

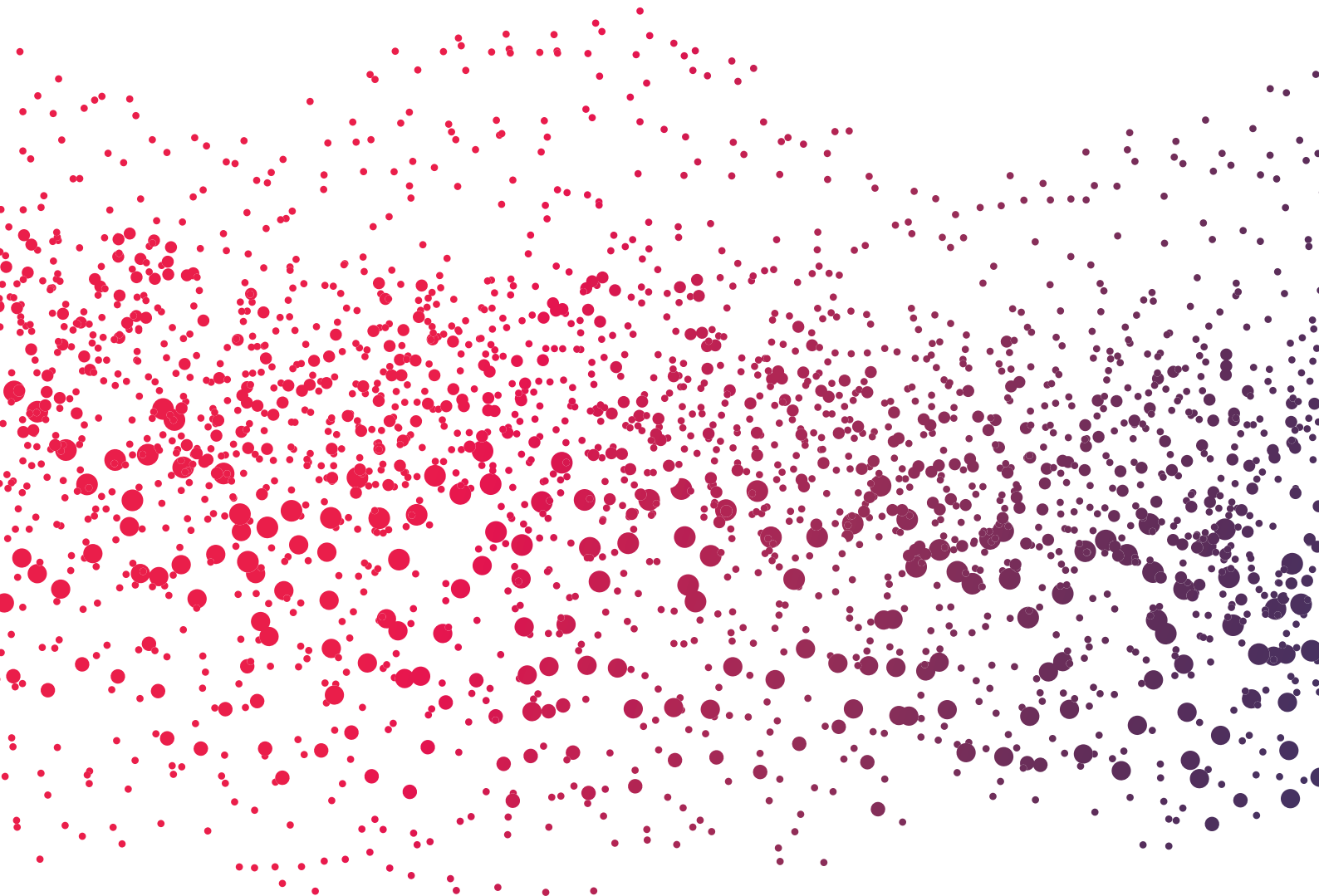
**AMPLIFON CENTRE FOR
RESEARCH AND STUDIES**



CRS SCIENTIFIC JOURNAL

Otology & Audiology Article Review

Volume 4
February 2021



Make Listening Safe:
Promoting earplugs
at music events

Acoustic Effects of Medical,
Cloth, and Transparent Face
Masks on Speech Signals

Increase Risk of Dementia
in Patients With Sudden
Hearing Loss

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The Amplifon Centre for Research and Studies, CRS, houses one of the finest private libraries in the field of audiology and otorhinolaryngology, offering the sector's most important international journals. Every quarter, a team of Amplifon Audiologists from around the globe select the most relevant publications in the field of Otolaryngology and Audiology and make a comprehensive review. The Amplifon Centre for Research and Studies coordinates the development of this quarterly review. We are happy to share this latest selection of reviews with you.

The opening article in this issue discusses how we can ensure that earplugs are used during music events. Simply handing them out for free is not enough, and needs to be complemented with a health promotion program. Even then, as this article reports, only 23% of the audience actually used the earplugs. As co-chair of the "Make Listening Safe" workgroup – an initiative of The World Health Organisation which is committed to creating a world where nobody's hearing is put in danger due to unsafe listening – I find this is very concerning.

The second covers a study on the relative impact of medical, cloth, and transparent face masks on the acoustics of the speech signal, and how we can fine-tune hearing aids and accessories to improve communication. This is highly relevant during this COVID-19 period, where communication in health care is so important. One practical conclusion from this article is that when using remote microphones, it is best to wear microphones placed on the lapel.

We also have two very interesting reviews on the relation between hearing loss and dementia. One covers changes in the Auditory Association Cortex in dementing illnesses; and the other is a Population-Based Cohort Study With 7-Year Follow-Up in Taiwan on the Increase of the Risk of Dementia in Patients with Sudden Hearing Loss. Please enjoy this new *CRS Scientific Journal*.

Mark Laureyns,
Global International CRS & Medical
Scientific Research Manager





PROMOTING EARPLUGS AT MUSIC EVENTS: EVALUATION OF THE CELEBRATE SAFE APPROACH



Crutzen R., Noijen J. & Peters GJY.

International Journal of Audiology
(2020), 1–6.

By Tom De Neve – Belgium

The results of this study showed that, at festivals where a health promotion program was ran, the use of earplugs was 62% higher compared to festivals where no such intervention was implemented.

