Glioblastoma multiforme: a review of where we have been and where we are going.

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Abstract
Malignant gliomas such as glioblastoma multiforme (GBM) present some of the greatest challenges in the management of cancer patients worldwide, despite notable recent achievements in oncology. Even with aggressive surgical resections using state-of-the-art preoperative and intraoperative neuroimaging, along with recent advances in radiotherapy and chemotherapy, the prognosis for GBM patients remains dismal: median survival after diagnosis is about 14 months. Established good prognostic factors are limited, but include young age, high Karnofsky Performance Status (KPS), high mini-mental status examination score, O6-methylguanine methyltransferase promoter methylation, and resection of > 98% of the tumor. Standard treatment includes resection, followed by concurrent chemotherapy and radiotherapy. GBM research is being conducted worldwide at a remarkable pace, with some of the more recent promising studies focused on identification of aberrant genetic events and signaling pathways, tumor stem cell identification and characterization, modulation of tumor immunological responses, combination therapies, and understanding of the rare long-term survivors. Past treatment strategies have failed for various reasons; however, newer strategies in trials today and on the horizon encourage optimism. To help illustrate 'where we have been' with this fatal disease and 'where we are going' with contemporary studies, we include in this review a detailed history of Phase III clinical trials for GBM, with a final emphasis on exciting new treatment strategies that offer hope for future GBM therapy.

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