prematurely pathologizing or punishing youth. Adolescents referred by concerned parents, identified by police or diverted by juvenile courts would be evaluated by commissions and referred for marijuana education classes, community service, group therapy, or formal assessment by a substance abuse or mental health professional in more severe situations. Available sanctions should be non-judicial and might include restrictions on driver's licenses. Adult-level privacy would not be offered; and, parents would be notified of important information.

Professional Treatment of Substance Use Disorders: The substance abuse treatment system needs help serving adolescents. *Youth First* focuses on the planning needed to meet the challenges and opportunities presented by the advent of national healthcare reform and mental health parity. CSAM's Blueprint for Adolescent Drug and Alcohol Treatment in California[9] calls for support of outpatient treatment by licensed, skilled providers with training in adolescent development and family therapy. Dual diagnosis treatment should be provided concurrently when required, and learning disabilities should also be screened for by educational consultants who are part of the treatment team. Primary funding for professional care should be family insurance plans, whenever available, with the secondary funding provided by sequestration of initial tax revenues from cannabis sales, i.e., the Marijuana Tax Fund.

Public education, school-based intervention programs, community commissions, and professional treatment of substance use disorders should be supported by dedicating revenue from marijuana sales before remaining marijuana tax revenue is dispersed to the state General Fund.

Although a far higher percentage of adolescents become dependent on marijuana than adults[10], current best estimates are that about 9% of adult marijuana users will experience dependence[3]. Public education programs designed to prevent and reduce marijuana use should also help alert adults to the symptoms of dependence and withdrawal. When treatment is medically necessary, adults should access the current substance abuse treatment system using coverage provided through healthcare reform. Particular attention still needs to be paid to developing the technology to assess impaired driving and workplace safety violations.

California Marijuana Regulatory Board: A state marijuana regulatory board will be necessary to administer a flexible schedule of fees and taxes on cannabis by the state to guarantee sufficient revenue for the following, all of which shall be funded before any excess revenue is directed to the General Fund or other specific goals:

1. Marijuana Regulatory Board and associated enabling legislation
2. Adolescent Education, Marijuana Prevention and Smoking Cessation Public Education
3. School-Based Early Intervention, Community Youth Commissions and Treatment Systems
4. Ongoing System of Data Collection and Analysis, through a competitive contract with the University of California

The regulatory board should be given authority to adjust fees and tax rates to assure full funding of the above elements. Other areas requiring regulation include determining sanctions for supplying marijuana to adolescents, controls over advertising and marketing, product safety and distribution, and restrictions on public use of marijuana.

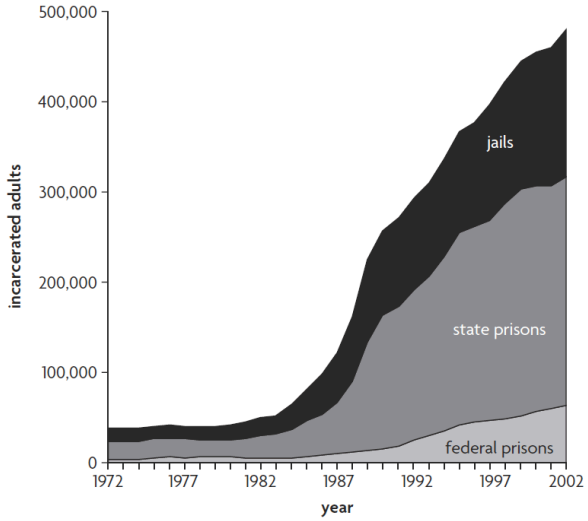
2. The War on Drugs and People Who Use Them

The original "War on Drugs" was enacted by the Nixon administration in 1971. Initially, the majority of resources went for innovative treatments; but, over time, it has morphed into four decades of emphasis on interdiction, enforcement, and incarceration[11].

With the adoption in California of the Compassionate Use Act of 1996 (Prop 215), which prohibited prosecution of medical marijuana and the Substance Abuse and Crime Prevention Act of 2000 (Prop 36), which diverted non-violent drug offenders to treatment rather than incarceration, California's voters began writing new drug policy that returns the emphasis to public health and treatment. In effect, California's voters moved from a punishment to a public health model.

CSAM, as a California society of physicians specializing in treatment of substance use disorders, believes that drug policies must continually be examined for both the positive and negative impacts they have on the public's health and safety.

Figure 1.1. Number of Adults Incarcerated for Drug Law Violations in the United States, 1972–2002



Source: Caulkins and Chandler (2006).

We are guided by the following beliefs:

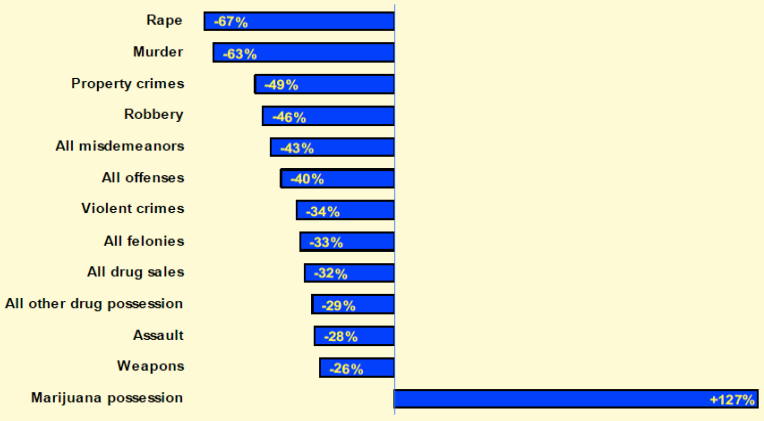
- Supply reduction through international interdiction and demand reduction through legal enforcement of prohibition have both failed to reduce availability of marijuana.
- Incarceration has exploded the California prison system to harmful and grossly expensive levels. The 2011-2012 California budget allocates $35.7 billion on K-12 education, $11 billion on higher education, and $9.8 billion on corrections and rehabilitation[12]. On a per-capita basis, California now spends more per inmate than it does per student. In 2009-2010, spending per inmate averaged $46,700 for each adult inmate ($208,766 for each juvenile inmate) versus $11,405 per student.
- Effective drug policies balance prevention, harm reduction, treatment, and public safety.
- Alcohol and other drug use is fundamentally a health issue and must be addressed as such.
- Drug policies must be based on scientific evidence, compassion, health and human rights.

