...working to reform marijuana laws...

Representing cannabis consumers since 1970

Marijuana:

Historical, Legal and Medical Facts

for

The Exchange Club of Nashville

June 26, 2012

A Brief History of Marijuana

Unique in the world, the plant *Cannabis Sativa* has been cultivated throughout recorded history for both its useful fiber and its psychoactive and medicinal properties.

When grown for fiber, the plant is known as hemp and is typically planted in tightly spaced rows to maximize the stalk. Hemp grows well in a variety of climates and soil types and is naturally resistant to pests, precluding the need for pesticides. It out-competes most weeds, so herbicides are not necessary and it leaves a weed-free field for a following crop.

In modern times, hemp has been used for industrial purposes including paper, textiles, biodegradable plastics, construction, health food and fuel. Hemp can displace cotton which is usually grown with massive amounts of chemicals. George Washington and Thomas Jefferson both grew hemp. Jefferson drafted the Declaration of Independence on hemp paper. It is now illegal to grow hemp in America so we import hemp products..

Cannabis use for recreational, religious or spiritual, and medicinal purposes goes back as far as the 3rd millennium BC. The typical herbal form of cannabis consists of the flowers and subtending leaves of mature pistillate female plants so marijuana is grown widely spaced to maximize the leaves and flowering tops. The resinous form of the drug is known as hashish (or merely as 'hash').

As medicine, cannabinoids in marijuana supplement our body's endocannabinoid system (discussed below) to treat or prevent a wide variety of conditions including migraine headaches, chronic pain, glaucoma, nausea, AIDS wasting syndrome, ALS, MS, Parkinson's, Crohn's Disease, addiction to alcohol and opiates, fibromyalgia, hypertension, Hepatitis C, cancer, rheumatoid arthritis, PTSD and Tourette's Syndrome.

As a mild intoxicant, marijuana heightens awareness of our thoughts and surroundings, enhancing intellectual and sensual experiences as well as creativity and generally improving one's mood. There is an increased appreciation of music and art. Food tastes more delicious.

Prohibition Begins

Cultivated for fiber from the first days of the American colonies (the Jamestown settlers brought hemp to Virginia in 1611), marijuana was rarely used as an intoxicant until Mexican and West Indian immigrants imported the drug to the United States in the early years of the 20th century. The first anti-marijuana laws were passed by southern and southwestern states, aimed at Hispanics.

Beginning in the 1930s, the federal government conducted an unrelenting campaign to demonize marijuana. The newly-formed Federal Bureau of Narcotics was staffed by agents from Treasury Department formerly in charge of enforcing the Volstead Act. Anxious to justify their continued employment, they needed a new prohibition and they needed it fast.

Marijuana was the perfect target because it was unfamiliar to the general public. Thus the government could create an image of pot as a highly dangerous and foreign substance. Calling cannabis "marijuana" made it seem even more foreign. Physicians who had prescribed cannabis for decades did not realize this new prohibition was aimed at a familiar medicine until it was too late. The government's unscientific and racist claim included these:

"There are 100,000 total marijuana smokers in the US, and most are Negroes, Hispanics, Filipinos, and entertainers. Their Satanic music, jazz, and swing, result from marijuana use. This marijuana causes white women to seek sexual relations with Negroes, entertainers, and any others."

"...the primary reason to outlaw marijuana is its effect on the degenerate races."

"Marijuana is an addictive drug which produces in its users insanity, criminality, and death."

"Reefer makes darkies think they're as good as white men."

"Marihuana leads to pacifism and communist brainwashing"

"Marijuana is the most violence-causing drug in the history of mankind."

Hearings before the Senate Interstate Commission on Crime (1937): Senator DAVIS: How many (marijuana) cigarettes would you have to smoke before you got this vicious mental attitude toward your neighbor? Mr. ANSLINGER (head of the Federal Bureau of Narcotics): I believe in some cases one cigarette might develop a homicidal mania, probably to kill his brother…some people could smoke five before it would take effect, but all the experts agree that the continued use leads to insanity.

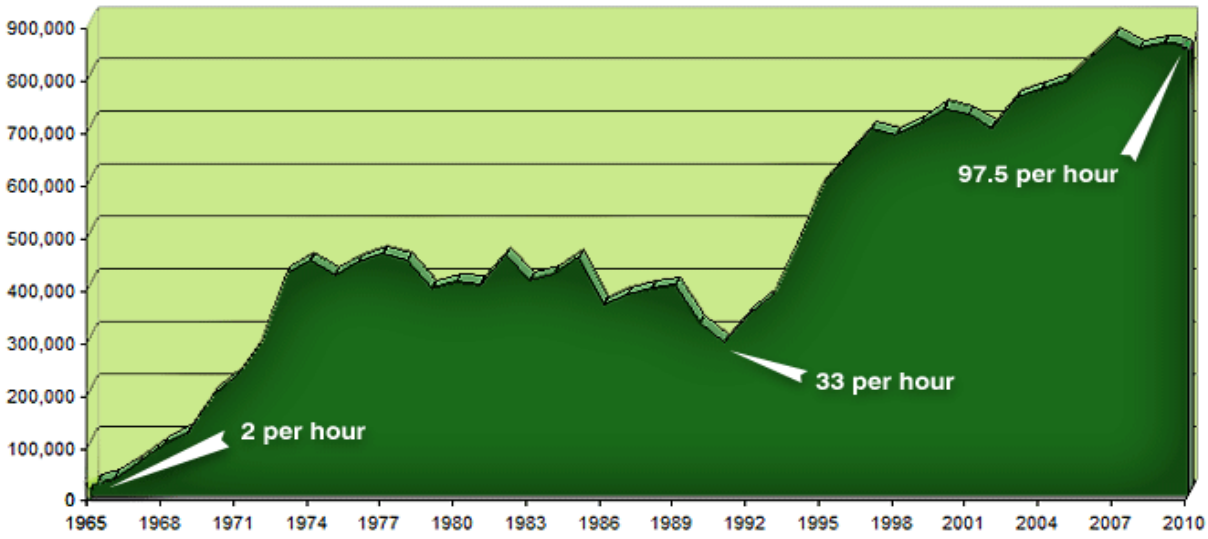
Based on these scurrilous charges, pot prohibition sailed through Congress despite the opposition of the American Medical Society which predicted (accurately) that passage of the Marihuana Tax Act would lead to marijuana being unavailable as medicine.

