The role of cancer stem cells in glioblastoma.

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Abstract

Recurrence in glioblastoma is nearly universal, and its prognosis remains dismal despite significant advances in treatment over the past decade. Glioblastoma demonstrates considerable intratumoral phenotypic and molecular heterogeneity and contains a population of cancer stem cells that contributes to tumor propagation, maintenance, and treatment resistance. Cancer stem cells are functionally defined by their ability to self-renew and to differentiate, and they constitute the diverse hierarchy of cells composing a tumor. When xenografted into an appropriate host, they are capable of tumorigenesis. Given the critical role of cancer stem cells in the pathogenesis of glioblastoma, research into their molecular and phenotypic characteristics is a therapeutic priority. In this review, the authors discuss the evolution of the cancer stem cell model of tumorigenesis and describe the specific role of cancer stem cells in the pathogenesis of glioblastoma and their molecular and microenvironmental characteristics. They also discuss recent clinical investigations into targeted therapies against cancer stem cells in the treatment of glioblastoma.

KEYWORDS: CSC = cancer stem cell; GBM = glioblastoma; HIF = hypoxia-inducible factor; NSC = neural stem cell; OS = overall survival; PFS = progression-free survival; SHH = sonic hedgehog; TGF-β = transforming growth factor–β; TMZ = temozolomide; VEGF = vascular endothelial growth factor; VEGFC = VEGF C; cancer stem cells; clinical trials; glioblastoma; pathophysiology; treatment

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