

CBD SNAPSHOT

THE ULTIMATE GUIDE
{ TO CBD }



 { CONTENTS }

1.

**A BRIEF HISTORY
OF CBD & HEMP**

2.

**UNDERSTANDING
THE BASICS**

3.

**HOW CBD
AFFECTS THE BODY**

4.

**COMMON USES
OF CBD**

{ INTRODUCTION }

Cannabidiol, most often simply called CBD, is a non-psychoactive chemical compound most abundantly found in the cannabis plant. In recent years, CBD has quickly become one of the most sought after natural therapeutic compounds currently available.

But, along with its growth in availability and popularity, as well as a huge increase in media exposure, many people are wondering what the buzz around CBD is about. What is it? What does it do and how is it intended to work? What types of health conditions could it potentially help?

In this guide, *CBD Snapshot* aims to answer all of these questions to help educate you about CBD and enable you to make informed decisions.



{ A BRIEF HISTORY OF CBD & HEMP }

Despite hemp being a popular cash crop before the 1900s, increasing restrictions placed on cannabis from 1906 onward and social pressure caused hemp production to fall out of favor.

Things started changing again in the early 1990s, when interest in commercial hemp cultivation came back, and several states started devoting resources to bring it back. Then, with the introduction of the Agricultural Act of 2014, also known as the Farm Bill, federal restrictions on industrial hemp were removed, with an updated version in 2018 making it easier for farmers to grow hemp again ^{1,2}.

BRIEF HISTORY OF HEMP IN THE UNITED STATES



2018 FARM BILL



{ THE MODERN HISTORY OF CBD }



1940

CBD was first extracted in 1940 by Harvard University graduate Roger Adams. Six years later, the first CBD animal studies were performed by Dr. Walter S. Loewe, who determined and documented the effects of cannabinoids on mammals for the first time^{3,4}.

1963

However, the true modern history of CBD starts in 1963 when Dr. Raphael Mechoulam and his colleague Yuval Shvo from the University of Jerusalem defined the molecular structure of CBD for the first time⁵.



PRESENT DAY

Since then, CBD research has boomed. And with health experts such as Dr. Sanjay Gupta and Dr. Mehmet Oz getting in on the debate, the message of the therapeutic benefits of CBD has been popularized among the masses. It is no wonder that the CBD market is expected to surpass \$16 billion by 2025⁶.

{ THE BASICS OF CBD }

CBD is one of almost 200 types of cannabinoids¹ identified so far. Phytocannabinoids like CBD are the cannabinoids found in plants that bind to the cannabinoid receptors in the body (more about that in the next section). CBD is by far the most researched of all the cannabinoids, and because of the way that it interacts with the body, it also shows the most therapeutic potential.

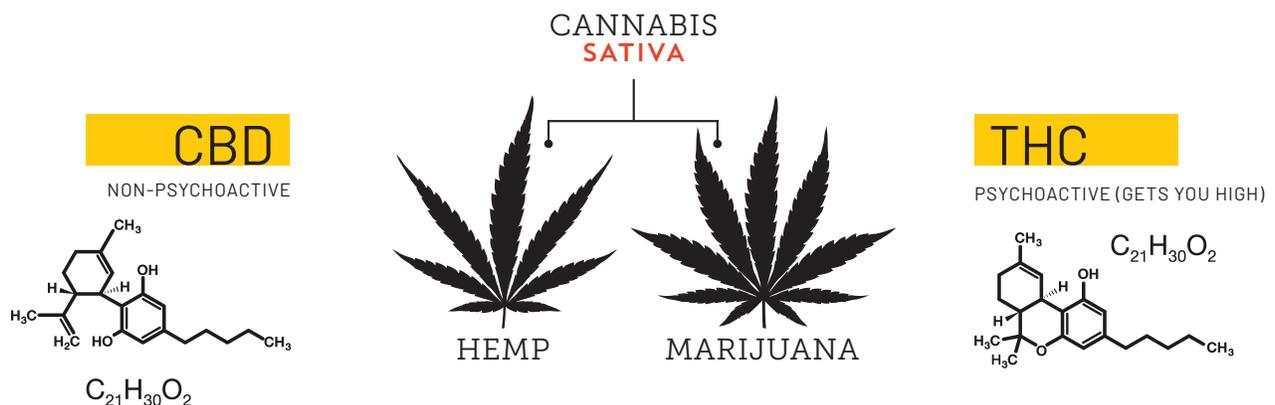
WHAT'S THE DIFFERENCE BETWEEN HEMP, CANNABIS & MARIJUANA?