From our history books: The bill to ban the cannabis plant from American soil passed easily in the committee and moved on to the House of Representatives. It landed on the Speaker's Platform before a limited number of Congressional Representatives. The debate that followed consisted of a single man, a Republican from New York State, who stood and asked what the bill was about. Speaker Rayburn replied, "I don't know. It has something to do with something called marihuana. I think it's a narcotic of some kind."

The same man asked if the AMA supported the bill. In response to the question, a member of the committee that had criticized Dr.Woodward and sent the bill to Congress leaped to his feet and shouted, "Their Doctor Wentworth came down here. They supported this bill 100 percent!" This spurious statement ended further questions, and the vote began. There was no recorded vote on the bill; instead, legislators walked past this point or that point on the floor to indicate a yes or no vote. The bill was on the floor for a remarkable 92 seconds before it became Federal Law. This new prohibition happened in 1937, just four years after Congress repealed alcohol prohibition

Arrests Started Slow but Have Spun Out of Control

Law enforcement officials often dismiss efforts to reform pot laws, claiming, "We don't concentrate on marijuana." Really? The fact is arrests for marijuana have soared, particularly since 1992. More than **22 million** Americans have now been arrested on marijuana charges:



Annual Marijuana Arrests in the US 1965-2010

NORML
The National Organization for the Reform of Marijuana Laws
norml.org

What accounts for this surge? The most likely explanation is that **these are easy arrests**.

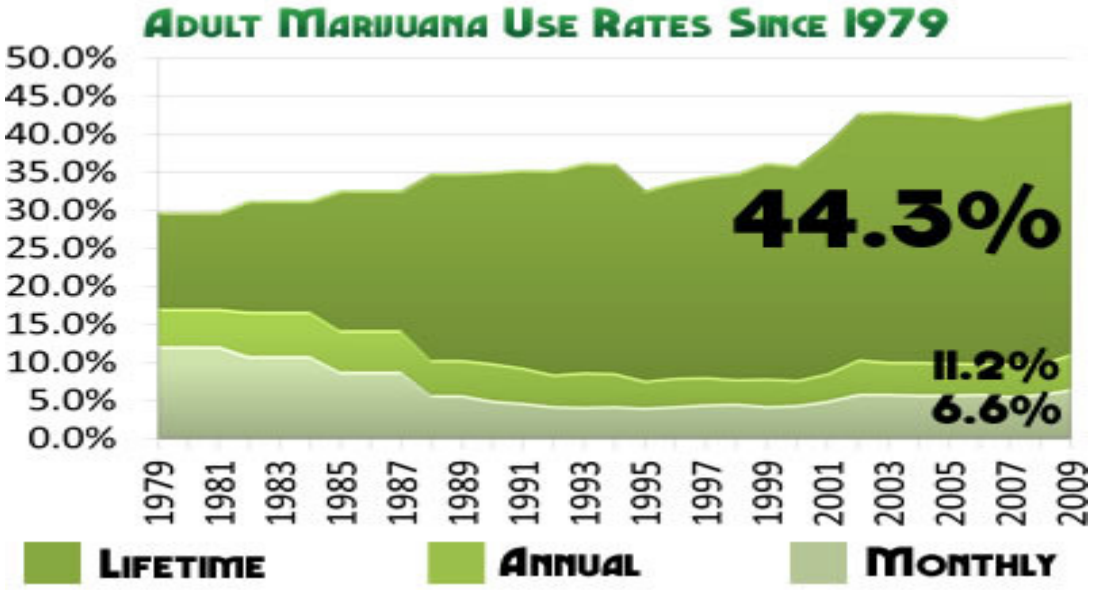
If it's late on your shift and you'd like a few hours of overtime, why arrest a drunk who may be belligerent and throw up in your vehicle? Arrest a citizen for marijuana, boost your arrest statistics (often tied to funding) and use the forfeiture laws to acquire cash, homes, autos and other personal possessions for your district.

An arrest is not a trivial event. It may result in loss of employment, financial aid for college or even having your children placed in foster care. And marijuana arrests are aimed disproportionately at minorities.

According to Alice Huffman, Past President of the California State Conference of the NAACP, "Studies show that all racial groups abuse drugs at similar rates, but the numbers also show that African Americans, Hispanics and other people of color are stopped, searched, arrested, charged, convicted, and sent to prison for drug-related charges at a much higher rate. This dual system of drug law enforcement that serves to keep African-Americans and other minorities under lock and key and in prison must be exposed and eradiated."

But Marijuana Use Is Steady to Rising Slowly

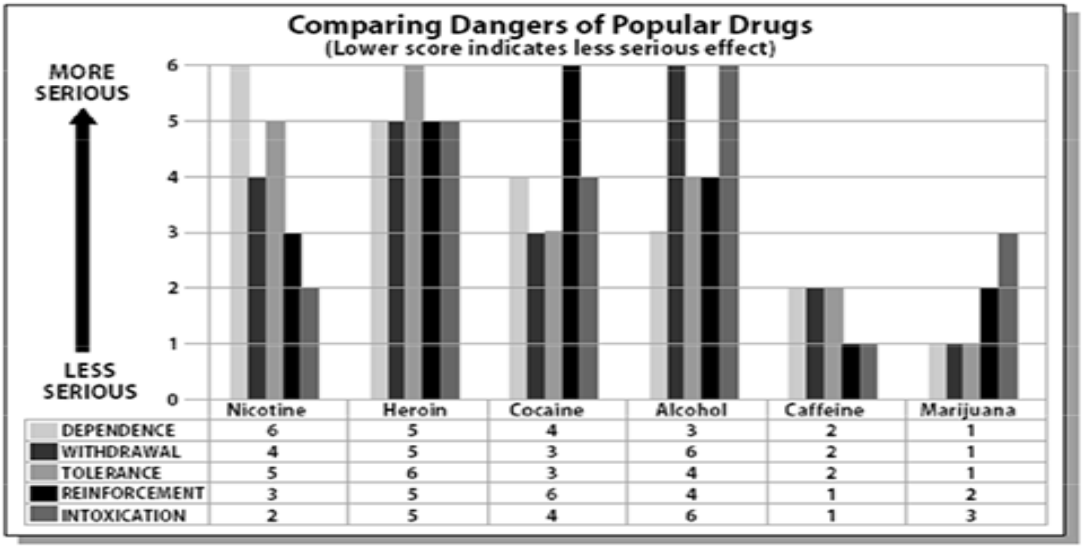
- **44.3% of all American adults have tried marijuana in their lifetime** (National Survey on Drug Use and Health 2009).
- For the first time in 2009, there were **over 100 million American adults who have tried marijuana** in their lifetime. Including our current and last two presidents.
- Over 25 million adults or **11.2%** according to the author of books on risk in the global financial system **of all American adults used marijuana last year**.
- Almost 15 million adults or **6.6% of all American adults used marijuana last month.**
- **The peak of American marijuana use was 1979**, when 17.1% of adults used annually and 12.2% used monthly.



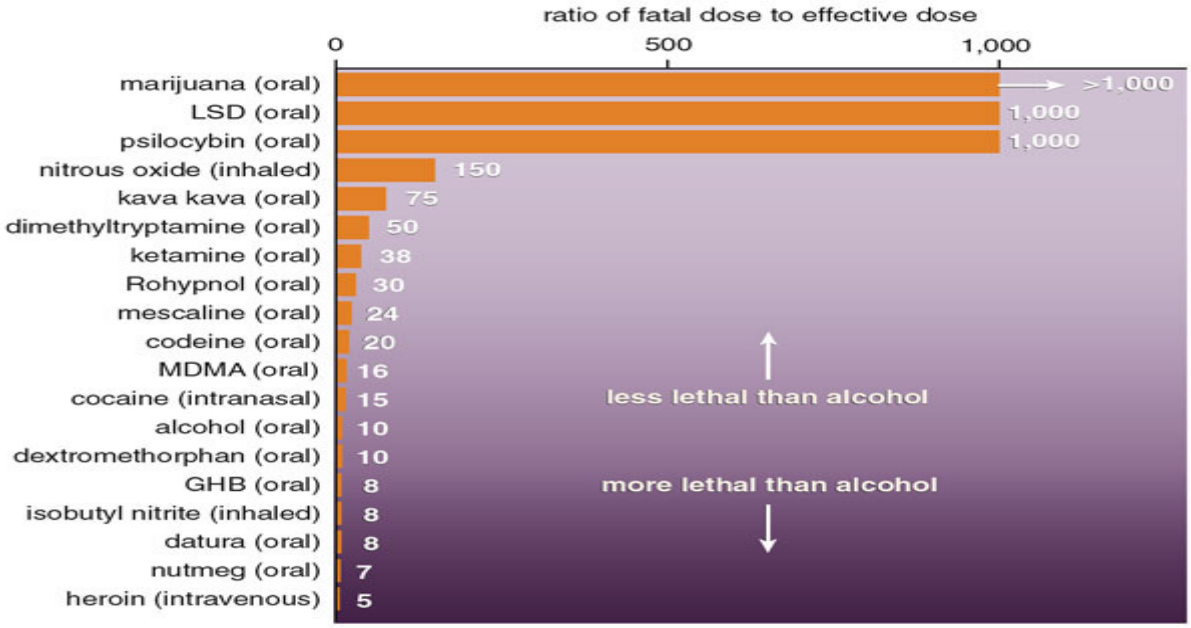
Is Marijuana Really Dangerous? Or Is It Safer, Much Safer?

