The Endocannabinoid System—Whazzat?

Your body makes, uses, and needs marijuana-like chemicals called "endocannabinoids." Your physical and mental health require these endocannabinoids. Members of the Animal Kingdom, from sponges to men, have nerve and other organ receptors that respond to endocannabinoids. A basic understanding of the nervous system is fundamental to understanding how these endocannabinoids work.

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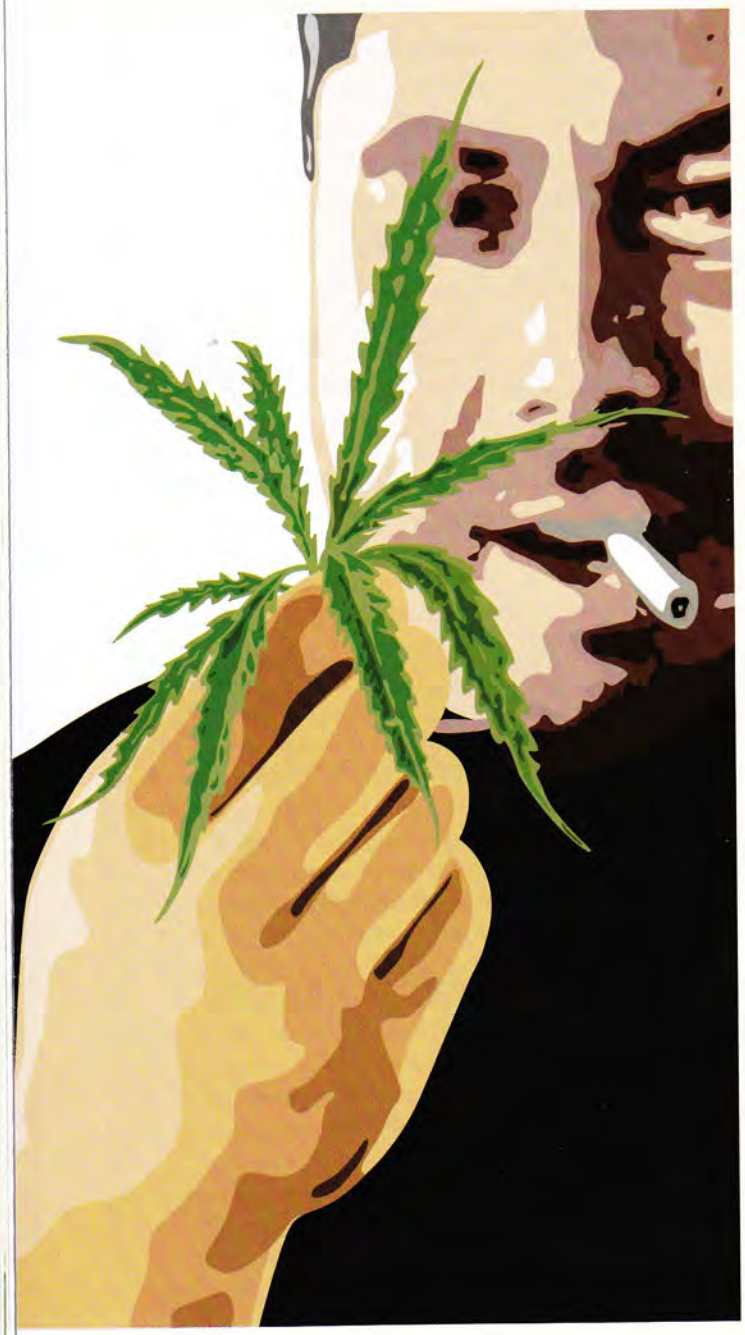


The Basics

The nervous system works using the movement of chemicals and electricity. In its most simplified fashion, electrochemical activity usually proceeds along the "wires" (axons) of nerve cells ("neurons") to the tip where special chemicals ("neurotransmitters") are released into a space between neighboring neurons. The space is called a "synapse". The neurotransmitter is released from a "presynaptic" neuron, and then diffuses across the synapse to bind to receptors in the neighboring "postsynaptic" neuron. Neurotransmitters fit specific receptors to activate (or block) those receptors, sort of like a key in a lock. Our own bodies make endocannabinoids that fit our endocannabinoid receptors. Marijuana works because many of marijuana's chemicals are like "keys" that fit and activate our different endocannabinoid "locks." Marijuana's chemicals are "phytocannabinoids," plant cannabinoids.

Endocannabinoids are unique in a few respects. Most neurotransmitters are synthesized *in advance* by the *presynaptic* neurons to be *stored* in tiny packets ("vesicles") in the cells to be available when needed. Endocannabinoids are not synthesized in advance and stored, but are synthesized *on demand* for *immediate* release. Also, it is not the presynaptic neurons but the postsynaptic neurons that synthesize the endocannabinoids. This means that the endocannabinoids are released into the synapse and then diffuse *backwards* to affect the presynaptic neuron. In a sense, the chemicals go against the flow of "electricity" to modulate the flow of "electricity," hence endocannabinoids are sometimes classed as "neuromodulators." Similar chemical interactions also occur in the organs outside of the nervous system.