According to the WHO (World Health Organization), 1.1 billion teenagers and young adults are at risk of developing hearing loss due to the unsafe use of personal audio devices and exposure to damaging levels of sound in noisy entertainment venues. In response to this, many countries have implemented regulations to limit the sound level and duration of music events. Some event organizers promote safe behaviours by placing the speakers further away from the crowd and offering appealing chill-out areas. However, some argue that visitors expect high volumes for a fully immersive experience and that it is their personal responsibility to engage in safe behaviours. This raises the question: how can such safe behaviours – distancing themselves from speakers, visiting chill-out rooms, wearing earplugs – be encouraged?

For this reason, hearing protection was included in the Celebrate Safe initiative, a collaboration between public health bodies and music event organizers. It is designed to encourage health promotion in nightlife settings by means of a systematic approach which is then used to identify possible “intervention activities.” This approach starts with a survey of visitors to music events in order to collect the most important determinants for unsafe behaviour and look for the most effective intervention measure to achieve safer behaviours – in this particular study, this focused on the use of earplugs.

Based on the survey results, the authors were able to identify four key determinants associated with not wearing earplugs: good fit; price-quality; difficulty remembering to wear earplugs; and not always knowing where to buy earplugs at the event.

A cluster-randomised controlled trial (k=15) was carried out to evaluate the effectiveness of the health promotion program based on these four determinants. The first part of the intervention was to **encourage organizers to**

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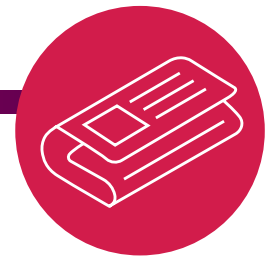
This highly relevant article encourages audiologists to remember that the effective use of earplugs at music venues goes beyond simply providing our clients with the best hearing protection. Their engaging in safe behaviours by wearing hearing protection at music venues is a direct result of measures taken to mitigate the most relevant determinants of the non-use of earplugs.

This article clearly demonstrates how an effective health promotion program can be set up using the methodology of behaviour change and provides the reader with several methodological tips to set up and evaluate an effective intervention.

Unfortunately, even with the implementation of this health program, only 23% of the audience wore earplugs. Therefore, much remains to be done.

inform visitors before the event: reminding them to bring earplugs to the event; informing them on where to buy good quality earplugs ahead of time; and that it might take some time to get used to wearing them. The second intervention involved **reminding visitors to wear earplugs directly after the security check.** The third intervention consisted in **increasing visibility of opportunities to buy earplugs directly at the venue.**

The proportion of event visitors wearing earplugs was assessed through observations. The results of this study showed that at festivals where the health promotion program was run, the use of earplugs was 62% higher compared to the control events where no health promotion intervention was carried out. Furthermore, the researchers found that in order to secure the commitment from event organizers in such health promotion initiatives, intervention activities should always be developed in collaboration with music event organisers. •



ACOUSTIC EFFECTS OF MEDICAL, CLOTH, AND TRANSPARENT FACE MASKS ON SPEECH SIGNALS



Corey RM., Jones U. & Singer AC.
Journal of the Acoustical Society of America (2020):
 148(4), 2371–5.
 By Pierre Devos – France

In this paper, the authors investigate the effects of different types of face masks on sound attenuation in order to identify possible solutions to help effective communication for the hard of hearing.

With this article, the authors set out to investigate the effects of different types of face masks on sound attenuation, in order to identify possible solutions to help effective verbal communication with masks. A total of 12 types of masks were tested – six different cotton density masks, surgical, KN95, N95, PVC window, vinyl window and plastic face shield – using a live talker and a head-shaped loudspeaker.

The results showed that masks had a very low acoustical effect under 1kHz and significant attenuation above. The surgical mask and the KN95 respirator produced the lowest effect, peaking at 4 dB. The cloth masks produced very different attenuations depending on the material of which they were made and the weave: the more breathable they are, the more sound filters through... and the less the virus is filtered out! The most significant

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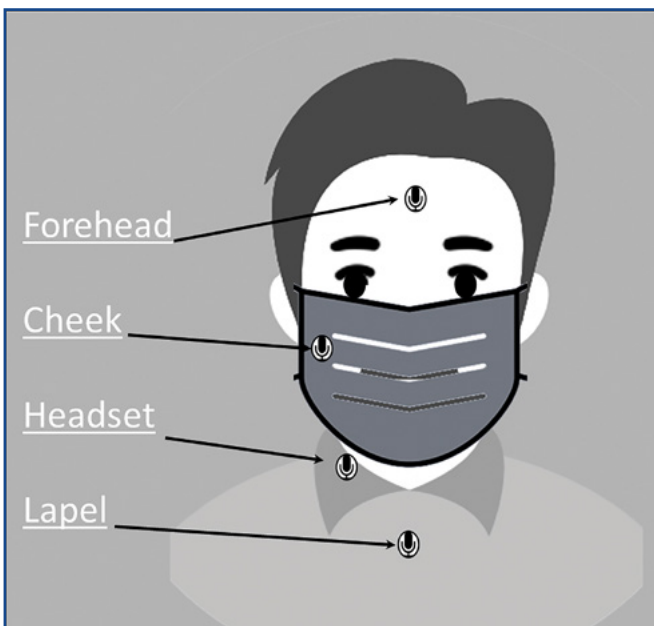
These findings are consistent with Amplifon France's own internal measurement which compared surgical masks and window mask (the French officially approved masks from the brand "Masque Inclusif®"), except for the high "plastic resonance peak" we measured around 1,5 kHz. Amplifon measurements were based on a X-mini Capsule loudspeaker recessed in a dummy head stimulation, recorded by a USB Dual Microphone MiniDSP H.E.A.R.S.

acoustical effect was noted for transparent masks with a reduction of 8 to 14 dB on high frequencies. Finally, a distorted resonance was found with the face shield around 800 Hz.

All measured attenuations were stronger in front of the talker. Transmission of the speech signal to the side (and rear) was less affected, which would indicate that speech reinforcement (and loss compensation) is possible with a remote microphone on the side.

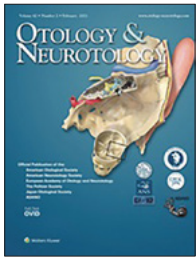
The authors also evaluated four different microphone placements. The placements yielding the best results were "Forehead" and "Lapel" – the latter being the most commonly used with FM and remote microphones systems in classrooms – even with window masks, with a maximal attenuation of 2 dB under 5 kHz and 5 dB above (the only exception was the plastic shield which amplifies and distorts the signal).