Data reveal that the growth in marijuana arrests since the 1980s did not lead to a decrease in use or availability, or even to a relative increase in the price of cannabis. Meanwhile, billions are being spent nationally on selective enforcement decisions that have led to the increased processing of marijuana arrestees with no demonstrable impact on the use of marijuana itself, or any general reduction in other criminal behavior.[13]

There are, however, two additional negative impacts from the War on Drugs. The first arises from a disproportionately high rate of marijuana arrests among some minorities, especially African-Americans and Latinos[15]. The second has been the degree to which organized crime has grown larger and more powerful during the nation's heavy reliance on prohibition. Just as the bootleggers of America's 1920's thrived during alcohol prohibition, drug cartels have grown more sophisticated and ruthless to meet the demand for illegal drugs.

It should be clear by now that it is impossible to stamp out drugs. This fact ultimately leads us to confront the inevitable choice: non-medical drug markets can remain in the hands

Change in California arrest rates for various offenses, 2008 versus 1990



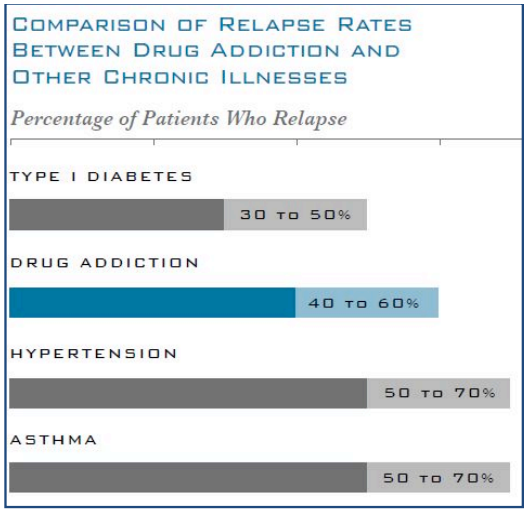
Sources: Crime in California, California Department of Justice[14]

of unregulated profiteers or they can be controlled and regulated by appropriate government authorities. There is no third option that will actually eliminate drugs from society. The cost of production is so low, particularly in third-world locales, that interdiction is doomed to continue to fail, irrespective of any increase in across-border seizures.

Should the goal of drug policy be to get rid of marijuana, or to reduce problems created by marijuana? The experience of our failed War on Drugs adequately demonstrates that the former is not possible. So, what would be the most effective way to achieve the latter?

3. Treatment Works

Today, it is widely recognized that substance abuse and dependence is a chronic condition whose treatment outcomes and relapse rates are very similar to other chronic conditions, such as hypertension, diabetes and asthma[16]. Unfortunately, substance use disorders have too often been treated as an acute disorder by means of arbitrary insurance company limits. Short-term treatment under 90 days has been shown to be mostly ineffective. Nor is there evidence that substance use disorders can be effectively treated through acute care, such as detoxification and short-term treatment alone[17].



From NIDA

Over many decades, scientific studies have shown that adequate, evidence-based treatment for substance use disorders is effective not only in reducing and eliminating alcohol and drug use but also in reducing other related social problems, illness and crime. Treatment works; incarceration does not. And treatment is demonstrably more cost-effective.

When treatment is provided to adolescents, it produces a 48% reduction in primary drug use, a 53% reduction in alcohol and drug-related medical visits, and an 80% reduction in criminal activity (ONDCP & CSAT)[18]. Treating our adolescents is both a humane and a wise investment.

4. International Experience & Decriminalization of Drug Possession

The issue of decriminalizing illicit drugs is hotly debated in the U.S., but is rarely subject to evidence-based analysis. Legal reforms in the Netherlands, United States, Australia and Italy produced modestly positive impacts, primarily reducing the financial burden of criminal justice. Decriminalization alone had little or no impact on drug use or drug-related health harms[19].

The British government first loosened marijuana restrictions, then recently tightened them again because of growing concerns that adolescent use of marijuana is correlated with subsequent psychoses in some individuals. It is not yet clear how much this is a response of genetically vulnerable individuals or whether cannabinoids have independent psychosis-producing or psychosis-revealing properties.

Portuguese decriminalization, beginning in 2001, is particularly noteworthy[20]. Possession of all drugs is decriminalized when for personal use. Equally important, the Portuguese system provides a health-oriented response (Dissuasion Commissions), incorporating an emphasis on referring people who are dependent on drugs to treatment. By contrast, reforms in other countries simply seek to diminish or completely eliminate criminal penalties for drug users without any treatment component.

Contrary to predictions, the Portuguese combination of decriminalization and "dissuasion efforts" did not lead to major increases in drug use. Evidence indicates the following changes have occurred:

- Small increases in reported illicit drug use among adults
- Reduced illicit drug use among problematic drug users and adolescents
- Reduced burden of drug offenders on the criminal justice system
- Increased enrollment in drug treatment

5. Marijuana Use in California Youth

Availability has not been the primary determinant of adolescent use. Monitoring the Future documents that 12th graders across the U.S. have reached levels of marijuana use during the prior year as high as 50% in the late 1970's, as low as 26% in the early 1990's, and currently remains in the high 30's[21]. Whereas the patterns of marijuana use by adolescents over the past four decades has varied significantly, availability of marijuana has not: 81-90% of high school seniors have consistently rated pot as "fairly easy" or "very easy" to obtain. Current annual use by 12th grade students is about 35%. The National Institute on Drug Abuse (NIDA) has traced the rates of lifetime, past year, past month and daily use for high school seniors since the 1970s. Past month use is generally considered a fairly good proxy for regular use.