"…it is now demonstrable—*by any measure* (italics in original)—that marijuana is substantially less harmful than alcohol and, indeed, marijuana is probably the least harmful psychoactive substance now in widespread use in the world."

Bonnie, Richard J. *Marijuana Use and Criminal Sanction* . Charlottesville, Virginia. The Michie Company. 1980. (Professor Bonnie was the Legal Director of the National Commission on Marijuana and Drug Abuse appointed by President Richard Nixon.)



Source: Jack E. Henningfield, PhD for the National Institute on Drug Abuse (NIDA), Reported by Philip J. Hilts, New York Times, Aug. 2, 1994 "Is Nicotine Addictive? It Depends on Whose Criteria You Use."



Unlike Marijuana, Alcohol Overdoses Are Fatal—and Common:

By The Associated Press Nov. 4, 2011

Menomonie - The University of Wisconsin-Stout is requiring freshmen to complete an online alcohol assessment before they can register for next semester's classes. Wisconsin Public Radio reported that **six UW-Stout students have died in the past three years in alcohol-related incidents**. Now the campus is trying to fight back against student binge drinking.

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From "Marijuana legalization bill offers safer alternative," by Paul Armentano and Paul Kuhn, *The Tennessean*, August 15, 2011.

According to the Journal of the American Medical Association (JAMA), the use of tobacco is the leading cause of death in America, contributing to 400,000 deaths each year, an estimated one of every five fatalities. So it's hardly any wonder the FDA will soon require the placement of prominent warning labels on cigarette packages. It is also no wonder smoking rates have dropped in half over the past 40 years—without the arrest of a single consumer.

According to the same JAMA study, alcohol is the third leading cause of death in America. The World Health Organization reported earlier this year that "alcohol causes nearly four percent of deaths worldwide, more than AIDS, tuberculosis or violence." The authors added: **"Alcohol is a causal factor in 60 types of diseases and injuries. … Its consumption has been linked to cirrhosis of the liver, epilepsy, poisonings, road traffic accidents, violence, and several types of cancer, including cancers of the colorectum, breast, larynx and liver."** Yet warning labels on alcohol are inconspicuous at best and mention only two risks, **birth defects** and driving.

When marijuana is legal, how many deaths should we expect from the drug's consumption and what should warning labels say? We know the number of deaths directly attributable to marijuana will remain at zero because cannabis is incapable of causing a fatal overdose.

And unlike alcohol and tobacco, the adverse health effects of even heavy cannabis use are minimal. **There is no epidemiological evidence in any country, after hundreds of studies and centuries of use by tens of millions of people, that marijuana smokers have a shorter life expectancy than non-smokers.** They don't become violent at sports events or beat their spouses and children. They don't get heart disease, cancer, brain damage or any other deadly illness at a higher rate than those who abstain. In fact, a pair of studies conducted by Kaiser Permanente found that marijuana use, even long-term, was not associated with elevated levels of mortality or incidences of cancer, including types of cancers associated with tobacco smoking.

In short, marijuana is a safer alternative to alcohol and tobacco. To the extent marijuana replaces these two substances, individuals and our society will be safer.

The Public Believes Its Eyes, Not Its Government.

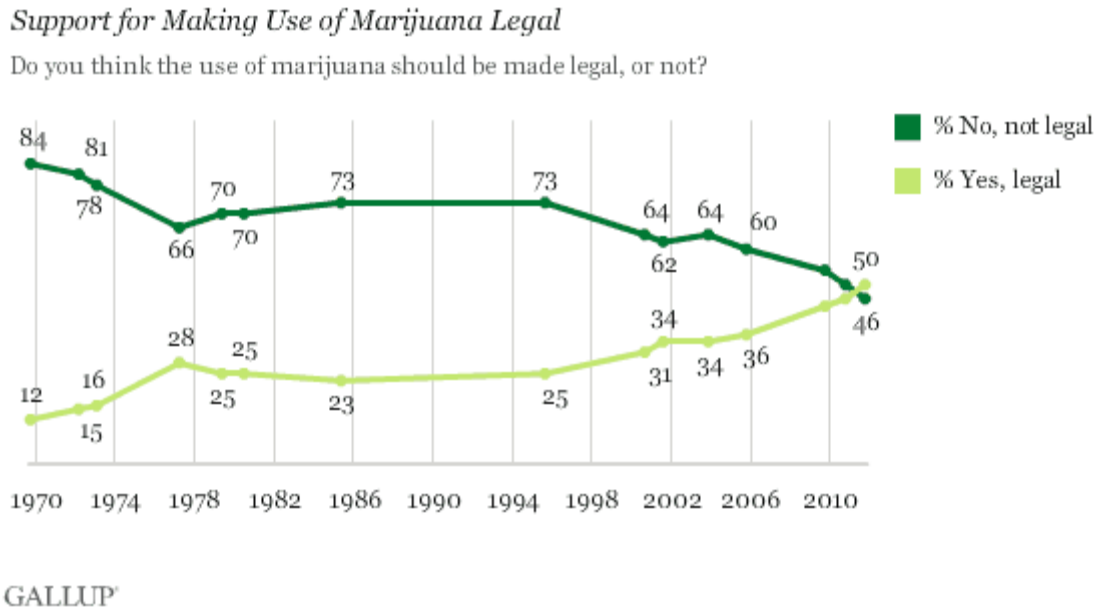
Our government continues to label marijuana as a dangerous drug with no medical value. As we face a budget crisis and real enemies around the world, it spends billions of dollars arresting otherwise law-abiding citizens. Voters know better—support for legalization is accelerating:

Gallup Poll October 17, 2011

Record-High 50% of Americans Favor Legalizing Marijuana Use

by Frank Newport

PRINCETON, NJ -- A record-high 50% of Americans now say the use of marijuana should be made legal, up from 46% last year. Forty-six percent say marijuana use should remain illegal.



