

The Chemical Breakdown of Cannabis

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In total, cannabis consists of more than 400 chemicals, 60 of which are similar to CBD and THC, known as cannabinoids. The role each chemical plays in the effects of cannabis is not yet known in-depth. However, there are some about which we do have a decent amount of information.



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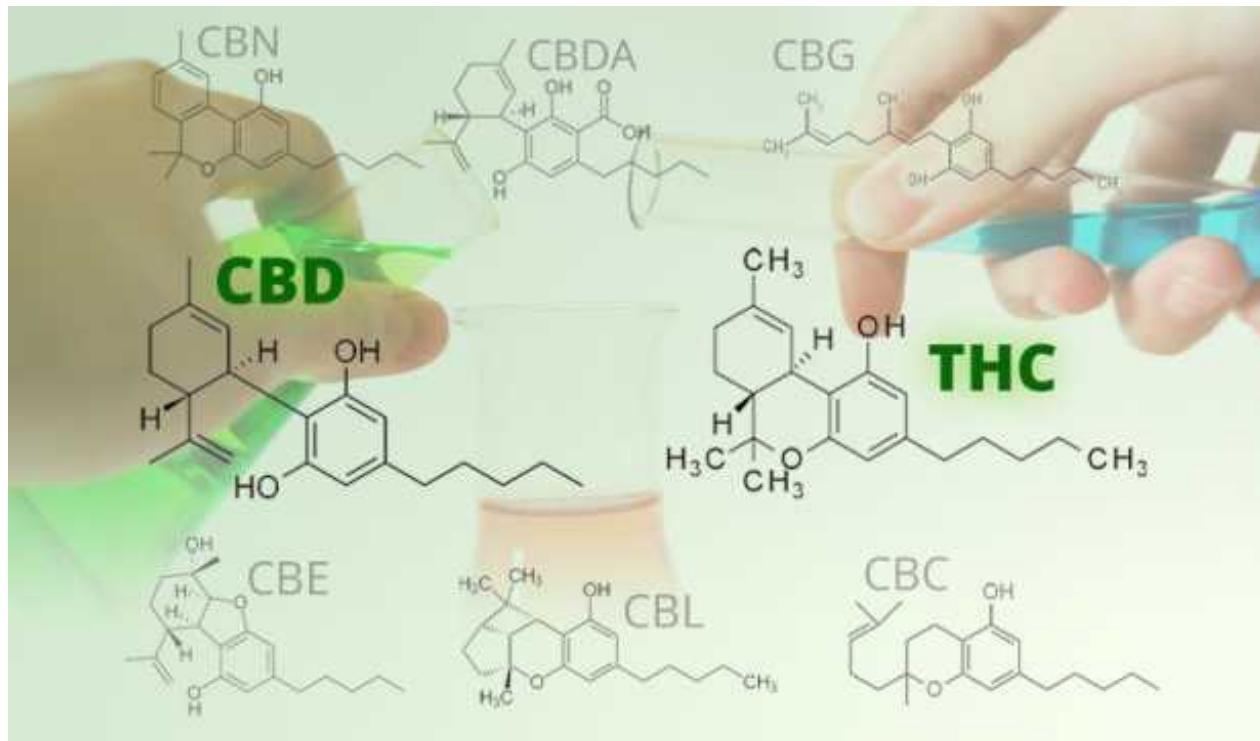


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Humans have been cultivating and using [cannabis](#) for upwards of 6000 years. However, it has only been in the last 200 years that it has been investigated for its pharmacological properties. Nowadays, as cannabis is legalized in a growing number of US states, it is

becoming a topic of interest to many people. Experts who have studied cannabis and its effects report of its ability to treat a number of health issues, which has led them to dig even deeper to understand how cannabis works. There are many components to the cannabis plant. The most well known are tetrahydrocannabinol (THC) and cannabidiol (CBD). While those two chemicals are the main phytochemical constituents of cannabis, many more also affect how it interacts with the human body.

Cannabis was originally famous for its THC

In recent history, most people who have used cannabis have used it because it has potent psychoactive properties that have the power to alter perception, create a feeling of euphoria, and provide a general feeling of intoxication, or a “high.” This physiological response to cannabis is a result of the naturally occurring chemical in cannabis called THC, a cannabinoid. Cannabinoids are also made naturally by the human body. In fact, our bodies have an entire system in place called the endocannabinoid system (ECS), which includes cannabinoids and cannabinoid receptors (CB1 and CB2). CB1 receptors are principally concentrated in parts of the brain that help control thinking, pleasure, perception of time, coordination, and memory. Upon entering the bloodstream, THC binds to those cannabinoid receptors, thereby causing an altered state where thoughts, pleasure, movement, coordination, concentration, sensory perception, and time are concerned.

