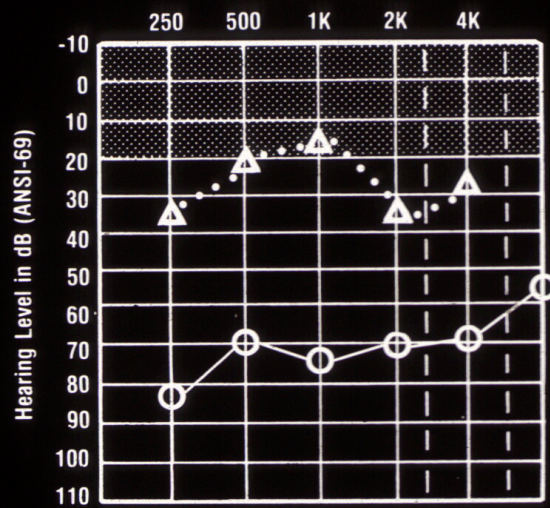


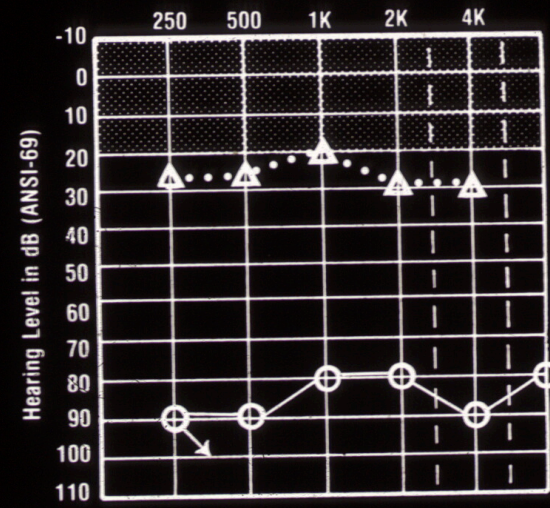
Application of ABR in Infants and Young Children

- ❑ Rationale
- ❑ Tone burst (frequency specific) ABR
- ❑ **Bone conduction ABR**
- ❑ Auditory steady state response (ASSR)
- ❑ Sedation and anesthesia

