

# Identification and Assessment of Children with Hearing Impairment

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# Philippine Pediatric Society, Inc.

## Recommendations for Preventive Pediatric Health Care 2002

### Hearing Screening

- At birth to 3 months<sup>7</sup>
- Objective/subjective hearing screening<sup>8</sup>

<sup>7</sup> endorsed by the Philippine Society of Otorhinolaryngology – Head and Neck Surgery

<sup>8</sup> AAP Task Force on Newborn and Infant Hearing Loss

Hearing Impairment is the single most common condition affecting newborns

1-3 per 1000 in well-baby

2-4 per 100 in the NICU

# Early Identification

- In learning to understand spoken language and to speak it, an intact auditory system is necessary



Signal  
Source

An integral part of the receptive communication chain



Listener

# Early Identification

- Because so much of the language-learning process occurs within the first few years of life, there has been considerable emphasis on early identification and intervention for hearing impaired children

# Early Identification

- Without appropriate opportunities to learn language, children who are hard of hearing or deaf will fall behind their hearing peers in language, cognition, and social-emotional development
- Such delays may result in lower educational and employment levels in adulthood

# Early identification

- Children with both normal and low cognitive abilities have significantly better language skills when they are early-identified with intervention.
- Children with all degrees of hearing loss benefit from early identification and intervention.

*Yoshinaga - Itano*

# Early Identification

- Children who receive early identification and intervention benefit regardless of the amount of education of their mothers.

*Yoshinaga - Itano*

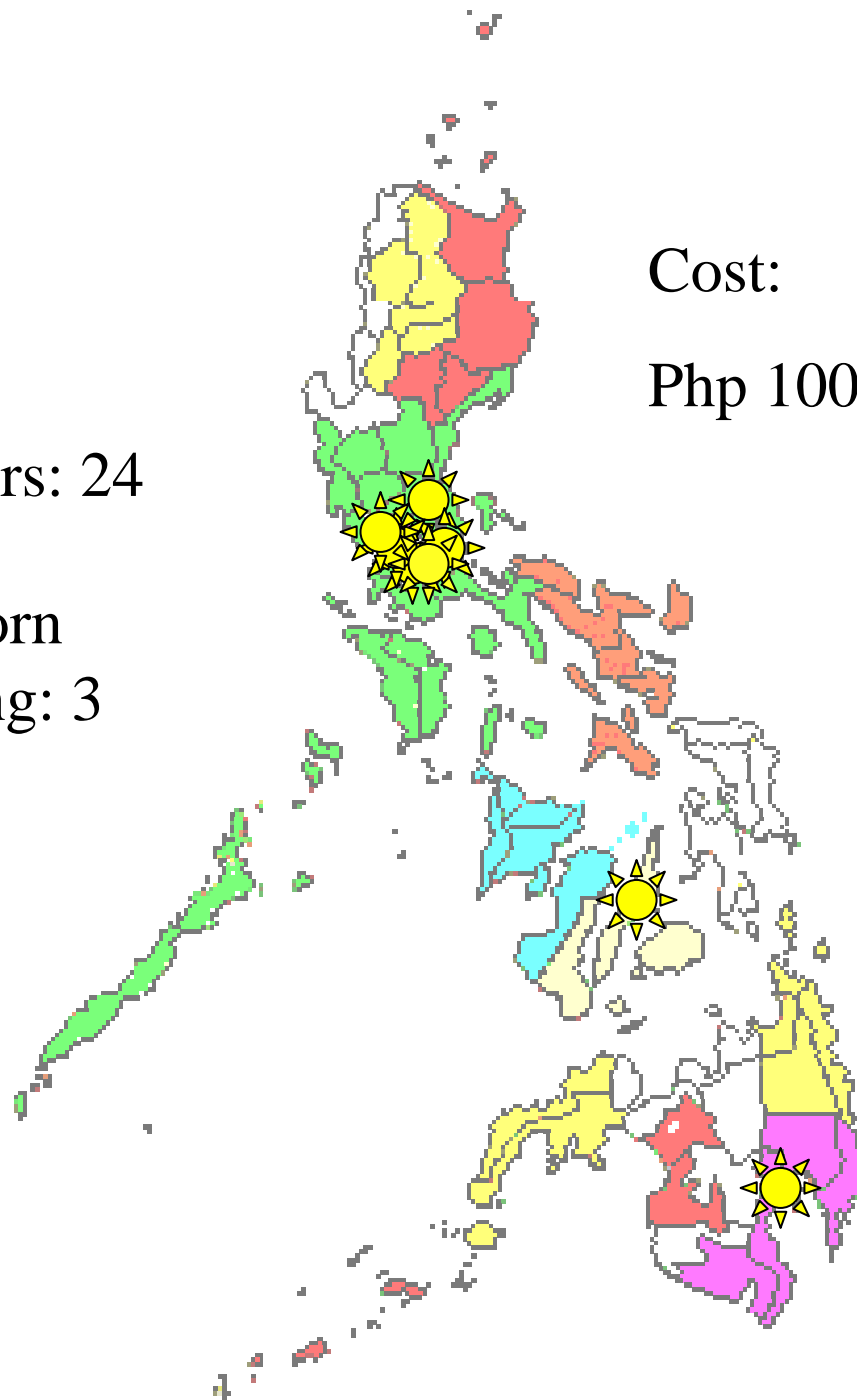


OAE Screening  
Hospitals / Centers: 24

Universal Newborn  
Hearing Screening: 3

Cost:

Php 100.00 – Php 700.00



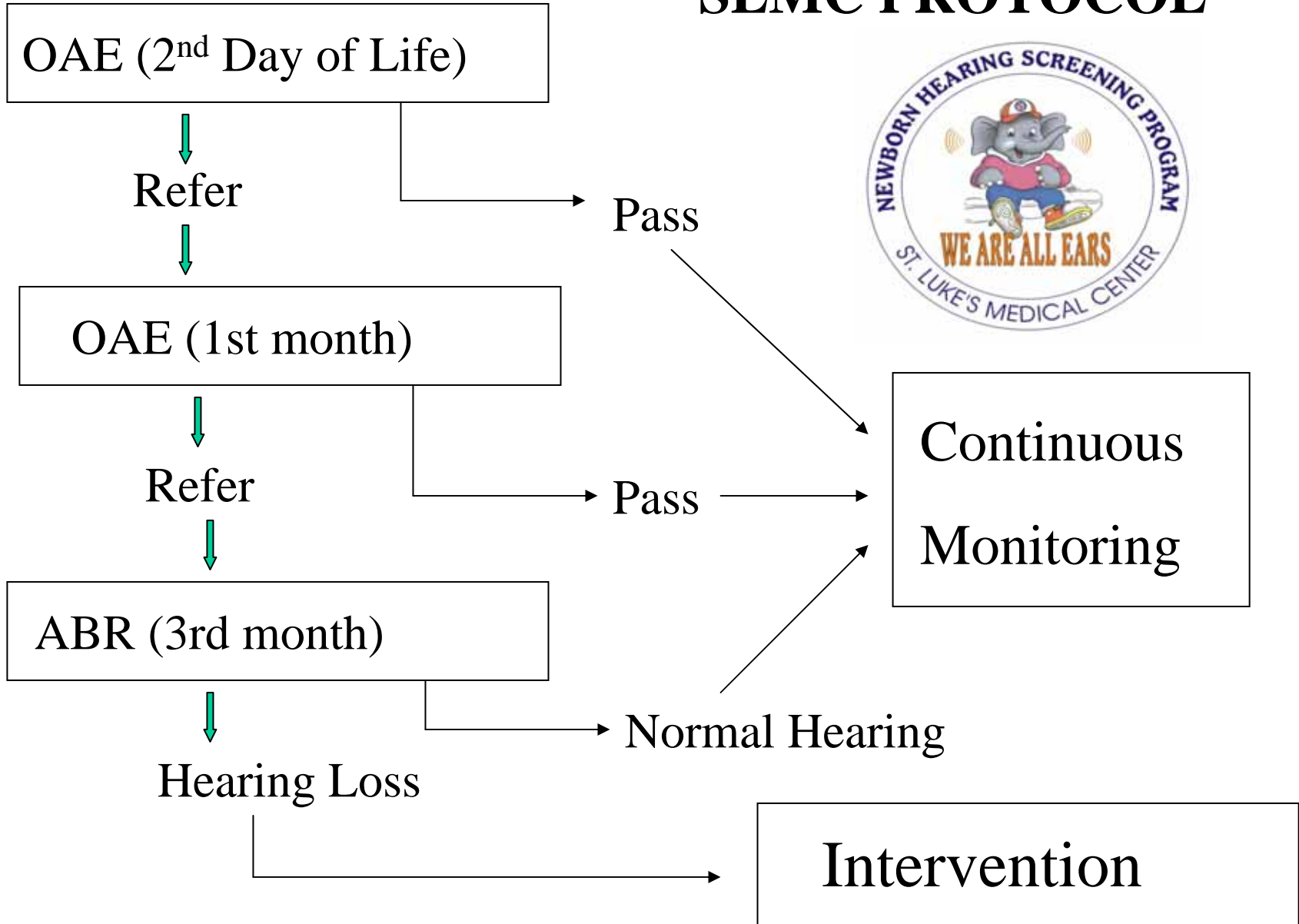
# UNHSP: SLMC Model



- Pediatrics
- Obstetrics & Gynecology
- Otolaryngology – Head & Neck Surgery

January 2004

# SLMC PROTOCOL



# OAE Interpretation



- **“PASS” Result**

The cochlea responded well to the tones presented through the probe

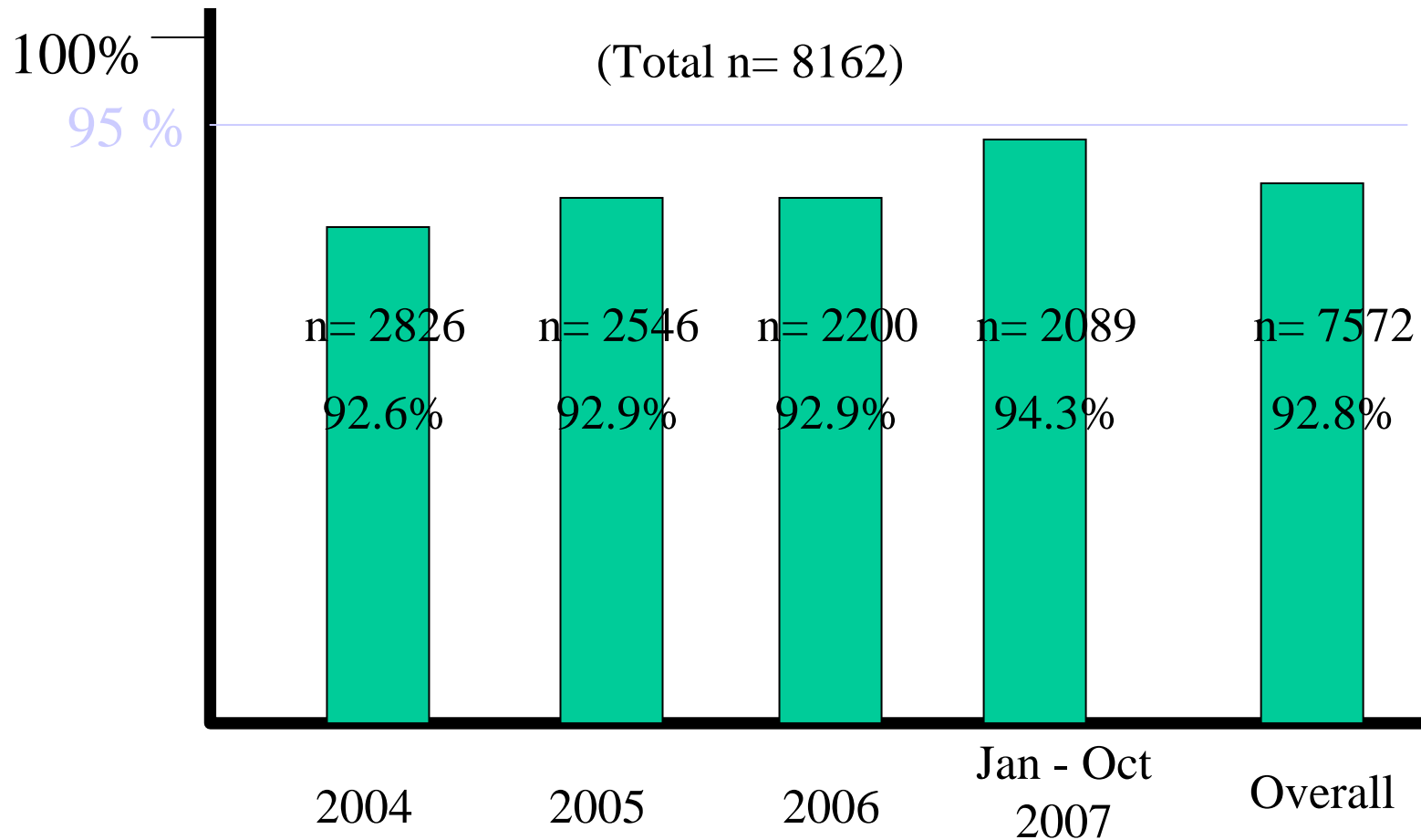
