

Proposed Recommended Procedure for the Use of OAEs in Hearing Conservation: a Delphi Exercise

ENT/SAAA/SASLHA conference

Bloemfontein

30 September 2013



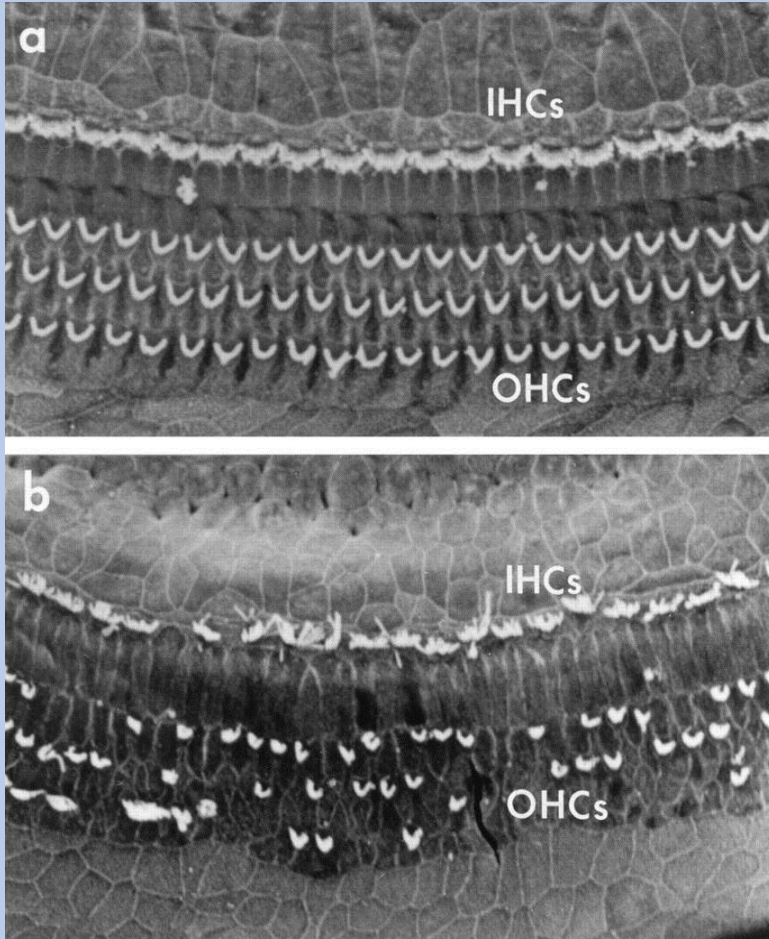
Acknowledgments

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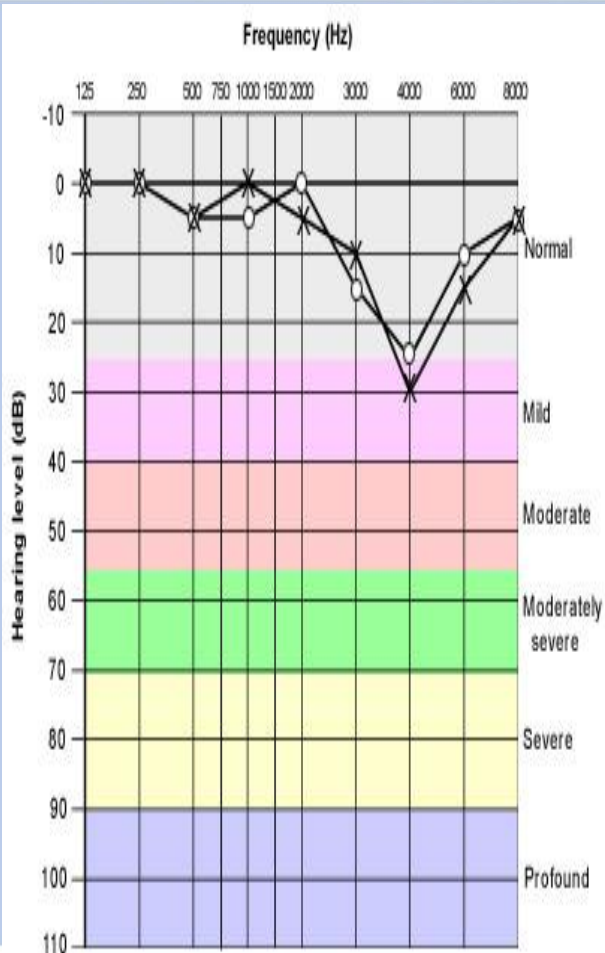
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Audiologist**

**Members of the OAE web-community forum
Various – ENTs, Audiologists, Policy, OHPs, Hearing
Conservation, Researchers**



- Introduction
- Methodology
- Results
- Future plans

Introduction



NIHL = reduced worker quality of life + compensation costs

If we are to prevent NIHL need early identification

The audiogram = subjective method that relies on co-operation from the worker

Alternative or adjunct approach is an objective testing method - OAEs

Metropolitan Police exemption from using HPDs

Delphi technique

- a widely used and accepted method
- has been used in various fields of study such as program planning, needs assessment, policy determination, and resource utilization
- for gathering data from experts in a particular domain
- to develop a full range of alternatives, explore or expose underlying assumptions, as well as correlate judgments on a topic spanning a wide range of disciplines.