RIGHT EAR



LEFT EAR

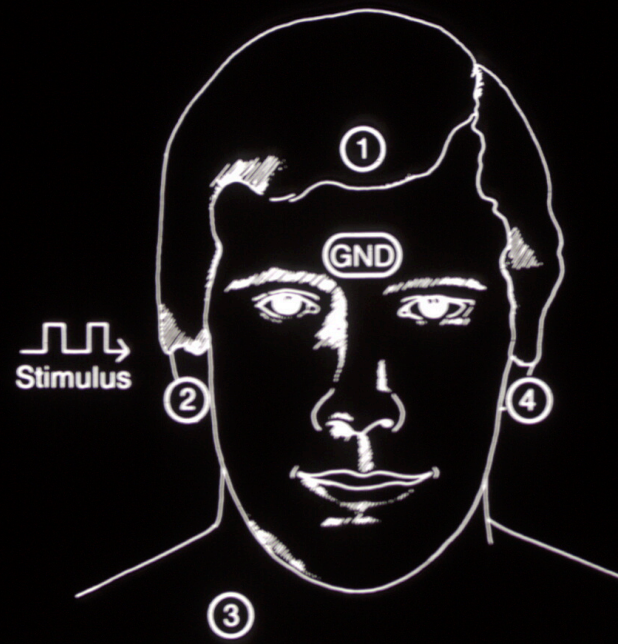


KEY TO SYMBOLS

	unmasked	masked
AC	○	●
BC	△	▲
SAL	◇	

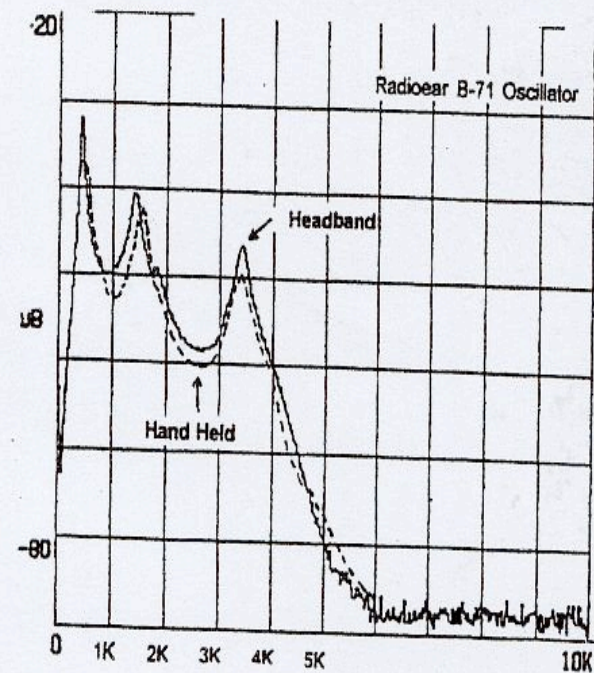
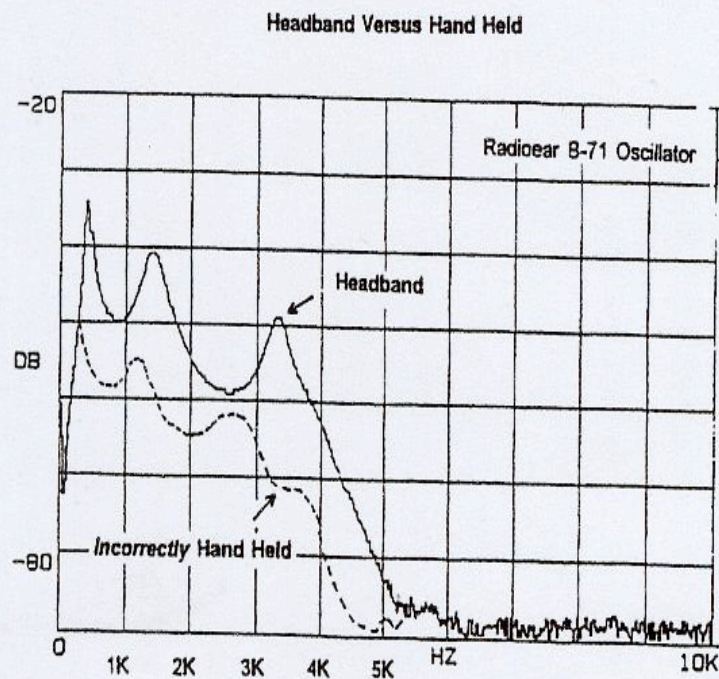
ABR: Protocol for bone conduction

- ❑ B-70 vibrator
- ❑ Mastoid placement
- ❑ Earlobe inverting electrodes (distance from transducer)
- ❑ Alternating click stimuli (or tone burst stimulation) to minimize stimulus artifact
- ❑ Slower rate (e.g., 11.1/sec) to enhance wave I
- ❑ 30 to 3000 Hz (need low frequencies)
- ❑ Begin near maximum intensity level (about 50 dB nHL)
- ❑ Identify wave I in ipsilateral array to verify test ear
- ❑ Plot latency/intensity function for wave V (vs. AC)



<u>Channel</u>	<u>Description</u>	<u>Electrode array</u>
1	Forehead-ipsilateral	1-2
2	Forehead-noncephalic	1-3
3	Forehead-contralateral	1-4
4	Horizontal	4-2

Bone Conduction: Effect of Transducer Factors



Bone Conduction: Adjusting the Head Band for Infants



Bone Conduction: Posterior Placement of the Oscillator

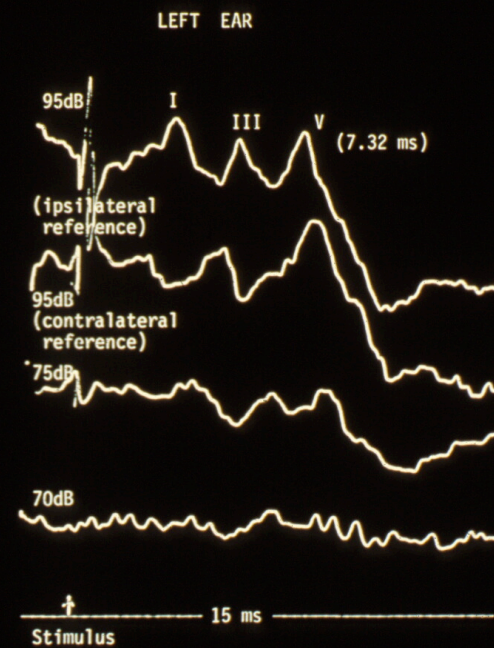
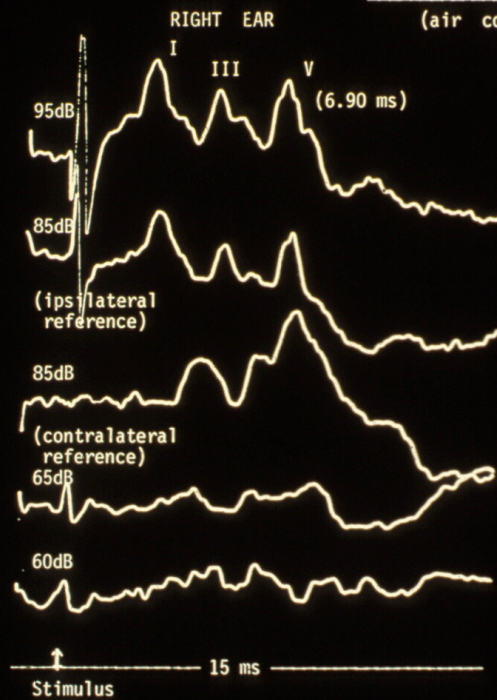


