Hearing Review

Making Education Easy

Issue 3 – 2007

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Welcome

to the third edition of Hearing Review, a unique New Zealand publication bringing you some of the most important research from around the world every two months. We summarise the best we can find to save you time, and hope our interpretation of the results helps make your job easier.

Thanks to everyone who provided feedback to the first and second editions and to our sponsors for their ongoing commitment. If you have a colleague who you think might like a copy please feel free to pass it on. We trust you find it stimulating and look forward to your comments and opinions.

Kind regards,

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Education qualification levels and school careers of unilateral versus bilateral hearing aid users

Authors: Beijen J et al

Summary: This study analysed the difference in school careers and secondary school qualification levels between unilateral and bilateral hearing aid users, using data collected from 40 adult respondents to a postal-based questionnaire. All had been fitted with unilateral (n=19) or bilateral (n=21) hearing aids during childhood. The data revealed superior secondary school qualifications among the binaural hearing aid users compared with the unilateral users. Further, 33% of binaural hearing aid users achieved qualifications giving access to a bachelors degree compared with 21% of unilateral users. However, comparison of the benefit of bilateral versus unilateral hearing aids on the type of school the children attended (mainstream versus special), class failure and additional assistance used (speech and language therapy, personal frequency modulation systems) revealed no differences between the groups. The authors conclude that children fitted with bilateral hearing aids attain better secondary school qualifications than children fitted with unilateral hearing aids, but their school careers are comparable.

Comment: Though based on a rather small sample, this study provides further support for the bilateral fitting of hearing aids for those with bilateral hearing loss. With government funding for listening devices, this is not an issue for children in NZ. Unless there are medical or other significant contra-indications, all children in NZ are fitted with bilateral hearing aids if they are found to have bilateral hearing loss.

http://www.blackwell-synergy.com/doi/abs/10.1111/j.1365-2273.2007.01411.x

Reference: Clin Otolaryngol. 2007;32(2):86-92PMID: 17153722

Survey of mobile phone use and their chronic effects on the hearing of a student population

Authors: Davidson HC et al

Summary: This UK-based study reports findings from an investigation into the prevalence of student mobile phone ownership and any possible long-term effects of usage on hearing, tinnitus and balance. Analyses of questionnaires completed by 117 University of Southampton postgraduates revealed that 94% were current mobile phone users, and only 2% had never used a mobile phone. Duration of ownership and daily usage ranged from 0-7 years and 0-45 minutes respectively. Phones were used more often for text-messaging than for talking. Hearing, tinnitus, or balance was reportedly no worse among high or long-term users than among low or short-term users. In conclusion, these outcomes confirm a high prevalence of mobile phone ownership amongst students, with no apparent harmful effects on their audio-vestibular systems within the range of exposure of the study.

Comment: While the results bring relief to those of us who wondered about the effect of mobile phones on the younger generation who represent an important market for mobile phone companies, younger people do tend to text more than talk with their mobile phones. It would be interesting to do the same study on the older users who tend to talk more than text, and use mobile phones for a longer duration. Also, mobile phones vary in their radiation levels and their sound quality, and the effects on adult users would be a great topic for further investigation.

http://www.informaworld.com/smpp/content~content=a773301386~db=all

Reference: Int J Audiol. 2007; 46(3):113-8

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

Aided auditory steady-state responses in infants

Authors: Stroebel D et al

Summary: This study investigated the use of aided auditory stead-state responses (ASSRs) in determining aided thresholds in young infants with hearing loss. Aided and unaided ASSR thresholds, and subsequent behavioural thresholds, were compared in six young infants with hearing loss fitted with hearing aids between three and six months of age. Aided ASSR thresholds were obtained in 83% of frequencies where aided behavioural thresholds were obtained, with a mean threshold difference of 13+/-13 dB. Aided ASSR-based threshold estimates were within 15 dB of behavioural thresholds in 63% of cases, indicating a moderate correlation (r = 0.55). The average functional gain was 36+/-15 dB with aided ASSRs versus unaided ASSRs. The authors conclude that ASSRs provide objective evidence of hearing aid benefit in young infants, several months before reliable behavioural responses to amplified sound can be observed.

