



Audiology for Primary Care Physicians

John Weigand Au.D., F-AAA

Doctor of Audiology
NYS Licensed Hearing Aid Dispenser

Acknowledgements

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Conflicts of Interest

- **None**



Learning Objectives

Upon completion of this module, viewers will be able to:

- Demonstrate general knowledge of audiology and the role of healthy hearing in improving quality interdisciplinary care across care continuum
- Understand the impact of current events on audiovestibular systems
- Identify and leverage common audiological misconceptions to aid in the eradication of ageism subsequently improving patient quality of life and healthcare delivery

The Team

John Weigand, AuD, F-AAA, Assistant Professor, Board Certified in Audiology

Anastasiya Goldin, AuD, Clinical Supervisor, 6 years experience

Monica Skarzynski, AuD, Certified Occupational Hearing Conservationist

Megan Wehner, AuD, Cochlear Implant Specialist

Kirston Clifton, AuD, Audiologist

Tameka Thomas and David Tonkowich, Practice Managers

Six Audiology Residents



Audiologists (AuD)



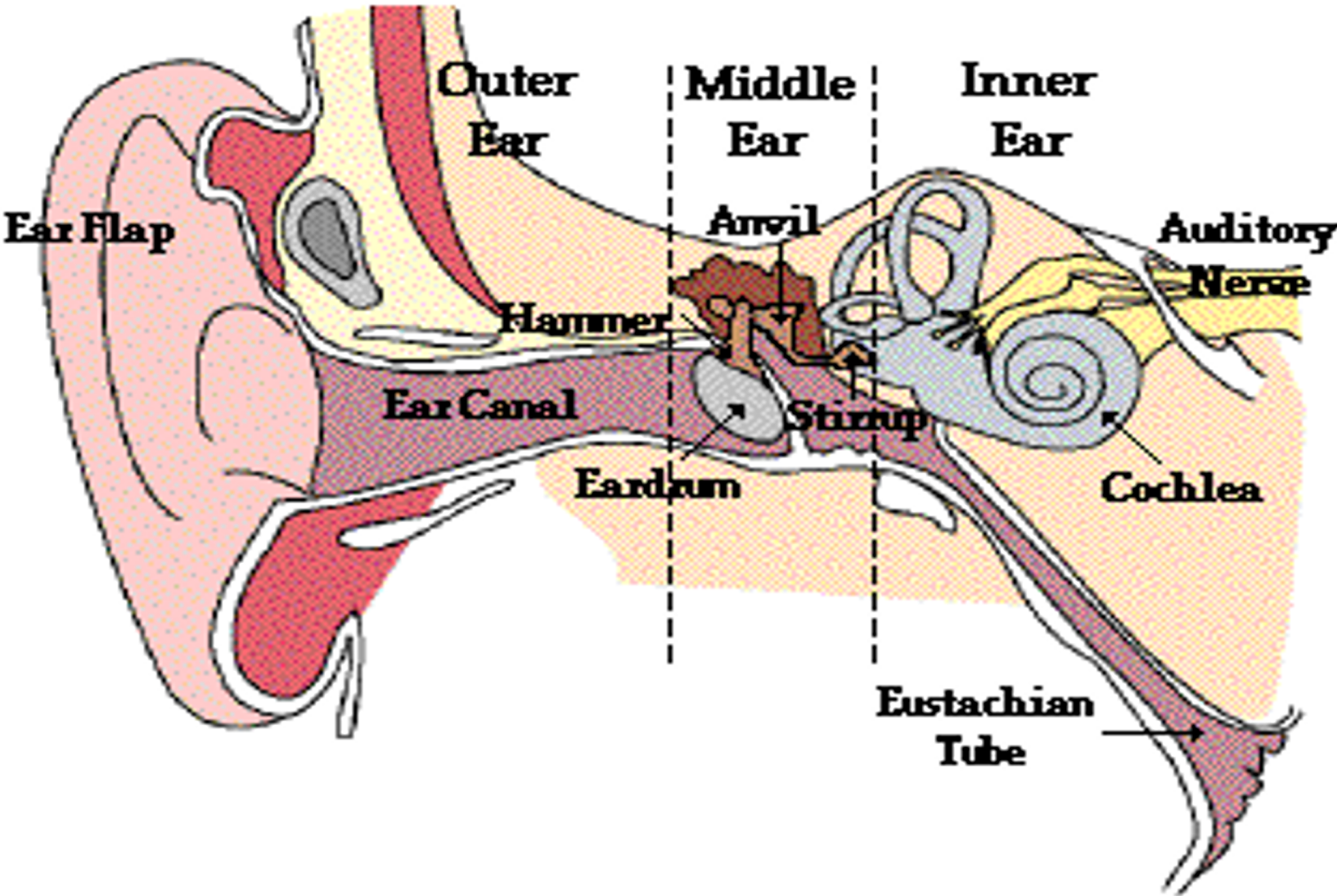
- Provide patient-centered care in the prevention, identification, diagnosis, and evidence-based treatment of hearing, balance, and other auditory disorders for all ages
- Navigate complex medical, psychological, physical, social, educational, and occupational needs
- Maintain knowledge of existing and emerging technologies, current research, and interpersonal/counseling skills