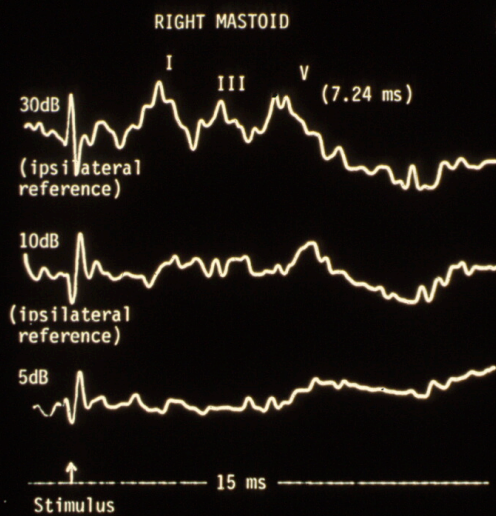
**Bone Conduction:
Hold the Band, Not the Oscillator**



AUDITORY BRAINSTEM RESPONSE
(air conduction)

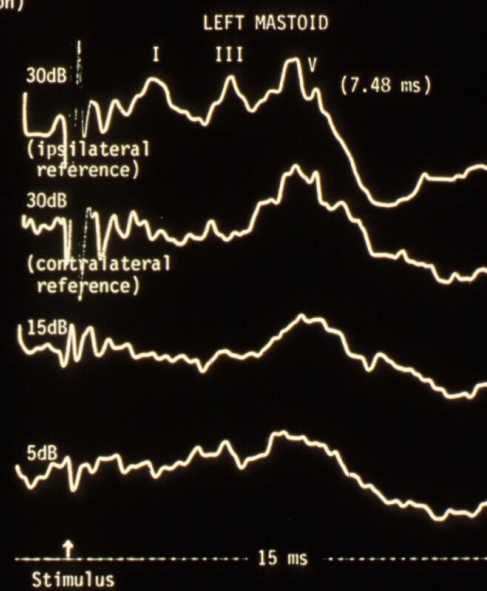
K.R.C., 6 yrs., female



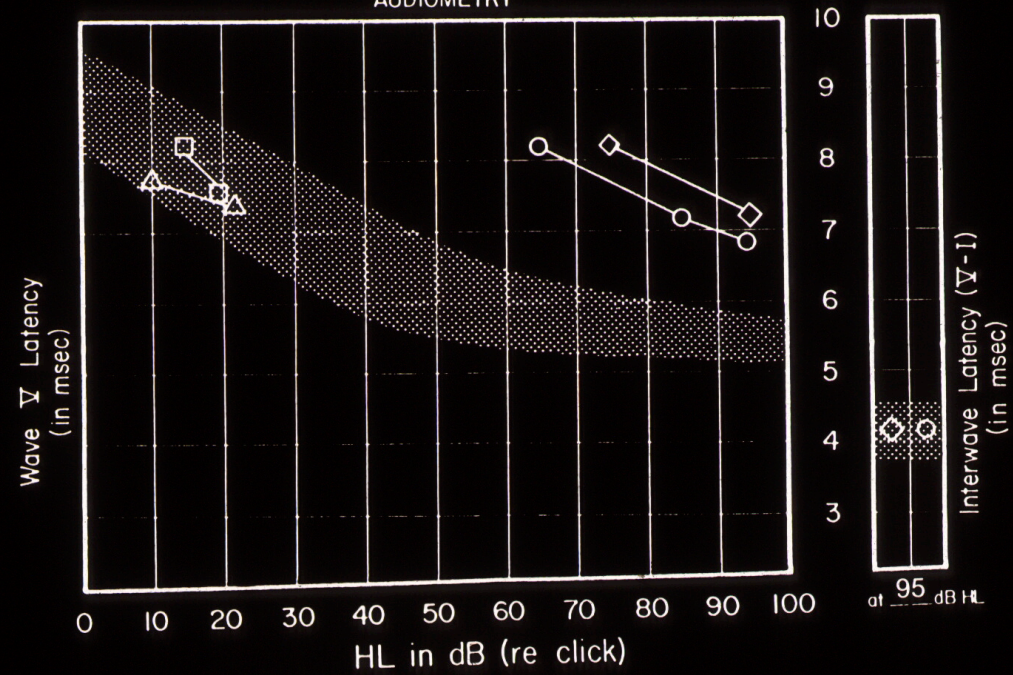


AUDITORY BRAINSTEM RESPONSE
(bone conduction)

