

## Cannabis (Marijuana) for Medical Use

3.5 contact hours: \$24

**Author:** Mary Lynn Mathre, RN, MSN, CARN

**Course Summary:** Reviews the medicinal use of cannabis, introduces the endocannabinoid system, addresses myths, outlines therapeutic indications, and spells out dosages and routes of administration. This course addresses public policy and legal issues as use of medicinal cannabis becomes legal in a growing number of states throughout the United States.

**COI/Commercial Support:** The planners and authors of this course have declared no conflict of interest and all information is provided fairly and without bias. We have received no commercial support for this activity and do not approve or endorse any commercial products displayed.

**Off-Label Use:** Any off-label medications uses described in this course have been clearly identified.

**Criteria for Successful Completion:** 80% or higher on the post test, a completed evaluation form, and payment where required. No partial credit will be awarded.

This course will be reviewed every two years. It will be updated or discontinued on September 1, 2013.

## Accreditation Information

### Nursing

ATrain Education, Inc. is accredited as a provider of continuing nursing education by the American Nurses Credentialing Center's Commission on Accreditation.

### Physical Therapy

ATrain Education, Inc. is an approved reviewer and provider by the Physical Therapy Board of California and an approved provider by the New York State Board for Physical Therapy.

### Occupational Therapy

ATrain Education, Inc. is an approved provider by the American Occupational Therapy Association. The following course information applies to occupational therapy professionals:

*Target Audience:* Occupational Therapists, OTAs

*Instructional Level:* Introductory

*Content Focus:* Category 1 - Context and Environment, Cultural  
Category 3 - Contemporary Issues and Trends

### Other Professions and Accreditations

See the ATrainCEU Accreditation page at <http://www.ATrainCeu.com/accreditation.php>.

## Instructions

1. Read the course material and then complete the following forms:
  - A. Answer Sheet
  - B. Evaluation Learning Activity
  - C. Registration Form
2. If you are not paying by credit card, prepare a check for the amount of the course made out to: *ATrain Education, Inc.*
3. Mail the completed forms and your payment to:  
ATrain Education, Inc  
5171 Ridgewood Rd  
Willits, CA 95490

When we receive your forms and payment, we will mail (or email, at your request) your completion certificate. If you have any questions, please call or email [Info@ATrainCEU.com](mailto:Info@ATrainCEU.com).

## Course Objectives

When you finish this course, you will be able to:

- Summarize the myths and truths about cannabis as a medication.
- Identify phytocannabinoids, and contrast Marinol with cannabis occurring in nature.
- Explain the endocannabinoid system and its implications for the use of cannabis as medication.
- Comment on the generally supposed health risks related to cannabis.
- Discuss the dosage and routes of administration of cannabis.
- Describe elements of patient and family education regarding cannabis.
- Debate the public policy and legal issues associated with the medicinal use of cannabis.

Penalties against possession of a drug should not be more damaging to an individual than the use of the drug itself—and where they are they should be changed.

Jimmy Carter  
Drug Abuse Message to Congress  
August 2, 1977

## Introduction

A world of controversy surrounds the medical use of cannabis. In the United States we have been taught about "marijuana" as a drug of abuse, and cannabis is currently a forbidden medication in Schedule I of the Controlled Substances Act. However, cannabis is an ancient medication with a wide margin of safety and it is useful in an array of medical conditions and ailments. A number of states have passed medical marijuana laws or are considering such laws despite the federal prohibition. Patients are using cannabis as medication, and it is imperative that healthcare professionals understand not only the risks and benefits of this herbal medication but also the legal issues involved in its use.

This course will review the current federal and state laws regarding cannabis and the history of its medicinal use throughout the world. It looks at the chemical components of the cannabis plant in light of the newly discovered cannabinoid system within the human body. It reviews the safety profile of cannabis and considers patient risks, then looks at the indications for use as well as dosage and administration. The course includes a section on patient and family education and concludes by addressing the legal and ethical challenges for healthcare professionals.

## The Truth About Marijuana

In the formal education of today's healthcare professionals, marijuana has been seen exclusively as a drug of abuse. However, in the early twentieth century cannabis was presented as an effective analgesic and sleep medication in pharmacology classes (Blumgarten, 1919). At the time there were numerous preparations of cannabis and it was considered an essential medication (Aldrich, 1997).

What happened?

First we will correct the common myths and misconceptions regarding marijuana/cannabis. A brief review of its use as an ancient medication will be followed by a historical reference to the reefer madness era, which marked the beginning of the marijuana prohibition and led eventually to its placement in Schedule I of the controlled substances.

Politics and prejudice are now coming head to head with science and compassion as we understand the plant and how it interacts with the human body. Patients are desperate for this medication and the public overwhelmingly supports legal access to it. State and federal laws are in conflict and healthcare professionals are caught in the middle. In this changing climate, it is important that healthcare workers understand the use of cannabis as a medication.

## Myth Busters

Marijuana is not medication. False. Cannabis has been used as medication throughout recorded history (Abel, 1980; Aldrich, 1997). It was popular in the United States prior to the reefer madness campaign that lied about its effects.

Marijuana is a dangerous drug. False. Cannabis is "one of the safest therapeutic substances known to man" (Young, 1988).

Cannabis is highly addictive. False. Compared to most drugs of abuse, cannabis is much less addictive (Anthony, Warner and Kessler, 1994; Hall, Room, and Bondy, 1999).

Marijuana is a "gateway" drug. False. The illegal status of marijuana exposes the user to the illicit drug trade. Cannabis use does not cause a person to try other, "harder" drugs (Joy, Watson, and Benson, 1999).

Marijuana has more than four hundred constituents. True. Fruits, vegetables, and herbal medications contain hundreds of constituents, but that does not make them dangerous for consumption.

Marinol is legal marijuana in pill form. False. Marinol is synthetic tetrahydrocannabinol (THC) and lacks all of the other therapeutic constituents found in cannabis.

Marijuana kills brain cells. False. Cannabis has neuroprotective properties (Izzo et al., 2009).

Marijuana causes cancer. False. Longitudinal studies show no increase in cancers related to cannabis use (Freimuth, Ramer and Burkhard, 2010; Hashibe et al., 2006). New research on the **endocannabinoid system (ECS)**, as well as animal research, indicates that cannabis can kill cancer cells (Izzo et al., 2009).

Allowing the legal use of medical cannabis will send the message to kids that it is good for you. False. Medication should always be used cautiously. What is therapeutic for one person may be deadly for another. Children need to be taught to respect medications and their proper applications in our lives. Not allowing patients to use this medication sends a distorted message to our youth.

Marijuana causes schizophrenia. False. There is no evidence to show that cannabis causes schizophrenia (Macleod et al., 2006). In populations where there has been an increase in cannabis use, there has been no subsequent increase in the incidence of schizophrenia (Friser et al., 2009).

Marijuana is more potent today. Partly true. Delta-9-tetrahydrocannabinol (THC) is the primary psychoactive cannabinoid found in cannabis, and many growers have developed strains with higher THC content. However, in its natural form, other cannabinoids found in cannabis—such as cannabidiol (CBD)—serve to dampen the psychoactive effects of THC.

## History and Current Status

Cannabis has been used as medication since ancient times. As stated earlier, in the early twentieth century physicians routinely used various cannabis products with their patients. Many of the pharmaceutical companies (eg, Ely Lilly, Parke Davis, Merck) sold various cannabis tinctures, tablets, or topical preparations. By the 1930s, Prohibition had ended and the Director of the Bureau of Narcotics and Dangerous Drugs, Harry Anslinger, spearheaded a campaign to demonize cannabis. At that time cannabis was being used recreationally by jazz musicians in the South, who called it "reefer," and by Mexican soldiers, who called it "marijuana."

Anslinger began spreading stories about "a new drug menace called marijuana" that was causing users to commit violent crimes or go insane (Bonnie and Whitebread, 1974; Abel, 1980). His efforts led to the passage of the Marihuana Tax Act of 1937, which resulted in a prohibitive tax on the medication, and that ultimately led to its removal from the U.S. Pharmacopoeia by 1941. Since that time, cannabis has no longer been included as a medication in pharmacology texts, and healthcare professionals were taught only that marijuana was a drug of abuse.

In 1970 Congress passed the Controlled Substances Act (CSA), which created a system to regulate psychoactive drugs (CSA, 1970). Five levels (Schedules I to V) were established to categorize drugs according to their medical utility, abuse potential, and safety of use under medical supervision. Schedule V is the least restrictive category and Schedule I is the forbidden drug category.

To belong in Schedule I, a drug must meet three criteria:

- It has no currently accepted medical use in treatment in the United States.
- It is highly addictive.
- It is not safe for medical use.

Schedule I includes marijuana, heroin, LSD, and more.

Schedule II drugs are highly addictive, but have been determined to have medicinal value, and most of the drugs in this category are opioids such as morphine and dilaudid. Prescriptions for these medications are limited in the amount that can be prescribed and the prescription cannot be "called in." Restrictions on prescriptions decrease as the schedule level decreases.

With the passage of the Controlled Substances Act, cannabis was wrongly placed in Schedule I. Responding to questions about the placement of marijuana in Schedule I, President Richard Nixon appointed experts to review the science and report back. This Commission on Marihuana and Drug Abuse, commonly referred to as the Shafer Commission (for its chairman), released its findings in a document, *Marijuana: A Signal of Misunderstanding*, which found that cannabis did not meet criteria for Schedule I (National Commission on Marihuana and Drug Abuse, 1972). However Nixon ignored the commission's findings, and cannabis remained forbidden.

Numerous challenges to the cannabis prohibition arose over the years. The National Organization for the Reform of Marijuana Laws (NORML) submitted a petition to reschedule marijuana to the Drug Enforcement Administration (DEA) in 1972 (Randall, 1988). Years later, the Alliance for Cannabis Therapeutics (ACT) joined the petition, and finally in 1988 the DEA's administrative law judge, Francis Young, ruled on the petition that marijuana should be moved to Schedule II (Young, 1988). However the head of the DEA, John Lawn, ignored the judge's ruling and the prohibition of marijuana continued.

Back in the late 1970s, Robert Randall, a glaucoma patient, was arrested for growing marijuana on his back porch in Washington, DC. After a long federal court case he was found not guilty through a medical necessity defense (Randall and O'Leary, 1998). Randall was able to prove that cannabis was the only medication that could control his intraocular pressure and thus prevent blindness. Randall's law firm managed to get him into the Compassionate Investigational New Drug (IND) program. Randall would receive medical marijuana in rolled cigarette form from the federal government for free. The National Institute on Drug Abuse (NIDA) allows the University of Mississippi to grow marijuana for research on its dangers, and this marijuana farm was the source of Randall's medication.

Randall did not remain silent. He and his wife formed the Alliance for Cannabis Therapeutics (ACT) in 1981, with the goal of helping other patients gain legal access to cannabis (Randall & O'Leary, 1988). By 1992 the AIDS epidemic was universally acknowledged, and hundreds of applications for the IND program were being submitted for HIV-positive patients. Alarmed by the increased demand for cannabis, the Secretary of Health and Human Services closed access to it. At the time there were 15 patients in the program, and only they would be allowed to receive the medication. Today only 4 of those patients are still alive and in the program.

Patient awareness of the therapeutic potential of cannabis continued to grow, and desperate patients began helping each other. Cannabis buyers' clubs began to appear around the country. Patients would grow cannabis or find someone to grow it and then provide it to other patients in need. The buyers' clubs (now often referred to as compassion clubs or dispensaries) required patients to provide evidence that they had a medical need for cannabis, and in many cities (eg, San Francisco) law enforcement looked the other way. Finally in 1996 California voters passed Proposition 215, which permitted patients to grow and use cannabis as medication.

By 2010 fifteen states (Alaska, Arizona, California, Colorado, Hawaii, Maine, Michigan, Montana, New Jersey, Nevada, New Mexico, Oregon, Rhode Island, Vermont, and Washington) plus Washington DC had medical marijuana/cannabis laws. In May 2011 the Delaware legislators passed a medical marijuana bill, making it the sixteenth state to allow patients to use cannabis. However, cannabis remains forbidden under federal law and patients are still at risk for federal prosecution. Because cannabis remains in Schedule I, physicians (and in some states nurse practitioners) cannot write a prescription for this medication even in states where it is lawful, but instead are allowed to "recommend" cannabis for certain conditions.

Another formal petition to reschedule cannabis is overdue for a decision (see [www.drugscience.org](http://www.drugscience.org)). It demands that cannabis be removed from Schedule I because the current scientific evidence shows that it does have accepted medical value. After holding it for three years, the DEA finally passed the Petition on to the Department of Health and Human Services (DHHS) for their scientific review. The DHHS is long overdue with their response and the Coalition to Reschedule Cannabis has taken legal action to demand a decision.

If cannabis is removed from Schedule I, other states will be able to allow the medical use of cannabis and patients will no longer be under threat of federal prosecution. If the DEA denies the rescheduling, the coalition that initiated the petition will demand public hearings to argue the case ([www.drugscience.org](http://www.drugscience.org)).

In addition, each state that has a medical cannabis law has the legal authority to challenge the federal government based on the understanding that state laws trump federal regulations regarding medical practice. The medical marijuana states have allowed the use of cannabis, therefore there is "accepted medical use in the United States" and that justifies the removal of cannabis from Schedule I. Unfortunately, no state government has made this challenge due to a lack of understanding of the law or fear of challenging the federal government (and possibly losing federal funds).

Healthcare professionals today are caught in a legal bind. Numerous state healthcare associations have passed resolutions that recognize the safety and efficacy of cannabis and support patient access to this medication. In 2003 the American Nurses Associations (ANA) passed a similar resolution. They reaffirmed their position in 2005. However, because of its Schedule I placement, healthcare professionals cannot legally help their patients obtain cannabis and cannot themselves possess it.

In the meantime, patients are using cannabis and healthcare professionals have an obligation to provide education on its risks and benefits. This course presents evidence-based information about the safety and efficacy of cannabis and introduces the emerging science on the endogenous cannabinoid system. By understanding the science, healthcare professionals can be empowered to help end the prohibition of cannabis, which will not only allow legal access for the medicinal use but also permit quality control of this medication.

## The Cannabis Plant

Cannabis has been grown and used for centuries as food, medication, fuel, fiber, shelter—as well as an intoxicant. When the plant is grown for its fiber and pulp it is called “hemp” and the crop is densely sown. When it is grown for its leaves and buds it is called “cannabis,” and the plants are sown more sparsely.

Unique to the cannabis plant is a group of chemicals called **cannabinoids** (or phytocannabinoids). More than a hundred different cannabinoids have been identified in cannabis. Delta-9-tetrahydrocannabinol, or THC, is the primary psychoactive cannabinoid, and the THC content is often used to differentiate hemp from cannabis. Hemp plants generally have a THC content of <0.3%, while the medicinal cannabis plant has >1% THC content.

Cannabis is a fast-growing and sun-loving **dioecious plant** (meaning that the seeds will grow into male or female plants). When grown for its medical or psychoactive effects, the males are separated from the females and destroyed as soon as they can be identified, to avoid fertilization. Without fertilization, the female plant, referred to as **sinsemilla** (without seed), will focus its energy on producing flowers and resin. The primary source of the active cannabinoids is found in the leaves and flowers or, more specifically, in the glandular trichomes found on the vegetative material. These trichomes hold the sticky resin that is used to make hash oil. The cannabinoids are fat-soluble (lipophilic) rather than water-soluble (Gieringer, Rosenthal and Carter, 2008).