Audiologists' Roles in Healthcare

- Change the course of cognitive decline for patients
- Reduce the risk of falls
- Promote education, literacy, and employment
- Prevent social isolation and loneliness
- Decrease depression and anxiety
- Decrease medically adverse events, hospitalizations, & readmissions
- All of this saves the healthcare system \$3.3B per year

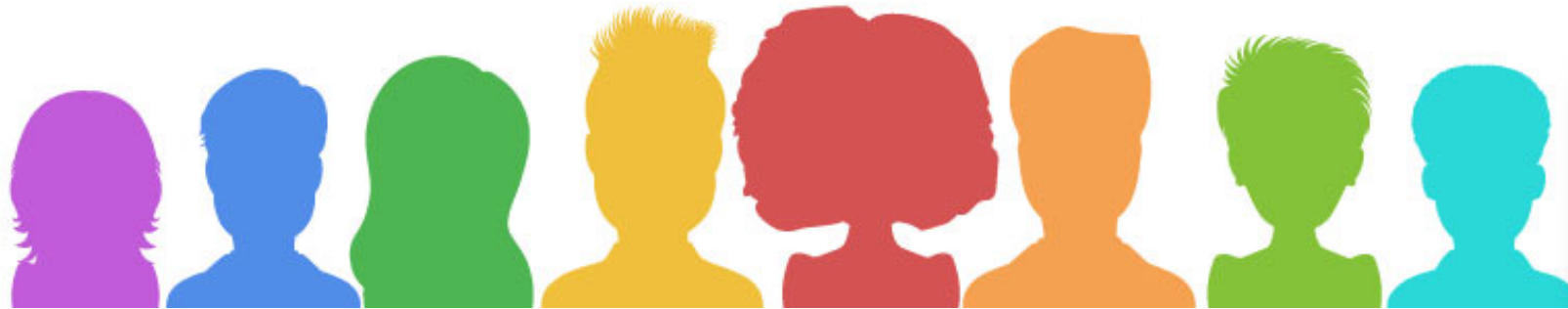


Ear Anatomy





Did you know?



- The Ossicles, the smallest bones in the human body together are smaller than an orange seed!!!!



- 2-3/1000 children are born with hearing loss in one or both ears
- 90% of deaf children are born to hearing parents
- 15% of American adults age 18+ report some trouble hearing (37.5M)
- Age is the strongest predictor of hearing loss (ages 60-69)
- 2% of adults aged 45 to 54 have disabling hearing loss
 - The rate increases to 8.5 percent for adults aged 55 to 64

Quick Stats (NIDCD 2016)