NIDA
INFOFACTS
www.drugabuse.gov
National Institute on Drug Abuse • National Institutes of Health • U.S. Department of Health & Human Services

Percentage of 12th-Graders Who Have Used Marijuana

	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Lifetime*	49.1	49.7	48.8	49.0	47.8	46.1	45.7	44.8	42.3	41.8	42.6
Past Year	37.5	37.8	36.5	37.0	36.2	34.9	34.3	33.6	31.5	31.7	32.4
Past Month	22.8	23.1	21.6	22.4	21.5	21.2	19.9	19.8	18.3	18.8	19.4
Daily	5.6	6.0	6.0	5.8	6.0	6.0	5.6	5.0	5.0	5.1	5.4

* "Lifetime" refers to use at least once during a respondent's lifetime. "Past year" refers to use at least once during the year preceding an individual's response to the survey. "Past month" refers to use at least once during the 30 days preceding an individual's response to the survey.

Data obtained from the National Survey on Drug Use and Health (NSDUH) on the prevalence and population estimates for marijuana use by various age groups in California are as follows:

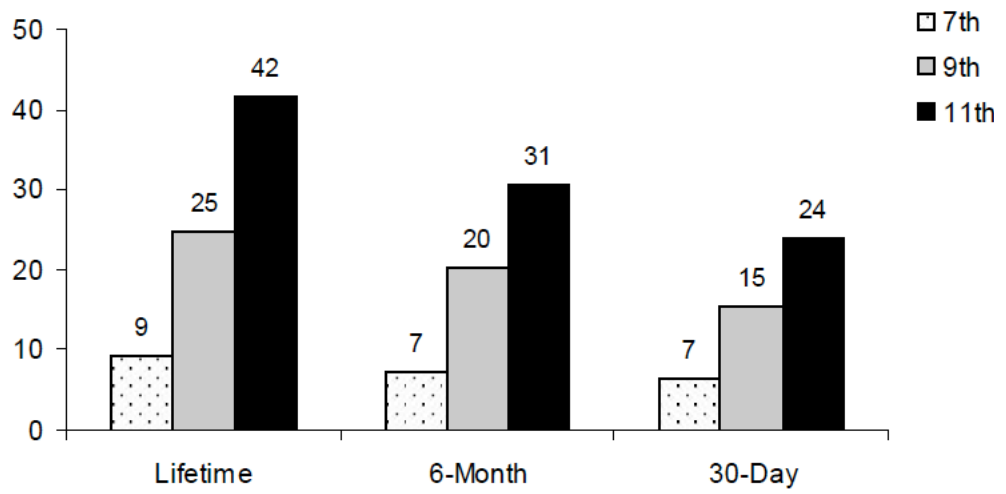
Past Month Marijuana Use (2007)			Past Year Marijuana Use (2007)		
Age	**Percent**	**Pop.**	**Age**	**Percent**	**Pop.**
12-17	6.80%	222,000	**12-17**	13.00%	424,000
18-25	17.00%	716,000	**18-25**	28.20%	1,187,000
26+	4.50%	1,011,000	**26+**	7.80%	1,731,000
Total	6.60%	1,949,000	**Total**	11.20%	3,342,000

Among 12th graders, the higher the perceived risk, the lower the percentage that report use during the previous year[21]. This inverse relationship rightfully raises the concern that legalizing marijuana for non-medical use could tend to decrease the perception of risk and thereby increase use among adolescents.

However, data from the California Attorney General's office does not support this conclusion. Despite predicted fears that the advent of medical marijuana in 1996 would send the "wrong message" to California's adolescents, the data does not show any impact on their use. According to data from the California Healthy Kids Survey, use by 9th graders in the six months prior to Prop 215's passage peaked at 34.2% in the 1995-96 survey. In 1997-98 this use rate edged down to 32.5%. Then in 1999-2000 it sank to 19.2% and has stayed within one percentage point of that figure ever since. These data are consistent with the experience regarding adolescents in Portugal since the onset of decriminalization of all illicit drugs in 2001[22].

Twelfth Biennial California Student Survey, Grades 7, 9 and 11 (2007-08)

Any Marijuana Use in Lifetime, Past Six Months, and Past 30 Days



Among 7th-grade students there is relatively little difference between lifetime, six month and 30-day prevalence of marijuana use (9%, 7% and 7%, respectively), reflecting that many 12-13 year olds had tried marijuana only recently. Predictably, lifetime use increases dramatically to 25% in 9th grade and 42% in 11th, while differences between lifetime and current use rates widen. Current rates, in the past 30 days, were 15% in 9th and 24% in 11th, about 60% of lifetime use in both grades. Since 2003, use in the past six months has remained stable at 7% in 7th grade, 20% in 9th and 31% in 11th. (California Attorney General's Office, 2008)

While it would be best to prevent all use, or at least excessive use, of marijuana by adolescents, the current reality is that many if not most youth have ready access to the drug. Because of the financial rewards available to retailers of marijuana and the ease of growing marijuana for personal use, CSAM has concluded that it is virtually impossible to enforce complete prohibition, especially in light of California's experience with de facto legalization, which has not led to a surge in hard drug use or to civic instability. If the practical goal is to reduce the total harm that both marijuana and past draconian marijuana penalties cause California, CSAM believes that it is time to enact more pragmatic drug policies.

6. Rationale for Strict Regulation

Marijuana "works" by mimicking the action of our brain's naturally occurring cannabinoid chemistry (e.g., anandamide). Many people enjoy the experiences and sensations that arise when they increase the activity of their endocannabinoid system by flooding the brain with THC and other cannabinoids from smoked marijuana. This alters the natural balance within the endocannabinoid system, and within other neurochemical systems that are modulated by endocannabinoids. Our experience of this is an "altered" state of mind — pleasant for the majority of people.

