

ABSTRACT

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Neuron-Glial Interactions in Health and Brain Cancer.

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Brain tumors are devastating diseases of the central nervous system. Brain tumor pathogenesis depends on both tumor-intrinsic oncogenic programs and extrinsic microenvironmental factors, including neurons and glial cells. Glial cells (oligodendrocytes, astrocytes, and microglia) make up half of the cells in the brain, and interact with neurons to modulate neurodevelopment and plasticity. Many brain tumor cells exhibit transcriptomic profiles similar to macroglial cells (oligodendrocytes and astrocytes) and their progenitors, making them likely to subvert existing neuron-glial interactions to support tumor pathogenesis. For example, oligodendrocyte precursor cells, a putative glioma cell of origin, can form bona fide synapses with neurons. Such synapses are recently identified in gliomas and drive glioma pathophysiology, underscoring how brain tumor cells can take advantage of neuron-glial interactions to support cancer progression. In this review, it is briefly summarized how neurons and their activity normally interact with glial cells and glial progenitors, and it is discussed how brain tumor cells utilize neuron-glial interactions to support tumor initiation and progression. Unresolved questions on these topics and potential avenues to therapeutically target neuron-glia-cancer interactions in the brain are also pointed out.

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