K.R.C., 6 yrs., female



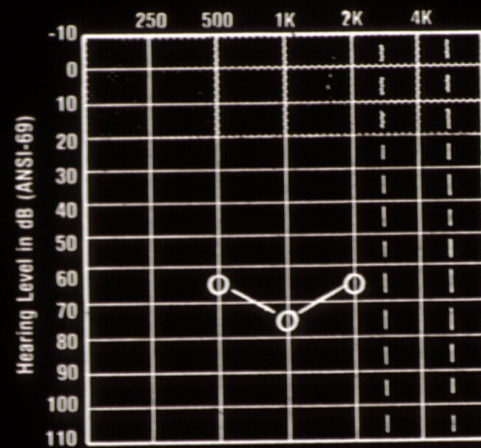
AUDITORY BRAINSTEM RESPONSE (ABR) AUDIOMETRY



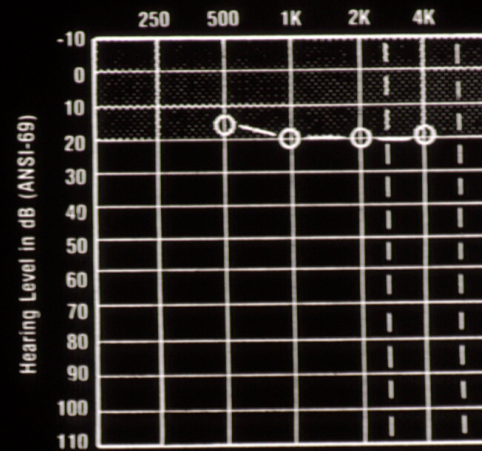
- Right Ear (Air-Conduction)
- △ Right Mastoid (Bone-Conduction)
- ◇ Left Ear (Air-Conduction)
- Left Mastoid (Bone-Conduction)