Adverse Effects of Marijuana: Although marijuana contains cannabinoid chemistry that mimics the brain's neurotransmitters, current cannabis products are of uncertain purity, of uncertain potency, and usually smoked. Four medical concerns dictate caution in the liberalization of marijuana restrictions:

1. Marijuana contains psychoactive chemicals with the potential for dependence in vulnerable individuals.
2. Marijuana is demonstrably more harmful to teenagers than to adults, affecting learning capacity and school performance in many users.
3. An association has been demonstrated between adolescent marijuana use and certain forms of psychosis. Although the mechanism underlying this relationship is not well understood, youth with nascent mental illness, such as schizophrenia, are particularly susceptible to adverse effects of marijuana.

4. Marijuana is most often consumed as a smokeable product, with documented effects on lungs similar to cigarette smoking. Many of the compounds in marijuana smoke cross the placenta and enter breast milk. Smoked marijuana irritates the delicate lining of the respiratory tract and causes damage to the cells lining the bronchial passages[23, 24]

Marijuana Dependence: There are four separate lines of evidence that indicate marijuana has all the characteristics of a drug with the potential for dependence.

1. Neuroscientists have demonstrated that marijuana affects the brain's reward centers in similar ways as all other known drugs of abuse[25].
2. Animal studies have demonstrated consistent patterns of withdrawal when THC, the main active ingredient, is given twice a day for one week and then suddenly withdrawn[26].
3. Clinical reports in humans reveal a similar pattern of withdrawal symptoms during the first weeks of abstinence[27]. Common symptoms of marijuana withdrawal (reported by > 70% of abstinent individuals) include anger or aggression, decreased appetite or weight loss, irritability, nervousness/anxiety, restlessness, and sleep difficulties including strange dreams[28, 29].
4. Epidemiologists have found that approximately 9% of people who begin smoking marijuana at 18 years or older eventually satisfy the criteria for dependence. But, this percentage triples at ages under 18. For near-daily users, the risk for dependence some time later in life is estimated to be 35-40%[30].

Given the consistent rates of lifetime dependence, the absolute number of individuals who develop addiction will be a function of how many people choose to experience marijuana.

Implications of Full Decriminalization: In 2009, 525,000 marijuana users in California were estimated to meet criteria for abuse or dependence. However, the 2010 Rand Report (*Altered State?: Assessing How Marijuana Legalization in California Could Influence Marijuana Consumption and Public Budgets*) estimates that marijuana legalization would lead to a 58% increase in total consumption, based on a markedly reduced price[31]. This is only Rand's best-guess estimate, as no data on the effect of total legalization on consumption exist. However, following their logic, if consumption increased by 58%, an additional 305,000 Californians would become dependent, bringing the total number of users meeting clinical criteria for abuse or dependence in California to 830,000. It is reasonable to believe that, if full legalization created the kind of increase in consumption envisaged by the Rand report, it would put an increased number of youth at risk for the abuse and dependence end of the marijuana use spectrum. The Rand Report importantly notes that, while "Consumption will increase, it is unclear how much because we know neither the shape of the demand curve nor the level of tax evasion."

Complicating any estimate of future marijuana use are data that show availability is not the sole determinant of use. Rates of marijuana use in California are fairly similar to those of the rest of the country. The percentage of Californians age 12 or over reporting use of marijuana in the previous 30 days was 7 percent circa 2007, compared to 6 percent for the rest of the nation. For the youngest category, ages 12–17, the difference between California and the rest of the nation is even smaller. Apparently the *de facto* legalization of marijuana in California has not led to greater use. On the other hand, price considerations have been shown to play a role in consumption of legal drugs such as tobacco and alcohol, and legalization of marijuana is very likely to decrease its price.

The bottom line remains the same: marijuana carries the risk of dependence for a small, but significant minority of users. Children and adolescents are the most vulnerable and full decriminalization may increase the total usage of marijuana in CA.

Vulnerability: Children and adolescents are uniquely vulnerable. Their brains and personalities are under rapid development. Schoolwork requires an ever-increasing capacity for memorization and learning. A public health response to substance abuse begins with prevention of, or delay of, substance use by youth. However, when dependence has already emerged during childhood or adolescence, then early detection and treatment are needed.

At least five reasons exist for focusing on the impact that marijuana has on children and adolescents:

1. The brain continues to undergo important development up until the age of 25[32].
2. Children and adolescents are at far greater risk of becoming dependent on marijuana, and dependence happens far more quickly.
3. Children and adolescents are more significantly affected by marijuana, even before dependence occurs.

4. Structural changes have been found in the brains of young marijuana users.
5. Subtle effects from marijuana on emotions and reasoning are increasingly being demonstrated in all marijuana users.

1. Brain Development in Children and Adolescents

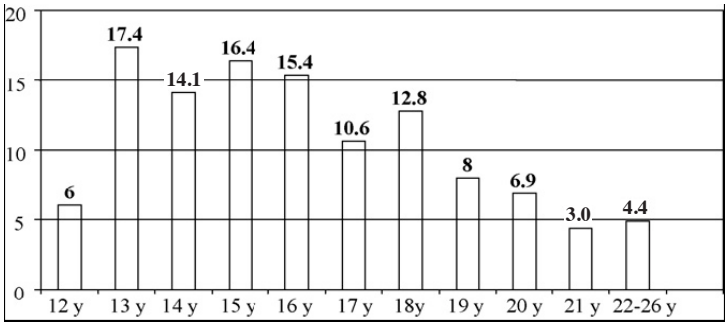
Unlike computers, which are finished products before being turned on, human brains begin functioning long before they are fully developed. We begin experiencing the world and developing our sense of identity with very immature brains, unable to understand abstract reasoning or to calculate realistic consequences of our actions. Fortunately, at puberty the brain undergoes a sudden and stunning growth of new connections among its billions of nerve cells, permitting a new, and higher level of comprehension of self and the world to emerge[33, 34]. A gradual maturation of this new brain growth occurs throughout adolescence in regions that contain heavy concentrations of the brain's intrinsic cannabinoid system. One of the questions under active research today is whether the normal course of brain development during adolescence is altered by heavy use of marijuana during this period of active neural reorganization. We are currently aware of frequent ebbing and flowing naturally occuring in the level of cannabinoid receptors and cannabinoid neurotransmitters during critical stages of adolescent brain development[35].

