



# The Medicinal Benefits of Cannabis

marQaha is committed to educating the consumer and general public on the deep medicinal benefits of Cannabis. This brochure is a detailed introduction to the many facets of this amazing plant. We look forward to continuing this path by keeping the medical cannabis community well informed on the latest news and research through our own efforts and by relaying the advancements made in the global medical community.

## INTRO

Cannabis is Nature's gift to us, a plant with many uses. People have used this beneficial plant for thousands of years, yet the complex chemistry of this amazing plant is only beginning to be understood.

To help educate the consumer on the deeper medicinal benefits of cannabis, this brochure lists the common cannabinoids, terpenes and flavonoids found in cannabis plants, along with some of their known effects and a spectrum analysis of the plant for better understanding. [Enjoy!](#)

## WHAT'S IN YOUR CANNABIS?

Cannabis plants produce a complex blend of bioactive compounds, primarily cannabinoids and terpenes or terpenoids, and also flavonoids. The cannabinoids and terpenes are concentrated in the sticky flowering tops, also known as colas, whereas the flavonoids are spread throughout the plant.

The spectrum of cannabinoids in a specific cannabis strain is known as its cannabinoid profile. Most of these compounds are not psychoactive, yet they synergize together in complex ways. For example, the psychoactivity of THC is modified by interactions with other cannabinoids such as CBD and THCV. These cannabinoids bind to the CB1 and CB2 receptor sites on cells in the human body, and there may be other receptor sites that we are only now discovering. The CB1 receptor sites are found especially in the nervous system and also in the reproductive system, and the CB2 receptor sites are found mostly in the immune system, especially in the spleen.

THC and other cannabinoids found in cannabis are called phytocannabinoids, or cannabinoids from plants. Our bodies also produce their own cannabinoids, called endocannabinoids, such as anandamide, also known as AEA, short for N-arachidonylethanolamine. Another endocannabinoid is 2-AG or 2-arachidonoyl glycerol. 2-AG is present in human mothers' milk. The endocannabinoids



function as intercellular messengers, but their mode of action tends to be more localized, and they are lipid-soluble, unlike neurotransmitters such as serotonin.

In addition, the complex set of interactions between the cannabinoids is further affected by the presence of a wide spectrum of terpenes found in cannabis plants.

Terpenes, also referred to as terpenoids, are a class of chemical compounds that are present in many of the plants we eat, and which contribute to their scent or taste. Large quantities of terpenes are present in cannabis flowering tops. For example, the smells of citrus fruits are from terpenes like limonene, a common terpene in cannabis, which has anti-cancer properties, and helpful against depression. Pine trees have a piney smell due to terpenes such as alpha-pinene, also present in cannabis. Alpha-pinene helps memory, and acts as a bronchodilator. Mangoes contain beta-myrcene, a terpene also found in cannabis in large quantities, which synergizes with THC and is analgesic, anti-inflammatory and antibiotic. Eating a mango an hour before smoking cannabis, according to Ed Rosenthal, author of *The Big Book of Buds*, volumes 1-4, may improve the vibrancy of the effects one experiences, due to the beta-myrcene in the mango interacting with the THC and other cannabinoids in the cannabis.

Flavonoids are polyphenols found in plants and constituents of many foods we eat. “Preliminary research indicates that flavonoids may modigy allergens, viruses, and carcinogens, and so may be biological “response modifiers.” In vitro studies show that flavonoids also may have anti-allergic, anti-inflammatory, anti-microbial, and anti-cancer activities.” (Wikipedia)

Flavonoids act as antioxidants in the human body, and they may help in the prevention of certain cancers and cardiovascular diseases.

## SPECIES OF CANNABIS PLANTS

There are three primary species of cannabis, indica, sativa and ruderalis.

**Cannabis indica** tends to have wider leaves and denser flowering tops, a shorter, bushy appearance, as well as often having more sedative effects.

**Cannabis sativa** generally has more slender leaves, airy flowering tops, often a tall, gangly appearance, and a more active, cerebral, and energetic high. Most indicas take less time for their flowering tops, known as colas, to mature. Indicas and sativas have been hybridized to produce strains that blend characteristics of both species.

A third species, **Cannabis ruderalis**, is a small plant native to Russia, and is a short-season cannabis plant that begins flowering dependent on the age of the plant. Cannabis indica and Cannabis sativa are photoperiod species, in that the length of the day determines the onset of flowering. Cannabis

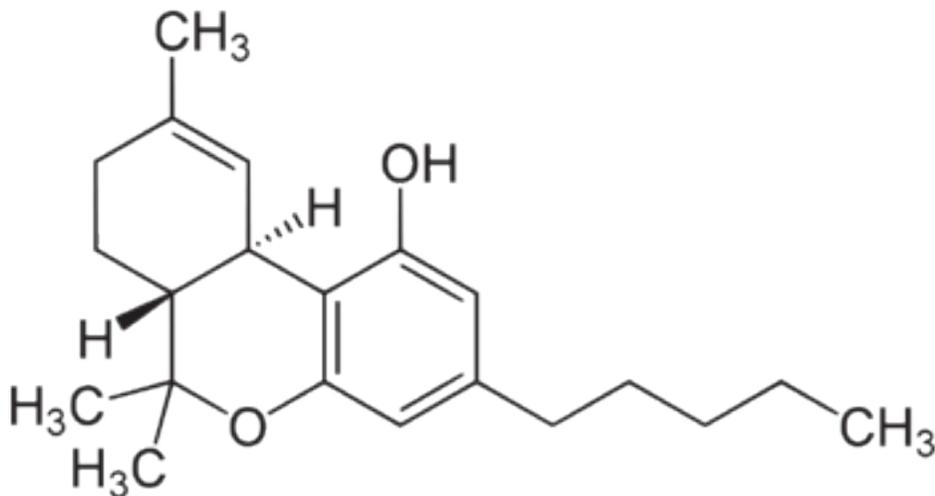


ruderalis is very low in THC, and is only used in some hybrids designed for cultivation in northern areas with a short growing season.

