The Endocannabinoid System

A Beginner's Guide

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Introduction

This comprehensive, easy to understand guide examines the endocannabinoid system in its entirety, exploring what it is, how it works, and the role cannabinoids like THC and CBD play in its functioning.

We hope you enjoy the contents put together by our team.

Happy reading!

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Section One

What is the Endocannabinoid System?

What is the Endocannabinoid system, really? This section covers the top level ECS. Let's get started! ⟶

What is the Endocannabinoid System?

The endocannabinoid system (ECS) is a wide-reaching cell signaling network that works to keep the other major systems in our body — like the nervous, endocrine, immune, and reproductive systems – in balance (homeostasis). It is referred to as the "universal regulator", Short for "endogenous cannabinoid system," the ECS is named after the compounds found in *Cannabis*. Yep, that cannabis. One of the most important biological systems in the human body was discovered thanks to pot.

The 'Universal Regulator'

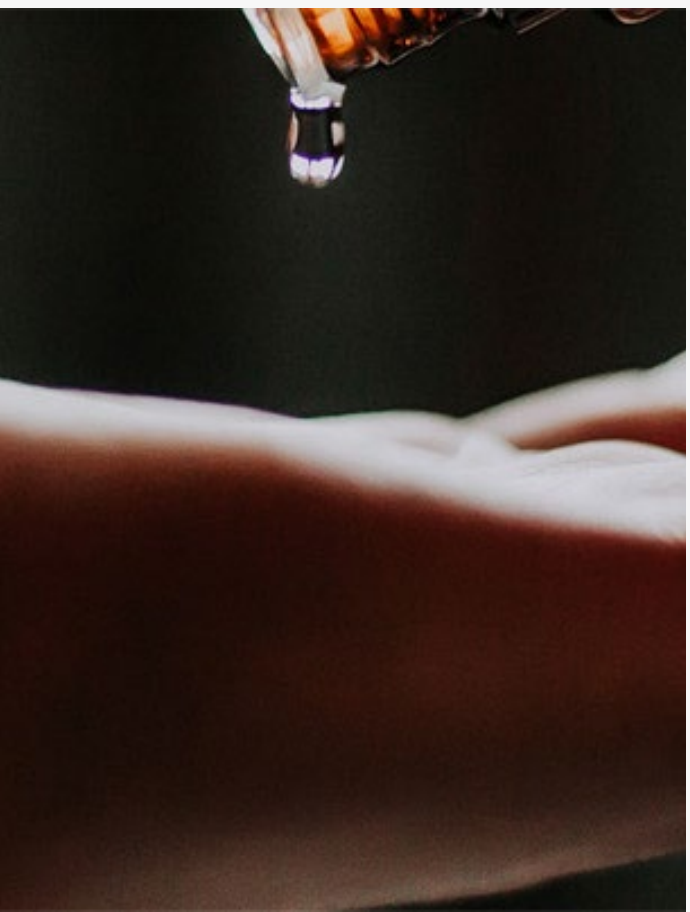
Cannabis, Cannabinoids and You

Cannabinoids are the key to understanding the endocannabinoid system.

Cannabinoids are compounds that interact with the endocannabinoid system. A well-known cannabinoid is THC. But there are more.

A lot more.

Cannabis — the genus of plants associated with marijuana — has over 100 cannabinoid compounds. Many of these cannabinoids have nothing to do with feeling "high". Such as CBD, a very popular cannabinoid that's non-psychoactive.



What's more, cannabinoids aren't only found in *Cannabis.*

The big breakthrough that led to the discovery of the endocannabinoid system was that humans produce their own cannabinoids endogenously (or originating internally).

This led to the classification of three types of cannabinoids:

- **Phytocannabinoids** (plant-derived, like THC and CBD)
- **Endocannabinoids** (originating in human or animal tissues)
- **Synthetic cannabinoids** (lab produced)

So, the human body contains a physiological system that not only reacts to external compounds like THC and CBD, but it also reacts to similar compounds created internally.

Which begs the question:

Why are our bodies a factory for producing cannabinoids?

Section Two

What does the Endocannabinoid System do?

Great, so we know what the ECS is – sort of. Now what does it do? ⟶

The Endocannabinoid System regulates the functions of the body -

- so that we remain in homeostasis - a balanced state that ensures our body functions optimally. Without the ECS, we'd experience a homeostasis imbalance. Left unchecked, this imbalance can lead to a variety of negative outcomes.