Not only does the brain's natural endocannabinoid neural system undergo development throughout adolescence, but it also helps guide the development of the rest of the brain. The proper laying down of nerve tracts within the brain is facilitated by our natural cannabinoids[36]. Even the maturation of other neurotransmitter systems is influenced by our endogenous cannabinoid system[37]. Exposure to excessive cannabinoid stimulation from the outside during early phases of development has been shown to alter the normal development of endorphin, glutamate, GABA, serotonin and catecholamine (e.g., adrenaline and dopamine) neural systems.

Our understanding of the impact of marijuana on brain development is like a large unfinished puzzle. Research has uncovered thousands of pieces to the puzzle, but the final picture still remains in flux. It appears that **critical periods occur when the excessive cannabinoid stimulation produced by marijuana has significant impact on the course of brain development.**

2. Marijuana Dependence in Children and Adolescents

Because children's and adolescents' brains and personalities are under rapid development, they can become dependent more often and more rapidly than adults. For example, only 4.4% of individuals who start smoking marijuana after age 21 become dependent within the first two years of use, while 17.4% of thirteen-year-olds become dependent within the first two years. (similar percentages also hold for the risk of developing alcohol dependence).



Percentages of past year cannabis use disorder by age among recent cannabis onset users (prior 2 years)[10]

3. Impact of Marijuana on Brain Function in Children and Adolescents

Dependence represents only one impact that marijuana can have on youth. Marijuana has a range of impacts that occur before full dependence is established. Research is rapidly accumulating proof that marijuana can affect the functioning of developing brains leading to greater cognitive deficits in adolescents than in adults. Recent studies have found that, while adolescent marijuana users may score as well as nonusers on cognitive tests, they recruit more areas of the brain to accomplish the task, a sign of inefficient brain function[38].

Not only are functional differences found in adolescent marijuana smokers, but also cognitive differences exist even after 28 days of documented abstinence[39, 40]. Whereas adults recover cognitively more quickly, adolescent marijuana users demonstrate decreased psychomotor speed and diminishment in several higher functions, including sequencing ability, story learning, and complex attention.

It is likely that these cognitive deficits in regular smokers contribute to decreased academic performance. Adolescents who have smoked more than 100 times leave school 5.8 times more often, enter college 3.3 times less often and earn a college degree 4.5 times less often[41].

Studies of the impact of cannabis exposure during adolescence on emotional development have focused primarily on subsequent anxiety and depressive disorders. Both animal and human studies find significant gender differences, with females showing more vulnerability[42]. Further studies are needed to understand the gender differences in marijuana's effects. It is clear, however, that marijuana decreases scores on Affective Sensitivity Scales and ratings of interpersonal skills and affective resonance[43-45].

There is little doubt about the existence of an association between marijuana use and psychotic illness[46-48]. Six longitudinal studies in five countries show that regular cannabis use confers a twofold increase in the risk for later schizophrenia[49]. Cannabis use is also associated with an earlier age at onset of psychotic disorders [50, 51].

4. The Impact of Marijuana on Brain Structure in Children and Adolescents

Our brain's natural cannabinoid chemistry gradually develops from fetal life until adulthood, hand in hand with the rest of the brain's development[35]. Multiple studies now show that our cannabinoid chemistry is also instrumental in guiding the development of other brain structures as well[36].

Chronic exposure to excessive cannabinoid stimulation can alter the size and internal structure of multiple areas of the brain, including the amygdala, hippocampus, cerebellum and frontal cortex, with greater impact when exposure occurs during early life.[52-57] Functional deficits have been correlated with these structural changes. More detailed description of structural changes associated with marijuana use is provided on the CSAM website ("Evidence-Based Information on Cannabis/Marijuana," http://www.csam-asam.org/CannabisInfo.vp.html).

5. Subtle Effects on Emotions and Reasoning Occur in all Marijuana Users

Multiple subtle, but important, impacts of marijuana on the brain occur at all ages, but have greater impact on children and adolescents. This greater impact is due both to the less mature development of the young brain and the fact that youth are still in the process of developing a sense of identity, a set of values, and the basic education required to launch successfully into independent adulthood.

A host of subtle effects, acute and chronic (i.e., both during the experience of being "high" and effects that linger long afterward), include changes in temperament[58], response to novelty, threat,[59, 60] the forgetting of negative experiences[61, 62], and the assessment of loss and gain[63, 64].

Recent studies have demonstrated that the subtle impact of marijuana cannot always be demonstrated during structured laboratory testing of cognitive tasks. However, even when no impairments are measured on standardized tests, brain imaging often reveals the recruitment of larger than normal areas of the brain to accomplish the task, presumably a means of compensating for subtle deficits[38, 65-67]. And measures of real-world functioning reveal significantly reduced everyday memory, prospective memory (which requires planning and sequencing) and cognitive abilities[68].

Additional information is available on the CSAM website (http://www.csam-asam.org/CannabisInfo.vp.html).

Summary – Children, Adolescents and Marijuana

Five reasons have been documented for focusing on the impact that marijuana has on children and adolescents. The human brain continues to undergo important development up until the age of 25. As a result of their brains still undergoing growth and development, children and adolescents are at far greater risk of becoming dependent on marijuana, and dependence happens far more quickly. Apart from dependence itself, children and adolescents are more significantly affected by marijuana in other ways.

Structural changes have been found in the brains of young marijuana users that lead to functional impairments, including cognitive deficits that result in educational under-achievement. Subtle effects of marijuana on emotions have increasingly been demonstrated in all marijuana users that would be more profoundly disruptive to individuals still developing psychologically.