## INTRODUCTION TO PRIMARY CANNABINOIDS:

Over 85 cannabinoids have been isolated from *Cannabis indica* and *Cannabis sativa*. The following cannabinoids are the most common, and are the focus of intensive research at this time. Also listed here is anandamide, or AEA, the best known of our body's own endocannabinoids.

### THC

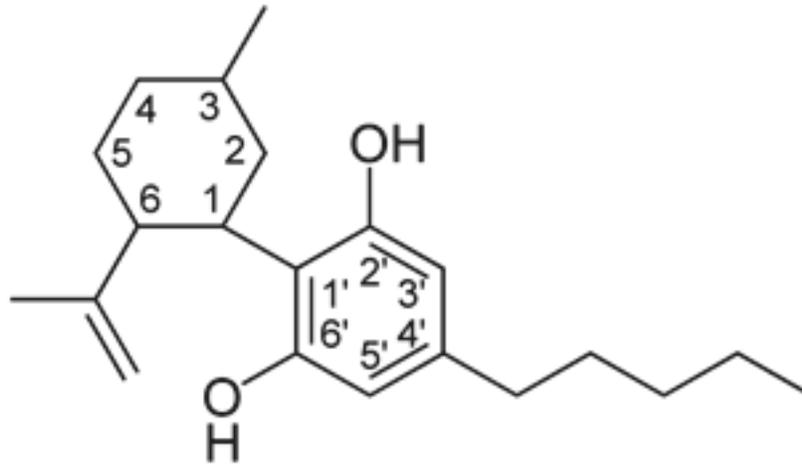


THC is well known for its psychoactivity. THC or tetrahydrocannabinol has many effects including elevation of mood, alteration of awareness, and increasing appetite. THC is the predominant cannabinoid in the majority of strains of medical cannabis, and is primarily responsible for the euphoric high of cannabis via the CB1 receptor sites in the nervous system. THC binds equally to CB1 and CB2 receptor sites in the body.

Benefits and effects of THC: psychoactive, sensory enhancement, euphoria, elevation of mood, anti-cancer, anti-nausea, anti-viral, relief for pain, improves appetite, help for glaucoma, mitigates spasms, muscle relaxant, antimicrobial, neuroprotective, help for autoimmune disorders such as Crohn's disease, anti-inflammatory, and antioxidant.



## CBD

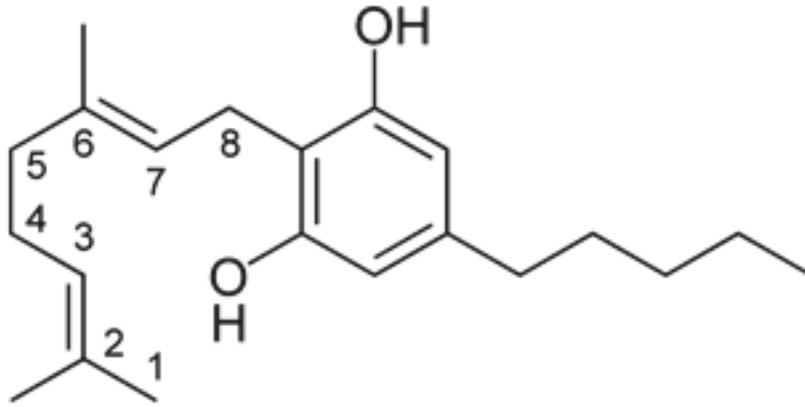


Although not psychoactive, CBD or cannabidiol modifies the effects of THC. CBD has great medical potential, with numerous effects including anti-cancer, anti-nausea, and pain reduction. CBD binds more to the CB2 receptor site than to the CB1 receptor site, and it also has been found to be a 5-HT 1A receptor agonist, giving CBD anti-depressant, anxiolytic, and neuroprotective effects. CBD also binds to the vanilloid receptor TRPV1, which regulates sensations of pain, and this helps to explain how CBD acts as an analgesic in the human body. Strains with lower THC may have higher levels of CBD.

Benefits and effects of CBD: non-psychoactive, extensive effects include anti-cancer, anti-nausea, relief for pain, causes drowsiness or sedation, mitigates spasms, mitigates seizures, anxiolytic, muscle relaxant, antibacterial, neuroprotective, anti-diabetic, improves blood circulation, help for autoimmune disorders such as Crohn's disease and psoriasis, bone stimulant, help for rheumatoid arthritis, and a neuroprotective antioxidant.



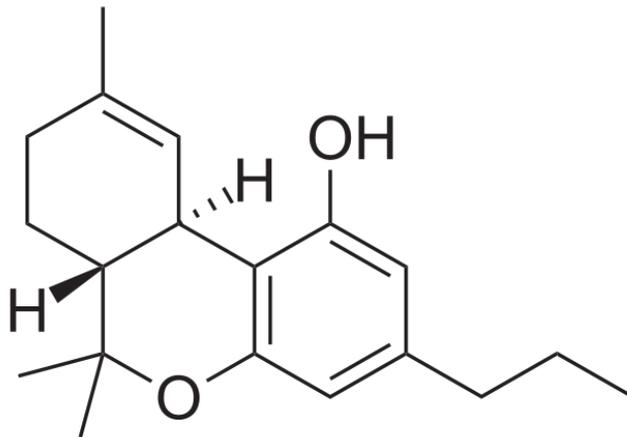
## CBG



Not psychoactive, CBG or cannabigerol is commonly found in large quantities in fiber hemp. Certain medical strains have considerable CBG, which has promise for its anti-tumor qualities. CBG binds to the CB2 receptor site, as well as being a CB1 receptor antagonist. It also is an alpha-2 adrenergic receptor agonist and a 5-HT 1A receptor antagonist.

