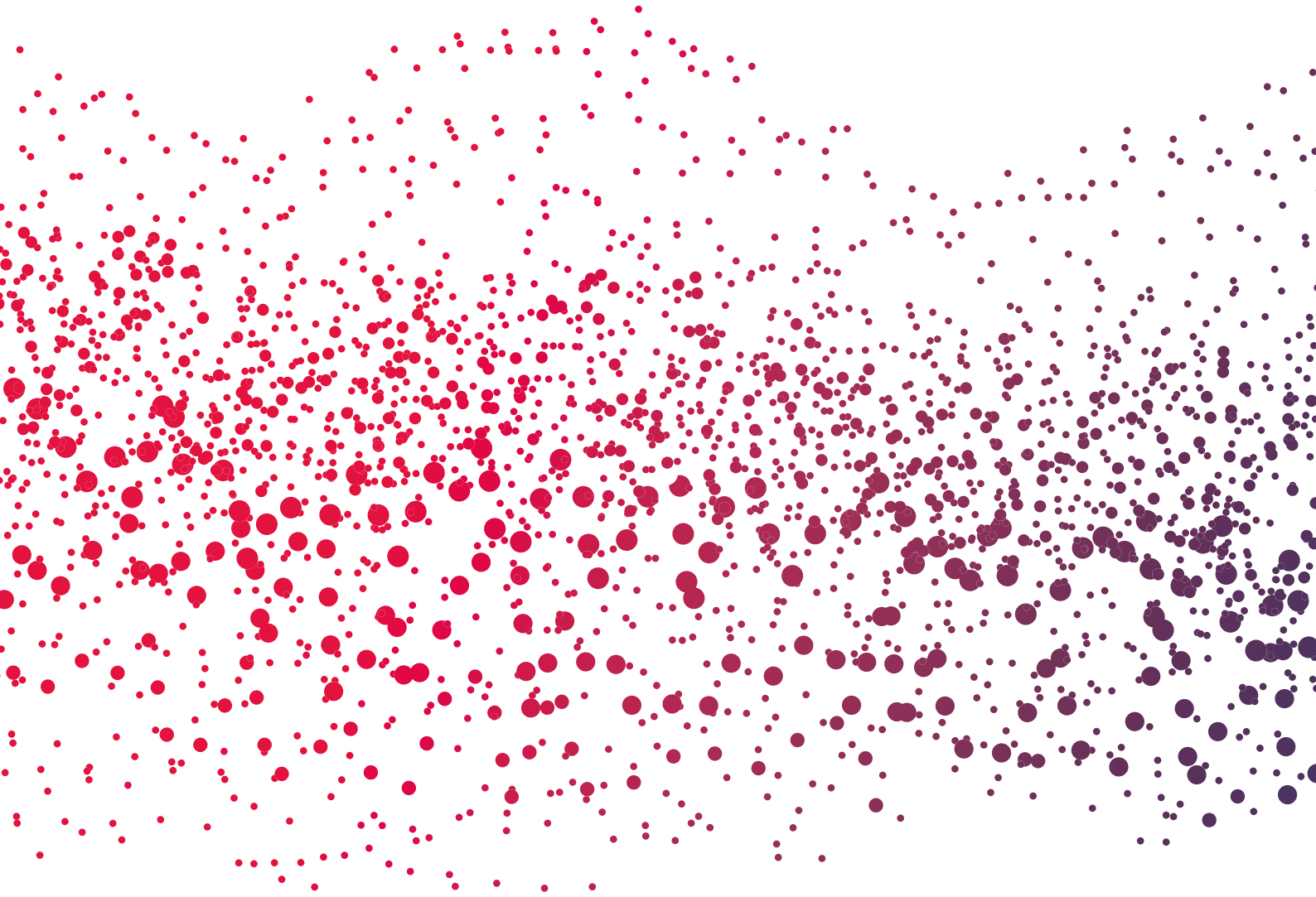
AMPLIFON CENTRE FOR RESEARCH AND STUDIES

CRS SCIENTIFIC JOURNAL

Otology & Audiology Article Review



APRIL 2014

Index

Assistive and Therapeutic Effects of Amplification for Auditory Processing Disorder

Keith, W J & Purdy, SJ

Seminars in Hearing. 35(1):27-38,2014.