While the majority of children and adolescents who use marijuana do not become dependent and are not grossly harmed, the fact remains that their brains' are modified. This is the reason people smoke marijuana, to change their brains. Chronically altered brain function alters a person's subjective experience of themselves and the world. However, altering brain function by introducing excessive cannabinoid stimulation also physically alters the brain well beyond the period of initial intoxication. When marijuana use becomes daily, or nearly daily, this alteration to the brain can become chronic, and structural. In very many cases, children and adolescents who reach this point in their marijuana use do not perceive the ongoing impact of marijuana on their experience, nor do they often connect any negative changes in their lives with marijuana use.

The overwhelming preponderance of scientific evidence provides adequate rationale for public policies that deter, delay and detect child and adolescent marijuana use. Our goal should be to limit access to marijuana for those under 21, to keep youth engaged in school, to provide schools with resources to identify and help students using marijuana, to construct a community-based intervention system to evaluate youth under 18 years of age who are using marijuana problematically and to provide them educational and constructive interventions, and to provide professional treatment to youth who have become dependent on marijuana.

7. Medical Ethics & and Substance Use Disorders

The AMA's Code of Ethics Opinion 10.015 - The Patient-Physician Relationship[72] emphasizes the beneficence required of physicians:

> *The practice of medicine, and its embodiment in the clinical encounter between a patient and a physician, is fundamentally a moral activity that arises from the imperative to care for patients and to alleviate suffering.*
>
> *The relationship between patient and physician is based on trust and gives rise to physicians' ethical obligations to place patients' welfare above their own self-interest and above obligations to other groups, and to advocate for their patients' welfare.*

Addiction Medicine strongly holds that this same beneficence must be shown to those who suffer from a substance use disorder. The ideals of the profession remind physicians to treat all patients with dignity, respect, and compassion. Public policy governing marijuana that is based primarily on enforcement and incarceration clearly violates the moral principles outlined above. The only important possible benefit of prohibition is prevention of cannabis use. However, there is little or no evidence that a public policy of prohibition effectively achieves this benefit. Patterns of cannabis use in the population appear to have been largely independent of the policies surrounding use, and criminalizing individual cannabis users does not appear to modify their use in a healthy way. In our view, cannabis use should be reframed as a public health problem, rather than remaining a criminal justice issue; and, the important public health goal of prevention should be pursued within the same paradigm as is applied currently to the two other readily-available substances that cause the most public health harm — tobacco and alcohol.

Weighing against the failed use of incarceration as a tool is the ethical question of decriminalizing or regulating and taxing yet another potentially addictive drug. If the Rand Report estimating that more 305,000 California citizens would become dependent on marijuana after legalization is accurate, then marijuana legalization would be appropriate only if public benefits from legalization outweigh this additional public burden.

Arguing against adult legalization furthering adolescent addiction is the chart from California Pediatrician[73], which documents adolescent use of marijuana prior to states enacting medical marijuana laws and the most recent data. For the most part "medical marijuana" did not lead to growth in adolescent use.

On the other hand, Alaska's experiment with legalization in the '70s ended in re-criminalization of marijuana in 1990, largely because the state's youth started smoking at twice the rate of their counterparts nationally. The Alaskan experiment did not, however, include any provisions for enhancing treatment for individuals harmfully

Table 2: Change in overall "current" adolescent marijuana use, by oldest high school grade, pre- and post-legalization of medical marijuana

State	Percent use pre-, and most recent data
California	11th grade: 25.9 to 23.9
Alaska	12th grade: 30.9 to 23.8
Oregon	11th grade: 21.0 to 21.8
Washington	12th grade: 28.7 to 23.4
Maine	12th grade: 30.4 to 25.4
Colorado	N/A
Hawaii	12th grade: 22.7 to 20.5
Nevada	12th grade: 27.5 to 22.7
Montana	12th grade: 29.1 to 27.7
Vermont	12th grade: 37.2 to 32.9
Rhode Island	12th grade: 34.3 to 31.7
New Mexico	12th grade: 25.4 to 29.5
Michigan	12th grade: 19.0 to 27.4
Arizona	N/A
New Jersey	N/A
Washington, D.C.	N/A

involved with marijuana, nor did it establish regulation and taxation as CSAM is proposing in this paper. The Alaska experience remains one of mixed messages and uncertain lessons.

Although the benefits of decriminalization include decreasing the prison population, adding revenue to the state General Fund and increasing civil liberties, CSAM is primarily focused on the potential for using regulation and taxation to fund improvements in the care provided to adolescents and children problematically involved with marijuana.

8. Outcome – Measuring Policy Impact

Without a good baseline epidemiological assessment, it would be impossible to gauge the impact of regulating and taxing marijuana for adults and instituting *Youth First*. Sufficient revenue from the taxation of marijuana sales must be dedicated to the development of an ongoing data collection and analysis before any money is dispersed to General Funds. Without good data, public policy cannot be adequately defended against ideology or improved when necessary.

- Enhanced Research and Outcomes: Redesign of substance abuse treatment in California should be accompanied by baseline and ongoing treatment services research. Dedicated funds from the regulation of marijuana sales should support University of California based research to analyze the data necessary to guide future decisions regarding marijuana regulation in California.

