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1: [Neurosurgery](#). 2008 Dec;63(6):1022-1034.

A COMPARISON BETWEEN STEM CELLS FROM THE ADULT HUMAN BRAIN AND FROM BRAIN TUMORS.

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OBJECTIVE: To directly compare stem cells from the normal adult human brain (adult human neural stem cells [AHNSC]), Grade II astrocytomas (AC II), and glioblastoma multiforme (GBM), with respect to proliferative and tumor-forming capacity and differentiation potential. **METHODS:** Cells were isolated from tissue obtained during epilepsy surgery (AHNSCs) or tumor surgery (glioma stem cells [GSC]). They were cultured and investigated in vitro or after transplantation in immunodeficient mice. **RESULTS:** Under identical experimental conditions, the following were found: 1) GBM stem cells formed tumors after orthotopic transplantation; AHNSCs showed no sign of tumor formation; 2) GSCs showed a significantly higher growth rate and self-renewal capacity; 3) both the growth rate and telomerase expression were high in GSCs and correlated with malignancy grade (GBM higher than AC II); AHNSCs had low telomerase expression; 4) GSCs invaded normal neurospheres, not vice versa; 5) both AHNSCs and stem cells from AC II and GBM responded to differentiation cues with a dramatic decrease in the proliferation index (Ki-67); 6) GSCs differentiated faster than AHNSCs; 7) upon differentiation, AHNSCs produced normal glia and neurons; GSCs produced morphologically aberrant cells often expressing both glial and neuronal antigens; and 8) differentiation of AHNSCs resulted in 2 typical functional phenotypes: neurons (high electrical membrane resistance, ability to generate action potentials) and glial cells (low membrane resistance, no action potentials). In contrast, GSCs resulted in only 1 functional phenotype: cells with high electrical resistance and active membrane properties capable of generating action potentials. **CONCLUSION:** AHNSCs and stem cells from AC II and GBM differ with respect to proliferation, tumor-forming capacity, and rate and pattern of differentiation.

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