The starting quote of the article is very intriguing- Individuals with APD (Auditory Processing Disorder) are often in appropriately described as "normal hearing"- since the audiogram cannot detect all aspects of auditory functionality.

This article is mostly an overview of the available research on how subjects with APD benefit from the use of Amplification – with the focus on FM systems. Since the main benefits of FM systems are improving the signal to noise ratio in noisy environments, reducing the negative aspects of speaker distance (speech energy) and reducing reverberation, it is not surprising that these systems improve the way that children with APD and dyslexia function in a class room environment. Further the use of these systems also has a positive impact on psychosocial aspects.

The main part of the article concerns the long term effect of the use of FM systems and neuro-plasticity. Multiple studies with a well-structured cross over design and using control groups show that FM systems really have a very positive impact and that the post treatment effects when the subjects stop using the system are significant. This even leads the authors to suggest that subjects with APD can stop using FM systems when they have used them for 2 years.

Overall the conclusion of the authors is that auditory training only has very limited effect on APD, except for treating "amblyaudia" (inter-aural asymmetry diagnosed with dichotic testing). A procedure called "ARIA" (Auditory Rehabilitation for Inter-aural Asymmetry) can correct this problem in four sessions per week for 4 weeks. It is recommended to correct amblyaudia before starting with binaural FM systems (Remote Microphone Hearing Aids). They also stress the essential need for expert professional support to ensure the full cooperation of teachers to optimise the benefits of amplification in the acoustically challenging environment of the classroom. This is best documented with this quote: *"Fitting remote microphone hearing aids in the clinic and leaving school liaison and teacher guidance to parents and children is a recipe for failure."*

There is no peer reviewed evidence that demonstrates the benefit of other types of amplification like traditional hearing aids or class sound field systems. All children with APD are candidates for the use of FM systems, even those who don't complain of having problems in noise.

Overall a very interesting article, that offers a very useful and practical intervention strategy for subjects with APD. Unfortunately the article lacks critical reflections on the use of FM systems and on the ARIA rehabilitation procedure. Preliminary results on a limited number of subjects (8 in the first study and 13 in the second) with the intensive training to "correct" amblyaudia are used as strong evidence? Field trials and studies sponsored by a manufacturer are so present in the reference list that it is somewhat suspicious.

Is Type 2 Diabetes Mellitus Associated With Alterations in Hearing?A Systematic Review and Meta-Analysis

Akinpelu, OV et al.

Laryngoscope, 124:767–776, 2014.

The prevalence of Diabetes type 2 progressively increased the last two decades. Multiple studies investigated the impact of Diabetes on the hearing function, mostly a negative impact was found, but other studies are non-conclusive. Recently Horikawa et al. concluded in their review of the available research, that there was a confirmed relation between Diabetes Mellitus (all types) and Hearing Loss. The meta-analysis in this study focussed on Type 2 Diabetes only.

2666 articles were identified and both title and abstract were reviewed. 67 articles were selected for full review of which 38 were excluded and 29 were assessed for quality. Finally, 18 passed both the content requirements and quality assessment.
Results of the meta-study confirm that mild hearing loss occurs more frequently in subjects with Diabetes Mellitus type 2 compared to the non-diabetic control groups. Below you can find the results of 6 studies where this aspect was studied. The odds ratio for the subjects with Diabetes also to present with a hearing loss is 1.91 – so subjects diagnosed with Diabetes Mellitus type 2 run a double risk to develop hearing loss.

