Glioblastoma and other malignant gliomas: a clinical review.

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Abstract

IMPORTANCE: Glioblastomas and malignant gliomas are the most common primary malignant brain tumors, with an annual incidence of 5.26 per 100,000 population or 17,000 new diagnoses per year. These tumors are typically associated with a dismal prognosis and poor quality of life.

OBJECTIVE: To review the clinical management of malignant gliomas, including genetic and environmental risk factors such as cell phones, diagnostic pitfalls, symptom management, specific antitumor therapy, and common complications.

EVIDENCE REVIEW: Search of PubMed references from January 2000 to May 2013 using the terms glioblastoma, glioma, malignant glioma, anaplastic astrocytoma, anaplastic oligodendroglioma, anaplastic oligoastrocytoma, and brain neoplasm. Articles were also identified through searches of the authors’ own files. Evidence was graded using the American Heart Association classification system.

FINDINGS: Only radiation exposure and certain genetic syndromes are well-defined risk factors for malignant glioma. The treatment of newly diagnosed glioblastoma is based on radiotherapy combined with temozolomide. This approach doubles the 2-year survival rate to 27%, but overall prognosis remains poor. Bevacizumab is an emerging treatment alternative that deserves further study. Grade III tumors have been less well studied, and clinical trials to establish standards of care are ongoing. Patients with malignant gliomas experience frequent clinical complications, including thromboembolic events, seizures, fluctuations in neurologic symptoms, and adverse effects from corticosteroids and chemotherapies that require proper management and prophylaxis.

CONCLUSIONS AND RELEVANCE: Glioblastoma remains a difficult cancer to treat, although therapeutic options have been improving. Optimal management requires a multidisciplinary approach and knowledge of potential complications from both the disease and its treatment.

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The molecular characterization for glioblastoma section of this paper was a bit weak; unfortunately due to a paucity of work in this field. I realize the whole field is desperate for cures for this rather frightening class of brain tumor. However, its very heterogeneity renders it a formidable foe. We need better maps of this undiscovered molecular territory if we are to even hope for a targeted strategy with chemotherapies. Genetic and morphological information gives me a few pieces of the picture, but I need to know the spatially resolved biochemistry to mount an effective chemical attack.

The authors state in their neurosurgery section "In inoperable tumors, stereotactic biopsy may be performed for histologic diagnosis, but the limited amount of tissue acquired may preclude full molecular characterization."

Optical methods like Raman and infrared spectroscopy can help to directly address this issue, since they are (a) non-invasive and (b) you can get reliable phenotype information about the biochemistry from quite small tissue samples (for example, ratios of lipids to proteins) fairly rapidly (see my paper Stelling AL, 2013; as well as recent work on skin cancer Kong K, 2013 for more).

On a final note: I've chatted with a few neuropathologists. Even when the entire brain hemisphere with the tumor in it is removed, there's still recurrence. I strongly suspect after the cancerous cells are present (after they have evolved from the stem cells etc), they leave behind carcinogenic contamination. There's some studies on the extracellular matrix of gliomas pointing to a role for these structural proteins and sugars in progression and recurrence as well. (See Payne LS, 2013 for a recent review.)