Malignant gliomas are the most common primary brain tumor in adults, but the prognosis for patients with these tumors remains poor despite advances in diagnosis and standard therapies such as surgery, radiation therapy, and chemotherapy. Progress in the treatment of gliomas now depends to a great extent on an increased understanding of the biology of these tumors. Recent insights into the biology of gliomas include the finding that tyrosine kinase receptors and signal transduction pathways play a role in tumor initiation and maintenance. Deregulation of phosphatidylinositol 3-kinase (PI3K) signaling pathways resulting from genetic alterations in the PTEN tumor suppressor gene on 10q23 at the level of LOH, mutation and methylation have been identified in at least 60% of glioblastoma. Loss of PTEN function by mutation or LOH correlates with poor survival in anaplastic astrocytoma and glioblastoma, suggesting that PTEN plays a role in patient outcome. Interestingly, amplification of Epidermal growth factor receptor (EGFR) in the background of heterozygous PTEN knockout mice develop invasive glioma very similar to human glioblastoma, demonstrating the importance of PTEN in glioma progression and providing a model system to evaluate the efficacy of targeting PTEN in glioblastoma.

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