Preface

Current Trends in Neuropathology

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Editor

The field of neuropathology has rapidly evolved over the past decade, largely due to the wealth of information generated by modern molecular technologies. The discovery of characteristic genomic alterations for a wide spectrum of neoplasms arising within the central nervous system has revolutionized the diagnostic approach to tumor classification, leading to the incorporation of widespread molecular definitions in the recent 2016 World Health Organization update. As our knowledge of tumor biology continues to grow, so will our need to carefully integrate new findings with traditional histopathologic evaluation.

This issue of *Surgical Pathology Clinics* covers several key areas where recent advances in molecular diagnostics are poised to impact current practice for pathologists and clinicians alike. For example, 3 articles are dedicated to pediatric brain tumors, which not only discuss updated genomic features of many existing neoplasms but also include newly described entities as well. Furthermore, molecular testing for mesenchymal neoplasms, lymphoid malignancies, and even infectious diseases is beginning to be utilized for diagnosis confirmation and treatment planning.

Beyond simply refining tumor classification schema, the age of molecular medicine ushers in new challenges and opportunities for the practicing neuropathologist. As the list of available tools continues to expand, understanding the ability and limitations of each assay can be challenging. To this end, a primer on the currently employed assays in brain tumor diagnosis is included in this issue. Because neuropathologists are being increasingly relied upon to perform and interpret genomic assays for treatment planning and trial enrollment, we have a unique opportunity to help design and participate in modern biomarker-based clinical trials; therefore, 1 article is dedicated to summarizing the current list of actionable events as well as general concepts of trial design.

These same advances in molecular diagnostics have been exploited clinically through the development of targeted agents and cellular therapies. Immunomodulation and the use of chimeric antigen receptor T cells are promising new treatment paradigms in oncology and are likely to be utilized with increasing frequency. Still, the off-target effects of these therapies are not well understood in the brain, but recent work demonstrates an expanding spectrum of iatrogenic neuropathology that will be

critical to recognize as we examine the efficacy of novel agents and which is summarized herein.

Finally, we must consider what will likely be the next revolution in our field: applying artificial intelligence to image analysis. Currently, available deep learning algorithms have made great strides at being able to accurately recognize diverse tissue elements and histologic diagnoses, and a discussion of the capabilities and limitations of this technology is included in this issue.

This diverse collection of articles aims to serve not only as an update for several rapidly evolving

areas of neuropathology but also as a reference for integrating molecular diagnostics into clinical practice.

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