The Chemicals

Endocannabinoids are fats ("lipids"), so they are able to diffuse quickly through lipid-laden tissues and membranes. In 1992, Anandamide, also known as N-arachidonylethanolamine or AEA, was the first endocannabinoid identified and derives its name from the Sanskrit word "ananda" (meaning "bliss") joined with "amide," its general chemical class. So far, other identified endocannabinoids include 2-arachidonylyglycerol (2-AG), 2-arachidonyl glyceryl ether (noladin ether), O-arachidonyl ethanolamine (OAE or virodhamine), and

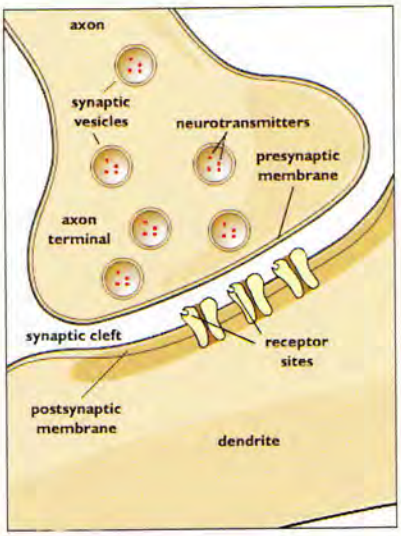
N-arachidonyl dopamine (NADA). While "your" government tells you there is no medical use for marijuana, Big Pharma is already developing proprietary versions of these chemicals to sell to you.

The Receptor Subtypes

In man, the endocannabinoids bind to endocannabinoid receptors of different subtypes distributed throughout our many organ systems. The best characterized of these receptor subtypes are the CB1 and CB2 receptors, however there are likely at least three additional subtypes that are temporarily and not very cleverly named "non-CB1/non-CB2" receptors.

CB1 Receptors

CB1 receptors are most widely found in the brain, but are not found in the brainstem, the medulla, where our important respiratory and heart control centers are located. It is thought that this accounts for the enormous safety of marijuana, because cannabinoids cannot depress respiratory or heart function like opiates and other toxic chemicals. CB1 receptors are not limited to the brain, but are also widely distributed in the pituitary, thyroid, adrenals, liver, lung, kidney, gut, pain receptors, and even our reproductive systems. Endocannabinoids are suspected to play a role in regulating the implantation of newly conceived babies. There appears to be an optimum level of endocannabinoids for fertility. If levels are too high or too low the baby will not implant properly or grow in the mother's womb.



A strain of laboratory mice without CB1 receptors, known as "CB1 knockout mice," suffer from severe memory problems and die early from stroke and heart attack. These observations in mice correlate with research in humans showing the importance of cannabinoids in modulating memory, cardiovascular function, and nerve-protecting effects.

It is well known that cannabis affects appetite ("the munchies") and also makes you happy. Research aimed at the role of cannabis in appetite led to the development of very potent appetite suppressants. A drug that blocks CB1 receptors, Rimonabant, was a very effective and widely prescribed appetite suppressant in Europe. Despite its effectiveness in dieting, Rimonabant was pulled from the market. Why? Big Pharma's drug so completely blocked patients' natural endocannabinoids that patients were deprived of not only their craving for food, but also deprived of their mental health. Because Rimonabant blocked the mood stabilizing effects of natural endocannabinoids, Rimonabant users were committing suicide in significant numbers.

What do we learn from these observations? Endocannabinoids maintain our physical health and mental stability. Yes, Divine Providence at work—happy minds and healthy bodies require marijuana-like chemicals!

CB2 Receptors

CB2 receptors are also widely distributed, most notably throughout the immune system (T-cells, B-cells, macrophages, monocytes, etc.) and hematopoietic (blood-making) system of the spleen, liver, tonsils, thymus, and bone marrow. CB2 receptors are found in the brain, but unlike CB1 receptors that are mostly observed on neurons (the nerve cells), CB2 receptors are found primarily on microglia, the support and immune cells of the brain and spinal cord. CB2 receptors are also prevalent in the gastrointestinal tract and bone. Stimulation of CB2 receptors by endocannabinoids and by marijuana's phytocannabinoids, especially cannabidiol (CBD), appears to down-regulate both the immune system and pain receptors. Endocannabinoids also help to maintain bone mass, preventing osteoporosis.

It is likely that such down-regulated CB2 receptor activity in pain receptors, the immune system, and the gut explains the observed effectiveness of marijuana in reducing inflammation and pain, especially in inflammatory bowel diseases like Crohn's Disease and ulcerative colitis, and in neuropathic pain—pain due to disorders of pain receptors. Effects on microglial cells may explain not just the palliative (symptom reduction) effects of marijuana, but also the *curative* effects observed by some researchers in Alzheimer's Disease, multiple sclerosis, and a particularly aggressive type of brain cancer, glioblastoma multiforme. Researchers have observed that cannabinoids reduce the hallmark amyloid deposition and neurofibrillatory tangles of Alzheimer's Disease, the demyelination of multiple sclerosis, and numerous types of cancers.

Future Developments

As the term "non-CB1/non-CB2 receptors" implies, there are a variety of other receptors that remain to be characterized and their roles elucidated. Stay tuned for that news as it develops.

As you may discern, many are the benefits that the Reefer Madness propagandists would deny you. In future articles, I will build on this understanding to explain how marijuana provides so many health benefits. Be good and be well!

Any questions? Any topics you would like me to address in these columns? Send me an email at staff@doctorsuter.com.

Next month: Phytocannabinoids

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