Pure - Tone Audiometry

Pre-operative
PTA: 68dB
ST: 60dB



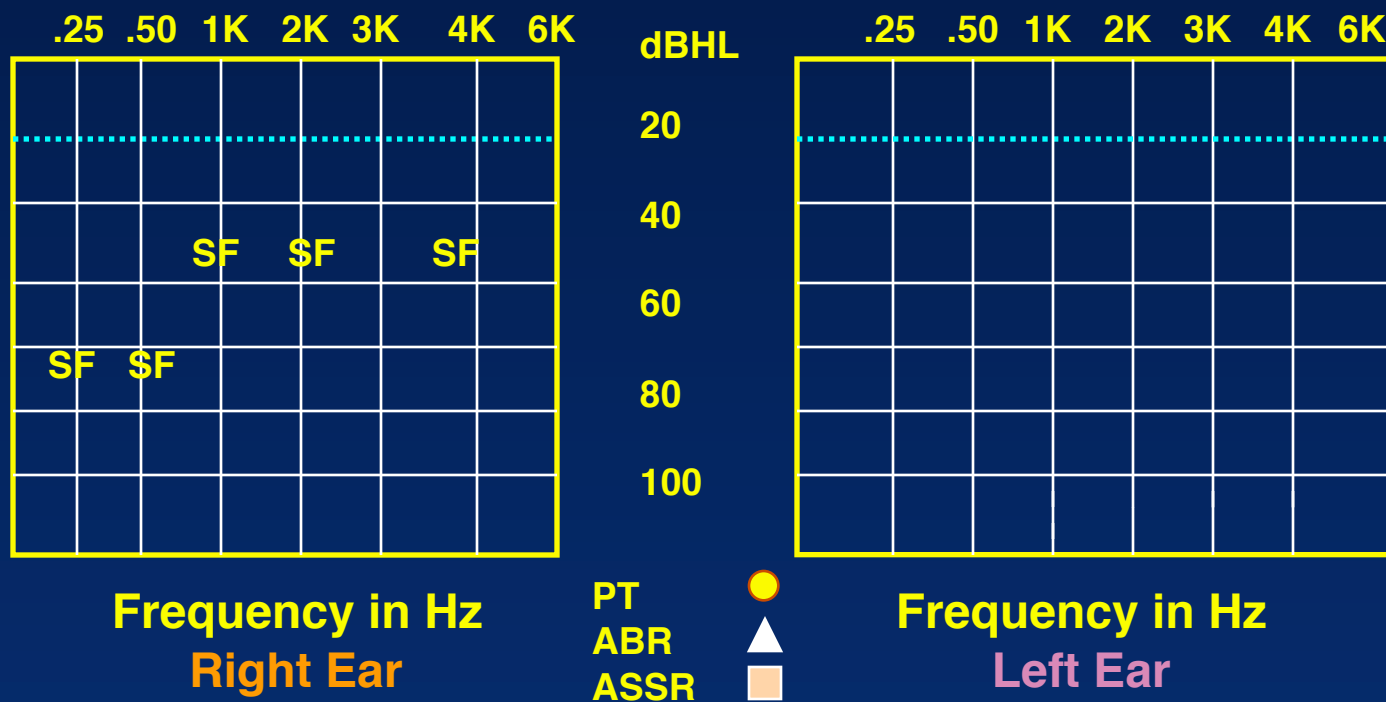
Post-operative
PTA: 18dB
ST: 20dB



ASSR: Case Report

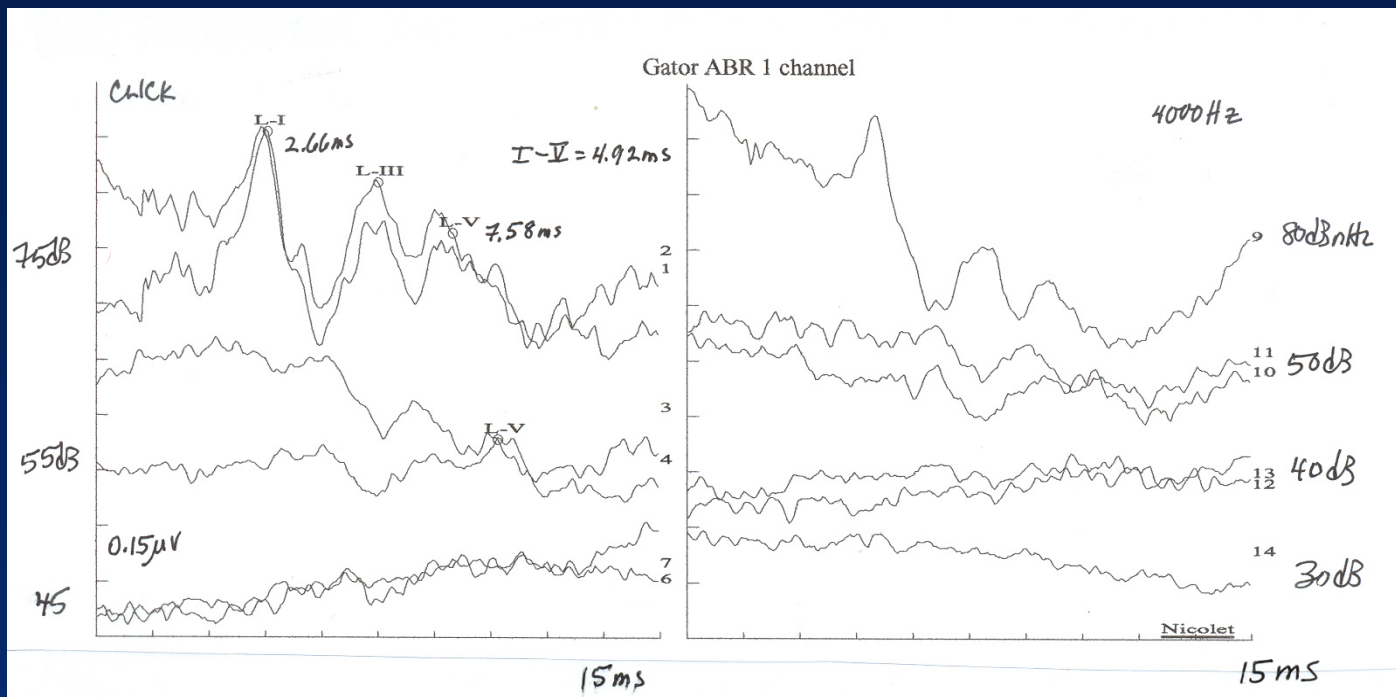
- ❑ 3 year old boy
- ❑ Dx: Goldenhaar's Syndrome
- ❑ Otologic Findings
 - ♦ Very small external ear canals with probable stenosis
- ❑ Previous audiologic assessment
 - ♦ sound field behavioral audiometry indicated moderate to severe hearing loss ABR threshold only for 500 Hz tone burst in left ear
 - ♦ Mild language delay
- ❑ Referred for ABR under light anesthesia

