

Hearing Review™

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Issue 7 - 2007

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Welcome to the seventh issue of Hearing Review.

In this edition we feature a couple of studies concerning cochlear implantation, one of which assessed the benefits of fitting a hearing aid in conjunction with a cochlear implant (CI), a much debated topic these days. The other suggests guidelines for CI selection strategies; such guidelines may enable both clinicians and prospective patients to make better informed decisions about cochlear implantation.

I hope you enjoy the latest edition and welcome your comments and feedback. Kind regards,

Valerie Looi

Lecturer in Audiology, University of Canterbury
valerielooi@researchreview.co.nz

Tone-evoked ABR in full-term and preterm neonates with normal hearing

Authors: Ribeiro FM and Carvallo RM

Summary: Intensity series of tone-ABRs were obtained from 30 preterm neonates and 20 full-term neonates who had confirmed normal peripheral auditory function after undergoing OAE screening and ABR testing using 500, 1500, and 4000 Hz tone bursts at 70, 50, 30, and 20 dB nHL. Responses to tone bursts of 20 and 30 dB nHL were detected in 97% and 100% of all ears, respectively, in addition to responses to the higher-intensity stimuli. ABR latencies were significantly prolonged in preterm neonates compared with full-term infants.

Comment: The results of this Brazilian study suggest that tone-burst ABR can be used at low intensity levels. However, the total test time for each infant was approximately 1.5 hours, which would probably make it unfeasible for routine clinical application. Modifications to the procedure may help to decrease the overall test time, such as assessing for the presence versus absence of wave V (as opposed to identifying the peak latency), for the low-intensity stimuli. Such modifications are mentioned in the article. The study also pointed out that currently, most normative data used by clinics do not consider gender differences for ABR wave V latency in neonates, although it has been consistently found that females have a shorter wave V latency than males for the higher frequency stimuli.

<http://dx.doi.org/10.1080/14992020701643800>

Reference: *Int J Audiol.* 2008;47:21-9

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Directional benefit in simulated classroom environments

Authors: Ricketts T and Galster J

Summary: Speech recognition performance and subjective ratings for directional and omni-directional microphone modes in hearing aids were assessed in 26 children aged 10–17 years in up to eight simulated classroom environments.

Comment: Overall, the results highlighted the importance of choosing the correct microphone mode for different listening conditions. As expected, directionality provided significant benefit when the speaker was in front; however, it detracted from performance when the speaker was behind or beside the listener. When there were multiple speakers both in front and behind the listener, omni-directional settings were recommended. The overall results suggest that although having both options available is preferable, teaching (older) children so that they can accurately switch microphone modes is imperative. If automatic switching algorithms are used, the algorithm should err on the side of being conservative for switching from omni- to directional modes. That is, if a switching error is made, there may be more detriment when incorrectly in directional mode than if incorrectly in omni-directional mode. For manual switching, it could be worthwhile initially suggesting to new users or children to switch to directional mode only when there is no one speaking behind them.

[http://dx.doi.org/10.1044/1059-0889\(2007\)017](http://dx.doi.org/10.1044/1059-0889(2007)017)

Reference: *Am J Audiol.* 2007; 16:130-44

Independent commentary by Dr Valerie Looi, a Lecturer in Audiology for the Department of Communication Disorders at the University of Canterbury.

Her primary areas of research are in the field of cochlear implants, along with the music perception of those with a hearing impairment. She is particularly interested in developing a music training programme for cochlear implant users.

Hearing handicap ratings among different profiles of adult cochlear implant users

Authors: Noble W et al

Summary: Self-reported hearing handicap ratings from the Hearing Handicap Inventory for the Elderly (HHIE) and the Hearing Handicap Questionnaire (HHQ) were compared across groups of patients fitted with one versus two cochlear implants (CI, CI + CI), or with an implant and a hearing aid (HA) in the nonimplanted ear (CI + HA). Three factors were identified in the HHIE, labelled Emotional Distress, Difficulty in Hearing, and Social Restriction. The highest emotional distress scores were seen in the CI + HA group. Scores for difficulty in hearing and social restriction were significantly lower in the CI + CI group than in the CI or CI + HA groups. Two factors were identified in the HHQ; Emotional Distress and Social Restriction. The CI + CI group had significantly lower emotional distress scores than the CI + HA group, and significantly lower social restriction scores than in the CI or CI + HA groups.