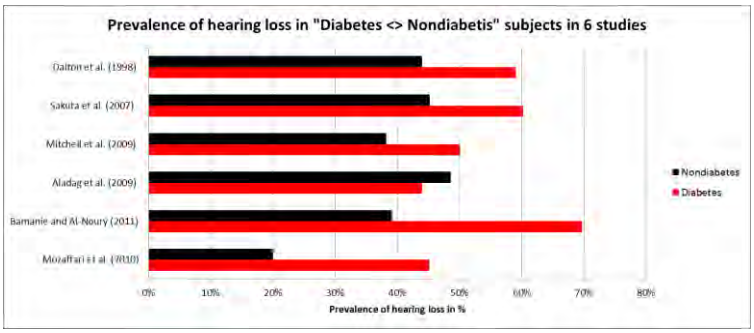


Fig 2: Prevalence of hearing loss for subjects with Diabetes Mellitus Type 2 compared to a non-diabetic control group.

Another finding of this meta-analysis is that the latency of Wave V in Auditory Brainstem Evoked Responses (ABR) tends to be significantly longer for subjects with Diabetes Mellitus type 2 than for the control subjects.

Very well designed Meta-Study reaching clear conclusions on the relation between Diabetes Mellitus Type 2 and hearing loss. The "Forest Plot" graphs used to document the odds ratio in favour of the control or experimental group for each study are very practical for this kind of study. Unfortunately the scale is not kept constant and the print resolution makes is hard to see the details.

Patient-centred audiological rehabilitation: Perspectives of older adults who own hearing aids

Grenness C. et al.

International Journal of Audiology 2014; 53: S68–S75.

Patient-centred care is becoming a widely spread concept in different areas of health care as an alternative to disease-centeredness or clinician-centeredness. Several health professions have proposed models for the clinical application of patient-centred care. For audiology, no such model has been proposed yet. In two studies, the authors focus on patient-centred audiological care from the audiologist's point of view and from the perspective of older adults who had experience of audiological rehabilitation.

A descriptive qualitative study examined patients' experiences and preferences for patient-centred audiological rehabilitation in a clinical setting where hearing aid fitting and managing was the major activity. All patients were experienced hearing aid users aged 60+.

Three categories describe participants' key-aspects for patient-centred care. The overall theme is individualised care; it is seen as the main ingredient to ensure that audiological rehabilitation was patient-centred for any given patient. Patients expect the audiologist to be flexible and to adapt to each patient's own needs.

Category 1: Therapeutic relationship: thrust and loyalty.

Since financial decisions and problem solving are important aspects of audiological rehabilitation, the patient should trust the audiologist under all circumstances. Trust is seen as the audiologist's responsibility. The development of trust is a complex phenomenon that might change over time, but it is basic to a positive therapeutic relationship. As a consequence of this positive relationship, patients describe a sense of loyalty.

Category 2: Players: Audiologist and patient

Most patients consider technical competence as important, but not sufficient for providing patient-centred audiological rehabilitation. They expect the audiologist to be an expert in hearing, hearing disability and hearing rehabilitation. Interpersonal skills in communication and professionalism are related to feeling unrushed or unpressured. Patients want to rely on the audiologist's professionalism and integrity, they don't want recommendations to be influenced by potential benefit to the audiologist.Patients recognise their responsibilities in the process, such as being motivated to ask questions, being interested and taking responsibility for their on-going care.

Category 3: Clinical process: Information exchange and decision-making/problem-solving.

All patients want to be informed. They describe a preference for different forms of information: written, oral and reliable online. Most participants reported having to ask for more information about why a particular hearing aid was right for them. Being informed is more than receiving information. Patients want to be involved in the process of decision-making and problem-solving. Patient-centred care includes informed decision making.

Other studies have shown that patient-centred care leads to better therapeutic outcome. The main ingredients are the presence of a strong therapeutic relationship, where the audiologist and the patient both have their responsibilities and share information to make decisions in bilateral understanding.