### Cannabis Plant Showing Trichomes



The trichomes are the primary source of the active cannabinoids. Source: Courtesy of Ethan Russo. Used by permission.

There have been several species of the genus *Cannabis*, but in general *Cannabis sativa* and *Cannabis indica* are the most widely recognized. The sativa plant generally is taller with longer branches and slender palmate leaves, while the indica is more compact with shorter branches and broader palmate leaves. The sativas generally produce a more psychoactive stimulating effect, while the indicas produce a more sedating or relaxing effect. Today's growers have developed numerous strains combining genetics from indicas and sativas to produce new varieties.

## Cannabis Sativa



Source: Wikipedia Commons. Originally from the U.S. Fish and Wildlife Service.

### The Phytocannabinoids

While modern medicine and our pharmaceutical industry may continue to focus on specific chemicals in medical cannabis, others believe that the natural botanical with all of its constituents may be safer and more beneficial. When using the whole plant, these chemicals work together in a synergistic manner that provides more therapeutic benefit to the patient and usually fewer or milder side effects. In addition to the cannabinoids, cannabis also contains **terpenoids** and **flavonoids** that have therapeutic value (McPartland and Russo, 2001).

As stated earlier, delta-9-THC is the primary psychoactive cannabinoid found in the cannabis plant, but researchers have identified more than one hundred phytocannabinoids. The array of cannabinoids in the plant varies among its diverse strains. Most of the research on cannabis has been conducted on THC rather than the whole plant or its other cannabinoids. However, much has been learned about the pharmacologic actions of some of the other nonpsychoactive cannabinoids.

Cannabidiol, or CBD, is a very promising cannabinoid that has a wide range of effects including anti-emetic, analgesic, anti-inflammatory, anxiolytic, neuroprotective, antipsychotic, anticancer, and bone stimulation. In addition, in Brazil, two research laboratories have been evaluating the use of CBD for anxiety, depression, bipolar disorder, psychosis, and posttraumatic stress (Takahashi, 2010; Crippa, 2010).

Other cannabinoids of interest include cannabinal (CBN), cannabichromene (CBC), delta-8-THC, cannabigerol (CBG), and tetrahydrocannabivarin (THCA) (Izzo et al., 2009). Cannabinal has sedative and antibiotic properties and, as a degradation product of THC, the amount of cannabinal increases as the plant material ages. Cannabichromene and CBG are noted for their anti-inflammatory, antibiotic, and antifungal properties. Delta-8-THC lacks the psychoactive properties of delta-9-THC but serves as an effective anti-emetic (Plasse, 2002).

In an Israeli study on eight pediatric oncology patients, delta-8-THC was uniformly effective in the management of chemotherapy-induced nausea and vomiting (Abrahamov, Abrahamov, and Mechoulam, 1995). In fact, since October 2003 the U.S. government has held a patent (#6630507) on cannabinoids as anti-oxidants and neuroprotectants (Hampson, Axelrod, and Grimaldi, 2003).

Terpenoids are responsible for the distinctive smell of cannabis and are easily extracted as an essential oil. Although terpenoids are found in other plants, there are more than one hundred terpenoid compounds found in cannabis. Terpenoids also produce therapeutic effects including anti-inflammatory, antibiotic, antineoplastic, antimalarial, and antiviral. Approximately twenty flavinoids are found in cannabis and they provide additional therapeutic effects including anti-inflammatory, antiviral, and anxiolytic (McPartland and Russo, 2001).

### **Marinol® vs. Cannabis**

Marinol is synthetic THC in sesame oil and comes in capsules at doses of 2.5, 5, and 10 mg. In 1986 Marinol (dronabinol) was released as a new Schedule II medication and marketed as the pharmaceutical equivalent to cannabis. Dronabinol, developed by Roxanne Laboratories, was supposed to end the fight for medical marijuana because a "marijuana pill" was now available. It was initially allowed by prescription for chemotherapy-induced nausea and vomiting and later authorized as an appetite stimulant. After several years on the market and with no diversion problems, it was down-regulated\* to Schedule III in 1999. In 2010 the patent expired for dronabinol and the DEA/FDA now allows both natural and synthetic forms of THC as legal medication in Schedule III.

\*To date, dronabinol is the only drug ever down-regulated in the controlled substances scheduling classification. Many drugs have been rescheduled to a more restrictive category, but this was the first time a drug was moved to a less restrictive level.

Marinol® Capsules Shown in Three Doses



Marinol is synthetic THC in sesame oil. Source: Courtesy of Ethan Russo. Used by permission.

The assignment of synthetic THC (Marinol) to Schedule III is not reasonable in light of cannabis's assignment to Schedule I. The DEA/FDA allows the use of the primary psychoactive substance in cannabis (the substance that produces the "high") in pill form, yet continues to prohibit the whole plant. The federal government complains that marijuana is much stronger today than decades ago; what they mean is that the THC content in the plant is higher. Strong strains of cannabis may be up to 20% THC, yet dronabinol is 100% synthetic THC in sesame oil.

As noted above, there are other nonpsychoactive cannabinoids found in whole cannabis. When CBD is present in cannabis, it dampens the psychoactive effects of THC; so, even if an individual used a strain with 20% THC, the CBD would interact with the THC to decrease the psychoactive effects. Patients report that cannabis works better for them than dronabinol. Many report dysphoria (feeling unwell or unhappy) with dronabinol (Holland, 2010).

## The Endocannabinoid System

An evolving body of science about our physiology was not available to us in school (and unfortunately this information is still absent in most nursing and medical schools). All animals except for insects have an **endogenous** (made within the body) cannabinoid system, or endocannabinoid system (ECS) (Richmond, 2010). It has been found that we make our own cannabinoids, and they are similar in structure to those of the cannabis plant; further, we have receptors for these molecules. This newly discovered molecular system is essential for life and helps keep us in balance as we deal with daily stressors. Some researchers are suggesting that a weak or overstressed ECS may be the underlying cause of a variety of ailments, such as fibromyalgia or migraine headaches as well as auto-immune diseases. Russo has suggested naming such a problem a **clinical endocannabinoid deficiency, or CECD** (2004).

In 1988 American researcher Allyn Howlett and her graduate student William Devane discovered cannabinoid receptors in the brain and called them **cannabinoid 1 receptors (CB1)** (Devane et al., 1988). In 1992 researchers in Israel discovered an endogenous cannabinoid and called it *N*-arachidonoyl ethanolamine or anandamide (“ananda” means *bliss* in Sanskrit) (Devane et al., 1992). By 1993 another group of scientists found cannabinoid receptors in the immune system (CB2), followed by the discovery of a second endocannabinoid called 2-arachidonoyl glycerol or 2-AG (Munro, Thomas, and Abu-Shaar, 1993). To date five endocannabinoids have been discovered, but anandamide and 2-AG appear to be the most important.

The CB1 receptors are found mainly on neurons in the brain, spinal cord, and peripheral nervous system, but are also present in other organs and tissues including immune cells, the spleen, adrenal and pituitary glands, heart, lungs, and parts of the reproductive, urinary, and gastrointestinal tracts. The CB1 receptors are abundant in the cerebral cortex, basal ganglia (substantia nigra pars reticulata, globus pallidus, nucleus caudatus and putamen), cerebellum, hippocampus, periaqueductal grey, rostral ventromedial medulla, certain nuclei of the thalamus and amygdala, and dorsal primary afferent spinal cord regions, which helps explain the role of cannabinoids in motor control, memory processing, and pain modulation. The low number of CB1 receptors in the brain stem may help explain the absence of cannabis overdoses due to the depression of respirations. The CB2 receptors are primarily found in immune cells, among them leukocytes, the spleen, and tonsils. There are cannabinoid receptors throughout our bodies, and we have more receptors for cannabinoids than for any other substance (Grotenhermen, 2005).

The endocannabinoids bind with the cannabinoid receptors in a fashion similar to other neurotransmitters and can exert various effects depending upon the lock-and-key mechanisms. They can activate the receptors as full agonists or partial agonists, or they can dock in a receptor and act as a neutral antagonist, which does not activate the receptor, or as an inverse agonist, in which case it deactivates the receptor.

The endocannabinoids are not stored in the body, but are synthesized and released on demand. The activation of these endocannabinoids influences other chemical reactions, producing a cascade effect. The ECS helps in maintaining homeostasis and has the ability to move back and forth across the synapses between cells and may exert either an excitation or inhibition of activity (McPartland, 2008).

Robert Melemede calls the ECS the "oil of life" because it keeps numerous physiologic processes running smoothly (Melamede, 2006). Endocannabinoids serve as neurotransmitters or neuromodulators. Italian researcher Vincenzo DiMarzo noted that the ECS helps us eat, sleep, relax, protect, and forget (1998). The existence of this molecular system may explain why cannabis is helpful for such a wide array of conditions.

## Cannabis as Medication

Cannabis seems unique in its wide array of indications for use. The newly discovered ECS not only adds to our understanding of human physiology but also helps us understand how and why cannabis is safe and effective for so many indications. This section reviews the safety profile of cannabis and discusses its potential risks. Then it outlines the therapeutic effects and indications for use and presents information about dosage and administration. Cannabis seems to work synergistically with opioids, and most patients with chronic pain significantly reduce or eliminate their use of opioids; thus, cannabis can be viewed as an opiate-sparing medication (Abrams, 2010). Finally, the section ends with some case examples of patients using medicinal cannabis.

### Safety Profile

"In its natural form, marijuana is one of the safest substances known to man." That statement was made by the DEA's administrative judge, Francis Young, after reviewing more than 5000 pages of evidence during the hearings to reschedule marijuana in 1988. He also stated that "It would be unreasonable, arbitrary, and capricious for the DEA to continue to stand between those sufferers and the benefits of this substance in light of the evidence in this record" (Young, 1988). Note that he drew these conclusions in 1988, even before we discovered the endocannabinoid system.

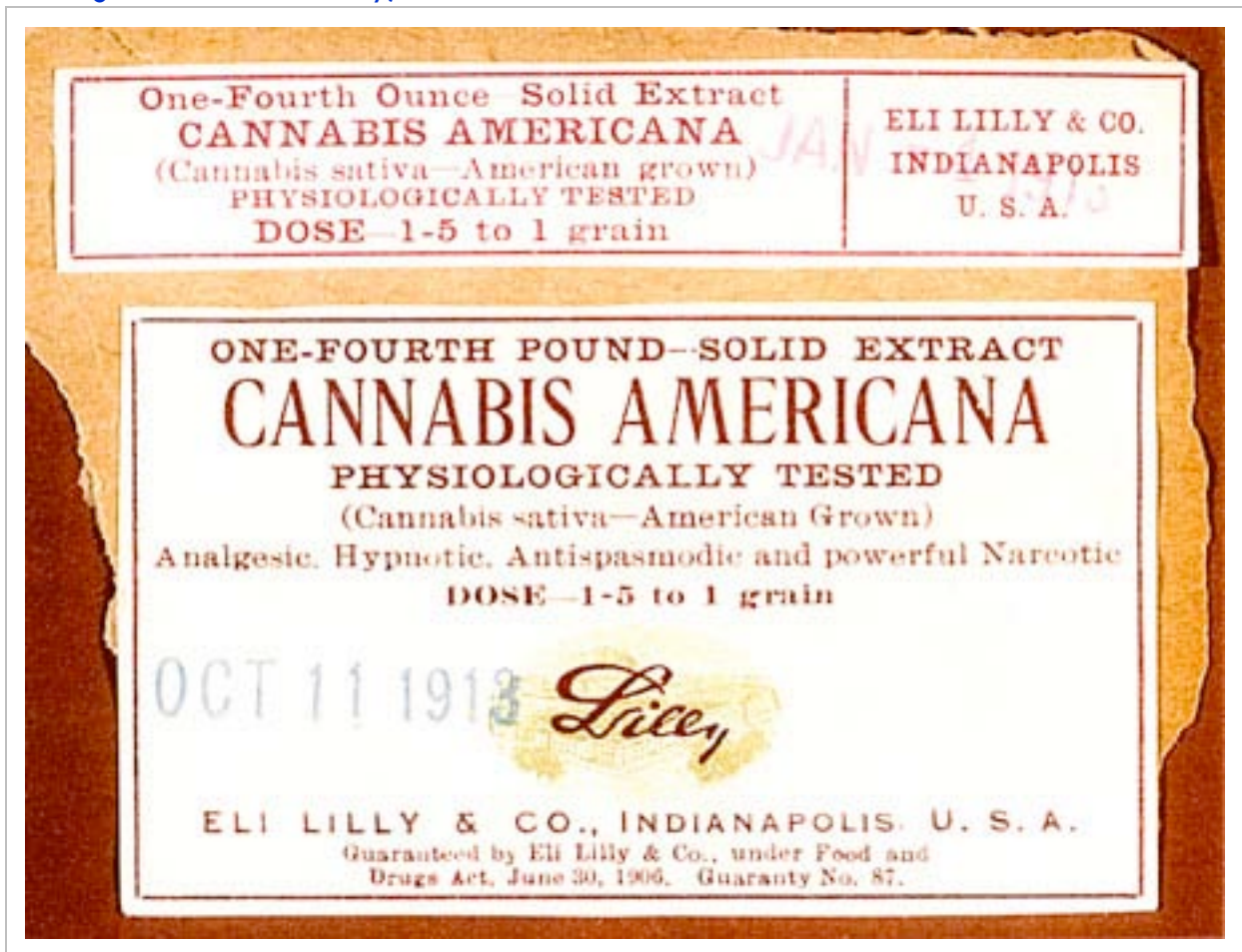
By trial and error over centuries of use, humans have learned how to use many herbal plants as medication. With more modern research, physicians have moved from using botanicals to specific chemicals within those plants or synthetic versions of those chemicals. In research studies it is much easier to focus on a particular chemical; however, although these specific chemicals may have stronger and more direct effects, they can come with stronger and sometimes-toxic side effects.

Today clinicians are taught to rely on the scientific method, and double-blind placebo-controlled studies are the gold standard. To safeguard the public, the Food and Drug Administration allows new drugs on the market only after they have met basic safety studies and have been shown to have therapeutic value in clinical trials. This research takes years to come to fruition and, even then, some drugs have been allowed on the market and found to have dangerous side effects or adverse reactions when consumed by a larger population.

This course is about the medicinal use of a plant called cannabis. What's so different about cannabis?

Cannabis is an ancient drug that has been used by countless individuals over the centuries. It is not a new drug. As noted earlier, cannabis was a very popular medication in early American history. Included on numerous bottles of medicinal cannabis would be the claim that it was “guaranteed under the Pure Food and Drugs Act of June 30, 1906.” This was the forerunner of our FDA process today. Many of our early medications (eg, aspirin) had been found to be safe for medical use based on their historical record, and so they were grandfathered in to the list of FDA-approved drugs. Had it not been for the politically driven reefer madness campaign of the 1930s, cannabis would have also been grandfathered in as an approved medication based on its safety record and efficacy.