Simply put, what is commonly referred to as cannabis and marijuana are terms used more or less interchangeably to refer to strains of the cannabis plant that contain high concentrations of THC. Similarly, hemp is nothing more than just another strain, but specifically referring to those strains of cannabis sativa that contain very little to no THC.

THE LEGALITY OF CBD

Whether CBD oil is legal depends on two factors; your state's and federal laws, and whether your CBD is derived from hemp or cannabis.

Hemp-derived CBD is federally legal as long as it is produced within the regulations defined by the law and contains less than 0.3 percent THC. However, state laws vary.



TYPES OF CBD OILS & EXTRACTS

In the same way you can get different types of olive oil, ranging from heat-extracted and refined, to cold-pressed and virgin, so too do CBD oils and extracts come in different types and grades. These range from whole-plant extracts that include a variety of cannabinoids and terpenes, to those that are super refined and made with almost 100 percent pure CBD.

FULL-SPECTRUM CBD

Full-spectrum CBD refers to products that contain all the cannabinoids (including small amounts of THC), terpenes and flavonoids that occur naturally in the plant. These products are often favored for their believed therapeutic value because of what is known as the entourage effect (see the next chapter).

BROAD-SPECTRUM CBD

Broad-spectrum CBD is very similar to full-spectrum in that it contains all the whole-plant compounds, but with all THC removed. This makes it a good choice for people who want the purported benefits, but without the risk of testing positive for THC.

CBD ISOLATE

As the name suggests, isolate contains only CBD. During the extraction process, all other cannabinoids, terpenes and plant compounds are removed to leave behind a white powder or crystals that is more than 99 percent pure CBD. Although considered controversial by some because of the extraction and refinement process, this is a frequent choice for people who are sensitive to other cannabinoids, or who need precise servings of CBD.

HEMP SEED OIL

Technically not a CBD extract, hemp seed oil is extracted from the seeds of the hemp plant and contains no cannabinoids. It is however rich in many vitamins, minerals and essential fatty-acids, which makes it a carrier medium in many CBD products.

{ HOW CBD AFFECTS THE BODY }

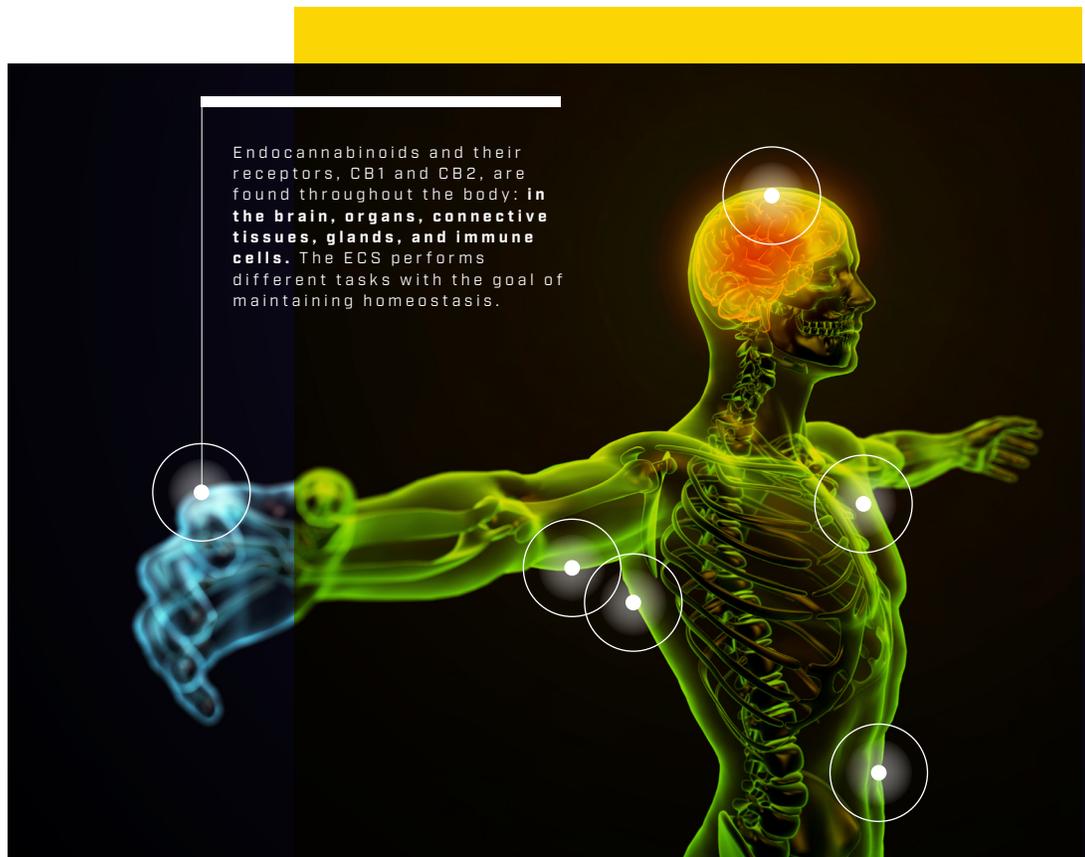
CBD and other plant cannabinoids have the ability to interact with our bodies through something called the endocannabinoid system (ECS). The ECS is the body's own biological cannabinoid-producing system that allows us to experience the potentially beneficial effects associated with CBD ^{1,2,3}.