Risk Factors

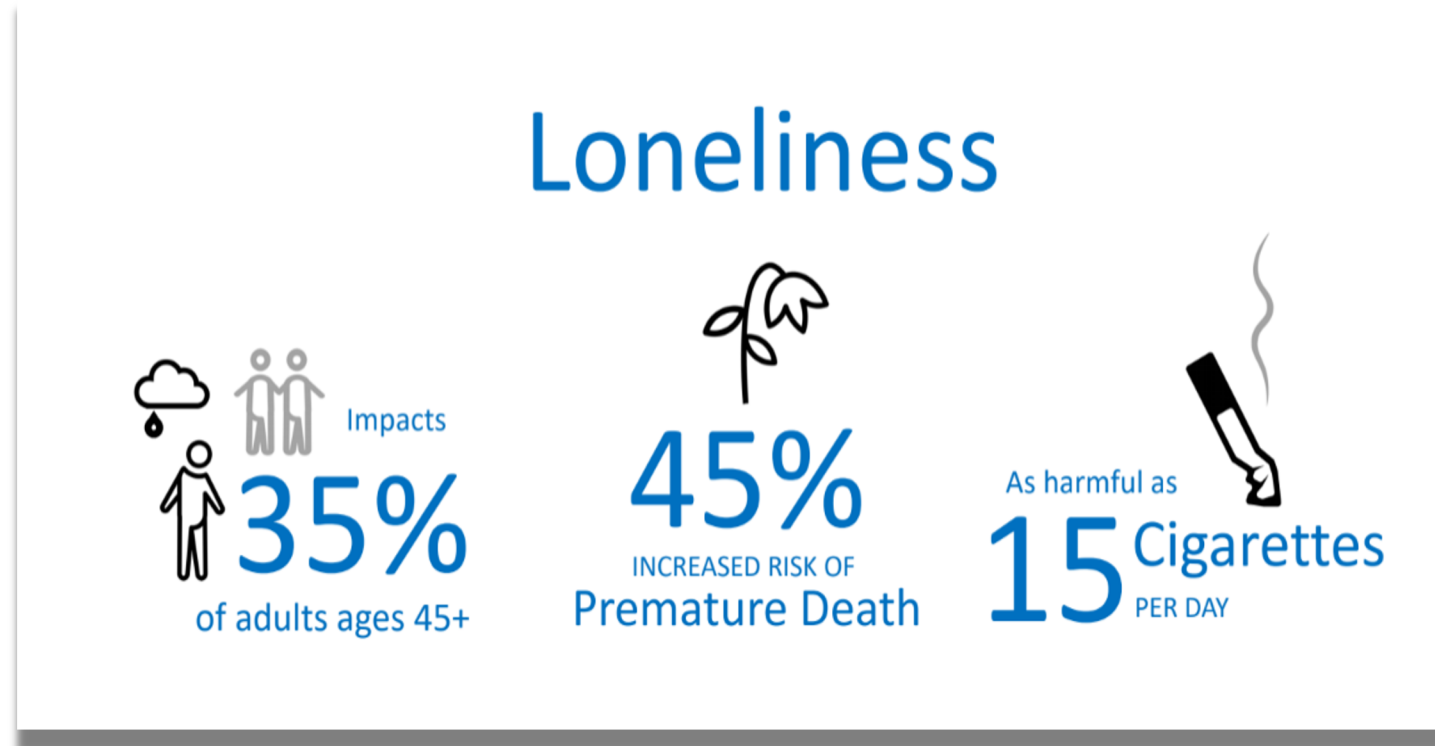
- Age
- Familial Hearing Loss/Genetics
- Noise Exposure
- Medications
 - Who can name one?
- Diabetes and Hypertension
 - Why?
 - By gender: Males 65%, Females 35%
 - Why?

Comorbidities of Hearing Loss

- Dizziness/Vertigo
- Tinnitus/Hyperacusis
- Psychiatric
 - Depression
 - Anxiety
 - Loneliness
- Cognitive Decline/Dementia

Loneliness

- “Loneliness is a health crisis” - Dr. Murthy, Former US Surgeon General



https://www.aarp.org/content/dam/aarp/research/surveys_statistics/life-leisure/2018/loneliness-social-connections-2018.doi.10.26419-2Fres.00246.001.pdf