Package Label from Eli Lilly, 1913



Note that this preparation was “guaranteed” under the Food and Drugs Act of 1906. Source: Courtesy of Patients Out of Time. Used by permission.

Throughout centuries of use there has never been a recorded human death as a result of cannabis consumption. It has a remarkably wide margin of safety. The median lethal dose or LD-50 (dose at which 50% of rats using a drug will die from overdose) of oral THC was 800 to 1900 mg/kg for rats, depending on sex and strain. No cases of death due to toxicity followed a maximum THC dose in dogs (up to 3000 mg/kg) and monkeys (up to 9000 mg/kg) (Grotenhermen, 2007). Stated another way, humans would have to consume 1500 pounds in 15 minutes to induce death. In other words, it is nearly impossible to overdose on this herbal plant. Compare that record to the fact that approximately 120 persons die each year from the use of aspirin or high doses of acetaminophen that can lead to liver damage and death.

Thousands of studies have been funded by the National Institute on Drug Abuse (NIDA) to determine the harmful effects of marijuana. In fact, researchers cannot get federal funding or approval for a study through NIDA if the purpose is to determine its safety or efficacy as a medication (Holland, 2010). Numerous claims have been made, such as marijuana causes cancer, it destroys the immune system, it's the gateway drug that leads to heroin, it kills brain cells, during pregnancy it will result in fetal abnormalities, and on and on.

Upon taking a closer look, many of these studies have been exposed for their flawed methodology, or the dosage was dramatically increased in an attempt to create a negative outcome. For example, there were early claims of marijuana use causing brain damage based on a study of monkeys that were exposed to cannabis smoke. However, it was discovered that the monkeys were forced to breathe only cannabis smoke for a period of time, and the damage was more likely caused by asphyxiation than cannabis smoke. No subsequent study showed such damage. Another early published study on THC and the immune system managed to show negative results but the dosage used on the rats were extremely high (Zimmer and Morgan, 1997).

In 1974, at Virginia Commonwealth University, research was conducted on rats under the theory that cannabis was carcinogenic. Rather than causing cancer, it was discovered that cannabis was effective in killing the lung-cancer cells. The funding was discontinued and the study was never published in the literature (Munson et al., 1975; Cushing, 2001). Early studies by pulmonologist Donald Tashkin of UCLA found that one cannabis cigarette had the same amount of carcinogenic material in its smoke as four tobacco cigarettes (Wu et al., 1988). The federal government held fast to this claim, but neglected to keep up with Tashkin's work. Admittedly surprised, Tashkin completed a longitudinal study on thousands of subjects and found no pulmonary disease (Tashkin, 2008).

In 1999 the Institute of Medication (IOM) completed an 18-month study on the medical value of cannabis and found that cannabis is not highly addictive, is not a gateway drug, and is safe for medical use. Specifically the IOM stated that "except for the harms associated with smoking, the adverse effects of marijuana use are within the range of effects tolerated for other medications." At that time, the study panel maintained some concern regarding administration of cannabis by smoking, yet they clearly noted that for patients suffering from cancer or AIDS the pulmonary risks were inconsequential compared to the disease being treated. For all other patients, the IOM panel found cannabis to be safe enough to allow physicians to conduct "n=1" (individual case) studies. For example, if a glaucoma patient's intraocular pressure could not be controlled by standard pharmaceuticals, the physician should be allowed to use cannabis as an individual case study with that patient (Joy, Watson and Benson, 1999).

## Health Risks Related to Cannabis

No drug is without risks, and no drug works for everyone. However, given the long recorded history of cannabis used as medication and the inability to find clear evidence of harmful effects despite decades devoted to that goal, unadulterated cannabis can be said to present low risk as a medication.

## Risks Related to Cannabis Prohibition

Over the past several decades Congress and state legislatures have passed numerous laws in the name of the war on drugs, including mandatory minimum prison sentences and asset forfeiture. In addition, a felony conviction of cannabis "manufacturing" or possession can lead to collateral damage, including revocation of professional licenses, loss of employment, loss of federal grant funding for colleges and universities, loss of child custody, and bars on voting, adoption, receiving food stamps, and living in public housing. For some patients, just admitting cannabis use to their healthcare provider or testing positive for THC in a urine drug screen may result in denial of healthcare services.

Despite the fact that cannabis is an illegal drug and wrongfully placed in Schedule I (forbidden medication) so that healthcare providers cannot legally prescribe it, patients throughout the country willingly take the legal risks because of the beneficial effects on their health.

Although cannabis is easy to grow, it requires knowledge and experience to grow medicinal-grade cannabis. If a patient grows it outdoors, the plants must be kept out of sight of prying eyes. If a patient grows it indoors, the plants require extra equipment and a dedicated room that must be protected from visitors. Most patients don't have this knowledge or, due to their illness, are not able to properly tend to the plant, so they depend on an outside source. Often family members will grow it for the patient or procure it from an outside source, putting themselves in legal jeopardy as well.

When patients must obtain cannabis from an outside source they have no guarantee of the quality of their medication (eg, contamination with pesticides, heavy metals, mold). This is one of the factors that places it on schedule 1 and the cost can be extreme with no insurance coverage. And, of course, as an illegal substance, patients who use cannabis as medication do not receive the basic education about safe administration from healthcare professionals that they do with other medications.

## Risks Related to Smoking Cannabis

How many times have you heard someone justify the cannabis prohibition by declaring "We cannot approve of patients smoking their medication"? Actually, before the cannabis prohibition there were several "cigarette" preparations of cannabis developed to treat patients with asthma. We now know that there are cannabinoid receptors in the bronchi and that cannabinoids help to dilate the airways.

Cannabis smoke does contain tar and other carcinogenic materials and, from a health perspective, it makes sense to avoid this route of administration. Donald Tashkin is the leading U.S. researcher on the clinical effects of smoking cannabis. In his extensive longitudinal study, Tashkin followed thousands of patients for years and evaluated their pulmonary status. He looked at three groups of individuals: cannabis-only smokers, cannabis-and-tobacco smokers, and tobacco-only smokers. To his surprise, the tobacco-only and cannabis-and-tobacco smokers had higher incidences of COPD or lung cancer, but the cannabis-only smokers did not. Tashkin concluded that, although the smoke itself may contain carcinogens, the cannabinoids counter the harmful effects of the smoke (Tashkin, 2008).

A large epidemiologic study of a Los Angeles population looked at 1,212 cancer cases and 1,040 cancer-free controls; they found no positive relationship between smoking cannabis and the investigated cancer types, which included mouth, larynx, lung, and pharynx (Hashibe et al., 2006).

In 2001 Ethan Russo led a team that conducted a thorough study of the longitudinal effects of cannabis on the health of four patients in the Compassionate IND program (referred to as the Missoula Study). These four patients had been receiving cannabis from a known source from 11 to 27 years and, although they were theoretically in a research program, no one had been tracking their health status over the years. It is important to note that these patients had been using the government-issued cannabis that was grown on the farm at the University of Mississippi, then shipped to North Carolina for rolling into cigarettes and packaging them in labeled canisters that held approximately 300 cigarettes. The label identified the THC level of the cannabis and the date of processing.

The patients received low-grade medicinal cannabis containing from 2% to 4% THC and some of their shipments were up to 13 years old. The quality was poor and even included stems and seeds. At the time, Irv Rosenfeld received and consumed up to 13 ounces over a 3-week period. A complete set of pulmonary function tests was conducted on each of these patients and no long-term pulmonary damage or disease was noted except for mild bronchitis (Russo et al., 2002).

### **Other Potential Risks Related to Medicinal Cannabis**

Healthcare professionals are well aware of the possibility of health risks related to medications even when used under medical supervision. When using any medication, the goal is for the benefit (reason for use) to outweigh the risks (side effects and/or adverse reactions). The usual side effects that accompany the use of cannabis include a mild tachycardia, injected conjunctivae (red eye), dry mouth, short-term memory loss, relaxation, sedation, euphoria (sense of well-being), dizziness, and an increased appetite ("the munchies"). Cannabis is not a hallucinogen, but users may experience an alteration of time perception and/or an increased sensory perception.

A side effect for one patient may be a desired effect for another patient. A cancer patient may use cannabis to control the nausea and increase the appetite (for the benefit or desired effect), yet may also experience the side effects of euphoria (not generally a negative effect) and sedation. Dry mouth may be an undesired side effect for many patients, but a desired effect for ALS patients who have difficulty managing their oral secretions. The tachycardia is usually of little concern to most patients, but could be a risk to persons with cardiac disease. Many pain patients have reported that they never experience the euphoria or "high" that is sought by recreational users.

While cannabis is often used as an anti-anxiolytic medication, one of the most common adverse psychic effects is an acute panic reaction, which usually occurs with novice or inexperienced users or with high doses of THC (as in dronabinol or a high-THC strain of cannabis). This rarely requires any pharmacologic intervention and treatment includes a quiet, relaxing environment with reassurance that the patient is fine and the effects will soon wear off.

Psychotic symptoms have been described following acute cannabis consumption and claims have been made that cannabis may cause schizophrenia. Recent reports affirmed that cannabis did not “cause” schizophrenia, but its use was associated with earlier onset of symptoms and more severe psychosis, especially paranoia. Yet some schizophrenic patients report a reduction in their symptoms with the use of cannabis. Although an association has been noted, no causal relationship has been determined (Macleod et al., 2006).

As cannabis use has increased in some populations, there has been no corresponding increase in the incidence of schizophrenia, which would be expected if cannabis was a causal factor. It is of interest to note that, independent of cannabis use, there are more cannabinoid receptors in the brains of patients with schizophrenia than in normal individuals.

In Brazil researchers at two separate laboratories have been conducting research with CBD as an antipsychotic medication (Crippa, 2010; Takahashi, 2010). Remember that CBD is non-psychoactive and when taken with THC it will dampen the psychoactive effects of THC. Could it be that the use of high-THC-content cannabis by patients prone to schizophrenia may trigger the onset of schizophrenia, while high-CBD content cannabis may help manage the symptoms? More research is needed in this area and, until then, patients with a family history of schizophrenia may be cautioned against the use of medicinal cannabis.

THC can impair perception and psychomotor performance, which means that patients may be at increased risk for accidents if operating equipment (eg, driving a vehicle). With chronic use, many patients develop tolerance to the effects that may contribute to impaired driving. For some patients, cannabis is necessary to control their symptoms so they can drive more safely.

The low risk of any serious adverse event occurring with initial use of cannabis makes it an ideal first trial medication (if it were legal) for many patients. No medication works for everyone, and if cannabis is not helpful to an individual patient there is essentially no harm done in trying it. If cannabis is an effective medication, then the clinician and patient need to know the potential risks related to chronic use of this herbal medication.

The primary purpose of the Missoula Study was to determine what, if any, were the negative effects of chronic use of smoking cannabis. In addition to the pulmonary function tests, this study of the four long-term federally supplied cannabis patients included exams such as a complete physical exam, chest x-ray, MRI of the brain, neuropsychological testing, hormone and immunological assays, and an EEG. The overall conclusions were that cannabis provided these patients with symptomatic relief from pain, muscle spasms, and intraocular pressure, helped reduce their use of other prescription medications, produced no long-term sequelae, and improved their quality of life. Obviously these four patients are a small sample size, but each of these patients is convinced that cannabis is an essential medication for them (Russo et al., 2001).

Long-term use of cannabis has not been associated with increased mortality in animals or humans. In an animal study, rats were administered 50 mg/kg of THC for a period of 2 years and at the end of the observation the survival rate was higher among the treated rats than in the controls (a higher incidence of cancer was noted in the control rats) (Chan et al., 1996). A longitudinal study of 65,171 Kaiser Permanente Medical Care Program enrollees found no relationship between cannabis use and mortality (Sidney et al., 1997).

Some studies have shown a reduction in sperm count with chronic cannabis use, but it is reversible if cannabis is discontinued. Studies are inconclusive regarding the effects of cannabis on male and female sterility. THC readily crosses the placenta, but it appears unlikely that cannabis causes fetal abnormalities. When socioeconomic variables have been accounted for, there appear to be no significant fetal problems related to cannabis use by the mother (Dreher, 1997).

Much research has been conducted on the effects of THC or cannabis on the immune system, and the negative effects seem to be dose-related, with negative findings associated with excessive dosage. In clinical studies of HIV-infected men, the use of cannabis was not associated with the onset of AIDS, and no negative drug interactions were found with the use of cannabis in HIV-positive adults taking protease inhibitors (Abrams et al., 2003). There has been some evidence that cannabis use is a risk factor for the progression of fibrosis in chronic hepatitis C patients (Herzode et al., 2005); however, cannabis use improved retention and virologic outcomes in patients treated for hepatitis C with interferon and ribavirin (Sylvestor et al., 2006). A recent study warned of a possible risk of heart attack with acute cannabis intoxication, yet chronic cannabis use has not been associated with cardiovascular risk factors such as blood triglyceride levels and blood pressure in the longitudinal CARDIA study, which began in 1986 (Grotenhermen, 2007).

### Risks Related to Abuse and Addiction

Since marijuana is commonly referred to as a drug of abuse, the risk of tolerance, dependence, and addiction should be addressed. **Tolerance** is defined as the need to increase the dose with chronic use in order to get the same effects. Healthcare professionals commonly see this with the use of opioids for chronic pain; over time patients develop a tolerance and require higher doses to manage their pain. When used medicinally on a regular basis over a period of time, patients who use cannabis often develop a tolerance to the cognitive and psychomotor impairment as well as the psychological "high," yet they do not develop a tolerance to its medicinal benefits.

The first patient admitted into the Compassionate IND program, Robert Randall, consumed 10 cannabis cigarettes per day for years to control his intraocular pressure. One month, he seemed to be going through his supply faster than usual. Upon further investigation he discovered that his federal prescription had been changed without his or his physician's knowledge. Each of his cannabis cigarettes contained 0.8 grams of cannabis rather than the usual 1 gram. Not realizing this decrease in dosage, he simply smoked more cigarettes to continue with his daily requirements. Once discovered, his physician complained and the correct dosage was provided in his next cannabis shipment (Randall and O'Leary, 1998). On the other hand, patients **have** noticed a tolerance to the therapeutic effects with the use of dronabinol (synthetic THC).

**Dependence** is a term often misused as a synonym for addiction, but the two terms are not synonymous. Dependence (also referred to as physical dependence) is the result of continued regular use of a drug that produces a physiologic change in the central nervous system to the extent that abrupt cessation of the drug causes withdrawal symptoms.

The seriousness of the withdrawal symptoms depends upon the drug being used and the extent of its use (risks increase with higher doses over long periods of time). For those drugs that do produce physical dependence, there is an expected physiologic response that would occur in anyone who used the drug on a regular basis, but this is not by itself indicative of addiction. For some drugs, such as alcohol or benzodiazepines, withdrawal symptoms can be serious and life-threatening. Opioids can cause withdrawal symptoms similar to a severe case of the flu. However withdrawal from cannabis is generally mild in comparison. Cannabis withdrawal symptoms may include irritability, restlessness, difficulty sleeping, decreased appetite, anxiety, anger, and strange dreams. Less common symptoms include headaches, sweating, chills, stomach pain, and general discomfort.

