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Brain tumor stem cells: The cancer stem cell hypothesis writ large.

Dirks PB.

Division of Neurosurgery, Developmental and Stem Cell Biology Program, Arthur and Sonia Labatt Brain Tumor Research Center, Hospital for Sick Children, #1503, 555 University Ave., Toronto, Ontario M5G 1X8, Canada.

Abstract

Brain tumors, which are typically very heterogeneous at the cellular level, appear to have a stem cell foundation. Recently, investigations from multiple groups have found that human as well as experimental mouse brain tumors contain subpopulations of cells that functionally behave as tumor stem cells, driving tumor growth and generating tumor cell progeny that form the tumor bulk, but which then lose tumorigenic ability. In human glioblastomas, these tumor stem cells express neural precursor markers and are capable of differentiating into tumor cells that express more mature neural lineage markers. In addition, modeling brain tumors in mice suggests that neural precursor cells more readily give rise to full blown tumors, narrowing potential cells of origin to those rarer brain cells that have a proliferative potential. Applying stem cell concepts and methodologies is giving fresh insight into brain tumor biology, cell of origin and mechanisms of growth, and is offering new opportunities for development of more effective treatments. The field of brain tumor stem cells remains very young and there is much to be learned before these new insights are translated into new patient treatments.

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