Fact and Fallacy in Neonatal Screening

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Early Hearing Screening

- Prerequisite for speech, language and communication development
- NIH (1993) recommended 2-stage screening before 3 months old
- Controversies in terms of economic, political and sociological implication

Fallacy

- Pass AABR/ABR

Fact

- Hearing loss in low frequencies

UNIVERSITY OF HONG KONG MEDICAL CENTRE
QUEEN MARY HOSPITAL
DEPARTMENT OF OTORHINOLARYNGOLOGY / AUDIOLOGY
AUDIOLOGICAL ASSESSMENTS REPORT

Name: [redacted] D.O.B.:

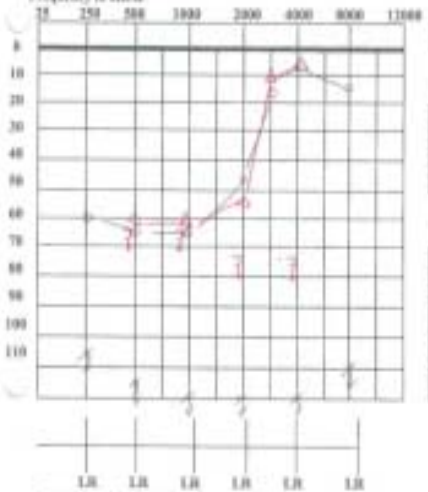
Age/Sex: F/4 I.D.:

Clinical/Ward No.: Referral Source:

Date of Test:

History:

AUDIOGRAM
Frequency in Hertz



Reliability	Good	Fair	Poor
	/		

Symbols

Ear	Air	Air Unmasked	Bone	Bone Unmasked
Left	X	⧗	]	△ R
Right	○	●	[	

Acoustic Reflex

Tone	Probe	500Hz	1KHz	2KHz	4KHz
L	R				
R	L				
R	R				
L	L				

Eustachian Tube Function Test

	Int.M.Press	M.Press.1	M.Press.2	Press. Diff.
R				Nor/Ab (<15-20daPa)
L				Nor/Ab (<15-20daPa)

Tympanogram

	Type	C. Vol.	M. Comp.	M. Press.
R				
L				

Comment/Recommendation: R: moderately severe SNHL to normal TM
L: profound SNHL

Done by
Audiology Technician

Audiologist

Fallacy

- Normal OAE

Fact

- No ABR response
- Poor hearing
- Auditory Neuropathy

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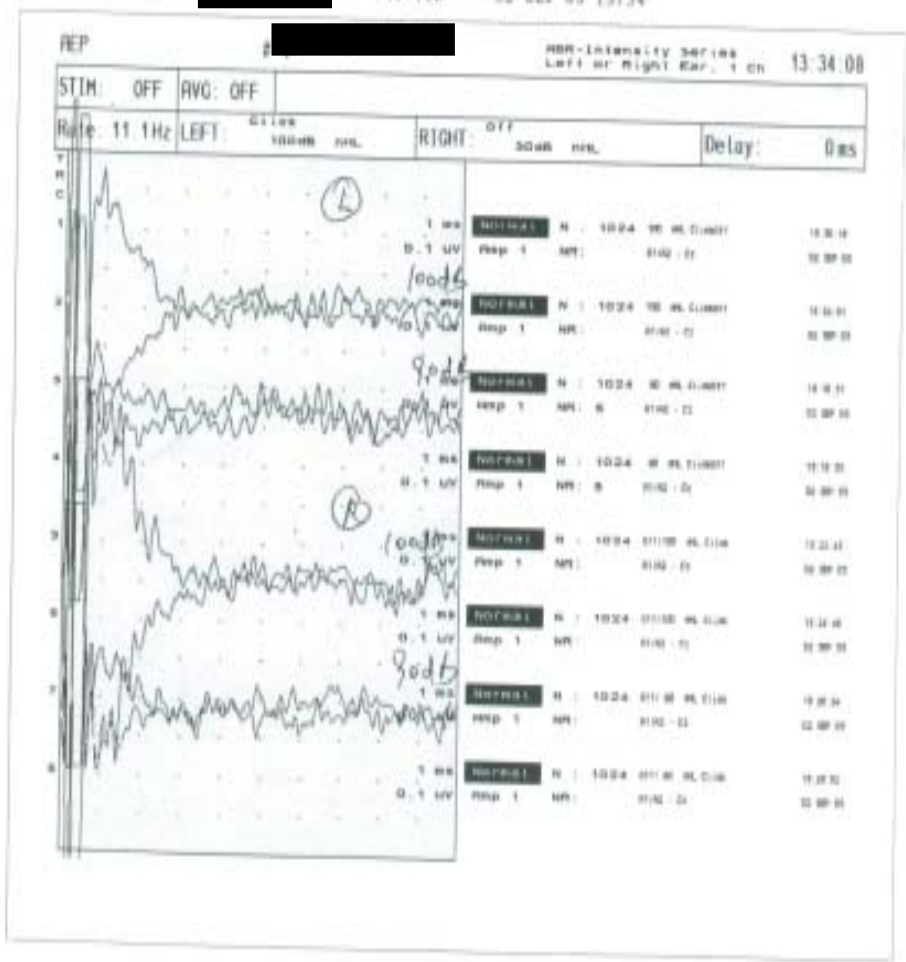
FILE ID: [redacted] 4.7.1b 02 SEP 05 13:34