Benefits and effects of CBG: non-psychoactive, promising as an anti-cancer agent, antibacterial, lowering of blood pressure, anti-inflammatory, and bone stimulant.

## THCV

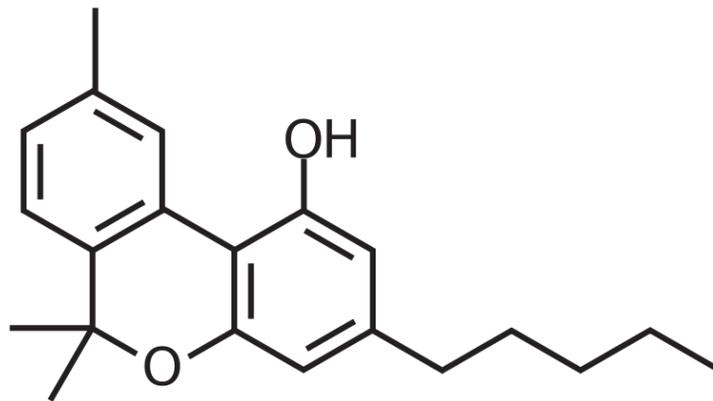




Closely related to THC, THCV or tetrahydrocannabivarin has a shorter 'tail' in its chemical structure, and it is not psychoactive. THCV is an antagonist at the CB1 and CB2 receptor sites, and tends to moderate some of the effects of THC. THCV is present in certain strains of cannabis, notably ones originating from Southeast Asia or South Africa. THCV has potential as an appetite suppressant and may also help with diabetes.

Benefits and effects of THCV: modifies the high from THC as it is a CB1 receptor site antagonist, decreases appetite, mitigates seizures, and a bone stimulant.

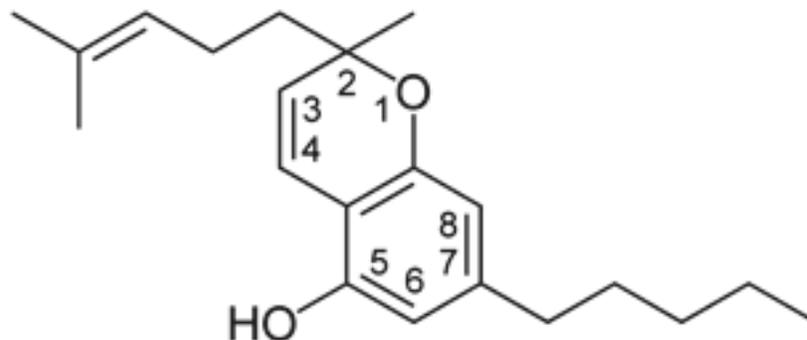
## CBN



Cannabinol (CBN) is primarily a decomposition product of THC from exposure to heat or light, very little CBN is found in fresh plants. CBN or cannabinol has only mild psychoactivity, and may cause drowsiness, as well as being antispasmodic. This is why freshly harvested cannabis buds may be more vibrant and awake than buds with higher levels of CBN that have been sitting around for a while.

Benefits and effects of CBN: somewhat psychoactive, relief for pain, causes drowsiness, mitigates spasms, help for glaucoma, neuroprotective, anti-inflammatory, and antioxidant.

## CBC

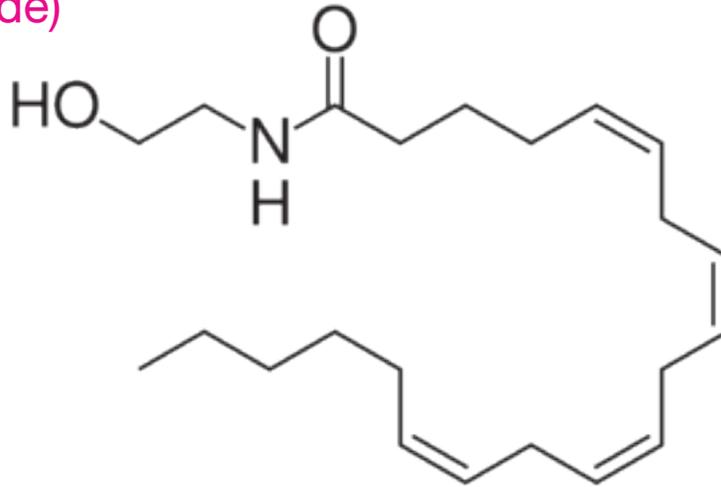




Cannabichromene or CBC is not psychoactive.

Benefits and effects of CBC: anti-cancer, antibacterial, antifungal, anti-inflammatory, analgesic, and bone stimulant.

### AEA (Anandamide)



Your Body already knows and produces its own type of cannabis called an EndoCannabinoid. Endocannabinoids are substances produced from within the body that activate cannabinoid receptors. After the discovery of the first cannabinoid receptor in 1988, scientists began searching for an endogenous ligand for the receptor. Here's the most recognized of that group:

Anandamide literally means, "bliss amide," according to Wikipedia, and it is one of the endocannabinoids found in the human body. Amazingly, anandamide is also present in chocolate from the tropical cacao tree, *Theobroma cacao*. (Wiki) This may be the reason that chocolate is sometimes called the "love drug." Anandamide, also known as AEA, short for N-arachidonylethanolamine, has a chemical structure unlike the phytocannabinoids found in cannabis, and it binds equally to the CB1 and CB2 receptor sites.

