

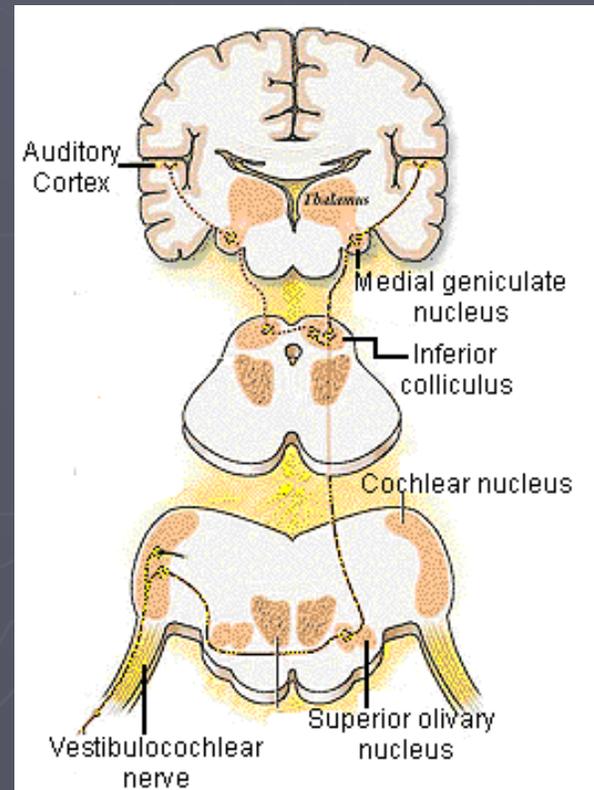
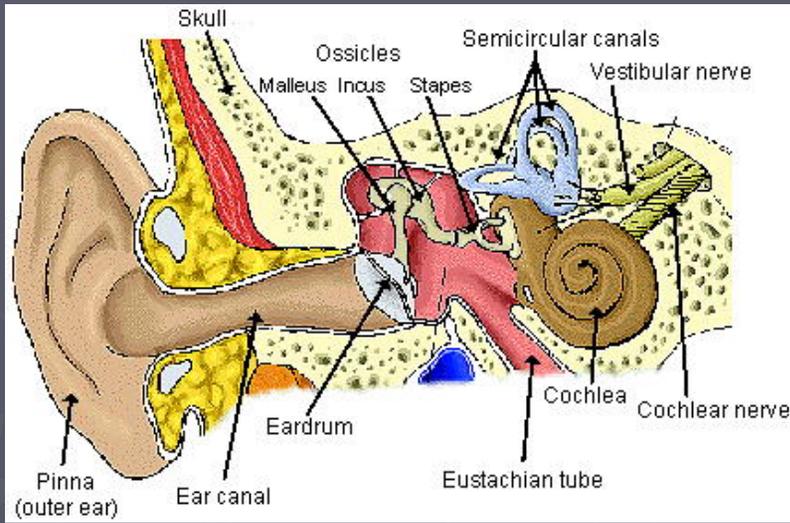
Auditory Brainstem Implant (ABI)

An Option for Some
Individuals with Hearing Loss

Krista Biernath, M.D.

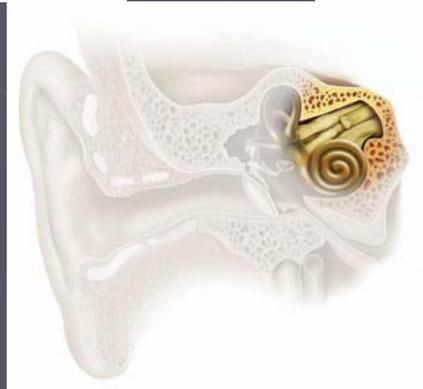
The findings and conclusions in this presentation have not been formally disseminated by the Centers for Disease Control and Prevention and should not be construed to represent any agency determination or policy

