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Isolation of cancer stem-like cells from a side population of a human glioblastoma cell line, SK-MG-1.

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Accumulating evidence suggests that in several types of brain tumors, including glioma, only a phenotypic subset of tumor cells called brain cancer stem cells (BCSCs) may be capable of initiating tumor growth. Recently, the isolation of side population (SP) cells using Hoechst dye has become a useful method for obtaining cancer stem cells in various tumors. In this study, we isolated cancer stem-like cells from human glioma cell lines using the SP technique. Flow cytometry analysis revealed that SK-MG-1, a human glioblastoma cell line, contained the largest number of SP cells among the five glioma cell lines that were analyzed. The SP cells had a self-renewal ability and were capable of forming spheres in a neurosphere culture medium containing EGF and FGF2. Spheres derived from the SP cells differentiated into three different lineage cells: neurons, astrocytes and oligodendrocytes. RT-PCR analysis revealed that the SP cells expressed a neural stem cell marker, Nestin. The SP cells generated tumors in the brains of NOD/SCID mice at 8 weeks after implantation, whereas the non-SP cells did not generate any tumors in the brain. These results indicate that SP cells isolated from SK-MG-1 possess the properties of cancer stem cells, including their self-renewal ability, multi-lineage differentiation, and tumorigenicity. Therefore, the SP cells from SK-MG-1 may be useful for analyzing BCSCs because of the ease with which they can be handled and their yield.

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