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Senior Audiologist

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Saturday, August 10, 2019

(Room 6)

8:30 - 9:25 WS #68: Hearing Health - Why Does It Matter?

9:35 - 10:30 WS #78: Hearing Health - Why Does It Matter? (Repeated)

DILWORTH HEARING

Hearing Health – Why Does it Matter?

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Audiologist

Today's plan:

- Review of hearing loss
- Perceptual consequences of hearing loss
- Hearing loss and associated health conditions
- The cost of hearing loss
- What to do with this information

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Good hearing essential to physical and emotional well-being

POSTED OCTOBER 20, 2016, 9:30 AM

Charlotte S. Yeh, MD
Chief Medical Officer, AARP Services, Inc., Guest Contributor

For many years, it was clear that my father was becoming hard of hearing. Normally gregarious and the life of the party, he became increasingly withdrawn because he couldn't hear well enough to partake in conversations around the table. He began to walk with a shuffling gait. He was declining in front of my eyes. And yet, when we communicated by email, his intellectual curiosity and warm storytelling skills were intact. But in person, he seemed to be fading away.

After considerable prodding, I convinced him to get a pair of custom hearing aids. The transformation was amazing. At a family reunion a month later, there was my father sitting at the breakfast table, regaling everybody with stories of his mischievous childhood. He was, once again, the center of attention. Gone was the shuffling walk, replaced by a strong, confident stride. From the withdrawn, quiet man who would sit by himself emerged my funny, animated father who told stories, laughed, and played jokes. He could hear his children and grandchildren. The dad I remembered as a child came back to us.

This story, and so many just like it, are about changing the public conversation on hearing to show how people who experience hearing loss can move from fear and denial to aging gracefully, with resilience, joy, and health.

The health benefits of hearing well

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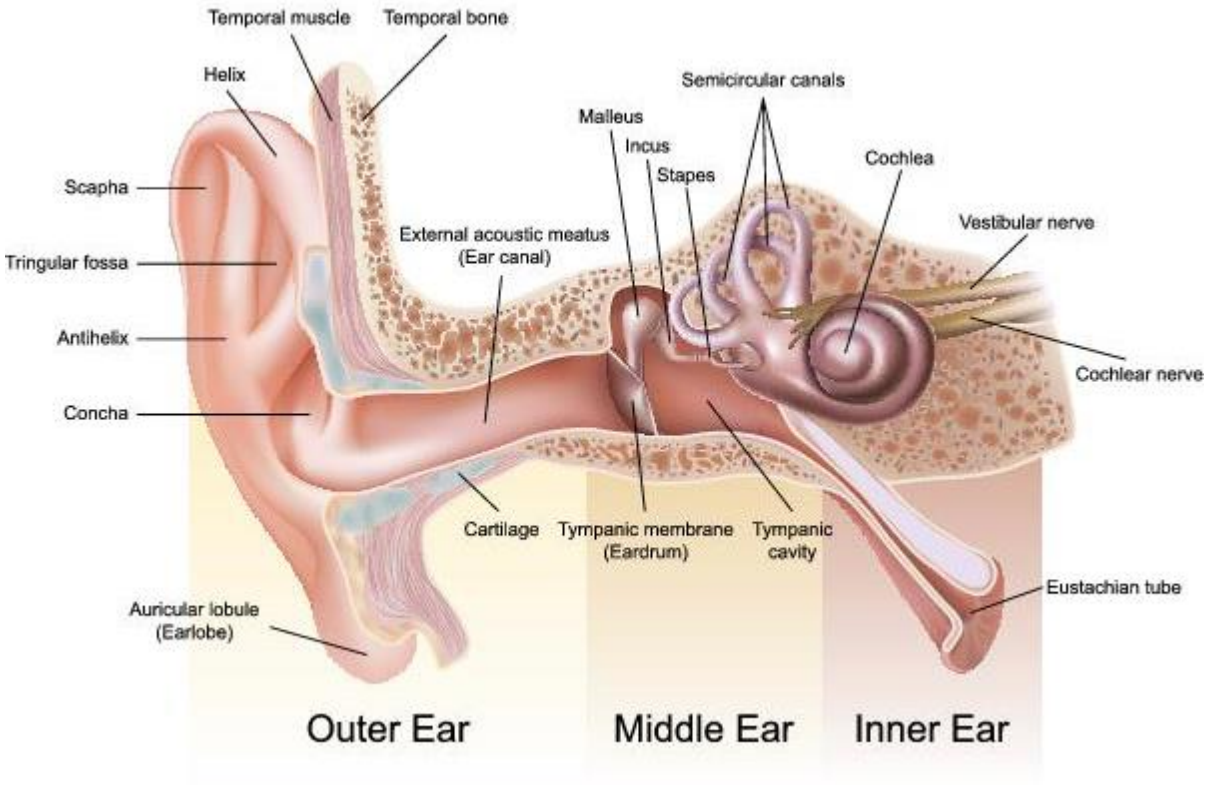
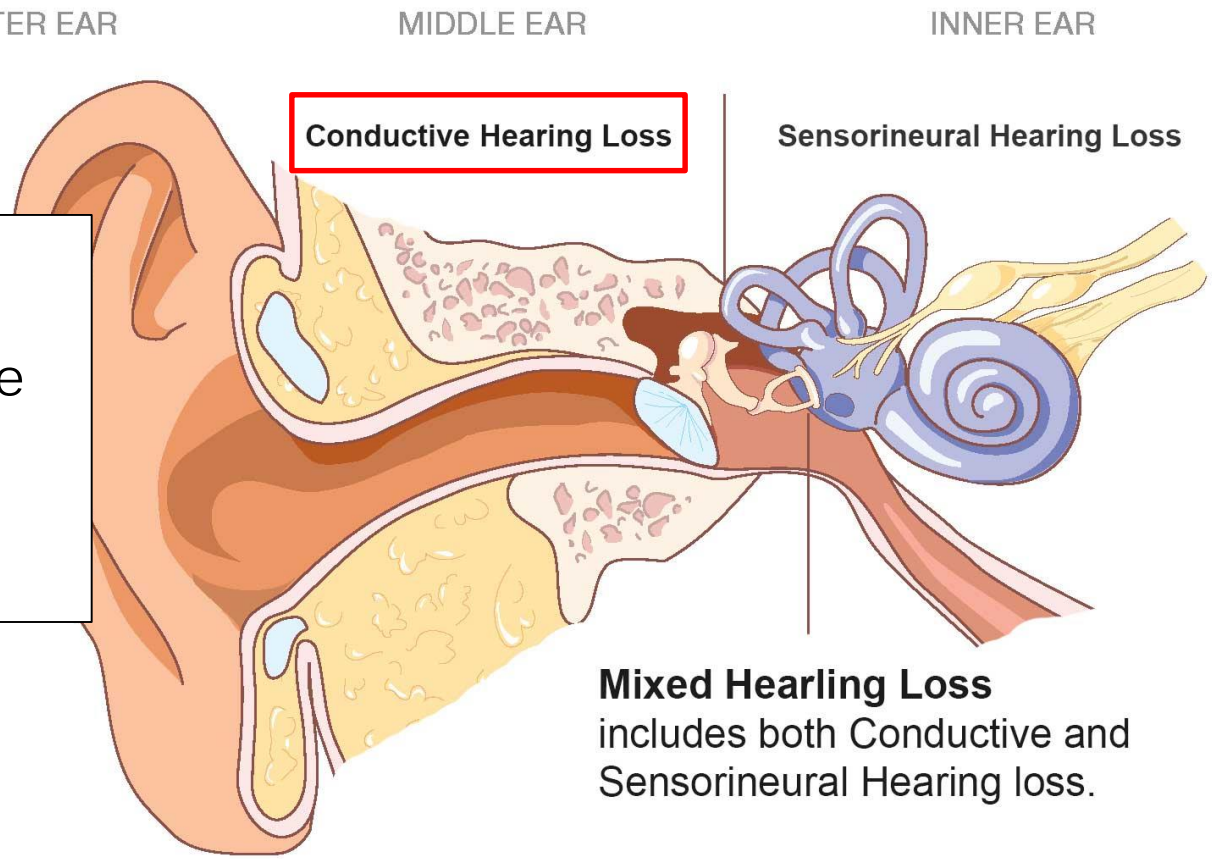
The auditory system