Most of the cannabis withdrawal symptoms begin within 24 hours following abrupt cessation, are most severe 2 to 4 days later, and last 1 to 2 weeks. Withdrawal from cannabis is generally uncomfortable but not dangerous and does not require medical management. Not all persons complain of withdrawal when discontinuing use. A large survey in Australia found approximately 30% of current marijuana users reported withdrawal symptoms when they stopped using cannabis (Teesson et al., 2002).

It seems important to note that some patients begin using cannabis to manage what some researchers consider withdrawal symptoms. Patients have used cannabis as a sleep aid, appetite stimulant, relaxant, and calming agent. If they stop using cannabis, are their initial reasons for use simply reemerging or are they experiencing true withdrawal symptoms?

**Cannabis abuse** is a very ambiguous and value-laden term and therefore its use is questionable. "Drug abuse" has often been defined as use of a drug without a prescription or use of an illegal drug. Those notions are not very helpful. Some persons or cultures may not accept the paternalistic notion that only a physician can decide whether a person should use a drug, when to use it, or how often to use it. And the idea that drugs are legal or illegal leads many people to believe that the legal drugs are good and the illegal drugs are bad. Drugs are not inherently good or bad but, as Andrew Weil noted years ago, it is their manner of use that is either bad or good (Weil and Rosen, 1993).

**Addiction** (sometimes referred to as psychological dependence) is defined as a pattern of drug abuse characterized by an overwhelming preoccupation with the compulsive use of a drug and securing its supply, and a high tendency to relapse if the drug is taken away. Tolerance and dependence are common results of addiction, but are not necessary components of addiction. The Diagnostic and Statistical Manual of Mental Disorders (DSM) of the American Psychiatric Association (APA) has been developed with the input of thousands of expert psychiatrists over several decades to classify and characterize human mental health disorders, including drug-use disorders. To provide some continuity in the concept/diagnosis of cannabis addiction, clinicians can use the criteria set up in the DSM (as reported in the APA, 2000):

According to the DSM, addiction refers to use of a substance that causes the user significant impairment or distress, and is associated with at least three of the following effects within the same 12-month period:

Tolerance develops.

Withdrawal symptoms occur when use of the drug is stopped and/or the drug or other drugs are used to avoid withdrawal symptoms.

Larger amounts of the drug are used or use persists for a longer period of time than was intended.

The user reports a persistent desire to reduce use of the drug or is unsuccessful in attempts to cut down or quit using the drug.

A great deal of time is spent in activities surrounding obtaining, using, and recovering from the effects of the drug.

Use of the drug interferes with engagement in important social, recreational, or work-related activities.

Use of the drug is continued despite knowledge that the drug is likely causing or worsening a health problem. (APA, 2000)

Addiction to cannabis rarely occurs because, in general, persons who have problems with drug addiction usually prefer more potent psychoactive drugs. When dronabinol was initially approved as a medication it was placed in Schedule II of the CSA. After several years on the market, it was down-regulated to Schedule III because of the lack of diversion and little evidence of addiction. Initially, animal studies are used to evaluate the abuse potential of drugs, with the understanding that these do not necessarily reflect similar outcomes in humans. It is important to note that numerous studies have concluded that while cannabis may produce a feeling of euphoria in humans, in general animals will not self-administer THC (DSM-R IV, 2000).

In 1994 Jack E. Henningfield, of the National Institute on Drug Abuse (NIDA), and Neal L. Benowitz, of the University of California at San Francisco (UCSF), ranked six commonly used drugs by five criteria: withdrawal symptoms (dependence), reinforcement (craving), tolerance, dependence (addiction) potential, and intoxication. They ranked the six drugs from 1 as the most serious to 6 as the least serious. Cannabis (marijuana) was ranked lowest for withdrawal symptoms, tolerance, and dependence (addiction) potential; it ranked close to caffeine in the degree of reinforcement and higher than caffeine and nicotine only in the degree of intoxication (Henningfield and Benowitz, 1994).

Ranking of Risk of Six Commonly Used Drugs										
	Withdrawal		Reinforcement		Tolerance		Dependence		Intoxication	
	NIDA	UCSF	NIDA	UCSF	NIDA	UCSF	NIDA	UCSF	NIDA	UCSF
Nicotine	3	3	4	4	2	4	1	1	5	6
Heroin	2	2	2	2	1	2	2	2	2	2
Cocaine	4	3	1	1	4	1	3	3	3	3
Alcohol	1	1	3	3	3	4	4	4	1	1
Caffeine	5	4	6	5	5	3	5	5	6	5
Marijuana	6	5	5	6	6	5	6	6	4	4

Ranking scale: 1 = Most serious 6 = Least serious

Explanation of terms

Withdrawal (physical dependence). Presence and severity of characteristic withdrawal symptoms.

Reinforcement. Substance's ability, in human and animal tests, to get users to take it repeatedly, and instead of other substances.

Tolerance. Amount of substance needed to satisfy increasing cravings and level of plateau that is eventually reached.

Dependence (addiction). Difficulty in ending use of substance, relapse rate, percentage of people who become addicted, addicts self-reporting of degree of need for substance, and continue use in face of evidence that it causes harm.

Intoxication. Level of intoxication associated with addition, personal, and social damage that substance causes.

Source: Henningfield and Benowitz, 1994.

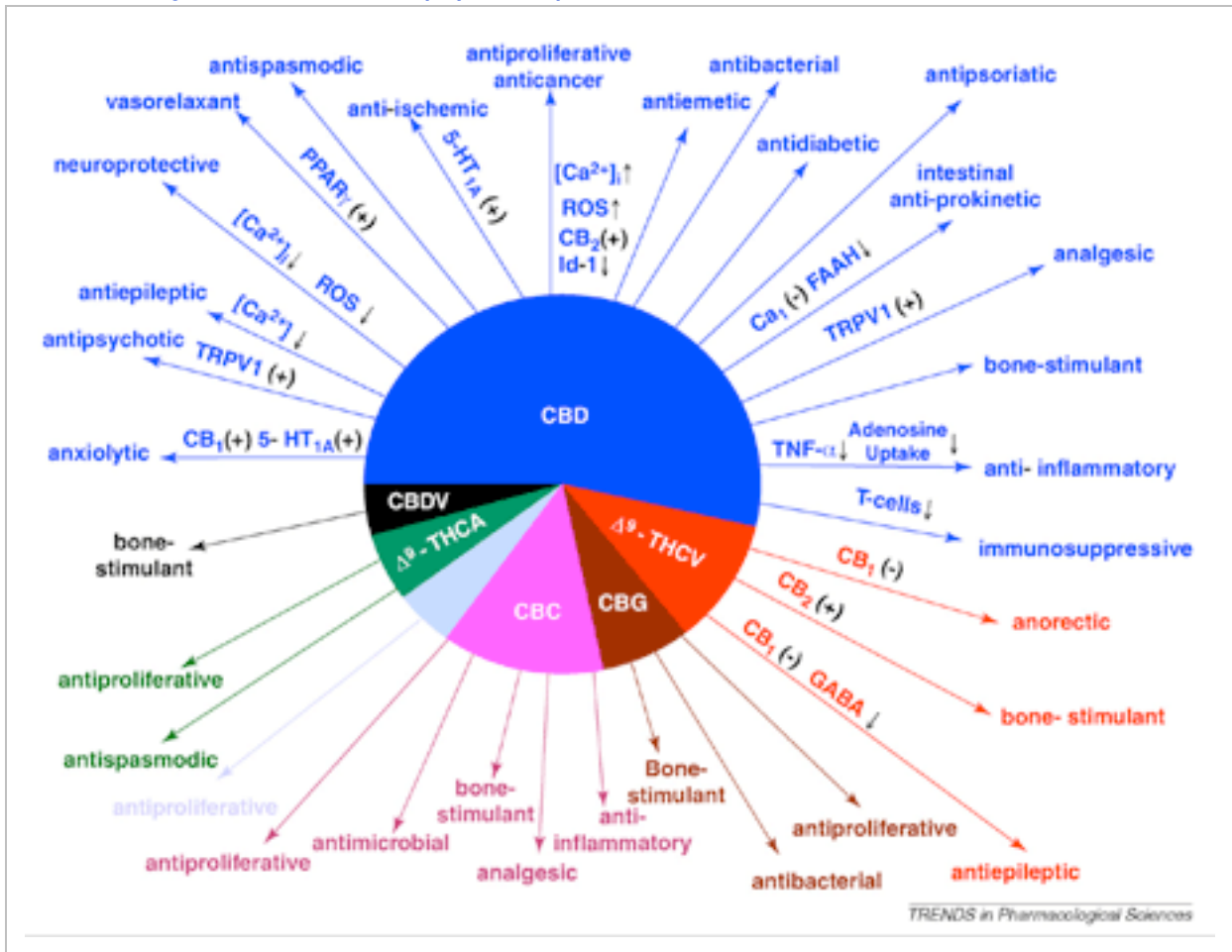
Also in 1994, the U.S. National Comorbidity Study found that 9% of lifetime cannabis users met the DSM-R-III criteria for dependence at some time in their life, compared to 32% of tobacco users, 23% of opiate users, 17% of cocaine users, and 15% of alcohol users (Anthony, Warner and Kessler, 1994). It does appear that early onset of first use of cannabis is associated with an increased risk of later developing addiction.

## Therapeutic Effects and Indications for Cannabis Use

Cannabis is not only remarkable in its wide margin of safety as a medication but also for the wide array of conditions, symptoms, or illnesses for which it is used. This may be a stumbling block for many clinicians, who find it hard to believe that a medication can be effective for so many indications. Although just in its infancy, the growing understanding of our ECS helps explain how and why cannabis is so versatile. As stated earlier, the ECS is involved in numerous physiologic processes that affect how we eat, sleep, relax, protect, and forget.

Cannabis is the only plant that contains cannabinoids similar to the endocannabinoids found in humans. Delta-9-THC is the primary psychoactive cannabinoid and the most studied, but researchers are finding therapeutic potential in some of the other plant-based cannabinoids as well. The therapeutic properties of cannabinoids include anti-inflammatory, neuroprotective, analgesic, antispasmodic, anti-oxidant, antibiotic, anticonvulsive, antiviral, antifungal, bone stimulant, anxiolytic, antipsychotic, vasorelaxant, antidiabetic, antiproliferative, and anti-tumor. The following figure shows some of the actions of some of the non-psychoactive cannabinoids, to give you an idea of their therapeutic potential (Izzo et al., 2009).

## Pharmacologic Actions of Non-psychoactive Cannabinoids



Abbreviations: CBN, cannabiniol; CBD, cannabidiol; D9-THCV, D9-tetrahydrocannabivarin; CBC, cannabichromene; CBG, cannabigerol; D9-THCA, D9-tetrahydrocannabinolic acid; TRPV1, transient receptor potential vanilloid type 1; PPARg, peroxisome proliferator-activated receptor g; ROS, reactive oxygen species; 5-HT1A, 5-hydroxytryptamine receptor subtype 1A; FAAH, fatty acid amide hydrolase. (+), direct or indirect activation; ↑, increase; ↓, decrease. Source: Izzo et al., 2009.

### Indications for Use

While the use of cannabis for chemotherapy-induced nausea and vomiting may be the best-known and accepted use of cannabis by healthcare professionals, pain management is the most common reason for use among the medical marijuana states that keep records (although New Jersey does not accept chronic pain as an acceptable use). Listed below are recent statistics from the Oregon, Rhode Island, and New Mexico medical cannabis programs. Note that the state laws vary in the conditions allowed for cannabis recommendations. For example, Oregon does not allow physicians to recommend cannabis for posttraumatic stress, yet New Mexico does.

<b>New Mexico Medical Cannabis Program Patient Numbers (as of 6/15/11)</b>			
Status: patients		Status: caregivers	
Active	3860	Active	134
Deceased	16	Deceased	1
Inactive	928	Inactive	48
Withdrawn	3	Withdrawn	3
<b>TOTAL</b>	<b>4807</b>	<b>TOTAL</b>	<b>176</b>
<b>Qualifying condition</b>			
PTSD	1517		
Chronic pain	1125		
Cancer	529		
Painful peripheral neuropathy	363		
HIV/AIDS	230		
Intractable nausea/vomiting	192		
Multiple sclerosis	188		
Spinal cord damage w/intractable spasticity	167		
Epilepsy	139		
Glaucoma	90		
Severe anorexia/ cachexia	74		
Inflammatory autoimmune-mediated arthritis	63		
Crohn's disease	60		
Hep C under treatment	50		
Hospice care	14		
ALS	6		
<b>Qualifying condition of inactives</b>			
PTSD	201		
Cancer	173		
Chronic pain	139		
HIV/AIDS	84		
Painful peripheral neuropathy	81		
Multiple sclerosis	56		
Spinal cord damage w/ intractable spasticity	55		
Epilepsy	32		
Intractable nausea/vomiting	32		

<b>New Mexico Medical Cannabis Program Patient Numbers (as of 6/15/11)</b>			
Qualifying condition of inactives (cont.)			
Glaucoma	23		
Hep C under treatment	18		
Crohn's disease	15		
Severe anorexia/cachexia	7		
Hospice care	5		
Inflammatory autoimmune-mediated arthritis	4		
ALS	3		

Source: New Mexico Department of Health (2011).

As of April 1, 2011 there were 39,774 registered medicinal cannabis patients in Oregon. The following table shows their qualifying medical conditions.

<b>Qualifying Conditions for Medicinal Use of Cannabis in Oregon, 2011</b>	
Conditions*	
Agitation related to Alzheimer's disease	< 50
Cachexia	917
Cancer	1,671
Glaucoma	524
HIV/AIDS	668
Nausea	5,356
Severe pain	35,793
Seizures, inc. but not limited to epilepsy	977
Persistent muscle spasms, inc. but not limited to epilepsy	9,067

\*A patient may have more than one diagnosed qualifying medical condition. Source: Oregon Health Authority, 2011.

As of May 17, 2011 there were 3,496 patients and 2,232 caregivers registered in the state of Rhode Island. In the table below, note that many patients have more than one diagnosis code. Therefore the count of diagnosis codes used will always be higher than the number of patients.

Medical Marijuana Program Patients by Diagnosis in Rhode Island, 2011		
Diagnosis	Percent	Count
1–Cancer or treatment	5%	232
10–Severe or persistent muscle spasms	18%	777
11–Agitation related to Alzheimer’s disease	0%	3
2–Glaucoma or treatment	1%	44
3–Positive status for HIV or treatment	2%	99
4–AIDS or treatment	1%	38
5–Hepatitis C or treatment	5%	232
6–Cachexia or wasting syndrome	3%	126
6–Other	32%	1,377
7–Severe, debilitating chronic pain	25%	1,099
8–Severe nausea	7%	294
9–Seizures, inc. epilepsy	1%	35
Total no. of diagnosis reasons used		4,346

Source: Rhode Island Department of Health, 2011.

As you can see, the indications for use of cannabis as medication are numerous and cover all specialty areas of practice. From a nursing perspective, cannabis can be effective for many common patient problems: nausea and vomiting, lack of appetite, inability to sleep, pain, depression, and anxiety. One way of categorizing the indications for cannabis is to use the descriptive properties of the ECS noted by DiMarzo: eat, sleep, relax, protect, and forget (DiMarzo, 1998).

