CBD: Everything You Need To Know About Cannabidiol

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Do you know how CBD works? The medicinal potential of this cannabinoid might surprise you. Here's everything you've ever wanted to know about CBD.

Cannabidiol (CBD) came out to the world in a big way after this simple plant chemical stopped an epileptic seizure in its tracks on U.S. national television. In the time since, many enthusiasts have realized that this miracle compound can stop spasms, calm anxiety, and soothe those in chronic pain. But, what is CBD and how does it work? How is it different from THC? To help you become more familiar with the cannabinoid here is everything you need to know about CBD.

What is cannabidiol (CBD)?

Cannabidiol (CBD) is one of the most prevalent chemical compounds in the cannabis plant. Unlike the more famous molecule, tetrahydrocannabinol (THC), CBD is completely nonpsychoactive.

Don't expect to get "high" off of this organic chemical, however. CBD is all relaxation without intoxication.

While CBD still has an effect on your body, consuming CBD by itself isn't going to send you on the cerebral adventure associated with THC. For decades, medical professionals and the general public overlooked CBD because psychoactive cannabis took center stage.

Now, the medical potential of CBD has taken cannabis to mainstream audiences. Preclinical trials over the past four decades have found that the cannabinoid shows promise as an:

- anti-inflammatory
- antioxidant
- neuroprotectant
- anxiolytic
- antidepressant
- analgesic
- anti-tumoral agent
- anti-psychotic

CBD is often used by patients in the form of an oil. Patients with more chronic conditions such as cancer and epilepsy often use medical cannabis oil extracted from high-CBD varieties of cannabis.

How does CBD work?

Most predominant inside the resin glands (trichomes) of the female cannabis plant, CBD is one of over 80 chemical compounds known as cannabinoids. Cannabinoids are agonists that bind to special receptors on your cells, called cannabinoid receptors.

Certain receptors are heavily concentrated in the central nervous system while others are found in almost every organ of the body. Cannabinoid receptors are even found in the skin, digestive tract, and even in the reproductive organs.

You can think of agonists as keys and cannabinoid receptors as locks. By consuming cannabis, you are taking in agonists that interact with different locks on cells in the body. Together, these cell receptors make up a larger endocannabinoid system (ECS).

The ECS is a vast network of cell receptor proteins with many functions. Some describethe ECS as the greatest neurotransmitter system in the body. It lends a hand in seemingly just about everything, including:

- mood
- memory
- motor control
- immune function
- reproduction
- pain perception
- appetite
- sleep
- bone development

Four primary purposes of the ECS include neuroprotection, stress recovery, immune balance, and homeostatic regulation. The last one is a fancy way of referring to a system that creates optimum energy balance in the body.

Somehow, CBD seems to tap into this balancing system to produce its therapeutic effects. CBD is able to interact with cells in our bodies because the molecule has a similar composition to similar chemicals that the human body produces naturally, called endocannabinoids.

Endo means inside and cannabinoid refers to action on cannabinoid receptors. In contrast, the cannabinoids in the cannabis plant are technically called phytocannabinoids.

It’s not often that a plant compound can make headlines over and over again. However, CBD is a phytocannabinoid with some serious life-saving potential.

In fact, CBD has only gained mainstream attention quite recently, after the family of one brave little girl decided to throw caution to the wind and speak out about medical cannabis.

The beginning of the CBD movement

Before she was five years old, Charlotte Figi stopped laughing. While the average child laughs around 300 times a day, Charlotte temporarily lost her ability to communicate due to a rare and severe form of epilepsy called Dravet syndrome.

Dravet syndrome affects roughly 1 in 30,000 infants around the globe. Though most Dravet patients begin their lives as healthy children, development quickly begins to regress after the first few months.

Intense seizures overtake children as young as three months old. These seizures cause them to lose consciousness and convulse for up to a few hours at a time.

After years of rushed trips to the emergency room, the Figi's were desperate. Between unexpected complications, experimental medications, being told that they've reached "the end of the line", they had experienced it all. When there were seemingly out of options, the family finally made a life changing decision.