Hearing



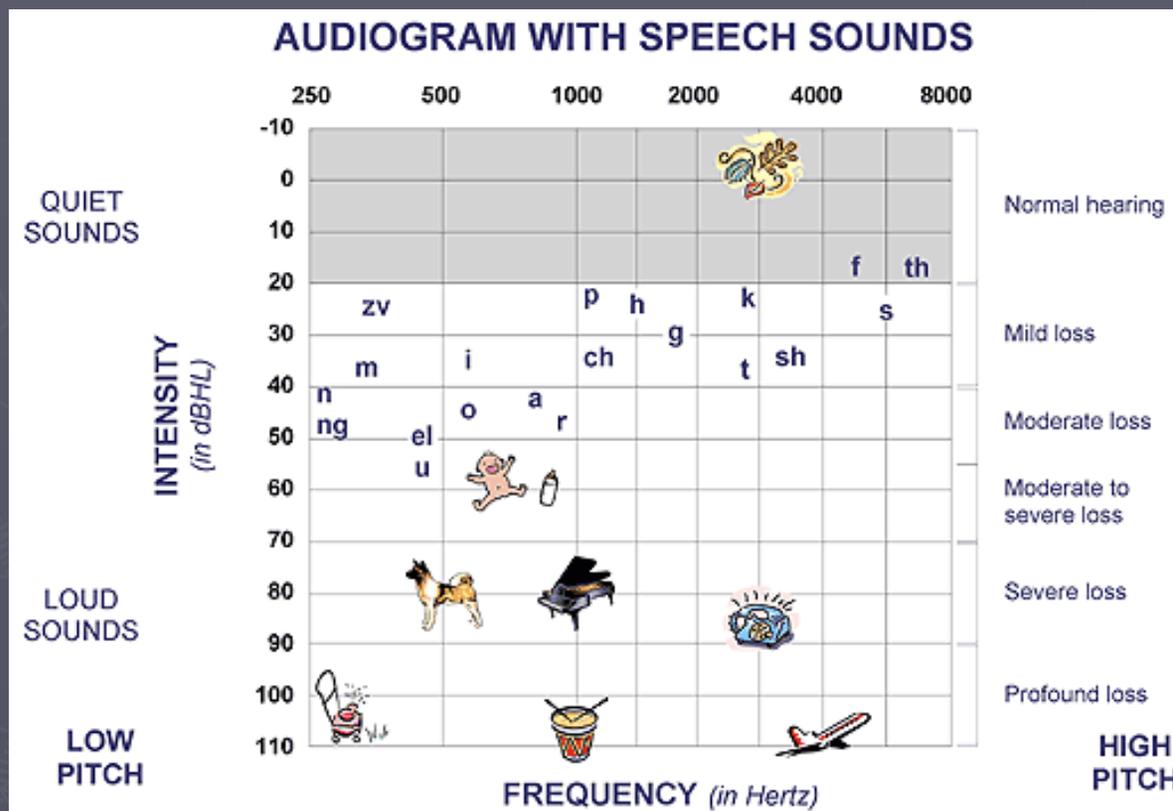
The Anatomy of Hearing Loss

Conductive



Sensorineural

The Audiogram



Cochlear Implants and Auditory Brainstem Implants (ABI)

Cochlear Implants

- ▶ App. 37,000 in US, 100,000 world wide
- ▶ First US recipient -1961
- ▶ FDA approved - 1985
- ▶ FDA approved manufacturers
 - Advanced Bionics Corporation
 - Cochlear Corporation
 - MED-EL
- ▶ Approved for children \geq 12 months

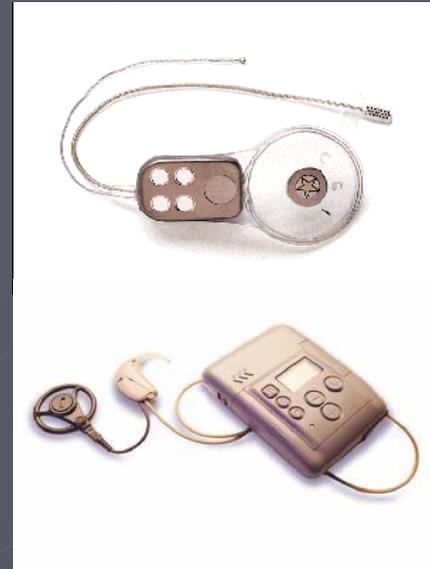
Auditory Brainstem Implants (ABI)

- ▶ App. 300 recipients in US, 600 world wide
- ▶ First implant recipient-1979
- ▶ FDA approved - 2000
- ▶ FDA approved manufacturer
 - Cochlear Corporation
- ▶ Approved for persons \geq 12 years