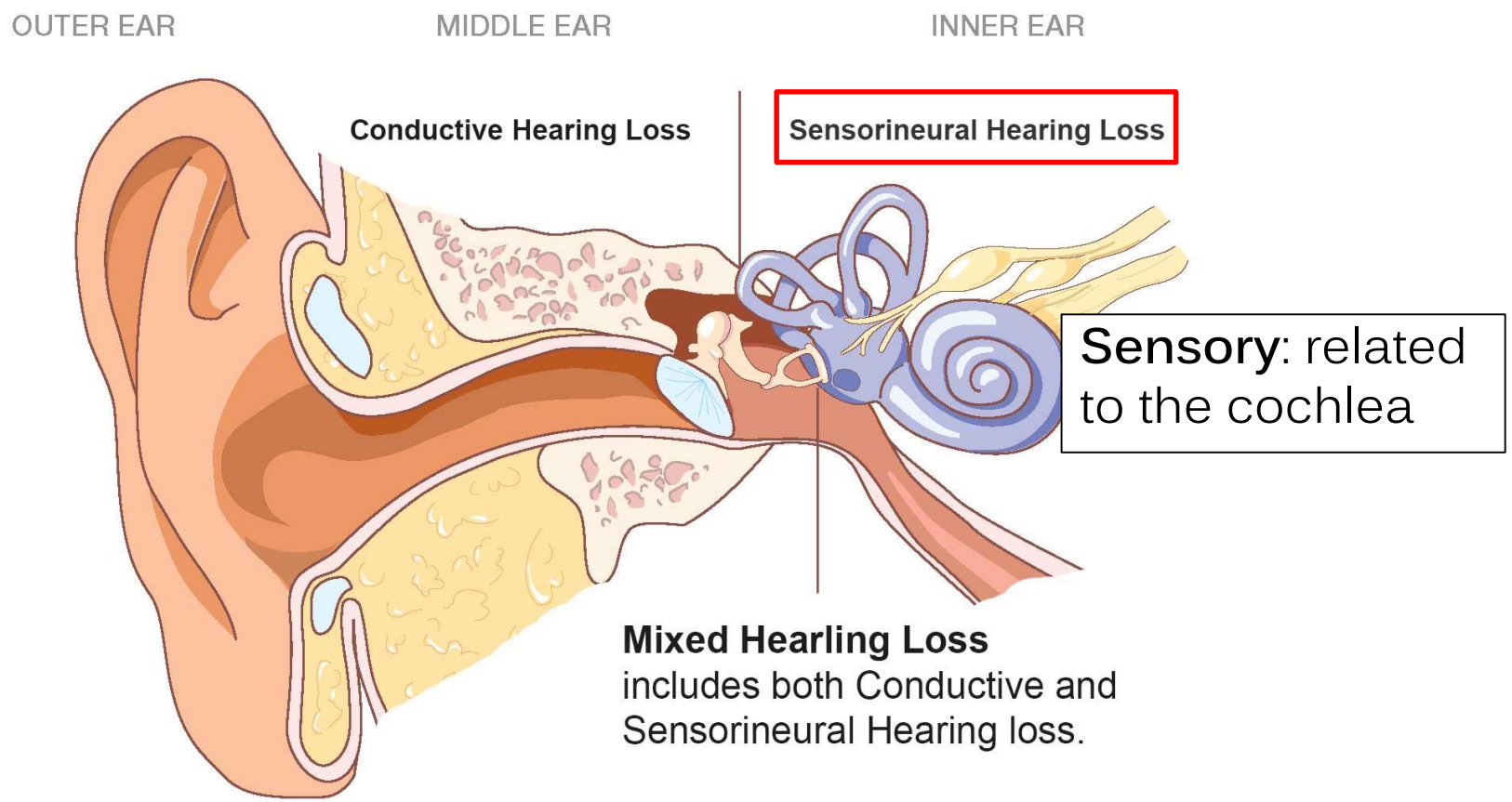
- The **outer ear** consists of the pinna and ear canal.
- The **middle ear** contains the ossicles, the three smallest bones in the body.
- The **inner ear** consists of the **cochlea** *(the organ of hearing)* and the **vestibular system** *(the organ of balance)*