THE ENDOCANNABINOID SYSTEM

The ECS is fundamental in helping us stay healthy by keeping our bodies in a constant state of homeostasis. Think of this as a Goldilocks state where all the conditions are just right for all our cells, tissues and physiological systems to work at their best ⁴. Unfortunately, just like any other system, the ECS can become dysfunctional and cause our bodies to fall out of this state of balance.

In fact, scientists believe that the ECS plays such an important role in our health that many of the symptoms and diseases we experience are because of something going wrong with our ECS.

Scientists believe that this imbalance is also the reason why plant cannabinoids such as CBD could help to relieve so many symptoms and illnesses. When a cannabinoid like CBD is introduced into the body, it attaches to and regulates the same receptor cells that endocannabinoids and other types neurotransmitters do, in a way helping to kickstart the ECS and rebalancing biological systems ^{5,6}.



THE ENTOURAGE EFFECT

CBD is not the only therapeutic compound found in cannabis and hemp. Whole-plant cannabis extracts also contain other types of cannabinoids and aromatic compounds called terpenes. These work together to potentially increase the overall beneficial effects more so than if the individual compounds were used on their own. This is what is known as the entourage effect⁷.

TERPENES

Terpenes are produced by most plants and act as both an attractant for pollinators and repellent for pests and are what gives flowers, herbs and plants their distinctive aromas and flavors. Terpenes also have powerful therapeutic effects, with a long history of use in natural remedies such as aromatherapy, as well as a variety of supplements and cosmetics⁸.



{ COMMON USES OF CBD }

CBD has been used for a wide range of applications, from analgesic (pain killer) and anti-inflammatory, to anxiolytic (anti-anxiety) and anticonvulsant (anti-epileptic) properties. Here we discuss a few of the most common health issues, and how CBD can potentially help to relieve symptoms and help treat disease.



PAIN & INFLAMMATION

Researchers have found that CBD has the ability to significantly reduce inflammatory and neuropathic pain by controlling and suppressing $\alpha 3$ -glycine receptors, which are the receptors that produce the sensation of pain¹. CBD may also help combat inflammation through a couple of other mechanisms, one of which is to exert an immunosuppressive effect on the cells that play the primary role in inflammation and immunity².



ANXIETY & MOOD

Some users say CBD reduces their symptoms of anxiety and helps with other types of mood disorders. CBD boosts serotonin levels in the brain, in a similar way as selective serotonin reuptake inhibitors (SSRIs) such as citalopram, fluoxetine and paroxetine do³. Second, it stimulates neurogenesis in the hippocampus, which is the part of the brain that regulates emotion and mood⁴.



SEIZURES & SPASMS

Seizures are due to a kind of electrical storm happening in the nervous system. CBD is a powerful anticonvulsant because of its ability to decrease and inhibit the excitatory neurotransmitters in the central nervous system that cause these storms⁵. Similarly, CBD helps relieve muscle spasms by improving muscle tone and control, especially for people suffering from multiple sclerosis⁶.