Comment: ASSRs is one of the hot topics in auditory electrophysiology today. The past three years in particular have seen a proliferation of commercially available ASSR systems, each using a slightly different algorithm for response detection and purporting to be better than their competition in this regard. However, given that the difference between ASSR thresholds and the actual hearing thresholds can be as large as 30 dB in some cases, it might be a long while before it replaces tone-bursts ABR which is still the best tool audiologists have at their disposal to objectively obtain frequency-specific auditory threshold estimations.

http://www.informaworld.com/smpp/content~content=a779054464~db=all~order=page

Reference: Int J Audiol. 2007;46(6):287-92

The role of hope in adjustment to acquired hearing loss

Authors: Kent B et al

Summary: A total of 114 adults (mean age of 67 years) with sensorineural hearing loss who had accessed hearing therapy services in New Zealand were surveyed, in an attempt to define the relationship between individual and disability characteristics and adjustment to acquired hearing loss, and the role of hope in that relationship. According to multiple regression analyses, the degree of loss was the only statistically significant individual and disability characteristic related to adjustment. The trait of hope served as a mechanism by which the degree of loss affects adjustment. Hearing loss affects hope which in turn affects adjustment. Hope accounted for 45% of the relationship between the degree of loss and adjustment. Further, the analyses revealed that self-efficacy and personal meaning influence hope and despair dimensions in different ways. The authors suggest that their findings have implications for intervention strategies in rehabilitation programmes for individuals with significant hearing loss.

Comment: This study, which is right out of our own back yard, underscores the need for audiologists to address traits like hope when counselling clients to adjust to their hearing loss. Most audiologists do not provide much counselling at the time of diagnosis or address traits like hope and personal meaning which may not be considered the realm of the audiologist. Having taught audiology for 8 years in various institutions in both hemispheres, I consider counselling has never been taught comprehensively enough (if at all) in most audiology schools. This study sends an important signal for hearing care practitioners to be better educated and trained about these psychosocial aspects of hearing loss for better rehabilitation outcomes.

http://www.informaworld.com/smpp/content?content=10.1080/14992020701261389

Reference: Int J Audiol. 2007;46(6):328-40

Research Review publications are intended for New Zealand health professionals.

Severe tinnitus and its effect on selective and divided attention

Authors: Stevens C et al

Summary: The effect of chronic, severe tinnitus on two visual tasks was investigated in this study involving 11 participants who had experienced severe tinnitus for >2 years, who were matched for age and verbal IQ with a control group. Levels of anxiety, depression, and high frequency average hearing level were treated as covariates. Participants completed the say-word (easy) and say-colour (demanding) conditions of the Stroop task, a single (baseline) reaction time (RT) task, and dual tasks involving word reading or category naming while performing a concurrent RT task. In both conditions of the Stroop task, and in the word reading and category naming conditions of the dual task, RT was slower in the tinnitus group than in the control group. These outcomes were not affected by high frequency average hearing level, anxiety, or depression. According to the authors, these study results support a general depletion of resources hypothesis (i.e. overall performance is impaired in a tinnitus group relative to a control group), as opposed to a controlled processing hypothesis (i.e. only tasks that are demanding, requiring strategic processes, are affected).