Types of hearing loss - Conductive

e.g. wax, middle ear effusion, perforation, disease of the middle ear bones (e.g. otosclerosis)



Types of hearing loss - Sensorineural

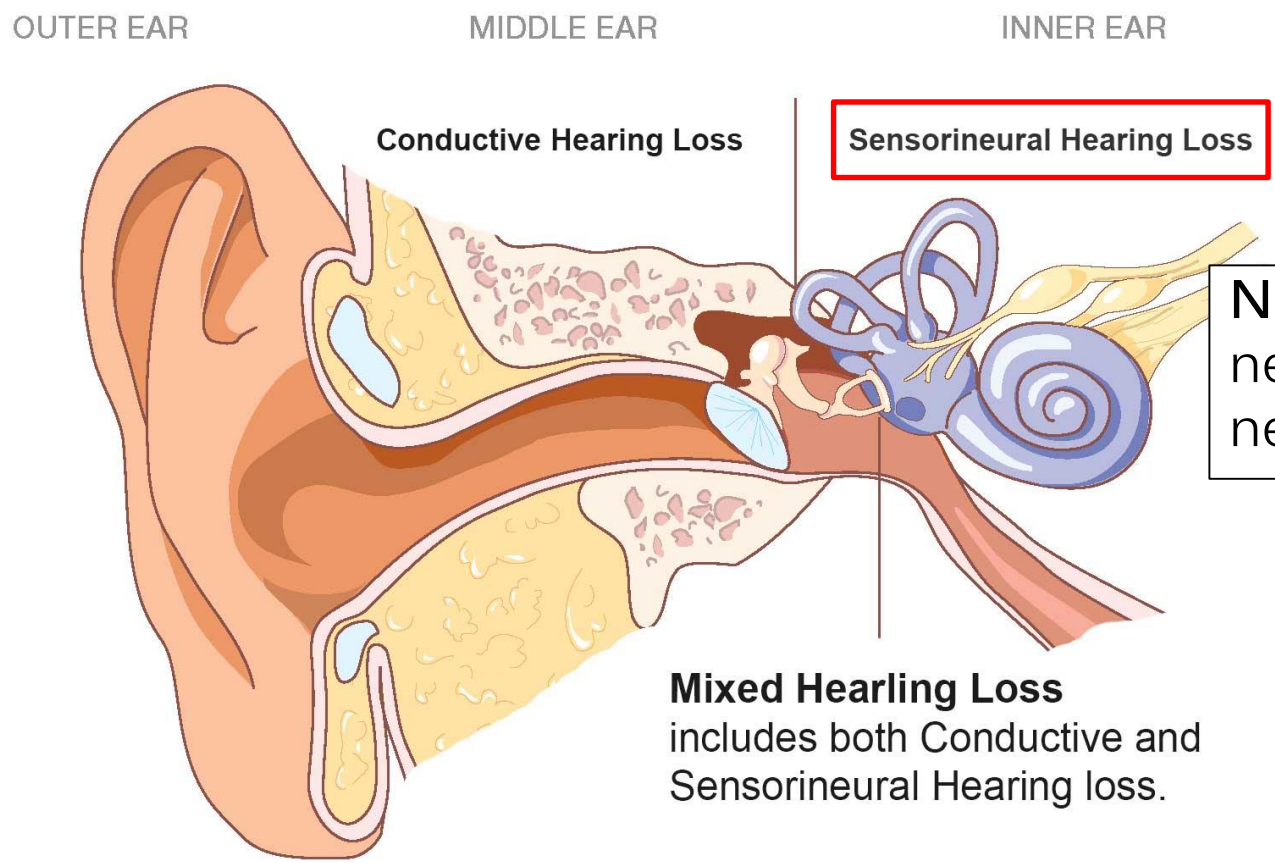


Sensory: related to the cochlea

Causes of cochlear damage

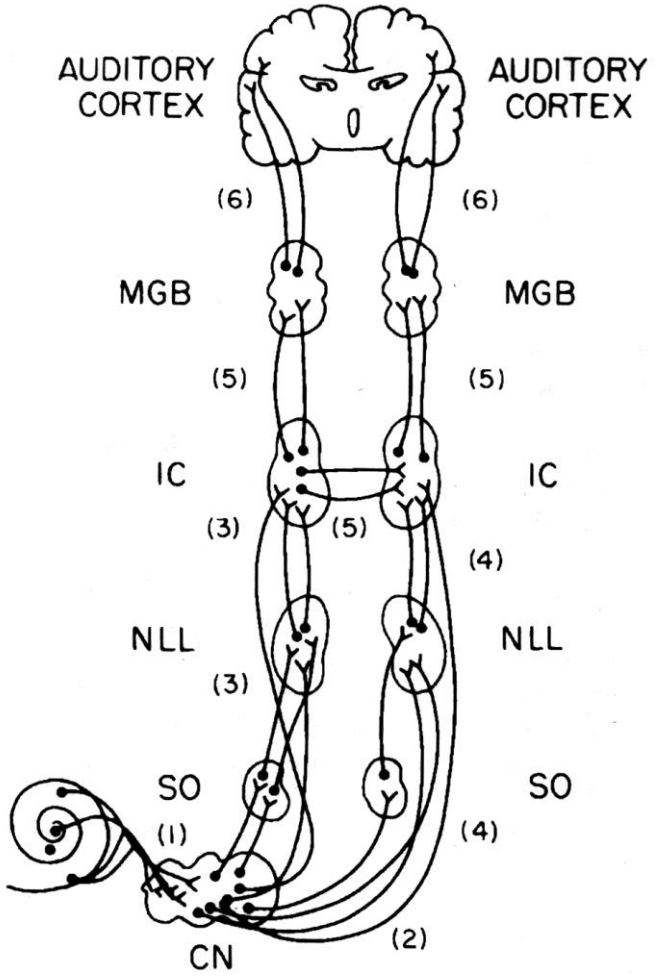
- Noise exposure
- Bacterial and viral infections, e.g. meningitis, measles, mumps
- Medications, e.g. antibiotics, chemotherapy drugs
- Head injury
- Stroke or vascular disease
- Genetics
- Age
- *And many more…*

