THE ENDOCANNABINOID SYSTEM

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What is the Endocannabinoid system?

Discovered in the 20th Century, the endocannabinoid system is a biological system composed of endocannabinoids that are neurotransmitters that bind to cannabinoid receptors in the mammalian brain and body. CBD is one of the primary cannabinoids found in hemp. These cannabinoid receptors play a pivotal role in physiological processes such as mood, memory and pain. There are two cannabinoid receptors - CB1 and CB2 that are located on cells throughout the body.

What are CB1 and CB2 Receptors?

CB1 receptors are primarily located on nerve cells in the brain, spinal cord and central nervous system. They are very abundant in the cerebellum, basal ganglia, and hippocampus. The CB1 receptors have been found to play a role in memory processing, motor regulation, pain sensation, mood, and sleep. CB2 receptors are primarily found on cells in the immune system and its associated structures. When activated, they stimulate a response that fights inflammation, which can reduce pain and minimize damage to tissues.

How do these receptors work?

Cannabinoids help coordinate and regulate how we feel and think by binding with the endocannabinoid system's CB1 and CB2 receptors. Fitting like puzzle pieces, cannabinoids are designed to link together with the cannabinoid receptors. Linking activates the receiving neuron into action, triggering a set of events to pass along the message and carry out a variety of cellular responses needed for homeostasis and healthy functioning.

Where are they located?

CONCENTRATIONS OF CBD RECEPTORS

CB1

1. Brain/CNS/Spinal Cord
   - Cortigal Regions (neocortex, pyriform cortex, hippocampus, amygdala)
   - Cerebellum
   - Brainstem
   - Basal Ganglia (Globus pallidus, substantia nigra pars, reticulata)
   - Hypothalamus (endocrine-brain link CB1)
   - Olfactory Bulb
   - Thalamus
   - Pituitary
2. Thyroid endocrine gland
3. Upper Airways of mamals
4. Liver kupffer cells (macrophage immune cells), hepatocytes (liver cell), hepatic stellate cells (fat storage cell)
5. Adrenals endocrine gland
6. Ovaries gonads and endocrine gland
7. Uterus myometrium
8. Prostate epithelial and smooth muscle cells
9. Testes gonads and endocrine gland CB1): Leydig cells; sperm cells

