

Cannabis and Cannabinoids (PDQ®)

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Cannabis and Cannabinoids (PDQ®)

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The National Cancer institute has updated its summary information about cannabis and cannabinoids for January 2016. Without approving or recommending any cannabinoid it does provide an summary of main treatment findings seen in animal studies and cell culture. *Another active cannabinoid is cannabidiol (CBD), which may relieve pain and lower inflammation without causing the "high" of delta-9-THC.*

*Other possible effects of cannabinoids include:*

- *Anti-inflammatory activity.*
- *Blocking cell growth.*
- *Preventing the growth of blood vessels that supply tumors.*
- *Antiviral activity.*
- *Relieving muscle spasms caused by multiple sclerosis.*

*Preclinical studies of cannabinoids have investigated the following antitumor activity:*

- *Studies in mice and rats have shown that cannabinoids may inhibit tumor growth by causing cell death, blocking cell growth, and blocking the development of blood vessels needed by tumors to grow. Laboratory and animal studies have shown that cannabinoids may be able to kill cancer cells while protecting normal cells.*
- *A study in mice showed that cannabinoids may protect against inflammation of the colon and may have potential in reducing the risk of colon cancer, and possibly in its treatment.*
- *A laboratory study of delta-9-THC in hepatocellular carcinoma (liver cancer) cells showed that it damaged or killed the cancer cells. The same study of delta-9-THC in mouse models of liver cancer showed that it had antitumor effects. Delta-9-THC has been shown to cause these effects by acting on molecules that may also be found in non-small cell lung cancer cells and breast cancer cells.*
- *A laboratory study of cannabidiol (CBD) in estrogen receptor positive and estrogen receptor negative breast cancer cells showed that it caused cancer cell death while having little effect on normal breast cells. Studies in mouse models of metastatic breast cancer showed that cannabinoids may lessen the growth, number, and spread of tumors.*
- *A laboratory study of cannabidiol (CBD) in human glioma cells showed that when given along with chemotherapy, CBD may make chemotherapy more effective and increase cancer cell death without harming normal cells. Studies in mouse models of cancer showed that CBD together with delta-9-THC may make chemotherapy such as temozolomide more effective.*

About other conditions the National Cancer Institute stated more potential benefits of CBD:  
*Pain relief*

## PDQ Cancer Information about CBD 2016

- *Cannabinoid receptors (molecules that bind cannabinoids) have been studied in the brain, spinal cord, and nerve endings throughout the body to understand their roles in pain relief.*
- *Cannabinoids have been studied for anti-inflammatory effects that may play a role in pain relief.*
- *Animal studies have shown that cannabinoids may prevent nerve problems (pain, numbness, tingling, swelling, and muscle weakness) caused by some types of chemotherapy.*

### *Nausea and vomiting*

- *Cannabinoid receptors found in brain cells may have a role in controlling nausea and vomiting. Animal studies have shown that delta-9-THC and other cannabinoids may act on cannabinoid receptors to prevent vomiting caused by certain types of chemotherapy.*

### *Anxiety and sleep*

- *Cannabinoid receptors found in the brain and other parts of the nervous system may be involved in controlling mood and anxiety.*
- *Anti-anxiety effects of cannabidiol (CBD) have been shown in several animal models.*

## Cannabidiol Anticancer Activity

Cannabinoids possess anticancer activity and represent a new class of anti-cancer drugs concludes a comprehensive review published in the October 2005 issue of the scientific journal *Mini-Reviews in Medicinal Chemistry*. Cannabidiol (CBD) and other cannabinoids exert their anti-cancer effects in a number of ways and in a variety of tissues which makes them applicable in many forms of cancer. These are some of the most prominent general effects that have been shown in clinical studies and research.

