ADVERTORIAL

WHY CANNABIS WORKS

An Introduction to the Endocannabinoid System

Have you ever wondered how cannabis exerts its effects on the body? The answer is a complex biological mechanism, a network of chemical signals called the endocannabinoid system (ECS).

All invertebrate animals have an endocannabinoid system. It helps the body maintain homeostasis — internal balance.

Though it was discovered decades ago, our understanding of the ECS is in its infancy. Scientists nonetheless believe it plays a role in regulating sleep, mood, appetite, memory and reproduction and likely has an impact on our responses to pain and stress.

The primary components of the ECS are 1) cannabinoid receptors 2) endocannabinoids and 3) metabolic enzymes.

1. Cannabinoid receptors are located on the surface of cells. They are found all over the body, affecting virtually every other bodily system. The receptor CB1 appears to be most prevalent in the brain; CB2 is more widespread in the immune system.

2. Endocannabinoids are neurotransmitters, molecules that send impulses from one nerve cell to another across what's called a synapse. They're located inside cells. To promote homeostasis, they bind to and activate cannabinoid receptors. The best-known endocannabinoid is called "anandamide."

3. Metabolic enzymes break down endocannabinoids. They do this so the endocannabinoid activates the cannabinoid receptor only as long as needed. The enzyme FAAH acts on the endocannabinoid anandamide.

To understand how the ECS functions, think of the cannabinoid receptor as a lock, the endocannabinoid as a key and the metabolic enzyme as a locksmith, who unlocks the lock (and in this case, throws away the key).

So where does the cannabis plant fit into all this?

Cannabis has several active ingredients. Perhaps chief among them are the chemical compounds known as cannabinoids or, more precisely, phytocannabinoids ("phyto" means "of a plant"). Phytocannabinoids like THC (tetrahydrocannabinol) and CBD (cannabidiol) interact with cannabinoid receptors much as endocannabinoids do. In fact, "endocannabinoid" simply denotes cannabinoids produced inside the body ("endo" means "within").

CBD seems to exert its effect by blocking the action of the metabolic enzymes. It "inhibits" the enzyme FAAH, preventing it from breaking down the endocannabinoid anandamide. When this happens, the anandamide stays in the synapse longer than it ordinarily would. The word "anandamide" is Sanskrit for "joy" or "bliss," which suggests one of the ways the body responds to it. When anandamide sits in the synapse, mood is improved, which is why CBD has been hailed as a treatment for anxiety.

THC, meanwhile, mimics the action of anandamide when it binds with a cannabinoid receptor. But when that connection is made, the enzyme has no impact — because metabolic enzymes can't break down external cannabinoids like THC, only internal cannabinoids like anandamide. When the key is THC, it "sticks" in the lock, with the locksmith nowhere to be found, which means the THC lingers in the synapse. Researchers believe this is how THC intoxicates, eases pain and stimulates appetite, among other effects.

The endocannabinoid system is also thought to limit the body's inflammatory response. The activation of CB1 receptors by endocannabinoids purportedly regulates the electrochemical signals brain cells (neurons) send to one another, keeping them from becoming overloaded.

When homeostasis is maintained, the immune system sends just enough lymph fluid (the action that produces swelling) to counter any damage it may detect, resulting from, say, bacteria or injury. When this signal becomes overloaded, we experience unnecessary swelling and thus, pain. Sometimes a distress signal is sent when no bacteria or illness is present. Finding no damage to contain, the immune system instead attacks healthy cells, resulting in autoimmune illness.

Endocannabinoid deficiency may explain the persistence of mood, inflammatory and other conditions in the human population, much as a deficiency of serotonin is blamed for depressive illness. The theory goes that people suffering from endocannabinoid deficiency could be helped by treatments that target endocannabinoid production.

Optimism surrounding the development of such therapies is tempered, however, by how much of the ECS is still unknown. But the fact remains, our naturally occurring endocannabinoid system is what allows us to benefit from cannabis, so as studies begin to find that cannabis may be a cure for what ails us, we have the ECS to thank.