Experimental therapies: gene therapies and oncolytic viruses.

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Abstract
Glioblastoma is the most common and aggressive primary brain tumor in adults. Over the past three decades, the overall survival time has only improved by a few months, therefore novel alternative treatment modalities are needed to improve clinical management strategies. Such strategies should ultimately extend patient survival. At present, the extensive insight into the molecular biology of gliomas, as well as into genetic engineering techniques, has led to better decision processes when it comes to modifying the genome to accommodate suicide genes, cytokine genes, and tumor suppressor genes that may kill cancer cells, and boost the host defensive immune system against neoantigenic cytoplasmic and nuclear targets. Both nonreplicative viral vectors and replicating oncolytic viruses have been developed for brain cancer treatment. Stem cells, microRNAs, nanoparticles, and viruses have also been designed. These have been armed with transgenes or peptides, and have been used both in laboratory-based experiments as well as in clinical trials, with the aim of improving selective killing of malignant glioma cells while sparing normal brain tissue. This chapter reviews the current status of gene therapies for malignant gliomas and highlights the most promising viral and cell-based strategies under development.

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