Human Needs

Water
Food
People

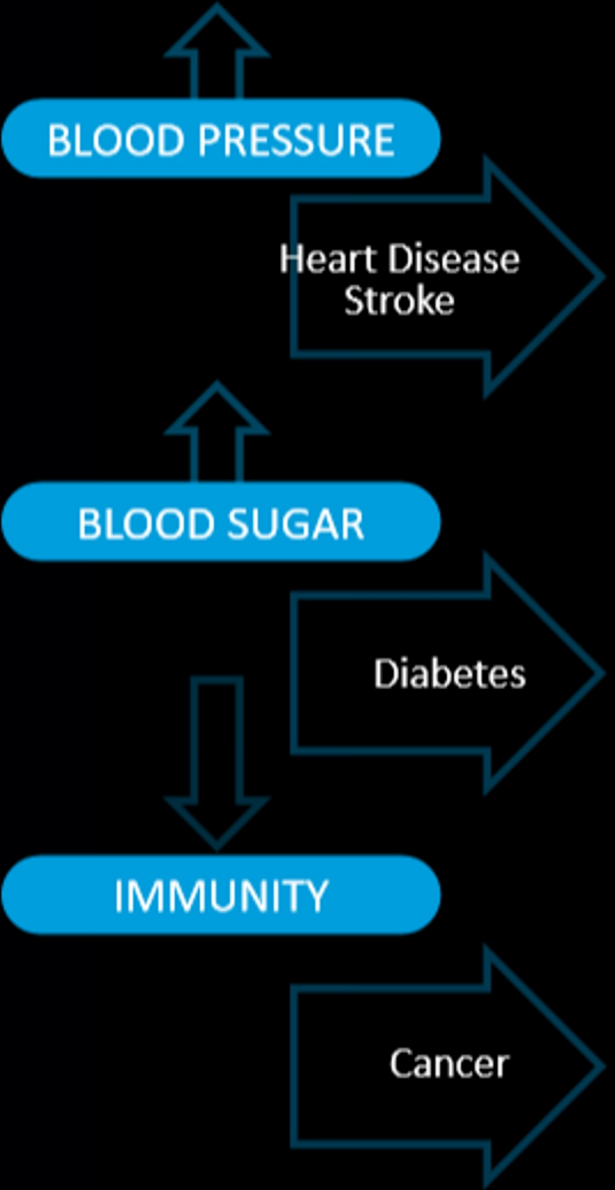
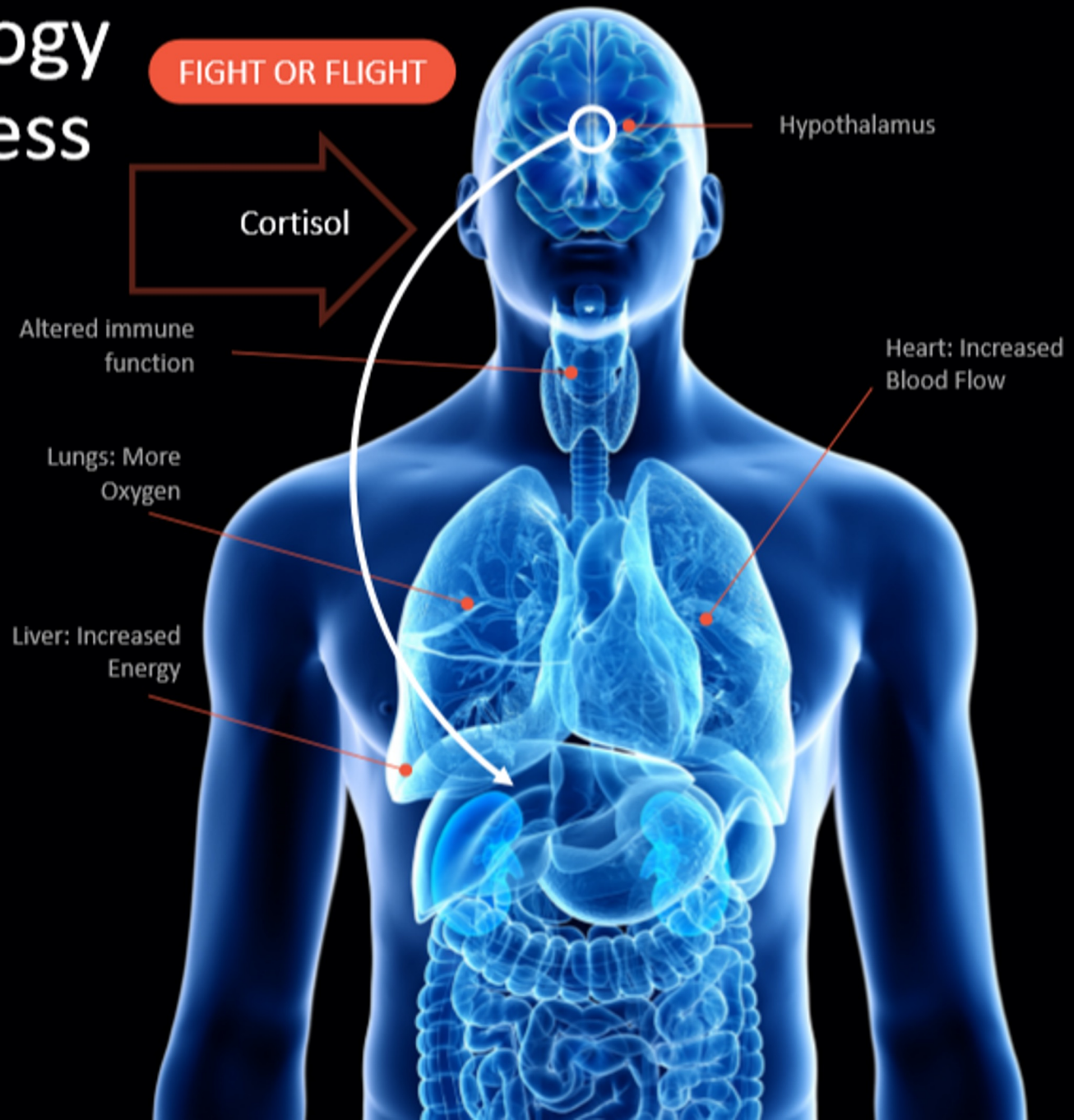


