INTRODUCTION

Neurooncology: update on therapeutic options

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The rapid pace of discovery in cancer biology has expanded therapeutic options for patients with brain tumors. Neurooncologists no longer need to prescribe the same regimen for all patients but instead can design customized therapies based on the molecular profile, imaging features, and clinical behavior of individual tumors. Moreover, the role of each modality in the treatment plan must be reviewed in light of current evidence. In this issue of *Neurosurgical Focus*, the authors discuss therapeutic options for primary and metastatic central nervous system tumors, highlighting the decisions that clinicians make to design the most effective approach.

Molecular markers are now used for identifying individualized treatment options. Chen et al. describe the molecular features of low-grade gliomas that guide decision making. Sun and associates report on an algorithm for managing meningiomas. Karsy et al. review the prognostic value of molecular markers in glioblastoma. The role of immunotherapy in cancer treatment has continued to grow. Jones and colleagues provide a retrospective analysis of melanoma patients who had surgery for brain metastasis while undergoing treatment with the immune checkpoint blocking agent ipilimumab. Caruso et al. review the literature on treatment approaches to metastatic melanoma, with emphasis on the role of immunotherapy of metastases to the spine.

Endovascular technology is being exploited to augment surgery and chemotherapy, while those traditional treat-

ments have continued to be applied in new and unique ways. Shah and coworkers describe preoperative embolization of meningiomas. Wang et al. report on the efficacy of convection-enhanced delivery of bevacizumab in a mouse model of glioblastoma, offering hope that the discouraging results of intravenous delivery might be overcome. Azad and colleagues comprehensively review strategies to disrupt the blood-brain barrier. Hendricks et al. discuss novel endovascular methods of bypassing the blood-brain barrier to improve drug delivery.

Sughrue et al. analyze survival times of glioblastoma patients after multiple resections, and they define a useful clinical parameter, the relative aggressivity index, which is dependent only on radiographic definition of tumor re-lapse. Golden and associates describe responses of human glioblastoma cells to quinoline-based antimalarial drugs, which are known to block autophagy, the process by which cell membranes are degraded and recycled.

Finally, entirely new technologies are being explored that offer alternative therapies for patients. Missios et al. review laser interstitial thermal ablation, a technique for obliterating brain lesions, including those in deep-seated, high-risk locations. Rehman et al. describe the evidence supporting the use of percutaneous application of alternating electrical fields. This broader set of therapeutic options will help overcome the challenges of brain tumor treatment.

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