Abstract

The therapeutic resistance of gliomas is at least in part due to stem-like glioma cells (SLGC), which self-renew, generate the bulk of tumor cells and sustain tumor growth. SLGCs from glioblastoma multiforme (GBM) have been studied in cell cultures or mouse models, whereas little is known about SLGCs from lower grade gliomas. In our research group we compared cell and organotypic slice cultures from GBMs and lower grade gliomas and studied the maintenance of SLGCs. I participated in cultivation and characterization of GBM slice cultures. In particular, I evaluated the effect of the cytokine M-CSF.

Cells and tissue slices from astrocytomas, oligodendrogliomas, oligoastrocytomas and GBMs were cultivated in (i) serum-free medium supplemented with the growth factors EGF and bFGF (N-medium), (ii) medium containing 10% serum plus EGF and bFGF (F+GF-medium) or (iii) medium containing 10% FCS (F-medium). Maintenance of cells and cytoarchitecture was addressed, using several candidate SLGC markers (Nestin, Sox2, CD133, CD44, CD49f/Integrin α6 and Notch), as well as CD31 (endothelial cells), Iba-1 (microglia) and Vimentin. Cell vitality was determined.

SLGCs were present in tissue slices from lower and higher grade gliomas. Preservation of the cytoarchitecture in slices was possible for>3 weeks. Maintenance of SLGCs required the presence of EGF/bFGF in cell and slice cultures, in which F+GF appeared superior to N medium. Constraints were observed regarding the preservation of the microglia but not of the endothelial cells. Maintenance of the microglia was improved by addition of the cytokine M-CSF. Supplemented with serum and the growth factors EGF, bFGF and M-CSF permits the preservation of SLGCs and non-SLGCs in the original glioma microenvironment.