- **“REFER” Result**

Outer hair cell problem

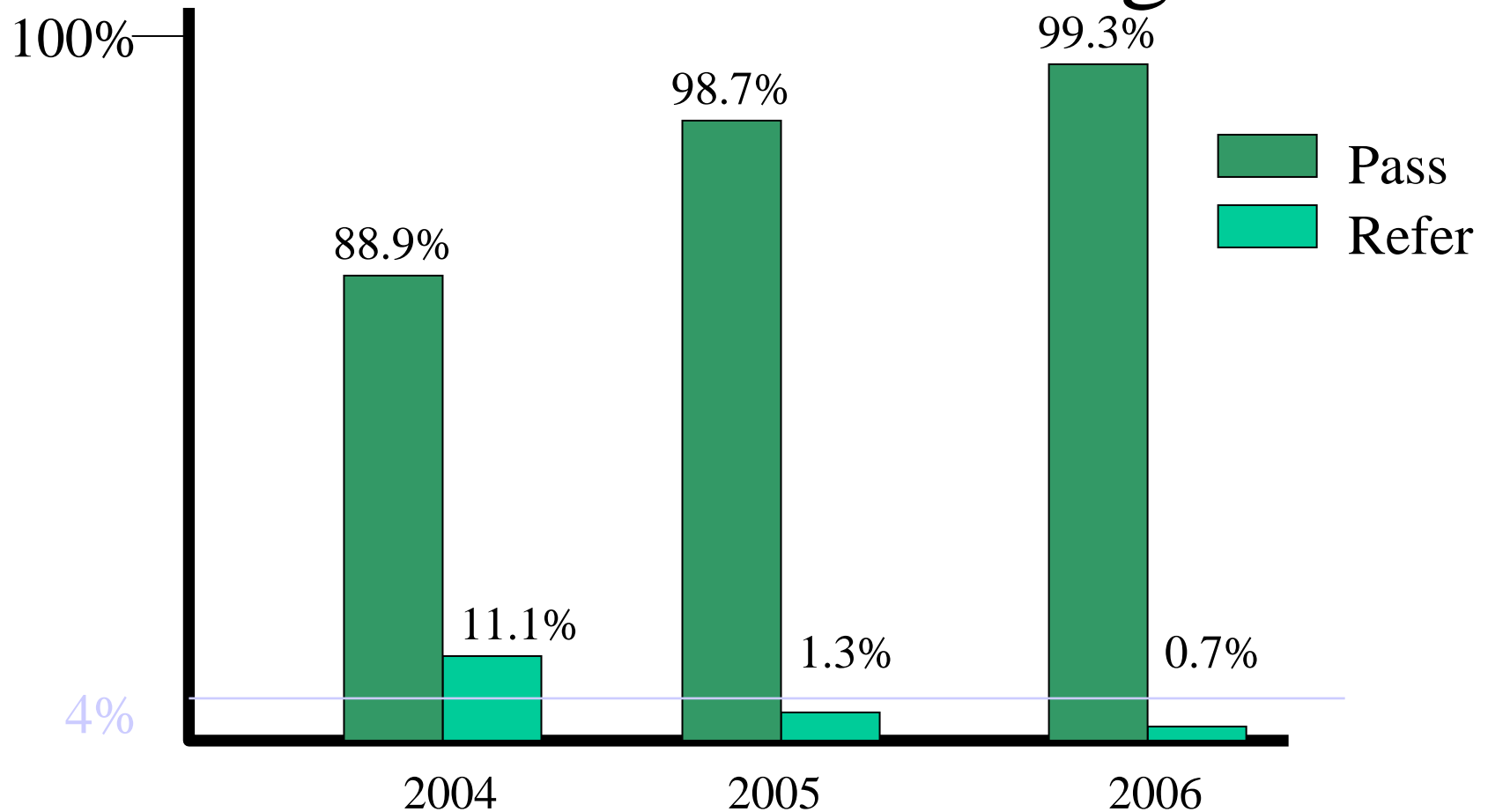
Fluid present in the middle ear

Ear canal and/or probe tip are plugged with debris

# SLMC UNHS: Population Screened



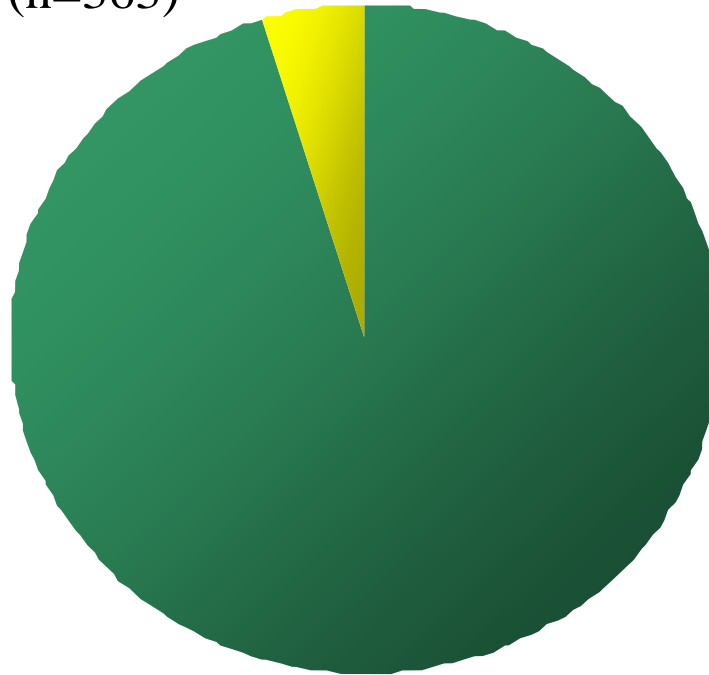
# SLMC UNHS: First OAE Screening



# First OAE Screening:

Overall Results (n= 7572)

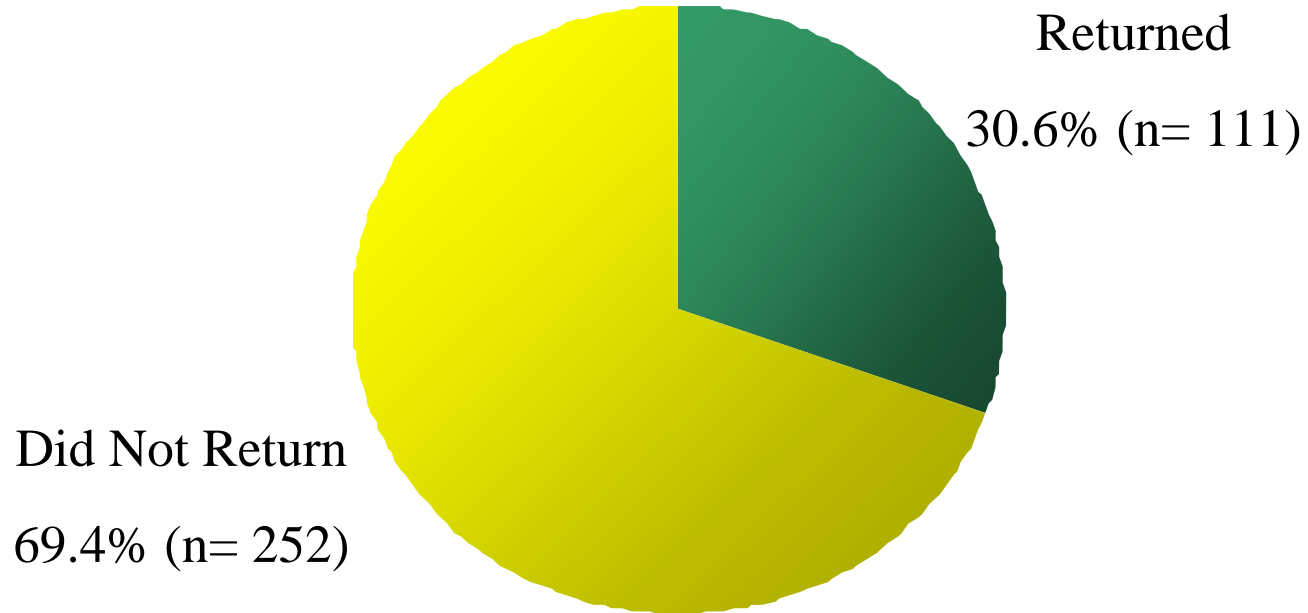
Refer: 4.8%  
(n=363)



Pass: 95.2%  
(n= 7209)

# Follow-up After First “Refer” Screening Result

(n=363)





# Causes of Attrition on Repeat OAE Testing

(n=198)

- Baby was perceived by parents to have normal hearing 37%
- Transferred to another place or city 17 %
- Not advised by MD to undergo re-screening 12%
- Parents were busy to bring baby for repeat testing 10%
- Not much information was given about the test 9%
- Transferred to another M.D. 8%
- Parents forgot schedule for repeat testing 8%
- Transferred hospital 6%
- Baby was always awake 3%
- Baby or mother too sick to repeat testing 1%

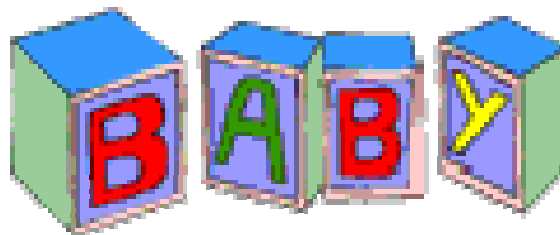
# Other Causes of Attrition During Telephone Interview ...

Number not in service	40.8%
No contact number	33.7%
Wrong number	14.3%
	<hr/>
	88.8%



# Risk Factors of Infants with “Refer” OAE

- Perinatal Infections 19.60%
- Ototoxic Antibiotics 18.92%
- Craniofacial Abnormalities 4.05%
- Birthweight < 1500 gm 2.03%
- Hyperbilirubinemia 0.68%
- Syndromic 0.68%



# Number of Risk Factors Present in Infants with “Refer” OAE

## NO. OF RISK FACTORS

## PERCENTAGE

None

75.00

One

6.76

Two

17.57

Three

0.00

Four

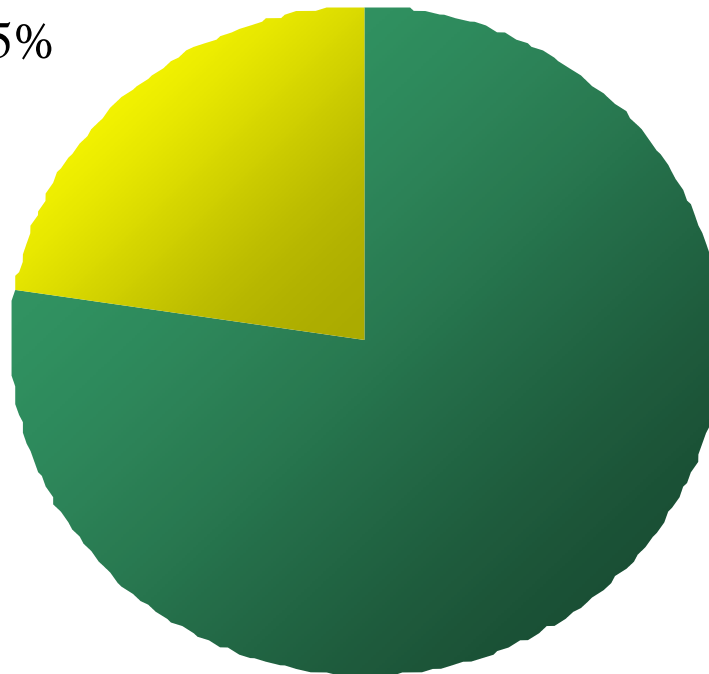
0.67



# Second OAE Screening: Overall Results

(n= 111)