- Triggering cell death, through a mechanism called apoptosis
- Stopping cells from dividing
- Preventing new blood vessels from growing into tumors
- Reducing the chances of cancer cells spreading through the body
- Stopping cells from moving or invading neighboring tissue
- Speeding up the cell's internal 'waste disposal machine' - cell self-suicide

Hemp oil is available in three forms. One is just a vegetable oil from crushed hemp plants without any significant special chemicals other than good omega-3 polyunsaturated fats. Medical marijuana oil (controlled) contains some amount of two cannabinoid substances, THC and CBD among other minor components. CBD hemp oil does not contain any THC because it comes from industrial hemp (legal everywhere). These plant cannabinoids supplements the body's own cannabinoid chemicals (endocannabinoid) to regulate nerves, hormones and immune functions throughout the body. Cancer experiments with animals and cell cultures CBD and THC have both shown anticancer effects. And in combination with radiation or chemotherapy, CBD also protects normal cells but enhances cancer killing effects. Every cancer treatment plan should include hemp cannabinoids.

**Breast:** CBD represents the first nontoxic exogenous agent that can significantly decrease DNA-binding protein inhibitor ID-1, in metastatic breast cancer cells leading to the down-regulation of tumor aggressiveness. ID-1 is a protein that in humans is encoded by the ID1 gene critical to tumor growth and angiogenesis. The CBD concentrations were effective at inhibiting the proliferative and invasive phenotype of breast cancer cells. Of the five cannabinoids tested cannabidiol is the most potent inhibitor of cancer cell growth. These data provide the basis for possible cannabinoid therapy in the management of breast cancer.

**Lung:** Cannabinoids represent a novel class of drugs active in increasing the life span in mice carrying Lewis lung tumors and decreasing primary tumor size. Research has also found a cannabidiol-driven impaired invasion of human cervical cancer (HeLa, C33A) and human lung cancer cells (A549) that was reversed by antagonists to both CB(1) and CB(2) receptors as well as to another important receptor, the vanilloid 1 (TRPV1). The decrease of cancer invasion induced by cannabidiol appeared along with up regulation of tissue inhibitor of matrix metallo-proteinases (TIMP). These findings suggest a novel mechanism underlying the anti-invasive action of cannabidiol and imply its use as a therapeutic option for the treatment of highly invasive cancers. Researchers in lung cancers also reported that they observed significant reduction in Focal Adhesion Complex, which plays an important role in cancer migration. By all measures cannabinoids significantly inhibited in vivo tumor growth and lung metastasis

**Pancreatic:** In research on pancreatic cancer it was found that cannabinoids lead to cell-death of pancreatic tumor cells via a CB2 receptor and up-regulation of endoplasmic reticulum stress-related genes through ceramide-dependent mechanism. The National Cancer Institute suggests these findings may contribute a new basis for a new therapeutic approach in this increasing and deadly carcinoma .

**Prostate:** These malignant cells possess increased expression of both cannabinoid 1 and 2 receptors, and stimulation of the receptors results in decrease in cell viability, increased cell-death, and decreased androgen receptor expression along with prostate-specific antigen excretion (PSA). It might therefore be possible to have CBD melt away prostate disease while watching the current standard prostate screening parameter.

**Colorectal:** In these cell lines, cannabidiol protected DNA from oxidative damage, increased endocannabinoid levels and reduced cell proliferation in a CB(1)-, TRPV1- and PPAR-antagonists sensitive manner. Cannabidiol exerts chemo-preventive effect in vivo and reduces cell proliferation through multiple mechanisms. Cannabinoids have been found to counteract intestinal inflammation as well cancer, which includes polyp formation,

inflammatory bowel and even diverticulosis. The control of the cellular proliferation has become a focus of major attention as opening new therapeutic possibilities for the use of cannabinoids as potential antitumor agents.

**Ovarian:** This cancer represents one of the leading cause of cancer-related deaths for women and is the most common gynecologic malignancy. Results with cannabinoids support a new therapeutic approach for the treatment of ovarian cancer. It is also conceivable that with available cannabinoids as lead compounds, non-habit forming agents that have higher biological effects could be developed.