The advocacy group National Organization for the Reform of Marijuana Laws claims that marijuana is the third-most-popular recreational drug in America, behind only alcohol and tobacco. …A Gallup survey last year found that 70% favored making it legal for doctors to prescribe marijuana in order to reduce pain and suffering.

The Major Marijuana Commissions

Over the past 100+ years, seven government commission have studied the effects of marijuana:

The Indian Hemp Drugs Commission Report (1894)

Panama Canal Zone U. S. Military Investigations into Marijuana (1916-29)

The LaGuardia Committee (New York City, 1939-1944)

The Wootton Report on Cannabis (United Kingdom, 1969)

Le Dain Commission of Inquiry into the Non-Medical Use of Drugs (Canada, 1969-1972)

The U. S. National Commission on Marihuana and Drug Abuse (1970-1973)

The Jamaican National Commission on Ganja (2001)

Each began with an anti-marijuana bias but all reached the same conclusion: there is nothing about marijuana that justifies treating users as criminals.

Marijuana Is Medicine

Mayo Clinic Proceedings: "Bureaucratic Hurdles ... Interfere With Legitimate Cannabis Research"

Thursday, 01 March 2012

Rochester, MN: Federal officials should reclassify cannabis under federal law and permit "long-stifled research into a potential trove of (the plant's) therapeutic applications," according to review published in the February issue of the journal *Mayo Clinic Proceedings*, a peer-reviewed journal sponsored by Mayo Clinic in Rochester, Minnesota.

The review, entitled "Blurred Boundaries: The Therapeutics and Politics of Medical Marijuana," states: "Bureaucratic hurdles not erected for other potential pharmaceuticals continue to interfere with legitimate cannabis research. The federal government instituted its 1970 ban in the absence of scientific evidence supporting its position. It maintains the ban, despite scientific evidence suggesting that cannabis could have positive effects on the many organ systems endocannabinoid activity modulates."

It concludes: "Because of this modern-day prohibition, opportunities to further study marijuana's risks and benefits and develop new pharmacotherapies are squandered. It is high time for the federal government to ... reclassify marijuana so that it has the same status as certain opiates and stimulants. ... By forcing marijuana to languish as a Schedule I drug with a 'high potential for abuse, no accepted medical use, and no accepted safety for use in medically supervised treatment,' the federal government thumbs an illogical nose at contemporary public sentiment, recent scientific discoveries, and **potentially head-to-toe therapeutic breakthroughs**. This reclassification would be a first step toward reconciling federal and state law and permitting long-stifled research into a **potential trove of therapeutic applications** to commence."

Cancer and Cannabis

The fact that marijuana (cannabis) is the safest and most effective treatment for chemotherapy-induced nausea is well-established. Less well known is that in 1974, a research team at the Virginia Commonwealth University (acting at the behest of the federal government) discovered that cannabis inhibited malignant tumor cell growth in culture and in mice.

As reported in the *Washington Post* on August 14th, 1974, administration of marijuana's primary cannabinoid THC, "slowed the growth of lung cancers, breast cancers and a virus-induced leukemia in laboratory mice, and prolonged their lives by as much as 36 percent."

US government officials dismissed the study (which was eventually published in the Journal of the National Cancer Institute in 1975) and refused to fund follow-up research until conducting a similar—though secret—clinical trial in the mid-1990s. That study, conducted by the US National Toxicology Program to the tune of $2 million concluded that mice and rats administered high doses of THC over long periods experienced greater protection against malignant tumors than untreated controls.

Government researchers once again shelved the results, which only came to light after a draft copy of its findings were leaked in 1997 to a medical journal, which in turn forwarded the story to the national media.

Nevertheless, in the decade since the completion of the National Toxicology trial, the U.S. government has yet to encourage or fund additional, follow up studies examining the cannabinoids' potential to protect against the spread cancerous tumors.

Fortunately, scientists overseas have generously picked up where US researchers so abruptly left off. In 1998, a research team at Madrid's Complutense University discovered that THC can selectively induce apoptosis (program cell death) in brain tumor cells without negatively impacting the surrounding healthy cells. Then in 2000, they reported in the journal Nature Medicine that injections of synthetic THC eradicated malignant gliomas (brain tumors) in one-third of treated rats, and prolonged life in another third by six weeks.

In 2003, researchers at the University of Milan in Naples, Italy, reported that non-psychoactive compounds in marijuana inhibited the growth of glioma cells in a dose dependent manner and selectively targeted and killed malignant cancer cells.