What they didn't know was that their choice would ultimately spur a social movement and, more importantly, bring their daughter back to life. The Figi's decided to treat their daughter with cannabidiol (CBD), one of the primary compounds found in the marijuana plant.

CBD: Underappreciated for too long

When Paige and Matt Figi first began their search for nonpsychoactive cannabis in Colorado, they fell upon some tough luck. Since the 1980s, marijuana breeders have had one major goal: creating the most potent, psychoactive cannabis out there.

The competition is tough. After nearly three decades of rising demands for psychoactive cannabis, it's not uncommon to walk into a dispensary today and find cannabis with THC content over 20%. By comparison, cannabis in the 70s contained an average of 6 to 8%.

Focusing on THC content alone meant growers overlooked CBD during the hybridization process, making access nearly impossible for anyone hoping to experiment with CBD as medicine.

Fortunately for children like Charlotte, one Colorado family was ahead of the curve. The Stanley Brothers had been developing exactly the plant the Figi's had been searching for: a strain high in CBD and low in THC.

High-CBD/ low-THC strains have little, if any, psychoactive effect. Rather, anecdotal reports and preclinical studies suggest that high-CBD cannabis can calm excitability without causing cognitive impairment.

Before making the final decision to try CBD as a treatment, Charlotte was having 300 grand mal seizures a week, one every 15 minutes.

After adding CBD oil to her daily routine? CBD kept Charlotte's seizures at bay for an entire week. The Figi's were astonished.

I didn't hear her laugh for six months. I didn't hear her voice at all, just her crying. I can't imagine that I would be watching her making these gains that she's making, doing the things that she's doing (without the medical marijuana). I don't take it for granted. Every day is a blessing. – Paige Figi

CNN first aired Charlotte's story in 2013. Since then, CBD has been making headlines all over the world. Families have even begun to relocate to Denver to find medical cannabis for their sick children. These families make up a group of migrants termed "medical cannabis refugees."

The audacity of the Figi family has spurred real policy change. States that once seemed centuries away from changing their cannabis laws have introduced pro-CBD legislative initiatives, with the encouragement of Paige Figi.

High-CBD strains can be found at nearly every medical cannabis dispensary in medical states.

CBD vs. THC

As mentioned above, THC is psychoactive while CBD is not. While both compounds are cannabinoids, they each interact with the body in different ways. THC directly engages the cannabinoid receptor 1 (CB1), which is concentrated largely in the central nervous system.

CBD, however, doesn't engage CB1 in the same way. As explained by neurologist and medical researcher Dr. Ethan Russo in an interview with Project CBD:

[CBD] doesn't tend to bind directly to what's called the orthosteric site [on cannabinoid receptors] where THC binds. Rather, it binds on what's called an allosteric site, another site on the receptor, and so it alters the binding of both THC and the endogenous cannabinoids, the endocannabinoids.

So, what's the verdict in a THC vs. CBD mashup? CBD and THC both connect on receptors in different locations. While THC directly engages the cannabinoid through the orthosteric site, CBD seems to regulate or fine tune that interaction by connecting to a separate receptor location.

This fact is perhaps what enables CBD to modulate the psychoactivity of THC. Simply stated, if you're feeling a little anxious after some cannabis, it could mean too much THC and not enough CBD. Evidence suggests that CBD reduces the psychoactive high from THC.

As Russo suggests, CBD also alters the ability for the body's own endocannabinoids to engage with the primary binding site. This is theorized to alter "endocannabinoid tone", which could be quite beneficial for certain medical conditions.

In a 2008 paper, Russo hypothesizes that some people may experience an "endocannabinoid deficiency". He speculates that this deficiency is one of the culprits behind migraine, irritable bowel syndrome, and fibromyalgia.

Should more trials of CBD show positive results, the cannabinoid may prove to be a powerful, therapeutic tool for conditions related to the ECS.

How else does CBD work?