These findings suggest that remote microphones can compensate for the acoustic attenuation caused by face masks, particularly when using a lapel microphone, and that transparent masks can therefore offer an effective solution for hard of hearing who rely on visual cues. •





NOISE DAMAGE ACCELERATES AUDITORY AGING AND TINNITUS: A CANADIAN POPULATION-BASED STUDY



Jafari Z., et al.

Otol Neurotol (2020):
41(10), 1316–26.

By Majda Basheikh – Canada

This paper provides an analysis of the association between chronic noise exposure and tinnitus as well as age-related hearing loss. The study found that the group with chronic noise exposure had greater prevalence of all types of tinnitus.

Hearing loss (HL) is one of the most common progressive conditions in older adults. Presbycusis (age-related hearing loss, ARHL) presents as a gradual perceived hearing decline in older adults and is commonly associated with tinnitus. Tinnitus is also more prevalent in older adults. Studies have consistently established that both HL and tinnitus can result from chronic noise exposure (CNE). In this study, it is hypothesised that the severity of presbycusis and the occurrence of tinnitus is greater in individuals with CNE.

The study participants consisted of 928 individuals between the ages of 30 and 100, with the following characteristics:

- normal hearing or various degrees of HL
- individuals with HL (and ARHL) reported in both ears
- tinnitus reported to be unilateral or bilateral, constant or intermittent, and present for at least six months
- participants included both those with and without reports of CNE
- cases with CNE related to a long history of occupational noise (typically in industries such as the food industry, the steel industry, construction, etc.)
- cases with other known risk factors for tinnitus and/or HL were excluded from this study (e.g., chronic ear infection or known ear diseases, diabetes, family history of HL, etc.)

Comprehensive audiological evaluations were conducted on all participants. This included audiometric evaluations at 250 Hz through to 8000 Hz, word recognition scores (WRS), and tympanometry. Individuals with abnormal tympanograms were excluded from the study. Multiple statistical analyses were performed on the collected data to further analyse the relationships between CNE, ARHL, and tinnitus.

CRITICAL NOTE

Chronic noise exposure has deep physiological impacts via changes in both middle ear function and inner ear function. Greater loss of hearing thresholds and decline in WRS, increase in static compliance of the tympanic membrane, and greater prevalence of tinnitus were all observed in individuals with a long history of occupational noise exposure. Age-related auditory changes are therefore likely to be more severe in patients with chronic noise exposure.

Study participants were divided into two main groups: the control group (no history of CNE); and the CNE group. The following findings were made:

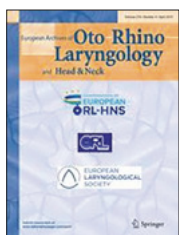
- a progressive decline in hearing thresholds with age was observed in both groups
- decrease in pure tone average (PTA), WRS, and tympanic compliance with increasing age
- in the CNE group, hearing thresholds and tympanic compliance were significantly greater than in the control group (for most age groups)
- the PTA of the CNE group exceeded normal hearing thresholds (>25 dB HL) by decade three, whereas the control group exceeded PTA of 25 dB HL by decade five
- the CNE group had a greater decline in WRS with increasing age than the control group
- greater prevalence of tinnitus with increasing age
- the CNE group had greater prevalence of all types of tinnitus (unilateral/bilateral, constant/intermittent)
- greatest prevalence of tinnitus was demonstrated by the sixth decade in both groups
- a significantly greater percentage of men than women reported chronic noise exposure (CNE group consisted of 91.3% male, 8.70% female)

• although females presented with greater low-frequency hearing decline than males, no other audiometric differences were found between the different sexes. This study demonstrated the significant impacts of CNE on hearing acuity and tinnitus. Although a gradual

decline in HL is anticipated with age, results indicated that CNE accelerated the decline by at least two decades. This outcome in addition to the higher prevalence of tinnitus with CNE ultimately suggest that the auditory aging process is sensitive to acoustic trauma. •



HEARING AIDS ARE STILL BENEFICIAL TO PATIENTS, EVEN IF THEY HAVE A LOW SPEECH DISCRIMINATION



Kim H., et al.
European Archives of Oto-Rhino-Laryngology (2020): 277, 2987–94.
 By Majda Basheikh – Canada

This study examined the effectiveness of hearing aids in patients with poor speech discrimination scores (SDS). The results indicated an overall improvement in SDS in all groups following a year of wearing amplification.

Hearing aids (HAs) are the most prescribed treatment option for individuals with hearing loss (HL). Results vary, however, based on numerous factors including one's motivation and ability to adapt to amplification, as well as one's residual hearing ability. Speech Discrimination Scores (SDS) are a standard measurement for examining a patient's ability to recognise and repeat spoken words, thereby giving an overall indication of one's communicative ability. It is expected that individuals with higher SDS will perform better with HAs than those with lower SDS. This study specifically examines individuals with lower SDS and their outcomes with HA amplification.

In this study, 186 ears of adult patients (20 years old and older) with bilateral HL and an SDS of less than or equal to 64% were prescribed amplification. The subjects were categorised into four groups based on their SDS scores: Group 1 (0-16%); Group 2 (20-32%); Group 3 (36-48%); and Group 4 (52-64%). Various styles and manufacturers of HAs were fitted in the study. The

following audiometric measures were conducted at one, three, six, and 12 months following HA fitting: unaided pure tone audiometry (PTA); unaided SDS; and aided SDS to assess the efficacy of the hearing aid fitting in the presence of environmental noise. The Hearing In Noise Test (HINT) was performed three months after HA fitting. Furthermore, the Hearing Handicap Inventory for the Elderly (HHIE) and International Outcome Inventory for Hearing Aids (IOI-HA) were used to examine subjective outcomes of HA use and degree of satisfaction. Both questionnaires were completed at three months after HA fitting. The Wilcoxon's signed-rank test was used to analyse the changes in SDS, Hearing Handicap Inventory for the Elderly (HHIE), and HINT values before and after HA fitting. Analysis of variance was also used to compare International Outcome Inventory for Hearing Aids (IOI-HA) scores between the different group categories. The results indicated an overall improvement in SDS in all groups following a year of wearing amplification. Groups 1, 2, and 3 demonstrated the greatest improvement in SDS scores by 27.4%, 26.4%, and 24.6%, respectively.