Comment: This study's division of two hearing handicap questionnaires into the sub-domains of 'emotional distress', 'difficulty in hearing', and 'social restriction' is a useful method for analysing quality of life outcomes (QOL), for any population. This study focused on comparing QOL outcomes for single implant users to bilateral and bimodal implant users. It is well accepted that a second implant can help in more complex listening environments. The finding that bilateral and bimodal implant users reported less difficulty hearing and lower social restriction scores than unilateral implant users suggests that a second implant provided significant incremental benefits in subjective QOL assessments, over and above benefits obtained from cochlear implantation.

<http://www.ear-hearing.com/pt/re/earhearing/abstract.00003446-200801000-00011.htm>

Reference: *Ear Hear.* 2008;29:112-20

Universal newborn hearing screening: parental reflections on very early audiological management

Authors: McCracken W et al

Summary: Forty-five parents and caregivers identified key challenges generated by the home-based audiological management of very young babies with hearing loss, after the introduction of universal newborn hearing screening (UNHS) in England. Most concern was expressed about the virtual timetable constructed by parents after screening, practical daily management issues and how audiological practice needs to establish infant rather than a child focus. Specific challenges were mentioned for infants with a moderate hearing loss.

Comment: The results of this qualitative study would be of interest to those involved, or who will be involved, in the referral stage of the UNHSP. Although this study derived from the UK's UNHSP, a few important points are worth noting. Firstly, parents felt that audiologists needed to understand that there was a difference between providing amplification to an infant rather than a toddler. For example, the more frequent replacement of ear moulds for infants, and associated waiting time, was a commonly raised issue. Secondly, audiologists could have had a more holistic view of child development, rather than solely emphasising the importance of amplification. For example, if a parent was informed about the importance of non-verbal communication, their concern whilst ear moulds were replaced, or non-functioning devices were fixed, could be eased. Thirdly, parents suggested that having written information on practical issues that preceded a problem was very helpful, as opposed to being given the information only after the problem arose. Finally, some parents felt that the needs of children with a moderate hearing loss (as opposed to a more severe loss) were often overlooked, or less satisfactory.

<http://www.ear-hearing.com/pt/re/earhearing/abstract.00003446-200801000-00006.htm>

Reference: *Ear Hear.* 2008;29:54-64

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Development of a hearing aid self-efficacy questionnaire

Authors: West RL and Smith SL

Summary: New and experienced hearing aid users evaluated the psychometric properties of the Measure of Audiologic Rehabilitation Self-Efficacy for Hearing Aids (MARS-HA). Strong internal consistency and good test-retest reliability were observed in both groups. Validity was identified by expected differences based on group comparisons, training effects, and the impact of particular hearing aid features.

Comment: This questionnaire may be a worthwhile clinical tool for audiologists to use to gauge their client's opinions of their own efficacy in managing hearing aids. There are four subscales in the MARS-HA: basic handling, aided listening, adjustment, and advanced handling skills. The questionnaire is suited to both new and experienced HA users, and could therefore be applied across a host of situations including: pre-post assessments for new HA users, monitoring progress of new or experienced HA users, for current HA users who have difficulties or are poor users, to assess if there's a mismatch between a patient's perception of their ability to manage the device and their true ability, planning the initial HA orientation session, or determining goals for follow-up visits. With self-efficacy being related to use versus rejection of HAs, this measure may allow audiologists to help new HA users best adjust to using the device, monitor how existing HA users are going, and identify areas for further training or counselling where required.