**Eat:** Studies have clearly shown that THC and cannabis are effective anti-emetics. As an anti-emetic, cannabis may be used to combat the nausea and vomiting from chemotherapy (cancer, HIV/AIDS, hepatitis treatment), postoperative nausea and vomiting related to anesthesia or intra-operative medications, motion sickness, morning sickness, and hyperemesis gravidarum.

Cannabis is effective as an appetite stimulant for cancer patients or HIV/AIDS patients with cachexia or wasting syndrome (Abrams, 2002; Schnelle and Strasser, 2002; Plasse, 2002). There have been cases of hospitalized patients on tube feedings using cannabis to start eating again. The endocannabinoid anandamide, is present in the breast milk of all female mammals. An Israeli researcher conducted several rat experiments in which she blocked the formation of anandamide. When the anandamide was blocked at the time of delivery, all of the rat litter died.

With a subsequent litter, the anandamide was blocked a day after delivery of the pups and half of the pups died, while the surviving pups were about half the weight of the control pups. There were no negative effects noted when the anandamide was blocked after 3 days, and the conclusion is that these pups received enough of the anandamide to stimulate their sucking/feeding instincts sufficiently and the pups nursed as actively as the control litter (Fride, 2005).

**Sleep:** Cannabis helps induce sleep and, unlike many pharmaceuticals used as sleep aids, cannabis does not leave a person feeling drugged in the morning (Russo, Guy, and Robson, 2007).

**Relax:** As a muscle relaxant, cannabis helps decrease the muscle spasms experienced by chronic pain patients; it can ease the spasticity in patients with multiple sclerosis or spinal cord injuries, and it can ease menstrual cramps. Cannabis can relax blood vessels and prevent migraines. Although the mechanism of action is not completely understood with glaucoma patients, cannabis can reduce the intra-ocular pressure that leads to blindness. Cannabis can relax the bowels for persons suffering from irritable bowel syndrome or Crohn's disease. Cannabinoids help induce bronchial dilation, which is helpful for asthmatic patients. It can relax the anxious person, help reduce stuttering, and help decrease obsessive behavior with OCD patients. Cannabis has also been helpful in eliminating or reducing the frequency of seizures (Mathre, 1997; Russo and Grotenhermen, 2002).

**Protect:** This covers a broad array of conditions because the cannabinoids have anti-inflammatory, neuroprotective, antibacterial, antifungal, antiviral, anti-tumor, and antiproliferative properties. Cannabis may be helpful after acute injuries such as traumatic brain injury, in part through its anti-inflammatory effects. One of the cannabinoids has been found to kill MRSA in the laboratory; clearly we need further study on this action (Appendino et al., 2008). Cannabis has been helpful with phantom limb pain and other neuropathic pain conditions. It is now believed that certain auto-immune diseases may be the result of an overactive immune system and cannabis can help put it back in balance. Research on the ECS indicates that cannabinoids may prevent Alzheimer's disease. As a bone stimulator, cannabinoids can help hasten the healing process of bone fractures and prevent osteoarthritis (Mechoulam, 2010a).

Cancer patients have used cannabis to combat chemotherapy-induced nausea and vomiting and to help manage cancer pain. Animal research is showing that cannabinoids can kill cancer cells, and there are a growing number of case studies of cancer patients who have used concentrated cannabis oils or tinctures in treating their cancer. Research on the ECS shows that one of its functions is to identify cancer cells and induce apoptosis (cell suicide), prevent angiogenesis (the formation of blood vessels that feed a tumor), and prevent the spread of cancer to other areas (Holland, 2010). This leads researchers to explore the use of cannabis as a perfect cancer chemotherapy agent—one that can actually differentiate and destroy cancer cells rather than healthy cells. Studies have shown that cannabis/cannabinoids may be helpful in cancer treatment of glioma (aggressive brain cancer), lung, pancreatic, cervical, breast, colon, prostate, thyroid, and skin cancer, as well as leukemia and lymphomas (Pacher et al., 2006).

**Forget:** Many jokes have been made about short-term memory loss with persons who smoke cannabis recreationally. However, research on the endocannabinoid system shows that it is involved in the process of helping us forget painful experiences, such as traumatic experiences or the pain of childbirth. Many of our combat veterans, as well as rape and incest victims, have used cannabis to help them manage their posttraumatic stress symptoms. Based on research findings, Israel and Czechoslovakia now allow the use of cannabis for their veterans who suffer from posttraumatic stress (Mechoulam, 2010b).

Addressing the substance abuse issue: With the reefer madness campaign, marijuana was portrayed not only as dangerous and addictive but also as a "gateway" drug. Prohibitionists claim that marijuana use will cause the user to try hard drugs such as cocaine or heroin. The IOM report noted that "it was not the substance itself but the illegal status of cannabis that served as a gateway to stronger drugs." To purchase cannabis, a user had to interact with illicit drug dealers. If the drug dealer did not have cannabis, he would encourage the potential buyer to try whatever else was available (Joy, Watson, and Benson, 1999).

Historically, cannabis pharmaceuticals were used to "combat habits of morphine and chloral hydrate" and to "manage delirium tremens from alcohol withdrawal." Today, in many of the bigger compassion clubs and cannabis dispensaries, staff are noting that many patients report that cannabis has helped them get off of a drug of abuse. Philippe Lucas, of the Vancouver Island Compassion Society (VICS) in Canada, coined a new term to describe cannabis; he called it an "exit" drug (Lucas, 2004).

Rather than causing persons to use stronger drugs, patients are finding that cannabis helps them get off and stay off of drugs such as alcohol, nicotine, cocaine, methamphetamine, benzodiazepines, prescription opioids, and heroin. Some report that cannabis helped manage their withdrawal symptoms when they quit using their problem drug. Others found that if they used cannabis they could resist using their previous drug of choice and their lives became more manageable (Reiman, 2008).

## **Opiate-Sparing**

Severe chronic pain is commonly treated with opioids (eg, morphine, oxycodone, methadone). Unfortunately, opioids will cause physical dependence with regular use and patients readily develop a tolerance to their analgesic effects, requiring increased dosage over time. Some of the opioids are in combination drugs (eg, Percoset, Vicodin) that also contain acetaminophen (Tylenol). Opioids carry the risk of overdose by respiratory depression, and acetaminophen carries a substantial risk of fatal liver damage with excess dosage.

Opioids present other problems as well. Many patients complain of feeling "drugged" and unable to think clearly when using opioids. Care has to be taken to avoid severe constipation as an expected side effect of opioids; some patients experience nausea and some suffer from depression (which may in part be due to the depressive effects of opioids as well as the result of living with chronic pain).

Many pain patients have found that they can significantly reduce or eliminate their use of opioids when they begin using cannabis. In addition cannabis is not constipating, prevents nausea, and can act as an anti-depressant. Thus patients report effective pain relief and no longer require additional medications to counter the side effects of opioids (Mathre, 1997; Gieringer, Rosenthal and Carter, 2008, Holland, 2010).

## Dosage and Administration

Given that the cultivation of cannabis currently remains a criminal offense under federal law, growers have focused their horticultural skills on developing stronger strains (higher THC content) with the intention of raising the price and increasing their profits. Unfortunately, these overzealous growers have developed some strains that are high in THC but almost devoid of CBD and other cannabinoids. Based on the therapeutic value of the non-psychoactive cannabinoids, these high-THC content plants are not as beneficial to patients. They are too psychoactive for novice patients, especially elders, and are not as effective therapeutically.

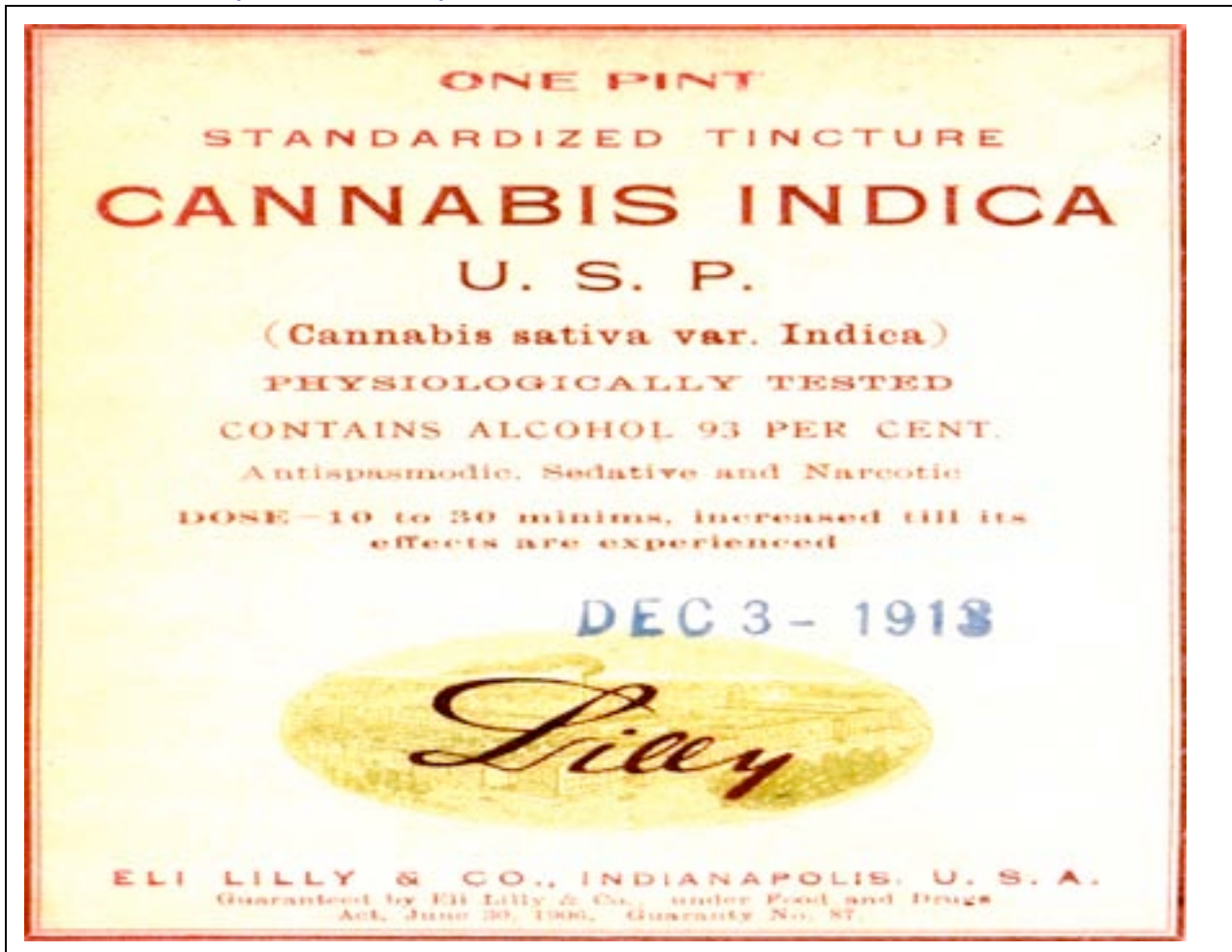
Project CBD was created to correct this situation by reaching out to growers of medicinal-grade cannabis and educating them about the need to develop strains rich in CBD and other cannabinoids. Project CBD also reaches out to educate patients and clinicians so that they will create a demand for CBD-rich cannabis.

The research on the various phytocannabinoids will eventually lead to pharmaceutical products targeted specifically to various illnesses or conditions. However, the whole natural plant may continue to be preferred by many patients. In the states that currently allow the medical use of cannabis, cannabis growers and dispensaries are keeping records on patient preferences for various conditions. They are finding trends that suggest certain strains, with their specific cannabinoid makeup, work best for particular indications.

A seed from a particular strain may develop into a plant with a different chemical profile when grown in a different region under different conditions. What this means is that much more research is needed to match specific strains with various indications. Once a strain is found effective for a particular ailment, clones can be taken from the mother plant to produce new plants with the same genetic makeup. In the meantime, this section will focus on general dosing guidelines for use of whole cannabis, and medical professionals should understand that individual patients will prefer some cannabis strains or hybrids over others.

Cannabis has a remarkably wide margin of safety; thus, there is virtually no risk of death by overdose. Clinicians who have experience in the use of cannabis have found that the dosage will vary greatly among patients, even when treating the same condition. The basic principal for dosing is to start low and go slow. Prior to the marijuana prohibition, many of the pharmaceutical tinctures were highly concentrated, and the dosage was in "minums." The top of the container was a dropper to administer the medication. The label of an Ely Lily tincture of cannabis included dosage instructions that said: "DOSE 10–30 minums, increased till its effects are experienced."

Label from Eli Lilly Cannabis Preparation, 1913



The label instructions read: "DOSE 10 to 30 minims, increased till its effects are experienced." Source: Courtesy of Patients Out of Time. Used by permission.

Although the federal government—and more recently the American Society of Addiction Medication (ASAM)—continue to denigrate the medicinal use of cannabis by focusing on "smoked marijuana," the truth is that cannabis can be formulated in a variety of preparations, and healthcare professionals need to separate the false propaganda from the facts.

### Medicinal-Grade Cannabis

The term **medicinal-grade cannabis** means that care has been taken in growing the plant in a clean environment without the use of dangerous pesticides or nonorganic fertilizers. Once the cannabis is ready for harvest it needs to be properly cured or dried to prevent mold such as the aspergillus fungus. To keep the raw material from decomposing and losing its effectiveness it should be kept in a dry, air-tight container and out of sunlight. Freezing cannabis will also help maintain freshness. The stems and any seeds should be removed.

In the more sophisticated dispensaries, owners are responding to the patient need for quality control, and some are beginning to only use cannabis that has been tested for contaminants and cannabinoid content. Without clear regulations, this lack of quality control can be a serious problem for patients.

### **Inhalation**

Many Americans think of smoking as the primary delivery method for cannabis; this limited view arose because of the marijuana prohibition that put an end to its medicinal use back in 1937, when pharmaceutical companies and physicians stopped making the medicinal formulations. In truth, cigarette forms of medicinal cannabis had been used earlier to treat asthma, since the effect of inhaling cannabis was to open the airway. Inhalation has the primary advantage of allowing a patient to titrate the dosage easily for maximum benefit because the onset of action is almost immediate. The medication is taken into the lungs and quickly absorbed through the capillaries into the bloodstream. The effects of inhaled cannabis will last approximately 4 hours.

### **Smoking**

Patients can smoke raw cannabis in several forms. The "joint" or cigarette form (hand-rolled or machine-rolled) is the most common among recreational users, but cannabis can be smoked using a pipe or bong (water pipe) as well. Smoking by joint is the least efficient because much of the medication goes up in smoke as the cigarette burns. Smoking small amounts using a pipe is more efficient, and the use of a bong can cool the smoke so that it is less irritating to the airway.

### **Vaporization**

Rather than burning the plant material and creating smoke, cannabis can be heated to a temperature that will release the medication in vapors that can be inhaled, much like the nebulizer treatment common in hospitals. The original vaporizers were somewhat clumsy and the heat source was not well-regulated. Today there are numerous vaporizers on the market ranging in cost, size, shape, and effectiveness. There are home models and smaller portable models that patients can use when traveling. The better models have digital temperature controls that allow the patient precise control with heating, since the individual cannabinoids vaporize at different temperatures.