Benefits and effects of AEA: Anandamide regulates the function of our central nervous system and our immune system, via the CB1 and CB2 receptors. AEA also regulates appetite, memory, sensations of pleasure and pain, and sleep patterns. It also inhibits certain cancers, such as breast cancer in humans. In women, levels of anandamide are highest at ovulation. Like CBD, AEA also attaches to



the vanilloid receptors TRPV1, which are involved with the sensation of pain. Levels of anandamide in the brain may be increased by dietary essential fatty acids, especially arachidonic acid.

## TERPENES IN CANNABIS

Terpenes are the main components of the essential oils and resins found in most plants, and especially in cannabis plants. Their functions include limiting insect feeding, attracting pollinating insects, protecting plants from external agents like animals and environmental conditions, and as construction materials for other molecules. They have distinctive scents and, even more important, they synergize with and modify the effects of THC and other cannabinoids. The following are some of the common terpenes in cannabis:

**Beta-myrcene:** a monoterpene found also in large amounts in West Indian bay tree, mango, myrcia, verbena, cannabis and hops. Not found in fiber hemp plants. Used in the perfume industry, beta-myrcene smells like cloves, earthy, green vegetation, citrus, fruity, with mango and minty undertones. Ed Rosenthal, in *The Big Book of Buds*, states that eating a mango an hour before smoking cannabis can add “zing” to the quality of the high, due to the beta-myrcene in the mango. Beta-myrcene is found especially in tropical sativas. Analgesic, anti-inflammatory, muscle relaxing, anti-depressant and uplifting, antibiotic, blocks certain carcinogens such as aflatoxin B. Enhances absorption of cannabinoids, allowing more THC to reach cells in the brain, and probably synergizes with THC. Extremely high levels of beta-myrcene have been found in White Widow and probably Neville’s Haze.

**Limonene:** has the strong smell of oranges, and gives citrus fruits their distinctive scents. Relaxation effects, plus enhances alertness and focused attention, anti-depressant, anti-cancer, antibiotic and anti-fungal. Found in high amounts in lemons and other citrus, especially in citrus rind; also in rosemary, juniper, peppermint; and abundant in cannabis. Helps with absorption of other terpenes such as cannabinoids. Cannabis strains high in limonene are Lemon Skunk and Big Bang.

**Caryophyllene:** one variation, beta-caryophyllene, also known as BCP, binds to the CB2 receptor site, and it is the first known cannabinoid found in food. Most cannabis essential oil contains large amounts of beta-caryophylline. Beta-caryophylline is analgesic and anti-inflammatory; it is non-psychoactive. A major component of cloves and black pepper, it is also found in cinnamon, limes, carrots, celery, hops and many other food plants. Smells and tastes peppery, spicy, sweet, and woody, with elements of cloves and camphor.

**Pinene:** One form, beta-pinene, can increase mental focus and energy, and feelings of self-satisfaction; it inhibits acetylcholinesterase in the brain, and hence enhances memory. This explains why rosemary and sage, both high in beta-pinene, are considered “memory plants.” Beta-pinene also acts as an expectorant and bronchodilator. Beta-pinene is common in cannabis, and also eucalyptus oil, dill, parsley, rosemary, basil, yarrow, rose, hops, and sage; it has the familiar pine tree odor.



Alpha-pinene is found in pine trees and pine needles, essential oil of rosemary, and eucalyptus oil; high levels have been found in Super Silver Haze and possibly Great White Shark; it also smells like pine trees.

**Terpineol:** Terpineol has the scents of floral, lilac, apple and orange blossoms, limes. Terpineol reduces physical motility by nearly half in lab rats, possibly the source of couchlock in humans after smoking cannabis, and is present in some Afghan indica strains. Terpineol is a sedative, and its presence is often masked by pinene. Helpful for insomnia.

**Borneol:** smells like menthol or camphor, pine or woody; borneol is found in cinnamon and worm-wood or artemisia. This is calming, sedative and relaxing, used for fatigue, and recovery from stress or illness. Probably abundant in Silver Haze, which is calming, as well as psychoactive.

**Delta-3-Carene:** sweet, pine, cedar, woody, pungent. May contribute to dry eyes and mouth in cannabis smokers, as cedar oil, which has abundant delta-3-carene, has a drying effect on bodily fluids and secretions. Found in pine and cedar resin, and also in rosemary.

**Linalool:** has a sweet, floral scent like lily of the valley, with hints of spice. Found in lavender, neroli and other essential oils. Linalool is strongly sedative, especially when inhaled, and may lead a person into sleep. May be anti-cancer. The floral scent of linalool can be masked under the citrus scents of limonene.

**1,8-Cineole:** spicy, camphor, minty, refreshing. Found in eucalyptus and rosemary, 1,8-cineole is good for circulation and pain relief; effects are also thought-provoking and stimulating.

Sabinene: a monoterpene found in juniper berries, marjoram and black pepper, and is a major constituent of carrot seed oil. Sabinene has a spicy scent, and may act as an anti-depressant. Sabinene is found in high amounts in Super Silver Haze and in Arjan's Ultra Haze #1.

There are many other terpenes found in cannabis. We are only beginning to understand their effects and interactions with the phytocannabinoids of cannabis and the endocannabinoids in our bodies.