**Leukemia:** Examination of a number of human leukemia and lymphoma cell lines demonstrate that CB2 cannabinoid receptors expressed on malignancies of the immune system may serve as potential targets for the induction of apoptosis. Also, because CB2 agonists lack psychotropic effects, they may serve as novel anticancer agents to selectively target and kill tumors of immune origin. Additionally, a new anticancer quinone (HU-331) was synthesized from cannabidiol. It shows significant high efficacy against human cancer cell lines in vitro and against in vivo tumor grafts in nude mice. Two non-psychotropic cannabinoids, cannabidiol (CBD) and cannabidiol-dimethylheptyl (CBD-DMH), induced cell-death in a human acute myeloid leukemia (AML) HL-60 cell line. In other research into plant-derived cannabinoids, delta9-tetrahydrocannabinol (THC) and CBD, induced apoptosis (cell death) in leukemic cells. This was accompanied by impairment of tumor vascularization, as determined by altered blood vessel morphology and decreased expression of pro-angiogenic factors (VEGF), placental growth factor, and angiopoietin. Loss of EGF-R function that protects tumor cells was also observed in cannabinoid-treated tumors.

**Liver:** Hepatocellular carcinoma (HCC) is the third cause of cancer-related death worldwide. When these tumors are in advanced stages, few therapeutic options are available. In this study, the effects of cannabinoids—a novel family of potential anticancer agents—on the growth of HCC was investigated. It was found that cannabinoids reduced the viability of the human HCC cell lines. And, cannabinoids were also able to inhibit tumor growth and ascites in a model of HCC transplanted to other animals.

**Brain:** Cannabinoid treatment inhibits angiogenesis of gliomas in vivo. Remarkably, cannabinoids kill glioma cells selectively and protect non-transformed glial cells from death. “Cannabinoid administration induces regression of malignant gliomas in rodents by a mechanism that may involve sustained ceramide generation (mentioned above in pancreatic) and extracellular kinase activation (MAPK/ERK pathways) that are molecules that are involved in functions in regulating cell differentiation. In contrast, most of the experimental evidence indicates that “cannabinoids may normal neurons from toxic insults, such as glutamatergic overstimulation, ischemia, and oxidative damage.”  
Cannabinoids: potential anticancer agents. *Nat Rev Cancer*. 3(10):745-55

Thus, through a wide and diverse complex of mechanism the cannabinoids, and particularly CBD, defend and protect the bodies normal tissue and function while accelerating the destruction of a broad range of cancers. Oncologists tell us that every cancer is unique in its characteristics but CBD seems to have the silver bullets assassinate most of the cancers plaguing us in this modern era. More research is needed and far more human trials to verify the extraordinary capabilities of the cannabinoids in defending our bodies.

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# Condition: Cancer

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Also see: *CBD cannabis for nausea.* (<http://www.projectcbd.org/condition/35/Nausea>)

## General

- **Cannabidiol as potential anticancer drug** (<http://www.ncbi.nlm.nih.gov/pubmed/22506672>) (PubMed)
- **Cannabidiol inhibits angiogenesis by multiple mechanisms** (<http://www.ncbi.nlm.nih.gov/pubmed/22624859>) (PubMed)
- **The inhibitory effects of cannabidiol on systemic malignant tumors** (<http://www.ncbi.nlm.nih.gov/pubmed/23544909>) (PubMed)
- **Cannabidiol inhibits cancer cell invasion via upregulation of tissue inhibitor of matrix metalloproteinases-1** (<http://www.ncbi.nlm.nih.gov/pubmed/19914218>) (PubMed)
- **Marijuana fights cancer and helps manage side effects** (<http://www.thedailybeast.com/articles/2012/09/06/marijuana-fights-cancer-and-helps-manage-side-effects-researchers-find.html>) (Daily Beast)

