

A combination of radiotherapy, nitric oxide and a hyperoxygenation sensitizing protocol for brain malignant tumor treatment

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ABSTRACT

Summary Brain malignant tumor such as glioblastoma is a challenging medical and surgical problem. In spite of surgery, radiotherapy and chemotherapy, the prognosis is still very poor. The limitations of currently available treatment modalities to cure or significantly prolong and improve the quality of life should stimulate rigorous research and studies to combat brain malignant tumors. While precision radiotherapy to reduce tumor size and meliorate symptoms is still the standard of care, tumor sensitivity to radiation is compromised by low oxygen tensions and a necrotic tumor center. We propose here to take advantage of the fact that elevated oxygen increases sensitivity of tumor cells to radiation. A specific application of hyperbaric oxygen (HBO₂), using nitric oxide (NO) donors and inducers (such as L-arginine, dinitrite or tocopheryl succinate) and ascorbic acid to dilate blood vessels, should permit oxygen tensions in the range of 1000 mmHg to diffuse into the cells and thus increase sensitivity to radiation. This should permit doses that are low enough to cause the death of tumor cells yet minimize injury to brain tissue near the tumor and induced neurological sequelae.