There is still much to learn about CBD. However, scientists have discovered that the compound does a lot more than engage cannabinoid receptors. The effects of CBD in the body are broad and far-reaching. Thus far, the cannabinoid is known to also directly or indirectly affect the following:

- Vanilloid receptors (important for pain modulation)
- Adenosine receptors (important for the sleep-wake cycle)
- Serotonin receptors (important for mood and stress management)

Some rodent studies suggest that CBD may also work by blocking a particular fatty acid known as fatty-acid amide hydrolase (FAAH). The enzyme that's responsible for breaking down the naturally occurring endocannabinoid anandamide in your body.

Anandamide is also known as the "bliss molecule" or the human THC. It helps regulate basic functions like pleasure and reward, appetite, ovulation, memory, sleep, and pain.

The oversimplified theory was that with nothing to break anandamide into smaller parts, CBD boosts the amount of this chemical in your system. In some cases, this could theoretically improve endocannabinoid tone.

However, a 2015 study published in the Journal of Biological Chemistry suggest that CBD does not inhibit FAAH in humans. Rather, they suggest that the compound engages proteins that bind anandamide to FAAH, not to FAAH itself. Regardless, the cannabinoid is still linked to a spike in the bliss molecule. However, how it achieves this is unknown.

What is CBD used to treat?

The therapeutic value of CBD is almost unbelievable. For decades, outdated laws have banned a plant that produces what may become one of the most important medicines for modern disease.

CBD is polypharmacological, meaning that it can affect multiple different pathways in the body at once. This makes it extremely difficult to study, as it is almost impossible to tell what effect these different interactions have upon each other. However, regardless of a lack of high-quality human trials, many medical cannabis patients find relief with this calming cannabinoid. Here are a few of the common reasons patients use CBD:

- Cancer
- Diabetes
- Lupus
- Motor disorders
- Nicotine addiction
- Parkinson's Disease
- Chronic and neuropathic pain
- Obsessive Compulsive Disorder
- Osteoporosis
- Various pediatric conditions

3 major conditions helped by CBD

1. Epileptic Disorders

As the anecdote about Charlotte Figi has hopefully made clear, the endocannabinoid system may play a key role in the future treatment of epilepsy. Recently, a British

pharmaceutical company, GW Pharmaceuticals, has had successful phase III trials with a pure CBD medication for epilepsy.

The drug is named Epidiolex, and it has already shown favorable results for patients with Dravet syndrome and Lennox-Gastaut syndrome. In other research, CBD has been found to increase the efficacy of other common anti-epileptic drugs and is known to be neuroprotective. In theory, this helps keep brain cells healthy and reduces cell damage.

2. Schizophrenia and Psychotic Disorders

The topics of schizophrenia and psychosis have long been major points of contention in cannabis medicine. You might find it surprising, then, that CBD is anti-psychotic. A 2015 review published in Schizophrenia Research suggested that CBD's ability to reduce the psychoactive qualities of THC may also be helpful for schizophrenia patients.

THC affects brain regions like the hippocampus and prefrontal cortex. The THC activity in these regions is thought to contribute to the herb's psychoactive effects. Incidentally, these brain regions are also implicated in schizophrenia. The review suggests that it is possible that the opposite effects of CBD and THC in this region could provide a new window into new schizophrenia research.

Coupled with traditional medication, early trials with CBD as a supplemental treatment for schizophrenia were successful with an impressive safety profile. The potent anti-inflammatory properties of CBD may also lend to its anti-psychotic properties. Psychosis has been linked to increased inflammation in the brain.

3. Anxiety

Has consuming marijuana ever made you feel more anxious? Well, the problem might be too much THC, not enough CBD. As mentioned above, CBD and THC work opposite of each other. One is a stimulating psychoactive, the other a compound that works to quell unnecessary psychoactivity.

Though THC is known to cause paranoia, CBD is an excellent option for the canna-curious who are nervous about a psychoactive experience.

The cannabinoid may even ease the discomfort of social anxiety as well. In a 2011 study, researchers recruited 10 patients with social anxiety. The patients had not yet received any medical treatments for their disorder.

Patients were given either 400 mg of CBD or a placebo in a double-blind experiment. The CBD treatment successfully improved subjective anxiety symptoms when compared to a placebo.