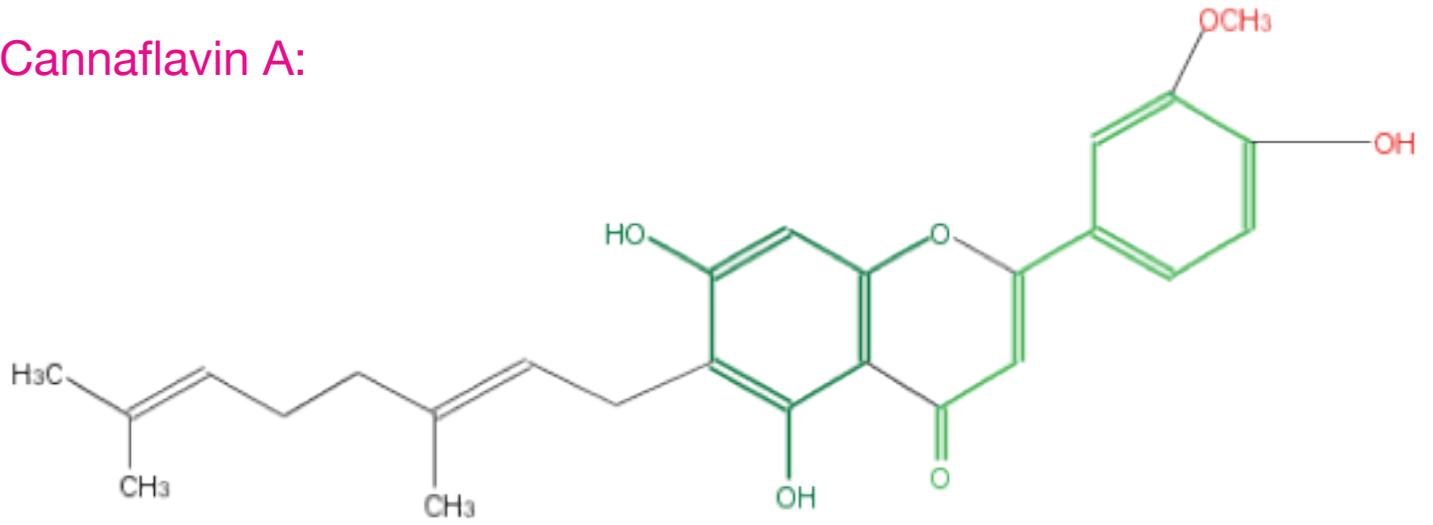
## COMMON FLAVONOIDS IN CANNABIS

Flavonoids in cannabis have now come under scrutiny for their various effects. The following are the most common flavonoids in Cannabis sativa.

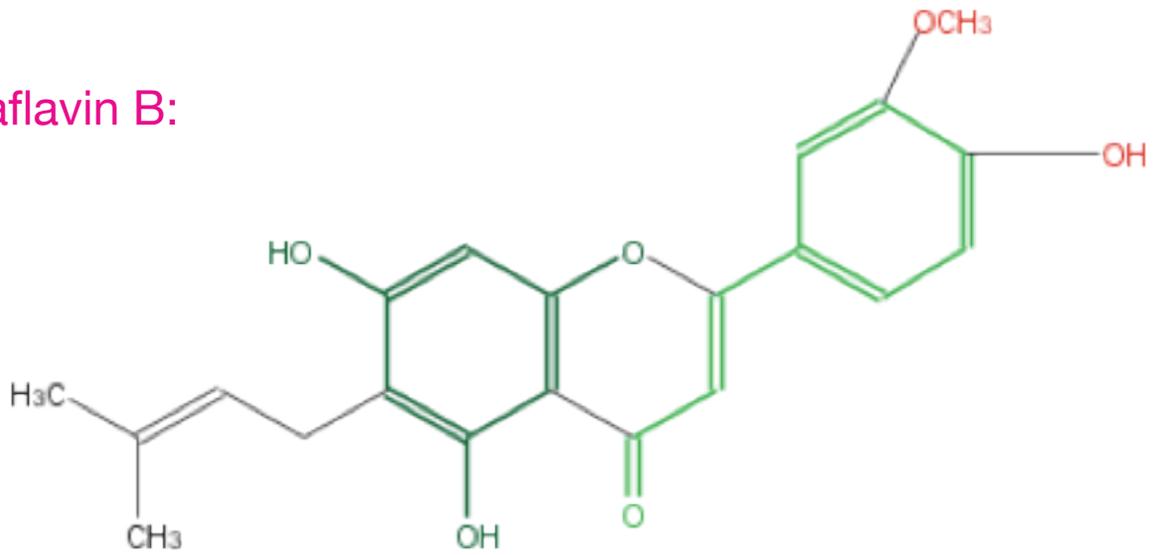
Cannflavin A and B: COX-2 inhibitor (anti-inflammatory and pain relief, as well as potentially anti-cancer), and Lipoxygenase (LO) inhibitor (anti-inflammatory). Cannflavin A and B appear to be the prevalent flavonoids in cannabis. Both cannflavin A and B inhibit prostaglandin E2 production.



Cannaflavin A:



Cannaflavin B:





**Apigenin:** Anxiolytic (anti-anxiety anti-panic), anti-tumor, anti-depressant, and anti-inflammatory. Apigenin also facilitates the transport of monoamines within the body. It is a citrus flavonoid, and is found in parsley and celery.

**Quercetin:** Antioxidant, antimutagenic, antiviral, antihistamine, and antineoplastic (anti-cancer/tumor). One in-vitro study indicated that the combination of quercetin and resveratrol (binds to CB1 as a reverse agonist) inhibited the production of fat cells.