Case Report (JC) : Bilateral Conductive Hearing Loss *Behavioral Audiometry*

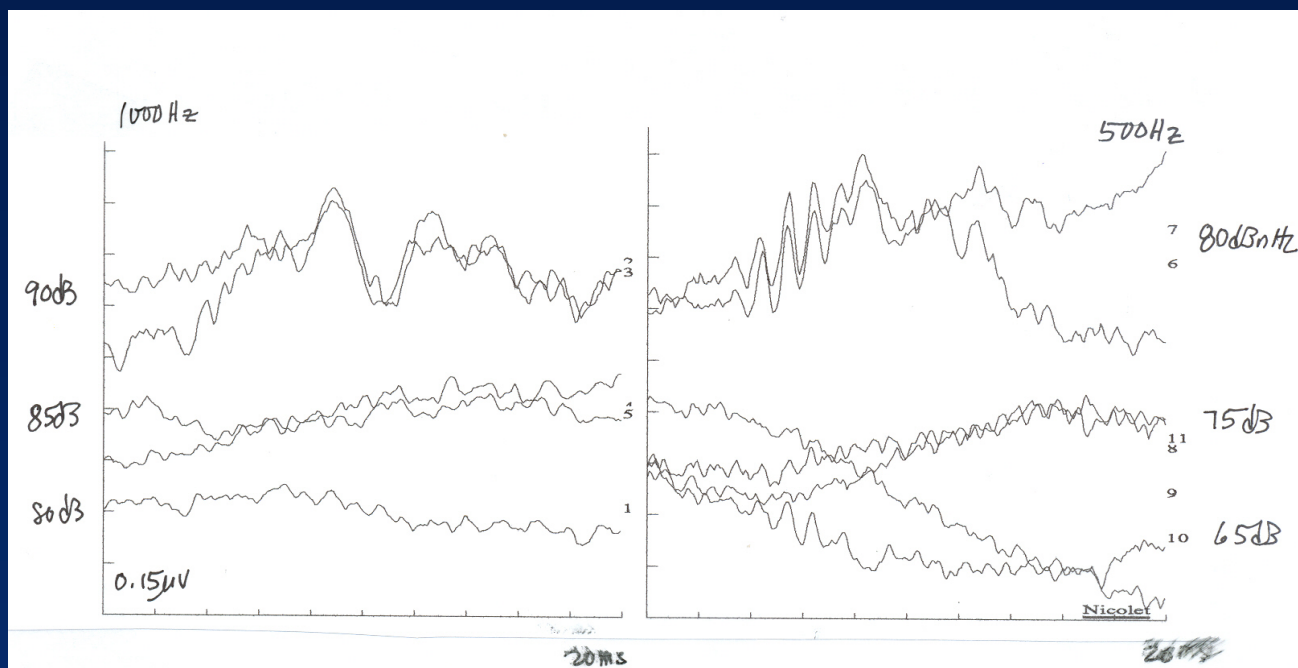


Case Report (JC) :

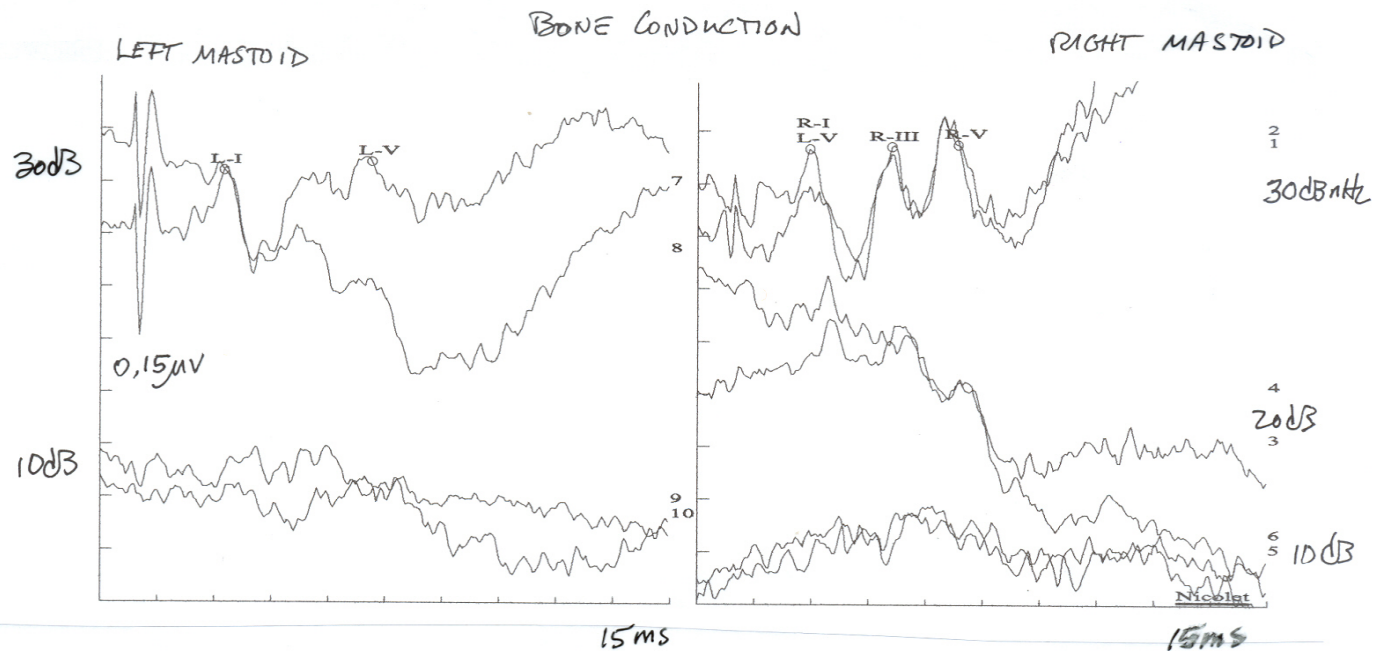
ABR for click and 4000 Hz tone burst stimulation