PMS & MENOPAUSE

Although there aren't any studies dealing specifically with CBD as a treatment option for premenstrual syndrome (PMS) and menopause, it could potentially help relieve many of the symptoms associated with these. For instance, CBD has been shown to effectively treat symptoms such as acne⁷, sleep difficulties⁸, cramping⁹ and bone loss¹⁰.

{ REFERENCES }

CHAPTER 1

1. United States Department of Agriculture, Economic Research Service (Last Updated: 2018, December 21). Agricultural Act of 2014: Highlights and Implications. Retrieved from <https://www.ers.usda.gov/agricultural-act-of-2014-highlights-and-implications/>
2. United States Department of Agriculture (2019, April 12). USDA Update on Farm Bill Implementation Progress. Retrieved from <https://www.usda.gov/media/press-releases/2019/04/12/usda-update-farm-bill-implementation-progress>
3. Adams, R., Hunt, M., & Clark, J. H. (1940). Structure of cannabidiol, a product isolated from the marijuana extract of Minnesota wild hemp. I. *Journal of the American Chemical Society*, 62(1), 196-200. <https://pubs.acs.org/doi/abs/10.1021/ja01858a058?journalCode=jacsat>
4. Loewe, S. (1946). Studies on the pharmacology and acute toxicity of compounds with marijuana activity. *Journal of Pharmacology and Experimental Therapeutics*, 88(2), 154-161. <http://jpet.aspetjournals.org/content/88/2/154.short>
5. Mechoulam, R., & Gaoni, Y. (1965). Hashish—IV: the isolation and structure of cannabinolic cannabidiolic and cannabigerolic acids. *Tetrahedron*, 21(5), 1223-1229. <https://www.sciencedirect.com/science/article/pii/004040206385022x>
6. Iris Dorbian (2019, March 12). CBD Market Could Pull In \$16 Billion By 2025, Says Study. Retrieved from <https://www.cannabisbusinesstimes.com/article/cowen-co-analysts-cbd-market-16-billion-2025/>

CHAPTER 2

1. Hanuš, L. O., Meyer, S. M., Muñoz, E., Tagliabatella-Scafati, O., & Appendino, G. (2016). Phytocannabinoids: a unified critical inventory. *Natural product reports*, 33(12), 1357-1392. <https://pubs.rsc.org/en/content/articlehtml/2016/np/c6np00074f> United States Department of Agriculture, Economic Research Service (2018, December 21).
2. Laura Pyne (Last Updated: 2019, May 9). Agricultural Act of 2014: Highlights and Implications. Retrieved from <https://www.cbdcentral.com/is-cbd-legal/>

CHAPTER 3

1. Lu, H. C., & Mackie, K. (2016). An introduction to the endogenous cannabinoid system. *Biological psychiatry*, 79(7), 516-525. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4789136/>
2. Battista, N., Di Tommaso, M., Bari, M., & Maccarrone, M. (2012). The endocannabinoid system: an over-view. *Frontiers in behavioral neuroscience*, 6, 9. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3303140/>
3. Pacher, P., Bátkai, S., & Kunos, G. (2006). The endocannabinoid system as an emerging target of pharmacotherapy. *Pharmacological reviews*, 58(3), 389-462. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2241751/>
4. McPartland, J. M., Guy, G. W., & Di Marzo, V. (2014). Care and feeding of the endocannabinoid system: a systematic review of potential clinical interventions that upregulate the endocannabinoid system. *PloS one*, 9(3), e89566. <https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0089566>
5. Ligresti, A., De Petrocellis, L., & Di Marzo, V. (2016). From phytocannabinoids to cannabinoid receptors and endocannabinoids: pleiotropic physiological and pathological roles through complex pharmacology. *Physiological reviews*, 96(4), 1593-1659. <https://www.physiology.org/doi/full/10.1152/physrev.00002.2016>
6. Di Marzo, V., & Piscitelli, F. (2015). The endocannabinoid system and its modulation by phytocannabinoids. *Neurotherapeutics*, 12(4), 692-698. <https://link.springer.com/article/10.1007/s13311-015-0374-6>
7. Russo, E. B. (2011). Taming THC: potential cannabis synergy and phytocannabinoid-terpenoid entourage effects. *British journal of pharmacology*, 163(7), 1344-1364. <https://bpspubs.onlinelibrary.wiley.com/doi/pdf/10.1111/j.1476-5381.2011.01238>
8. De Carvalho, C. C., & da Fonseca, M. M. R. (2006). Biotransformation of terpenes. *Biotechnology advances*, 24(2), 134-142. <https://www.sciencedirect.com/science/article/pii/S0734975005001023>

