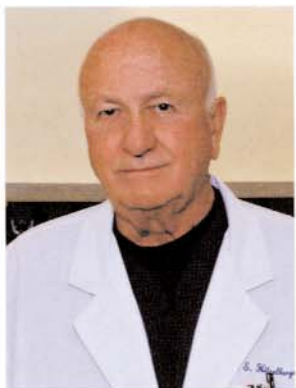


UNIQUE

COLLABORATIONS

## in Science and Medicine



*William E. Hitselberger, M.D., is a neurosurgeon specializing in head and neck surgery who surgically treats patients with diseases related to the ear, facial nerve, balance system and tumors (acoustic neuroma, or vestibular schwannomas). An expert in his field, Dr. Hitselberger works primarily with physicians of the House Clinic, and has been involved in more than 6,000 various procedures since he began collaborating with them in the early Sixties. Dr. Hitselberger also serves as neurosurgical consultant for St. Vincent Medical Center, Hospital of the Good Samaritan and Kaiser Hospital.*

*Dr. Hitselberger first learned how to use the House-Urban operating microscope for the removal of acoustic neuromas from William F. House, M.D. – specialized techniques that Dr. Hitselberger later adapted for use in other neurosurgical procedures that include laminectomies, aneurysms and other brain tumors. Dr. Hitselberger also partnered with Dr. William House in the development of the auditory brainstem implant (ABI) in 1979, the first auditory device designed to bypass the cochlea and the auditory nerve to transmit sound directly to the brainstem, allowing patients who were not candidates for a cochlear implant due to a damaged hearing nerve, to receive sound. He has traveled all over the world to help otologic and neurosurgical teams perform their first auditory brainstem implant (ABI) surgeries and performed the first-ever surgeries of this kind in Europe, North and South America, Asia and Australia. Dr. Hitselberger spoke with House Calls Magazine about his work and unique partnership with the House Clinic and House Ear Institute.*

**House Calls:** Can you please explain how you and a neurotologist (ear surgeon) from the House Clinic work together during a tumor removal or related surgical procedure?

**Dr. Hitselberger:** From the time we first worked together, Dr. William House and I both felt there should be a degree of cross training between the neurosurgeon and the neurotologist in all these specialized procedures we perform. In fact, Dr. Howard House, the founder of the House Ear Institute, used to say

that when you perform a new procedure it's no good unless you teach other surgeons how to do it. This philosophy is Dr. House's legacy, and speaks to the mission of the Institute and all that we do. This collaborative approach has continued in my current work with Dr. Derald Brackmann and others on the ABI team at the House Ear Institute and colleagues at the House Clinic. This interchange of ideas and skills has resulted in a dramatic improvement in the surgical results for our patients.

**House Calls:** What is your collaborative role during surgical procedures with “House” colleagues?

**Dr. Hitselberger:** In most of these procedures, the neurosurgeon is concerned with the removal of the tumor from the brain area and the neurotologist is concerned with the exposure of the tumor through the temporal bone (where the ear system is located) and isolation of the facial nerve. In an implant procedure, the neurosurgeon is responsible for placement of the implant on the cochlear nucleus in the brainstem.

**House Calls:** Can you speak further about the ABI, the ABI team and the patients who are candidates for this device?

**Dr. Hitselberger:** Dr. House and I developed the ABI for those patients who have a genetic disease called Neurofibromatosis Type II (NF2), characterized by tumors growing on both balance nerves that adversely affect the auditory and facial nerves. In this group of patients there is the possibility of total deafness with the removal of their tumors. However, with the placement of the ABI, we are able to preserve a degree of hearing for many of these patients. Audiologists and physiologists are integral members of the ABI team who contribute to the advancement of the device technology and the successful rehabilitation of the patients. The team approach is truly dependent on cohesive interplay between all of these disciplines, and the program could not exist without the cooperation and interaction of each of its specialists.

**House Calls:** How is the ABI different from the cochlear implant (CI)?

**Dr. Hitselberger:** The cochlear implant is for those patients whose auditory nerve (which runs from the cochlea, or inner ear, to the brainstem) is fully intact.

Microelectrode technology applied in a 2003/2004 penetrating auditory brainstem implant (PABI) limited clinical trial at the House Ear Institute (HEI) was made possible thanks to the early pioneering work of Drs. William House and William Hitselberger. In 1979, Drs. House and Hitselberger implanted Marilyn Davidson with the first auditory brainstem implant (ABI). Their early work with Neurofibromatosis Type II (NF2) patients, and later work by Derald E. Brackmann, M.D., and the ABI team at HEI led to FDA approval of the ABI in 2000, and provided the basis for the newer PABI.