Comment: This study is a welcome addition to the tinnitus literature, providing a totally different perspective to tinnitus. There are many so called "chronic maladjusted" tinnitus sufferers who are incapable of performing the tasks required of them in their daily work, and it is possible the general depletion of resources theory could partly account for this apparent incapacity. More studies are needed to help hearing professionals convince employers and even family members that tinnitus can indeed have a detrimental impact on work performance without being associated with anxiety or depression.

http://dx.doi.org/10.1080/14992020601102329

Reference: Int J Audiol. 2007;46(5):208-16

Results of TRT after eighteen months: our experience

Authors: Baracca GN et al

Summary: This study evaluated the efficacy of Tinnitus Retraining Therapy (TRT) treatment, based on Jastreboff's neurophysiological model, in 51 patients with tinnitus belonging to the I-II-III-IV classes according to Jastreboff. At 18 months, after undergoing Jastreboff's structured interviews, 68% of patients reported a reduction in symptoms associated with tinnitus, including sleep disturbance, problems in concentration, and inability to relax. The majority of patients (64.7%) reported improvement in their quality of life. Significantly better results were achieved among patients who had experienced tinnitus symptoms for <1 year than those who had experienced symptoms for a longer period of time. In conclusion, TRT effectively reduced the symptoms related to tinnitus in this study.

Comment: TRT is a popular approach for tinnitus therapy but there aren't many published reports on its long-term efficacy. The results of this study indicate that TRT is an effective approach, and is more effective for people whose tinnitus is in the acute stage rather than in the chronic stage. However, the directive counselling and sound therapy, the two cardinal tenets of the approach, are usually delivered as soon as the tinnitus is reported. In other words, people who receive TRT are, for the most part, individuals with a recent history of tinnitus.

http://dx.doi.org/10.1080/14992020601175945

Reference: Int J Audiol. 2007;46(5):217-22

Music exposure and audiological findings in Brazilian disc jockeys (DJs)

Authors: Santos L et al

Summary: In this study, 30 professional disc jockeys (DJs) participated in personal noise dosimetry and interviews regarding their hearing and their job. Initial testing comprised pure-tone audiometry, and transient and distortion product otoacoustic emissions before their exposure to music during their work, following a ≥12-hour period without exposure to music or noise. Repeat testing with the pure-tone audiometry and otoacoustic emissions after their music exposure produced poorer performances in all retests. Average sound levels of the nightclubs ranged between 93.2 to 109.7 dB(A). Statistical analyses of audiometry performed pre- and post-exposure to amplified music revealed significant bilateral temporary threshold shifts at all frequencies. Transient otoacoustic emissions were significantly different in bilateral amplitude and reproducibility at all frequency bands tested, and distortion product otoacoustic emissions results were significantly different in amplitude post-music exposure, compared with pre-music exposure. In conclusion, this group of DJs experienced temporary and permanent auditory dysfunction.

Comment: There have been many reports on the effects of loud music on musicians and night club goers but not on DJs. This study used personal dosimetry on a fairly good size sample of DJs and found both PTA and OAEs to be compromised after music exposure. It is imperative that we include DJs as well in our efforts to prevent hearing loss from exposure to excessive recreational noise to ascertain the real life benefit of DNR.

http://www.ncbi.nlm.nih.gov/sites/entrez?db=pubmed&list_uids=17487670&cmd=Retrieve&indexed=google

Reference: Int J Audiol. 2007;46(5):223-31

Prevalence of dead regions in subjects with sensorineural hearing loss

Authors: Vinay et al

Summary: This study used data from 308 adult subjects (556 ears) with mild to severe sensorineural hearing impairment as a function of audiometric threshold and frequency, to estimate the prevalence of dead regions and to assess the extent to which the presence/absence of a dead region can be predicted from the audiogram, gender, or age. The threshold-equalizing noise hearing level (TEN (HL)) test determined the presence or absence of dead regions for test frequencies ranging from 0.5 to 4 kHz. 177 subjects (57.4%) had a dead region in one or both ears for at least one frequency. Fifty-four women (54.5%) and 123 men (58.8%) had dead regions in one or both ears. Classifying by ear, 256 (46%) were diagnosed as having a dead region at one frequency or more: 233 ears (41.9%) had only a high-frequency dead region, 13 ears (2.3%) had only a low-frequency dead region, and 10 ears (1.8%) had a dead region at both low and high frequencies, with a surviving middle-frequency region. For each test frequency on the audiogram, ≥59% of ears had a dead region when the absolute threshold exceeded 70 dB HL. According to statistical analyses, age and gender failed to significantly affect the prevalence of dead regions. The authors conclude that dead regions have a relatively high prevalence in adults with sensorineural hearing impairment, especially for frequencies at which the hearing loss exceeds 70 dB HL.

