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Cancer stem cells from glioblastoma and peritumor tissue

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It has been reported that distinct cancer stem cell-like (CSC) populations can be isolated from different regions of the same human glioblastoma (GBM), namely from the tumor core or from peritumor tissue. Although originating from common ancestor cells, these populations can exhibit different characteristics in terms of growth properties, genetic anomalies, and their tumor initiating ability. In particular, CSCs deriving from the GBM core (GCSCs) induced tumors in immunodeficient mice with an efficiency of 95% while CSCs isolated from peritumor tissue (PCSCs) have much less, if any, tumorigenic potential. In this study, we aimed at gaining a deeper insight into the features of both GCSC and PCSC populations. By means of immunocytochemical and Western blot analysis, we investigated the expression of stem cell markers such as nestin, Sox2, Musashi-1, CD133, and also NG2 and GD3 (associated with invasion and angiogenesis), as well as markers linked to proliferation (i.e., pJNK). Immunocytochemistry showed that all these molecules are expressed in both GCSCs and PCSCs. Furthermore, Western blot analysis on nestin, Musashi-1, and pJNK proteins, revealed a higher expression in GCSCs than in PCSCs. The Sox2 protein was equally expressed in GCSCs and PCSCs, probably because Sox2 is critical for the maintenance of broader stem cell potential. Yet, GCSCs that grew as neurospheres showed a higher growth rate than PCSCs, which were generally found to grow as adherent cells or floating neurospheres. TEM showed differences between GCSCs and PCSCs in terms of cytoskeletal component expression and presence of cell-cell junctions. Taken together, our data confirm that, at least in some instances, GCSCs can be more aggressive than PCSCs which are likely to begin their malignant transformation in a microenvironment that may be influenced by various factors deriving from the main tumor mass.

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