

Safety in Mines Research Advisory Committee

Project Summary : SIM 02-07-01 Part 1

Project Title:	Evaluate the viability of auditory steady state response testing for pseudohypacusic workers in the South African mining industry. (79 pages)		
Author(s):	Elize De Koker	Agency:	HearCare
Report Date:	September 2003	Related Projects:	Health 802
Category:	Occupational Health	Applied Research	Thrust 7 and 8

Large numbers of South African mineworkers incur noise-induced hearing loss (NIHL), which is recognised as a compensable disease by COIDA (Compensation for Occupational Injuries and Diseases Act No. 130 of 1993). The prevalence of NIHL is such that its financial implications for the industry are substantial, threatening the viability of marginal operations and eroding the profitability of others.

With regard to NIHL's financial impact, this is compounded by an exaggeration of hearing loss on the part of some workers in an attempt to obtain compensation. In a review of the literature it was found that the highest prevalence of pseudohypacusis (exaggerated or simulated hearing loss) has been reported among workers eligible for monetary compensation in the event of NIHL. In the South African mining industry the occurrence of noise-induced hearing loss and compensation are well documented. During a three-month period, this author found clear indications of pseudohypacusis in 32 per cent of 160 cases referred for audiological assessment. Such cases must be re-assessed several times by the consulting audiologist and ENT, increasing the cost of evaluations and the number of unproductive shifts, and impacting on the effectiveness of Audiology and Occupational Health Departments.

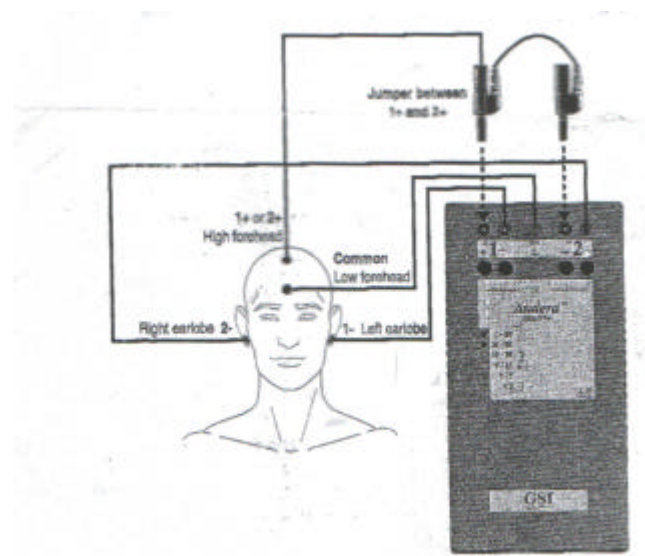
Difficulties in determining true hearing thresholds may also result in warranted compensation claims not being settled, failure to identify instances of sudden hearing loss, and unfit (in terms of hearing) employees being returned to work, further exposing them and increasing risks to the individual and his fellow workers. Current audiological procedures can identify instances of exaggerated hearing loss (pseudohypacusis), but it is difficult to quantify the extent of the exaggeration. Hearing evaluations mainly employ pure-tone and speech discrimination techniques, in accordance with the Compensation Commissioner's Instruction No 171 (2000). Although internationally regarded as the "gold standard" for hearing threshold determination, these methods require patient cooperation and, hence, are inadequate to resolve cases where the individual deliberately seeks to feign or exaggerate hearing loss.

Accordingly, the present study was undertaken to evaluate auditory steady state response (ASSR) testing, a recently identified auditory evoked potential, as a means of accurately estimating the true hearing thresholds for pseudohypacusic mineworkers who have NIHL, even without their active cooperation. An exploratory study was conducted to assess various test protocols and instruments for a normative group of subjects with noise-induced hearing loss, after which the selected protocol was evaluated for an experimental group of workers displaying pseudohypacusis.

The findings demonstrate the validity, sensitivity and accuracy of ASSR testing, particularly the single-frequency (SF) method, thereby providing a basis for the recommendation that SF-ASSR tests be implemented as an alternative to pure-tone testing for pseudohypacusic workers with noise-induced hearing loss. This method, using the 40 Hz response, was shown to estimate thresholds to within 10 dB of corresponding pure-tone results. Furthermore, the method's use of automated testing and analysis algorithms eliminates any possible influence from the clinician, thereby ensuring objectivity.

The use of sedation was investigated to determine if sensitivity could be improved and test time shortened, by reducing noise from subject movement and spontaneous EEG activity. It was found that sedation has no significant positive or negative effect on either aspect and, accordingly, its use is not recommended.

The cost of implementation is evaluated against potential savings from reductions in lost shifts and production, unnecessary referrals and overcompensation of NIHL, indicating that the cost of instrumentation could be recovered in a matter of months.



Conclusions and recommendations

The clinical evaluation of ASSR test methods indicated that:

- ? The use of ASSR methods is a reliable alternative to pure-tone testing of adults with NIHL and that the test can serve as a once-off procedure to conclude the diagnosis of pseudohypacusis.
- ? ASSR results met the requirements for accurate thresholds at all frequencies required for compensation and fitness-for-work evaluations.
- ? The procedure is lengthier than the normal hearing test battery. The procedure took 60 minutes. This is to be expected of an electrophysiological procedure.
- ? ASSR testing is accurate in assessing of hearing losses ranging from mild to profound.
- ? There is no influence from the age of subjects.
- ? Sedation had no significant influence on the sensitivity or time-efficiency of the test procedure.
- ? Single-frequency stimulation with the 40 Hz response is the most accurate and time-efficient ASSR procedure in this population.
- ? The procedure is objective.

The implementation of ASSR testing is recommended to:

- ? Ensure appropriate recommendations for rehabilitation.
- ? Conclude fitness-for-work assessments.
- ? Finalise compensation evaluations.

? Make appropriate specialist referrals.

? To conclude audiological procedures.