### **Sublingual**

The sublingual (under the tongue) or oromucosal (in the oral cavity) delivery method of an oil or tincture provides another rapid onset of action as the medication is readily absorbed into the blood system. Tinctures are usually prepared in a base of alcohol, oil, or glycerol. Many concentrated tinctures are taken by dropper under the tongue, and within a few minutes the patient will feel the effects. Other tinctures may be in a spray container and sprayed in the mouth to be absorbed in the oral cavity and thence into the bloodstream. Many patients who never smoked cigarettes are more comfortable with this delivery method.

### **Oral Ingestion**

Taking cannabis by mouth in pill form or swallowed as a liquid has both benefits and drawbacks. Since the cannabinoids are fat-soluble, their absorption through the gut is slower and less predictable, being dependant upon the individual's metabolism as well as the contents of the stomach. The onset of action may take as long as 30 minutes to an hour, making it more difficult to determine an effective dose, especially for the novice patient. In addition, when taken orally, the medication gets metabolized through the liver before getting into the bloodstream. The liver converts the THC to another chemical called 11-hydroxy-THC, which is more psychoactive than THC, and so the effects will be different than if inhaled or taken sublingually. The advantage of the oral route is that it will last much longer, so a patient does not have to medicate as frequently. This can be helpful for glaucoma patients who are trying to maintain a lower intraocular pressure.

In addition to pills, many dispensaries offer "medibles," or edible cannabis products such as in tea, brownies, cookies, and even ice cream. An easy and versatile preparation is cannabis butter; since the cannabinoids are fat-soluble they mix well with butter and this can be used in cooking or put on toast or crackers. An advantage is that the butter can be made from the leaves that are often waste products for growers who only want the bud.

### Topical

Cannabis can be applied externally as a topical ointment, lotion, or poultice, and may be used in the treatment of skin inflammations, arthritis, or muscle pains. The goal is for the medication to be absorbed at the specific location being treated. Although it is unclear how well the cannabinoids are absorbed through the skin, the more soluble terpenoids and flavinoids also have anti-inflammatory properties that can be effective.

### Pharmaceuticals

In Jamaica, physicians have developed cannabis-based eye drops for glaucoma patients. Canasol and Canalol (cannabis and Timolol) are available by prescription in Jamaica (West, 1997). In England, GW Pharmaceuticals has developed an oromucosal cannabis extract spray (Sativex) for use with multiple sclerosis, as well as neuropathic and cancer pain. It has taken years of research to get approval in the European countries, but Canada approved its use in 2005. Clinical trials using Sativex for severe pain in cancer patients have taken place in the United States, and the company is working to get FDA approval.

Single cannabinoid products are also on the market. We have already discussed Marinol as a capsule containing synthetic THC in sesame oil. It comes in 2.5, 5, and 10 mg capsules that resemble fish eggs. Originally approved for use as an anti-emetic and appetite stimulant, it can now be prescribed for off-label uses as well. It has been proven to be effective for some patients, but most find it less effective than whole cannabis. Nabilone is a synthetic cannabinoid similar to THC that is available in the United Kingdom, Australia, Canada, and some European nations. Other synthetic cannabinoids—Levonantradol made by Pfizer, Ajulemic acid (CT3) developed in Massachusetts, and HU-308 made in Israel—are emerging as new medications. Research has also been done to develop a dermal patch (Grotenhermen and Russo, 2002).

Rimonabant, or SR141716, is a cannabinoid antagonist that was developed for use as an appetite suppressant for treatment of obesity. The initial idea was that since cannabis and the endocannabinoids are known to increase the appetite, blocking the cannabinoids could result in a decreased appetite and subsequent weight loss. However, once this medication was used by a larger population, reports of serious depression and potential suicide caused it to be withdrawn (<http://news.bbc.co.uk/2/hi/health/7687311.stm>). As we learn more about the endogenous cannabinoid system, it makes sense that blocking the normal action of the endocannabinoids could lead to serious health problems.

### Drug Interactions

A drug interaction should always be considered when taking more than one medication. A problem with patients using cannabis is that they may not report their use of it to their healthcare provider because of its illegality, and this prevents the healthcare provider from monitoring for possible interactions.

Cannabis and THC have been shown to alter the absorption and elimination of other drugs. Because of possible additive or synergistic action, cannabis should not be used in combination with alcohol, sedatives, or sleeping pills; increased sedation is one potential outcome. For patients using theophylline, cannabis will increase the metabolic processing of that drug. Because cannabis seems to work synergistically with opioids, patients may be able to decrease or cease their use of an opioid because they find they no longer need it.

## Case Examples

### Case 1

Jamie, a 40-year-old female with MS, had progressively lost her ability to walk due to leg spasms that required a cane or wheelchair. She had lost vision to the degree that she had to give up her drivers' license. She had lost control of her bladder, especially at night. Another MS patient suggested that she try cannabis. Jamie found that smoking the cannabis almost immediately relaxed her spasms. Since she had never used cannabis before, she started slowly by smoking part of a cannabis cigarette. When she felt a spasm starting, she would smoke some more. Over time she came to smoke about 10 low-grade (2%–3% THC) cannabis cigarettes throughout the day. She still doesn't drive, but her vision has improved. On good days she walks without her cane and she no longer requires diapers for incontinence. She no longer needs the prescription Valium and her anti-depressant.

### Case 2

Eileen is a 72-year-old female who was born with congenital cataracts. After multiple surgeries on both eyes, she developed glaucoma that could not be controlled with standard medications. Complications with the last surgery on her right eye caused her to lose all her vision. In her late thirties she began smoking and eating cannabis. She initially used the cannabis to help her quit smoking. Eileen found that she could keep her eye pressures within safe limits by eating homemade cookies throughout the day and that the oral route lasted longer. A few years later, she learned to make cannabis butter and ate a teaspoon of it on a cracker throughout the day and at bedtime. Eileen had a history of insomnia and initially could sleep only around 4 hours. As a bonus, she found that with the cannabis she could get 6 to 7 hours of sleep a night.

### Case 3

Casey was a 19-year-old male when he was diagnosed with Crohn's disease. He suffered from extreme abdominal pain and was losing >10 pounds/week, which resulted in his dropping out of college. His team of doctors tried everything, fearing Casey was going to die if he couldn't maintain his weight. Casey tried cannabis at the urging of friends, and he began gaining weight. He told his medical team about his use and they quietly supported him. He no longer needed a strong opioid for pain management, but his consulting physician for pain did give him a prescription for Marinol; in case he was tested for drugs, this would justify a positive THC finding. Casey lives in a state that has no medical cannabis law and his main concern is getting quality medicine at an affordable price. His parents had always thought marijuana was a drug of abuse, but now support him, since they too believe it saved his life. He cannot afford a vaporizer, but has been advised to smoke a pipe rather than cannabis cigarettes, to inhale and limit his breath-holding to <3 seconds, and to clean the pipe daily to avoid tar build-up.

#### Case 4

Brian is a 45-year-old male who was diagnosed with AIDS more than ten years ago. Following the advice of his support group, he started using cannabis when his medical treatment for AIDS began. To avoid any risk related to inhaling contaminated cannabis, he bought a cannabis tincture. Brian found that he only needed a quarter to a half of a dropper of the tincture at a time. He would start with a quarter of a dropper and take an additional quarter if needed after waiting for 10 minutes.

#### Case 5

As a baby, Jeffrey was not eating or sleeping well and was always restless. As a toddler he was soon known as the out-of-control problem child who had temper tantrums and aggressive behavior. By age 7 he had been diagnosed with ADHD, impulse disorder, OCD, Tourette syndrome, intermittent explosive disorder, conduct disorder, oppositional defiance disorder, PTSD, and bipolar disorder. Over the years he had been prescribed 15 medications—Ritalin, Mellaril, Dexidrine, Imiprimine, Adderall, Clonidine, Depakote, Tenex, risperdal, Tegretol, Seroquel, Neurontin, Klonopin, Zoloft and Zyprexa—many of which are not approved for children.

Jeffrey's desperate mother heard about cannabis and, through the Internet, located a compassion center in their state of California that could supply an edible form of cannabis and a physician who would write the recommendation. She was instructed on how to dose Jeffrey (now age 7 ½). About a half-hour after eating part of a medicated muffin, while being driven to his special school, Jeffrey relaxed his grip on his mother's hand and began smiling. He said "Mommy, I'm not mad. I'm happy, and my head doesn't feel noisy." His teachers noticed his calmer demeanor and over time his outbursts decreased. Within 6 months of using cannabis Jeffrey was learning how to have fun and was able to benefit from counseling. (For the full story see: Debbie and LaRayne Jeffries, *Jeffrey's Journey: Healing a Child's Violent Rages*, 2005, Oakland, CA: Quick American.)

## Patient and Family Education

When conducting an initial intake on all patients, always ask about their use of cannabis. They may not be willing to volunteer the information, but most patients will admit to use if asked directly (Mathre, 1985). If they admit to use, continue to assess their use patterns and reasons for use. This will help you understand if they are using it recreationally or medicinally. Either way, patients still need to understand the potential risks and benefits and be taught how to use cannabis safely.

Until cannabis is removed from Schedule I, begin by reminding the patient or family members that cannabis is illegal under federal law and that they are subject to legal consequences if arrested for possessing or growing the plant. For example, you could say "You understand that cannabis is illegal, so I cannot help you obtain it and you could get arrested if your use is known by law enforcement." This is simply stating the fact and also letting the patient know that you are not going to report their use.

It is important to ask the patient if they want their use noted in their record. Some patients will not, due to fear of their use being known by others, yet the record can be useful if they are arrested for cannabis possession and need to prove medical necessity. In the legal medical-cannabis states, patients need to understand that they are still in danger of federal prosecution.

The healthcare professional needs to know the conditions under which cannabis can be recommended for medicinal use because they vary among states. Another area of concern is reciprocity between states; patients need to understand that even though they have a legal recommendation for cannabis in one state, it does not mean they can take their medication into another state and use it.

Here are some other points to help patients use cannabis safely and responsibly:

1. **Vocabulary.** Teach patients to call it “cannabis.” This allows the patient to understand that there is a long history that supports cannabis as medication.
2. **Legality.** Know the laws of the state regarding how much a patient can grow or possess and under what conditions/diagnoses medicinal cannabis may be recommended.
3. **Storage.** Dark glass or metal tins are preferred over plastic. Use an opaque container or store in a dark area. Freeze for long-term storage.
4. **Inhaling cannabis:**
  - Use a pipe rather than a cigarette to be more efficient.
  - Clean the pipe daily because the tar will build up after each use. Glass pipes are easy to clean. Purple Power is a biodegradable cleaner that is effective and can be found in automotive supply stores.
  - Do not hold your breath for more than 3 seconds after inhaling. Holding it for longer periods of time will only allow more smoke to be absorbed into the pulmonary tissue.
  - Never use cannabis with mold on it. If you are in doubt, it can be baked at 350°F for 15 minutes. This will kill any aspergillus, which can be dangerous, especially to patients with a compromised immune system.
  - Encourage the use of a vaporizer to eliminate any potential harm from smoking.
  - Always begin with one inhalation when using a new supply and wait several minutes to determine if you need more.
5. **Taking Cannabis sublingually.** Start with a few drops, wait 10 minutes, and take more only if needed. Store in dark glass container.
6. **Using edibles.** Keep them clearly marked and out of reach of children or others who could ingest the food without realizing it is medication.
7. **If obtaining medication from a dispensary.** Ask about quality control testing. Ask for strains that are rich in CBD (this will encourage growers to develop and grow these strains).

## Public Policy and Legal Issues

### Drug Testing

THC is included in most urine drug screens that are used in the workplace for pre-employment, random, and for-cause testing. In the hospital setting, urine drug screens have been used as a diagnostic tool in the emergency department, on newborn babies if drug use is suspected, and in pain clinics when opioids are prescribed. Healthcare professionals should understand that drug screens are **not** diagnostic of drug abuse—they only help confirm recent drug use.

Cannabis is different from the other drugs included in the screening in that it can be detected in the urine for as long as a month after the last use (Gieringer, Rosenthal, and Carter, 2008). This is important to understand, because a positive urine drug screen for THC does not confirm impairment by cannabis.

Some clinicians believe they must confirm that the patient is not using cannabis before they can prescribe an opioid because it is illegal to provide an opioid to a narcotic addict. Cannabis is not a narcotic, but because it is an "illicit" drug many clinicians blindly include it in the testing. If the patient tests positive for THC, some clinics counsel the patient to quit and others either deny further treatment or simply stop prescribing any opioids.

With an understanding of the safety and efficacy of cannabis for management of chronic pain, one could question the value of including THC in the drug panel that is used to screen patients. One could further question the therapeutic value with pain patients of a urine drug screen for THC. If patients experience better pain management and require lower doses of opioids when using cannabis for pain management, how does it make sense for the healthcare provider to demand that the patient stop using the cannabis? If the only answer is that cannabis is illegal, one can wonder if the healthcare provider is practicing law rather than medication.

### Research Monopoly

As stated previously, NIDA allows the University of Mississippi to grow cannabis for research purposes, but NIDA is only interested in studies on the abuse potential or negative effects of cannabis and does not allow the cannabis to be used in studies regarding its medicinal value. This creates a "Catch 22" regarding the legal status of cannabis: Clinicians and legislators demand more research to validate the medical value of cannabis, but it is close to impossible to conduct clinical research on cannabis in the United States because of all of the legal restrictions.

A legal challenge is underway to allow for another research facility to grow medicinal-grade cannabis for research studies. Lyle Craker, of the University of Massachusetts, has applied for such a license and won his case before a DEA administrative judge. However, the ruling has been ignored, and to date cannabis can only be legally grown at the University of Mississippi farm (Craker, 2010).

## Veterans

Over the years, numerous combat veterans have found cannabis helpful in managing symptoms of posttraumatic stress as well as chronic pain related to wounds or injuries. In July 2010, the Undersecretary of Health for the Department of Veterans Affairs issued a directive to the healthcare providers of the Veterans Administration that provided some access to some veterans (VHA Directive 2010-035). Because cannabis remains illegal under federal law, the VA physicians still cannot recommend it to their patients, but this directive states that if a veteran lives in a medical marijuana state and has a recommendation for cannabis from a civilian physician, then the VA will treat that as medication and will continue to treat the veteran. However, this creates another problem—in effect, this directive allows veterans access to cannabis based on their geographic location and thus creates unequal treatment for veterans.

## Nursing Implications

As a healthcare professional, it is important that you use the proper name of the plant, *cannabis*, rather than the derogatory term, *marijuana*. Using the term *cannabis* lets others know that you are aware of its long history as a medication and allows you to educate others on its medicinal value. Using the correct term can help change the negative image associated with marijuana.

Learn more. Since 2000 Patients Out of Time has co-sponsored an accredited biennial series of national clinical conferences on cannabis therapeutics that feature international cannabis researchers, clinicians, and cannabis patients. All of the proceedings have been filmed and are available as DVD sets. In addition, much information is available on the website: [www.medicalcannabis.com](http://www.medicalcannabis.com). Based on the discovery of the endocannabinoid system and the value of cannabis as medication, a new specialty nursing organization has been created: the American Cannabis Nurses Association ([www.cannabisnurse.org](http://www.cannabisnurse.org)). Although in its infancy, this organization can be a resource to healthcare professionals who need or are interested in learning more about cannabis and the ECS.