Group 1 (with the lowest SDS) had the greatest increase in SDS; whereas Group 4 (with the highest SDS) had only a 10.5% improvement in SDS. Results from the HINT test also indicated that use of HAs (statistically) significantly improved the patient’s hearing ability in noisy environments for groups with the lowest SDS (Groups 1 and 2), as well as Group 4. HINT scores decreased for these groups following amplification, thereby indicating that HAs significantly improved speech understanding in noise. Changes in HHIE scores were only statistically significant in Groups 2 through 4, whereby reported data indicated reduction in perceived hearing disability. IOI-HA scores did not highlight any significant differences between the various groups, as they all reported similar levels of satisfaction with HAs.

This study emphasised the benefits that patients with low unaided SDS gain from amplification. Clinically, it is expected that individuals with the highest levels of SDS will adapt and cope better with amplification. Groups 1 and 2 had the lowest unaided SDS scores, but the greatest improvement in SDS scores, as well as the most significant improvement in HINT scores. This confirms that amplification is still beneficial for individuals with

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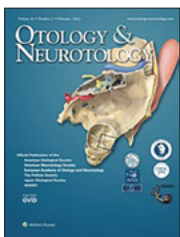
The findings in this study demonstrate that individuals with lower SDS should not be discouraged from adopting amplification, as multiple measures have indicated the extent of their potential benefit. It is critical that we continue to educate all patients, regardless of SDS scores, about evidence-based benefits and limitations of amplification, thereby fostering more realistic expectations towards amplification and, in so doing, that we encourage more of our patients to adopt them.

low SDS, even in the presence of noise. A low SDS score does not necessarily negatively impact an individual’s success with amplification. It should be noted that the HINT and questionnaires could not be performed on all subjects in this study, and there was no control on the different types and manufacturers of HAs that were used. Although this study could have benefited from more data and control against potential biases, it nonetheless supports the notion that patients with lower SDS scores can still expect to achieve benefits from amplification. •



CHANGES IN THE AUDITORY ASSOCIATION CORTEX

IN DEMENTING ILLNESSES



Aylward A., et al.
Otol Neurotol (2020):
 41(10), 1327–33.
 By Thomas Zacharia – Australia

This study was designed to identify the effect of cognitive impairment (Alzheimer’s disease, mild cognitive impairment, and patients with a mini mental state examination scores of ≤ 25 versus ≥ 25) on the grey matter density of the primary auditory cortex and the auditory association area.

Hearing loss (HL) and dementia are the two most common chronic conditions among individuals above the age of 65. Even though HL is considered to be

an independent risk factor for cognitive impairment, it is not clearly understood whether this is due to a neurobiological susceptibility, cognitive overload due

to brain resource reallocation, psychosocial factors or the influence of hearing loss on the performance of the cognitive test.

The primary auditory cortex (A1) is tonotopically organised and reflects the incoming sound from the cochlea, and performs the initial sound processing and localisation. The auditory association area (AAC) is for higher level sound processing. The aim of the current study is to establish whether there are any structural changes to the A1 or the AAC, or both, in cognitive impaired populations based on the grey matter density using high resolution MRIs.

This retrospective case-control study analysed patient data such as age, sex, clinical dementia diagnosis, Mini-Mental State Exam (MMSE) scores, Montreal Cognitive Assessment scores (this was converted to MMSE scores), handedness, and MRIs, which were collected from the Center for Alzheimer’s Care, Imaging, and Research (CACIR) database.

CRITICAL NOTE

This study proposes that HL may lead to changes in the auditory cortex, which in turn, leads to dementia; or that HL can cause both dementia and changes to the auditory cortex. Moreover, based on the results the authors further hypothesise that the auditory association cortex might be the area of selective vulnerability in dementing illness.

The data analysis revealed a statistically significant reduction in grey matter density of the AAC in patients with Alzheimer’s disease (AD) when compared with mild cognitive impairment (MCI) patients. This change was also observed in individuals with a higher MMSE score. No such atrophy was observed when analysing the A1. This would seem to indicate that the auditory signals do indeed reach the primary auditory area intact, but are processed in a dysfunctional way. •



INCREASE RISK OF DEMENTIA IN PATIENTS WITH SUDDEN HEARING LOSS: A POPULATION-BASED COHORT STUDY WITH 7-YEAR FOLLOW-UP IN TAIWAN



*Lin CC., Lin HC. & Chiu HW.
Otol Neurotol (2020):
41(10), 1334–40.
By Reddy Sivaprasad – India*

In this retrospective study, the authors examined individuals above 40 years of age with a diagnosis of sudden hearing loss. The prevalence of dementia in these individuals was 20 per 1,000 individuals, and the risk ratio for developing dementia was 1.6. Since the study used a longitudinal design, the validity of the results is high.

Sudden hearing loss (SHL) is characterised by an abrupt onset of hearing loss (HL) greater than 30 dB in one or both ears within a timeframe of 72 hours. Several studies have clearly demonstrated a correlation between HL in the elderly and cognitive decline. However, the underlying etiology of this association has not yet

been clearly identified. The authors report that only two case studies have explored the existence of such a link, and both confirmed the presence of dementia associated with SHL.

This retrospective study used the Taiwan national health insurance (NHI) database to investigate the prevalence

and risk of subsequent dementia in individuals with SHL compared to age and gender matched cohorts within a follow-up period of seven years.

The study sample was comprised of 1,858 subjects with SHL and no associated risk factor who were above 40 years of age, and 9,290 control subjects. At the end of the seven-year period, a total of 89 subjects and 478 were still alive in the study cohort group and in the comparison cohort group, respectively.

Results indicated that the incidence of dementia was 20 and 8 (per 1,000 individuals) for the SHL group and the control group, respectively. This led to the establishment of a hazard ratio (indicative of subsequent risk of dementia) of 1.69 in individuals with SHL compared to those with normal hearing.

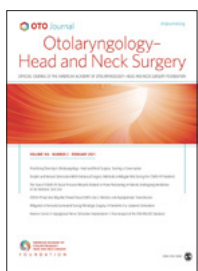
The authors posited that existing hypotheses linking HL and dementia – the cognitive load on perception hypothesis and the common cause hypothesis – could also be the underlying mechanisms causing people with SHL to develop dementia. The study concluded with a successful estimation of prevalence and risk measures in this population. •

CRITICAL NOTE

The statistical tests presented in this study and the sampling were all done with great care. However, the study presents the usual limitations of a retrospective study. Moreover, it needs replicating in order to understand the extent to which genetic mechanisms can influence the results.