When something forces our bodies out of balance, such as injury, inflammation, low blood sugar or stress, the ECS steps in to help us find balance again.

To achieve this homeostasis, the endocannabinoid system transmits cannabinoids throughout the body to elicit specific "feelings" (or bodily perceptions). These feelings then motivate us to act in ways that maintain homeostasis. Feeling such as being hungry, tired, panicked, anxious, or happy.

So, what does the Endocannabinoid System do?

It uses feelings to regulate processes in the body. Some of these processes identified by researchers include:

- **Immune function**
- **Appetite**
- **Reproduction & fertility**
- **Body temperature**
- **Aging**
- **Sleep**
- **Mood**
- **Memory**
- **Motor Control**
- **Inflammation**

Those hunger pains you feel? Thank the ECS for that. Feeling tired? You wouldn't if it weren't for your ECS. For similar reasons, the ECS causes us to feel high when consuming marijuana or feel at ease when using CBD products... But more on that in a moment.

First, let's see exactly how the endocannabinoid system makes all this happen.

Section Three

How the Endocannabinoid System works

Now that we're becoming scientists, let's take a deeper look into how the EC works.

How the Endocannabinoid System Works

As with everything about the body, understanding its function is incredibly complicated, intricate and filled with the type of scientific jargon that can easily become overwhelming when trying to consume.

That said, let's try to break down how the endocannabinoid system works in a way we can all understand.

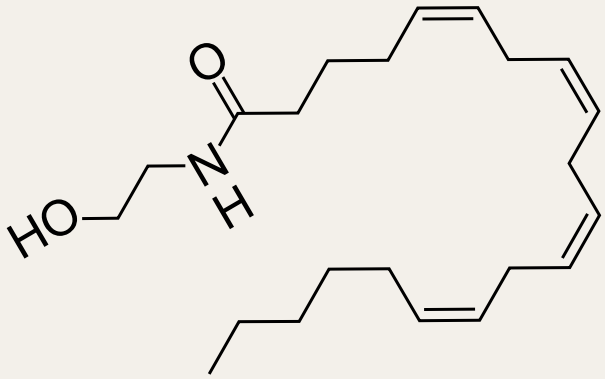
The endocannabinoid system is made up of three key elements:

1. Endocannabioids
2. Enzymes
3. Cannabinoid receptors

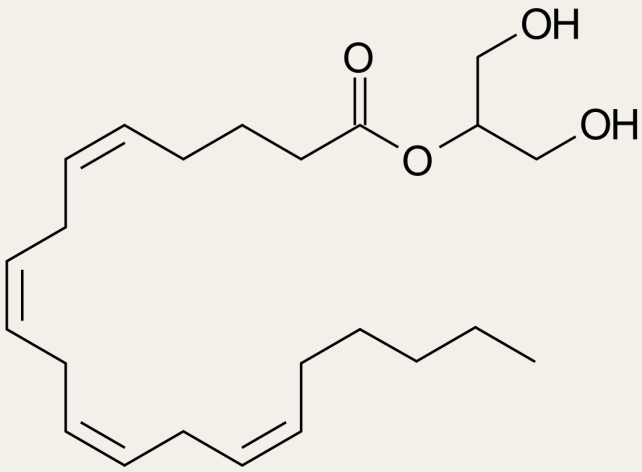
What are Endocannabinoids?

Endocannabinoids are cannabinoids made in the body of humans and animals. (As opposed to phytocannabinoids which are made in plants.) Two major endocannabinoids are anandamide (AEA) and 2-arachidonoylglycerol (2-AG).

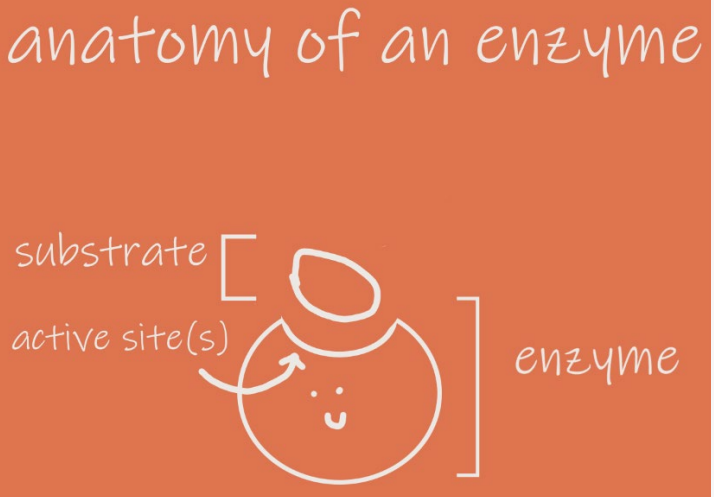
Endocannabinoids bind to, block or modulate **cannabinoid receptors.** These receptors signal the body to take a specific action, like eating or sleeping.



anandamide (AEA)



2-arachidonoylglycerol (2-AG)



What are Enzymes?

