Medical Cannabis & Cancer

Condition Description

According to the World Cancer Research Fund, there were an estimated 18 million cancer cases around the world in 2018. In that same year, an estimated 1,735,350 new cases of cancer were diagnosed in the United States, with 609,640 Americans dying from the disease, according to the National Cancer Institute.

Cancer is the name given to a group of diseases that are characterized by some of the body's cells beginning to divide without stopping while spreading into surrounding tissues. Many cancers form solid tumors, yet cancers of the blood, such as leukemias, do not manifest in the same way.

Cancer has been at the forefront of the medical cannabis movement, with many seeking to prove through research cannabis' efficacy for managing treatment symptoms, as well as it showing promise in the ability to cause "cell death" and stop the proliferation of cancerous cells.

Medical Cannabis & Cancer Research

Cannabis to Manage Cancer Treatment Side Effects

The use of cannabis for the treatment of the negative effects of treatments such as chemotherapy has been brought front and center in the cannabis for cancer discourse. In particular, researchers are looking at the issues of pain, nausea, and appetite.

A 2015 systematic review looked at 28 studies the involved a total of 2,454 participants examining the effects of inhaled cannabis (along with dronabinol, nabilone, and nabiximols) on neuropathic pain and cancer pain. The studies showed improvement in pain measures, with an overall odds ratio of 1.41 (95% confidence interval) for improvement in pain with the use of cannabinoids compared with placebo (Whiting, et al, 2015).

A 2001 series of studies examining the efficacy of THC in reducing or eliminating nausea and vomiting following chemotherapy concluded that inhaled cannabis was the most effective way to manage these negative effects. The studies highlighted that patients who smoked marijuana experienced 70-100% relief from nausea and vomiting, while those who used a THC capsule experienced 76-88% relief (Musty & Rossi, 2001).

The role of cannabinoids in aiding in the loss of appetite and "cancer anorexia" has been studied since the 1980s, with studies seeking to prove that THC can help improve taste and smell, appetite, caloric intake, and quality of life for cancer patients with chemosensory alterations due to cancer treatments. A small 2011 double-blind placebo-controlled study published in *Annals of Oncology* looked at 21 participants, half of which were administered THC (via Marinol), while the other half were administered a placebo. THC-treated patients reported that food "tasted better", had an increased pre-meal appetite, and consumed more calories as compared to the placebo group (Brisbois, et al, 2011).

Cannabis and Apoptosis & Autophagy

Apoptosis or "programmed cell death" involves a chemical signal being sent to the cell which instructs the cell to "self-destruct". An insufficient amount of apoptosis may lead to cancer, which results in uncontrolled cell proliferation. With decreased apoptosis, the body becomes unable to rid itself of diseased cells.

Similar to apoptosis, autophagy is a naturally occurring process where cells are "self-devoured" and cellular components are disassembled and recycled for use in new cell growth.

Cannabis is showing promise in the stimulation of apoptosis and autophagy in cancer cells by acting on the cannabinoid receptors of the body's endocannabinoid system. The THC and CBD bind to the endocannabinoid receptors (CB1 and CB2), sending signals that result in cell death. As the endocannabinoid system also plays a key role in cell migration, cannabis acts on receptors to slow or stop metastasis.

A 1998 study led by renowned cancer and cannabis researcher Cristina Sanchez showed how THC can induce cell death in cancer cells in aggressive forms of brain cancer, concluding that there is "a general role of these compounds as modulators of cell fate" (Sanchez, et al, 1998).

A 2013 study in the *Journal of Biological Chemistry* examined two cannabinoid cell receptors – CB2 and GPR55 – and concluded that they are responsible for the anti-tumor effects of THC. "CB2R-GPR55 complexes have unique pharmacological and signaling properties and are critically involved in the response of cancer cells to THC both *in vitro* and *in vivo*" write the researchers, indicating that this discovery opens new doors to the development of compounds targeting these receptors as novel sites of intervention for future cancer studies (Scott, et al, 2013).

The Anti-Angiogenic Effects of Cannabis

Angiogenesis is the process that allows benign tumors to become malignant cancers, as it involves the formation of new blood vessels from old blood vessels. Angiogenesis occurs within cancer cells, allowing new pathways to form and supply the cancer cells with an ongoing supply of nutrients and blood flow, helping the cancer cells to spread.

Blood vessel growth is regulated in part by the body's endocannabinoid system (ECS), with cannabinoids acting on CB1 and CB2 receptors to stop the formation of new blood vessels in cancer cells. Miraculously, cannabis has a unique way of distinguishing healthy cells from cancerous cells.

A 2016 study published in *Current Oncology* examined the antitumor properties of cannabinoids, and saw that the "engagement of a molecular target (CB1 and CB2 receptors) by a family of selective drugs (including THC and other cannabinoid agonists) inhibits tumour growth in animal models through a well-established mechanism of action" concluding that "cannabinoids induce tumor cell death and inhibit tumor angiogenesis and invasion in animal models of cancer, and there are indications that they act similarly in patients with glioblastoma" (Valasco, et al, 2016).

Cannabis Targeting Breast Cancer

In a 2007 study led by Dr. Sean McAllister published in *Molecular Cancer Therapeutics*, CBD was introduced as a novel inhibitor of Id-1 gene expression in aggressive breast cancer cells. The study posed that CBD switches off the Id-1 gene, a protein that appears to play a major role as a cancer cell conductor. Dr. McAllister proposes that CBD could be a breakthrough anti-cancer medication (McAllister et al, 2007).

Cannabis Increasing the Efficacy of Radiation

A 2014 <u>study</u> published in *Molecular Cancer Therapeutics* was the first to document the effects of cannabinoids when used with radiation therapy or radiotherapy. The study observed "dramatic reductions" in high-grade glioma masses, a deadly form of brain cancer, when THC and CBD were utilized in conjunction with radiotherapy on mice (Scott, et al, 2014).

National Support for Cannabis & Cancer

The <u>American Cancer Society</u>, while cautious to site more research is needed, provides positive information on the benefits of cannabis, particularly when used to ease the troubling side effects of chemotherapy.

References

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