HEARING VITAL SIGNS: MOBILE AUDIOMETRY IN THE EMERGENCY DEPARTMENT FOR EVALUATION OF SUDDEN HEARING LOSS



Lubner RJ., et al.
Otolaryngology Head and Neck Surgery (2020): 163(5), 1025–8.
 By Angela Ryall – Canada

Thanks to this study, the authors successfully demonstrate that mobile audiometry can provide information quickly during the time-sensitive process of sudden hearing loss complaints in the emergency room.

To date, there have been no recorded investigations of using mobile audiometry as a screening tool in hospitals. The authors investigated the accuracy of a mobile screening tool in the emergency room for individuals reporting sudden hearing loss (SHL) for comparing the individual and consecutive thresholds to conventional audiometry thresholds.

Twenty-three adults (12 females, 11 males; 55.9 ±17.6 years old) with complaints of SHL within a two-week period were recruited into the study. Participants

completed a self-administrated mobile hearing screening using “Shoebox” software on an iPad with headphones (supra-aural DD450 headphones from RadioEar) in the emergency department at the hospital. Participants were tested again later that day by an audiologist in a sound booth using an audiometer. Air conduction thresholds were obtained at 250; 500; 1,000; 2,000; 4,000; and 8,000 Hz in both settings. Any threshold greater than 20 dB HL at any frequency was defined as HL and any threshold in three consecutive frequencies with 30+ dB HL was considered SHL.

Overall, 77.1% of the thresholds (n=249) obtained in the emergency department with the iPad were within 5 dB of the conventional thresholds, and 89.7% were within 10 dB of the conventional thresholds. Additionally, 76 screening thresholds were identical (0 dB difference) to the conventional audiogram, and 26 screening thresholds had differences greater than 10 dB compared to the conventional threshold.

The researchers concluded that the mobile audiometry was 92.2% sensitive and 81.5% specific for detecting HL at a single threshold. In terms of frequency-specific differences, there were statically significant differences for the average thresholds at 250 and 500 Hz between the screening and conventional test but these differences were less than 5dB; no difference

was found at 1,000, 2,000, 4,000, and 8,000 Hz. In total, 15 (65.2%) participants had SHL according to the previously defined criteria, which was present in both the screening and conventional audiometry. The researchers concluded that the mobile audiometry screening tool was 100% sensitive and 62.5% specific for detecting SHL.

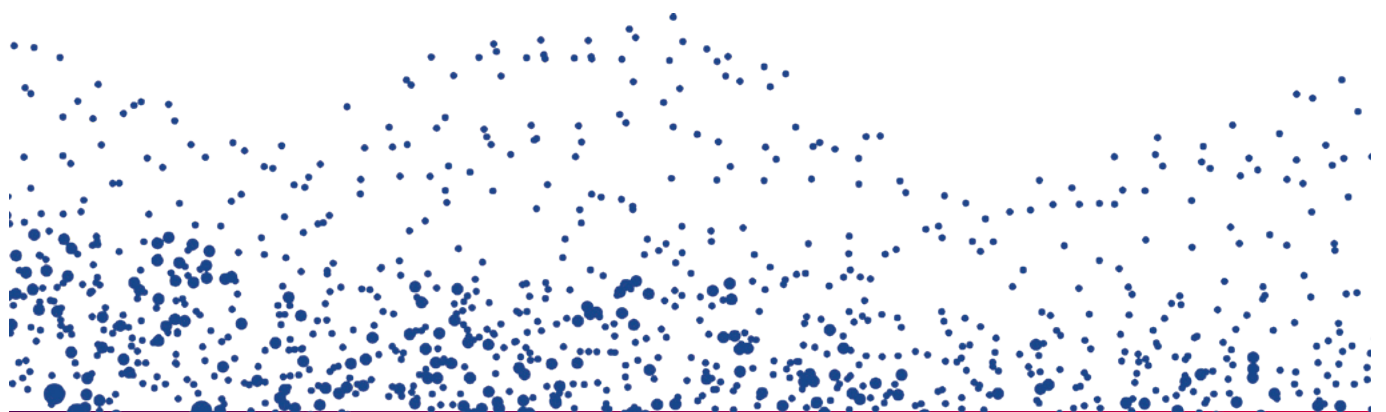
This study demonstrates that mobile audiometry is an excellent screening tool for detecting HL. Mobile audiometry can provide information quickly during the time-sensitive process of SHL complaints in the emergency room. Because prognosis of SHL relies heavily on the time elapsed from time of onset to time of treatment, providing information early on in the process may offer opportunities for earlier treatment initiation for patients. •

CRITICAL NOTE

This article is clinically relevant as there has been an increase in cases of SHL over the past few years. There should be documented procedures and treatment plans in place for helping these patients and potentially improving their prognoses.

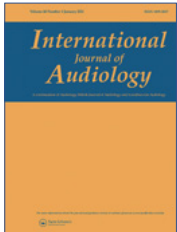
Although the sample size in this study is small, the results from the mobile screening were very similar to those obtained via conventional audiogram, which is all the more interesting considering the mobile screening was conducted in a non-sound-treated room. The researchers only investigated air conduction thresholds meaning some bone conduction information from patients (e.g., mixed HL) may not have been discussed.

Overall, I support the idea of incorporating mobile screening tools in hospitals to assist hearing health care professionals in potentially providing treatment for sudden losses earlier. The researchers also provided a flow chart treatment plan that can easily be deployed in any hospital.





INCREASING TELEPHONE ACCESSIBILITY FOR WORKERS WITH HEARING LOSS: A SCOPING REVIEW WITH RECOMMENDATIONS



Koerber R. & Jennings MB.
International Journal of Audiology
(2020): 59(10), 727–36.
By Katrien Hoornaert – Belgium

This article summarises different strategies workers with hearing loss use for managing hearing challenges on the telephone. It is a real must-read for all audiologists. The overview and strategies are very clear and practical.

This article summarises different strategies used by workers with hearing loss (HL) for managing hearing challenges on the telephone.