In a second study, the authors examined the preference for patient-centeredness by Australian audiologists. They noticed that Audiologists show the same preference as other clinicians. There is no effect of gender and employment status. There is a trend for older audiologists with more experience to be more patient-centred.

The first study shows the need of patients to be more involved in the audiological process, while the second one shows rather good scores form audiologists. It would be interesting to see a study where both are combined, and patients opinions are compared to the audiologist's perspective.

As the authors mention in the introduction, no standard has been set for patient-centred care in audiology, the new Amplifon M@P concept could be a useful model to implement patient-centeredness for Amplifon audiologists. All main ingredients of the patient's expectations as described in this article are present.

Acclimatization to Hearing Aids

Dawes P., Munro K.J., Kalluri S. and Edwards B.

Ear & Hearing 2014. 35 (2): 203 – 212.

Scientific evidence for acclimatisation associated with hearing aid use is mixed and all but one of previous studies have examined acclimatisation only to linear hearing aids. It would be reasonable to assume that experienced users would have largely acclimatised to their hearing aids after at least 1 year's use and that any further improvements in aided listening would be small in comparison to those in the new hearing aid user groups. So the aims of this research were to address the following questions:

1. Do acclimatisation effects exist with nonlinear digital hearing aids for improved aided speech recognition over time?
2. Are acclimatisation effects reflected in new hearing aid users' self-report of improvement in real-life listening situations?
3. Does acclimatisation differ between unilateral and bilateral hearing aid fittings?
4. What is the explanation for inter-individual variability in acclimatisation?
5. Is the amount of acclimatisation predictable from the severity of hearing loss, hearing aid use, or cognitive capacity?

Selected Results:

- Speech recognition in noise measured for a 65 dB SPL target with the Four Alternative Auditory Feature (FAAF) test. Figure 1 shows changes in FAAF performance after 12 weeks for each condition:
  - For the new unilateral group, no improvement for the non-fitted ear and small but insignificant improvement for both aided and unaided conditions.
  - For the new bilateral group, small, insignificant improvements on average across aided and unaided conditions for both ears.
  - For the experienced user group, no improvement for left ear and small but insignificant improvement for right ear in the aided condition.
  - Considerable variability or noticed in performance improvements in performance for all three groups.

- Self-reported change in performance was assessed using the Speech, Spatial and Qualities of Hearing Scale – Difference Version (SSQ-D) after 12 weeks for each condition:-
  - There was no change in the aided experienced user group but significant improvement in the aided new user groups.

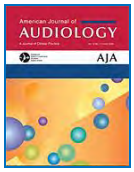
Conclusions

There was a small statistically significant improvement across conditions, consistent with a general practice effect. The practice effect detected in this study emphasises the importance of the use of a control group to avoid improvements in performance being wrongly interpreted as acclimatisation effects.

In the present study, new hearing aid users reported statistically significant improvement in aided listening compared to the control group of experienced users. This perceived improvement may relate either to an aspect of acclimatisation not measured in the present study or to factors other than acclimatisation which are associated with first-time hearing aid use, such as increased confidence or familiarity with hearing aids.

A well written article on a relevant and interesting subject which clearly challenges the expectation of acclimatisation effects in new hearing aid users which could just as likely be due to general effects of practice and familiarity with hearing aids over time. However, the significant variability between individuals does not allow for the categoric conclusion that acclimatisation never occurs. The effects of practice and increasing familiarity may be only part of the explanation for improved performance over time by new hearing aid users.

Better Together: Reduced ComplianceAfter Sequential Versus Simultaneous Bilateral Hearing Aids Fitting.



Lavie, L. et al.

American Journal of Audiology. Vol 23: 93-98.

We all know of the benefits of a binaural fitting when faced with a bilateral hearing loss. When given the choice in this situation, a lot of first time hearing aid users will select a monaural fitting stating that they may continue to a second aid fit if needed at a later stage. Reasons for this can be cosmetic, perceived maintenance issues and cost. This study compares initial binaural fittings with a second aid fitting one month after the monaural fit, and looks at user feedback and usage times.