Enzymes are proteins that cause chemical reactions in the body — help break down endocannabinoids, reducing its effect on the body. Certain enzymes can also help build endocannabinoids. One of the main enzymes in the ECS is fatty acid amidohydrolase (FAAH), which breaks down anandamide.

To better understand this process, let's take a look at how the endocannabinoid system works in the real world.

The ECS in Action

You know how they say exercise is a great antidepressant?

That's because endurance exercise activates the endocannabinoid system.

After exercising, your body releases the endocannabinoid known as anandamide. Anandamide then connects with receptors in the brain triggering a feeling of euphoria, commonly referred to as a "second wind" or "runner's high." In this sense, anandamide acts as a reward for doing something that's good for your body. It creates a positive feeling — a natural runner's high — that encourages you to continue the activity and help optimize your body's homeostasis.

It's for this reason they call anandamide the "bliss molecule." (It's named after the Sanskrit word *ananda*, meaning "joy, bliss, delight.")

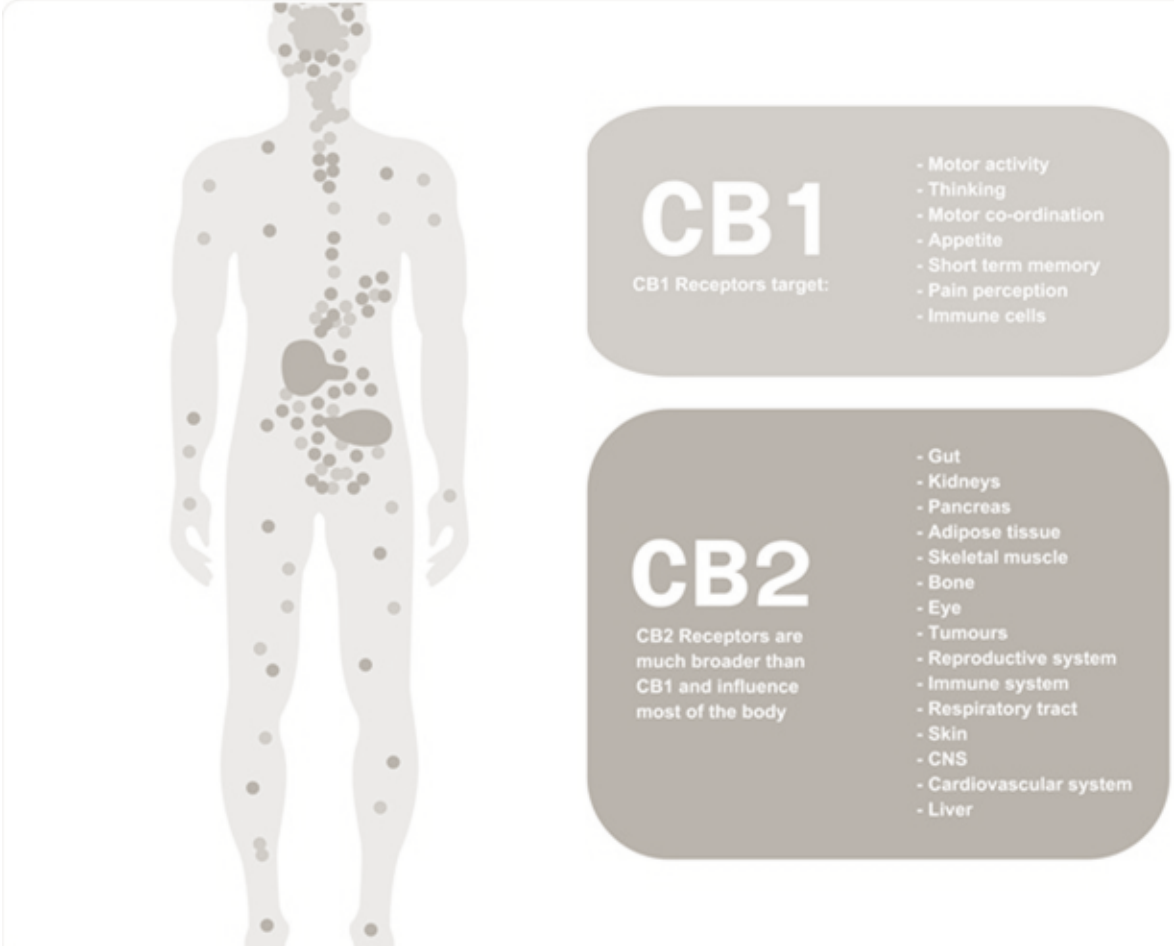
Another example of the ECS in action?

