

## Effects of Pineal Gland Neurohormone Melatonin on Cancer Cells in the Human Central Nervous System

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### Editorial

Melatonin (MLT), N-acetyl-5-methoxytryptamine, an endogenous compound synthesized by pineal gland and it was discovered nearly 50 years ago [1,2]. It was recognized with reproductive and neuroendocrine physiology [3]. Studies on mammals showed that MLT's acute and chronic toxicity is low. Even in human studies, there was not any significant negative effect. MLT is one of the members of regulatory factors which control proliferation and cell loss [4]. Up to now it is the only molecule known to hormonal regulator of neoplastic cell growth. Recently, it has been suggested that MLT inhibits cancer cell proliferation at physiological concentration, also exhibits cancer cell's cytotoxicity at pharmacologic concentration. Furthermore, at both concentrations MLT lowers invasive and metastatic status of cancer cells [5]. Also, there are in vivo and in vitro studies shows that MLT has a regressive role in tumors [6]. Studies of effects of MLT on brain tumors focus on two different cell types of the nerve system, glial and neuronal.

Brain tumours are of different cell types, the commonest being tumours of glia called gliomas. Cruz-Machado et al. [7] reported that rat pineal gland responds to lipopolysaccharide (LPS). LPS triggers tumor necrosis factor (TNF) production in vitro. TNF is recognized by TNF R1 expressed on astrocytes, microglia and pinealocytes, but the source of TNF production in cultured pineal glands is unknown at present [8]. Not only MLT's positive effect on regressing tumor but also a lack of MLT is linking with electromagnetic fields on MLT production by the pineal gland, to tumors. It is also known that pinealectomy causes increasing incidence of tumours [9].

Studies show that one of the major concepts of MLT is increasing apoptotic cell death in cancer cells. In general, research concerning the role of MLT in apoptosis focused on immune cells and neurons. In contrast with the certain, MLT inhibits apoptosis in normal cell [10]. However, there are proves that in cancer cells, MLT increases apoptosis. Fukuda et al. [11] studied in the previous step of MLT, hydroxy indole-O-methyltransferase (HIOMT) which catalyzes the terminal reaction of MLT. The proportions of HIOMT-immunoreactive cells successively regressed the pineocytoma, pineal parenchymal tumor of intermediate differentiation, and pineoblastoma. Their results indicated new way through the diagnosis of the parenchymal pineal tumor.

In spite of these studies, there is no clear evidence which suggests the obvious positive effect of MLT on brain carcinoma treatment. Nevertheless, we strongly believe that new studies will demonstrate MLT's therapeutical potential in future. In the following years, further studies to be published in the Journal of Brain Tumors & Neurooncology will reveal its way of effect clearly and combined clinical trials will increase the frequency of applications. Moreover, the outcomes of new studies may facilitate the experimental studies on MLT and attract more researchers into this field to make novel investigations in future.

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