What is the Endocannabinoid System (ECS)?

The ECS is involved in many different physiological functions, many of which relate to stress-recovery systems and to the maintenance of homeostatic balance[1]. Among other functions, the endocannabinoid system is in involved in neuroprotection[2-4], modulation of nociception[5], regulation of motor activity[6], and the control of certain phases of memory processing[7-9]. In addition, the endocannabinoid system is involved in modulating the immune system and inflammatory responses[10-12]. It also influences the cardiovascular and respiratory systems by controlling heart rate, blood pressure, and bronchial functions[13]. Endocannabinoids are also known to exert important antiproliferative actions in tumor cells[14].

What are Cannabinoid receptors?

CB1 receptors are found throughout the body but are mostly present in the brain and spinal cord (CNS). For example, there are CB1 receptors in the hypothalamus, which is involved with appetite regulation, and the amygdala, which plays a role in memory and emotional processing. CB1 receptors are also found in nerve endings where they act to reduce sensations of pain.

CB2 receptors tend to be found in the peripheral nervous system. They are especially concentrated in immune cells. When CB2 receptors are activated, they work to reduce inflammation. Inflammation is an immune response which is believed to play a role in many diseases and conditions.

The terpene β-caryophyllene is found in several commonly available plants, including black pepper, cinnamon, clove, and other spices. It selectively binds to the CB2 receptor at nanomolar concentrations and acts as a full CB2 agonist[15].

What are Endocannabinoids?

Endocannabinoids are cannabinoids produced naturally within the body. **2-AG (2-arachidonoyl glycerol)** and **anandamide** are the two major endocannabinoids.

Anandamide was the first endocannabinoid to be identified by scientists. Discovered in 1992, its name comes from the Sanskrit word *ananda* meaning bliss, referring to its unique effects on the mind and body. In 1995, scientists discovered a second endocannabinoid and named it 2-AG (2-arachidonoyl glycerol). 2-AG is found at higher concentrations in the brain, while anandamide is found at higher concentrations in other areas of the body. Both are capable of binding to CB1 and CB2 receptors but differ in their affinities for these receptors (i.e. how likely they are to bind to and activate each receptor).

What are Endocannabinoids?

Endocannabinoids are “short-order” neurotransmitters, meaning they are synthesized on demand. In other words, endocannabinoids are only produced when the body signals that they are needed, and their presence is transient. After being released, endocannabinoids are quickly broken down by enzymes, which include FAAH (fatty acid amide hydrolase) and MAGL (monoacylglycerol lipase).

What are Terpenes?

Terpenes are organic hydrocarbons found in the essential oils of plants such as cannabis. They are common constituents of flavorings and fragrances. Terpenes are made in the trichomes which cover the surface of the flower or plant, they are mushroom shaped, crystal like resin glands. Terpenes give the plant its unique aroma profile and function to attract pollinators as well as defending against its predators. They can also have the ability increase cellular permeability and therefore a rapid absorption of cannabinoids.

Terpenes share a precursor molecule with Phyto cannabinoids; they are all flavor and fragrance components common to human diets. Terpenes have been designated “generally recognized as safe” (GRAS) by the US Food and Drug Administration and other regulatory agencies. *Cannabis*-derived terpenes include limonene, myrcene, α-pinene, linalool, β-caryophyllene, caryophyllene oxide and nerolidol.[16] These terpenes are also found in other plants.

