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Persistent outpatient hyperglycemia is independently associated with decreased survival after primary resection of malignant brain astrocytomas.

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OBJECTIVE: Patients with malignant brain astrocytomas are at high risk for developing hyperglycemia secondary to frequent corticosteroid administration. Several clinical studies have shown that hyperglycemia is associated with poor outcome in multiple disease states. Furthermore, hyperglycemia augments in vitro astrocytoma growth, whereas hypoglycemia attenuates in vitro astrocytoma cell growth. We hypothesized that persistent hyperglycemic states in the outpatient setting may serve as a prognostic marker of decreased survival in patients with malignant brain astrocytomas. **METHODS:** We retrospectively reviewed 367 cases of craniotomy for malignant brain astrocytomas (World Health Organization Grade III or IV). Persistent hyperglycemia was defined as serum glucose greater than 180 mg/dL occurring three or more times between 1 and 3 months postoperatively. Isolated hyperglycemia was defined as an isolated occurrence of serum glucose greater than 180 mg/dL. The independent association of outpatient glucose levels and recorded clinical and treatment variables with overall survival was assessed via multivariate proportional-hazards regression analysis. **RESULTS:** A total of 367 craniotomies (209 primary, 158 secondary) were performed for malignant brain astrocytomas (glioblastoma multiforme, 297; anaplastic astrocytomas, 70); 68 (19%) and 28 (8%) of the patients experienced isolated or persistent outpatient hyperglycemia, respectively. Patients experiencing persistent hyperglycemia were older (59 +/- 13 versus 51 +/- 14 yr), were diabetic more frequently (7 [25%] versus 10 [3%]), continued to receive corticosteroids more frequently (21 [75%] versus 35 [10%]); and received temozolomide less often (4 [14%] versus 116 [34%]). Adjusting for intergroup differences and variables associated with survival in this model, age ($P = 0.001$), Karnofsky Performance Scale score ($P = 0.001$), tumor grade ($P = 0.001$), primary versus secondary resection ($P = 0.008$), temozolomide ($P = 0.007$), subsequent resection ($P = 0.07$), and continued outpatient dexamethasone therapy, persistent outpatient hyperglycemia (relative risk, 1.79; 95% confidence interval, 1.05-3.05, $P = 0.03$) remained independently associated with decreased survival. Median survival for persistently hyperglycemic versus normal-glycemic cohorts was 5 and 11 months, respectively. **CONCLUSION:** In our experience, persistent outpatient hyperglycemia was associated with decreased survival in patients undergoing surgical resection for malignant astrocytomas and was independent of the degree of disability, tumor grade, diabetes, prolonged dexamethasone use, or subsequent treatment modalities. Increased glucose control is warranted in this patient population and may contribute to improved outcomes in the treatment of malignant brain astrocytomas.

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