Comparison of CI and ABI Nucleus Systems*



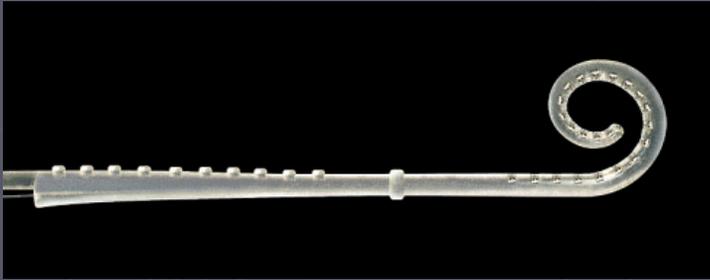
Nucleus 24 CI with Freedom processor



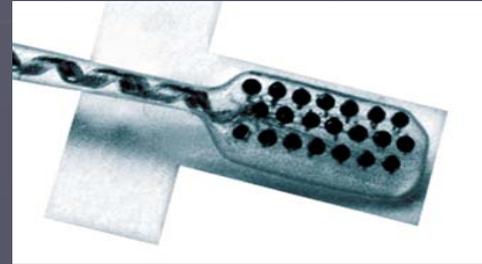
Nucleus 24 ABI with SPrint processor

*The Nucleus system was chosen for comparison between the CI and ABI as the Nucleus 24 ABI is the only ABI model with FDA approval for use in the US

Comparison of CI Contour and ABI Electrodes*



Nucleus 24 Contour electrode



Nucleus 24 ABI
electrode

*The Nucleus system was chosen for comparison between the CI and ABI as the Nucleus 24 ABI is the only ABI model with FDA approval for use in the US

ABI History

- ▶ Pioneers: Dr. W. Hitselberger and Dr. W.F. House. House Ear Institute (HEI)
- ▶ 1979: Ball electrode/ single channel implant
- ▶ 1992 Multichannel implant
- ▶ 2000 FDA approval of the Nucleus 24 ABI with SPrint processor



First ABI recipient Marilyn Davidson with Dr. Hitselberger: Photo courtesy of House Ear Institute

Implant Centers

- ▶ Approximately 300 ABI recipients the in US
- ▶ 11 centers
 - To access full listing and contact information for the US ABI centers, please see <http://www.cochlearamericas.com/Community/39.asp>

FDA Approval

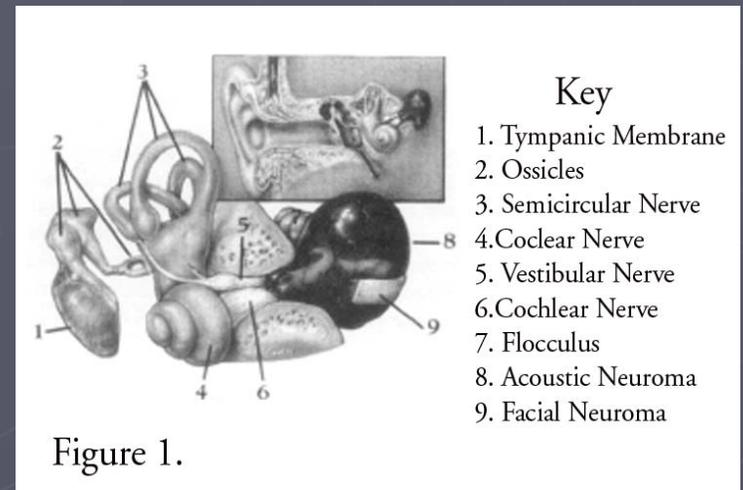
- ▶ FDA expedited approval - 2000
- ▶ Indications
 - Persons with Neurofibromatosis Type 2
 - Bilateral tumors on acoustic nerve resulting in hearing loss
 - Persons 12 years and older

Neurofibromatosis Type II (NF 2)

- ▶ 1 in 40,000
- ▶ Autosomal dominant / chromosome 22
- ▶ Spontaneous mutations 50%
- ▶ Usually detected clinically in 2nd or 3rd decade
- ▶ Benign tumors (schwannomas) on central and peripheral nervous system
 - Bilateral vestibular schwannomas

Vestibular Schwannomas

- ▶ Tumors on the 8th cranial nerve arising from Schwann cells
- ▶ Tumors enlarge and press on the brainstem and compromise other cranial nerves
- ▶ Surgical treatment
 - Must sever the 8th nerve
 - Results in complete deafness



What Does the ABI Do?

