



## Excerpts from Clinical Research on Medical Marijuana

Following are excerpts from numerous studies showing the medical efficacy of marijuana and its active components, known as cannabinoids, for a wide array of medical conditions, including cancer, HIV, multiple sclerosis, and glaucoma.

Due to government interference and restrictions placed on the use of the actual marijuana plant for scientific studies in the U.S., a large number of these studies were able to examine only the medical efficacy of component compounds extracted from marijuana or, in some instances, synthetic versions of those compounds.

"Cannabinoids exert palliative effects in patients with cancer and inhibit tumor growth in laboratory animals ... Cannabinoids are selective anti-tumor compounds, as they can kill tumor cells without affecting their non-transformed counterparts."

— **Guzman, Manuel, "Cannabinoids: Potential Anticancer Agents," *Nature Reviews*, October 2003**

"Cannabinoids are now known to have the capacity for neuromodulation, via direct, receptorbased mechanisms at numerous levels within the nervous system. These have therapeutic properties that may be applicable to the treatment of neurological disorders ... This class of compounds not only holds tremendous therapeutic potential for neurological disease, but it is also confirmed as having remarkably low toxicity."

— **Carter, Gregory, et al., "Overview: Cannabis: Old Medicine With New Promise for Neurological Disorders," *Current Opinion in Investigational Drugs*, March 2002**

"Smoked cannabis was well tolerated and effectively relieved chronic neuropathic pain from HIV-associated sensory neuropathy. The findings are comparable to oral drugs used for chronic neuropathic pain."

— **Abrams, Donald, et al., "Cannabis in painful HIV-associated sensory neuropathy" *Neurology*, 2007;68:515-521**

[M]arijuana has now been shown to have strong antioxidative and neuroprotective effects, which may prolong neuronal cell survival. From a pharmacological perspective, marijuana is safe with minimal possibility of overdose. In states where it is legal to do so, marijuana should be considered in the pharmacological management of ALS. " The article also noted: "[Cannabinoids] will vaporize at a temperature much lower than actual combustion. Heated air can be drawn through marijuana and the active compounds will vaporize, which can then be inhaled ... Theoretically, this removes most of the health hazards of smoking."

— **Carter, Gregory T. Rosen, Bill S., "Marijuana in the Management of Amyotrophic Lateral Sclerosis," *American Journal of Hospice and Palliative Care*, July/August 2001**

"[THC] inhibited tumour-cell proliferation in vitro and decreased tumour-cell Ki67 immunostaining"; "THC does not facilitate tumor growth nor decreases patient survival."

— **Guzman M., et al., "A Pilot Clinical Study of Delta-9-tetrahydrocannabinol in Patients With Recurrent Glioblastoma Multiforme," *British Journal of Cancer*, July 2006**

Post-operative nausea and vomiting (PONV) is a "significant problem in breast surgical patients. Preoperative treatment with dronabinol [oral THC] and prochlorperazine significantly reduced the number and severity of episodes of PONV." The rate of nausea decreased from 59 percent to 15 percent and the rate of vomiting from 29 percent to 3 percent compared to non-treated patients.

– Layeeque R., et al., "Prevention of Nausea and Vomiting Following Breast Surgery," *American Journal of Surgery*, June 2006

"Exposure of leukemia cells to cannabidiol led to CB2-mediated reduction in cell viability and induction in apoptosis ... [and] a significant decrease in tumor burden and an increase in apoptotic tumors in vivo."

– McKallip, Robert J., et al., "Cannabidiol-Induced Apoptosis in Human Leukemia Cells: A Novel Role of Cannabidiol in the Regulation of p22<sup>phox</sup> and Nox4 Expression," *Molecular Pharmacology*, June 5, 2006

"There is significant evidence that cannabinoids may be involved in the modulation of pain, especially of neuropathic origin. Preliminary results from a small, uncontrolled trial of smoked marijuana in HIV peripheral neuropathy are encouraging."

– Abrams, Donald, et al., "The Effects of Smoked Cannabis in Painful Peripheral Neuropathy and Cancer Pain Refractory to Uploads," IACM 2nd Conference on Cannabinoids in Medicine, Cologne, September 2003

"[R]ecent randomised controlled clinical trials have pointed to potential therapeutic benefits of cannabinoids for patients with MS and chronic neuropathic pain. This suggests that patients' reports of the effectiveness of cannabis ... could serve as a valid indicator of target diseases and symptoms for cannabinoid drug development."

– Ware, M.A., et al., "The Medicinal Use of Cannabis in the UK: Results of a Nationwide Survey," *International Journal of Clinical Practice*, March 2005

A strong and statistically significant anti-tumor effect was observed ... In particular, for a highly malignant human breast carcinoma cell line ... cannabidiol and a cannabidiol-rich extract counteract cell growth both in vivo and in vitro as well as tumor metastasis in vivo."

– Ligresti, Alessia et al., "Anti-Tumor Activity of Plant Cannabinoids with Emphasis on the Effect of Cannabidiol on Human Breast Carcinoma," *Journal of Pharmacology And Experimental Therapeutics*, May 25, 2006

"Our results indicate that cannabinoid receptors are important in the pathology of [Alzheimer's Disease] and that cannabinoids succeed in preventing the neurodegenerative process occurring in the disease."

– Ramierz, Belen, et al., "Prevention of Alzheimer's Disease Pathology by Cannabinoids: Neuroprotection Mediated by Blockade of Microglial Activation," *The Journal of Neuroscience*, February 25, 2005

"These data suggest that medicinal use of marijuana may facilitate, rather than impede, [antiretroviral therapy] adherence for patients with nausea. ... Adherence to medications is a challenge to any chronically ill patient and is critically important to HIV-infected individuals ..."

– DeJong, Bourke, "Marijuana Use and Its Association With Adherence to Antiretroviral Therapy Among HIV-Infected Persons With Moderate to Severe Nausea," *Journal of Acquired Immune Deficiency Syndromes*, 2005