The following year, researchers reported in the journal of the American Association for Cancer Research that marijuana's constituents inhibited the spread of brain cancer in human tumor biopsies. In a related development, a research team from the University of South Florida further noted that THC can also selectively inhibit the activation and replication of gamma herpes viruses. The viruses, which can lie dormant for years within white blood cells before becoming active and spreading to other cells, are thought to increase one's chances of developing cancers such as Karposi's Sarcoma, Burkitt's lymphoma, and Hodgkins disease.

More recently, investigators published pre-clinical findings demonstrating that cannabinoids may play a role in inhibiting cell growth of colorectal cancer, skin carcinoma, breast cancer, and prostate cancer, among other conditions. When investigators compared the efficacy of natural cannabinoids to that of a synthetic agonist, THC proved far more beneficial – selectively decreasing the proliferation of malignant cells and inducing apoptosis more rapidly than its synthetic alternative while simultaneously leaving healthy cells unscathed.

Finally, this article from the McClatchy newspaper chain may be of interest:

June 18, 2009 - Los Angeles, CA, USA

In 2006, Dr. Donald Tashkin led the largest population case-control study ever to assess the use of marijuana and lung cancer risk. The study, which included more than 2,200 subjects (1,212 cases and 1,040 controls), reported that marijuana smoking was not positively associated with cancers of the lung or upper aerodigestive tract – even among individuals who reported smoking more than 22,000 joints during their lifetime.

"**What we found instead was no association and even a suggestion of some protective effect**," Tashkin told the newspaper chain, noting that **cannabinoids cause "cells [to] die … before they age enough to develop mutations that might lead to cancer."**

In an interview, Donald Tashkin of the UCLA David Geffen School of Medicine, Division of Pulmonary and Critical Care Medicine, said: "[A]t this point, I'd be in favor of (marijuana) legalization. I wouldn't encourage anybody to smoke any substances. But I don't think it should be stigmatized as an illegal substance. **Tobacco smoking causes far more harm. And in terms of an intoxicant, alcohol causes far more harm (than marijuana)."**

Tashkin said that when he began his work thirty years ago, he "opposed ... legalization because [he] thought it would lead to increased use and that would lead to increased health effects." However, he now admits that his decades' worth of scientific research revealed an opposite conclusion.

Cancer and Cannabis: Which U.S. Government Agency Is Telling the Truth?

Website of the Drug Enforcement Administration: "Marijuana has no accepted medical use."

Website of the National Institute of Cancer: "Cannabinoids may cause antitumor effects by various mechanisms, including induction of cell death, inhibition of cell growth, and inhibition of tumor angiogenesis and metastasis. Cannabinoids appear to kill tumor cells but do not affect their nontransformed counterparts and may even protect them from cell death.

…The potential benefits of medicinal cannabis for people living with cancer include antiemetic effects, appetite stimulation, pain relief, and improved sleep. In the practice of integrative oncology, **the health care provider may recommend medicinal cannabis not only for symptom management but also for its possible direct antitumor effect.**"

Yes, but Marijuana Is Not FDA-Approved

That's correct because the FDA approves only chemical compounds submitted for testing by private companies. These studies typically involve a small homogenous group (sometimes fewer than 200 patients, mostly white males with no preexisting conditions other than the condition the untested compound is expected to treat).

Too often, the compound is approved and when used by a wider audience (women, minorities, patients with preexisting conditions), the "safe and effective" FDA-approved drug (fen-phen, Vioxx) causes serious health problems, including fatalities. This would be impossible in the case of marijuana which has been used for centuries and was widely prescribed by physicians for decades before the Marijuana Tax Act effectively prohibited use. Moreover, marijuana has, in fact, been the subject of so-called "gold standard" studies that meet FDA criteria:

Thursday, 18 February 2010 ***Sacramento, CA:*** *The results of a series of randomized, placebo-controlled clinical trials assessing the efficacy of inhaled marijuana consistently show that*

cannabis holds therapeutic value comparable to conventional medications, according to the findings of a 24-page report issued Wednesday to the California state legislature by the California Center for Medicinal Cannabis Research (CMCR).

Four of the five placebo-controlled trials demonstrated that marijuana significantly alleviated neuropathy, a difficult to treat type of pain resulting from nerve damage."There is good evidence now that cannabinoids (the active compounds in the marijuana plant) may be either an adjunct or a first-line treatment for ... neuropathy," said Dr. Igor Grant, Director of the CMCR, at a news conference at the state Capitol. He added that the efficacy of smoked marijuana was "very consistent," and that its pain-relieving effects were "comparable to the better existing treatments" presently available by prescription.

A fifth study showed that smoked cannabis reduced the spasticity associated with multiple sclerosis. A separate study conducted by the CMCR established that the vaporization of cannabis – a process that heats the substance to a temperature where active cannabinoid vapors form, but below the point of combustion – is a "safe and effective" delivery mode for patients who desire the rapid onset of action associated with inhalation while avoiding the respiratory risks of smoking.

Marijuana as Medicine Would Save Patients and Taxpayers Millions of Dollars

A recent example: When BB in Nashville was undergoing chemotherapy, she found the best anti-emetic did not work so she tried marijuana. The result as she posted on Facebook:

"I woke up the other night with the worst nausea I've ever had. I was afraid. But 3 or 4 minutes after cannabis, all the nausea was gone. I went from wanting to just die to wanting to eat something in just a few minutes!"