36 participants were used, with 12 of these fitted binaurally (simultaneously) and the rest monaurally (sequentially) to start. Everyone had hearing losses which was sensori-neural in nature and mild – moderate in severity and all had a willingness to wear binaural devices. After the one month period all participants wore binaural devices. Everyone was seen every ten days for follow-up appointments and questionnaires were completed to subjectively grade compliance at the one and two month periods. Usage was taken from the data-logging features of the aids as an objective measurement of compliance.

Overall compliance for both categories was high after the first month (75-79%) but while the simultaneous group remained high after the second month, the sequential group compliance lowered compared to the first month data (Fig. 1 shows subjective questionnaire data).

Not only did the later addition of a second aid decrease overall satisfaction of the fitting but also lowered the perceived benefit of the first monaural device for some participants.

The study seems to demonstrate a clear preference towards binaural fittings. However, with this being the first study of its kind and having used a small cohort size, the results would benefit from being repeated for another study. Further research into this area would be helpful to see if the same data could be replicated with severe – profound cases and possibly performing a longitudinal study to evaluate how varying times between initial and second aid fittings affect the results. It is good that the authors also point out research contradicting the benefit of binaural fittings and do not take previous knowledge for granted. One area which did not seem to be looked into was the effect of varying fitting formulae between hearing aid styles (CIC and open fittings) and whether occlusion could be a variable for compliance. Overall, the paper can be used as a useful tool when counselling clients on appropriate hearing solutions for their degree of hearing loss and may reduce cancellations of a second aid further down the line. If someone were to be leaning towards a second aid being fitted at a later stage, they could make an ideal candidate for a month trial of binaural devices.

Clinical features of rapidly progressive bilateral sensorineural hearing loss.

Kishimoto, I. et al.

ActaOto-Laryngologica.2014; 134: 58–65.

Sensory Neural Hearing Loss (SNHL) is the most common spectrum of hearing losses that we encounter in our professional day to day work in Audiology. The time course of the patient's hearing deterioration may be particularly important in estimating the nature of the SNHL. Rapidly bilateral SNHL often develops as a symptom of intracranial disease or systemic vasculitis. To investigate this, a retrospective study was done to reveal clinical features and causative diseases for rapidly progressive bilateral SNHL.

12 subjects (with a median age of 62) were selected with average hearing thresholds greater than or equal to 50dB and difficulty in understanding daily conversation. If clients presented with a mixed loss they were not included as part of the study.

For diagnosing the causative disease of the SNHL, examinations such as, blood tests, culture tests, radiographic examinations and cerebrospinal fluid as well as the full auditory test battery were used. Analysing the results the causative diseases were categorised into five groups (1) intracranial lesions, (2) systemic vasculitis (3) auditory neuropathy (4) isolated inner ear disorders (5) and undefined auditory disorders.

Using these methods the researchers were able to pinpoint the cause of the loss and clinical symptoms

1. cryptococcal meningitis – fever, headache, dizziness and altered mentation
2. chronic herpes – fever and tinnitus
3. meningeal metastasis of lymphoma – fever and dizziness
4. superficial siderosis – dizziness and tinnitus
5. Cogan's syndrome – fever, headache and dizziness
6. vasculitis syndrome – fever, headache and altered mentation
7. auditory neuropathy - tinnitus
8. isolated inner ear disorders – tinnitus
9. undefined disorders – fever and backache.

The researchers found that rapidly progressive bilateral SNHL is rare, but it often develops as a symptom of intracranial disease or systemic vasculitis. If the causative disease is diagnosed early some clients may recover some hearing function (conditions, 1, 3, 9). If too much time has passed between onset and treatment then the treatment does not provide any benefit (conditions 2, 4 and 5). Thus supporting the view that early diagnosis followed by appropriate treatment and management can show hearing improvement.