Otoacoustic Emission Audiology Report

To: [redacted]

Our Ref. No : 30637

Your Ref. No :

Patient's Name : [redacted]

Sex / Age : M / 20 days

Telephone No :

Date : 17th JUNE, 2004

Transient Otoacoustic Emission (TEOAE)

RIGHT EAR : **NORMAL** responses from 1 - 4 KHz

LEFT EAR : **NORMAL** responses from 1 - 4 KHz

Comment :

OAE hearing screening test "PASS " in both ears.

Fallacy Fact

- Failed ABR twice (2 cases)

- Normal hearing
- Normal DP
- New type of auditory neuropathy?

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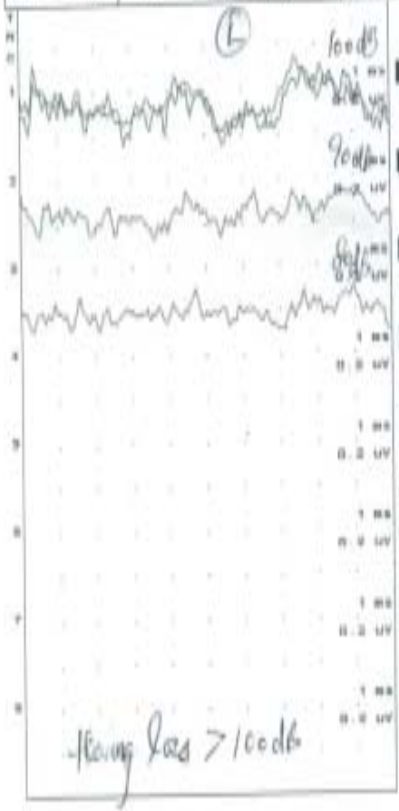
FILE ID: Y8998327 4.7.1b 08 AUG 03 11:58

AEP # [redacted] HBR-Intensity Series Left or Right Ear, 1 Ch 11:58:50

STIM: OFF AVG: OFF

Rate: 11.1Hz LEFT: 80dB nHL RIGHT: 100dB nHL Delay: 0ms



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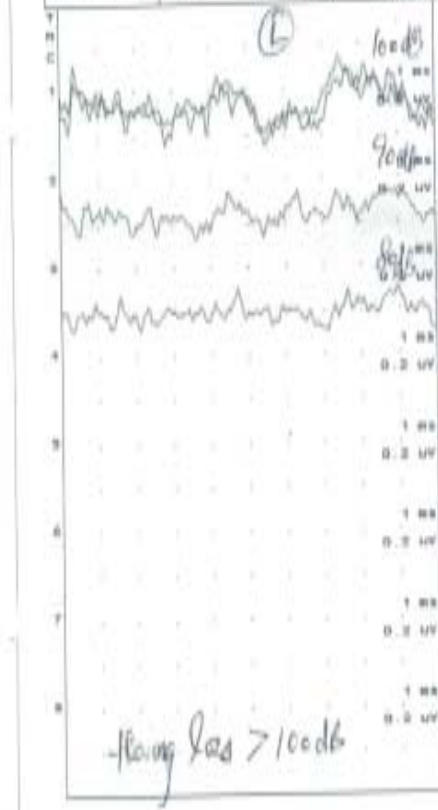

