

CBD 101: The Ultimate Guide to Cannabidiol

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Cannabidiol, (CBD) was tagged a few years back “as the most misunderstood compound on the planet,” by many CBD apologists. However, within the last 20 years, 33 states in the U.S. have approved the use of CBD obtained from marijuana for medical purposes. Also, at the Federal level, CBD from hemp is legal under the [2018 Farm Bill](#).

Cannabidiol, (CBD) popularity and usage by consumers in the U.S. marketplace are on the rise. Industry experts project that the CBD revenue will surpass \$2 billion by 2020. Based on recent surveys, about 7% of Americans use CBD products. According to [Cowen & Co](#) estimates predict a rise to usage by 10% of the population by 2025 as consumers search for superior alternative treatments for their ailments. CBD, according to [Consumer Reports](#), is most popular among younger people in their 20s; and less popular among seniors above 60 years of age. An examination of the data by gender has established that [women are more likely](#) to use CBD for wellness purposes while men utilize CBD for social and spiritual purposes.

Understanding CBD

What is CBD?

Cannabidiol (CBD), according to the [World Health Organization](#) (WHO), is one of the natural cannabinoids compounds present in cannabis plants. CBD is a 21-carbon terpene phenolic compound formed by the decarboxylation of a cannabidiolic acid precursor.

CBD is the [second most](#) common active ingredient in cannabis plants (marijuana). For many years it has been an important part of [medical marijuana](#). It is extracted directly from the hemp plant, a cousin of the cannabis plant. It is used to formulate products such as edibles, gummies, and oils that provide users with a provide a feeling of calm and relaxation.

[Findings](#) from preclinical and clinical research studies show that CBD has strong anti-convulsant, anti-inflammatory, anti-oxidant, anti-depressant, anti-tumor, anti-psychotic, and neuroprotective properties. CBD does not have intoxicating properties. It does not make people feel high. There are a lot of claims by CBD proponents that it can effectively treat conditions such as anxiety, chronic pain, rheumatoid arthritis, cancer, PTSD, MS, and cardiovascular disease. Research is ongoing in the U.S., and other parts of the world to ascertain the efficacy of CBD against these and other ailments.

Substance identification

- Physical appearance: A crystalline solid
- Molecular weight: 314
- Chemical Formula: C₂₁H₃₀O₂
- International Nonproprietary Name (INN) : Cannabidiol
- Chemical Abstract Service (CAS) Registry Number : 13956-29-1
- Other Chemical Names: CBD, 2-[1R-3-methyl-6R-(1-methylethenyl)-2-cyclohexen-1-yl]-5-pentyl-1,3- benzenediol;

Difference between CBD and THC?

CBD (cannabidiol) and THC (tetrahydrocannabinol) are the prominent natural cannabinoids present within cannabis Sativa plants. They have the same chemical formula and interact with the body's endocannabinoid system. However, there is a difference in the arrangement of their atoms. This accounts for their different effects upon the body.

CBD and THC, due to their different molecular structures, interact differently with CB1 and CB2 receptors in the endocannabinoid system. While the two natural products both bind with the CB2 receptor, their interaction with the CB1 receptor differs. According to the National Center for Biotechnology Information (NCBI), THC binds directly to CB1. This bonding, when completed, results in reactions that transmit signals to the brain responsible for the euphoria feelings associated with marijuana. Brain imaging studies reveal that the prefrontal cortex region of the brain experiences increased blood flow during THC intoxication. This region is responsible for attention, decision-making, and other executive functions, such as self-monitoring, task initiation, and organization. THC overdose can affect any of these executive functions to varying degrees depending upon the individual.

CBD, on the other hand, does not bind directly to the CB1 receptor. Its presence, according to research, can negate the connection between THC and the CB1 receptors in a process, neutralizing the intoxicating effects (or in other words "high") induced by THC.