References

1. Global Commission on *Drug Policy, War on Drugs*. 2011.
2. Austin & Skager, *12th Biennial California Student Survey: Drug, Alcohol, and Tobacco Use, 2007-08: Compendium of Tables, Office of the Attorney General.* 2008.
3. Budney, A.J., et al., Marijuana dependence and its treatment. *Addict Sci Clin Pract*, 2007. 4(1): p. 4-16.
4. Kalant, H., Adverse effects of cannabis on health: an update of the literature since 1996. *Prog Neuropsychopharmacol Biol Psychiatry*, 2004. 28(5): p. 849-63.
5. Justice Policy Institute, *Substance Abuse Treatment and Public Safety*. 2008.
6. Ashtari, M., et al., Medial temporal structures and memory functions in adolescents with heavy cannabis use. *J Psychiatr Res*, 2011. 45(8): p. 1055-66.
7. Ashtari, M., et al., Diffusion abnormalities in adolescents and young adults with a history of heavy cannabis use. *J Psychiatr Res*, 2009. 43(3): p. 189-204.
8. Sznitman, S.R., et al., Student Drug Testing in the Context of Positive and Negative School Climates: Results from a National *Survey. J Youth Adolesc*, 2011.
9. CSAM, *Blueprint for Adolescent Drug and Alcohol Treatment in California*.
10. Winters, K.C. and C.Y. Lee, Likelihood of developing an alcohol and cannabis use disorder during youth: association with recent use and age. *Drug Alcohol Depend*, 2008. 92(1-3): p. 239-47.
11. Caulkins & Chandler, Long-run Trends in Incarceration of Drug Offenders in the United States. *Crime and Delinquency*, 2006. 52(4): p. 619-641.
12. CA State Budget, 2011-2012.
13. Beckett & Herbert, L.S.a.J.P., University of Washington Seattle., *The Consequences and Costs of Marijuana Prohibition*.
14. Lockyer, *Crime in California*: 2005. 2008.
15. Johnson, P.W., Arrest Probabilities for Marijuana Users as Indicators of Selective Law Enforcement. *American Journal of Sociology*. 83(3).
16. McLellan, A.T., et al., Drug dependence, a chronic medical illness: implications for treatment, insurance, and outcomes evaluation. *JAMA*, 2000. 284(13): p. 1689-95.
17. NIH, *Principles of Drug Addiction Treatment: A Research-Based Guide NIH Publication* No. 09–4180. Revised April 2009.
18. CSAT, 1997 *National Treatment Improvement Evaluation Study (NTIES)*. 1997.
19. MacCoun, R. and P. Reuter, Evaluating alternative cannabis regimes. *Br J Psychiatry*, 2001. 178: p. 123-8.
20. Hughes_and_Stevens, What Can We Learn From The Portuguese Decriminalization of Illicit Drugs? *BRIT. J. CRIMINOL*, 2010.
21. Monitoring_The_Future.
22. Hughes, C., What can we learn from the decriminalization of illicit drugs? *Brit. J of Criminology*. 50(6): p. 999-1022.
23. Kalant, H., Medicinal use of cannabis: history and current status. *Pain Res Manag*, 2001. 6(2): p. 80-91.
24. Taylor, D.R., et al., A longitudinal study of the effects of tobacco and cannabis exposure on lung function in young adults. *Addiction*, 2002. 97(8): p. 1055-61.
25. Kolb, B., et al., Chronic treatment with Delta-9-tetrahydrocannabinol alters the structure of neurons in the nucleus accumbens shell and medial prefrontal cortex of rats. *Synapse*, 2006. 60(6): p. 429-36.