Methodology

- designed as a group communication process
- aims to achieve a convergence of opinion on a specific real-world issue
- well suited as a method for consensus-building
- Techniques used -
 - Conference telephonic calls
 - Email discussions and records
 - Committee meetings
 - Formal conference or seminar
 - Electronic conferencing

Objective

To develop an agreed upon standardised method of using OAEs in health surveillance for Hearing Conservation

To develop agreed upon criteria to interpret outcomes of OAE levels

Expert colloquium UK 2011

Web-community

Literature review

Workshop at CSIR in November 2012

Regular meetings - local and international electronic/in person

Alison Codling, Clare Forshaw

Bart Vinck

David Kemp

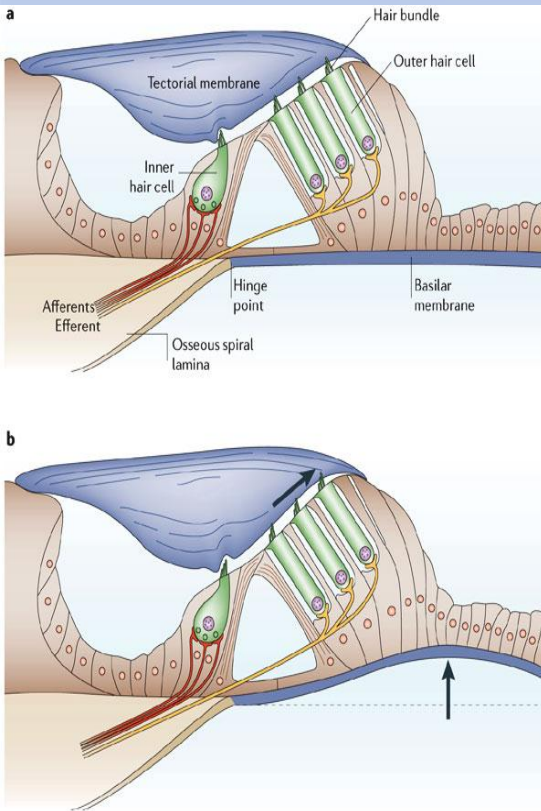
Equipment suppliers

Survey of current methods used

- Circulated to known users and interested parties
- Based on outcome developed a recommended procedure
- Circulated on web-community

OAEs are a feasible alternative

- Large body of research in laboratory- mainly diagnostic
- Clinically sensitive tool for assessing NIHL and the outer hair cells (OHC)
 - repeatable results
 - identify cochlear damage before evidenced on an audiogram – normal audiogram but evidence of OHC loss
- Feasible method of evaluating HPD effectiveness using temporary emission shift (TES)



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Reliable OAE test results require:

- Normal middle ear functioning- need tympanogram and reflex arc test
- Relatively quiet room- there should be an acceptable difference between the emission level and the noise floor (SNR)
- Hearing threshold levels impact on results- must use DPOAEs and diagnostic test protocol

Expert forum in UK in 2011

Conclusion:

No accepted standardised method of using OAEs part of health surveillance

No agreed upon criteria to evaluate what changes in OAE levels indicate a change in OHC function.

Recommended Procedure

Otoscopic examination

Reason for activity	Tester requirements	Equipment requirements	Test parameters	Result interpretation	Outcome activity
Identify cerumen	Right and left ear sequentially.	Otoscope. Record result in medical records.	View tympanic membrane.	If obstructed with cerumen arrange for removal.	Proceed to impedance test.

Recommended Procedure

Tympanometry

Reason for activity	Tester requirements	Equipment requirements	Test parameters	Result interpretation	Outcome activity
Measure middle ear pressure	Right and left ear sequentially.	Automated tympanometer. Ear nubs of correct size to cause a sealed external ear. Using a 226 Hz probe tone.	Tympanic membrane mobility. Middle ear Impedance.	Type A tympanograms Peak values comprised from 0.5 to 1.6 ml at ± 50 daPa.	Proceed to acoustic reflex.

Recommended Procedure

Reflex

Reason for activity	Tester requirements	Equipment requirements	Test parameters	Result interpretation	Outcome activity
Confirm clear middle ear pathway.	Right and left ear sequentially.	Tympanometer with acoustic reflex test.	1kHz at 100dB.	Reflex present.	Proceed to DP OAE test.

Recommended Procedure

DPOAE

Reason for activity	Tester requirements	Equipment requirements	Test parameters
Cochlear function.	Right and left ear sequentially.	DPOAE Machine.	L1/L2 = 75/70 dB F2 frequencies = 1/8 frequencies per octave i.e. 814Hz,917Hz,1000Hz,1091Hz, 1189Hz,1297Hz,1542Hz,1682Hz, 1834Hz,2000Hz,2181Hz,2378Hz,2594Hz 2828Hz, 3084Hz,3364Hz,3668Hz, 4000Hz,4362Hz,4757Hz, 5187Hz,5657Hz, 6169Hz, 6727Hz,7336Hz,8000Hz

Recommended Procedure

Interpretation guidelines

SNR = 6dBSPL at a minimum of 2 frequencies.