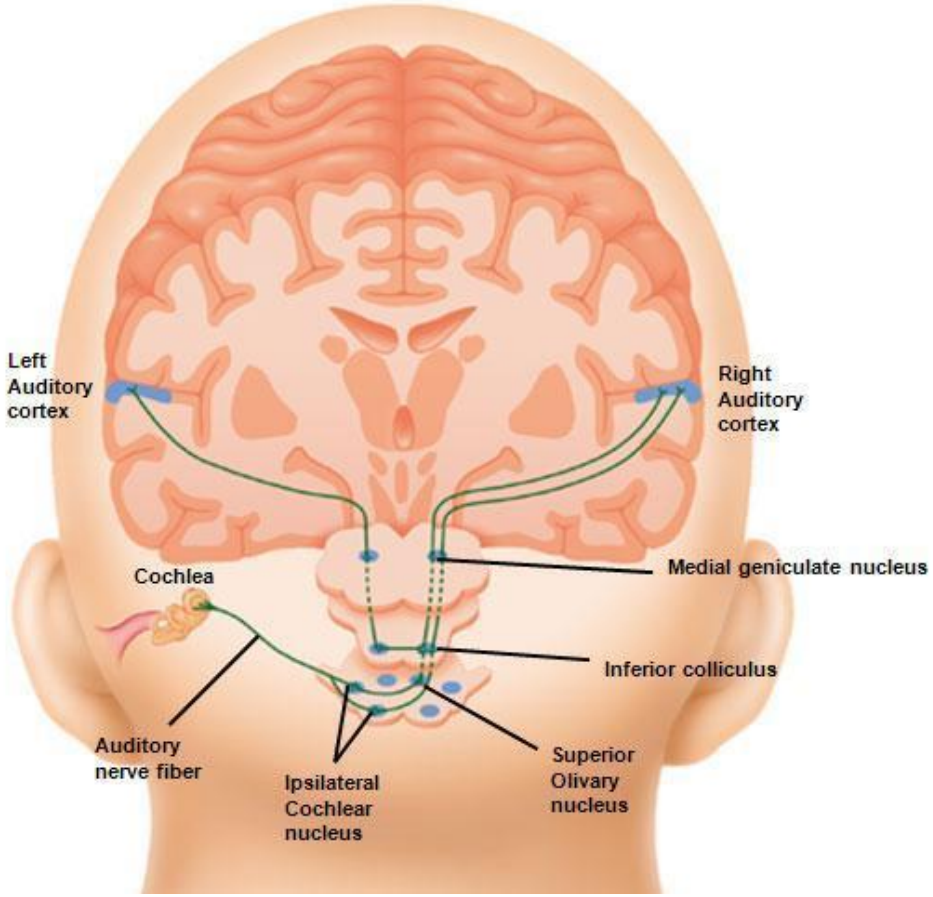
Types of hearing loss - Sensorineural



Neural: e.g. auditory neuropathy, acoustic neuroma

The role of the brain in hearing





Perceptual consequences of hearing loss

- **Difficulty understanding speech**, particularly in the presence of background noise.
  - Decrease in both volume and clarity of speech
- **Reduced awareness of environmental sounds**
- **Loudness recruitment –** perception of loudness increases more rapidly that in listeners with normal cochlear function.
  - Increased sensitivity to loud sound
- **Tinnitus**

Relationship between hearing loss and health and wellbeing

Recent studies have found a link between hearing loss and increased risk of:

- Social isolation/loneliness
- Depression
- Cognitive decline/dementia
- Falls
- Cardiovascular disease
- Diabetes

