

Editorial

Biology of brain tumor stem cells

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THE review by Xie and Chin, published in this issue of *Neurosurgical Focus*, highlights how tumor-initiating brain tumor stem cells (BTSC) rely upon many of the same cell cycle regulatory mechanisms, developmental programs, and germinal niches as normal neural stem cells. Functional similarities include multipotency, self-renewal, and migratory capacity. The shared properties of these normal and abnormal cells suggest a unified lineage, although the directionality of this relationship remains unknown. One persistent challenge is our inability to recognize these cells. To date, there exists no marker that specifically identifies normal neural stem cells. Similarly, although CD133 has been popularized as a BTSC marker, CD133-negative BTSCs are also capable of brain tumor initiation.

We agree that further characterization of BTSCs is of tremendous interest and may facilitate targeting of potent cellular populations in brain tumors. Any discussion, however, of the implications (if any) of brain tumor therapy for normal neural stem and progenitor cells would first require evidence demonstrating the functional significance of these

cells in humans. Moreover, exploiting the therapeutic potential of BTSCs will require additional insight into the fundamental mechanisms governing normal neural stem and progenitor cells, a phenotypically diverse population that varies in spatial and temporal distribution throughout postnatal life. Attention should also be paid to species-specific properties, as findings do not all necessarily translate directly to the human system.

RESPONSE: We thank Drs. Sanai and Berger for their comments on our review article. We agree that the lack of specific markers for BTSCs and neural progenitor/stem cells is a persistent challenge in the field. In addition, we agree that much more needs to be done to establish the relationship between BTSCs and neural progenitor/stem cells and to further elucidate fundamental mechanisms governing the proliferation, differentiation, and migration of these cells in both animal models and humans. Continued advancements in this field will require that these issues be addressed successfully.

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