Hearing Review

Making Education Easy

Issue 1 – 2007

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Welcome

to the first edition of Hearing Review, a unique New Zealand publication bringing you the most important research in this area from around the world every two months.

The Hearing Review has been established to help make life easier for New Zealand professionals working in this area. Every month around 10,000 scientific publications are printed worldwide containing a multitude of new studies. Many are devoted entirely to hearing. In short, keeping up is hard and requires significant time to screen out what is irrelevant to your practice or your country. In essence we aim to save you time sorting the 'wheat from the chaff' so you can spend more time doing what you're best at.

The Hearing Review is a summary of what we think are some of the most significant new papers, plus a local commentary on why they are important and how they can potentially affect practice. The papers have been independently selected and reviewed in conjunction with the University of Canterbury, Department of Communications Disorders. The Review also provides website links to the abstract or fully published papers where possible so you can make your own judgements.

The creation of this publication would not have been possible without support from our sponsors and to them we give our thanks.

If you have discovered or been involved in what you think is significant global research let us know and we will consider it for inclusion next time. If you have colleagues or friends within New Zealand who would like to receive our publication, send us their contact email and we will include them next issue.

We hope you find this first edition stimulating reading and look forward to hearing your comments.

Kind regards,

Dr Ravi Sockalingam
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Wideband reflectance norms for Caucasian and Chinese subjects

Authors: Shahnaz N and Bork K

Summary: This study assessed middle-ear transmission properties in 62 Caucasian and 64 Chinese subjects using Mimosa Acoustics wideband reflectance (WBR) equipment. In Chinese subjects, WBR was significantly lower at higher frequencies than in Caucasian subjects. Caucasian subjects had significantly lower energy reflectance at lower frequencies than Chinese subjects. The authors suggest that these differences in WBR could result from differences in body size and middle-ear characteristics.

Comment: This Canadian study is very relevant to NZ where there is a significant Asian population. The norms largely based on the Caucasian populations may not be suitable for the Asian population as the middle ear characteristics may be different for the two ethnic groups. Clinicians working in the larger metropolitan areas should probably look at collecting separate normative data for different ethnic groups to ensure an accurate interpretation of data.

Reference: Ear & Hearing Dec 2006; 27(6): 774

An internet-based audiological counselling programme for new hearing aid users

Authors: Laplante-Lévesque A et al

Summary: Previous research has found that audiological counseling can facilitate adjustment to a first hearing aid in people with an acquired hearing loss. This study investigated the use of the internet to provide audiological counseling via daily emails in 3 new hearing aid users. The emails continued for 1 month following the fitting of a new hearing aid. Qualitative data was derived from the emails and from in-depth interviews with participants and their audiologists. The authors found that "the internet-based audiological counselling programme provided rich descriptions of the experiences of the participants and reinforced positive adjustment behaviours experienced by them."

Comment: As the age of the population that wears hearing aids shifts downwards in the industrialised world, this is a relevant study for New Zealand. Increasingly people today communicate and share information via the internet. This study illustrates how the power of internet technology can be successfully harnessed to provide an effective counselling programme for new hearing aid users in their own homes and/or offices.

Reference: International Journal of Audiology. 2006; 45(12):397-706

Independent commentary by Dr Ravi Sockalingam, Senior lecturer, Communications Disorders, University of Canterbury.

Research Review publications are intended for New Zealand health professionals.

Pharmacological rescue of noise induced hearing loss using N-acetylcysteine and acetyl-l-carnitine

Authors: Coleman JK et al

Summary: US military personnel often suffer acoustic trauma for a number of reasons, including incorrect use of hearing protection devices, excess sound levels or other injurious noise-exposure. However there is no definitive treatment for the hearing loss in these circumstances. In this study, the efficacy of a combination of N-acetylcysteine and acetyl-l-carnitine was assessed with regard to the treatment of cochlear injury. In animal studies, each of these agents significantly reduced permanent threshold shifts and hair cell loss compared to saline-treated animals when given at 1 and 4 hours post-noise exposure. The authors hypothesized that using both agents in combination, or at higher doses, or over a longer time period might result in greater therapeutic efficacy.

Comment: The use of a pill to prevent or minimize noise-induced hearing loss especially among military personnel has attracted a lot of world wide attention recently. In this study, the benefit of combining two drugs - N-Acetylcysteine and acetyl-l-carnitine- was reported. In an earlier study by Kramer et al. (J Am Acad Audiol. 2006 Apr;17(4):265-78) on the efficacy of N-Acetylcysteine monotherapy in protecting ears against loud music, no statistically significant difference between those who received the placebo and those who received N-Acetylcysteine was noted. However, research is still warranted on the dose effect relationship for this combination drug therapy.