These practical tactics were identified based on a systematic review of 84 texts found in articles published between 1980 and 2019:

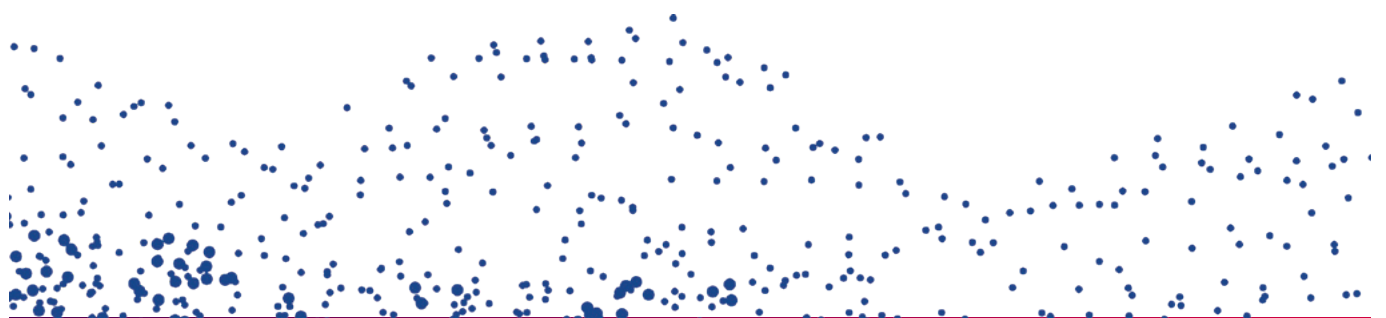
1. amplifying the signal, if possible, frequency-specific
2. reducing background noise
3. bilateral listening

CRITICAL NOTE

This article is definitely a must-read for all audiologists. The overview and strategies are very clear and practical. The only drawback is that new wireless functionality in HAs, directly communicating with both IOS and Android smart phones, are not included in this review. Since these technological developments offer good functionality without the need of any extra hardware or Assistive Learning Device (ALD), it is important these be considered in the range of possible solutions.

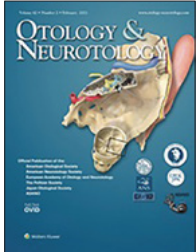
4. text-based communication and captioned telephone
5. using internet-based telecommunication: additional frequency bandwidth and visual cues when video is used.
6. coupling hearing aids with telephone: acoustic, telecoil induction or wireless (Bluetooth)
7. selecting appropriate mobile and digital phones.
8. improving hearing aid users' telephone skills
9. improving users' telephone communication tactics
10. requesting accommodation for telephone work
11. accounting for individual differences

The authors conclude that people with HL may no longer be able to continue in employment if they are not provided with a solution to use the telephone. In most cases, fitting hearing aids (HAs) is not enough. This scoping review identified that the most effective strategies include: amplifiers for the telephone signal; transmitting the telephone signal through both HAs; calling in a quiet environment; and selecting telephones that work well with HAs. These findings offer important insights which can be useful to employees, employers as well as healthcare professionals. •





EAR PREFERENCE AND INTERAURAL THRESHOLD ASYMMETRY



Chang JL., et al.

Otol Neurotol (2020):
41(10), e1178–84.

By Paul Van Doren – Belgium

A group of 70 subjects answered an e-mail survey where they filled out a check list and a visual-analogue scale to rate and categorise their ear preference. The authors established a strong correlation between self-reported values and measured thresholds, indicating these scales can play a relevant role at an early stage.

In this cross-sectional study, the authors argue that querying ear preference in routine clinical practice could help identify patients with asymmetric hearing and promote timely evaluation and treatment.

For this study, 259 participants with all types of hearing conditions were recruited by means of an e-mail survey. On a check list and a visual-analogue scale, they categorized themselves on the preferences for one ear. The group consisted of patients with normal hearing (25%), symmetric hearing loss (32%) and asymmetric hearing loss (43%). The Speech, Spatial, and Qualities of Hearing scale (SSQ) administered to a subgroup of 70 subjects (Speech – Spatial – Quality of Hearing; Noble, Gatehouse).

The seven-point checklist ranges from “completely dependent on left ear”, to “completely dependent on right ear” through “both ears are the same”. On the visual-analogue scale they indicated their answer with an “x”.

The results of the survey were then compared with threshold audiometry data collected from the same participants.

The classification of the asymmetry was defined on the maximal interaural difference of two subsequent

CRITICAL NOTE

Although there is a possible bias in this study due the fact that some of the respondents already knew their audiometric results, the results seem to indicate that the use of the scale is sensitive for relatively small asymmetric losses (from 15 dB on only two subsequent thresholds). This suggests that this scale is a very useful basic tool in the early identification of hearing problems, and could be used easily in our hearing centres for the rapid detection of what further diagnoses might be required.

thresholds in a range from 0.25 kHz to 8 kHz. Four categories were defined: <15; 15 – 29; 30 -44; and > 45.

The authors found a significant correlation between the scale and the checklist. When comparing these results with the measured hearing loss (HL), they found a good correlation with the scale and the SSQ scores.

Keeping in mind that asymmetric loss has consequences on binaural processing, such as sound localisation, separating competing voices and understanding in noise, it is important to identify these deficits as early on as possible. The visual-analogue scale is therefore an easy instrument for collecting difficulties – even remotely – at an early stage and for remediating them sooner. •



ETIOLOGY OF PRELINGUAL HEARING LOSS IN THE UNIVERSAL NEWBORN HEARING SCREENING ERA: A SCOPING REVIEW



Satterfield-Nash A., et al.

Otolaryngology – Head and Neck Surgery (2020): 163(4), 662–70.

By Reddy Sivaprasad – India

In this review, the authors offer an overview of 20 studies which discuss the universal newborn hearing screening and the etiology of prelingual hearing loss. Genetic and other causes of prelingual hearing loss were reported by these studies.

Prelingual hearing loss seen before two years of age can significantly affect speech and language development. Universal new-born hearing screening (UNHS) programs are being conducted across the globe to detect this condition at birth and implement the necessary interventions to prevent speech and language delays. The authors conducted a scoping review to identify the extent to which UNHS programs are facilitating identification of HL in infants and also to explore the etiology of HL reported in these publications.