Hearing loss, depression and social isolation

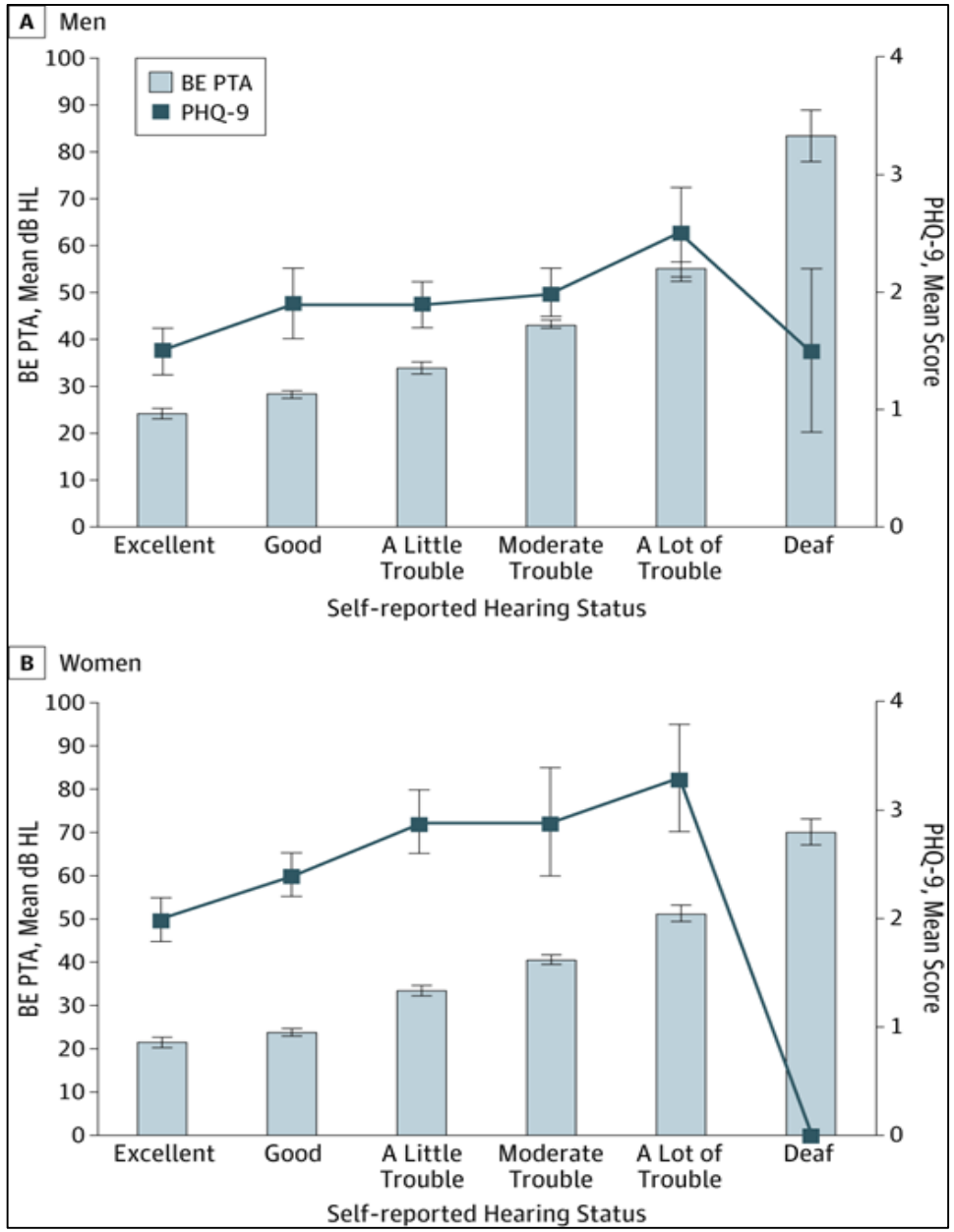
- People with hearing loss usually find communication difficult, and this can lead to stress, fatigue, and social isolation which is thought to contribute to the development of depression (Mick et al., 2014).

"You men who think or say that I am malevolent, stubborn, or misanthropic, how greatly do you wrong me. You do not know the secret cause which makes me seem that way. Though born with a fiery, active temperament, susceptible to the diversions of society, I was soon compelled to isolate myself, to live life alone." (Beethoven, 1802)

Mick, P., Kawachi, I., & Lin, F. (2014). The association between hearing loss and social isolation in older adults. *Otolaryngol Head Neck Surg, 150*(3), 378-384.

Hearing loss, depression and social isolation

- Research evidence shows a significant increase in the risk of depression in individuals with hearing loss.
- Li et al. (2014) found that the odds of having moderate to severe depression increasing as self-reported hearing progresses from “good” to “a lot of trouble”.



Li et al. (2014). Hearing impairment associated with depression in US adults, National Health and Nutrition Examination Survey 2005 – 2010. *JAMA Otolaryngol Head Neck Surg, 140*(4), 293-302.

Can hearing aids help?