Neurobiology of Loneliness

FIGHT OR FLIGHT

LONELINESS

Threat



STRESS

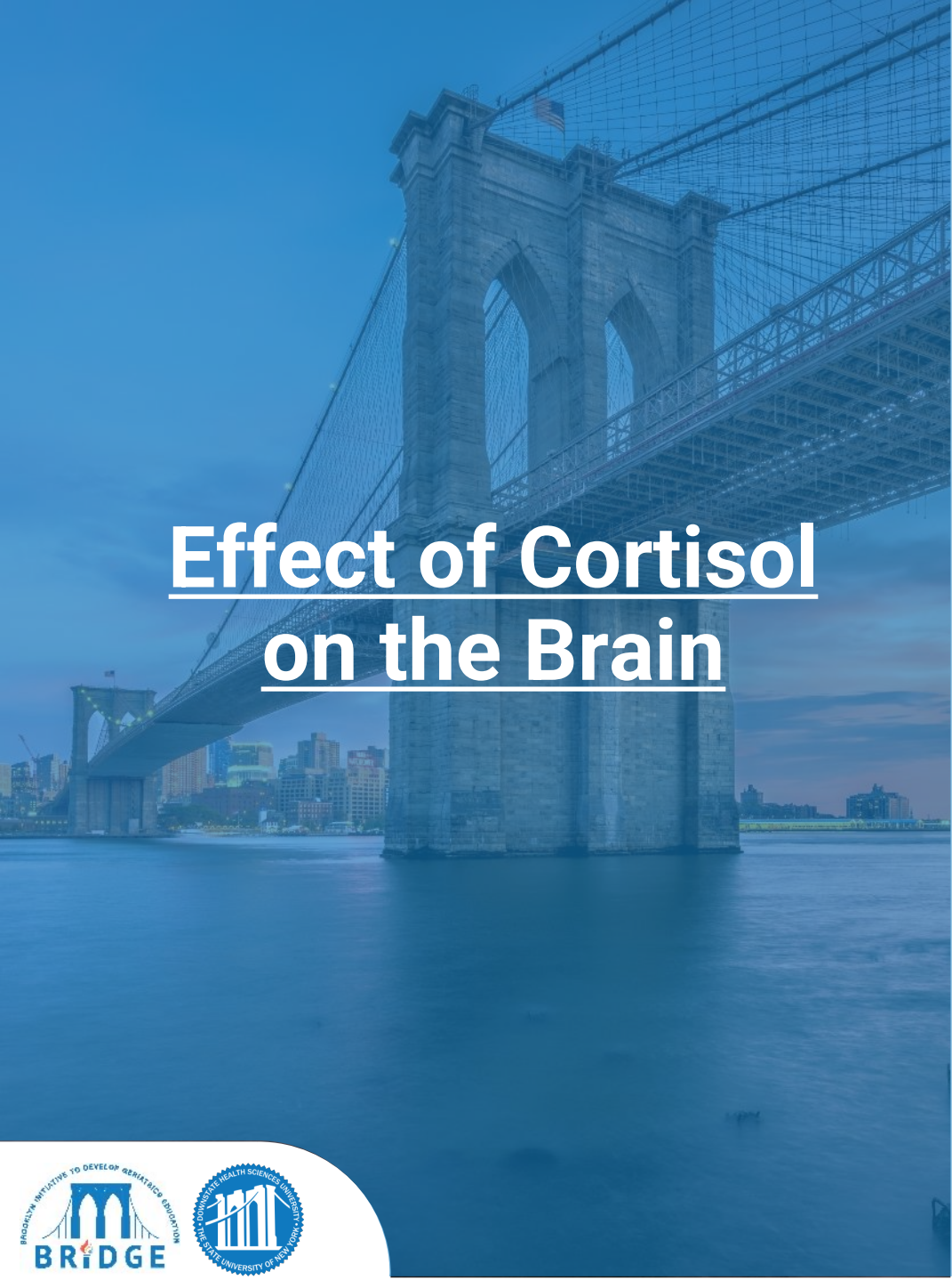


hormone release



STRESS HORMONES:
reduced perception of pain
increased blood pressure, heart rate
increased blood sugar

OVER TIME:
more inflammation
higher risk of cancer
higher risk of diabetes



Effect of Cortisol on the Brain

- **Effect of cortisol on the brain**
 - Activated sympathetic nervous system (i.e. fight or flight)
- **Chronic Increases in Cortisol affect the prefrontal section of the brain**
 - Gives us personality, filters and judgement,
 - Persistently aggressive and distrustful, not fun to be around, less attractive social partners
- **Loneliness begets loneliness**
 - Reduced social interaction, associated with dementia
 - Lower social interaction means brain is tasked less