Physicians, scientists and engineers have worked together as a team throughout the development and implantation of these auditory devices. The patient is first evaluated and diagnosed by the neurotologist, who then works closely with the neurosurgeon for surgical implantation. The neurosurgeon performs any necessary tumor removal and implants the device in each patient, in collaboration with the neurotologist. The engineers and researchers work together on the technology and testing methodology for the device.



*Dr. Hitselberger with two pioneering patients – Marilyn and Katie*

The PABI team for the limited clinical trial conducted at the House Ear Institute (HEI) includes:

Derald E. Brackmann, M.D., Neurotologist, House Clinic

William Hitselberger, M.D., Neurosurgeon Primary Investigator, Douglas McCreery, Ph.D., Huntington Medical Research Institutes

Co-Investigator, Robert V. Shannon, Ph.D., HEI Research Audiologist, Steve Otto, M.A., HEI Consulting Audiologist, Pete Arkis, M.A., Cochlear Limited, Manufacturer

The CI stimulates the nerve endings inside the cochlea, while the auditory brainstem implant bypasses the inner ear and stimulates the brain itself. In patients who are candidates for the ABI, the auditory nerve does not exist or has been severely compromised by NF2 or by tumor-removal surgery.

**House Calls:** Can you tell us more about the patients who receive the ABI and discuss the first patient who underwent the procedure to receive this device?

**Dr. Hitselberger:** Neurofibromatosis Type II (NF2) is a relatively uncommon disease that occurs in approximately one in 40,000 births. There is a strong hereditary predilection for this disease, and in the same family there may be siblings who manifest the disease and some who do not.

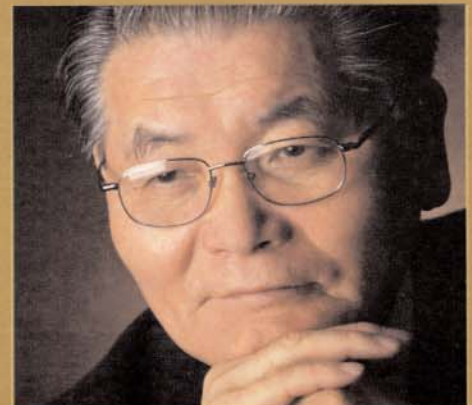
Marilyn Davidson was the first patient to undergo a single-channel auditory brainstem implant in association with removal of a tumor from NF2 in 1979. Even though Dr. House and I could not be absolutely certain what effect this device would have on the adjacent areas of the brain, Marilyn was willing to take the risk and be the first. She is a very special and courageous woman. Because of Marilyn's fortitude, many other patients have been able to benefit from this advance in hearing research. Bonifacio "Jay" Oliva became the first patient to

receive the multi-channel auditory brainstem implant in 1992. The multi-channel electrode allowed us more combinations of stimulation to the underlying cochlear nucleus for better hearing. The accuracy of placement with the multi-channel ABI is not as critical as it is with the single-channel device because there are more electrodes from which an electrical signal can emanate. Mr. Oliva has received good benefit from his multi-channel implant, and thanks to him and his success, many other patients around the world have also received the multi-channel device.

Katie Anderson was the first patient to receive the penetrating electrode auditory brainstem implant, or PABI, through a limited clinical trial at the House Ear Institute. She's receiving good results with her surface electrodes and demonstrated that it's possible to achieve hearing at low levels of current with a definite pitch sensation using the penetrating microelectrodes on the brain. The PABI's microelectrode array, which was developed by Doug McCreery, Ph.D., of Huntington Medical Research Institutes (HMRI) and Cochlear Corporation, should increase the potential for more accurate stimulus, but our early results have not been fully delineated. We are very grateful to Katie and the other four participants who joined our early PABI studies to help us refine and advance this technology. ❖

### Top Honors for House Ear Institute and House Clinic

Two "House Ear" experts received top honors at the May 2005 annual meeting of the American Otologic Society (AOS). David Lim, M.D., executive vice president of research at the House Ear Institute, received the Society's "Award of Merit" for his lifetime contributions to the field of Otology. The House Ear Institute and House Clinic have had five previous recipients of this prestigious award – Howard P. House, M.D. (1972), William F. House, M.D. (1982), James L. Sheehy, M.D. (1992), Fred H. Linthicum, Jr., M.D. (1994), and Derald E. Brackmann, M.D. (2001). Antonio De la Cruz, M.D., of the House Clinic was announced as the president-elect of the AOS for the 2006 term.



David Lim, M.D.