Reference: Hear Res. 2006 Oct 3 [Epub ahead of print]
PMID: 17023129

The effect of intravenously administered mexiletine on tinnitus: a pilot study

Authors: Berninger E et al

Summary: This small pilot study assessed the effect of IV mexiletine in 6 patients with tinnitus who had previously responded to lidocaine. Subjective measures of tinnitus loudness were obtained using a visual analogue scale (VAS). 3 of 6 patients reported reductions in tinnitus loudness as measured by VAS reductions of 34%, 95% and 100%. Of the remaining three, one reported no change, one found a change in tinnitus pitch, and the third reported a small (18%) reduction in VAS. There was no clear dose-response relationship, and the authors were unable to identify a general 'therapeutic level'. However they concluded that mexiletine had effects which included shifts in pure-tone threshold, transient evoked otoacoustic emission, and acoustic reflex threshold, and suggested that this may have resulted from a reversible interference in the function of organ of Corti. Adverse events occurred during 1 of 7 infusions.

Comment: Drug therapy in the treatment of tinnitus has so far met with little success. One of the reasons for this is the heterogenous nature of tinnitus patients. While the changes in audiometric threshold shifts indicate a physiological basis to tinnitus, the lack of a clear relationship between the dose of mexiletine and tinnitus perception once again indicates the variable nature of this little-understood phenomenon. Though the authors of this study have indicated that mexiletine shows potential as an effective therapeutic agent, large-scale double blind trials are needed to show its efficacy.

Reference: International Journal of Audiology. 2006; 45(12): 689-696

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The listening in spatialized noise test: an auditory processing disorder study

Authors: Cameron S et al

Summary: 10 children at risk for auditory processing disorder (APD) were assessed on the Listening in Spatialized Noise test (LISN) and a traditional APD test battery. Results were compared with 48 aged-matched controls. The LISN enables assessment of the extent to which either spatial, vocal, or spatial and vocal cues combined increase a listener's ability to comprehend a target story in the presence of distracter sentences, without being affected by differences between participants in variables such as linguistic skills. The APD group performed significantly less well than controls on all measures of the LISN. With regard to the spatial advantage measure, there was a significant 6.3 dB difference between the APD group and controls ($p < 0.000001$) when the distracters were spatially separated from the target by +/-90 degrees. 9 children scored outside the normal range. The authors concluded that the LISN was "a promising addition to an APD test battery."

Comment: The overriding dilemma facing audiologists is the lack of consensus on what constitutes an auditory processing disorder (APD). Though there are guidelines on how to assess APD, it is really up to the assessing clinician to use the type of tests that they deem fit for a particular client. Research in this area has been expanding rapidly and the LISN as reported in this study adds value to the battery of tests currently used as it assesses an area of auditory process (processing of spatial cues) never addressed in other typical tests of APD.

Reference: J Am Acad Audiol. 2006 May;17(5):306-20

PMID: 16796298

Newborn hearing screening: identification of children with GJB2 (Connexin 26) deafness

Authors: Norris VW et al

Summary: The authors report retrospective identification of 9 children, each with two pathogenic GJB2 mutations, who passed their newborn hearing screening tests. They estimate that current newborn hearing screening tests will fail to detect least 3.8% of newborns with two connexin 26 mutations. The authors suggest that "GJB2 deafness may not always be congenital in onset and should not be excluded as a diagnostic possibility in nonsyndromic hearing loss even when the newborn hearing screening results are within the normal range."

Comment: It has taken a lot of time and concerted effort to make newborn hearing screening a reality in many countries in the developed world. And it is not yet a reality in NZ. This study clearly indicates a potential pitfall of the newborn screening programme. However, I think it will have to take a lot more than 3.8% of newborns with two connexion 26 mutations who slip through the system before health policy makers even contemplate screening for GJB2 deafness as an adjunct to existing screening programmes