Based on science, history, and compassion, there is no justification for the placement of cannabis in Schedule I. Because cannabis is a Schedule I drug, patients are denied safe and legal access to a medication that can relieve suffering and improve quality of life. Nursing leaders agree that healthcare professionals should be more involved in public policies, especially when they are health-related. We now have a variety of state laws that are meant to help patients gain access to this medication, but as long as it remains in Schedule I on the federal level, patients remain under threat of legal consequences for growing or possessing cannabis and healthcare providers are hesitant to recommend its use when there is no assurance of quality control. Healthcare professionals need to help correct this situation by being more proactive:

- Educate your legislator.
- Get your state association or professional specialty organization to pass a formal resolution supporting patient access to cannabis.
- Break the silence and discuss the medicinal use of cannabis with your co-workers.
- Encourage patients who use cannabis to use a vaporizer or other delivery forms rather than smoking it.
- In states that allow medicinal cannabis, work to create policies in healthcare facilities (hospitals, assisted-living facilities, clinics) to allow patient use of their medication.
- Request the medicinal use of cannabis as a topic at your professional conferences.

## References

- Abel EL. (1980). *Marihuana: The First Twelve Thousand Years*. New York: McGraw-Hill.
- Abrahamov A, Abrahamov A, Mechoulam R. (1995). An efficient new cannabinoid antiemetic in pediatric oncology. *Life Sciences* 56(23–24):2097–2102.
- Abrams D. (2010). Cannabinoid: opioid reactions. Presentation at The Sixth National Clinical Conference on Cannabis Therapeutics, April 17, 2010; co-sponsored by Patients Out of Time and the UCSF School of Medicine; held at the Crowne Plaza Hotel, Warwick, RI.
- Abrams D. (2002). Cannabis use with AIDS patients. Presentation at The Second National Clinical Conference on Cannabis Therapeutics, May 3, 2002; co-sponsored by Patients Out of Time and the Oregon Department of Human Services, Health Services; held at the Holiday Inn, Portland, OR.
- Abrams DI, Hilton JF, Leiser RJ, et al. (2003). Short-term effects of cannabinoids in patients with HIV-1 infection: A randomized, placebo-controlled clinical trial. *Annals of Internal Medicine* 139: 258–66.
- Aldrich M. (1997). History of therapeutic cannabis. In ML Mathre (Ed.), *Cannabis in Medical Practice: A Legal, Historical, and Pharmacological Overview of the Therapeutic Use of Marijuana* (pp. 35–55). Jefferson, NC: McFarland.
- Appendino G, Gibbons S, Giana A, et al. (2008). Antibacterial cannabinoids from *Cannabis sativa*: A structure-activity study. *Journal of Natural Products* 71:1427–30.
- Blumgartin, AS. (1919). *Materia Medica for Nurses*, 2nd Ed. New York: MacMillan.
- Bonnie RJ, Whitebread II (CH). (1974). *The Marihuana Conviction: A History of Marihuana Prohibition in the United States*. Charlottesville: University Press of Virginia.
- Chan PC, Sills RC, Braun AG, et al. (1996). Toxicity and carcinogenicity of delta-9-tetrahydrocannabinol in Fischer rats and B6C3F1 mice. *Fundamental and Applied Toxicology* 30(1):109–17.
- Craker L. (2010). Chasing the rainbow: Medical cannabis and the struggle to break the NIDA monopoly. Presentation at The Sixth National Clinical Conference on Cannabis Therapeutics, April 17, 2010; co-sponsored by Patients Out of Time and the UCSF School of Medicine; held at the Crowne Plaza Hotel, Warwick, RI.
- Crippa J. (2010). Cannabidiol for the treatment of neuropsychiatric disorders: Past, present and future. Presentation at The Sixth National Clinical Conference on Cannabis Therapeutics, April 17, 2010; co-sponsored by Patients Out of Time and the UCSF School of Medicine; held at the Crowne Plaza Hotel, Warwick, RI.
- Cushing R. (March 29, 2001). Pot shrinks tumors; government knew in '74. *San Antonio Current*, TX.
- Devane WA, Dysarz FA III, Johnson MR, et al. (1988). Determination and characterization of a cannabinoid receptor in rat brain. *Molecular Pharmacology* 34:605–13.
- Devane WA, Hanus L, Breuer A, et al. (1992). Isolation and structure of a brain constituent that binds to the cannabinoid receptor. *Science* 258:1946–49.
- Di Marzo V, Melck D, Bisogno T, De Petrocellis L. (1998). Endocannabinoids: Endogenous cannabinoid receptor ligands with neuromodulatory action. *Trends in Neuroscienc.* 21: 521–28.
- Diagnostic and Statistical Manual of Mental Disorders (DSM-IV). (1999).
- Dreher M. (1997). Cannabis and pregnancy. In ML Mathre (Ed.), *Cannabis in Medical Practice: A Legal, Historical and Pharmacological Overview of the therapeutic Use of Marijuana* (pp. 159–70). Jefferson, NC: McFarland.
- Freimuth N, Ramer R, Burkhard H. (2010). Anti-tumorigenic Effects of Cannabinoids Beyond Apoptosis. *Perspectives in Pharmacology* 332(2):336–44.

- Fride E, Bregman T, Kirkham TC. (2005). Endocannabinoids and food intake: Newborn suckling and appetite regulation in adulthood. (Review). *Exp Biol Med (Maywood)* 230(4):225–34.
- Frisher M, Crome I, Martino O, Croft P. (2009). Assessing the impact of cannabis use on trends in diagnosed schizophrenia in the United Kingdom from 1996 to 2005. *Schizophr Res* 113(2-3):123.
- Gieringer D, Rosenthal E, Carter G. (2008). *Marijuana Medical Handbook*. Oakland, CA: Quick American.
- Grotenhermen F. (2007) The toxicology of cannabis and cannabis prohibition. *Chemistry and Biodiversity* 4:1744–69.
- Grotenhermen F. (2005). Cannabinoids. *Current Drug Targets—CNS and Neurological Disorders* 4:507–30.
- Grotenhermen F, Russo E. (Eds.) (2002). *Cannabis and Cannabinoids: Pharmacology, Toxicology, and Therapeutic Potential*. NY: Haworth Integrative Healing Press.
- Hall W, Room R, Bondy S. (1999). Comparing the health and psychological risks of alcohol, cannabis, nicotine and opiate use. In: Kalant H, Corrigan W, Hall W, Smart R, eds. *The health effects of cannabis* pp. 477–508. Toronto: Addiction Research Foundation.
- Hampson AJ, Axelrod J, Grimaldi M. (2003). Cannabinoids as Antioxidants and Neuroprotectants. Patent No. US 6,630,507 B1. Date: 10/7/2003. U.S. Patent and Trademark Office.
- Hashibe M, Morgenstern H, Cui Y, et al. (2006). Marijuana use and the risk of lung and upper aerodigestive tract cancers: Results of a population-based case-controlled study. *Cancer Epidemiological Biomarkers Prevention* 15(10):1829–34.
- Henningfield JE, Benowitz NL. (1994, August 2). In Hilts PJ: Is Nicotine Addictive? It Depends of the Criteria You Use. *The New York Times* (p. C3).
- Herzode C, Roudot-Thoraval F, Nguyen S, et al. (2005). Daily cannabis smoking as a risk factor for fibrosis progression in chronic hepatitis C. *Hepatology* 42(1):63–71.
- Holland J. (Ed.). (2010). *The Pot Book: a Complete Guide to Cannabis*. Rochester, VT: Park Street Press.
- Izzo AA, Borrelli F, Capasso R, et al. (2009). Non-psychotropic plant cannabinoids: New therapeutic opportunities from an ancient herb. *Trends in Pharmacological Sciences* 30(10):515–27.
- Joy JE, Watson SJ, Benson JA. (1999). *Marijuana and Medicine: Assessing the Science Base*. Washington, DC: National Academy Press (Institute of Medicine). ISBN 0-309-07155-0.
- Lucas P. (2004). British Columbia Patient Surveys. Presentation at The Third National Clinical Conference on Cannabis Therapeutics, May 22, 2004; co-sponsored by Patients Out of Time and the University of Virginia Schools of Medicine, Nursing, and Law; held at the Omni Hotel, Charlottesville, VA.
- Macleod J, Davey Smith G, Hickman, M. (2006). Does cannabis use cause schizophrenia? *Lancet* 367(9516), 1055.
- Mathre ML. (1985). *Marijuana Disclosure to Health Care Professionals*. Unpublished master's thesis. Case Western Reserve University, Cleveland, Ohio.
- McPartland J. (2008). The endocannabinoid system: An osteopathic perspective. *JAOA* 108(10):586–600.
- McPartland JM, Russo E.B. (2001). Cannabis and cannabis extracts: Greater than the sum of their parts? *Journal of Cannabis Therapeutics* 1(3–4), 103–32.
- Mechoulam R. (2010a). Head trauma, osteoporosis, and Alzheimer's disease—an unexpected trio. Presentation at The Sixth National Clinical Conference on Cannabis Therapeutics, April 17, 2010; co-sponsored by Patients Out of Time and the UCSF School of Medicine; held at the Crowne Plaza Hotel, Warwick, RI.

Mechoulam R. (2010b). Cannabis: Opening new vistas in both therapy and chemical biology. Presentation at The Sixth National Clinical Conference on Cannabis Therapeutics, April 16, 2010; co-sponsored by Patients Out of Time and the UCSF School of Medicine; held at the Crowne Plaza Hotel, Warwick, RI.

Melamede R. (2006). Cannabinoids and the Physics of Life. Presentation at The Fourth National Clinical Conference on Cannabis Therapeutics, April 7, 2006; co-sponsored by Patients Out of Time and UCSF School of Medicine; held at Santa Barbara City College, Santa Barbara, CA.

Munro S, Thomas KL, Abu-Shaar M. (1993). Molecular characterization of a peripheral receptor for cannabinoids. *Nature (London)*. 365:61–65.

Munson AE, Harris LS, Friedman MA, et al. (1975). Antineoplastic activity of cannabinoids. *Journal of the National Cancer Institute* 55(3): 597–602.

National Commission on Marihuana and Drug Abuse. (1972). *Marihuana: A Signal of Misunderstanding*. New York: New American Library.

New Mexico Department of Health. (2011). *New Mexico Medical Cannabis Program Patient Numbers (as of 6/15/11)*. Retrieved June 29, 2011 from [http://nmhealth.org/IDB/mcp\\_reports.shtml](http://nmhealth.org/IDB/mcp_reports.shtml).

Oregon Health Authority. (2011). *Oregon Medical Marijuana Statistics*. Retrieved June 29, 2011 from <http://public.health.oregon.gov/DiseasesConditions/ChronicDisease/MedicalMarijuanaProgram/Pages/data.aspx>.

Pacher P, Bátkai S, Kunos G. (2006). The endocannabinoid system as an emerging target of pharmacotherapy. *Pharmacological Reviews* 58(3):389–462.

Plasse T. (2002). Antiemetic effects of cannabinoids. In: Grotenhermen F and Russo E. (Eds.), *Cannabis and Cannabinoids: Pharmacology, Toxicology and Therapeutic Potential* (pp. 165–80). New York: Haworth Integrative Healing Press.

Randall R. (Ed.). (1988). *Marijuana, Medicine, and the Law*. Washington, DC: Galen Press.

Randall R, O'Leary A. (1998). *Marijuana Rx: The Patients' Fight for Medicinal Pot*. New York: Thunder's Mouth Press.

Reiman A. (2008). *Compassion Clubs of California*. Presented at The Fifth National Clinical Conference on Cannabis Therapeutics, April 5, 2008; co-sponsored by Patients Out of Time and the UCSF School of Medicine; held at Asilomar Conference Grounds, Pacific Grove, CA.

Rhode Island Department of Health. (2011). *Medical Marijuana Program Patients by Diagnosis in Rhode Island, 2011*. Retrieved June 14, 2011 from

<http://www.health.ri.gov/publications/programreports/MedicalMarijuana2011.pdf>.

Richmond L. (Writer, Director). (2010). *What if Cannabis Cured Cancer (DVD)*. Len Richmond Films.

Russo EB, Guy GW, Robson PJ. (2007). Cannabis, pain, and sleep: Lessons from therapeutic clinical trials of Sativex, a cannabis-based medicine. *Chemistry and Biodiversity* 4:1729–43.

Russo E. (2004). Clinical endocannabinoid deficiency (CECD): Can this concept explain therapeutic benefits of cannabis in migraine, fibromyalgia, irritable bowel syndrome, and other treatment-resistant conditions? *Neuroendocrinology Letters* 25(1–2): 31–39.

Schnelle M, Strasser F. (2002) Anorexia and cachexia. In Grotenhermen F and Russo E. (Eds.), *Cannabis and Cannabinoids: Pharmacology, Toxicology and Therapeutic Potential* (pp. 153–64). New York: Haworth Integrative Healing Press.

Sidney S, Beck JE, Tekawa IS, et al. (1997). Marijuana use and mortality. *American Journal of Public Health* 87(4):585–90.

Sylvester D, et al. (2006). Cannabis use improves retention and virological outcomes in patients treated for hepatitis C. *European Journal of Gastroenterology and Hepatology*. 18:1057–63.

Takahashi R. (2010). Cannabinoids and adverse memories in animals: Novel perspectives in the treatment of PRS(d). Presentation at The Sixth National Clinical Conference on Cannabis Therapeutics, April 17, 2010; co-sponsored by Patients Out of Time and the UCSF School of Medicine; held at the Crowne Plaza Hotel, Warwick, RI.

Tashkin DP. (2008). Does regular marijuana smoking lead to pulmonary or pulmonary-related disease (COPD, lung cancer, pneumonia)? Cohort- and population-based studies. Presented at The Fifth National Clinical Conference on Cannabis Therapeutics, April 4, 2008; co-sponsored by Patients Out of Time and the UCSF School of Medicine; held at Asilomar Conference Grounds, Pacific Grove, CA.

Teesson M, Lynskey M, Manor B, Baillie A. (2002). The structure of cannabis dependence in the community. *Drug and Alcohol Dependence* 68:255–62.

United States Congress. (1970). Controlled Substances Act (P.L. 91-513, 84 Stat. 1242). Retrieved June 29, 2011 from <http://www.enotes.com/major-acts-congress/controlled-substances-act>.

Weil A, Rosen W. (1993). *From Chocolate to Morphine: Everything You Need to Know About Mind-Altering Drugs*. Boston: Houghton Mifflin.

West M. (1997). The use of certain cannabis derivatives (Canasol) in glaucoma. In ML Mathre (Ed.), *Cannabis in Medical Practice: A Legal, Historical, and Pharmacological Overview of the Therapeutic Use of Marijuana* (pp.103–11). Jefferson, NC: McFarland.

Wu T-C, Tashkin DP, Djahed B, Rose JE. (1988). Pulmonary hazards of smoking marijuana as compared with tobacco. *New England Journal of Medicine* 318(6):347–51.