THC is the main psychoactive compound in marijuana responsible for its intoxicating and euphoria inducing effects. It is available in tinctures, oils, capsules, edibles, and other forms. It can also be consumed by smoking marijuana. In contrast to THC, "CBD does not possess psychoactive properties. This makes it attractive for people who are not interested in the euphoric effects, but instead desire the other benefits that CBD offers", said Sara Ward, a pharmacologist at Temple University in Philadelphia.

According to the World Health Organization, CBD does not induce harmful effects when abused. There does not seem to be a potential for developing a dependence on the substance. In addition, there is no evidence to date of any public health-related problems linked to the use of pure CBD.

“CBD is an integral part of my training and post-fight regimen expediting my body’s natural healing process,” says Anthony. Sergio adds, “Rather than relying on potentially damaging anti-inflammatory drugs like Tylenol and Advil, I have been turning to CBD and am seeing incredible results with no side effects.”

Anthony and Sergio Pettis (Professional Mixed Martial Arts (MMA) and UFC Fighters)

Mechanism of Action: How does CBD work?

CBD and the Brain

Cannabinoid receptors present in the body are responsible for regulating many different processes. These include appetite, mood, pain sensation, and memory. The system is activated by naturally occurring endocannabinoids, by CBD, and by other plant cannabinoids present in hemp. Some means by which CBD exerts its therapeutic influences upon the body include:

1. CBD binds to other non-cannabinoid receptors and ion channels while THC binds strongly with CB1 receptors and CB2 receptors. CBD activates receptors that include the 5-HT1A (hydroxytryptamine) serotonin receptor, the vanilloid receptor and the adenosine receptors GPR55, and PPARs.
2. CBD also exerts its effect by acting through multiple receptor independent pathways. Receptors are tiny proteins on the surface of most cells. Receptors act as the ‘go-buttons’ on cell surfaces. When activated by compounds that fit into them, receptors instruct the cell concerning what to do or not to do. For instance; CBD delays the reuptake of endogenous neurotransmitters, such as adenosine and anandamide.

CBD functions as an antagonist by blocking or deactivating GPR55, another G protein-coupled receptor. CBD produces a different therapeutic effect depending upon the receptor or ion channel activated or inhibited.

Why CBD does not work for everyone

Perhaps you decided to try CBD due to the claims of those that have benefited from it. After trying it for weeks or months, you did not notice any improvement or positive changes in your health. You are not alone. But, before turning your back on CBD, there are four legitimate reasons why CBD may not work for you,

Wrong Dosage

This is a significant issue with CBD users. CBD effects vary from individual to individual. Therefore, it makes it difficult to give one-size-fits all dosage advice when it comes to CBD. Failure to take the right dose at the right time limits your chances of getting the full benefit. Factors like age, health history, gender, medical condition, weight, and ethnic background may affect the dosing required for optimal effect.

It is advisable to start low and go slow. By starting with a small dose and slowly increasing it after 4 or 5 days, you will find what is called your sweet spot. This is the dosing point, which activates your endocannabinoid system.

Low-Quality Product from Disputed Sources

There is currently a great deal of hype being offered about CBD, and many consumers are being taken advantage of by those creating fake news noise. CBD is available everywhere from online companies to over-the-counter shops. This raises a concern about the quality, especially in an industry is not yet regulated by the Food and Drug Administration (FDA). These market conditions provide perfect opportunities for scammers to make quick money by selling low-quality CBD products that are not as potent as claimed.

If you have been using a particular CBD product for weeks or months, and nothing has changed, you might need to try a different CBD product. Many CBD consumers have tried different brands until they eventually find one that works for them. Elements of selecting a quality CBD product include:

Pay close attention to online consumers' reviews of the products

You can find them here on our website and also on other trustworthy resources on the web.

Select CBD products from established brands

Some brands over the years have made a name for themselves in the CBD industry, due to the quality of their products. You can select a product from this list of favorite CBD products, and you will not have to worry about the quality of the product you are buying.