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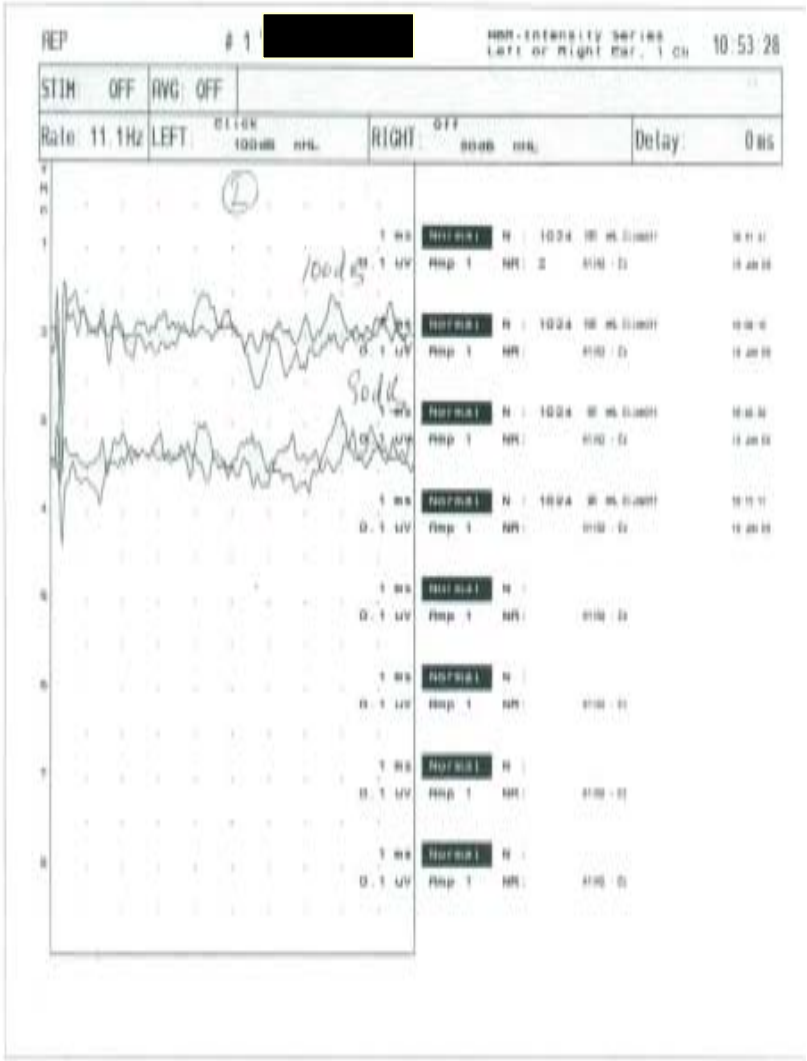
FILE ID: UM17126109 4.7.1b 13 JUN 03 10:53



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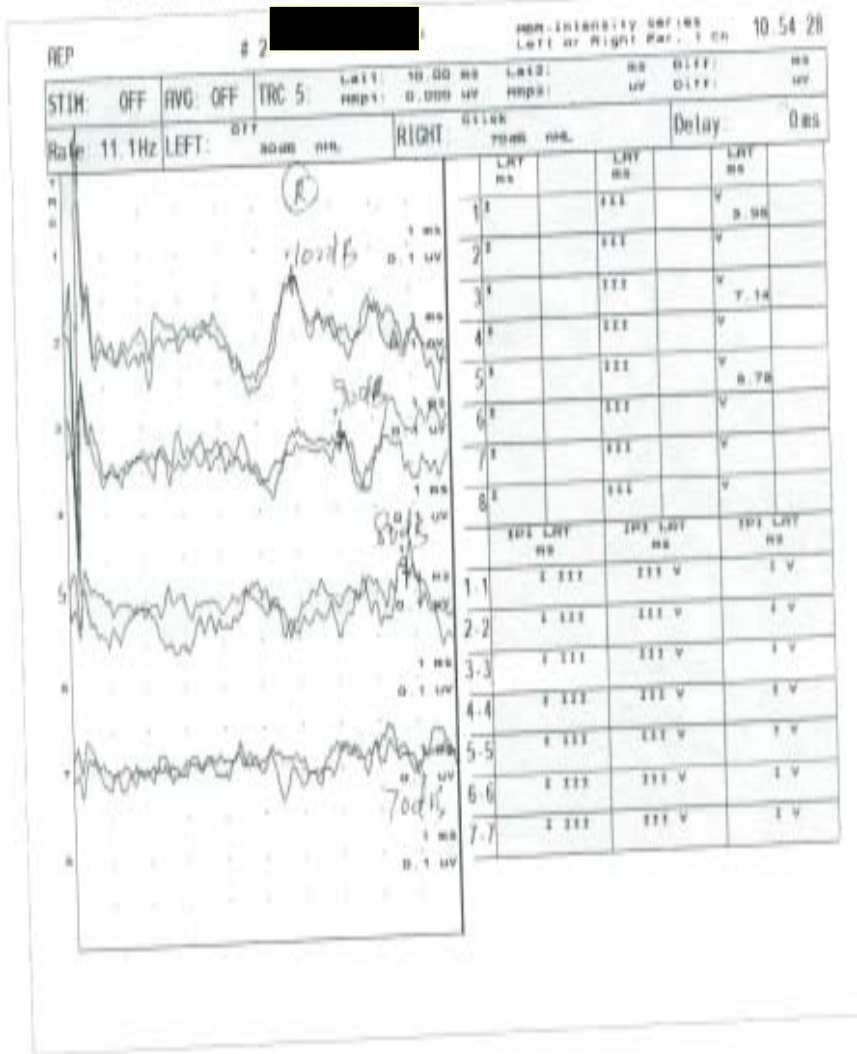