Comment: Testing for dead regions in the cochlea has important implications for hearing aid fitting. Most of us have heard of the TEN test that will tell us if there are dead regions so we do not provide amplifications at those frequencies. This study was aimed at obviating the need for such a test if the dead regions could be reliably predicted from the pure-tone-audiogram alone. As it turns out, dead regions cannot be accurately predicted from audiometric thresholds alone although a sensorineural hearing loss in excess of 70 dB HL at a certain frequency indicates a cochlear dead region at that frequency.

www.ear-hearing.com/pt/re/earhearing/abstract.00003446-200704000-00009.htm

Reference: Ear Hear. 2007; 28(2):231-41

Neuromonics tinnitus treatment: third clinical trial

Authors: Davis PB et al

Summary: This study investigated the efficacy of the Neuromonics Tinnitus Treatment in 35 subjects with a predominantly moderate to severe level of tinnitus-related distress. They were randomised into one of two treatment groups, representing two variations of the treatment approach. At 2, 4, 6, and 12 months after commencing treatment, both groups experienced rapid and profound improvements in tinnitus distress, awareness, and minimum masking levels as well as loudness discomfort levels. Improvements occurred throughout the first 6 months of therapy, at which time 91% of all subjects across the two groups reported a ≥40% improvement in tinnitus disturbance (according to the Tinnitus Reaction Questionnaire). Further, 80% of subjects at 6 months reported a level of tinnitus disturbance that was no longer clinically significant. At 12 months, there were no statistically significant between-group differences. The authors conclude that the Neuromonics Tinnitus Treatment provides clinically significant reduction in tinnitus disturbance and improves quality of life.

Comment: This is a rehabilitation approach that has been around for a few years now, predominantly in Australia where it originated from. In NZ, it is currently available in Auckland. It involves the use of a sound player capable of delivering an extended frequency acoustic stimulation via a pair of high quality Bang and Olufsen headphones. This trial of the Neuromonics again showed its effectiveness in improving the severity of tinnitus and quality of life including sleep disturbances. However, it does come with a price tag similar to the price of a top end hearing aid.

www.ear-hearing.com/pt/re/earhearing/abstract.00003446-200704000-00010.htm

Reference: Ear Hear. 2007;28(2):242-59

Aging effects on the activation of the auditory cortex during binaural speech listening in white noise: an fMRI study

Authors: Hwang JH et al

Summary: The functional significance of age-related pathology of the auditory cortex was investigated in this study, which performed functional magnetic resonance imaging (fMRI) on 12 elderly subjects with normal hearing acuity during selective listening with both ears to speech sounds in quiet and in white noise. Twelve young, normal-hearing subjects served as controls. During selective listening to speech, activation of the auditory cortex decreased in elderly subjects compared to young subjects, especially in noise. Reduced activation occurred in the anterior and posterior regions of the bilateral superior temporal gyrus (STG), but mainly in the posterior part of the left STG. Testing also revealed that background noise had a greater masking effect on speech perception in the elderly subjects than in the young ones. The authors suggest that "early functional changes associated with central presbycusis occur mainly in the posterior part of the left STG".

Comment: This study demonstrated the usefulness of fMRI in unravelling some of the mysteries associated with listening to speech in noise that we so often observe with our older population. Much light has been shed upon the auditory processing difficulties in age-related hearing but there is nothing like having a direct window to the functional aspects of different parts of the brain. fMRI has, no doubt, taken auditory research to a totally new level.

http://content.karger.com/ProdukteDB/produkte.asp?Aktion=Citation&ArtikelNr=103209

Reference: Audiol Neurootol. 2007;12(5):9-18

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