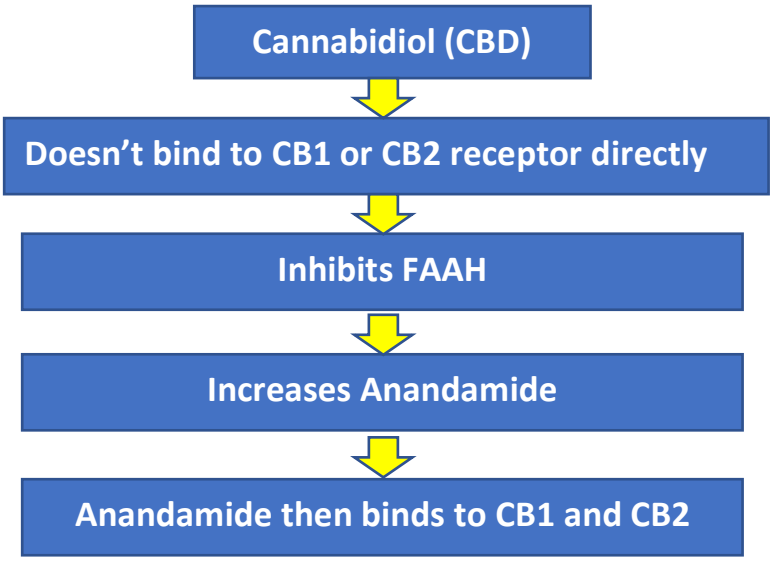
Both CB1 and CB2 receptors are known to have effects on:

- Pain perception
- Stress
- Anxiety
- Inflammation

ECS regulates many functions in body including:

- Mood
- Sleep
- Inflammation
- Immune response
- Brain function
- Stress
- Pain

Mechanism of Cannabidiol



***Cannabidiol (CBD) is Schedule 4 prescription ONLY medicine in Australia.**

FSANZ 1.4.4

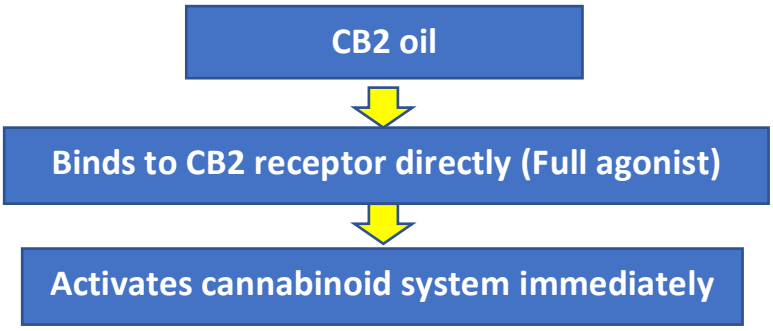
Level of Cannabidiol in food for sale

Cannabidiol must not be present in any food for sale at a level greater than 75mg/kg.

The Office of Drug Control Australia

The total Cannabidiol (CBD) content of the hemp seed oil is 0.0075% (75mg/kg) or less

CB2 Oil



Hemp oil is legal under Food Standard **1.4.4**

Under Food Standard **1.1.2**

permitted flavouring substance means any of the following:

(a) a substance that is listed in at least one of the following publications:

(i) Generally Recognised as Safe (GRAS) lists of flavouring substances published by the **Flavour and Extract Manufacturers'** Association of the United States from 1960 to 2013 (edition 26);

(ii) Chemically-defined flavouring substances, Council of Europe, November 2000;

(iii) Annex I of Council Regulation (EU) No 872/2012 of 1 October 2012 adopting the list of flavouring substances [2012] OJ L267/1;

(iv) 21 CFR § 172.515;

(b) a *flavouring substance obtained by physical, microbiological, enzymatic or chemical processes from material of vegetable or animal origin either in its raw state or after processing by traditional preparation process including drying, roasting and fermentation;

(c) a flavouring substance that is obtained by synthetic means and which is identical to one of the substances described in paragraph (b).

Caryophyllene FEMA number 2252

Myrcene FEMA number 2762

Quick reference Comparison Guide

FEATURES	CBD	CB2
Reduced pain and inflammation	Yes	Yes
Easy to access	Depends on country laws	Yes
Inhibits FAAH	Yes	No
Increases risk of Cannabis Hyperemesis (Side Effect)	Yes	No
Long term side effects	Yes	No
Prescription Only	Depends on country	No
Cost effective	No	Yes
Reduced stress and anxiety	Yes	Yes
Better Sleep	Yes	Yes
Gastroprotective	Yes	Yes
Anti-microbial	Yes	Yes
Psychoactive	No	No
Available at retail	Depends on Country	Yes
Results with use	Yes	Yes

Research Evidence and Efficacy.

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