CHAPTER 4

1. Xiong, W., Cui, T., Cheng, K., Yang, F., Chen, S. R., Willenbring, D., ... & Zhang, L. (2012). Cannabinoids suppress inflammatory and neuropathic pain by targeting $\alpha 3$ glycine receptors. *Journal of Experimental Medicine*, 209(6), 1121-1134. <http://jem.rupress.org/content/jem/early/2012/05/08/jem.20120242.full.pdf>
2. Booz, G. W. (2011). Cannabidiol as an emergent therapeutic strategy for lessening the impact of inflammation on oxidative stress. *Free Radical Biology and Medicine*, 51(5), 1054-1061. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3085542/>
3. Linge, R., Jiménez-Sánchez, L., Campa, L., Pilar-Cuellar, F., Vidal, R., Pazos, A., ... & Díaz, Á. (2016). Cannabidiol induces rapid-acting antidepressant-like effects and enhances cortical 5-HT/glutamate neurotransmission: role of 5-HT_{1A} receptors. *Neuropharmacology*, 103, 16-26. <https://www.ncbi.nlm.nih.gov/pubmed/26711860>.

4. Campos, A. C., Ortega, Z., Palazuelos, J., Fogaça, M. V., Aguiar, D. C., Díaz-Alonso, J., ... & Galve-Roperh, I. (2013). The anxiolytic effect of cannabidiol on chronically stressed mice depends on hippocampal neurogenesis: involvement of the endocannabinoid system. *International Journal of Neuropsychopharmacology*, 16(6), 1407-1419. <https://www.ncbi.nlm.nih.gov/pubmed/23298518>
5. Wallace, R. (2004). Cannabinoids: defending the epileptic brain. *Epilepsy currents*, 4(3), 93-95. <https://journals.sagepub.com/doi/full/10.1111/j.1535-7597.2004.43003>
6. Baker, D., Pryce, G., Croxford, J. L., Brown, P., Pertwee, R. G., Makriyannis, A., ... & Di Marzo, V. (2001). Endocannabinoids control spasticity in a multiple sclerosis model. *The FASEB journal*, 15(2), 300-302. <https://pdfs.semanticscholar.org/d027/45ddf4a69959608ad27832d3207937497cfc.pdf>
7. Oláh, A., Tóth, B. I., Borbíró, I., Sugawara, K., Szöllösi, A. G., Czifra, G., ... & Ludovici, M. (2014). Cannabidiol exerts sebostatic and antiinflammatory effects on human sebocytes. *The Journal of clinical investigation*, 124(9), 3713-3724. <https://www.ncbi.nlm.nih.gov/pubmed/25061872>
8. Babson, K. A., Sottile, J., & Morabito, D. (2017). Cannabis, cannabinoids, and sleep: a review of the literature. *Current psychiatry reports*, 19(4), 23. <https://www.med.upenn.edu/cbti/assets/user-content/documents/s11920-017-0775-9.pdf>
9. do Nascimento, T. A., dos Santos Caçula, D. M. R., Temoteo, J. L. M., do Nascimento, T. G., de Assis Bastos, M. L., de Araújo Júnior, J. X., & de Moura, M. A. B. F. (2017). Pharmacological and Toxicological Aspects of Cannabis sativa: A Systematic Review. *Journal of Chemical and Pharmaceutical Research*, 9(3), 175-183. <https://pdfs.semanticscholar.org/ba0b/0b538ae9e021bd903fb8c4ad4af035bfe0fd.pdf>
10. Idris, A. I., Sophocleous, A., Landao-Bassonga, E., Canals, M., Milligan, G., Baker, D., ... & Ralston, S. H. (2009). Cannabinoid receptor type 1 protects against age-related osteoporosis by regulating osteoblast and adipocyte differentiation in marrow stromal cells. *Cell Metabolism*, 10(2), 139-147. <https://www.sciencedirect.com/science/article/pii/S1550413109002022>