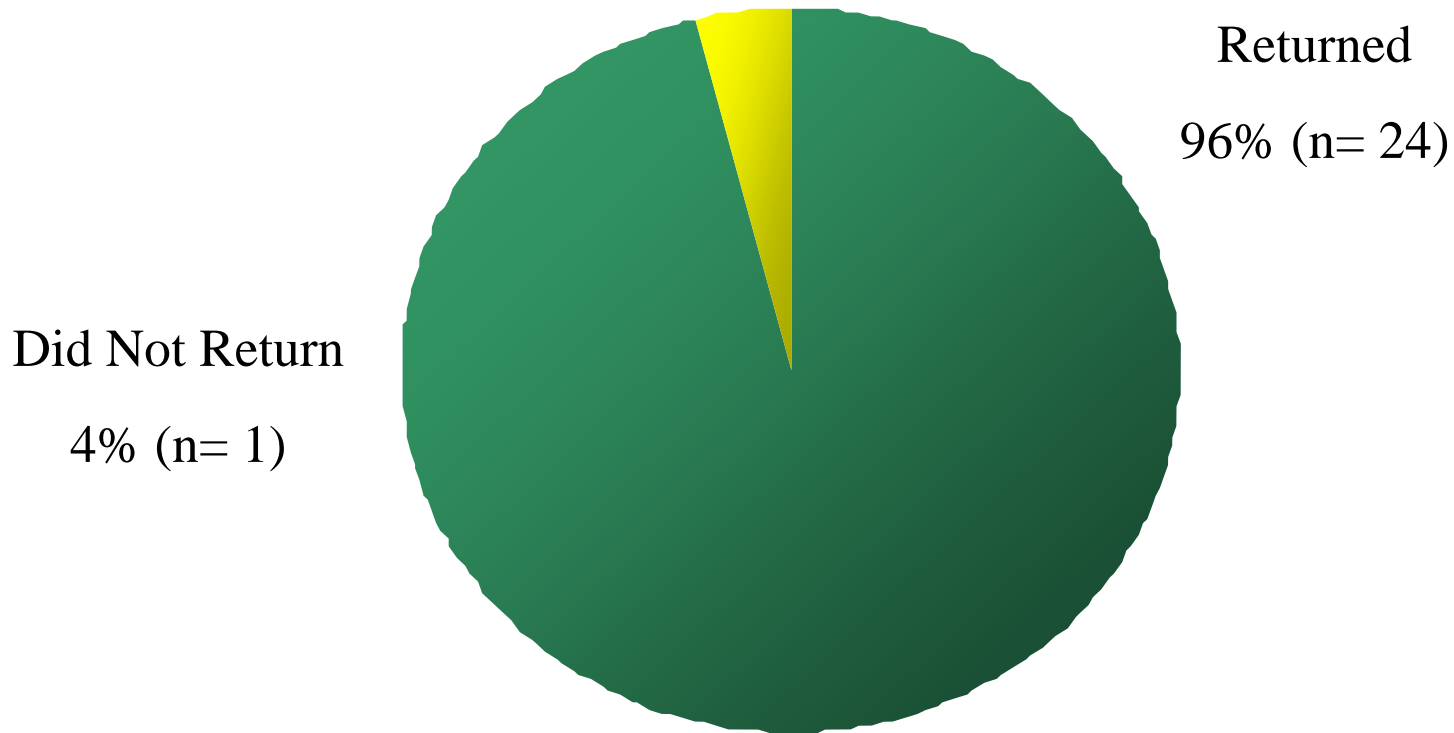
Refer: 22.5%  
(n= 25)



Pass: 77.5%  
(n= 86)

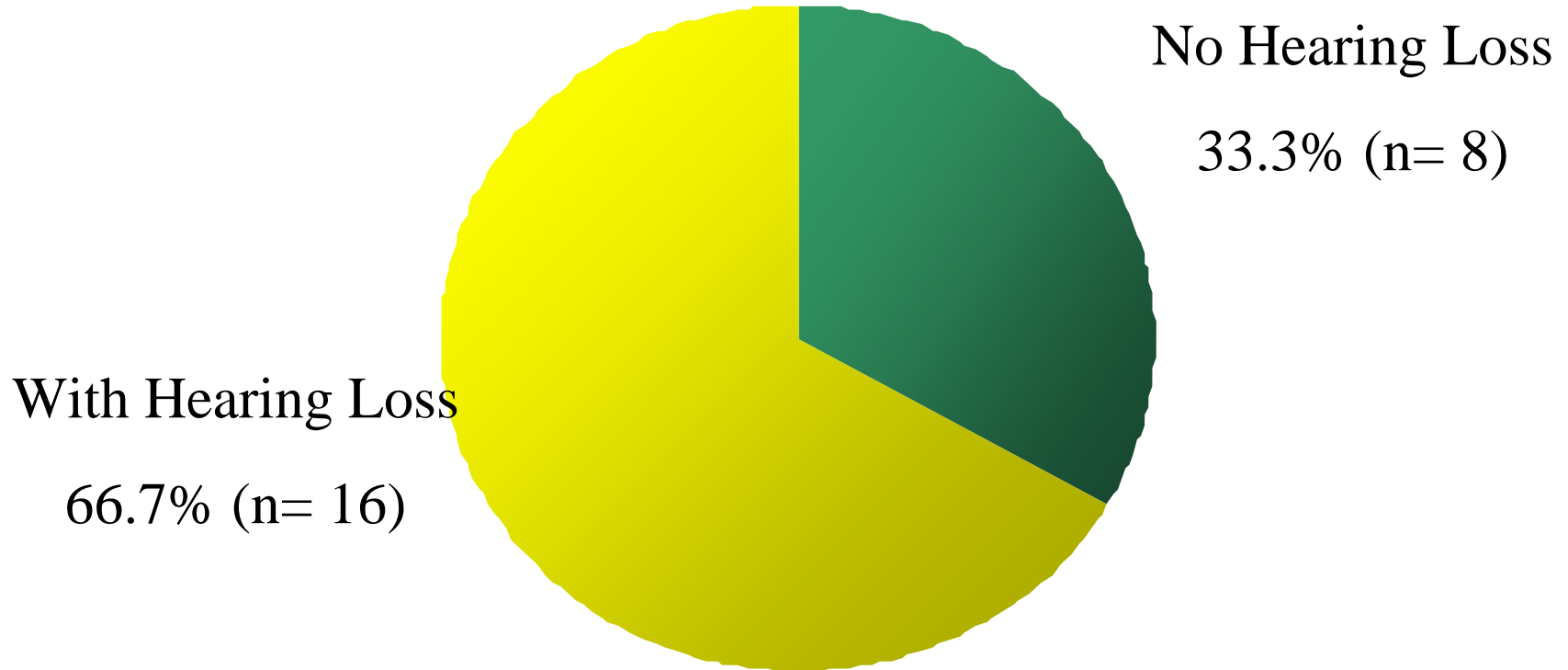
# Follow-up for Definitive Diagnosis

(n = 25)