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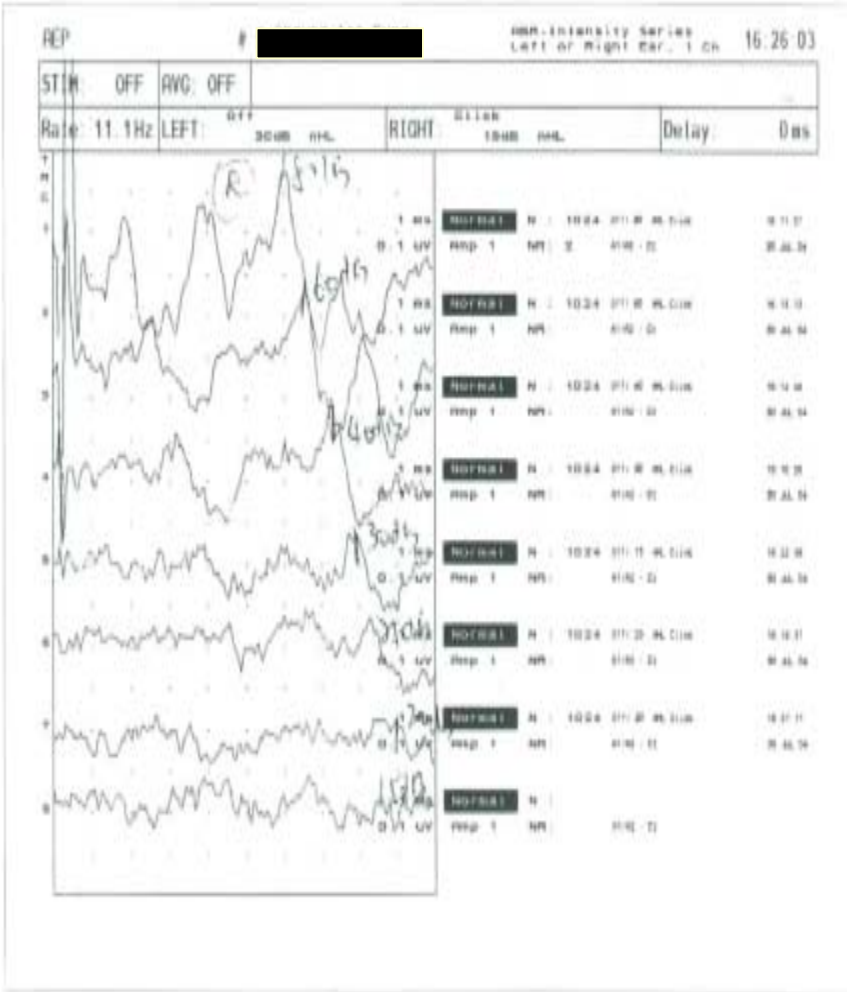
FILE ID: Y8998327 4.7.1b 30 JUL 04 16:26



