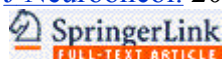




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1: [J Neurooncol](#). 2009 May;92(3):317-35. Epub 2009 Apr 9.



Brain tumor hypoxia: tumorigenesis, angiogenesis, imaging, pseudoprogression, and as a therapeutic target.

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Hypoxia is implicated in many aspects of tumor development, angiogenesis, and growth in many different tumors. Brain tumors, particularly the highly aggressive glioblastoma multiforme (GBM) with its necrotic tissues, are likely affected similarly by hypoxia, although this involvement has not been closely studied. Invasion, apoptosis, chemoresistance, resistance to antiangiogenic therapy, and radiation resistance may all have hypoxic mechanisms. The extent of the influence of hypoxia in these processes makes it an attractive therapeutic target for GBM. Because of their relationship to glioma and meningioma growth and angiogenesis, hypoxia-regulated molecules, including hypoxia inducible factor-1, carbonic anhydrase IX, glucose transporter 1, and vascular endothelial growth factor, may be suitable subjects for therapies. Furthermore, other novel hypoxia-regulated molecules that may play a role in GBM may provide further options. Emerging imaging techniques may allow for improved determination of hypoxia in human brain tumors to better focus therapeutic treatments; however, tumor pseudoprogression, which may be prompted by hypoxia, poses further challenges. An understanding of the role of hypoxia in tumor development and growth is important for physicians involved in the care of patients with brain tumors.

PMID: 19357959 [PubMed - in process]