<http://dx.doi.org/10.1080/14992020701545898>

Reference: *Int J Audiol.* 2007;46:759-71

Enhanced visual speech perception in individuals with early-onset hearing impairment

Authors: Auer ET and Bernstein LE

Summary: Speechreading accuracy was assessed in 112 individuals with early-onset hearing loss and 220 individuals with normal hearing; participants had to identify 30 pre-recorded sentences from visible speech information alone. The participants with early-onset hearing loss scored significantly better than those with normal hearing (43.55% vs 18.57% words correct, respectively). Within the early-onset hearing loss participants, speechreading ability correlated with several subjective measures of spoken communication. There were no reliable effects of gender.

Comment: Although the proposition that adults with early-onset deafness would be significantly better at speechreading than adults with normal hearing (NH) may seem intuitive, there has been some discrepancy amongst the research regarding this hypothesis. The current study reported that the average prelingually deafened adult would score better on this speechreading task than 95% of NH adults. The authors propose that it is the experiential environment and conditions associated with early-onset deafness that are conducive to developing enhanced speechreading skills. Further, exposure to speechreading early in life would be associated with compensatory brain plasticity, and the 'sensitive period' for learning, both commonly reported in developmental literature. The authors also report, though, that small gains can be made in speechreading ability even with short-term training. Therefore, individuals with a later-onset hearing loss may benefit from some training to develop their speechreading skills. However, they would be unlikely to achieve the same proficiency as an individual with a prelingual hearing loss.

[http://dx.doi.org/10.1044/1092-4388\(2007\)080](http://dx.doi.org/10.1044/1092-4388(2007)080)

Reference: *J Speech Lang Hear Res.* 2007;50:1157-65

Toward a standard description of hearing loss

Authors: Margolis RH and Saly GL

Summary: This study describes the development and validation of hearing loss categories of AMCLASS™, an automated interpretation tool. Category definitions (configuration, severity, and site of lesion) from five expert judges for 231 audiograms of wide audiometric configuration revealed high levels of interjudge disagreement. After adjusting the category definitions to maximise agreement between AMCLASS™ and the consensus of the judges, the final set of definitions agreed with the consensus more often than the average agreement between pairs of judges.

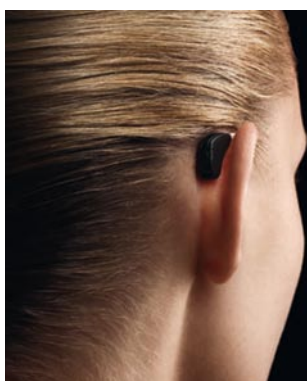
Comment: The topic discussed in this article of a standardised description for puretone audiograms is an important issue. At present there is a lot of variability between countries, regions/states, clinics, and even individuals, as to how to classify a hearing loss. For example, is the cut-off for normal hearing 15, 20, or 25 dB HL? When is an audiogram 'flat' versus 'sloping'? This study attempts to devise a set of rules in order to allow for automatic classification of audiograms. The eventual goal is for a software tool where the audiologist can enter the details of the audiogram, and the software would output a description for the level, type, configuration, and symmetry of the loss. How successful this becomes would be highly dependent on how well accepted and adopted the software/programme proves to be. However, this is a valid issue that needs addressing, with the global nature of audiology. Practical information and a web-based application of this tool is available at www.audiologyincorporated.com.

<http://dx.doi.org/10.1080/14992020701572652>

Reference: *Int J Audiol.* 2007;46:746-58

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Vestibular rehabilitation in individuals with inner-ear dysfunction: A pilot study

Authors: Enticott JC et al

Summary: This study enrolled 32 adults with vestibular dysfunction; test subjects were provided with an individualised 10-week vestibular home exercise programme designed by a physiotherapist, while control subjects received a set of strength and endurance exercises only. Although subjective and objective patient measures collected at 0, 6, 10 and 26 weeks demonstrated improvements in vestibular function from baseline in both groups, benefits were significantly greater for test subjects compared with controls.