## Lung

- **Cannabidiol inhibits lung cancer cell invasion and metastasis via intercellular adhesion molecule-1C** (<http://www.ncbi.nlm.nih.gov/pubmed/22198381>) (PubMed)
- **COX-2 and PPAR-γ confer cannabidiol-induced apoptosis of human lung cancer cells** (<http://www.ncbi.nlm.nih.gov/pubmed/23220503>) (PubMed)
- **Decrease of plasminogen activator inhibitor-1 may contribute to the anti-invasive action of cannabidiol on human lung cancer cells** (<http://www.ncbi.nlm.nih.gov/pubmed/20668920>) (PubMed)
- **Media ignored expert's shocking findings that marijuana helps prevent lung cancer** (<http://www.alternet.org/drugs/media-ignored-experts-shocking-findings-marijuana-helps-prevent-lung-cancer-now-its-med-school?akid=9578.1118899.-dKN0s&rd=1&src=newsletter732160&t=10&paging=off>) (O'Shaughnessy's)

## Prostate / Colon

- **Towards the use of non-psychoactive cannabinoids for prostate cancer** (<http://www.ncbi.nlm.nih.gov/pubmed/22849856>) (PubMed)
- **In Vitro Anticancer Activity of Plant-Derived Cannabidiol on Prostate Cancer Cell Lines** (<http://www.scirp.org/journal/PaperInformation.aspx?PaperID=47691#U8FwiKiAQUF>) (Scirp.org)
- **Induction of apoptosis by cannabinoids in prostate and colon cancer cells is phosphatase dependent** (<http://www.ncbi.nlm.nih.gov/pubmed/22110202>) (PubMed)
- **Chemopreventive effect of the non-psychoactive phytocannabinoid cannabidiol on experimental colon cancer** (<http://www.ncbi.nlm.nih.gov/pubmed/22231745>) (PubMed)
- **Inhibition of colon carcinogenesis by a standardized *Cannabis sativa* extract with high content of cannabidiol** (<http://www.phytomedicinejournal.com/article/S0944-7113%2813%2900472-8/abstract>) (PubMed)

## Breast

- **Antitumor activity of plant cannabinoids with emphasis on the effect of cannabidiol on human breast carcinoma** (<http://www.ncbi.nlm.nih.gov/pubmed/16728591>) (PubMed)
- **Cannabidiol induces programmed cell death in breast cancer cells by coordinating the cross-talk between apoptosis and autophagy** (<http://www.ncbi.nlm.nih.gov/pubmed/21566064>) (PubMed)
- **Pathways mediating the effects of cannabidiol on the reduction of breast cancer cell proliferation, invasion, and metastasis** (<http://www.ncbi.nlm.nih.gov/pubmed/20859676>) (PubMed)
- **Cannabidiol as a novel inhibitor of Id-1 gene expression in aggressive breast cancer cells** (<http://www.ncbi.nlm.nih.gov/pubmed/18025276>) (PubMed)
- **Cannabidiolic acid, a major cannabinoid in fiber-type cannabis, is an inhibitor of MDA-MB-231 breast cancer cell migration** (<http://www.ncbi.nlm.nih.gov/pubmed/22963825>) (PubMed)

## Glioblastoma / Brain

- **Cannabidiol enhances the inhibitory effects of delta9-tetrahydrocannabinol on human glioblastoma cell proliferation and survival** (<http://www.ncbi.nlm.nih.gov/pubmed/20053780>) (PubMed)
- **Antitumor effects of cannabidiol, a nonpsychoactive cannabinoid, on human glioma cell lines** (<http://www.ncbi.nlm.nih.gov/pubmed/14617682>) (PubMed)
- **Systematic review of the literature on clinical and experimental trials on the antitumor effects of cannabinoids in gliomas** (<http://www.ncbi.nlm.nih.gov/pubmed/24142199>) (PubMed)
- **Cannabidiol inhibits human glioma cell migration through a cannabinoid receptor-independent mechanism** (<http://www.ncbi.nlm.nih.gov/pubmed/15700028>) (PubMed)

