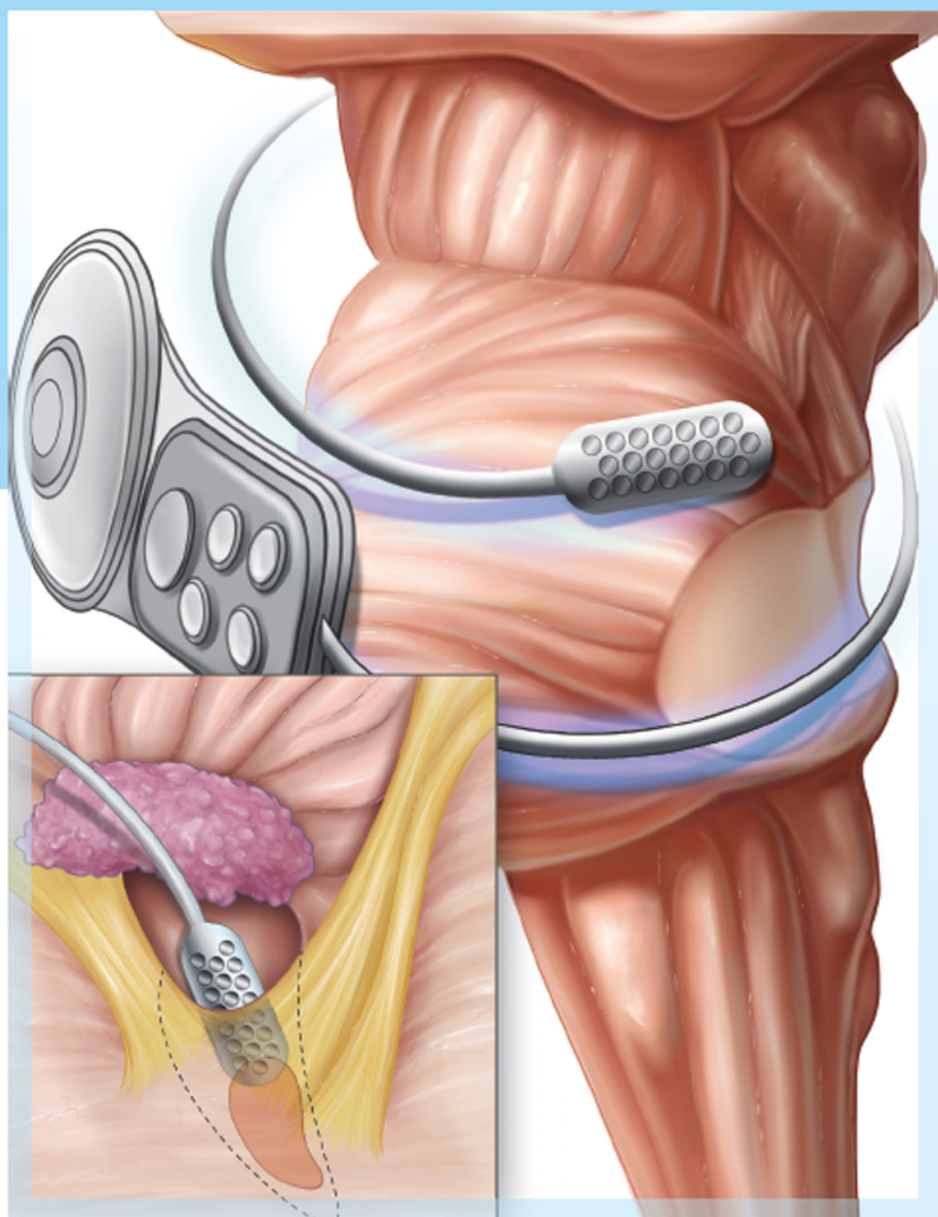


Auditory Brainstem Implants

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Preface

The auditory brainstem implant (ABI), through the course of its development, has brought together surgeons, audiologists, engineers, auditory physiologists, and researchers in psychoacoustics.

Although a very specialized and narrow topic, ABI development has involved clinicians and scientists working together. Those with interest in ABI are from a broad range of fields: audiologists, otolaryngologists, neurosurgeons, oncologists, speech therapists, neurophysiologists, social workers, educational specialists, engineers, and implant manufacturers. This textbook is designed to be suitable for all personnel working with the clinical and research application of ABI, both in adults and children. It is an effort to bring together materials and resources regarding ABI under one cover, with sensitivity to the fact that prospective readers may bring various levels of expertise in individual topics.

The ABI is a triumph of translational research. It was initially developed somewhat serendipitously: Surgeons recognized that the cochlear nucleus is directly in the surgical field during resection of neurofibromatosis type 2-associated acoustic tumors and it might respond to direct stimulation. After several iterations, today's devices capitalize on existing cochlear implant (CI) receiver-stimulator technology and apply it to the central auditory system. The ABI shows the benefit that can be derived from technology—the ability to convey auditory information electrically to the central nervous system—while also highlighting its limitations—a relatively small population of recipients who can understand open-set speech information. It shows how technology developed for one indication (neurofibromatosis

type 2) can fortuitously assist with other indications (nontumor adults and children with cochlear ossification, cochlear malformations, and cochlear nerve deficiency). The ABI can give insights into common, disabling conditions (e.g., tinnitus), and it can provide research insights into such areas as the central auditory pathways. The chapters in this textbook delve into these topics.

What does the future hold for ABI? In this textbook, the current state of ABI is explored, and future directions are mapped out. Questions regarding how we move forward are many: Should we completely reconsider how we are doing speech processing with ABI? Have conventional CI strategies been inadequate for the central auditory system? Can new electrode technologies (penetrating arrays, contoured paddles) help in creating a better interface between the device and the tissue? What new research areas, such as improved medical imaging and optical stimulation, might assist in improving outcomes? And, finally, how does the narrow topic of cochlear nucleus stimulation relate to the topic of neurostimulation in general?

Those of us in the ABI field continue to apply this technology for the benefit of our patients. We have been generally cautious in its expansion to wider populations, understanding that there are risks involved and that the measurement of benefits is an ongoing process. Although we are cautious, at the same time we understand that there may be preconceptions and assumptions that we need to move beyond.

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