Loneliness as a Medical Condition

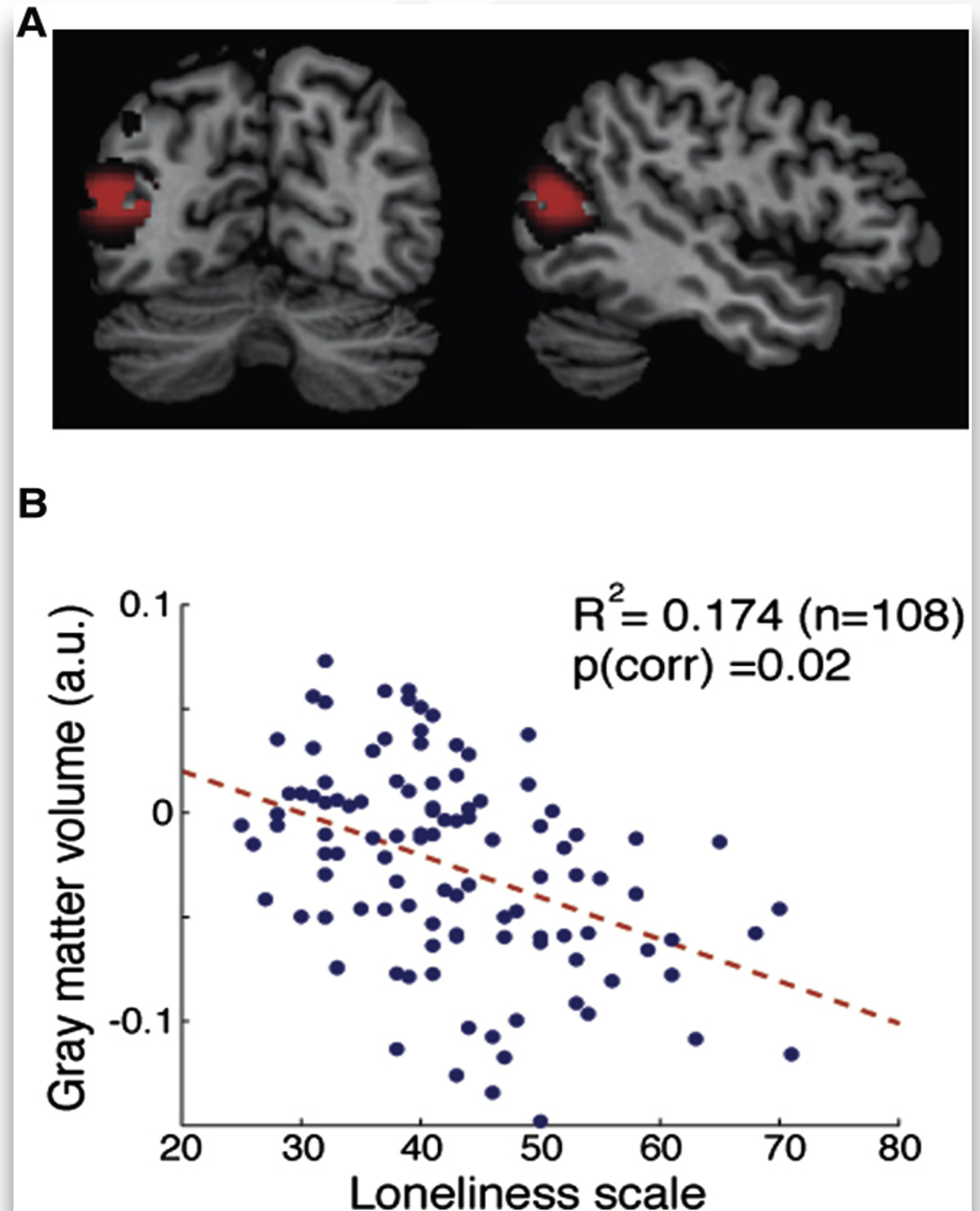
- What happens in the brain leading to neuronal cell death and dementia?
 - MRI's show that adults with loneliness have decreased brain volume
- Several Hypotheses
 - Damage from cortisol/frequent HTN -> damaged brain cells
 - Lower social interaction-> reduced cognitive activity
 - Distorted sound/reduced access to sound due to hearing loss
- 20% of people w untreated HL are reportedly lonely



Reduced Grey Matter Volume

- Duzel et al examined correlations between (i) loneliness, (ii) a range of covariates, and (iii) loneliness by covariate interactions with latent brain volume estimates of brain structures known to be involved in processing, expressing, and regulating emotions.

(Duzel, et al 2019)



Causes of Loneliness

Reversible

- Decreased hearing
- Decreased vision

Non-Reversible

- Age
- Being female
- Living in a rural area
- Low education
- Poor health status
- Quarantine



It's your brain that hears, not your ears!

Hearing serves many purposes:

Keeping you safe

Localizing direction of sounds

Speech understanding in noisy environments



Living with hearing loss is tiring and affects your memory

- More effort required to follow and understand
- Brain has to work harder to fill in the gaps
- More mental resources required which can make one feel tired
- Less energy available for memory and information recall
- Good hearing reduces the workload on the brain





Hearing Loss and Cognition in the Baltimore Longitudinal Study of Aging. Frank Lin, et al 2011

Objective

- To determine the relationship between hearing loss and cognitive function
- Hypothesized that greater hearing loss is associated with lower cognitive test scores on tests of memory and executive function



Hearing Loss and Cognition in the Baltimore Longitudinal Study of Aging. Frank Lin, et al 2011

Results/Conclusion

- Greater hearing loss was significantly associated with lower scores on measures of mental status
 - (Mini-Mental State Exam), memory (Free Recall), and executive function (Stroop Mixed, Trail Making B)
- The reduction in cognitive performance associated with a **25 dB hearing loss was equivalent to the reduction associated with an age difference of 6.8 years**