Human CBD receptors chart

THC causes brain cells to release dopamine, responsible for the euphoric effects it can induce. Normal information processing in the brain’s hippocampus is also affected by THC, which can cause lapses in our ability to form new memories. Deep thinking, anxiety, paranoia, hallucinations, and even delusions can occur because of THC consumption. Sedation is also a common response. Cannabis strains with higher concentrations of THC are more likely to produce these effects at more intense levels.



Not all users experience the same effects from THC. This has to do with the fact that the ECS encompasses nearly the whole body and many of its connections. Since each individual has a certain level of uniqueness in his or her chemical makeup, THC can have quite a varied impact.

Aside from the intoxicating effects of THC, research shows it may also have medicinal uses. This seems to be related to THC’s ability to bind to CB2 receptors, found mainly in the immune system. Right now, the efficacy of the therapeutic use of THC remains unconfirmed because research is still limited. Still, trials have indicated that THC produces a strong analgesic effect, particularly for patients suffering with neuropathic pain, fibromyalgia, and rheumatoid arthritis. It has also been shown to alleviate nausea and vomiting caused by chemotherapy given to cancer patients and to help manage seizure disorders, muscle spasticity disorders, Alzheimer’s and Parkinson’s diseases, inflammatory

bowel disease, PTSD, severe and/or chronic pain, and HIV/AIDS. This wide range of uses seems to be related to how expansive the ECS is across the human body.

CBD is quickly catching up to THC in popularity

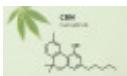
CBD shares many of THC's potential medicinal properties. It is also a cannabinoid, though unlike THC, CBD is non-intoxicating. To put it simply, CBD does not make you high because it is not psychoactive. The way it interacts with the human body and ECS is notably different from how THC interacts. CBD does not bind to CB1 or CB2, which seems to be why it lacks THC's psychoactive impact. However, it does act as an antagonist to THC's interaction with CB1, blocking some of THC's high-inducing effects. As such, if a cannabis product contains a high concentration of CBD, its psychoactive effects will likely be less intense.

Instead, CBD binds to and interacts with several ion channels and non-cannabinoid receptors. It also indirectly influences the behavior of other bodily processes. CBD interacts with serotonin receptors, which play a role in mood, anxiety, addiction, perception of pain, and sleep. Some research shows its effectiveness in treating anxiety, depression, and sleep disorders. As a result, though to prove its efficacy in these areas, more clinical trials must be done.

CBD also binds to TRPV1, or vanilloid, receptors, a function that may influence pain perception. In addition, CBD acts as an antagonist to the GPR55, or orphan receptor, potentially acting to reduce bone resorption and cancer cell migration. Other anti-cancer effects, as well as the prevention of Alzheimer's disease and the treatment of diabetes, may also come from the fact that CBD activates another receptor called PPAR, which is involved in related bodily systems. CBD increases endocannabinoid levels in synapses in the brain, as it acts as an anandamide reuptake and breakdown inhibitor. This mechanism may explain why CBD can protect against seizures. It also inhibits adenosine reuptake, meaning CBD increases the brain's levels of adenosine. Adenosine receptors are important when dealing with cardiovascular function and anti-inflammatory activity. As such, CBD's ability to act as both an anti-anxiety and anti-inflammatory may come from this interaction.

These are just a few of the many internal processes that involve a CBD interaction. Current research shows that CBD may target over 65 areas of the body. Hence its potential relationship to the treatment of so many health issues, including depression, anxiety, chronic pain, inflammatory disorders, including arthritis, diabetes, MS, bone diseases, and skin disorders, cancer, sleep disorders, and epilepsy. In fact, the FDA approved a CBD-based drug in 2018, Epidolex, to treat a rare form of epilepsy.

Cannabinol



Cannabinol (CBN) is another cannabinoid in cannabis. Its presence is the result of THC oxidation and decomposition. Heating THC may convert it to CBN. Leaving cannabis out and exposed will lead to higher CBN content. CBN has potential benefits, so letting cannabis age might be a good idea depending on your desired results. Studies show that CBN might have significant antibacterial effects and some neuroprotective effects, allowing it to ward off neurodegenerative diseases. It may be able to stimulate the appetite, reduce intraocular pressure that can lead to glaucoma, and serve as an anti-inflammatory. In terms of intoxication, CBN on its own is not psychoactive, but when used with THC, it seems to enhance its euphoric effects. Evidence for CBN's medical uses is preliminary at this point, so more studies are needed to understand its functions better.

Cannabichromene



Cannabichromene (CBC) is another cannabinoid in cannabis, which may also provide therapeutic health benefits. Like CBD, CBC is not good at binding to CB1 receptors, meaning it is not psychoactive. It has other similarities to CBD, like how it binds to TRPV1 receptors. In addition, CBC binds to TRPA1 receptors. Both TRPV1 and TRPA1 receptors are tied to pain perception.