The drug that failed was Emend and as BB further noted:

"Emend, which you take for 3 days during each chemo treatment, is $1,500 a week and I needed it for 6 weeks."

In other words, $9,000 for a drug that was ineffective and has serious side effects (including liver damage and potentially fatal interaction with other drugs) compared to a few hundred dollars at most for a drug that is effective and has no serious side effects. Multiply this by hundreds of times a day to understand the financial costs of medical marijuana prohibition.

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Is Marijuana Medicine? Yes, an Safe and Effective Medicine Because of Our Body's Cannabinoid System.

Introduction to the Endocannabinoid System

Dustin Sulak, DO
Maine Integrative Healthcare

As you read this review of the scientific literature regarding the therapeutic effects of cannabis and cannabinoids, one thing will become quickly evident: cannabis has a profound influence on the human body. This one herb and its variety of therapeutic compounds seem to affect every aspect of our bodies and minds. How is this possible?

In my integrative medicine clinic in central Maine, we treat over a thousand patients with a huge diversity of diseases and symptoms. In one day I might see cancer, Crohn's disease, epilepsy, chronic pain, multiple sclerosis, insomnia, Tourette's syndrome and eczema, just to name a few. All of these conditions have different causes, different physiologic states, and vastly different symptoms. The patients are old and young. Some are undergoing conventional therapy. Others are on a decidedly alternative path. Yet despite their differences, almost all of my patients would agree on one point: cannabis helps their condition.

As a physician, I am naturally wary of any medicine that purports to cure-all. Panaceas, snake-oil remedies, and expensive fads often come and go, with big claims but little scientific or clinical evidence to support their efficacy. As I explore the therapeutic potential of cannabis, however, I find no lack of evidence. In fact, I find an explosion of scientific research on the therapeutic potential of cannabis, more evidence than one can find on some of the most widely used therapies of conventional medicine.

At the time of writing, a PubMed search for scientific journal articles published in the last 20 years containing the word "cannabis" revealed 7,704 results. Add the word "cannabinoid," and the results increase to 15,899 articles. That's an average of more than two scientific publications per day over the last 20 years! These numbers not only illustrate the present scientific interest and financial investment in understanding more about cannabis and its components, but they also emphasize the need for high quality reviews and summaries such as the document you are about to read.

How can one herb help so many different conditions? How can it provide both palliative and curative actions? How can it be so safe while offering such powerful effects? The search to answer these questions has led scientists to the discovery of a previously unknown physiologic

system, a central component of the health and healing of every human and almost every animal: the endocannabinoid system.

What Is The Endocannabinoid System?

The endogenous cannabinoid system, named after the plant that led to its discovery, is perhaps the most important physiologic system involved in establishing and maintaining human health. Endocannabinoids and their receptors are found throughout the body: in the brain, organs, connective tissues, glands, and immune cells. In each tissue, the cannabinoid system performs different tasks, but the goal is always the same: homeostasis, the maintenance of a stable internal environment despite fluctuations in the external environment.

Cannabinoids promote homeostasis at every level of biological life, from the sub-cellular, to the organism, and perhaps to the community and beyond. Here's one example: autophagy, a process in which a cell sequesters part of its contents to be self-digested and recycled, is mediated by the cannabinoid system. While this process keeps normal cells alive, allowing them to maintain a balance between the synthesis, degradation, and subsequent recycling of cellular products, it has a deadly effect on malignant tumor cells, causing them to consume themselves in a programmed cellular suicide. The death of cancer cells, of course, promotes homeostasis and survival at the level of the entire organism.

Endocannabinoids and cannabinoids are also found at the intersection of the body's various systems, allowing communication and coordination between different cell types. At the site of an injury, for example, cannabinoids can be found decreasing the release of activators and sensitizers from the injured tissue, stabilizing the nerve cell to prevent excessive firing, and calming nearby immune cells to prevent release of pro-inflammatory substances. Three different mechanisms of action on three different cell types for a single purpose: minimize the pain and damage caused by the injury.

The endocannabinoid system, with its complex actions in our immune system, nervous system, and all of the body's organs, is literally a bridge between body and mind. By understanding this system we begin to see a mechanism that explains how states of consciousness can promote health or disease.

In addition to regulating our internal and cellular homeostasis, cannabinoids influence a person's relationship with the external environment. Socially, the administration of cannabinoids clearly alters human behavior, often promoting sharing, humor, and creativity. By mediating neurogenesis, neuronal plasticity, and learning, cannabinoids may directly influence a person's open-mindedness and ability to move beyond limiting patterns of thought and behavior from past situations. Reformatting these old patterns is an essential part of health in our quickly changing environment.

What Are Cannabinoid Receptors?

Sea squirts, tiny nematodes, and all vertebrate species share the endocannabinoid system as an essential part of life and adaptation to environmental changes. By comparing the genetics of cannabinoid receptors in different species, scientists estimate that the endocannabinoid system evolved in primitive animals over 600 million years ago.

While it may seem we know a lot about cannabinoids, the estimated twenty thousand scientific articles have just begun to shed light on the subject. Large gaps likely exist in our current understanding, and the complexity of interactions between various cannabinoids, cell types, systems and individual organisms challenges scientists to think about physiology and health in new ways. The following brief overview summarizes what we do know.

