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Control of the cell survival/death decision by cannabinoids.

Guzmán M[1], Sánchez C, Galve-Roperh I.

Author information

Abstract

Cannabinoids, the active components of Cannabis sativa (marijuana), and their derivatives produce a wide spectrum of central and peripheral effects, some of which may have clinical application. The discovery of specific cannabinoid receptors and a family of endogenous ligands of those receptors has attracted much attention to cannabinoids in recent years. One of the most exciting and promising areas of current cannabinoid research is the ability of these compounds to control the cell survival/death decision. Thus cannabinoids may induce proliferation, growth arrest, or apoptosis in a number of cells, including neurons, lymphocytes, and various transformed neural and nonneural cells. The variation in drug effects may depend on experimental factors such as drug concentration, timing of drug delivery, and type of cell examined. Regarding the central nervous system, most of the experimental evidence indicates that cannabinoids may protect neurons from toxic insults such as glutamaergic overstimulation, ischemia and oxidative damage. In contrast, cannabinoids induce apoptosis of glioma cells in culture and regression of malignant gliomas in vivo. Breast and prostate cancer cells are also sensitive to cannabinoid-induced antiproliferation. Regarding the immune system, low doses of cannabinoids may enhance cell proliferation, whereas high doses of cannabinoids usually induce growth arrest or apoptosis. The neuroprotective effect of cannabinoids may have potential clinical relevance for the treatment of neurodegenerative disorders such as multiple sclerosis, Parkinson's disease, and ischemia/stroke, whereas their growth-inhibiting action on transformed cells might be useful for the management of malignant brain tumors. Ongoing investigation is in search for cannabinoid-based therapeutic strategies devoid of nondesired psychotropic effects.

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