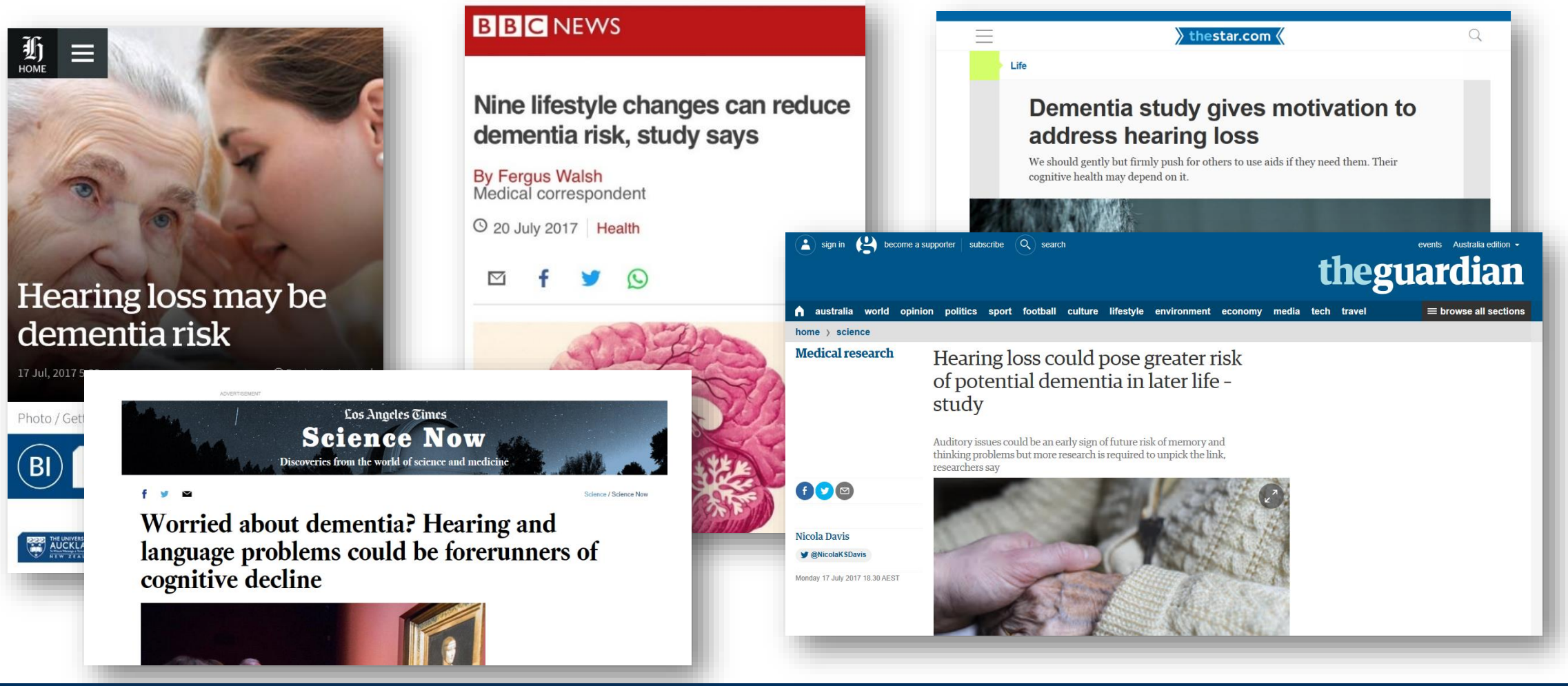
Depression and social isolation

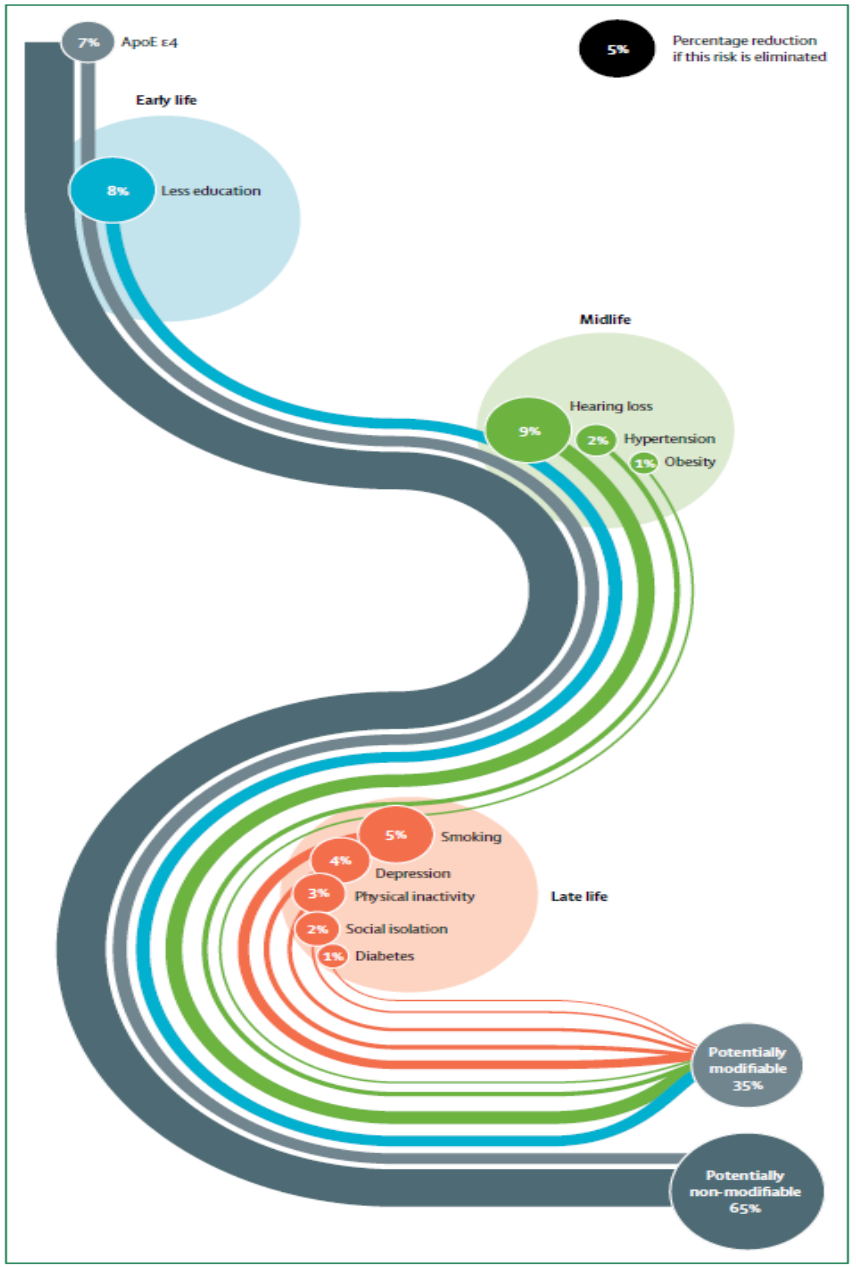
- A number of recent studies have shown the positive effects of wearing hearing aids on depression

- Reduction in depressive symptoms and an improved quality of life were reported in previous studies of older adults using hearing aids (Cacciatore et al., 1999; Boorsma et al., 2012)

- Both those with hearing loss and their family members have reported benefits from hearing aid use in terms of better relationships with others and more confidence (National Council on Aging, 1999).

Hearing loss and dementia in the media





Hearing loss as a modifiable risk factor for dementia

- The Lancet Commission on dementia prevention, intervention, and care identified nine potentially modifiable risk factors for dementia
- **The estimated risk from hearing loss was higher than any other individual risk factor.**