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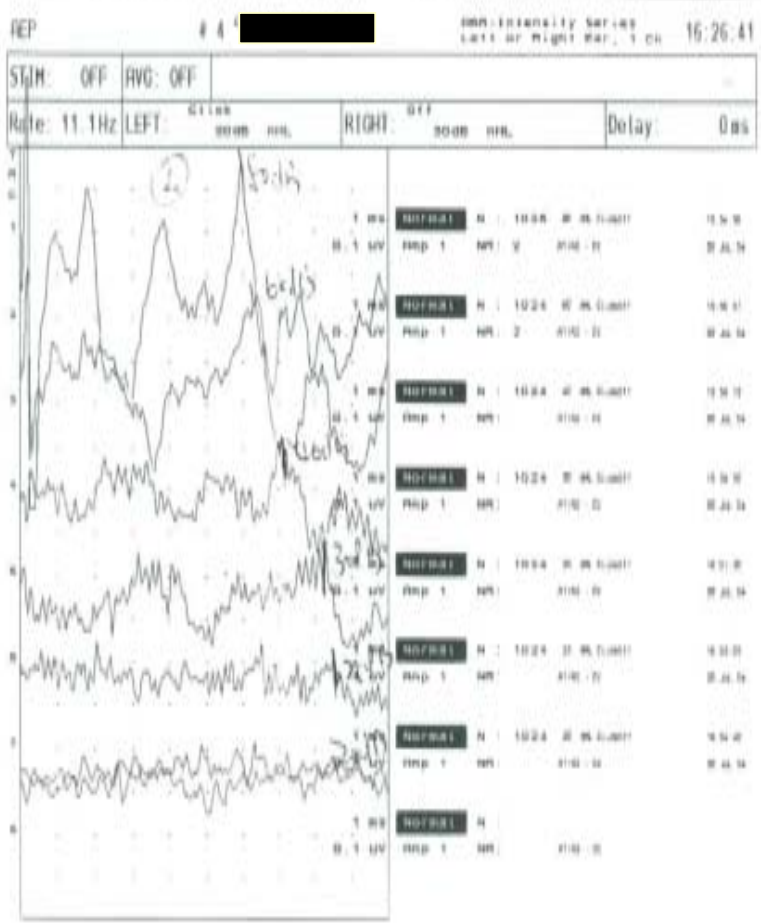
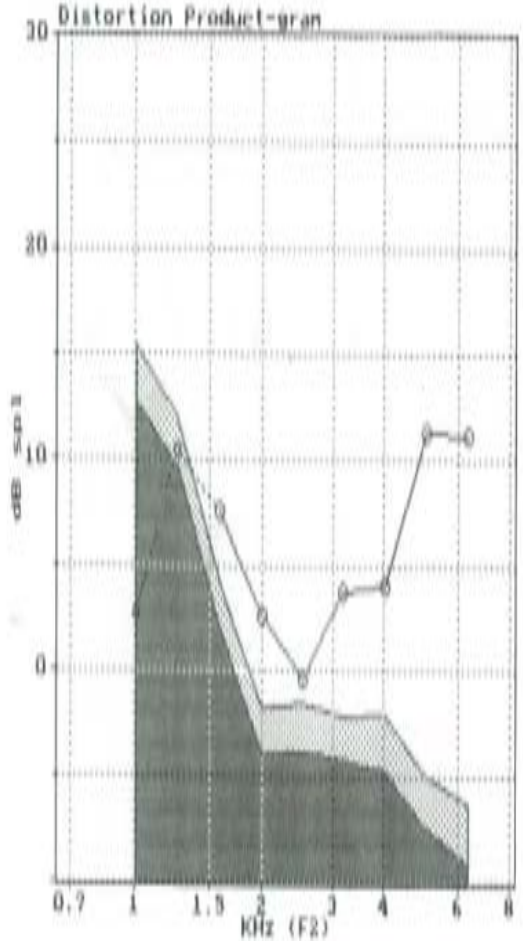
FILE ID: Y8998327 4.7.1b 30 JUL 04 16:26



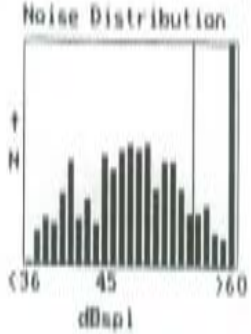
F2:F1=1.221 F1=70.0dBspl F2=70.0dBspl Elapsed time =29secs

Recalled -> CHEUN008.DPG Time=15: 4 on 7/30/2004



Low noise data: 98%

Rejection threshold=11nPa



Patient ID

[redacted]

