

Preface

Ablation Therapies in Neurosurgery



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Editors

The concept of localization of function in neurology and neurosurgery is owed to a series of early thinkers, including Gall, whose discredited theory of phrenology posited that bumps on the head had specific correlations and relations to brain functions. By the time of Broca, the concept that there was regionality in the brain was growing. Edwin Boldrey's description of the sensorimotor homunculus in his 1936 McGill master's degree thesis (supervised by Wilder Penfield) firmly entrenched the idea of specific localization in the neurosurgical psyche.¹ With that idea comes the parallel concept that certain pathologic conditions can be addressed by destroying certain structures that give rise to them, to wit, by ablation. By successive iteration defining targets and developing technology, ablation therapies are now a vital part of the neurosurgical toolkit that can achieve cellular inactivation of tumors, structures, or pathways to achieve clinical goals.

The articles in this issue provide a broad overview, in places more sweepingly and in others more in-depth, of the current state of application of ablation therapies. The journey begins with a concise history of how we came to current ablation therapies. How we have evolved from the earliest stages of ablation therapies, what we have retired or abandoned, and how we developed our current technologies inform where we

still may go. Among classic technologies, a review of the current application of ablation for trigeminal neuralgia anchors the list. Laser interstitial thermal therapy (LITT) has become the most widespread of the newer technologies and claims the lion's share of attention now. By delivering heat energy precisely in a way that can be monitored, LITT allows us to achieve targeted and tailored cell death in a way that has reinvigorated ablation in neurosurgery. Applications such as brain metastases, radionecrosis, and glioma are all detailed here by our colleagues, who are respected authorities in the field.

This issue also covers topics of application in specialized populations, such as LITT in the pediatric population and the performance of awake LITT. These are topics that are important because they open the technology to subgroups where the minimally invasive nature of the technique is particularly attractive.

Other topics include technologies that many have heard of but may not yet have a deep familiarity with, including MRI-guided high-frequency ultrasound ablation and magnetic hyperthermia.

Ablation therapies are here to stay for the duration. They satisfy multiple previously unmet needs, including the ability to treat effectively deep targets with a minimally invasive technique, the use

of nonionizing radiation, and generally a favorable patient experience. Advances in the underlying technologies for delivering the ablation have been paced by the necessary techniques for real-time monitoring of the process. Nonetheless, opportunities for the field still remain. Further developments to improve the ability to treat larger lesions, to treat irregularly shaped lesions, and to interrupt networks in a rational range will be a welcomed part of technologies still to come. This issue represents a view into both the best practices of today and the promises of tomorrow.

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1. Gandhoke GS, Belykh E, Zhao X, et al. Edwin Boldrey and Wilder Penfield's Homunculus: A Life Given by Mrs. Cantlie (In and Out of Realism). *World Neurosurgery* 2019;132:377–88.