The review includes studies from all around the world, published between 1998 and 2020 and found in medical

CRITICAL NOTE

Although the presentation of the results was wordy and the statistical techniques were basic, its findings are so encouraging, that the next versions of newborn screening programs could take cues from here. Depending on the more prevalent cause/gene, in addition to identifying hearing loss, screening programs should also examine etiology

database. A total of 20 studies met the selection criteria. These studies reported results from 2,149 children, 1,787 of whom with etiological investigation.

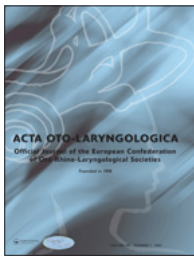
Based on this review, the authors found that:

1. screening referral rate varied from 0.2 to 3.4%.
2. prevalence of congenital hearing loss varied from 1 to 6 per 1,000 newborns screened.
3. six studies examined genetic causes: sequenced genes – GJB2, GJB3, GJB6, SLC26A4 – and mitochondrial mutations of MT-RNR1 and MT-TS1. The number of referrals attributable to genetic mutations ranged from 14 to 83 depending on the country.
4. the proportion of HL cases attributable to congenital cytomegalovirus (CMV) infection 3 ranged from to 32%.

Very few studies have carried out hearing screening along with etiological screening. The results vary widely due to differences in methodology, population size and characteristics as well as geographic differences. The authors concluded that availability of such data would help improve screening and intervention methods. •



CURRENT STATUS ON RESEARCHES OF MENIERE'S DISEASE: A REVIEW



Liu Y., Yang J. & Duan M.
Acta Oto-Laryngologica (2020):
 140(10), 808–12.
 By Reddy Sivaprasad – India

This article provides a comprehensive review of updates in understanding Meniere's disease. New diagnostic techniques, new diagnostic criteria, new audiological techniques, updates on histological findings, updates in treatment options are the highlights of the study.

The diagnosis of Meniere's Disease (MD) is based on a combination of symptoms including: episodic vertigo with neuro vegetative symptoms; sensorineural hearing loss; tinnitus or aural fullness. To date, research on this condition has not offered clarity on the underlying pathophysiology, especially, the relationship between MD and endolymphatic hydrops (EH). For example, thanks to MRI techniques, the presence of EH has been identified both in symptomatic and asymptomatic patients. This review summarised the research updates on epidemiology, pathophysiology, diagnosis techniques and management for MD.

1. HISTOPATHOLOGY AND MECHANISM

In early histopathological studies EH was considered mandatory for diagnosing MD. Recent findings indicate EH is a histologic marker but not the true cause. Other observable histologic markers are: ischemia of stria vascularis; fibrous tissue in saccule; atrophy of the saccule; hypoplasia of vestibular aqueduct, etc. New findings indicate several anomalies in the vestibular nerve such as corpora amylasea. Genetic anomalies such as DPT and SEMA3D gene mutations were associated with MD. Immunological studies have shown the presence of possible autoantigens that can damage inner-ear structures mediated by nuclear factor-kb.

2. DIAGNOSIS

Diagnosis relies mainly on medical history, clinical symptoms combined with results of auditory and vestibular function. AAO-HNS (1995) proposed four types of MD symptoms and hearing thresholds (certain MD, definite MD, probable MD, possible MD). The Barany Society (2015) proposed two types – definite

CRITICAL NOTE

The article provides a comprehensive summary of developments in various aspects of MD diagnosis and treatment. While the foundation of the research is interesting, greater details on new tools and techniques would make practical applications of these findings much easier readers. The format of the review was more academic in nature.

and probable MD. New MRI techniques such as the Rapid acquisition with relaxation enhancement (RARE) have made it easier to identify EH. Imaging studies have poor correlation with auditory and vestibular function tests such as audiograms, distortion product otoacoustic emissions (DPOAEs). Hence, the presence of EH can, at best, be considered a histological feature. Electrocochleography (ECoChG) ratios such as the SP/AP has been used successfully in the diagnosis of MD. Cervical Vestibular-evoked myogenic potentials (cVEMPs) recorded 60 min after injecting Furosemide can detect abnormal enhancement of saccular function in MD patients. Video-head impulse test (vHIT) results are normal in MD patients while the caloric reflexes are rarely shown to be normal. This contrast can also be used for diagnosing MD.