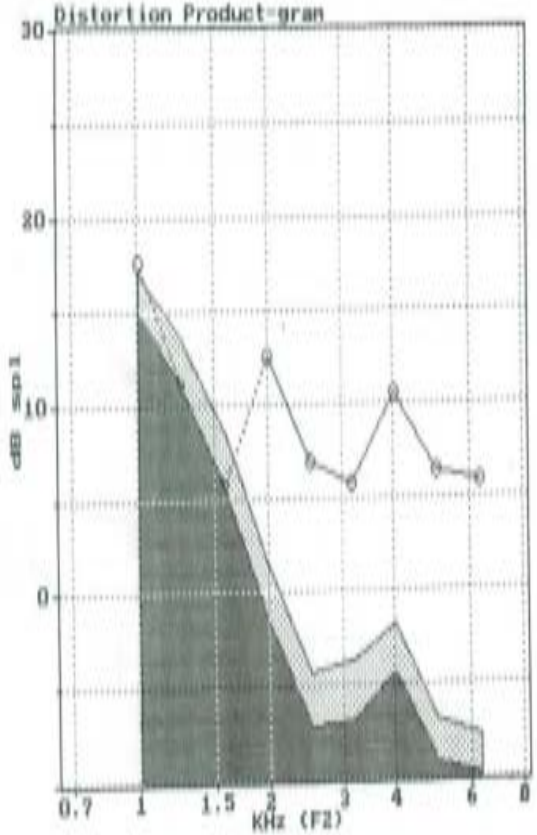
Right

Y0998327

Hear

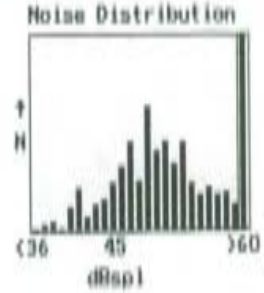
F2:F1=1.224 F1=70.0dBspl F2=70.0dBspl Elapsed time =54secs

Recalled -> CHEUN009.DPG Time=15: 7 on 7/30/2004



Low noise data: 40%

Rejection threshold=17nPa



Patient ID

[redacted]

Left

Y0998327

Hear

Fallacy

- Pass the screening indicates no further hearing loss

Fact

- Delayed on-set of hearing loss
- Ongoing surveillance

Recommendation from the 2000 Joint Committee to follow

- Parental or caregiver concern regarding hearing, speech, language, and/or developmental delay
- Family history of permanent childhood hearing loss
- Stigmata or other findings associated with a syndrome known to include a sensorineural or conductive hearing loss or eustachian tube dysfunction
- Postnatal infections associated with sensorineural hearing loss, including bacterial meningitis
- In utero infections such as cytomegalovirus, herpes, rubella, syphilis, and toxoplasmosis
- Neonatal indicators, specifically hyperbilirubinemia at a serum level requiring exchange transfusion, persistent pulmonary hypertension of the newborn associated with mechanical ventilation, and conditions requiring use of extracorporeal membrane oxygenation (ECMO)
- Syndromes associated with progressive hearing loss, such as neurofibromatosis, osteopetrosis, and Usher syndrome
- Neurodegenerative disorders, such as Hunter syndrome, or sensory motor neuropathies, such as Friedreich ataxia and Charcot-Marie-Tooth syndrome
- Head trauma
- Recurrent or persistent otitis media with effusion for at least 3 months
- Ototoxic medications (aminoglycosides)

Fallacy

- Good sensitivity and specificity of tests

Fact

- No sufficient large sample sizes and good follow-up to definitively establish sensitivity and specificity of techniques

Fallacy

- No harmful effect with false-positive result
- Benefit of early detection outweigh anxiety

Fact

- Parents feel guilty and depressed
- Parent-child relationship can be in danger

Fallacy

- Screening all babies for early hearing aid fitting and rehabilitation

Fact

- Create an alarm
- Sufficient facilities for follow-up diagnostic tests
- Sufficient knowledge and experienced manpower to fit hearing aid in very young infants

Fallacy

- Combination of techniques for screening

Fact

- OAE + ABR?
- AABR + ABR?

Fallacy

- Cost effective for per unit cost

Fact

- Low prevalence of deafness 2-6 per
- Efficiency (EF) – percentage of total test results that are correct

EF = HT X PD + (1-FA) X (1-PD)

TABLE 15.2 Posterior probabilities and efficiency for several audiological tests.[a]

		PR[D/+]			PR[N/–]		EF	
TEST	**HT/FA**	**2%**	**5%**	**50%**	**5%**	**50%**	**5%**	**50%**
ETT	99/5	29	51	95	99+	99	95	97
ABR	95/11	15	31	90	99+	95	89	92
TDT	70/13	10	22	84	98	74	86	79
BEK	49/7	13	27	88	97	65	91	71

[a]All measures in percent. 2%, 5%, 50% indicate disease prevalence. Abbreviations explained in Tables 15.1 and 15.4. ETT: excellent theoretical test.