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 OTO RHINO LARYNGOLOGY / AUDIOLOGY
AUDITORY ASSESSMENTS REPORT

Name: [Redacted]
D.O.B.: [Redacted]
Age/Sex: F, 65
Clinical/Ward No.: 26/6
Date of Test: 03/06/2015
Referral Source: [Redacted]

History:

Audiogram

Frequency in Hz: 500, 1000, 2000, 4000, 8000, 12000

Reliability: Good, Fair, Poor

Symbols:
- Ear
- Air
- Air Uncalibrated
- Base
- Base Uncalibrated

Acoustic Reflex:

Time: Probe 500Hz, 1000Hz, 2000Hz, 4000Hz

Level: R, L

Evanski Tube Function Test:

R: Nat(0)<15-20kPa
L: Nat(0)<15-20kPa

Comment/Recommendation:

R: moderately severe sensorineural hearing loss
L: normal hearing

Done by: Audiology Technician

[Signature]

[Signature]
Fallacy

• Normal OAE

Fact

• No ABR response
• Poor hearing
• Auditory Neuropathy
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?
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

\[ EF = HT \times PD + (1-FA) \times (1-PD) \]
<table>
<thead>
<tr>
<th>TEST</th>
<th>HT/FA</th>
<th>PR[D/+]</th>
<th>PR[N−]</th>
<th>EF</th>
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<tbody>
<tr>
<td></td>
<td></td>
<td>2%</td>
<td>5%</td>
<td>50%</td>
</tr>
<tr>
<td>ETT</td>
<td>99/5</td>
<td>29</td>
<td>51</td>
<td>95</td>
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<tr>
<td>ABR</td>
<td>95/11</td>
<td>15</td>
<td>31</td>
<td>90</td>
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<tr>
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<td>10</td>
<td>22</td>
<td>84</td>
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<tr>
<td>BEK</td>
<td>49/7</td>
<td>13</td>
<td>27</td>
<td>88</td>
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</table>

*aAll measures in percent. 2%, 5%, 50% indicate disease prevalence. Abbreviations explained in Tables 15.1 and 15.4. ETT: excellent theoretical test.*