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Natural substances to potentiate canonical glioblastoma chemotherapy

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Abstract

Glioblastoma multiforme (GBM) is the most frequent primary malignant brain tumour prevalent in humans, that exhibits aggressive cell proliferation and rapid invasion of normal brain tissue. Despite aggressive therapeutic approaches consisting of maximum safe surgical resection followed by radio-chemotherapy with temozolomide (TMZ), more than 95% of GBM patients die within 5 years after diagnosis. In most cases, the therapy is not able to counteract the growth and invasiveness of the tumour, which relapses after an interval of time that varies from patient to patient. An increasing number of evidence indicates that natural substances exhibited effective anti-tumour functions and might be successfully used in the treatment of GBM. This review summarizes some natural substances: lactoferrin, hispolon, aloe-emodin and tea tree oil; all these show a growth inhibition and synergistic effect when together with TMZ, (the most commonly used alkylating drug for the treatment of glioblastoma) were administered to U87MG glioblastoma cell line *in vitro* and in murine animal model. U87MG cell growth was monitored by daily cell count after treatments with the substances mentioned above and growth analysis showed that all drugs significantly decrease proliferation of U87MG in a time- and dose-dependent manner. FACS analysis demonstrates a block of cell cycle in S, G2/M or G0/G1 phases. These substances mediate multiple processes including apoptosis by releasing the inducing factor: PARP. Natural compounds, in combination with conventional chemotherapy TMZ, are a powerful approach to improve the effectiveness of brain cancer treatment.

Keywords: aloe-emodin; brain cancer; glioblastoma; hispolon; lactoferrin; natural drug; tree tea oil.