- ▶ Bypasses the cochlea and the nerve to transmit electrical signals directly to the brainstem
- ▶ During surgery electrodes are placed directly on the cochlear nucleus
- ▶ ABI is activated after 6 to 8 weeks
- ▶ Goal: Restore *some* degree of hearing
 - Aids lip reading and increases sound awareness

ABI Outcomes

NF 2 Patients

- ▶ Nucleus 22 ABI system
- ▶ 80% (72/ 90) patients perceived sound
- ▶ 60 patients w/ minimum 3 to 6 mo. experience
 - ▶ 1st side tumor n= 20; 2nd side tumor n= 40
 - 65% (39/60) - 50% or more environmental sounds
 - 85% (49/58) – improvement in open-set sentence understanding w/ lip-reading
 - 12% (7/58) scored > 10% on open-set sentence understanding w/o lip reading
- ▶ Questionnaire results
 - Daily use
 - Received benefit
 - Recommend to others

ABI Outcomes

Tumor vs. Non-tumor Patients

- ▶ 80 patients (26 NF 2 and 54 non-tumor)
- ▶ 79 reported auditory sensations
- ▶ Open speech recognition test after 1 yr
 - Non-tumor – average score 56%
 - NF 2 – average score 11%
- ▶ Most NF 2 and non-tumor patients reported improved communication and sound awareness

ABI Outcomes

Patients 12 – 19 years of Age

- ▶ 21 patients (aged 12 – 18 years)
- ▶ 19 received auditory sensations
 - 11 - regular users
 - 2 non-users - good hearing on 2nd tumor side
 - 2 non-users – persistent non-auditory sensations
 - 4 – program “dropouts”
 - ▶ 1 returned after 4 yrs with good results

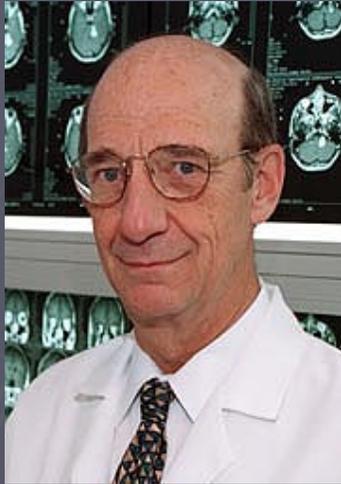
Penetrating Auditory Brainstem Implant (PABI)

- ▶ ABI penetrating microelectrodes in addition to surface electrodes
- ▶ First recipient implanted 2004
- ▶ Currently nine patients implanted
- ▶ Preliminary outcomes – variable results