Establish baseline initially.

If >3dBSPL reduction in DPOAE emission strength from previous test, replicate the test in the individual.

This can be at a time period suitable for tester. It can be immediately based on consideration of possible confounding factors for test results i.e. TTS, ill health etc.).

Following re-test; take the better set of results as the outcome of test.

Recommended Procedure

Interpretation guidelines

If 3-5dBSPL reduction in emission from previous test at any frequency counsel client and warn of deterioration.

Review other results on similar exposed workers. If similar or greater deterioration in one or more similarly exposed workers there is a need to review noise management procedures to ensure protection is being ensured (i.e. controls, PPE, supervision etc.).

Recommended Procedure

Interpretation guidelines

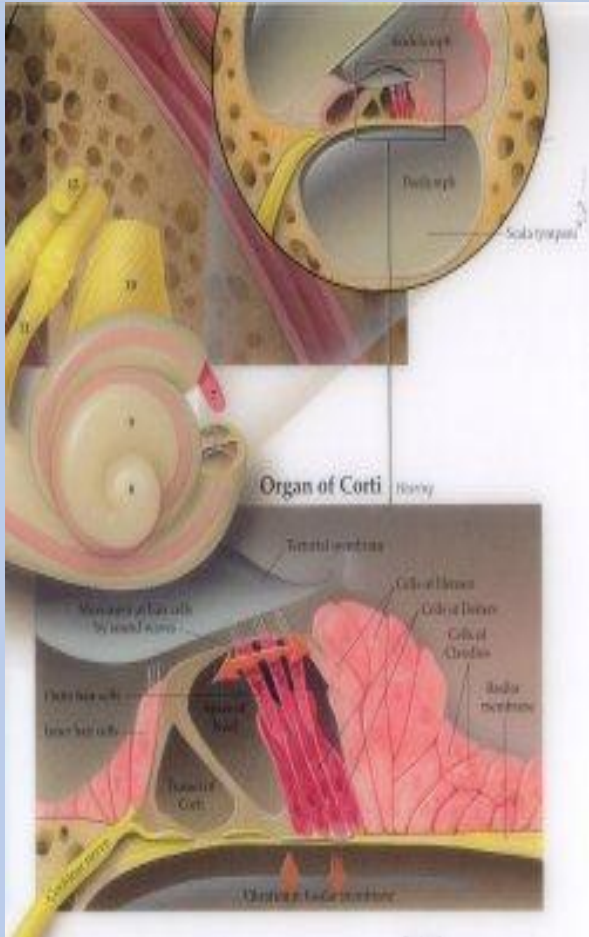
If 5-10dBSPL reduction in emission from previous test at any frequency counsel client and warn of deterioration.
Consider referral for PTA/diagnostic testing.

Review other results on similar exposed workers.
If similar or greater deterioration in one or more similarly exposed workers there is a need to review noise management procedures to ensure protection is being ensured (i.e. controls, PPE, supervision etc.).

Equipment suppliers

Record keeping and use of results



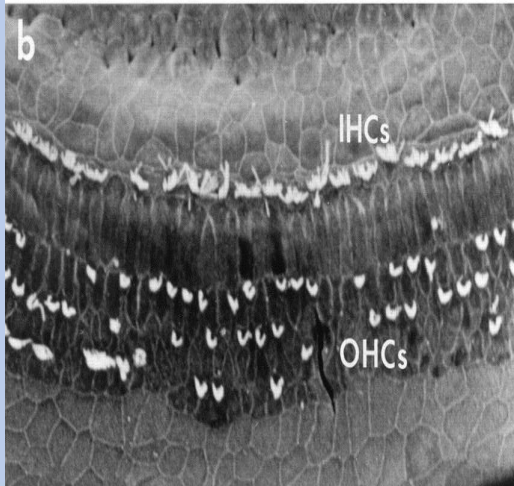
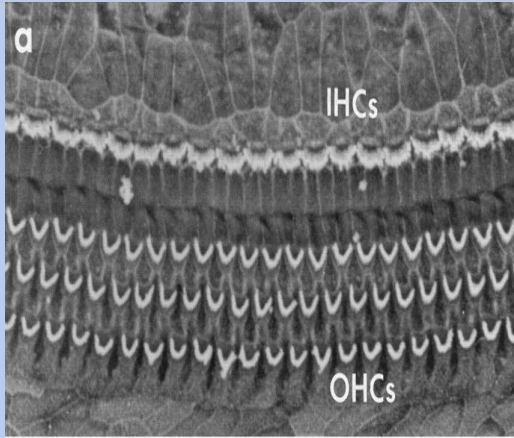


Qualitative study in UK

Launch in November

Bart Vinck

UK occupational health practitioners



Quantitative study in SA

SA mines

Three commodities

Gold, Platinum and Coal

Process has begun

Longitudinal study of three to four years