# Results of Definitive Testing: ABR

(n= 24)



# Prevalence of Hearing Loss among Infants at SLMC

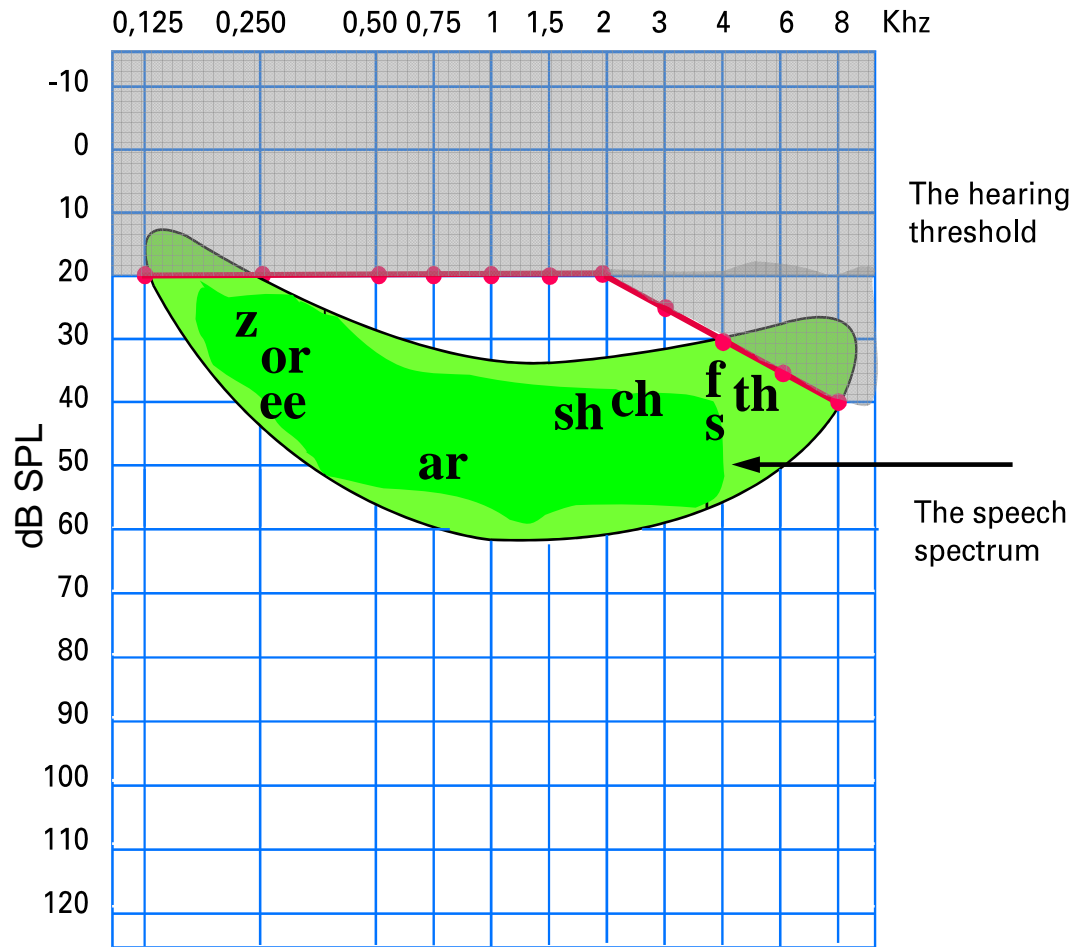


- 16 patients with confirmed hearing loss out of 8162 live births

• **2.1/1000 live births**

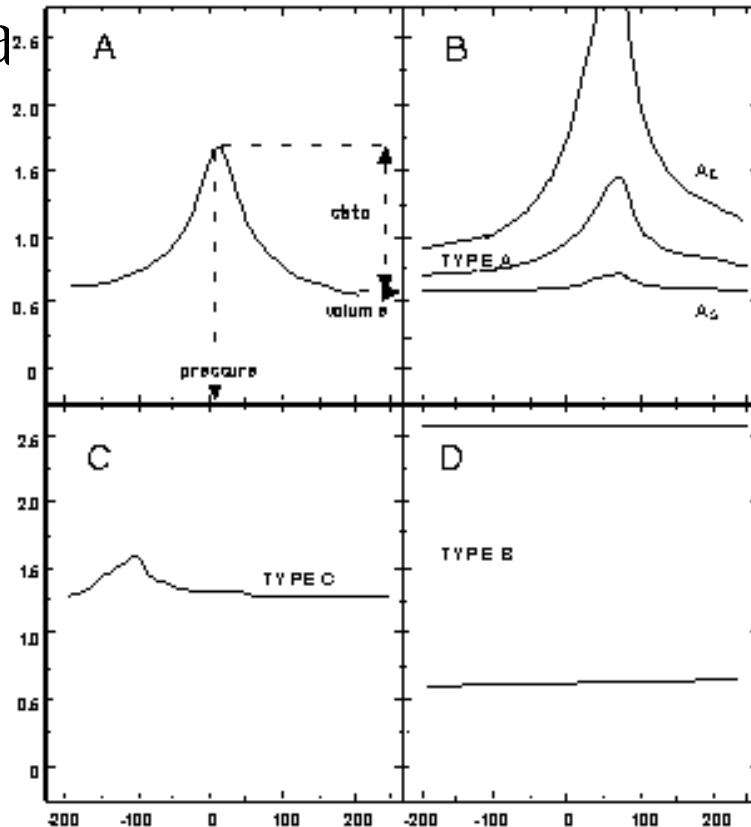


# Pure Tone Audiometry

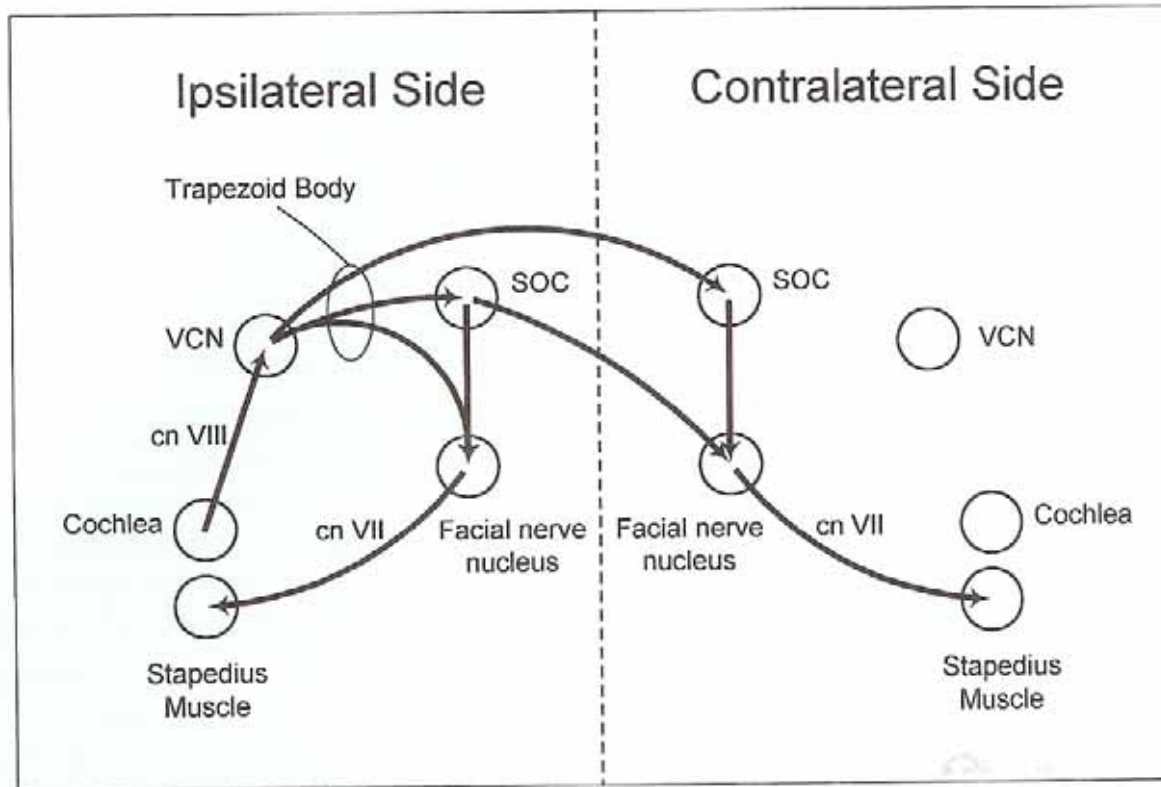


# Tympanometry

- Objectively evaluates the function of the middle ear



# Acoustic Reflex Threshold

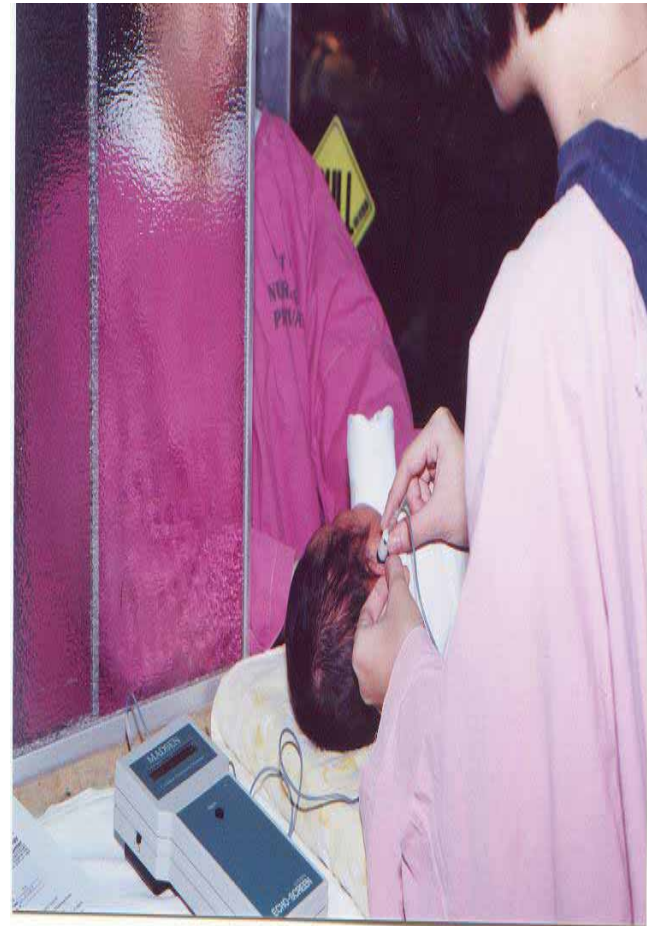