Dementia Will Double



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- In 2016, the global number of individuals who lived with dementia was 43.8 million
 - Up from 20.2 million in 1990
- 5.8 million Americans are living with Alzheimer's. By 2050, this number is projected to rise to ~14 million
- Hearing loss has been found to be independently associated with accelerated cognitive decline in elderly adults
 - The opposite statistical trend is observed in participants who used hearing aids
 - Cognitive decline of those who used hearing aids was not significantly different from those w/o HL


Hearing Loss and Dizziness/Imbalance

- Anatomical proximity/ shared CN VIII
- People with mild hearing loss are 3 times more likely to have a history of falling
 - Every additional 10 dB of hearing loss increases the chances of falling by 1.4 times the original risk.
- Hallway Example

Consequences of Untreated Hearing Loss

- Adults with **untreated HL** experience **30-40% faster decline in cognitive abilities** and are more likely to develop dementia
- 12% of those over age 50 report HL significant enough to reduce their understanding of their treatment plan
 - This group has a 32% higher rate of hospital readmission - American Geriatric Society
- Cost impact of untreated HL over 10 years is \$22k/capita of additional medical expenses





Benefits of Appropriate Amplification

- Increased safety/greater independence
- Better communication/relationships with friends/family
- Better communication with other healthcare providers
- Reduced perception of tinnitus
- Mitigate cognitive decline
- Overall improvement self confidence and Quality of Life



ENT vs Audiology- Where should they be referred?

- ENT
 - Medical complaint (pain, pressure, drainage, tinnitus)
 - Rapid onset of symptoms
 - Unilateral symptoms
 - Suspected infection
 - Hx of head trauma
- Audiology
 - Complaints of general hearing loss, tinnitus, reduced word understanding
 - Family complaints of communication difficulties

Typical Patient Journey

1. Lack of awareness/denial
 - a. Only 30% of people with Hearing Loss use Hearing Aids
2. Preliminary audiologic evaluation
 - a. Frequently pressured by family members and/or a precipitating event
 - b. People wait 4.8 years to get a CAE after they first suspect reduced hearing
3. Difficulty integrating/accepting diagnosis of hearing loss/need for amplification
 - a. Minimization, stigma/overgeneralization, blame others
 - b. Most patients wait 7-10 years after HL Dx to pursue hearing aids
4. Eventually move forward with treatment plan
 - a. Insurance coverage?
 - b. Cost sharing?
 - c. Acceptance of devices? Must see self as using HA's
 - d. Commitment to follow-up appts?



Ideal Patient Journey

- Regular hearing screenings as adults
- Appropriately referred by PCPs/ENTs/after a failed screening
- Bring a companion to share the experience
- Open-minded to diagnoses, compensatory strategies, and treatment options
- Enthusiastically agree to trial with appropriate amplification
- Return for follow-up with questions and requests for fine tuning
- Report significant benefit from device(s)
- Return for regular device maintenance and annual hearing tests



Communication Strategies for HCPs

- Make eye contact
- Use verbal verification
- Give information in writing
 - Diagnosis
 - Instructions
 - F/U plan
 - Medication details
- Communicate with the companion/caregiver



Healthcare in Brooklyn, New York

- The life expectancy in central Brooklyn, NY is approximately 6 years lower than the NYC average
- Hospitalization for conditions such as diabetes, asthma and other life threatening conditions are double the New York City average.
- In 2019 the poverty rate in Brooklyn, NY was 17.7% compared to the state of New York which has a poverty rate of 13%
- Kings County encompasses many neighborhoods that the Health Resources and Services Administration (HRSA) has deemed medically underserved and a shortage of providers in the following areas:
 - Primary care providers
 - Mental health workers and mental health facilities
 - Dentists



REFLECTION

How will I use audiology as a tool to improve care delivery and subsequent patient quality of life across the care continuum?



- Covid-19
- Aging Population
- Medicare Coverage
- Insurance Coverage
- OTC Hearing Aids