Studies have shown that the endocannabinoid system is the reason we derive pleasure from eating.

So the next time you're enjoying that piece of cake, forget the baker, it's your endocannabinoid system making you feel like you're in heaven.

What is a Cannabinoid receptor?

Receptors occur throughout the human body. The ECS has two main cannabinoid receptors, CB1 & CB2 receptors.



The ECS has two main cannabinoid receptors:

1. CB1 receptor

2. CB2 receptor

TRPV1 is also a receptor considered part of the endocannabinoid system. Other suspected cannabinoid receptors in the body include GPR 18, GPR 55, GPR 119 and PPAR.

These receptors appear on different cells all over the body.

Receptors act as a lock that only certain keys — like endocannabinoids, hormones or neurotransmitters — can activate.

For example, when your "adrenaline is pumping" it may be that an adrenaline hormone has activated the adrenergic receptor in your body. When experiencing "pleasant" feelings, it could be that the anandamide endocannabinoid has activated a CB1 receptor.

But here's what makes the cannabinoid receptors so special: they react with both endocannabinoids and phytocannabinoids.

If you recall, phytocannabinoids are derived from *Cannabis* plants, while endocannabinoids are generated within the human body. Which means that the cannabinoid receptors in the body are not only affected by internal endocannabinoids but can also be influenced by ingesting or using externally created *Cannabis* derived products.

Receptors & the relationship with THC

It's because our bodies have cannabinoid receptors that marijuana — which contains high concentrations of the phytocannabinoid THC — can reduce pain, stimulate appetites, cause a euphoric high, or even result in paranoia and anxiety.

But while the psychoactive effects of *Cannabis* capture the most attention, it is its therapeutic benefits that hold the most potential. Because the fact that our cannabinoid receptors are open to external influences, and the endocannabinoid system plays such a key role in maintaining our body's health, there is a huge opportunity to use these receptors to improve our well-being.

Without ever feeling "high."

Section Five

How to Boost Your Endocannabinoid System

Make the most of this elusive system – here's how. ⟶

We've already seen how aerobic exercise can help boost your endocannabinoid system. But that's not the only way you can take measures to improve your body's homeostasis.

How to boost your *endocannabinoid* System

Like all that is good and healthy, maintaining and boosting your ECS follows much of the same premise. Restful, healthy sleep, stress reduction and exercise are all ways that you can improve your ECS. Unsurprisingly, those three things can all impact each other – and your overall health too.

But if you're already ahead of the curve by getting plenty of sleep, water and exercise, while also keeping stress at bay, congratulations, your health, body and ECS will thank you for it. However, the majority of us still need to find a balance for all these things. Luckily, there are additional ways to improve your ECS as well, so if you're lacking in the sleep department, or have a little extra stress in your life, these supplements and foods can help.

CBD

One of the most medicinally beneficial phytocannabinoids, CBD's influence on the endocannabinoid system deserves a section all its own.

CBG

A non-psychoactive, non-intoxicating phytocannabinoid found in *Cannabis* that won't get you high like THC. CBG is called the "mother cannabinoid." Studies show CBG has inflammation and pain relief properties.