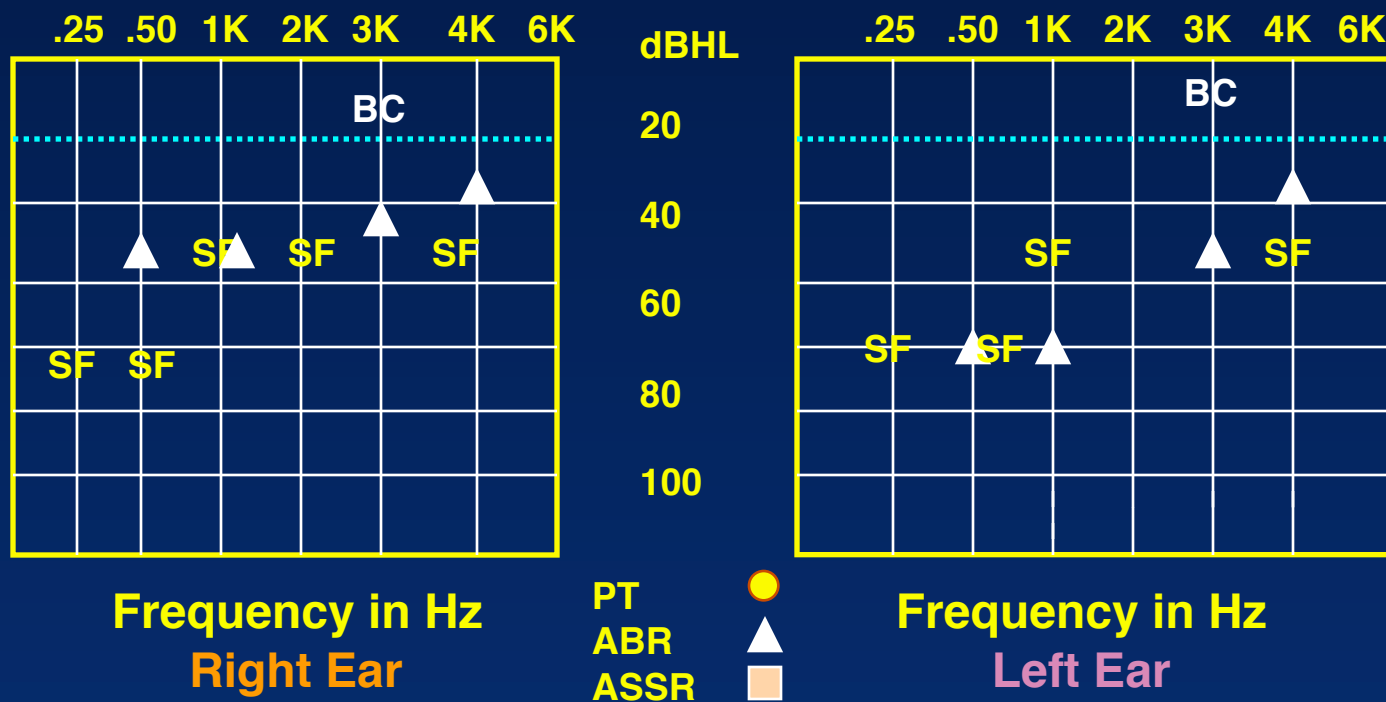
Case Report (JC) : ABR for 1000 and 500 Hz tone burst stimulation