Young FL, and U.S. Department of Justice, Drug Enforcement Administration (DOJ/DEA). (1988, September 6). In the Matter of Marijuana Rescheduling Petition (Docket No. 86-22). Opinion and Recommended Ruling, Findings of Fact, Conclusions of Law and Decision of the administrative law judge Francis L. Young.

Zimmer L, Morgan JP. (1997). *Marijuana Myths, Marijuana Facts*. New York: The Lindesmith Center.

(Suggested Reading follows on next page)

## Suggested Reading

Anthony JC, Warner LA, Kessler RC. (1994). Comparative epidemiology of dependence on tobacco, alcohol, controlled substances and inhalants: Basic findings from the National Comorbidity Survey. *Experimental and Clinical Psychopharmacology* 2:244–68.

Bearman D. (2006). Clinical implications of the endocannabinoid system: PTSD, ADD, and beyond. Presentation at The Fourth National Clinical Conference on Cannabis Therapeutics, April 8, 2006; co-sponsored by Patients Out of Time and the UCSF School of Medicine; held at Santa Barbara City College, Santa Barbara, CA.

Bonnie RJ, Whitebread II. (1974). *The Marihuana Conviction: A History of Marihuana Prohibition in the United States* (chapter). Charlottesville: University Press of Virginia.

Gerdeman G. (2010). Cannabinoids and the neurobiology of reward, habit formation, and addiction. Presentation at The Sixth National Clinical Conference on Cannabis Therapeutics, April 16, 2010; co-sponsored by Patients Out of Time and the UCSF School of Medicine; held at the Crowne Plaza Hotel, Warwick, RI.

Grotenhermen F, Russo E. (Eds.) (2002). *Cannabis and Cannabinoids: Pharmacology, Toxicology, and Therapeutic Potential*. New York: Haworth Integrative Healing Press.

Joy JE, Watson SJ, Benson JA. (1999). *Marijuana and Medication: Assessing the Science Base*. Washington, DC: National Academy Press (Institute of Medication). ISBN 0-309-07155-0.

Mathre ML. (Ed.) (1997). *Cannabis in Medical Practice: A Legal, Historical and Pharmacological Overview of the Therapeutic Use of Marijuana*. Jefferson, NC: McFarland & Company.

Nutt M, Jeffries D, Skidmore P, McCormick A. (2004). Mothers know best. Presentation at The Third National Clinical Conference on Cannabis Therapeutics, May 21, 2004; co-sponsored by Patients Out of Time and the University of Virginia Schools of Medicine, Nursing, and Law; held at the Omni Hotel, Charlottesville, VA.

Pederson M. (2011). An interview with Joey's mom, Mieko Hester-Perez. *Medical Cannabis Journal* 1(2):13–22.

Russo EB, Mathre ML, Byrne A, et al. (2002). Chronic cannabis use in the Compassionate Investigational New Drug Program: An examination of benefits and adverse effects of legal clinical cannabis. *Journal of Cannabis Therapeutics* 2(1), 3–57.

Russo E, Dreher M, Mathre ML. (Eds.). (2003). *Women and cannabis: Medication, science, and sociology*. Binghamton, NY: Haworth Integrative Healing Press.

Russo EB, Grotenhermen F. (Eds.) (2006). *Handbook of Cannabis Therapeutics: From Bench to Bedside*. New York: Haworth Integrative Healing Press.

(Post Test begins on next page)

## Post Test

Use the Answer Sheet following the test to record your answers. There are 30 questions.

1. The Controlled Substances Act lists cannabis (marijuana) as a:
  - a. Schedule I substance.
  - b. Schedule 3 substance.
  - c. Schedule 4 substance.
  - d. Cannabis is no longer a controlled substance.
2. Marijuana was dropped as a medication by the U.S. Pharmacopoeia when:
  - a. The National Prohibition Act became law in 1919.
  - b. Prohibition was repealed in 1933.
  - c. "Marihuana" was taxed prohibitively in 1937.
  - d. The U.S. Congress made marijuana illegal in 1941.
3. President Nixon appointed the Shafer Commission to determine whether cannabis met the criteria for Schedule I. The Commission reported that:
  - a. They were unable to come to an agreement on the matter.
  - b. Cannabis did not meet the criteria for its assignment to Schedule I.
  - c. Cannabis met the criteria for Schedule III.
  - d. Cannabis should be treated similarly to heroin and cocaine.
4. The 1981 Alliance for Cannabis Therapeutics (ACT) opened the door to helping patients gain legal access to therapeutic cannabis. The result was:
  - a. Virtually no one applied under ACT because they still feared legal retribution.
  - b. It was a panacea for HIV-positive patients and thousands took advantage of it.
  - c. The government became alarmed by the increased demand for cannabis and closed access to the program.
  - d. State by state, patients were able to gain some form of legal access because of ACT.
5. By May 2011 sixteen states had medical marijuana laws, but:
  - a. Only states with such laws are exempt from federal prosecution.
  - b. State governors have the power to legalize cannabis within their own states.
  - c. Successful state voter referendums are the only mechanism for legalizing cannabis and circumventing the federal government.
  - d. Patients in all states are still at risk for federal prosecution.
6. In some states that have legalized medical cannabis:
  - a. The physician and patient must together attend a hearing and get a permit before the prescription for cannabis can be honored.
  - b. Only "recommendations," not prescriptions, are allowed by physicians.
  - c. Only a limited number of medical cannabis prescriptions can be written in the state each year.
  - d. Patients must be eligible for hospice before cannabis is legally available to them.

7. Cannabis has been grown and used for centuries. When the plant is grown for fiber and pulp it is called “hemp.” When grown for its leaves and buds it is called “cannabis.”
  - a. True
  - b. False
8. Cannabis is a dioecious plant, meaning that the seeds will grow into male or female plants. The female plant, without fertilization, is referred to as:
  - a. Sativa.
  - b. Sinsemilla.
  - c. Indica.
  - d. Cannabia.
9. More than one hundred cannabinoids occur in cannabis, and all of them are psychoactive.
  - a. True
  - b. False
10. Delta-9-tetrahydrocannabinol (THC) is the primary psychoactive cannabinoid found in cannabis, and Marinol is:
  - a. Synthetic THC available in capsule form.
  - b. An unregulated form of THC.
  - c. Available as “injectable THC.”
  - d. Illegal in all forms under federal law.
11. The endocannabinoid system (ECS) is:
  - a. A name for the body’s response to cannabis.
  - b. A system created by the federal government to regulate the desire for marijuana.
  - c. A molecular system in the human body that produces natural cannabinoids and has receptors for them.
  - d. A mechanism found only in humans.
12. A 1999 Institute of Medicine study on the medical value of cannabis found that:
  - a. More study was needed before meaningful results could be reported.
  - b. Except for the harms associated with smoking, any adverse effects of marijuana use are within the range tolerated for other medications.
  - c. The conditions of cancer and AIDS patients were negatively impacted by exposure to cannabis smoke.
  - d. The intraocular pressure of glaucoma patients was unaffected by cannabis.
13. Risks arising from the prohibition of cannabis can include all but one of the following:
  - a. Loss of grant funding for colleges and universities.
  - b. Revocation of professional license or loss of employment.
  - c. Loss of food stamps and right to live in public housing.
  - d. Revocation of the driver’s license.
14. Cannabis smoke does contain tar and other carcinogenic materials and from a health perspective it makes sense to avoid this route of administration.
  - a. True
  - b. False

15. When cannabis is used as an anti-anxiolytic medication, some novice users experience an acute panic reaction. Treatment includes:
- Providing a quiet, relaxing environment and reassurance that the patient is fine and the effects will soon wear off.
  - Countering with another anti-anxiolytic medication.
  - Feeding snacks to divert the patient's attention to "the munchies."
  - Explaining that cannabis is not a gateway drug and is not harmful.
16. **Tolerance** is defined as:
- Seeing no perceptible change in drug response over time.
  - Being free of side effects.
  - The need to increase the dose with chronic use in order to get the same effects.
  - Accepting medicinal use of cannabis in the face of federal prohibitions.
17. **Dependence** is defined as:
- Wanting to take the next dose before it is scheduled.
  - A drug-related physiological change in the central nervous system so that abrupt cessation causes withdrawal symptoms.
  - Thinking about the medication between doses.
  - Checking to see if there are still remaining refills on your prescription.
18. Abrupt cessation of medical cannabis can cause withdrawal symptoms that:
- Begin within minutes and last as long as 3 days.
  - Affect virtually all of the patients who have taken medical cannabis.
  - Include rashes and hives.
  - Are generally uncomfortable but not dangerous and do not require medical management.
19. **Addiction** is defined as:
- The need to sever relationships and live on the streets.
  - An overwhelming preoccupation with the compulsive use of a drug and securing its supply coupled with a high tendency to relapse if the drug is taken away.
  - Fear of withdrawal symptoms.
  - A tendency to choose illegal activities in all realms of life.
20. Which of the following common patient problems is **not** an indication for the use of cannabis?
- Eczema.
  - Nausea and vomiting.
  - Lack of appetite.
  - Depression and anxiety.
21. The term **medicinal-grade** means the cannabis:
- Has been carefully stored in a sunny, well-aired environment.
  - Contains aspergillus, which enhances its therapeutic properties.
  - Has been grown in a clean environment with no pesticides or nonorganic fertilizers.
  - Has maintained freshness through retaining stems and seeds.

22. Nonsmokers have no alternate inhalation route for therapeutic cannabis.
- True
  - False
23. A difficulty of taking cannabis by mouth is:
- It is irritating to the oral mucosa.
  - Onset of action is too fast, with resulting anxiety for some patients.
  - The patient may have to medicate more often because effects don't last as long.
  - Absorption through the gut is slower and less predictable.
24. Until cannabis is removed from Schedule I, you should begin by telling the patient and family:
- Everyone knows that cannabis is against the law, but it's OK to use it medicinally.
  - There are ways to obtain cannabis, and you can give them some leads.
  - Cannabis is illegal and you can't help them obtain it, plus they could be arrested if use is known to law enforcement.
  - Law enforcement tends to look the other way when cannabis is used for medication.
25. If you were legally prescribed cannabis in your own state, you can take your cannabis from state to state with no repercussions.
- True
  - False
26. When taking cannabis sublingually (under the tongue), start with:
- A few drops.
  - A half-teaspoon.
  - A teaspoon.
  - One ounce.
27. Urine drug screens for THC used in the workplace:
- Indicates possible ongoing drug abuse.
  - Do not confirm impairment by cannabis at the time of the test.
  - Confirm that the employee is a drug addict.
  - Can pick up on use of THC as much as a year earlier.
28. As of July 2011, the only place under federal law where cannabis can be legally grown is the University of Mississippi.
- True
  - False
29. Combat veterans have found cannabis helpful in managing symptoms of PTSD and chronic pain. The legal situation is:
- The federal Department of Veterans Affairs has exempted veterans from laws against use of cannabis.
  - VAs in the states can prescribe cannabis if their state is a medical marijuana state.
  - The Virginia VA will treat cannabis as a medication if the vet is from a medical marijuana state and has had a "recommendation" from a civilian physician.
  - The ACLU has sued on the basis that differences among the states is unequal treatment for veterans.

30. To support corrective legislation legalizing the medical use of cannabis:
- a. Meet with colleagues secretly to create advocacy groups.
  - b. Request the medicinal use of cannabis as a topic at your professional conferences.
  - c. Publically accuse your congresspersons of purposely withholding legalization due to outdated fears of addiction.
  - d. Encourage patients to smoke cannabis openly in defiance of current laws.

(Answer sheet follows on next page)

## Answer Sheet

### Cannabis (Marijuana) for Medical Use

Name (Please print your name): \_\_\_\_\_

Date: \_\_\_\_\_

Passing score is 80%

- |           |           |
|-----------|-----------|
| 1. _____  | 27. _____ |
| 2. _____  | 28. _____ |
| 3. _____  | 29. _____ |
| 4. _____  | 30. _____ |
| 5. _____  |           |
| 6. _____  |           |
| 7. _____  |           |
| 8. _____  |           |
| 9. _____  |           |
| 10. _____ |           |
| 11. _____ |           |
| 12. _____ |           |
| 13. _____ |           |
| 14. _____ |           |
| 15. _____ |           |
| 16. _____ |           |
| 17. _____ |           |
| 18. _____ |           |
| 19. _____ |           |
| 20. _____ |           |
| 21. _____ |           |
| 22. _____ |           |
| 23. _____ |           |
| 24. _____ |           |
| 25. _____ |           |
| 26. _____ |           |

(continued on next page)

## Course Evaluation

Please use this scale for your course evaluation. Items with asterisks (\*) are required.

5 = Strongly agree

4 = Agree

3 = Neutral

2 = Disagree

1 = Strongly disagree

- \*1. Upon completion of the course, I was able to:
- a. Summarize the myths and truths about cannabis as a medication.  
 5    4    3    2    1
  - b. Identify phytocannabinoids, and contrast Marinol with cannabis occurring in nature.  
 5    4    3    2    1
  - c. Explain the endocannabinoid system and its implications for the use of cannabis as medication.  
 5    4    3    2    1
  - d. Comment on the generally supposed health risks related to cannabis.  
 5    4    3    2    1
  - e. Discuss the dosage and routes of administration of cannabis.  
 5    4    3    2    1
  - f. Describe elements of patient and family education regarding cannabis.  
 5    4    3    2    1
  - g. Debate the public policy and legal issues associated with the medicinal use of cannabis.  
 5    4    3    2    1
- \*2. The course was written in a way that facilitated my learning.  
 5    4    3    2    1
- \*3. This course was free from commercial bias.  
 5    4    3    2    1
- \*4. The course met my continuing education needs.  
 5    4    3    2    1
- \*5. The material presented was supported by evidence.  
 5    4    3    2    1



## Registration Information

Please answer all of the following questions (\*required).

\* Name: \_\_\_\_\_

\* Address: \_\_\_\_\_

\* City: \_\_\_\_\_ State: \_\_\_\_\_ Zip: \_\_\_\_\_

\* Phone: \_\_\_\_\_

\* Professional Designation: \_\_\_\_\_

\* License Number and State: \_\_\_\_\_

Please email my certificate:  Yes  No

Email (required if you want your certificate sent by email): \_\_\_\_\_

(If you request an email certificate we will **not** send a copy of the certificate by US Mail.)

### Payment Options

You may pay by credit card or by check.

Fill out this section only if you are **paying by credit card**.

3.5 contact hours: \$24

### Credit card information:

Name \_\_\_\_\_

Address (if different from above): \_\_\_\_\_

City: \_\_\_\_\_ State: \_\_\_\_\_ Zip: \_\_\_\_\_

Card type:  Visa  MC  American Express  Discover

Card number \_\_\_\_\_ CVS # \_\_\_\_\_

Expiration date \_\_\_\_\_

### Test Completion and Mailing Instructions

1. Complete all forms:

- Answer Sheet
- Evaluation Learning Activity
- Registration Form (this page)

2. If you are **paying by check**, prepare a check for \$24 made out to ATrain Education, Inc.

3. Mail the completed forms and your payment to:

ATrain Education, Inc  
5171 Ridgewood Rd  
Willits, CA 95490

When we receive your forms and payment, we will mail (or email, if you request it) your certificate of completion. If you have any questions or concerns, please call or contact us at Sharon@ATrainCEU.com. And thanks for taking the ATrain!