CBD interacts with one of the body's endocannabinoids called anandamide, inhibiting anandamide's reuptake, which keeps it in the bloodstream longer. Anandamide is linked to fighting breast cancer. CBC may also reduce inflammation and pain, particularly related to osteoarthritis. What's more, the combination of CBC and THC, together increased the anti-inflammatory response even further in one study. CBC seems that it might also be productive in promoting healthy brain function, preventing neurodegenerative processes that can lead to things like Alzheimer's. Treating acne could be another use for CBC. CBC seems to have the ability to inhibit acne.

Much more research is needed to determine CBC's effectiveness for specific therapeutic uses, though current data looks promising.

Cannabigerolic-acid



Cannabigerolic acid (CBGA) is a cannabinoid that is only found in cannabis during its early stages of growth. As it grows, it transforms into other chemicals (THC, CBD, and CBC, for instance) before pretty much disappearing. CBGA protects the cannabis plant while it is growing so the flower can get the most energy possible. Almost no research has been done on CBGA, though what has been done seems to show that further studies would be a

worthwhile endeavor. Those studies have provided a window into how CBGA could be effective for treating cardiovascular disease, as it significantly inhibited an enzyme called aldose reductase. CBGA may have value in treating metabolic disorders, based on its ability to activate PPARs; and it is capable of destroying colon cancer cells.

Terpenes



Terpenes

Plants have essential oils, called terpenes, and cannabis is no exception. The way a plant tastes and smells is dependent on its terpenes. Terpenes serve a practical purpose in attracting beneficial insects and deterring predators. The terpenes in cannabis, like their cannabinoids, may also present therapeutic benefits. Not all cannabis strains have the same terpenes. Based on the different effects they can have, cannabis growers develop different strains with different terpenes to try to produce a particular set of effects. Now, terpenes are even being extracted from cannabis based on their touted health benefits.

Just like cannabinoids, terpenes bind to receptors in the brain, leading to a physiological response. They can influence how much of specific neurotransmitters, like dopamine and serotonin, the body produces. Neurotransmitters have a significant impact on human physiology.

The potential medical uses of terpenes are not uniform; different terpenes have different possible benefits, such as relieving pain, depression, anxiety, and inflammation. They can work as an anti-bacterial, serve to ward off cancer, to help you sleep, and to enhance your mood. Some research indicates that some terpenes can enhance the psychoactive effects of THC and the therapeutic effects of THC, CBD, and other cannabinoids. Other terpenes seem to reduce THC's ability to intoxicate.

Examples of terpenes in cannabis include myrcene, linalool, limonene, and pinene, though there are many more. Myrcene, for instance, is cannabis' most abundant terpene. It smells like citrus and earth. Myrcene may increase THC's psychoactive effects, and it may help treat insomnia and pain. Linalool has been used in Ayurvedic medicine to treat sleep disorders, depression, and anxiety. Now, it is also used to help relieve pain. It tastes and smells similar to lavender.

A lack of clinical studies on terpenes makes it difficult to determine if they truly have therapeutic benefits. What is currently known suggests that when they work together with cannabinoids producing synergy and therapeutic benefits.

Flavonoids

About 10 percent of compounds isolated from cannabis are flavonoids. Like terpenes, they exist in many different plants, not just cannabis. Some flavonoids are unique to cannabis though, and those are called cannaflavins. Flavonoids' primary function in plants is to provide them their color and protect them from harmful elements in the exterior world. Some research also suggests that flavonoids may also contribute to the potential therapeutic benefits of the cannabis plant, specifically the cannaflavins.

Cannaflavin A has been shown to have a more powerful anti-inflammatory function than aspirin. Cannaflavin B and C are two others that may also have medical uses. Other regular flavonoids in cannabis, like quercetin (also found in vegetables and fruits), is known to have antioxidant and anti-fungal properties. In addition, the flavonoid catechins are good for the cardiovascular system because of their antioxidant properties. Not nearly enough research on the cannabis flavonoids has been done, so it is hard to know if and how they can be used therapeutically at this point. However, based on the preliminary data available, research on them will no doubt continue, especially as the legal strictures surrounding cannabis continue to loosen.

Cannabis may be greater than the sum of its parts

When talking about cannabis and its separate chemical constituents, it is important to understand the “Entourage Effect.” The Entourage Effect means additional benefits are delivered when consuming many of the chemicals in cannabis together rather than separating them and consuming them on their own. When they work together, synergistically, cannabinoids, terpenes, and flavonoids, for example, may have the ability to provide enhanced therapeutic benefits. Every single component of the cannabis plant has its own unique biochemical effect on the human body.

As with every aspect of cannabis at this point, it is necessary to conduct additional clinical research. This is essential if we are to understand if and how benefits are delivered and what specific compounds work energetically together to produce certain effects. Deep dive scientific investigations will be the future of cannabis consumption, particularly for people who are interested in the therapeutic healing effects that potentially come from consuming CBD.

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