Turmeric

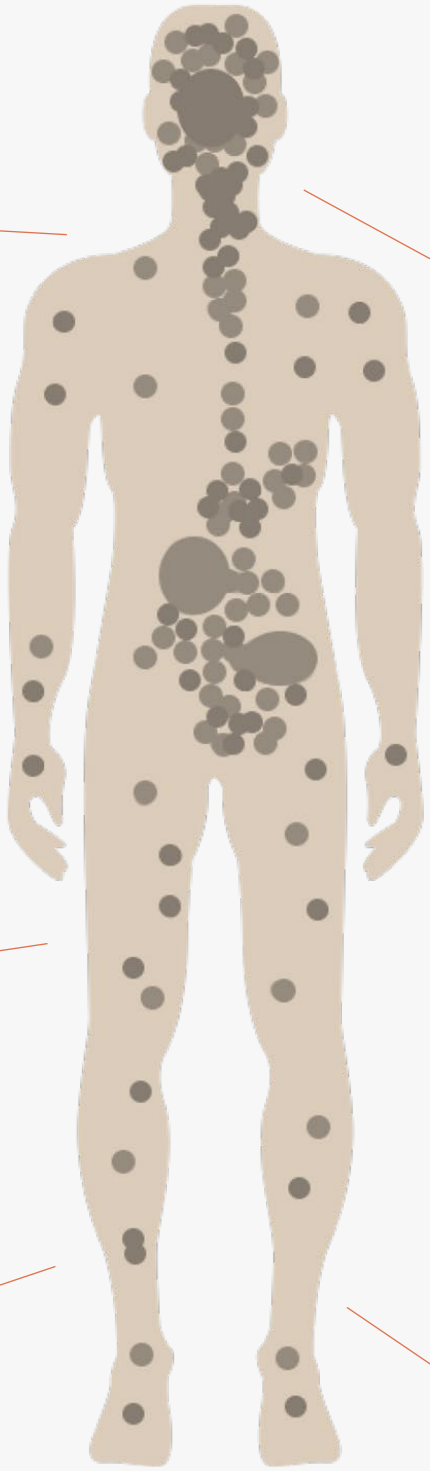
Curcumin is a natural anti-inflammatory compound found in turmeric that may elevate endocannabinoid levels, and has shown positive antidepressant effects in studies.

Echinacea

Alkamides in the echinacea herb are structurally similar to anandamide, and can bind to CB1 and CB1 receptors to potentially stimulate the immune system.

Truffles

Truffles contain anandamide. They also contain the metabolic enzymes native to the ECS. Truffles provide many potential health benefits, including antitumor, antioxidant, antibacterial, anti-inflammatory, and hepatoprotective activities



Lower Alcohol Consumption

Though moderate drinking likely has little impact on the ECS, alcohol dependency reduces the ability of cannabinoid receptors to function properly.

Chocolate

Chocolate boosts anandamide in the body, albeit indirectly. Coca decreases the enzyme FAAH by acting as an anandamide reuptake inhibitor. The FAAH enzyme is used by the body to break down the endocannabinoid anandamide. By reducing its impact, cocoa can boost the ECS.

Caryophyllene

A powerful terpene called caryophyllene can bind to CB2 receptors, just like cannabinoids. Caryophyllene elevates mood levels, and is suggested to help combat anxiety and depression. Studies have also shown caryophyllene can protect against dementia. While it is found in *Cannabis*, rosemary, black pepper, cloves and oregano all also contain high levels of caryophyllene.

Omega-3 Fatty Acids

Studies have shown that omega-3 fatty acids synthesize endocannabinoids in the body. Look to foods high in omega-3 like fish, nuts and seeds to potentially boost your ECS and fight inflammation.

Section Six

How CBD helps the Endocannabinoid System

There’s a reason the CBD market is growing. Here’s how CBD impacts the overall body system. ⟶