Perceptions of Age and Brain in Relation to Hearing Help-seeking and Rehabilitation

Preminger J.E., Laplante-Lévesque A.

Ear&Hearing. 35-1: 19-29, april 2014.

Why do some people with hearing loss choose to seek help and only some of them follow through with treatment? This study uses a qualitative approach with Age and Brain being seen as the most important contributing factors.

34 hearing impaired adults, aged between 26-96 years, from 4 different countries were interviewed about their perspectives on hearing help-seeking and rehabilitation. Results show that participants see Age and Brain as the most important contributing factors for their hearing impairment, disability, help-seeking and rehabilitation.

Hearing impairment is typically associated with ageing (stigma), but some people see ageing and its influence on priorities and relationships with family and friends as a positive trigger to seeking help and rehabilitation (obtain and wear HAs). Some participants expect increasing hearing loss with older age which makes accepting hearing aids easier.

The interviewees think that training their brain can enhance speech communication (without use of HAs) whereas others think that training their brain helps to have a better outcome with HAs.

People also suggest that Ageing causes cognitive decline (Brain) which would decrease speech understanding. Therefore they assume that cognitive decline results in less effect from HAs and more difficulties with learning to wear HAs.

It is very important to use these findings to counsel/coach our clients. Earlier mentioned negative aspects about Age, Brain and hearing health care should be averted by explaining the existence of hearing aid features, assistive listening devices, communication strategies and auditory training. We should also explain the positive aspects about Age and Brain and hearing healthcare. Older brains still have the capacity to adapt to changes and to learning how to train their brain and hearing through audiological training programs.

Interesting article that shows expected contributing factors. Because these results seem so logical we have to be careful to keep on explaining these findings to our clients. Apart from brain and ageing, it seems that there were no other factors included. What would be the influence of environmental factors (family who help the hearing impaired to take the first steps?), personal factors (introvert/extrovert person?), what is the influence of the family doctor/audiologist/ENT specialist? The existence of the 'change curve' is also very important to keep in mind for why people wait to take the next steps for their hearing loss.

The acceptable noise level: influence of repeated measurements

Brännströmm J. et al.

International Journal of Audiology 2014 Jan;53(1):21-9.

What is the influence of repeated measurements of the ANL within one subject during one session on the ANL precision? There seems to be a large variability in ANL for one subject during one session which means we would have to rename the ANL as the 'acceptable noise range' (ANR).
The acceptable noise level (ANL) test quantifies the amount of competing background noise (BNL) that a listener is willing to accept when listening to speech at the most comfortable level (MCL).

32 normal hearing adults were tested during one session with 12 ANL repetitions and afterwards divided into 4 complete ANL-tests. The coefficient of repeatability (CR) was used to analyse the variance within subjects.

A small fatigue effect was observed after 12 repetitions. The coefficient of repeatability (CR) ranged between 3.9 and 7.6 dB within the 4 ANL-tests. The Standard Deviations seems to be stable at about 3 dB after 3 repetitions which means there might be an effect of order and fatigue. Subjects with a lower ANL (ANL < 0) at the first repetition scored much higher at the last repetition (+ 10.4 dB) than subjects with a higher ANL at the first repetition (ANL≥0; 1.4 dB increase of ANL). Subjects with a lower ANL might change their criterion for background noise during the session.

These findings suggest there is more an 'acceptable noise range' than an ANL. There would be a transition zone between willingness and unwillingness to tolerate background noise while listening to speech. This transition zone presents itself as variability in the ANL-test. This finding would have large implications for interpretation of ANL for hearing aid selection/prediction of hearing aid use.

Future research should also test hearing impaired persons. It seems very logical that there is an influence of fatigue after 12 (!) repetitions of the ANL – it's even surprising that the ANL only increases by 0,8 dB between the second and the 12th repetition. The results suggest it's advisable to start with a training ANL test before measuring the exact ANL? This research also indicates the importance of right instructions and interpretation of the subject.