Cannabinoid receptors are present throughout the body, embedded in cell membranes, and are believed to be more numerous than any other receptor system. When cannabinoid receptors are stimulated, a variety of physiologic processes ensue. Researchers have identified two cannabinoid receptors: CB1, predominantly present in the nervous system, connective tissues, gonads, glands, and organs; and CB2, predominantly found in the immune system and its associated structures. Many tissues contain both CB1 and CB2 receptors, each linked to a

different action. Researchers speculate there may be a third cannabinoid receptor waiting to be discovered.

Endocannabinoids are the substances our bodies naturally make to stimulate these receptors. The two most well understood of these molecules are called anandamide and 2-arachidonoylglycerol (2-AG). They are synthesized on-demand from cell membrane arachidonic acid derivatives, have a local effect and short half-life before being degraded by the enzymes fatty acid amide hydrolase (FAAH) and monoacylglycerol lipase (MAGL).

Phytocannabinoids are plant substances that stimulate cannabinoid receptors. Delta-9-tetrahydrocannabinol, or THC, is the most psychoactive and certainly the most famous of these substances, but other cannabinoids such as cannabidiol (CBD) and cannabinol (CBN) are gaining the interest of researchers due to a variety of healing properties. Most phytocannabinoids have been isolated from *cannabis sativa*, but other medical herbs, such as *echinacea purpura*, have been found to contain non-psychoactive cannabinoids as well.

Interestingly, the marijuana plant also uses THC and other cannabinoids to promote its own health and prevent disease. Cannabinoids have antioxidant properties that protect the leaves and flowering structures from ultraviolet radiation - cannabinoids neutralize the harmful free radicals generated by UV rays, protecting the cells. In humans, free radicals cause aging, cancer, and impaired healing. Antioxidants found in plants have long been promoted as natural supplements to prevent free radical harm.

Laboratories can also produce cannabinoids. Synthetic THC, marketed as dronabinol (Marinol), and nabilone (Cesamet), a THC analog, are both FDA approved drugs for the treatment of severe nausea and wasting syndrome. Some clinicians have found them helpful in the off-label treatment of chronic pain, migraine, and other serious conditions. Many other synthetic cannabinoids are used in animal research, and some have potency up to 600 times that of THC.

Cannabis, The Endocannabinoid System, And Good Health

As we continue to sort through the emerging science of cannabis and cannabinoids, one thing remains clear: a functional cannabinoid system is essential for health. From embryonic implantation on the wall of our mother's uterus, to nursing and growth, to responding to injuries, endocannabinoids help us survive in a quickly changing and increasingly hostile environment. As I realized this, I began to wonder: can an individual enhance his/her cannabinoid system by taking supplemental cannabis? Beyond treating symptoms, beyond even curing disease, can cannabis help us prevent disease and promote health by stimulating an ancient system that is hard-wired into all of us?

I now believe the answer is yes. Research has shown that small doses of cannabinoids from marijuana can signal the body to make more endocannabinoids and build more cannabinoid receptors. This is why many first-time marijuana users don't feel an effect, but by their second or third time using the herb they have built more cannabinoid receptors and are ready to respond. More receptors increase a person's sensitivity to cannabinoids; smaller doses have larger effects, and the individual has an enhanced baseline of endocannabinoid activity. I believe that small, regular doses of marijuana might act as a tonic to our most central physiologic healing system.

Many physicians cringe at the thought of recommending a botanical substance, and are outright mortified by the idea of smoking a medicine. Our medical system is more comfortable with

single, isolated substances that can be swallowed or injected. Unfortunately, this model significantly limits the therapeutic potential of cannabinoids.

Unlike synthetic derivatives, herbal marijuana may contain over one hundred different cannabinoids, including THC, which all work synergistically to produce better medical effects and less side effects than THC alone. While marijuana is safe and works well when smoked, many patients prefer to use a vaporizer or cannabis tincture. Scientific inquiry and patient testimonials both indicate that herbal marijuana has superior medical qualities to synthetic cannabinoids.

So, is it possible that medical marijuana could be the most useful remedy to treat the widest variety of human diseases and conditions, a component of preventative healthcare, and an adaptive support in our increasingly toxic, carcinogenic environment? Yes. This was well known to the indigenous medical systems of ancient India, China, and Tibet, and as you will find in this report, is becoming increasingly well known by Western science. Of course, we need more human-based research studying the effectiveness of marijuana, but the evidence base is already large and growing constantly, despite the DEA's best efforts to discourage cannabis-related research.

Does your doctor understand the benefit of medical cannabis? Can he or she advise you in the proper indications, dosage, and route of administration? Likely not. Despite the two largest physician associations (American Medical Association and American College of Physicians) calling for more research, the Obama administration promising not to arrest patients protected under state medical cannabis laws, a 5,000 year history of safe therapeutic use, and a huge amount of published research, most doctors know little or nothing about medical cannabis.

This is changing, in part because the public is demanding it. People want safe, natural and inexpensive treatments that stimulate our bodies' ability to self-heal and help our population improve its quality of life. Medical cannabis is one such solution. This summary is an excellent tool for spreading the knowledge and helping to educate patients and healthcare providers on the scientific evidence behind the medical use of cannabis and cannabinoids.