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- Triggering of the TRPV2 channel by cannabidiol sensitizes glioblastoma cells to cytotoxic chemotherapeutic agents (<http://www.ncbi.nlm.nih.gov/pubmed/23079154>) (PubMed)
- Cannabidiol, a non-psychoactive cannabinoid compound, inhibits proliferation and invasion in U87-MG and T98G glioma cells through a multitarget effect (<http://www.ncbi.nlm.nih.gov/pubmed/24204703>) (PubMed)
- Local delivery of cannabinoid-loaded microparticles inhibits tumor growth in a murine xenograft model of glioblastoma multiforme (<http://www.ncbi.nlm.nih.gov/pubmed/23349970>) (PubMed)

## Leukemia

- Cannabidiol-induced apoptosis in human leukemia cells: A novel role of cannabidiol in the regulation of p22phox and Nox4 expression (<http://www.ncbi.nlm.nih.gov/pubmed/16754784>) (PubMed)
- Cannabidiol-Induced Apoptosis in Human Leukemia Cells (<http://www.ncbi.nlm.nih.gov/pubmed/?term=Cannabidiol-Induced+Apoptosis+in+Human+Leukemia+Cells>) (PubMed)

## Skin

- Anticancer activity of anandamide in human cutaneous melanoma cells (<http://www.ncbi.nlm.nih.gov/pubmed/24041928>) (PubMed)

## Kaposi Sarcoma

- Cannabidiol inhibits growth and induces programmed cell death in kaposi sarcoma-associated herpes virus-infected endothelium (<http://www.ncbi.nlm.nih.gov/pubmed/23264851>) (PubMed)

## Endocrine

- Endocannabinoids in endocrine and related tumours (<http://www.ncbi.nlm.nih.gov/pubmed/18508995>) (PubMed)
- A comparative study on cannabidiol-induced apoptosis in murine thymocytes and EL-4 thymoma cells (<http://www.ncbi.nlm.nih.gov/pubmed/18387516>) (PubMed)

## Bladder

- TRPV2 activation induces apoptotic cell death in human T24 bladder cancer cells: a potential therapeutic target for bladder cancer (<http://www.ncbi.nlm.nih.gov/pubmed/20546877>) (PubMed)

## Pain

- Multicenter, double-blind, randomized, placebo-controlled, parallel-group study of the efficacy, safety, and tolerability of THC:CBD extract and THC extract in patients with intractable cancer-related pain (<http://www.ncbi.nlm.nih.gov/pubmed/19896326>) (PubMed)
- Nabiximols for opioid-treated cancer patients with poorly-controlled chronic pain: a randomized, placebo-controlled, graded-dose trial (<http://www.ncbi.nlm.nih.gov/pubmed/22483680>) (PubMed)
- Marijuana extract helps prevent chemo pain ([http://www.upi.com/Health\\_News/2011/09/27/Marijuana-extract-helps-prevent-chemo-pain/UPI-64641317159672/?spt=hs&or=hn](http://www.upi.com/Health_News/2011/09/27/Marijuana-extract-helps-prevent-chemo-pain/UPI-64641317159672/?spt=hs&or=hn)) (UPI)

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## Nausea



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- [Cannabidiol, a non-psychoactive component of cannabis, attenuates vomiting and nausea-like behaviour via indirect agonism of 5-HT\(1A\) somatodendritic autoreceptors in the dorsal raphe nucleus](#) (PubMed)
- [Cannabidiolic acid prevents vomiting in Suncus murinus and nausea-induced behaviour in rats by enhancing 5-HT1A receptor activation](#) (PubMed)
- [Interaction between non-psychoactive cannabinoids in marijuana: effect of cannabigerol \(CBG\) on the anti-nausea or anti-emetic effects of cannabidiol \(CBD\) in rats and shrews](#) (PubMed)
- [Regulation of nausea and vomiting by cannabinoids](#) (PubMed)
- [Cannabidiol, a non-psychoactive component of cannabis and its synthetic dimethylheptyl homolog suppress nausea in an experimental model with rats](#) (PubMed)
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