Lin et al. (2011) – Hearing loss and incident dementia

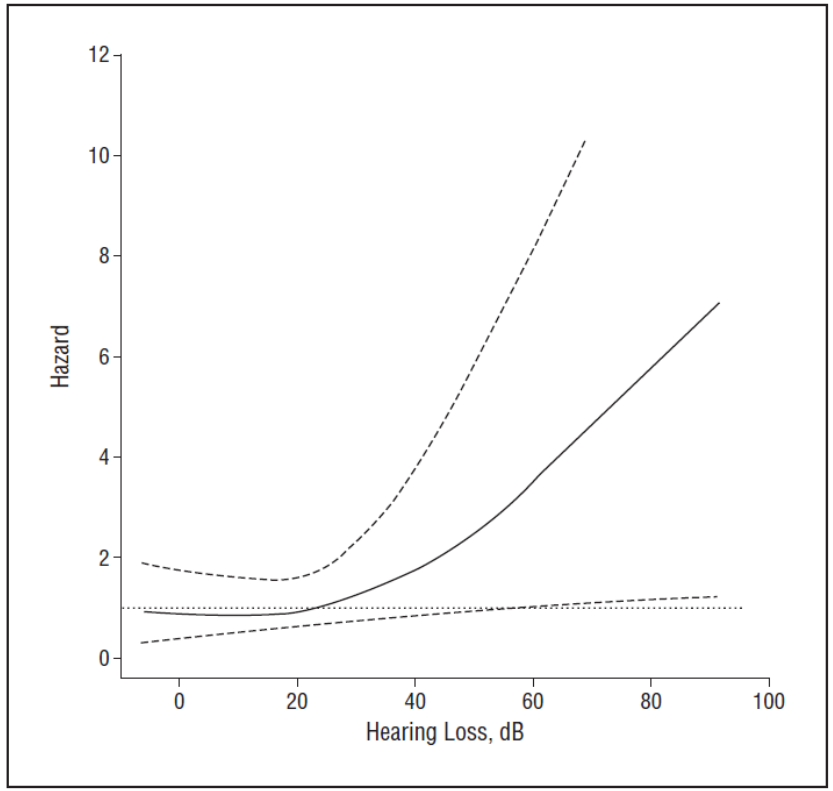
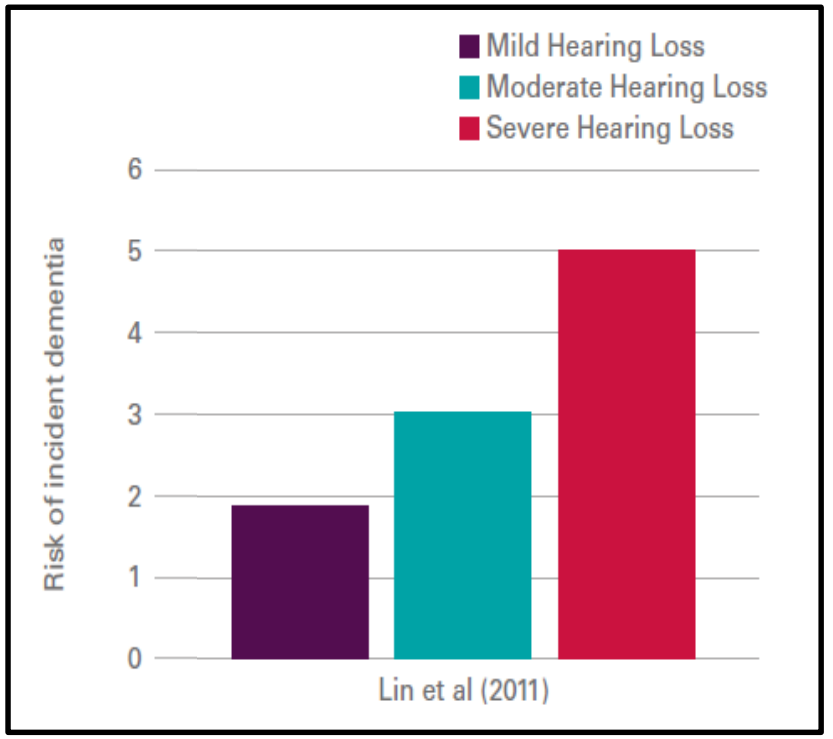


Figure 2. Risk of incident all-cause dementia by baseline hearing loss after adjustment for age, sex, race, education, diabetes mellitus, smoking, and hypertension. Hearing loss is defined by the pure-tone average of thresholds at 0.5, 1, 2, and 4 kHz in the better-hearing ear. Upper and lower dashed lines correspond to the 95% confidence interval.



Significant increase in the risk of dementia with increasing degree of hearing loss.

Lin, F. R., Metter, E. J., O'Brien, R. J., Resnick, S. M., Zonderman, A. B., & Ferrucci, L. (2011). Hearing loss and incident dementia. *Arch Neurol, 68*(2), 214-220.

Why is there a link between hearing loss and dementia?

- All studies thus far show a correlation, not a causal link
- Three potential underlying mechanisms proposed:
  - Hearing loss leads to cognitive decline
    - **Directly -** greater cognitive resources are required for processing a degraded auditory signal, to the detriment of other cognitive processes
    - **Indirectly -** increased social isolation, depression and reduced self-efficacy associated with hearing loss lead to reduced cognitive performance.

Why is there a link between hearing loss and dementia?

- Cognitive impairment impacts hearing
  - Listening in complex situations, e.g. background noise, is cognitively taxing. Cognitive deficit could increase hearing difficulty in difficult environments.

- Common cause leading to both hearing loss and cognitive decline
  - E.g. chronic inflammation, microvascular changes, genetics.

Do hearing aids reduce the risk of dementia?

- Four observational studies of the impact of hearing aid use on cognitive outcomes over long time frames (at least 3 years)
- One study showing more rapid cognitive decline over 25 years in older adults not using hearing aids compared to those that wore hearing aids (Amieva et al., 2015).
- Two studies showing a reduction in rates of cognitive decline in hearing aid users, but not a statistically significant effect (Lin et al., 2013; Deal et al., 2016).
- One study showing no significant impact of hearing aid use on cognitive decline or dementia rates (Dawes et al., 2015).

Can hearing aids improve cognitive function?

Good evidence is emerging that hearing aid use can improve performance on cognitive measures:

- *Doherty & Desjardins (2015):*
  - Using hearing aids over a six week period improved performance on auditory working memory tests in middle-aged and young-older adults.
- *Desjardins (2016):*
  - Significant improvements shown in performance on cognitive test measures after 2-8 weeks hearing aid use. Cognitive performance scores returned to baseline levels when hearing aids stopped being used.
- *Karawani, Jenkins, & Anderson (2018)*
  - Improvements in working memory performance and enhanced cortical response amplitude after six months hearing aid use compared to hearing-matched control group.

Hearing loss and falls

- An increased risk of falls has been associated with poorer hearing
- Lin & Ferrucci (2012) found that people with a mild hearing loss were nearly three times more likely to report a history of falling in the previous 12 months.
- The odds of reporting a fall were increased 1.4 fold for every 10 dB increase in hearing loss.

- **Potential mechanisms:**
- There may be dysfunction of both the cochlear and vestibular organs
- Decreased hearing sensitivity may limit access to auditory cues that are needed for environmental awareness
- The association of hearing loss with falls may be related to the increased cognitive load associated with hearing loss and reduced attentional resources

Lin, F. & Ferrucci, L. (2012). Hearing loss and falls among older adults in the United States. *Arch Intern Med. 172*(4), 369-371.