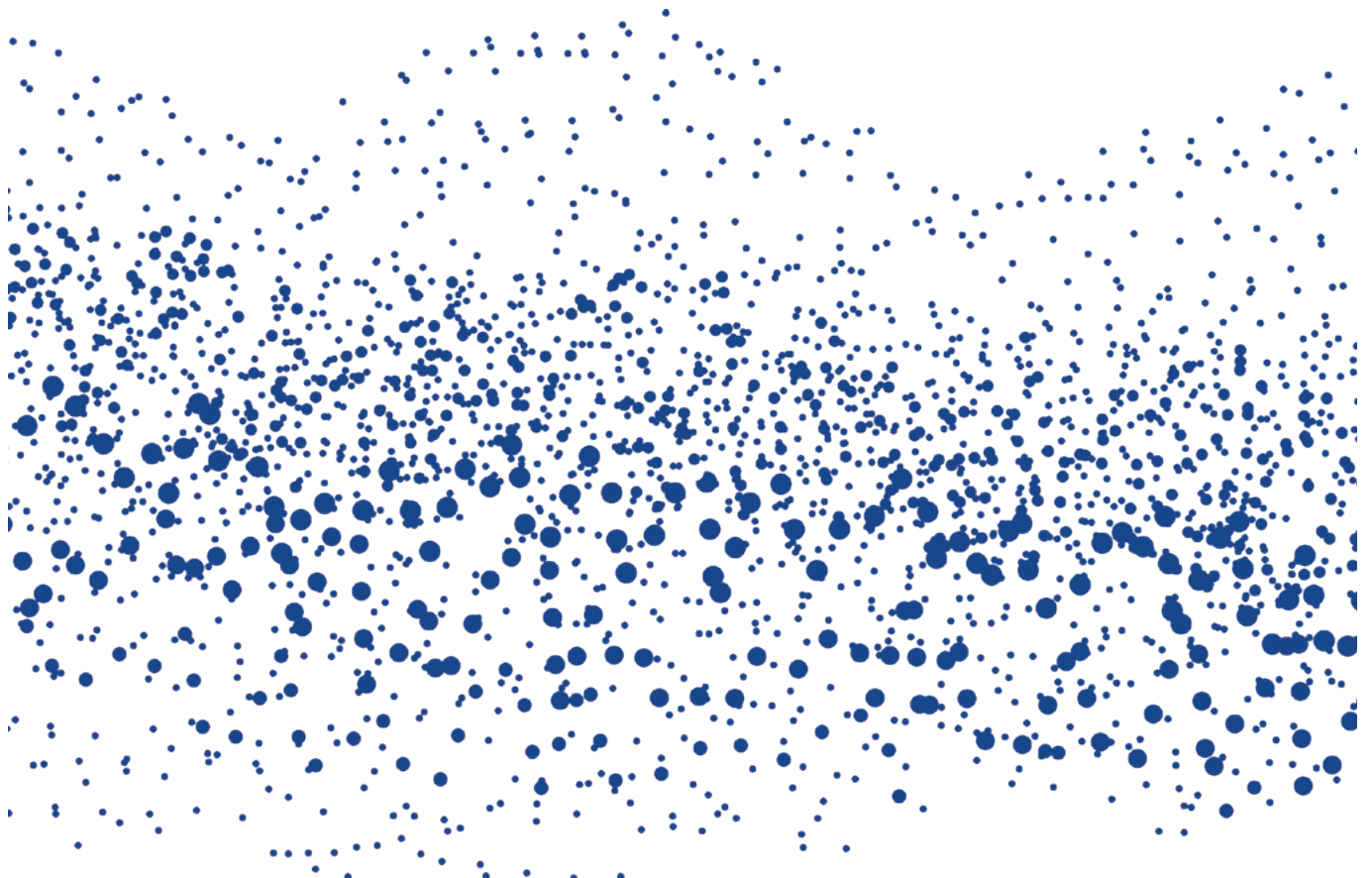
3. MANAGEMENT

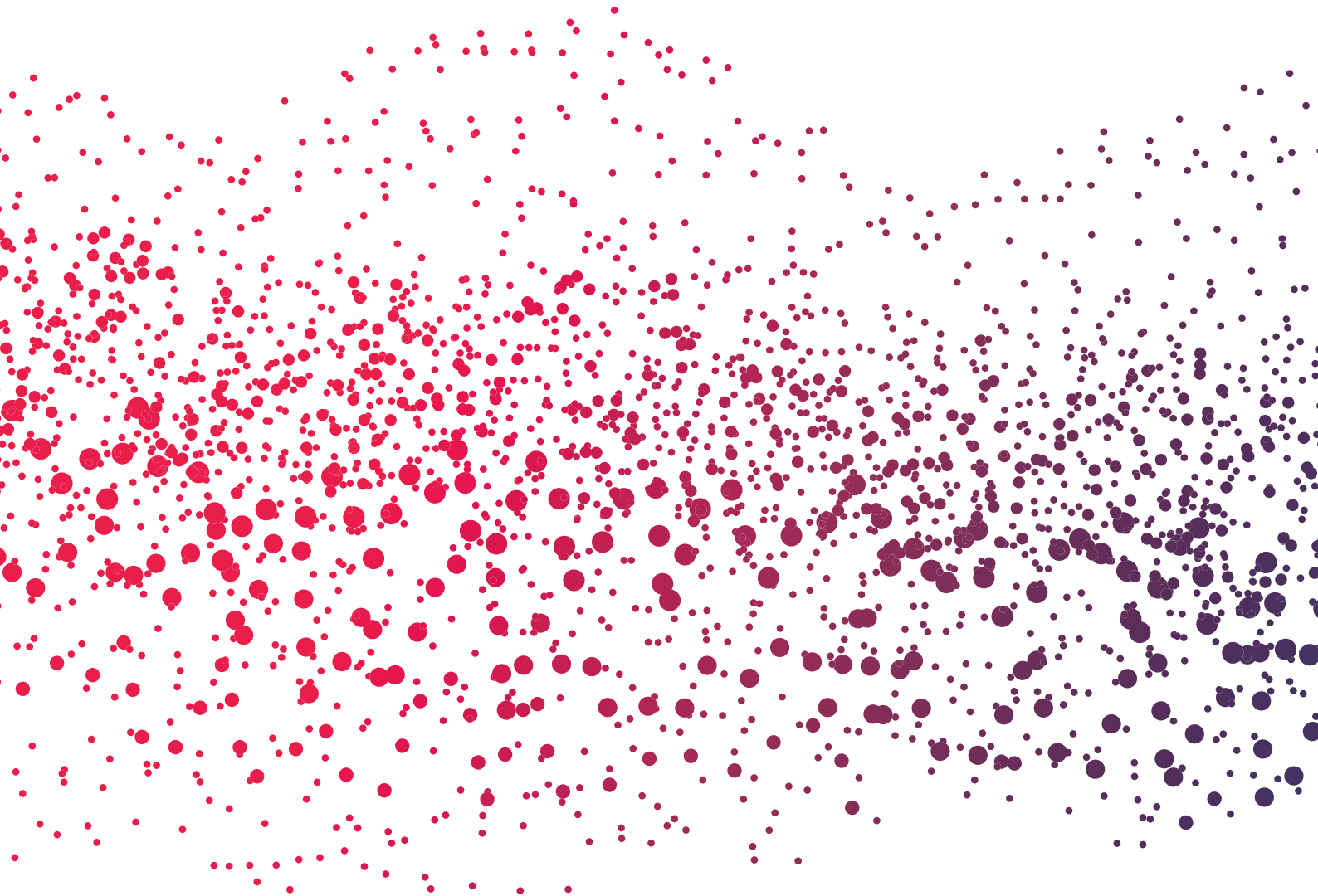
From the regimes proposed in the studies it was clear that the goal of treatment should be: firstly, to reduce the frequency of attacks; and secondly to preserve auditory and vestibular functions. Depending on the severity, Betahistine can be administered. Randomised controlled trials using Diuretics showed low efficacy. When the medical treatments fail, the intratympanic

injection of corticosteroids is shown to result in better control of vertigo symptoms. Intratympanic injections of gentamycin (ITG) is used in severe cases, where other treatments failed. Endolymphatic sac surgeries are very effective in treating refractory MD in early stages. Recent techniques such as endolymphatic

duct blockage (EDB) are more effective in controlling symptoms.

The authors conclude that though many aspects of MD are still unclear, the availability of new tools and intervention techniques make it better for both physicians and patients. •





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