Ask for proof of third-party testing

Inquire about the evidence provided by a third party test. Lab testing can reveal the quantity of CBD present in the product.

Failure to Give it Enough Time

Our body chemistry is unique and each of us reacts differently to CBD. While some people might experience instant results this, however, does not apply to everyone. CBD might not work for you as fast as you envisaged. It might take weeks or months before you start noticing the changes you anticipated. You must stay committed to taking your dosage for weeks before calling it quits on a particular CBD brand.

Failure to try a Different Delivery System

CBD exists in various forms such as vape oil, tinctures, gummies, topical creams, and capsules. If you have been trying a particular delivery system without positive results, you should consider trying another delivery system. However, in selecting a delivery system, bioavailability should be the primary determinant. This regulates the quantity of the CBD that eventually gets into your bloodstream. For instance, tinctures are absorbed faster into the blood when compared to gummies that have to pass through the digestive tract before the CBD is absorbed.

Misguided Expectations

There is so much fuss in the media about what CBD can do. Many consumers have tried CBD only to be disappointed due to unrealistic expectations. It is essential to seek information regarding what CBD can or cannot do.

“CBD helps with pain, stress and anxiety. It has all the benefits of marijuana without the high.”

Jennifer Aniston (Actor, Film Producer and Business Woman)

Benefits of CBD

Research into CBD and the neural network that mediates anxiety indicates that CBD at high concentrations directly activates the 5-HT_{1A} (hydroxytryptamine) serotonin receptor. This, subsequently gives it an anti-anxiety effect. The G-coupled protein receptor involved activates several neurological signaling pathways. Activating these pathways can mediate appetite, anxiety, addiction, pain perception, nausea, sleep, and the vomiting response.

Sleep

There is a growing body of research that suggests CBD helps people with sleep disorders. To exert sedative effects, CBD activates the GABA receptors and the serotonin receptors in the endocannabinoid system of the brain. These receptors play important roles in modulating mood and anxiety, which are vital for sleep. GABA inhibits excess activity in the brain, thereby promoting relaxation

Anxiety

Research suggests that CBD produces a calming effect that eases the perception of anxiety in the central nervous system. CBD does this by activating the serotonin receptors.

According to Dr. James Murrough, the Director of the Mood and Anxiety Disorders Program at the Icahn School of Medicine at Mount Sinai, activation increases serotonin in the brain, thereby boosting your mood.

Depression

There is limited scientific evidence that exists to support the assertion that CBD can treat depression. However, research performed since 2014 provides valuable information concerning why CBD is considered useful in treating depression. CBD's positive interaction with serotonin receptors in the brain are considered by many to be a crucial element of therapy for managing depression.

Pain

CBD is judged to be effective in alleviating pain due to its anti-inflammatory properties. It reduces inflammation and promotes sleep by interacting with other receptors in the endocannabinoid system. Most of the scientific evidence that supports this claim was obtained from animal-based research. Currently, very little evidence obtained from human trials exists apart from testimonial claims.

Epilepsy seizure disorder

Epidiolex, a plant-based CBD product, was recently approved by the FDA to treat seizures in people two-years and older with Lennox-Gastaut syndrome (LGS) and Dravet syndrome.

Neuroprotection and neurodegenerative disease

CBD's anti-inflammatory properties make it a promising treatment for neurodegenerative disorders. According to NCBI, inflammation is responsible for the loss of neurons in the nervous system. This, in turn, is responsible for the decline in motor and cognitive function experienced by patients with neurodegenerative disorders.

Arthritis

CBD, according to a study published in the European Journal of Pain, reduces inflammation and symptoms of arthritis pain without any side effects. The data was obtained through an animal-based study. The researchers noticed a significant drop in arthritis pain when topical gel containing CBD was administered to rats for four days. As always, additional clinical evidence is needed to confirm this effect in humans.

