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History of Neuroaugmentative Procedures

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Neuroaugmentation, the use of chronic stimulation of the brain and spinal cord for pain management, developed during the past 30 years. It evolved, however, from concepts of pain treatment that were based on observations and clinical experience dating back an additional two decades or more. The appreciation of the role of the extralemniscal system and descending influences from the brain in modulation of pain perception led to the Melzack-Wall gate theory. The concept proposed in that theory, that pain perception could be lessened by increasing activity in neural structures not associated with pain, led to chronic stimulation of deep brain and spinal cord as a modality for the management of chronic pain. Both brain and spinal structures emerged as targets for neuroaugmentation.

Evaluating the Complex Chronic Pain Patient

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Joel L. Seres

The chronic pain patient represents the failure of significant benefit from prior treatment approaches. The reasons for the patient's predicament are often a result of psychosocial issues as well as physical problems. Treating only the physical aspects of the clinical picture can only be expected to provide long-term effect if it also solves the patient's other needs. The evaluation of the chronic pain patient must include uncovering the full reasons for prior failure. This article provides a few ideas about how this might be done in a busy neurosurgical practice.

Mechanisms of Action of Intrathecal Medications

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Richard K. Simpson, Jr.

Implantable drug delivery devices have become a mainstay in the management of patients with chronic pain disorders. The surgical technique for implantation is relatively simple and safe. A variety of device styles and types are currently available to meet the patient's specific needs. Several medications can be delivered via these devices, including morphine and baclofen. The future role of this approach continues to expand as the indications for and flexibility of these systems continue to advance.

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<p>Deep brain stimulation (DBS) plays an important role in the treatment of chronic pain when other less invasive treatment modalities have been exhausted. DBS is an apparently safe and effective treatment option for a select group of patients. Further research into the mechanisms of pain relief by DBS and careful prospective outcomes studies should help to define better the optimal techniques for DBS and clarify which patient populations may be best helped by this interventional procedure.</p>	
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emotional status. Surgical interventions for medically refractory pain also possess inherent limitations. Technologic advancements have made cell type-specific targeting, expression control, and safe and stable gene transfer possible. Animal research has provided increasing experience with gene transfer to the nervous system and sensory neurons in particular. Gene-based neuromodulation can be achieved through neuronal delivery of transgenes capable of altering synaptic function. Alternatively, ex vivo gene transfer can be used to create cell lines capable of secreting analgesic neuropeptides. Transplantation of these grafts and direct gene-based neuromodulation can be applied to the control of pain and the root causes of pain. These approaches combine anatomic and pharmacologic specificity. As the technology continues to improve, clinical application of cellular and molecular pain control is likely.

Precentral Stimulation for Chronic Pain

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Ashwini D. Sharan, Joshua M. Rosenow, Massud Turbay, Roy Testerman, and Ali R. Rezai

A decade of clinical experience has suggested that precentral stimulation is an option for patients with deafferentation as well as other chronic pain syndromes. Permanent complications are uncommon. More scientific evidence is warranted to understand the precise mechanism for this treatment modality. A larger organized clinical trial is desired to establish its efficacy.

Anatomy and Physiology of Chronic Pain

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Joshua M. Rosenow and Jaimie M. Henderson

Although much has been accomplished in the past several decades, treatment of chronic pain remains imperfect. This article presents the anatomy and physiology of the pain system along with the neurobiologic changes that occur in the establishment and maintenance of chronic pain states.

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