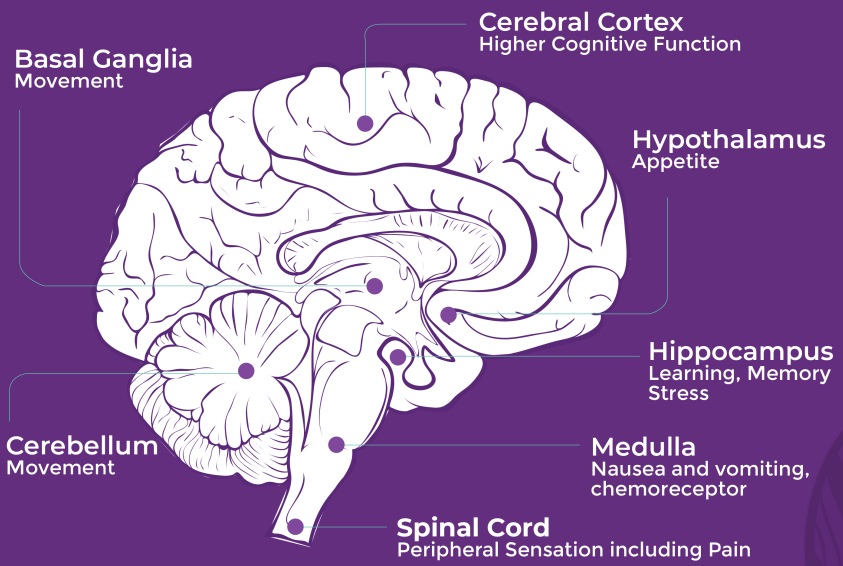
CB2

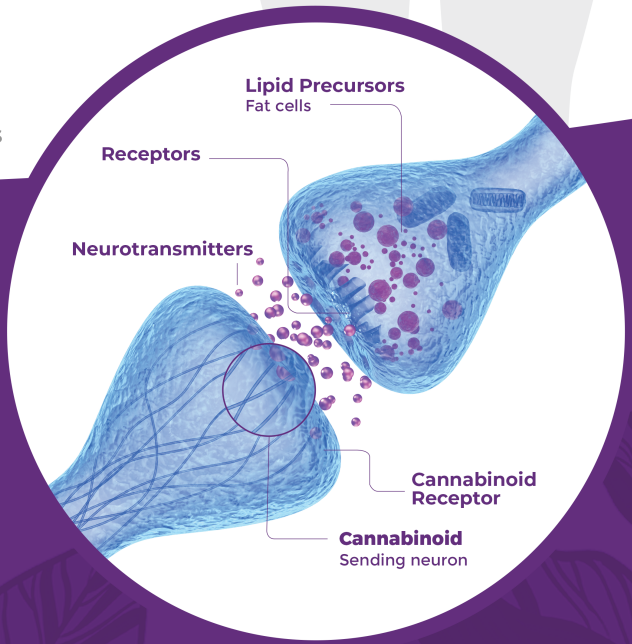
1. Eye Retinal pigment epithelial/ RPE cells
2. Stomach
3. Heart
4. Pancreas
5. Digestive Tract
6. Bone

Non-CB1 and non-CB2 are located in cells of the: Blood vessels: epithelial cells of arterial blood vessels (non-CB1 and non CB2)

CB2 receptors are located in cells of the: Lymphatic and Immune system Spleen (CB2), Thymus (CB2) , Tonis (CB2), Blood (CB2)

Non-Immune cell CB2 receptors are found in the Skin keratinocytes





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Some Interesting Facts:

- The hemp plant has the same Endocannabinoid system (ECS as mammals, producing CBD the same as mammals.
- When absorbed in the system, CBD goes to the cellular level into the ECS receptors.
- It helps to rejuvenate the receptors to function more efficiently.
- Because CBD works at the cellular level, that is why customers are saying they receive relief for a large array of health issues.
- CBD is known to be one of the best supplements to take to fight inflammation.
- 70% of health issues are caused by inflammation.

What exactly does The Endocannabinoid System (ECS) do?

We do not have a full and complete picture of what the ECS does but we do know that the ECS helps fine-tune most of our vital physiological functions. It promotes homeostasis affecting everything from sleep, appetite, pain, inflammation, memory, mood, and even reproduction. So in basic terms, the ECS helps modulate the regulation of homeostasis across all major body systems ensuring that all systems work in concert with one another.

Why don't more people know about The Endocannabinoid System.

We have known about the ECS for about 25 years. It was first discovered in the 1990's, by L.A. Matsuda. Dr. Matsuda was the first to describe the structure and functional expression of the cannabinoid receptor, CB-1. Scientists were trying to understand how THC, the primary intoxicating substance in marijuana, affected the body. What they discovered was a remarkably complex network of cannabinoid receptors (CBr) expressed in cells of both the central and peripheral nervous system. Since then other cannabinoid receptors have been identified including cannabinoid receptor type 2 (CB-2), which is found primarily in the immune system, digestive system (gastrointestinal-tract), and many of the body's major organs. But these receptors were only half the story.

Why don't more people know about The Endocannabinoid System.

The discovery of CB-1 and CB-2, prompted a hunt for the body's own cannabinoid-like chemicals that naturally interact with these newly discovered receptors. Why would the body produce receptors if there were no naturally occurring cannabinoids that would bind with them? The first cannabinoid-like chemicals to be discovered was Anandamide. Anandamide acts on both the CB-1 and CB-2 receptors, modulating both the central or peripheral nervous system, respectively. Activity in the peripheral nervous system is in regulating the of functions of the immune system.

7 Things You Probably Didn't Know About The Endocannabinoid System.

In school, you are taught that there are 11 major organ systems in the human body. They include the circulatory, respiratory, urinary, reproductive, integumentary, skeletal, muscular, nervous, endocrine, lymphatic, and digestive systems. All these systems make up the human body. But did you know you also have an endocannabinoid system (ECS)? You probably didn't because unless you are a research scientist or work with medical cannabis, it is unlikely that you will ever hear of it. And yet, the ECS has been called "the most important physiologic system involved in establishing and maintaining human health.

1 All animals have an Endocannabinoid System (ECS).

As human beings, we like to think of ourselves as special, but we're not special for having an ECS. All vertebrates and invertebrates are known to have an ECS. The most primitive animal found to express cannabinoid receptors is the sea-squirts, an animal which evolved over 600 million years ago.

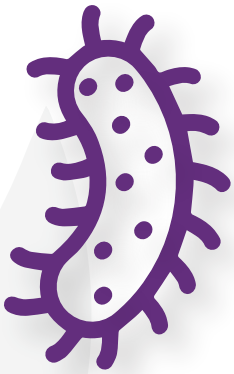
2 Endocannabinoid receptors are the most abundant neuromodulatory receptors in the body.

The total number of endocannabinoid receptors in the body is believed to be greater than all other neuromodulatory receptors found in the body combined, including receptors for the neurotransmitters serotonin and dopamine. Anandamide alone has the most receptors in the brain and is critical for maintaining a healthy central nervous system.

The Endocannabinoid System (ECS) has been found to play a role in many diseases. 3

The ECS helps bring balance to the body. As a result, it is no surprise that scientists have observed changes in ECS activity in a number of diseases. Everything from neurodegenerative disorders to rheumatoid arthritis and cancer have shown changes in endocannabinoid levels and greater receptor expression. This suggests that the ECS may be an effective target for restoring balance in the body and promoting good health.

4 Clinical Endocannabinoid System (ECS) Deficiency Syndrome may be a root cause of some diseases.



When the ECS is functioning properly, all our various body systems are maintained in a state of dynamic equilibrium, or homeostasis. But what happens when the ECS is dysfunctional or damaged? Scientists have found that certain conditions which are associated with hypersensitivity to pain or stimulus, such as migraines, fibromyalgia, and IBS, the ECS is dysfunctional.

This hypothesis, that the ECS may lie at the root of some disorders, is known as the Clinical Endocannabinoid Deficiency hypothesis. It is believed that by supplementing the body with naturally occurring cannabinoids from plants, we can correct this deficiency, relieve symptoms, and restore health.

The Endocannabinoid System (ECS) explains why natural cannabinoids in hemp and other plants have therapeutic effects. 5

Before cannabis prohibition, hemp and marijuana had been used for thousands of years to treat a number of ailments, including epilepsy, headaches, arthritis, pain, depression, and nausea. Traditional healers may not have known why the plant was effective but their experience demonstrated its effectiveness and provided the basis for later scientific inquiry. The discovery of the ECS revealed a biological basis for the therapeutic effects of plant cannabinoids and has sparked renewed interest in cannabis as medicine.

Research has shown that small doses of natural cannabinoids from hemp and other plants help support the ECS and enhance its signaling. This suggests that small, regular doses of naturally occurring cannabinoids from hemp and other plants might act as a tonic to our most central physiologic healing system.

6 Exercise and diet can also boosts The Endocannabinoid System (ECS).

Scientists have found that prolonged aerobic exercise increases levels of anandamide, the “feel good” endocannabinoid. Diet is also a useful target. Increasing your intake of the essential fatty acid, omega 3, found in oily fish or healthy seeds like flax or hemp, can help support endocannabinoid brain signaling.

Doctors know very little about The Endocannabinoid System (ECS). 7

Talking with your doctor about the ECS can be frustrating since the majority of doctors are not trained on it. This is beginning to change but for now it is helpful to come armed with good information about the ECS when speaking with your doctor. A 2013 survey conducted by Medical Cannabis Evaluation in Sacramento asked medical schools in the United States whether the ECS formed part of their curriculum. The survey found that only “13% teach the ECS to future doctors.” This means that many patients will have had more training on the ECS than their doctors.

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