Neurostimulation for the treatment of chronic pain

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NEUROSURGEONS have long played an important role in the management of pain. The majority of ablative procedures for the treatment of pain were forged by members of our specialty. Indeed, it was a neurosurgeon, Norman Shealy, who pioneered the concept of spinal cord stimulation (SCS) in the late 1960s. Given the rich heritage of neurosurgery in the field of pain management, it is therefore somewhat disappointing that we have taken a back seat to other nonsurgical specialties in this arena of medicine over the last 10 to 15 years. That is truly unfortunate, given the unique qualifications that neurosurgeons possess. Indeed, neurosurgeons have expertise in the fields of anatomy, physiology, pathology, and pharmacology of the human nervous system, which, combined with the ability to access any anatomical area of the nervous system, makes us uniquely qualified to treat patients with even the most difficult pain conditions. I am hopeful that in time more neurosurgeons will develop a renewed interest in and enthusiasm for this area.

This issue of *Neurosurgical Focus* is dedicated to reviewing the most common neurostimulation procedures currently in use for the management of pain. The SCS technique has now been in clinical use for nearly 40 years, during which time it has undergone a significant evolution and increased level of sophistication. The ability to custom-design systems with multiple electrodes, the development of pulse generators with more versatile programming platforms, the concept of current steering, and a more thorough understanding of the basic mechanisms and electrophysiology of SCS have led to significant advancements in the application of this technique. Based on the general principles of SCS, a number of other peripheral neurostimulation techniques have evolved and have proven extremely useful over the past several years. These include procedures such as occipital nerve stimulation for various occipital headache syndromes, trigeminal branch stimulation for neuropathic facial pain due to trigeminal

branch injury, spinal nerve root stimulation, and subcutaneous field stimulation techniques. Motor cortex stimulation has shown a great deal of promise for the treatment of some of the most refractory pain conditions, such as stroke pain, trigeminal neuropathic and deafferentation pain, post-herpetic neuralgia, and so on. This technique is being used with increasing frequency, and I believe it is poised to become an essential tool in the neurosurgical armamentarium for the treatment of chronic intractable pain.

The articles in this issue were written by some of the brightest and most talented young neurosurgeons practicing today, and they have dedicated a large portion of their practices to the management of pain. I would personally like to thank each author who contributed to this effort, and I also thank them for their dedication to the field of neurosurgical pain management. I would also like to dedicate this issue to the memory of John Oakley, M.D. Anyone who is familiar with the field of neuromodulation will immediately recognize Dr. Oakley as one of the true pioneers in this field. Dr. Oakley dedicated more than 30 years of his stellar career in neurosurgery to the field of pain management. He was instrumental in pioneering many of the advances that have been made over the past two decades in the field of SCS. Sadly, his life was taken from us earlier this year in a plane crash. Those of us who were fortunate to know him well knew him not only as a superb neurosurgeon but also a dedicated teacher and mentor, compassionate physician, inquisitive researcher, loving husband and father, humanitarian, and loyal friend. Without question, John will be dearly missed. I can think of no better way to honor his memory and legacy than for us as neurosurgeons to become more involved and dedicated to neuromodulation and the field of neurosurgical pain management.

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Abbreviations used in this paper: