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Diagnosis-Specific Prognostic Factors, Indexes, and Treatment Outcomes for Patients with Newly Diagnosed Brain Metastases: A Multi-Institutional Analysis of 4,259 Patients.

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PURPOSE: Controversy endures regarding the optimal treatment of patients with brain metastases (BMs). Debate persists, despite many randomized trials, perhaps because BM patients are a heterogeneous population. The purpose of the present study was to identify significant diagnosis-specific prognostic factors and indexes (Diagnosis-Specific Graded Prognostic Assessment [DS-GPA]). **METHODS AND MATERIALS:** A retrospective database of 5,067 patients treated for BMs between 1985 and 2007 was generated from 11 institutions. After exclusion of the patients with recurrent BMs or incomplete data, 4,259 patients with newly diagnosed BMs remained eligible for analysis. Univariate and multivariate analyses of the prognostic factors and outcomes by primary site and treatment were performed. The significant prognostic factors were determined and used to define the DS-GPA prognostic indexes. The DS-GPA scores were calculated and correlated with the outcomes, stratified by diagnosis and treatment. **RESULTS:** The significant prognostic factors varied by diagnosis. For non-small-cell lung cancer and small-cell lung cancer, the significant prognostic factors were Karnofsky performance status, age, presence of extracranial metastases, and number of BMs, confirming the original GPA for these diagnoses. For melanoma and renal cell cancer, the significant prognostic factors were Karnofsky performance status and the number of BMs. For breast and gastrointestinal cancer, the only significant prognostic factor was the Karnofsky performance status. Two new DS-GPA indexes were thus designed for breast/gastrointestinal cancer and melanoma/renal cell carcinoma. The median survival by GPA score, diagnosis, and treatment were determined. **CONCLUSION:** The prognostic factors for BM patients varied by diagnosis. The original GPA was confirmed for non-small-cell lung cancer and small-cell lung cancer. New DS-GPA indexes were determined for other histologic types and correlated with the outcome, and statistical separation between the groups was confirmed. These data should be considered in the design of future randomized trials and in clinical decision-making.

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