

### Cannabis for Pain

The transmission and perception of pain signals in the human body is a complex process. When a pain signal is initiated, it first travels down peripheral nerves, jumping from nerve to nerve across gaps called synapses. Eventually, the pain signal makes its way to the spinal cord and then up the spinal cord to the brain where pain perception occurs. This is called the pain pathway. There are also nerves that descend from the brain to the spinal cord which serve to dampen or moderate pain perception by acting as a gate of sorts: only signals that are strong enough are allowed to pass upward to the brain. This is what establishes an individual's pain threshold. In some conditions such as fibromyalgia or neuropathy, the size or intensity of signals traveling from the body to the brain are dialed up or amplified, and/or the pain threshold is lowered, causing a person to feel more pain than they normally would.



Cannabinoid CB1 receptors are found throughout the nerves, spinal cord, and brain along the pain pathway. By interacting with these receptors, cannabis plant cannabinoids such as THC and CBD and

human endocannabinoids such as Anandamide moderate the transmission, processing, and perception of pain. In fact, cannabinoids share mechanisms of action with many common medications including Capsaicin, NSAIDs, Lyrica, Gabapentin (Neurontin), and Duloxetine (Cymbalta), and can enhance the effectiveness of opiates without increasing the risk of opiate overdose<sup>1-10</sup>.

In addition, inflammation plays a primary role in causing pain as inflammatory chemical mediators can generate pain signals and increase the perception of pain in the brain. Inflammation is driven by the immune system. Cannabinoid CB2 receptors are present throughout the immune system and, by binding these, cannabinoids reduce inflammation and, by extension, inflammation-mediated pain. Although there is clearly a role for using cannabis to treat inflammation-related pain, there is no research to suggest that cannabis alone can adequately manage chronic autoimmune inflammatory conditions and conventional treatments for these disorders remain of highest importance.

While some preclinical research has suggested that minor cannabinoids such as CBN, CBG, CBC, and THCV or cannabis terpenes may play a role in reducing pain and inflammation, human clinical trials are lacking, and effective doses are not well established.

There is not much medical evidence showing the effectiveness of cannabis for acute pain or inflammation, but many studies suggest a benefit for chronic pain. Interestingly, animal models of chronic pain have revealed an increased production of CB1 receptors along the pain pathway in mice which implies a potentially central role of these receptors in moderating chronic pain<sup>11</sup>.

After examining all the available data, the National Academy of Sciences released a report in 2017 that found “substantial and conclusive evidence” for the effectiveness of cannabis in treating chronic pain<sup>2</sup>. Because they can be so effective in treating chronic pain, cannabinoids can help some patients reduce or eliminate the use of potentially harmful opioids. In fact, one study in 2016 showed a 64% reduction in opioid use in chronic pain patients who were using medical cannabis<sup>3</sup>.

Using cannabinoids for pain or inflammation can be complicated and it is recommended that an individual consult with a cannabis-literate clinician to help with dosing and to ensure that cannabis is used safely and effectively.

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