For more information on cannabis and anxiety, take a look at the full article here.

Whole plant medicine

While CBD is a powerful medicine on its own, it's important to note that the compound's effects are amplified when combined with other cannabinoids. One of the biggest debates surrounding CBD deals with the recent push toward "whole plant medicine."

The idea behind whole plant medicine has to do with something known as the entourage effect.

The entourage effect is the idea that combinations of cannabinoids, like CBD and THC, work together in synergy to produce certain therapeutic effects in the body. This may explain why some epileptic patients respond well to CBD, while others respond better to THC. The entourage effect has already been used in pharmaceutical medicines.

GW Pharmaceuticals' Multiple Sclerosis (MS) drug Sativex, for example, contains a balanced ratio of THC to CBD. The two cannabinoids together work better at managing MS symptoms than just CBD alone.

High CBD strains

Whether you're smoking, vaping, extracting, or making CBD-rich edibles, if you're looking to with CBD, you'll need to start with a high CBD Strain.

- Charlotte's Web
- Harlequin
- CBD Critical Cure
- Cannatonic
- Sour Tsunami
- ACDC

Keep in mind that when you buy a high-CBD flower, that doesn't necessarily mean it's THC-free. Many strains advertised as high-CBD still contain some psychoactive

cannabinoids. If you're hoping to avoid psychoactivity, be sure to ask your budtender or supplier for further testing information about the particular strain.

Other sources of CBD

You don't only have to smoke or vape high-CBD flower to access this biochemical gem. Local dispensaries and distributors typically carry extracted CBD in the forms of:

- Coconut Oil
- Oil
- Capsules – Note: You can extract CBD at home the way you would when cooking with THC

If CBD is non-psychoactive, is it still illegal?

Unfortunately, the answer to this question is complicated. Every country has its own cannabis laws, and CBD is more readily available in some regions than others. In the United Kingdom, for example, CBD was recently declared as medicine by the National Health Service (NHS).

In the United States, however, the legality of CBD may depend on where it was sourced. There are two types of CBD products available: products derived from "hemp" and products derived from "marijuana". The CBD found in both of these plants is the same, it's the legal definition that is not.

Under the United States Controlled Substances Act, all cannabis products are considered a schedule 1 drug. That means that they have no accepted medical value and possession of such a substance can result in criminal penalties. Recently, the DEA published a new rule that lumps CBD products into the category of “cannabis extracts”.

According to the DEA’s new statement, CBD is illegal. The agency clarifies,

For practical purposes, all extracts that contain CBD will also contain at least small amounts of other cannabinoids.[1] However, if it were possible to produce from the cannabis plant an extract that contained only CBD and no other cannabinoids, such an extract would fall within the new drug code 7350.

However, prospective lawsuits and hemp industry experts question whether or not the DEA has the legal right to include CBD under the definition of “marijuana”.

Back in 2004, the US Ninth Circuit Court of Appeals voted in favor of hemp in a different case. This time, it was in response to an “Interpretive Rule” posted by the DEA. The rule included language explaining that “any product that contains any amount of THC” would fall under the category of a Schedule 1 Controlled Substance.

The DEA’s new ruling also contradicts an amendment made to the Agricultural Act of 2014 (Farm Bill). Farm Bill federally legalized the production of industrial hemp in state-

managed pilot programs. These pilot programs allow a small number of growers to cultivate, process, and market hemp products.

Under Farm Bill, hemp plants are cannabis plants that contain less than 0.3% THC. However, how the DEA's new definition interacts with Farm Bill of 2014 is not clear at this time.

Until this plant is either reclassified or legalized, the harsh federal restrictions on cannabis prevent adequate research on the impacts and health benefits of CBD and the cannabis plant.

If there's one point to bring home in this article, it's this: CBD has tremendous therapeutic potential. But, scientists need more hard-hitting research. Already, the discovery of THC and the endocannabinoid system has opened major doors in biochemical and psychiatric medicine.

Until we address the legal and political barriers that prevent us from exploring cannabis as medicine, our opened doors will remain unexplored.