Life with an ABI



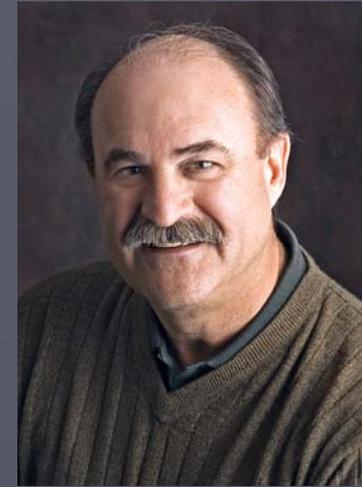
My Team



Derald Brackmann, MD
Otolaryngologist



William Hitselberger, MD
Neurosurgeon

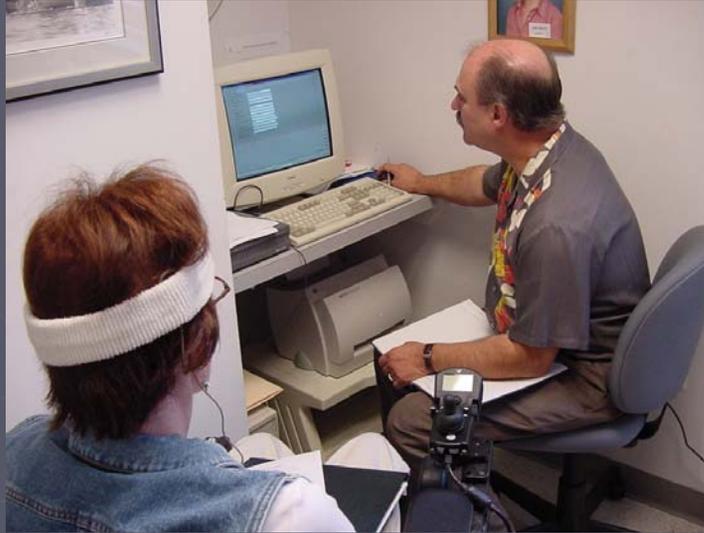


Steve Otto, MA CCC-A
Audiologist

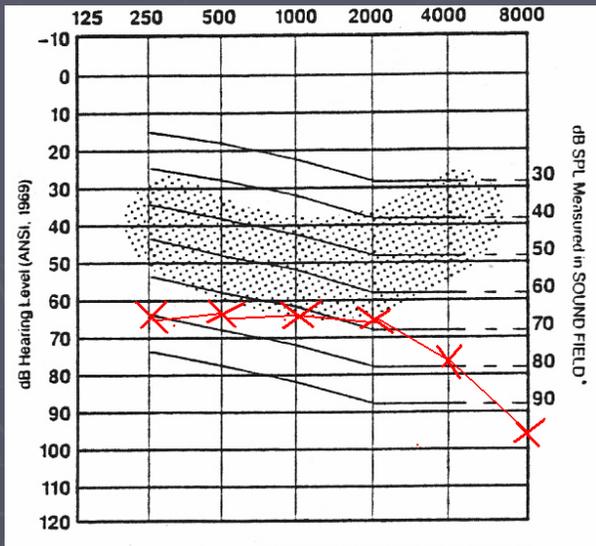
Oh Happy Day!!
May 24, 2007



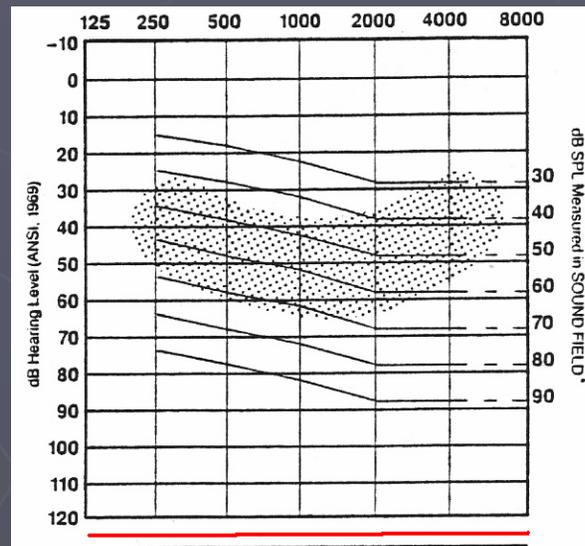
A Sound!!



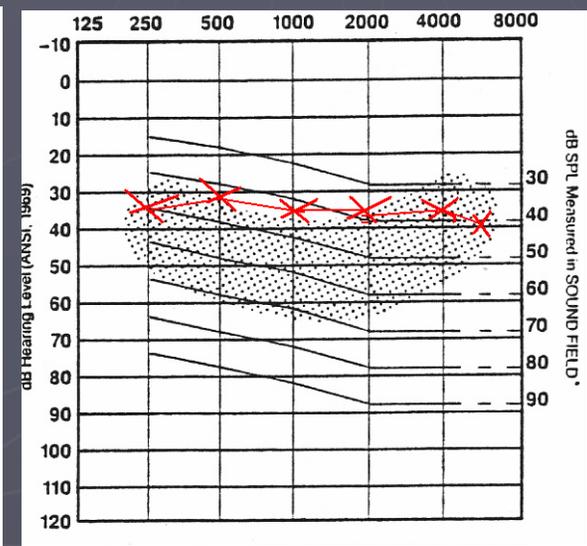
My Audiograms



August 12, 2004



March 22, 2007



May 24, 2007

My ABI Experience: The First Six Weeks