26. Tanda, G. and S.R. Goldberg, Cannabinoids: reward, dependence, and underlying neurochemical mechanisms--a review of recent preclinical data. *Psychopharmacology (Berl)*, 2003. 169(2): p. 115-34.
27. Budney, A.J. and J.R. Hughes, The cannabis withdrawal syndrome. *Curr Opin Psychiatry*, 2006. 19(3): p. 233-8.
28. Hasin, D.S., et al., Cannabis withdrawal in the United States: results from NESARC. *J Clin Psychiatry*, 2008. 69(9): p. 1354-63.
29. Budney, A.J., et al., Review of the validity and significance of cannabis withdrawal syndrome. *Am J Psychiatry, 2004*. 161(11): p. 1967-77.
30. Kandel, *Progression to regular marijuana involvement: phenomenology and risk factors of near daily use*. 1992: p. 221-253.
31. Rand_Report, *Altered State? Assessing How Marijuana Legalization in California Could Influence Marijuana Consumption and Public Budgets*. 2010.
32. Giedd, J.N., Structural magnetic resonance imaging of the adolescent brain. *Ann N Y Acad Sci*, 2004. 1021: p. 77-85.
33. Gagtay, Dynamic mapping of human cortical development during childhood through early adulthood. *PNAS*, 2004. 101(21): p. 8174-9.
34. Yurgelun-Todd, D.A. and W.D. Killgore, Fear-related activity in the prefrontal cortex increases with age during adolescence: a preliminary fMRI study. *Neurosci Lett*, 2006. 406(3): p. 194-9.
35. Fernandez-Ruiz, J., et al., The endogenous cannabinoid system and brain development. *Trends Neurosci*, 2000. 23(1): p. 14-20.
36. Romero, J., et al., Atypical location of cannabinoid receptors in white matter areas during rat brain development. *Synapse*, 1997. 26(3): p. 317-23.
37. Trezza, V., V. Cuomo, and L.J. Vanderschuren, Cannabis and the developing brain: insights from behavior. *Eur J Pharmacol*, 2008. 585(2-3): p. 441-52.
38. Tapert, S.F., et al., Functional MRI of inhibitory processing in abstinent adolescent marijuana users. *Psychopharmacology (Berl)*, 2007. 194(2): p. 173-83.
39. Medina, K.L., et al., Neuropsychological functioning in adolescent marijuana users: subtle deficits detectable after a month of abstinence. *J Int Neuropsychol Soc*, 2007. 13(5): p. 807-20.
40. Hanson, K.L., et al., Longitudinal study of cognition among adolescent marijuana users over three weeks of abstinence. *Addict Behav*, 2010.
41. Fergusson, D.M., L.J. Horwood, and A.L. Beautrais, Cannabis and educational achievement. *Addiction*, 2003. 98(12): p. 1681-92.
42. Patton, G.C., et al., Cannabis use and mental health in young people: cohort study. *Bmj*, 2002. 325(7374): p. 1195-8.
43. Clopton, P.L., et al., Marijuana and the perception of affect. *Psychopharmacology (Berl)*, 1979. 61(2): p. 203-6.
44. Janowsky, D.S., et al., Interpersonal effects of marijuana. A model for the study of interpersonal psychopharmacology. *Arch Gen Psychiatry*, 1979. 36(7): p. 781-5.
45. Limonero, J.T., J. Tomas-Sabado, and J. Fernandez-Castro, Perceived emotional intelligence and its relation to tobacco and cannabis use among university students. *Psicothema*, 2006. 18 Suppl: p. 95-100.
46. Moore, T.H., et al., Cannabis use and risk of psychotic or affective mental health outcomes: a systematic review. *Lancet*, 2007. 370(9584): p. 319-28.
47. Kuepper, R., et al., Continued cannabis use and risk of incidence and persistence of psychotic symptoms: 10 year follow-up cohort study. *BMJ*, 2011. 342: p. d738.
48. Large, Cannabis Use and Earlier Onset of Psychosis. Arch Gen Psychiatry, 2011.
49. Zammit, S., et al., Self reported cannabis use as a risk factor for schizophrenia in Swedish conscripts of 1969: historical cohort study. *Bmj*, 2002. 325(7374): p. 1199.
50. Veen, N.D., et al., Cannabis use and age at onset of schizophrenia. Am J Psychiatry, 2004. 161(3): p. 501-6.
51. Semple, D.M., A.M. McIntosh, and S.M. Lawrie, Cannabis as a risk factor for psychosis: systematic review. *J Psychopharmacol*, 2005. 19(2): p. 187-94.
52. Medina, K.L., et al., Effects of alcohol and combined marijuana and alcohol use during adolescence on hippocampal volume and asymmetry. *Neurotoxicol Teratol*, 2007. 29(1): p. 141-52.
53. Scallet, A.C., et al., Morphometric studies of the rat hippocampus following chronic delta-9-tetrahydrocannabinol (THC). *Brain Res*, 1987. 436(1): p. 193-8.
54. Medina, K.L., B.J. Nagel, and S.F. Tapert, Abnormal cerebellar morphometry in abstinent adolescent marijuana users. *Psychiatry Res*. 182(2): p. 152-9.
55. McQueeny, T., et al., Gender effects on amygdala morphometry in adolescent marijuana users. *Behav Brain Res*, 2011. 224(1): p. 128-34.
56. Churchwell, J.C., M. Lopez-Larson, and D.A. Yurgelun-Todd, Altered frontal cortical volume and decision making in adolescent cannabis users. *Front Psychol*, 2010. 1: p. 225.
57. Yucel, M., et al., Regional brain abnormalities associated with long-term heavy cannabis use. *Arch Gen Psychiatry*, 2008. 65(6): p. 694-701.
58. Katona, I., et al., Distribution of CB1 cannabinoid receptors in the amygdala and their role in the control of GABAergic transmission. *J Neurosci,* 2001. 21(23): p. 9506-18.
59. Romero, J., et al., Time-course of the cannabinoid receptor down-regulation in the adult rat brain caused by repeated exposure to delta9-tetrahydrocannabinol. *Synapse*, 1998. 30(3): p. 298-308.
60. Van Laere, K., et al., Relationship of type 1 cannabinoid receptor availability in the human brain to novelty-seeking temperament. *Arch Gen Psychiatry*, 2009. 66(2): p. 196-204.
61. Gruber, S.A., J. Rogowska, and D.A. Yurgelun-Todd, Altered affective response in marijuana smokers: an FMRI study. *Drug Alcohol Depend*, 2009. 105(1-2): p. 139-53.
62. Cornelius, J.R., H.J. Aizenstein, and A.R. Hariri, Amygdala reactivity is inversely related to level of cannabis use in individuals with comorbid cannabis dependence and major depression. *Addict Behav*, 2010. 35(6): p. 644-6.

63. Marsicano, G., et al., The endogenous cannabinoid system controls extinction of aversive memories. *Nature*, 2002. 418(6897): p. 530-4.
64. Chhatwal, J.P., et al., Enhancing cannabinoid neurotransmission augments the extinction of conditioned fear. *Neuropsychopharmacology*, 2005. 30(3): p. 516-24.
65. Shin, L.M., et al., A functional magnetic resonance imaging study of amygdala and medial prefrontal cortex responses to overtly presented fearful faces in posttraumatic stress disorder. *Arch Gen Psychiatry*, 2005. 62(3): p. 273-81.
66. Wesley, M.J., C.A. Hanlon, and L.J. Porrino, Poor decision-making by chronic marijuana users is associated with decreased functional responsiveness to negative consequences. *Psychiatry Res*, 2011. 191(1): p. 51-9.
67. Bolla, K.I., et al., Neural substrates of faulty decision-making in abstinent marijuana users. *Neuroimage*, 2005. 26(2): p. 480-92.
68. Becker, B., et al., Altered parahippocampal functioning in cannabis users is related to the frequency of use. *Psychopharmacology (Berl)*, 2010. 209(4): p. 361-74.
69. Jager, G., et al., Effects of frequent cannabis use on hippocampal activity during an associative memory task. *Eur Neuropsychopharmacol*, 2007. 17(4): p. 289-97.
70. Jager, G., et al., Cannabis use and memory brain function in adolescent boys: a cross-sectional multicenter functional magnetic resonance imaging study. *J Am Acad Child Adolesc Psychiatry*, 2010. 49(6): p. 561-72, 572 e1-3.
71. Fisk, J.E. and C. Montgomery, Real-world memory and executive processes in cannabis users and non-users. *J Psychopharmacol*, 2008. 22(7): p. 727-36.
72. AMA, Code of Ethics Opinion 10.015.
73. Ammerman, Medical Marijuana: Update for the Pediatrician. California *Pediatrician*, 2011.

575 Market Street, Suite 2125
San Francisco, CA 94105
415/764-4855
FAX: 415/764-4915
www.csam-asam.org
csam@compuserve.com