Comment: This paper would be of interest to professionals working with patients with vestibular problems. Often, pharmaceuticals or surgery are the main treatment options presented to these patients. This study provides evidence that an individualised vestibular rehabilitation programme can help alleviate symptoms and improve balance, both in the short term, and maintained to at least 6 months post-treatment. The treatment programme in this study involved exercises to be performed 3 times daily (approximately 15 minutes per session) for 10 weeks. The exercises were designed to improve gaze stability, habituation, and balance. The study details the specific exercises used in the programme. The success of this pilot study led to the public hospital involved in the study committing funds so that a specialised vestibular rehabilitation programme could be offered as a non-invasive treatment option for suitable patients.

<http://dx.doi.org/10.1159/000107434>

Reference: Audiol Neurotol. 2008;13:19-28

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The benefits of combining acoustic and electric stimulation for the recognition of speech, voice and melodies

Authors: Dorman MF et al

Summary: 15 patients fitted with a cochlear implant (CI) in one ear and a hearing aid in the other ear were tested on speech and melody recognition and voice discrimination under conditions of electric (E) stimulation, acoustic (A) stimulation and combined electric and acoustic stimulation (EAS). Combined EAS increased performance by 17–23 percentage points on tests of word and sentence recognition in quiet and sentence recognition in noise. CNC word test scores were higher in EAS patients than in patients fitted with a unilateral CI. The best EAS patients failed to outperform the best patients fitted with a unilateral CI, but more EAS patients than unilateral CI patients achieved very high scores on tests of speech recognition.

Comment: EAS (i.e. the use of a hearing aid [HA] in conjunction with a CI) is one of the current 'hot topics' in the CI literature. It is well documented that the addition of acoustic information via the HA can provide CI users with low-frequency information, translating to better speech perception in noise, along with better music perception. This study additionally found that the HA helped with speech perception in quiet as well. One other interesting question addressed in this article was whether EAS enables better performance than that achieved by the highest performing CI-only users. Should this be the case, then this would support the argument that the HA provides information that is not transmitted by a CI. The result, though, did not show that EAS patients outperform the best performing CI-only patients. This suggests that some patients using only a CI receive a similar amount of auditory information as patients using both devices simultaneously. However, the comparison also showed that proportionally more EAS patients achieve very high speech recognition scores than CI-only patients.

<http://dx.doi.org/10.1159/000111782>

Reference: Audiol Neurotol. 2008;13:105-12

Selection strategies for binaural and monaural cochlear implantation

Authors: Perreau AE et al

Summary: Theoretical guidelines are presented concerning cochlear implant selection criteria in adults and children. These guidelines emphasise the contribution of each ear to the binaural advantage and outline options for implanting one ear only, implanting one ear plus use of a contralateral hearing aid, and implanting both ears.

Comment: This article would be applicable to those associated with the cochlear implant (CI) assessment process, or clinicians who make referrals to the programme. The authors propose a set of general guidelines and assessment measures to determine CI candidacy, based on comparing current speech perception performance relative to the expected benefit from cochlear implantation. Issues related to bilateral, unilateral, and binaural implantation were addressed, with a focus on which ear to implant. The authors suggested that CI candidacy assessments need to incorporate measures to determine the relative contribution of each ear to binaural advantage – i.e. test each ear individually as well as bilaterally. Tests of spatial hearing, including sound localisation tests, are strongly recommended. At present, bilateral implantation is rare in NZ; however, binaural implantation is becoming more common. Therefore, the CI programmes may need to consider the cost-time-benefit ratio associated with undertaking more comprehensive pre-implantation assessments, which would enable more accurate post-CI outcomes to be assessed, as well as allow better informed counselling of listening options for the CI recipient.

[http://dx.doi.org/10.1044/1059-0889\(2007\)011](http://dx.doi.org/10.1044/1059-0889(2007)011)

Reference: Am J Audiol. 2007;16:85-93

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