Reference: Ear & Hearing Dec 2006; 27(6):732

Measuring parental satisfaction with a neonatal hearing screening program

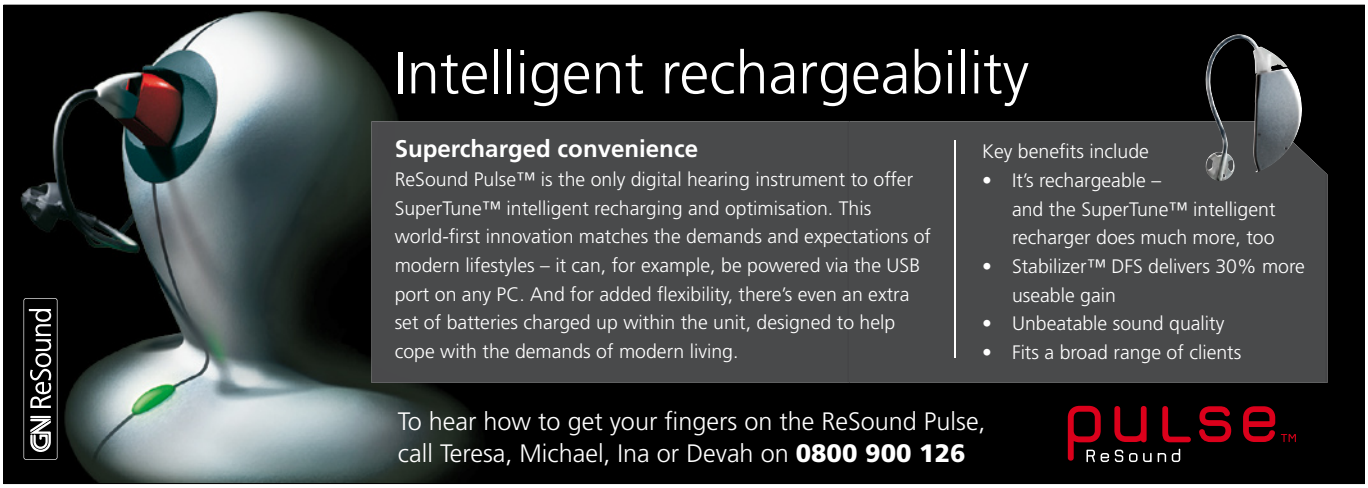
Authors: Mazlan R et al

Summary: This study was designed to investigate parental satisfaction with a neonatal hearing screening programme using a specifically designed questionnaire – the Parent Satisfaction Questionnaire with Neonatal Hearing Screening Program (PSQ-NHSP). Of 80 parents who participated in the study, more than 90% were satisfied with all aspects of the hearing screening programme. The study found the PSQ-NHSP to have strong internal consistency and test-retest reliability. Content and construct validity were also established. In conclusion, the PSQ-NHSP was found to be a reliable and useful tool, which was able to help identify service shortfalls.

Comment: Neonatal hearing screening programs have been implemented in most large metropolitan cities in the developed world. There is currently a lack of a questionnaire like the PSQ-NHSP to identify and address service pitfalls. In NZ, national newborn hearing screening is expected to be implemented soon. The use of this satisfaction questionnaire from the outset to monitor its development and growth would be advantageous from a policy and quality management perspective.

Reference: J Am Acad Audiol. 2006 Apr; 17(4):253-64

PMID: 16761700



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Audiogram notches in noise-exposed workers

Authors: Rabinowitz PM et al

Summary: Diagnosis of noise-induced hearing loss is complicated by the lack of standardised definitions for the audiometric notch. This study aimed to validate a number of objective notch metrics using a 6 member expert panel of audiologists, otolaryngologists, and occupational physicians. There was greater than 70% agreement on the presence of a noise notch, and this opinion tallied with several notch metrics. The authors conclude that incorporating audiogram notch metrics into audiometric software would assist in the diagnosis of noise-induced hearing loss.

Comment: Though an audiometric notch around 3-4 kHz has been seen as a distinguishing feature of noise-induced hearing loss (NIHL), its use as a criterion for defining NIHL has met with controversy. The findings of this study, which uses a panel of experts to validate various notch metrics, is useful to those who are tasked to diagnose NIHL. In NZ, this is particularly important to occupational and otolaryngologists who often have to make decisions for ACC on compensation claims.

Reference: Ear & Hearing Dec 2006; 27(6):742

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ASSR and TB-ABR thresholds in normal babies

Authors: Rance G et al

Summary: The development of auditory steady-state response (ASSR) and tone-burst auditory brainstem response (TB-ABR) thresholds was studied in normal babies during their first 6 weeks of life. Similar response thresholds were observed with both techniques using 500 Hz & 4 kHz stimuli calibrated in peak equivalent dBSPL. There was less variability of TB-ABR thresholds between subjects and less effect of maturational development on this parameter

Comment: This study clearly reveals the value of TB-ABR for the auditory assessment of babies in the first six weeks of their lives. With the recent arrival of several commercially available ASSR systems, many researchers as well as clinicians jumped on the ASSR bandwagon and have relied on ASSRs to the exclusion of its now unpopular cousin the TB-ABR. Yes, the TB-ABR does take longer and may involve more than one session to complete for some babies, but it will still remain the best time-tested tool for audiologists for some time to come.

Reference: Ear & Hearing Dec 2006; 27(6):751

The epidemiology of hearing problems: how should we investigate?

Authors: Stephens D et al

Summary: The apparent prevalence of hearing disorders in the Welsh population has varied significantly across different studies. The authors of this particular study have assessed factors which could have influenced these differences. Prevalence was usually less than 15% in studies which posed the survey questions in the context of a general health approach, which included other questions relating to general health. However, a prevalence of 20% or more was obtained by using the same questions in conjunction with additional questions relating to auditory function alone. Studies where a household survey approach is used, in which a single family member responds on behalf of the entire household may also be flawed. In these cases, hearing disorder prevalence tends to be greater amongst the respondents compared to their families.

Comment: This study has implications for how we would conduct a prevalence hearing survey in New Zealand. There is currently a dearth of information on the prevalence of hearing loss in the New Zealand population, and all the information that is available was derived primarily through general household surveys or estimates based on foreign data. If we are to obtain accurate data, any hearing survey conducted at a national level would have to use a direct approach focused on hearing and not in the context of general health.

Reference: Acta Otolaryngol Suppl. 2004 May;(552):11-5
PMID: 15219041

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