INTRODUCTION

Update on adult neuro-oncology

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NEURO-ONCOLOGY is a complex field that benefits from multidisciplinary expertise from many different clinical and other specialties. The complexities in neuro-oncology stem from many sources. One of the most important sources is the complexity of the brain itself and the central role it plays in life and well being. As a result, all modalities of tumor treatment have to balance the beneficial effects of the therapy against the potential negative effects on worsening neurological deficits and/or functional status. Another complexity arises from the wide variety of tumor types, biology, and disease natural history that encompass the spectrum of primary brain and spine tumors and metastatic tumors. In addition, the multidisciplinary and potentially expensive nature of neuro-oncological treatments raises important questions about the cost-benefit relationships of different treatment approaches, the issue of access to health care and disparities in that access, and the need to carefully evaluate the outcomes of treatments beyond simple disease control, including functional considerations regarding quality of life and work life.

The current issue of *Neurosurgical Focus* is dedicated to presenting a wide spectrum of papers covering many of these important topics. The optimal neurosurgical approaches and techniques to maximize tumor resection and minimize neurological deficits for specific diagnoses has long been a central, and sometimes controversial, topic in neuro-oncology. Several articles in this issue contribute to this discussion from a number of different perspectives. The optimal use of advanced imaging and functional approaches, including diffusion tensor tractography and transcranial magnetic stimulation in the preoperative evaluation and surgical planning for gliomas, is highlighted in articles by Sollman et al. and Oda et al. In terms of neurosurgical outcomes for specific tumor entities and clinical

situations, Dayani et al. (also see the associated editorial by Dr. Colman) describe outcomes from a large series of butterfly gliomas and identify a benefit of resection versus biopsy in this challenging tumor phenotype.

The field of intraoperative imaging, with both standard techniques and new vital staining methods, has also been an area of rapid recent development. The article by Acerbi et al. describes the use and potential applications of indocyanine green videoangiography for evaluation of vascularity and blood flow intraoperatively. While 5-aminolevulinic acid (5-ALA) has been well known as a fluorescent marker for aiding in determining the extent of glioma resection for some time, its use in other intracranial tumors is less well developed. Kiesel et al. describe another potential application of 5-ALA for the determination of the presence or absence of diagnostic tumor samples during stereotactic biopsy of lymphoma. Another novel diagnostic approach is presented by Hori et al., who describe use of a cell block technique to diagnose metastatic glioma to the lung from pleural fluid.

Beyond neurosurgical, imaging, and diagnostic improvements, one of the most significant advances in neuro-oncology in recent years has been the improved understanding of the biology and molecular underpinnings of different tumor types and subtypes. Perhaps the most visible example of this was the recent out-of-cycle revision of the WHO classification of tumors of the central nervous system that includes, for the first time, results from molecular diagnostic testing as part of the final integrated diagnosis. These discoveries have led to the identification of specific mutations or pathway alterations in a number of tumors that are relevant for diagnosis and/or potentially therapeutically targetable. One tumor type that is considered fairly resistant to systemic therapy is pituitary adenoma. The case report by Anderson et al. is

thus of interest in showing regression of a nonfunctioning pituitary macroadenoma to the CDK4/6 inhibitor palbociclib. Additional papers by Karsy et al. (meningioma), Barrett et al. (metastatic squamous cell), and Gupta et al. (craniopharyngioma) provide updates on the molecular understanding and potential therapeutic opportunities in these diseases. Choi et al. further review the promising field of chimeric antigen T-cells (CAR-T) as therapy for glioblastoma (GBM), and Kohli et al. report on the association between antidepressant use and a moderate increase in risk of recurrence in meningioma from a retrospective series. Mohme et al. examine tectal gliomas as a unique subtype and identify clinical and prognostic factors associated with more aggressive behavior and worse outcomes with this diagnosis.

Given the wide range of approaches in technology and therapies available in neuro-oncology, a key question facing the field is how to maximize outcomes for patients while at the same time making the most efficient use of health care resources and overcoming existing barriers to access to those resources. Chandra et al. report that a patient's status with regard to health insurance and access to health care is associated with prognosis in GBM. Starnoni et al. evaluate returning to work as an important func-

tional outcome for brain tumor patients and determined rates and prognostic factors for this outcome in patients with GBM treated with surgery, radiation therapy, and chemotherapy. Butenschön et al. examine an advanced technique, preoperative motor mapping with navigated transcranial magnetic brain stimulation, and determine the cost-effectiveness of this approach in terms of quality-adjusted life years in patients with gliomas. Finally, Marigil et al. describe a single-institution experience with the use of outpatient awake craniotomy for brain tumors.

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Disclosures

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