## NON-CANNABIS PHYTOCANNABINOIDS

Recently a number of phytocannabinoids have been discovered and researched. The first one discovered was beta-caryophylline, a terpene that binds to the CB2 receptor site. In addition, trans-resveratrol (a polyphenol found in red grapes) and curcumin (a polyphenol found in turmeric, a plant in the ginger family) have been found to bind to the CB1 receptor site. Both trans-resveratrol and curcumin act as inverse agonists at the CB1 site, which means that they modulate effects of agonists that occupy that receptor site. Both trans-resveratrol and curcumin are anti-inflammatory and COX2 inhibitors, and may help prevent cancer. In addition, recent research indicates that these nontoxic polyphenols or derivatives thereof may be effective for weight loss therapy.



# The Spectrum of the Cannabis Plant



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## GLOSSARY:

**Terpenes:** Terpenes and terpenoids are the primary constituents of the essential oils of many types of plants and flowers. Essential oils are used widely as natural flavor additives for food, as fragrances in perfumery, and in traditional and alternative medicines such as aromatherapy. Synthetic variations and derivatives of natural terpenes and terpenoids also greatly expand the variety of aromas used in perfumery and flavors used in food additives. Vitamin A is a terpene.

Terpenes are released by trees more actively in warmer weather, acting as a natural form of cloud seeding. The clouds reflect sunlight, allowing the forest to regulate its temperature.

The aroma and flavor of hops, highly desirable in some beers, comes from terpenes. Of the terpenes in hops myrcene,  $\beta$ -pinene,  $\beta$ -caryophyllene, and  $\alpha$ -humulene are found in the largest quantities

**Sesquiterpenes:** A class of terpenes that consist of three isoprene units and have the molecular formula  $C_{15}H_{24}$ . Like monoterpenes, sesquiterpenes may be acyclic or contain rings, including many unique combinations. Biochemical modifications such as oxidation or rearrangement produce the related sesquiterpenoids.



Sesquiterpenes are found naturally in plants and insects, as semiochemicals, e.g. defensive agents or pheromones.

**Cannabinoids (THC,THCV,CBD,CBN,CBG,CBC):** A class of diverse chemical compounds that act on cannabinoid receptors on cells that repress neurotransmitter release in the brain. These receptor proteins include the endocannabinoids (produced naturally in the body by humans and animals), the phytocannabinoids (found in cannabis and some other plants), and synthetic cannabinoids (manufactured chemically). The most notable cannabinoid is the phytocannabinoid  $\Delta$ 9-tetrahydrocannabinol (THC), the primary psychoactive compound of cannabis. Cannabidiol (CBD) is another major constituent of the plant, representing up to 40% in extracts of the plant resin. There are at least 85 different cannabinoids isolated from cannabis, exhibiting varied effects

**Chlorophyll:** A green pigment found in cyanobacteria and the chloroplasts of algae and plants. Its name is derived from the Greek words  $\chi\lambda\omega\rho\acute{o}\varsigma$ , chloros ("green") and  $\phi\acute{\upsilon}\lambda\lambda\omicron\nu$ , phyllon ("leaf"). Chlorophyll is an extremely important biomolecule, critical in photosynthesis, which allows plants to absorb energy from light

**Flavonoids:** Flavonoids (or bioflavonoids) (from the Latin word flavus meaning yellow, their color in nature) are a class of plant secondary metabolites. Flavonoids have been shown to have a wide range of biological and pharmacological activities in in vitro studies. Examples include anti-allergic, anti-inflammatory, antioxidant, anti-microbial (antibacterial, antifungal, and antiviral, anti-cancer, and anti-diarrheal activities

**Waxes:** Especially in warm climates, plants secrete waxes as a way to control evaporation and hydration.

**Pigments:** The primary function of pigments in plants is photosynthesis, which uses the green pigment chlorophyll along with several red and yellow pigments that help to capture as much light energy as possible.

**Pectins:** In plant biology, pectin consists of a complex set of polysaccharides (see below) that are present in most primary cell walls and are particularly abundant in the non-woody parts of terrestrial plants. Pectin is a major component of the middle lamella, where it helps to bind cells together, but is also found in primary cell walls.

The amount, structure and chemical composition of pectin differs among plants, within a plant over time, and in various parts of a plant. Pectin is an important cell wall polysaccharide that allows primary cell wall extension and plant growth. During fruit ripening, pectin is broken down by the enzymes pectinase and pectinesterase, in which process the fruit becomes softer as the middle lamellae break down and cells become separated from each other. A similar process of cell separation caused by the breakdown of pectin occurs in the abscission zone of the petioles of deciduous plants at leaf fall.

Pectin is a natural part of the human diet, but does not contribute significantly to nutrition. The daily intake of pectin from fruits and vegetables can be estimated to be around 5 g (assuming consumption of approximately 500 g fruits and vegetables per day).

In human digestion, pectin binds to cholesterol in the gastrointestinal tract and slows glucose



absorption by trapping carbohydrates. Pectin is thus a soluble dietary fiber.

Consumption of pectin has been shown to reduce blood cholesterol levels. The mechanism appears to be an increase of viscosity in the intestinal tract, leading to a reduced absorption of cholesterol from bile or food. In the large intestine and colon, microorganisms degrade pectin and liberate short-chain fatty acids that have positive influence on health (prebiotic effect)

**Sugars:** A short-chain, soluble carbohydrates, many of which are used in food. They are carbohydrates, composed of carbon, hydrogen, and oxygen. There are various types of sugar derived from different sources. Simple sugars are called monosaccharides and include glucose (also known as dextrose), fructose and galactose.

**Fats:** Plant fats/oils or vegetable oils are oils derived from plant sources, as opposed to animal fats or petroleum. There are three primary types of plant oil, differing both the means of extracting the relevant parts of the plant, and in the nature of the resulting oil:

1. Vegetable fats and oils were historically extracted by putting part of the plant under pressure, squeezing out the oil.
2. Macerated oils consist of a base oil to which parts of plants are added.