Diabetes

A 2015 [study](#) contends that CBD exhibits anti-inflammatory effects in rats. Excess inflammation is documented to affect the magnitude of insulin resistance and the severity of type II diabetes. This could have beneficial effects on humans.

In 2016, researchers from the [University of Nottingham](#) in the U.K. demonstrated that CBD, together with tetrahydrocannabivarin (THCV), reduced blood glucose levels and boosted insulin production in people with type II diabetes. .

What you need to know

Dosing

CBD proponents would tell you that you cannot overdose CBD. They will suggest that you can take as much as you wish until you get to your stop spot. Caution is warranted as, [2.5 mg/kg twice daily \(5 mg/kg/day\)](#) is the recommended starting dose of the FDA approved CBD product, Epidiolex, for both children and adults. This can be doubled after a week to 10 mg/kg/day if the person does not experience any positive change. However, the maximum dose recommended is 20 mg/kg/day for both children and adults.

How long does CBD last or remain in your system?

How often should you take CBD and how long does it take to work?

[Medline Plus recommends](#) that the approved CBD product, Epidiolex, should be taken twice a day, and the dose should not exceed 20 mg/kg/day.

Our body systems differ, and the effect of CBD can manifest [from 5 minutes on upwards](#) depending on the individual. According to NIH, CBD is [detectable in your body fluid](#) for up to 30 days or more after last use. The length of time that CBD stays in your system depends on the number of doses, the frequency, your age, gender, body mass index, and ethnicity.

Currently, there is no definitive consensus regarding the length of time that CBD remains in the body. Research into this area is ongoing. The general rule of thumb is it takes an average of a week for CBD to leave your system entirely.

CBD Side effects

Some [research](#) shows that the use of CBD may cause several effects such as:

- Dry mouth
- Diarrhea

- Reduced appetite
- Change in mood
- Fatigue
- Nausea
- Drowsiness
- Nausea
- Vomiting

Pneumonia and a decreased level of oxygen in the blood or tissue are some infrequent side effects of CBD.

Liver damage, hypersensitivity drug reaction, and suicidal thoughts are some of the rare side effects of using CBD products.

Adverse reactions

A study reveals that CBD can cause adverse reactions such as digestive disturbances, irritability, sleepiness, and aggravation of seizures in children with refractory epilepsy.

Drug interactions

CBD interacts negatively with many drugs, though the degree fluctuates from one person to another. According to the Medline Plus, the use of CBD together with the partial drug list shown below may negatively affect one or more body systems. It is recommended not to take CBD together with these drugs. The full list is available here.

- Valproic acid
- Clobazam
- Eslicarbazepine
- Topiramate
- (Cytochrome P450 1A1 (CYP1A1) substrates)
- (Cytochrome P450 1A2 (CYP1A2) substrates)
- (Cytochrome P450 1B1 (CYP1B1) substrates)
- (Cytochrome P450 2B6 (CYP2B6) substrates)
- (Cytochrome P450 2C9 (CYP2C9) substrates)
- (Cytochrome P450 3A4 (CYP3A4) substrates)

Promising Future

CBD is a non-psychoactive compound derived from the hemp plant and cannabis. It does not produce intoxicating effects so it is unlike THC. Given the soaring popularity and acceptance of CBD across the globe, one can say that CBD is here to stay. There is

promising evidence from animal sources that shows CBD to be effective and safe. However, there is a need to exercise great caution until additional double blind, placebo controlled, human scientific research evidence is presented to verify the claims made.

With the current rapid pace of continuing research focused upon the effectiveness of CBD, the future looks bright. You should seek the opinion of your medical professional before starting any CBD treatment.

Medical Disclaimer

The Federal Food, Drug, and Cosmetic Act requires that we inform you that the efficacy of CBD or CBDV products has not been confirmed by FDA-approved research as a treatment for any medical condition. The information in this document is not intended to diagnose, treat, cure or prevent any disease.

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