

EXTRACTS FROM ANTARCTIC YEASTS AND HEMP PLANT INHIBIT THE GROWTH OF HUMAN LYMPHOID MALIGNANT CELLS

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Introduction:

Psychrophilic microorganisms successfully colonized deep seas, high mountains and Polar areas. Antarctica offers permanent low temperatures, strong winds, short summer and intensive sun irradiation. To survive under Antarctic conditions microorganisms, need to possess adaptable metabolism thus producing bioactive components with attractive pharmacological properties. Cannabidiol is a component in hemp. It has remarkable pharmacological activities such as tumor growth inhibition, pain perception modulation, and anticonvulsive, antipsychotic and antiemetic properties as well. It lacks any psychotropic activity and common toxicity and therefore is present in food supplements.

Objectives:

A methanol extract from bioreactor grown yeast was prepared. The cytotoxic efficacy was measured using the MTT-assay. Induction of apoptosis was ascertained by nuclear changes, DNA fragmentation, up- and down-regulation of pro- and anti-apoptotic proteins, PARP cleavage and fragmentation, as well as by caspase activation. Inhibition of NF- κ B was estimated by specific ELISA.

Results:

Concentration response curves showed IC₅₀ values between 55 and 326 μ g/ml for the Antarctic yeast extract and below 30 μ M for Cannabidiol. An up-regulation of pro-apoptotic signaling molecules such as Bad, Bax, caspase 3, cytochrome c etc., as well as down-regulation of anti-apoptotic proteins such as Bcl-2, HSP-70, clusterin etc. were detected. Nuclear fragmentation and cell cycle changes were demonstrated. Cannabidiol was found to reduce the activity of the NF- κ B transcription factor to a comparable with that of curcumin extent.

Conclusions:

Cannabidiol and the yeast extract have antineoplastic activity, which is comparable with that of curcumin. Since both natural products are usually well tolerated and do not produce any toxic effects, there is considerable merit in the development of Antarctic yeast and hemp plant extracts as potential therapy for lymphoid neoplasms.