Essential oils are composed of volatile aromatic compounds, extracted from plants by distillation.

**Lignin:** A complex polymer of aromatic alcohols known as monolignols. It is most commonly derived from wood, and is an integral part of the secondary cell walls of plants and some algae. The term was introduced in 1819 by de Candolle and is derived from the Latin word lignum, meaning wood. It is one of the most abundant organic polymers on Earth, exceeded only by cellulose. Lignin constitutes 30% of non-fossil organic carbon and a quarter to a third of the dry mass of wood.

**Starches:** A carbohydrate consisting of a large number of glucose units joined by glycosidic bonds. This polysaccharide is produced by most green plants as an energy store. It is the most common carbohydrate in human diets and is contained in large amounts in such staple foods as potatoes, wheat, maize (corn), rice, and cassava.

**Cellulose:** An organic compound with the formula  $(C_6H_{10}O_5)_n$ , a polysaccharide consisting of a linear chain of several hundred to over ten thousand  $\beta(1 \rightarrow 4)$  linked D-glucose units. Cellulose is an important structural component of the primary cell wall of green plants

(Source for Glossary definitions, Wikipedia and private research)

# Cannabinoid Use Chart



## THC Δ9

Reduces vomiting and nausea  
Relieves pain  
Stimulate appetite  
Suppresses muscle spasms  
Cachexia  
Glaucoma  
Fatigue  
ADD/ADHD

## THC Δ8

Relieves Pain  
Appetite -Stimulating  
Analgesic

## THCA Δ9

Aids sleep  
Inhibits cancer cell growth  
Suppresses muscle spasms

## THCV

Reduces convulsions and seizures  
Promotes bone growth  
Diabetes

## CBDA

Reduces inflammation  
Inhibits cancer cell growth

## CBDV

Bone-stimulant

## CBG

Aids sleep  
Inhibits cancer cell growth  
Promotes bone growth  
Slows bacterial growth

## CBD

Antibacterial  
Anxiety  
Inhibits cancer cell growth  
Neuro-protective  
Promotes bone growth  
Seizures and convulsions  
Blood sugar levels  
Immune system support  
Inflammation  
Risk of artery blockage  
Nausea  
Pain  
Slows bacterial growth  
Suppresses muscle spasms  
Tranquilizing  
Treats psoriasis  
Vasorelaxant  
Cramps

## CBGA

Reduces inflammation  
Relieves pain  
Slows bacterial growth

## CBC

Inhibits cancer cell growth  
Promotes bone growth  
Reduces inflammation  
Relieves pain

## CBCA

Reduces inflammation  
Treats fungal infection

## CBN

Anti-spasmodic  
Anti-insomnia  
Analgesic

The Cannabis plant contains on average 70 types of cannabinoids. These are the chemical compounds created by the cannabis plant that are used to treat conditions from pain and epilepsy to cancer and nausea. They mirror the endocannabinoids that our bodies naturally produce illustrating our close relationship with the cannabis plant. There are three types of cannabinoids: phytocannabinoids (found in plants), synthetic cannabinoids (produced in the lab) and endocannabinoids (produced in the human body). Simply, they modulate communication between cells, and also help when a deficiency or problem with our endocannabinoid system exist. These cannabinoids bind to receptor sites throughout our brain (CB1 Receptors) and body (CB2 Receptors). Different cannabinoids have different effects depending on which receptors they bind to. For example, THC binds to receptors in the brain whereas CBD (cannabidiol) has a strong affinity for CB-2 receptors located throughout the body.



### THC Δ9

THC delta 9 or tetrahydrocannabinol is well known for its psychoactivity. Effects include: psychoactive, euphoria, sensory enhancement, anti-cancer, anti-nausea, pain relief, improves appetite, help for glaucoma, muscle relaxant, help for autoimmune disorders, and anti-inflammatory.

### THC Δ8

THC delta 8 is an analogue of THC Δ9 with antiemetic, anxiolytic, appetite-stimulating, analgesic, and neuroprotective properties and binds to the cannabinoid G-protein coupled CB1 receptor.

### THCA Δ9

Tetrahydrocannabinolic Acid is the acidic precursor to THC, which actually exists in only minute quantities in the living plant. In the live plant THCa is the most abundant cannabinoid. After harvest THCA begins to naturally convert to THC.

### THCV

THCV or tetrahydrocannabivarin is not psychoactive, but moderates some of the effects of THC. THCV is present in certain strains of cannabis, notably ones originating from Southeast Asia or South Africa. Effects include: decreases appetite, mitigates seizures, bone stimulant, and may help with diabetes.

### CBDA

Cannabidiolic Acid is not psychoactive. Initial research suggest that CBDA offers anti-emetic and anti-proliferative effects, making it ideal for fighting cancer. It also offers anti-inflammatory and anti-bacterial properties.

### CBDV

Cannabidivarin is similar to cannabidiol (CBD) and has anticonvulsant effects. Plants with relatively high levels of CBDV have been reported in feral populations of *C. indica* (= *C. sativa* ssp. *indica* var. *kafiristanica*) from northwest India, and in hashish from Nepal.

### CBG

Cannabigerol is not psychoactive. It is commonly found in large quantities in fiber hemp. Certain medical strains have considerable CBG, which has promise for its anti-tumor qualities. Effects include: promising as an anti-cancer agent, lowers blood pressure, anti-inflammatory, and bone stimulant.

