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Glioblastoma microenvironment–from biology to therapy

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Abstract

Glioblastoma (GBM) is the most aggressive primary brain cancer. These tumors exhibit high intertumoral and intratumoral heterogeneity in neoplastic and nonneoplastic compartments, low lymphocyte infiltration, and high abundance of myeloid subsets that together create a highly protumorigenic immunosuppressive microenvironment. Moreover, heterogeneous GBM cells infiltrate adjacent brain tissue, remodeling the neural microenvironment to foster tumor electrochemical coupling with neurons and metabolic coupling with nonneoplastic astrocytes, thereby driving growth. Here, we review heterogeneity in the GBM microenvironment and its role in low-to-high-grade glioma transition, concluding with a discussion of the challenges of therapeutically targeting the tumor microenvironment and outlining future research opportunities.

Keywords: glial cells; glioblastoma; glioma stem cell; lymphoid cells; myeloid cells; stem cell niche; tumor microenvironment.