**Figure 13.1.** Schematic diagram of the ipsilateral and contralateral acoustic (stapedius) reflex pathways that begin in the *left panel* at the

cochlea (*cn VIII*, auditory nerve; *cn VII*, motor branch of facial nerve); VCN, ventral cochlear nucleus; SOC, superior olivary complex.

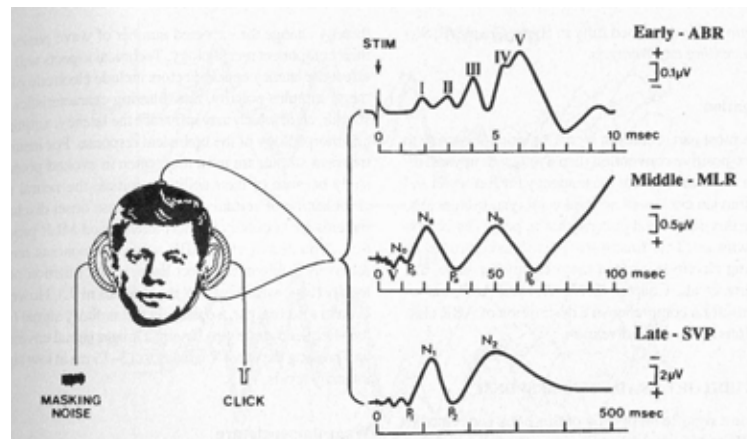
# Otoacoustic Emission

- Otoacoustic Emissions is defined as an acoustic energy generated by the cochlea in response to auditory stimuli which travels back through the middle ear and back to the ear canal where it can be measured with a microphone