Can hearing aids help?

- Evidence suggests that wearing hearing aids may improve balance, at least for some wearers
- Rumalla et al. (2015) demonstrated that participants were able to maintain stable posture for a longer period of time when wearing hearing aids.

Rumalla, K., Karim, A., & Hullar, T. (2015). The effect of hearing aids on postural stability. *Laryngoscope. 125*(3), 720-3.

Hearing loss and diabetes

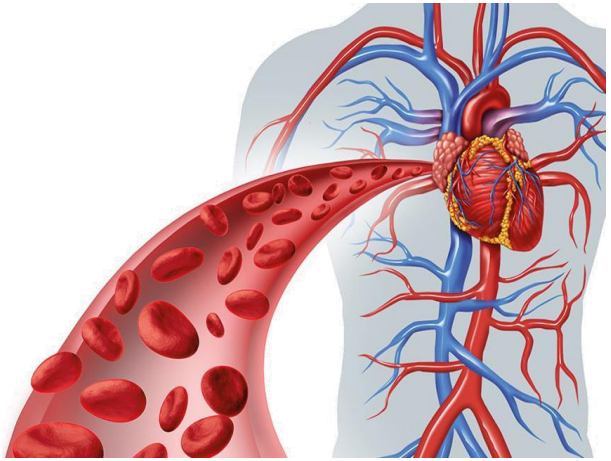
- There is strong evidence of an association between diabetes and hearing loss.
- A recent review revealed that the prevalence of hearing loss among those with diabetes was more that twice that of those without diabetes (Horikawa et al., 2013)

- What might explain the association?
- One possibility if that, over time, high blood glucose levels damage the blood vessels in the cochlea

Horikawa et al. (2013). Diabetes and risk of hearing impairment in adults: a meta-analysis. *J Clin Endocrinol Metab.* 98(1), 5108.

Hearing loss and cardiovascular disease

- Good circulation plays a role in maintaining good hearing health.
- Conversely, inadequate blood flow and trauma to the blood vessels of the inner ear can contribute to hearing loss.
- Impaired cardiovascular health is associated with an increased risk of hearing loss (e.g. Tan et al., 2018).



Tan et al. (2018). Associations between cardiovascular disease and its risk factors with hearing loss-A cross-sectional analysis. *Clin Otolaryngol, 43*(1), 172-181.

Can hearing aids help?

Cardiovascular disease and diabetes

- Although sensorineural hearing loss is permanent, it may be possible to help preserve your hearing by maintaining cardiovascular fitness (Hutchison et al., 2010).

- Reducing the risks of development of diabetes through proper diet and exercise may also reduce the risk of developing hearing loss.

Hutchison, K., Alessio, H., Bairduc, R. (2015). Association between cardiovascular health and hearing function: Pure-tone and distortion product otoacoustic emission measures. *Am J of Aud, 19*(10), 26-35.

Economic impact of hearing loss

- National Foundation of the Deaf Report on the Social and economic costs of hearing loss in New Zealand published in 2016
- In 2016, 880 350 people in New Zealand had some degree of hearing loss, representing 18.9% of the population
- The health system costs due to hearing loss are estimated at $131.8 million in 2016
- The largest component of health system expenditure was estimated to be other health professionals ($78.1 million).

Economic impact of hearing loss

- Hearing loss can have a significant impact on an individual's ability to work.
- The productivity loss in individuals with hearing loss was estimated at $552.4 million in 2016. The productivity cost is primarily largely due to reduced employment.
- The total loss of tax revenue from lower employee productivity is estimated to be $254.6 million
- **Overall, hearing loss cost the New Zealand economy an estimated $957.3 million in 2016**

Impact of hearing loss on overall health care

- Hearing loss can also affect other aspects of health care
  - Reed et al. (2019): Over a 10 year period, compared to those without hearing loss, those with untreated hearing loss:
    - Had a 47% higher rate of hospitalization
    - Spent 2.5 days longer, on average, during hospital stays
    - Had a 17% increased risk of an emergency department visit
    - Had a 44% increased risk of experiencing a 30-day readmission
    - Had 46% higher total health care costs

Reed et al. (2019). Trends in health care costs and utilization associated with untreated hearing loss over 10 years. *JAMA Otoloryngology- Head & Neck Surgery, 145*(1), 27-34

Impact of hearing loss on overall health care

- Hearing loss directly limits patient-provider communication
- Studies consistently report an adverse effect of hearing loss on patient-provider communication (Shukla et al., 2019).
  - Simple strategies and interventions may be employed to improve communication and provide safe, quality, patient-centred care to patients with hearing loss (Shukla et al., 2019).
- Hearing loss may also alter help-seeking behaviours, reducing the likelihood of people seeking health care when needed.

Shukla et al. (2019). Impact of hearing loss on patient-provider communication among hospitalised patients: a systematic review. *Am J of Med Qual, 34*(3), 284-292.

Can hearing aids improve health outcomes?

- Studies of cohort data suggest hearing aid use is associated with a reduction in hospitalization and emergency department visits (Mahmoudi et al., 2018).
- Using the Medicare Current Beneficiary Survey, Willink et al. (2019) matched hearing aid users who reported using hearing care services in the past 12 months to those who did not use hearing care services.
- Those who did not use hearing care services spent, on average, $2513 more in health care costs over the previous year.

Mahmoudi et al. (2018). Association between hearing aid use and health care use and cost among older adults with hearing loss. *JAMA Otolaryngology–Head & Neck Surgery*, *144*(6), 498-505.

What to do with this information

- Hearing loss should be addressed as an important part of overall healthcare, especially for older patients
    - Screening
    - Diagnosis
    - Rehabilitation
- Management of other health conditions linked with an increased risk of hearing loss
- Hearing loss prevention should be emphasised to patients of all ages

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Questions?

For any further queries please contact either myself of the Dilworth Hearing Team on the following details:

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