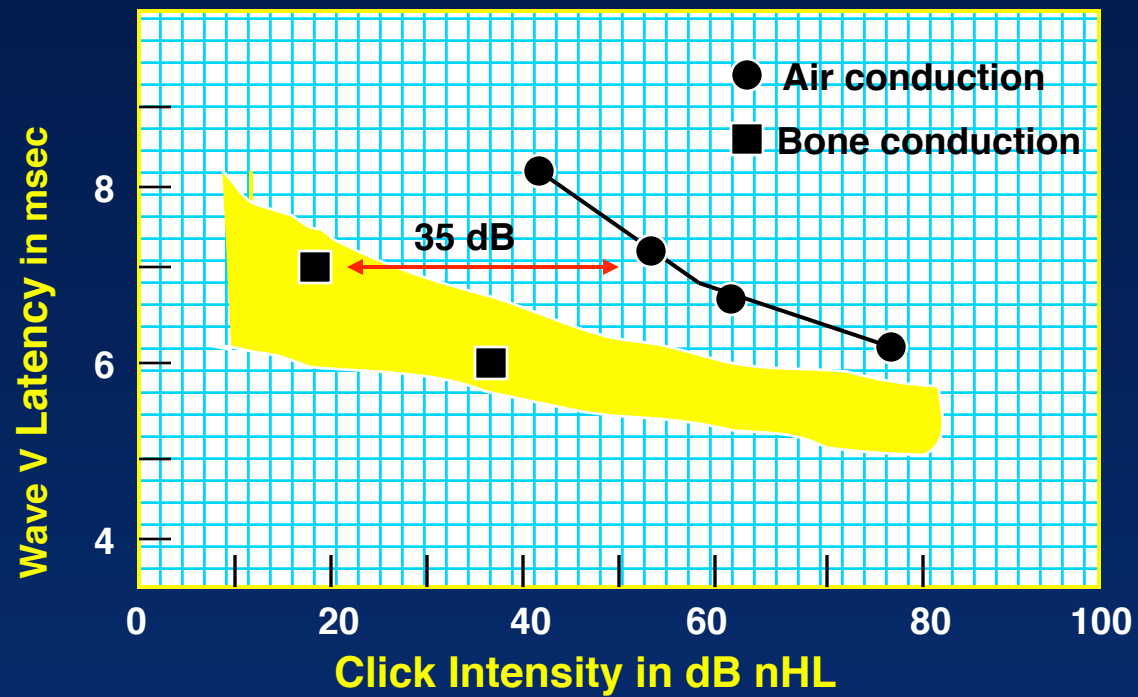
Case Report (JC) : ABR for bone conduction click stimulation



Case Report (JC) : Bilateral Conductive Hearing Loss ***Estimation of Audiogram with Tone-Burst*** ***and Bone Conduction ABR***



Estimation of Air-Bone Gap with ABR



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- ❑ Bone conduction ABR
- ❑ Auditory steady state response (ASSR)
- ❑ **Sedation and anesthesia**

ABR in the Clinic with Conscious Sedation (e.g., chloral hydrate)



American Academy of Pediatrics Guidelines for Conscious Sedation (WWW.AAP.org/policy)

Pediatrics 89, 1992, p 1110-1115

**Guidelines for Monitoring and Management of Pediatric Patients During
and After Sedation for Diagnostic and Therapeutic Procedures**

Pediatrics 110, 2002, pp 836-838

**Guidelines for Monitoring and Management of Pediatric Patients During
and After Sedation for Diagnostic and Therapeutic Procedures:
Addendum**

ABR in the Operating Room with Light Anesthesia (e.g., propofol)



SEDATION OPTIONS: Clinic versus Operating Room

Setting	Advantages	Disadvantages
Clinic	Less expensive Near or in audiology Scheduling ease	Limited sedation options Limited medical support Increased liability Uncertain success/> time
O.R.	Medical (ENT) support Ideal patient state Controlled sedation Limited liability	More expensive Remote location Noisy environment Complicated scheduling

Disadvantages of Anesthesia for in ABR Assessment of Children

- ❑ Delayed diagnosis (many months) due to problems with scheduling time in the operating room with medical support team (e.g., anesthesiologist)
- ❑ Ten fold increase in cost (>\$4000 versus \$400) associated with services in the operating room
- ❑ Medical risk of anesthesia and related procedures (e.g., intubation)
- ❑ Possible secondary neurological and cognitive deficits of anesthesia in children at risk for learning problems
- ❑ Inability to conduct a full auditory assessment in remote location outside of the audiology clinic

Thank you!
Questions?

