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Potential therapeutic implications of cancer stem cells in glioblastoma.

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Abstract

Glioblastoma is the most common and lethal type of primary brain tumor. Despite recent therapeutic advances in other cancers, the treatment of glioblastomas remains ineffective and essentially palliative. The treatment failure is a result of a number of causes, but we and others have demonstrated that a highly tumorigenic subpopulation of cancer cells called glioblastoma stem cells (GSCs) display relative resistance to radiation and chemotherapy. GSCs also contribute to tumor growth through the stimulation of angiogenesis, which has been shown to be a useful therapeutic target in the treatment of recurrent or progressive malignant gliomas. Cancer stem cells also have been hypothesized as a contributor to systemic metastases. While glioblastomas rarely metastasize beyond the central nervous system, glioblastomas invade into brain structures to prevent surgical cure and GSCs have an extremely invasive phenotype. Collectively, these studies and others suggest that GSCs may be important therapeutic targets not only to achieve cure but even reduce tumor relapse and improve overall survival. Many recent studies suggest that GSCs share core regulatory pathways with normal embryonic and somatic stem cells, but display important distinctions that provide clues into useful treatment targets. The cancer stem cell hypothesis may also modify our approaches in tumor imaging and biomarker development, but clinical validation waits. In this review, we summarize the current understanding of GSC biology with a focus on potential anti-GSC therapies. Copyright © 2010. Published by Elsevier Inc.

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