How CBD Helps the Endocannabinoid System

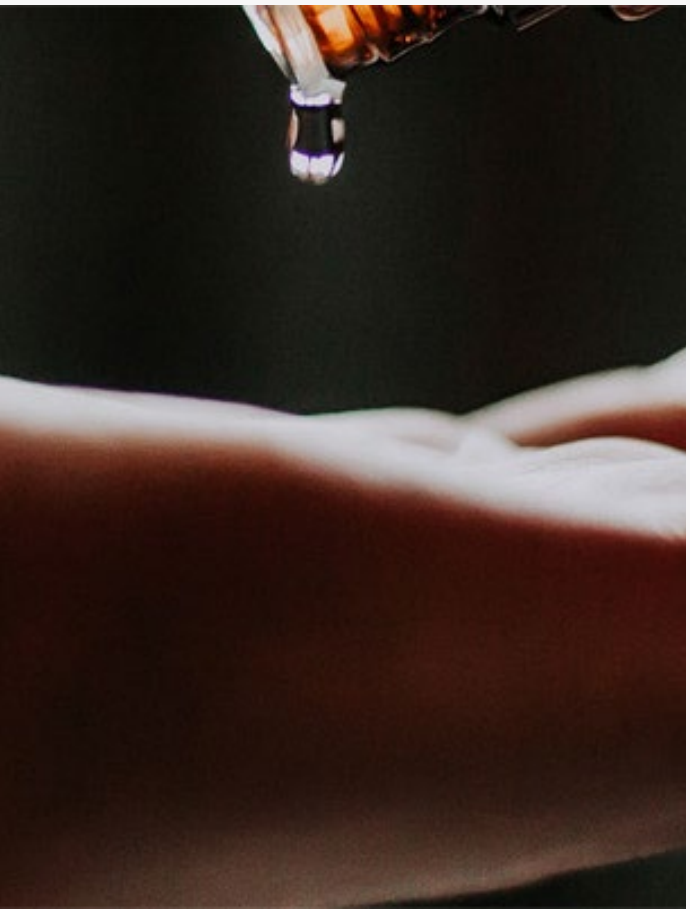
Cannabidiol (CBD) is fast becoming a popular all-purpose wellness remedy.

We're guessing you've heard of it.

Maybe you've even tried it.

There's a good chance you loved it.

What you might not know though is that the positive benefits of CBD are in large part due to its influence on the ECS.



CBD is non-psychoactive — i.e. it won't get you high. It has no serious side effects. And shows promising results for a variety of medical and psychiatric conditions. It's also a cannabinoid. A phytocannabinoid to be exact. But unlike some of the other phytocannabinoids, it has little binding affinity for the CB1 and CB2 receptors in the ECS.

In fact, quite the contrary.

There are three main areas (that we know about) where CBD affects the endocannabinoid system:

1. **CBD acts as an antagonist to cannabinoid receptors**
2. **CBD inhibits the enzyme FAAH**
3. **CBD binds to the TRPV1 receptor**

So yeah, there's a lot going on between the endocannabinoid system and CBD.

But what does that mean for you?

How CBD helps the Endocannabinoid System Cont.

When administered — either orally, through capsules, topicals, tinctures, or oils — CBD does a lot of good in the body .

Some of this good is unrelated to the ECS.

For instance, CBD regulates the body's mitochondria to help with autophagy, apoptosis and intracellular homeostasis.

Some of this good is indirectly related to the ECS.

CBD also interacts with a serotonin receptor known as 5-HT1A. While not directly connected, the roles of the 5-HT1A and endocannabinoid system overlap and could very well influence one another. For instance, studies have shown that by binding with 5-HT1A receptors, CBD can aid in multiple areas tied to the ECS.

And finally, some of this good is directly related to the ECS. For instance, by reacting with elements of the endocannabinoid system, the CBD can:

Counteract the Psychoactive Effects of THC

CBD may counteract the psychoactive effects of THC by blocking CB1 and CB2 receptors. This means CBD can potentially neutralize a THC-induced high, reduce paranoia and improve memory.

Elevate Levels of Anandamide — The Bliss Molecule

One of CBD's biggest benefits is that it inhibits the enzyme FAAH.

FAAH regulates the amount of andandamine in your system by breaking it down. (If you recall, anandamide is an endocannabinoid that makes you feel happy, content and naturally euphoric.) By hindering the FAAH enzyme's effectiveness to slow down anandamide decomposition, CBD helps increase anandamide production in the ECS. These elevated levels can result in greater pain suppression, reduced stress, elevated mood, increased dopamine levels, better sleep, and many other benefits.

Because of these benefits (and more), farmers and producers have researched and developed high-quality CBD products to take advantage of the benefits CBD provides to our endocannabinoid system.

The Endocannabinoid System Keeps Us Healthy. CBD Can Help

The endocannabinoid system keeps the biological process in our bodies stable, playing a key role in multiple bodily functions that keep us at our best. Yet, there's still a lot we don't know about it. Experts are learning more and more every day about just how influential the ECS is on our physical and mental health.

At the same time, research behind the benefits of CBD use is also growing. Developing in tandem with another, advancements in the understanding of the endocannabinoid system and CBD could hold the key to naturally treating several conditions in our body.

We look forward to future research and findings as they unveil the inner workings of both on our overall well-being.