### CBD

Cannabidiol is not psychoactive, yet it modifies the effects of THC. CBD has great medical potential, and effects include: anti-depressant, anti-cancer, anti-nausea, anxiolytic, pain relief, mitigates spasms, improves blood circulation, help for autoimmune disorders, and bone stimulant.

### CBGA

Through different forms of biosynthesis, Cannabigerolic acid (CBGA) becomes THCA, THC, CBDA, CBD, CBCA, CBC and CBG providing many of the medicinal elements of cannabis.

### CBC

Cannabichromene is not psychoactive. Effects include: anti-cancer, antibacterial, antifungal, anti-inflammatory, analgesic, and bone stimulant. It bears structural similarity to the other natural cannabinoids, including THC, THCV, CBD and CBN Evidence has suggested that it may play a role in the anti-inflammatory and anti-viral effects of cannabis, and may contribute to the overall analgesic effects of the plant.

### CBCA

Cannabichrome carboxylic acid (CBC-A) In this case of CBC-A, it obviously passes through the CBC synthase, or the enzymes that get the specific process underway. Over time, or quickly if exposed to heat, the CBC-A will lose a molecule of CO<sub>2</sub>; at this point it is considered CBC.

### CBN

Cannabinol is primarily a decomposition product of THC from exposure to heat or light, and very little CBN is found in fresh plants. CBN has only mild psychoactivity, and effects include relief from pain, causes drowsiness, mitigates spasms, help for glaucoma, and anti-inflammatory.

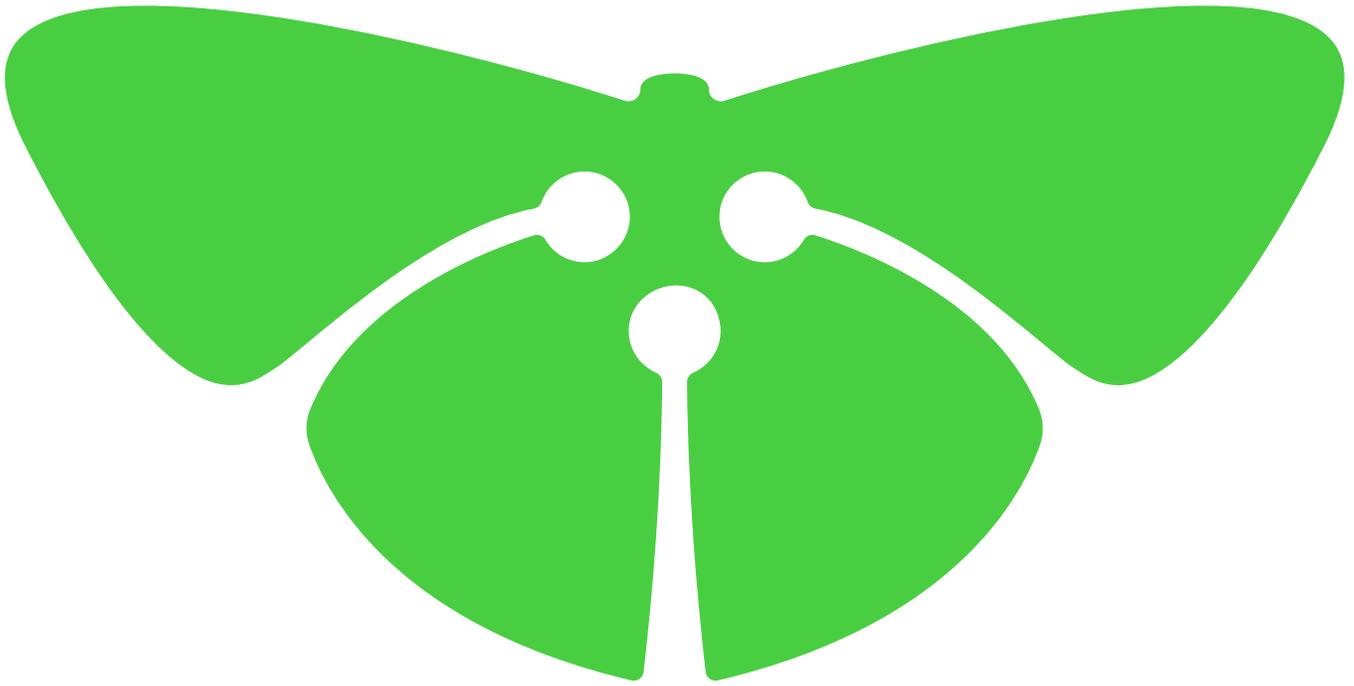
## Anandamide (AEA)

AEA, is one of the endocannabinoids found in the human body, and has a chemical structure unlike the phytocannabinoids found in cannabis. Anandamide regulates the functions of our central nervous system and our immune system. AEA regulates appetite, memory, sensations of pleasure and pain, our immune system, and sleep patterns. It also inhibits certain cancers, such as breast cancer in humans.

## The Receptors

CB1 receptors are found primarily in the brain. They are also present in both the male and female reproductive systems. CB1 receptors are absent in the medulla oblongata, the part of the brain stem responsible for respiratory and cardiovascular functions. Thus, there is not the risk of respiratory or cardiovascular failure that can be induced by some drugs. CB1 receptors appear to be responsible for the euphoric and anticonvulsive effects of cannabis

CB2 receptors are predominantly found in the immune system, with the greatest density in the spleen. CB2 receptors appear to be responsible for the anti-inflammatory and other therapeutic effects of cannabis.



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## Epilogue

Our goal with this educational brochure is to begin the conversation locally and globally on the many merits of this incredible species of plant. For a plant that has given the human race so much (food, fuel, medicine and clothing to name just a few), we have just scratched the surface in understanding it's true potential.

*Let's continue this journey together.*