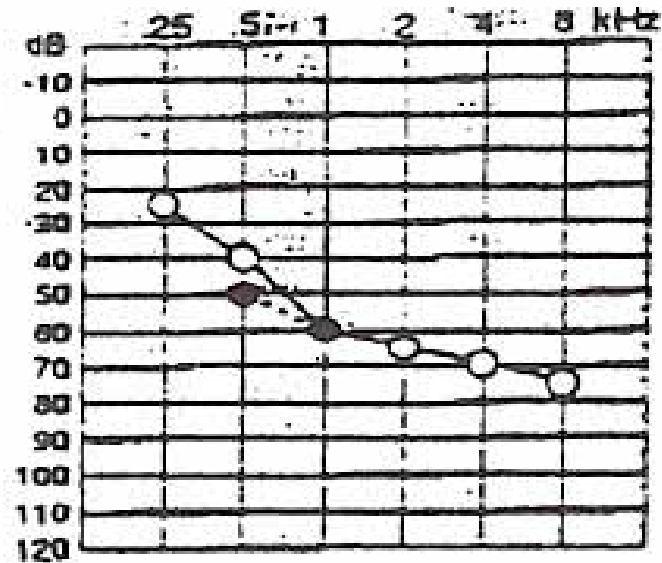
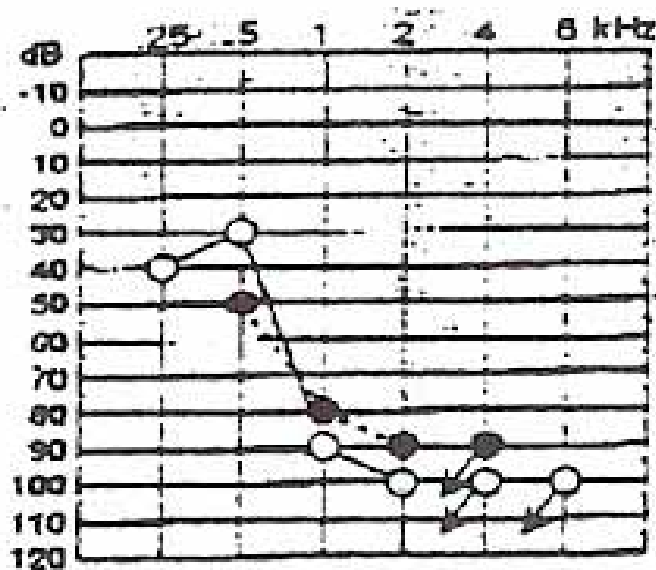


# Auditory Brainstem Response

- With Auditory Brainstem Response, the clinician may be able to infer the site of lesion and also estimate the degree of hearing loss by measuring the electrophysiologic response to stimulus presentation



# Auditory Steady State Response



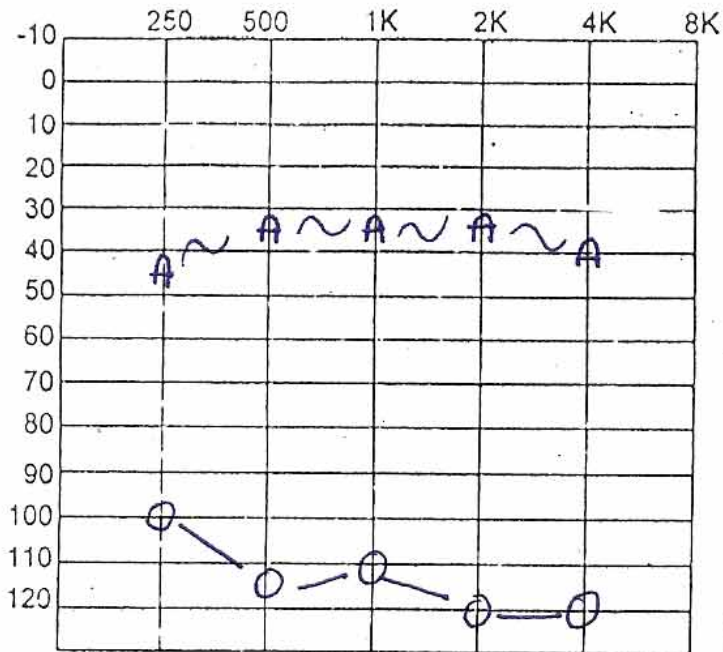
# Pediatric Evaluation





# Aided Threshold Test

RIGHT EAR



250	500	1K	2K	4K	8K
100	115	110	120	120	

Transducer

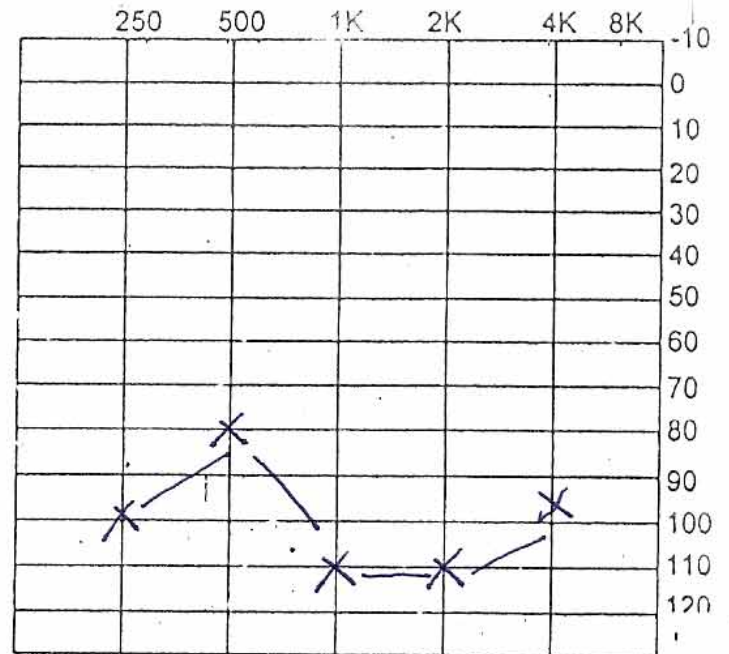
— Insertphone  
— Headphone  
— 90° SF

Reliability

— Very Good  
— Good  
— Fair  
— Low

AC  
BC

LEFT EAR



250	500	1K	2K	4K	8K
100	80	110	110	95	



Thank You!