Hot Topics In Audiology



Read my lips! Standard vs. Clear Masks



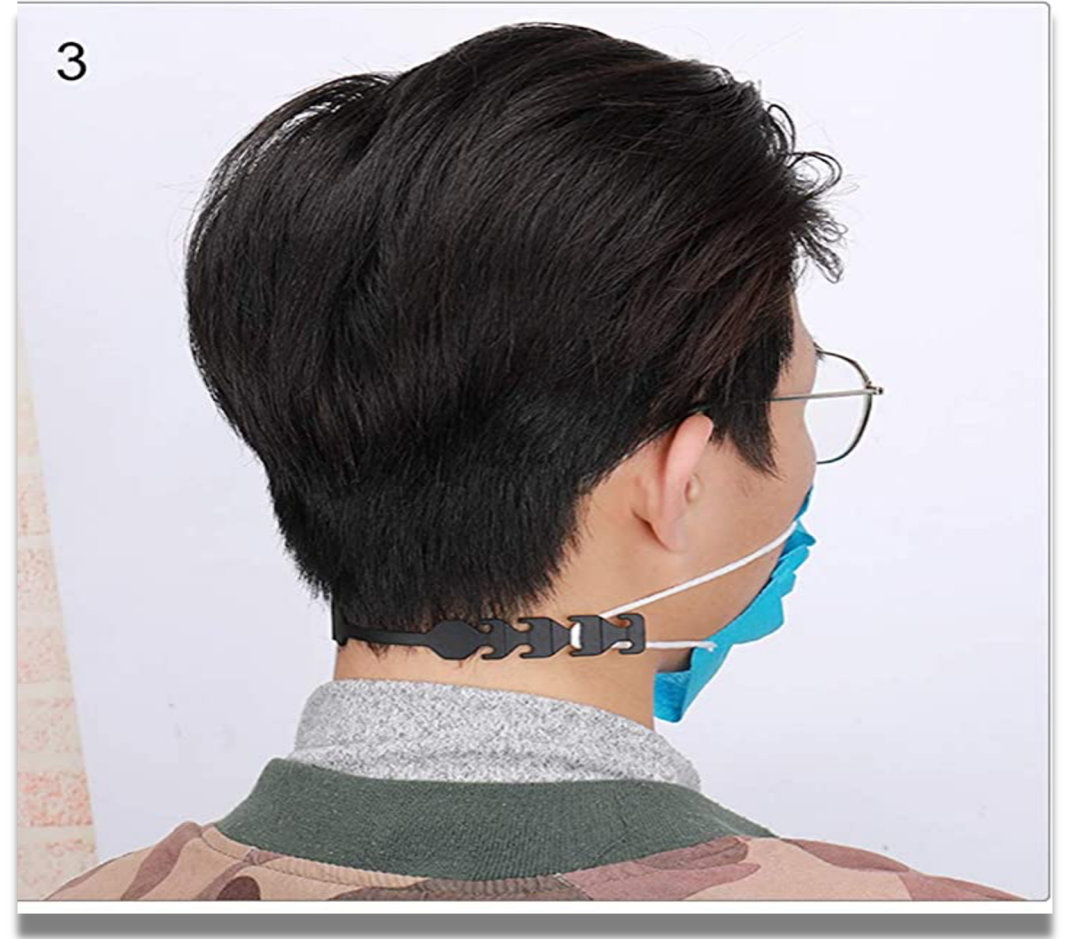
Hearing via vision

Hearing subjects focused more on the upper half of the face and those with hearing loss focused on the lower part

Gaze Patterns in Auditory-Visual Perception of Emotion by Children with Hearing Aids and Hearing Children, Yifang, et al 2017



Masks and Hearing Aids



Speech Droplets

- The Airborne Lifetime of Small Speech Droplets and Their Potential Importance in SARS-CoV-2 Transmission by Stadnytskyi, et al; published May 13, 2020. Proceedings of the National Academy of Sciences
- Asadi, S., Wexler, A.S., Cappa, C.D. et al. Aerosol Emission and Superemission During Human Speech Increase With Voice Loudness. Sci Rep 9, 2348 (2019).
 - Established increased droplet production with increased speech volume



Speech Droplets

- Speech droplets generated by carriers of Covid-19 are increasingly considered to be a likely mode of disease transmission
- Laser light scattering observations revealed that speech, especially loud speech, can emit thousands of oral fluid droplets per sec.
- In a closed, stagnant air environment, they disappear from the window of view in 8 to 14 min (varying on loudness of speech and dehydration of the subject)
- There is a substantial probability that speaking causes airborne virus transmission in confined environments



COVID-19 and Tinnitus

- Tinnitus is a sound perceived in the ear that is not actually being produced. Most people perceive a ringing in the ear, but others hear, buzzing, whooshing and/or music
- International Journal of Audiology estimates 7.6 % of people infected with COVID-19 experienced hearing loss, 14.8% suffered tinnitus and 7.2 % reported rotary vertigo
- The British Tinnitus Association (BTA) reported a 16% increase in phone calls to their tinnitus helpline and 256% rise in website helpline chats from May 2020 to December 2020
- More research is needed to further examine the relationship between COVID-19 and tinnitus



REFLECTION

***COVID-19 and hearing loss:
What's the connection?***



Aging Population

- Baby boomers have a longer predicted lifespan and they view themselves as 10-15 years younger than they actually are
- By 2035, the USA will have more people over the age of 65 than under the age of 18
- The 65 and older population grew 3.2% from 2018 to 2019
- They want to 'age in place' and feel young, healthy, and "with it"
- Want improved Healthspan

<https://www.census.gov/newsroom/press-releases/2020/65-older-population-grows.html>



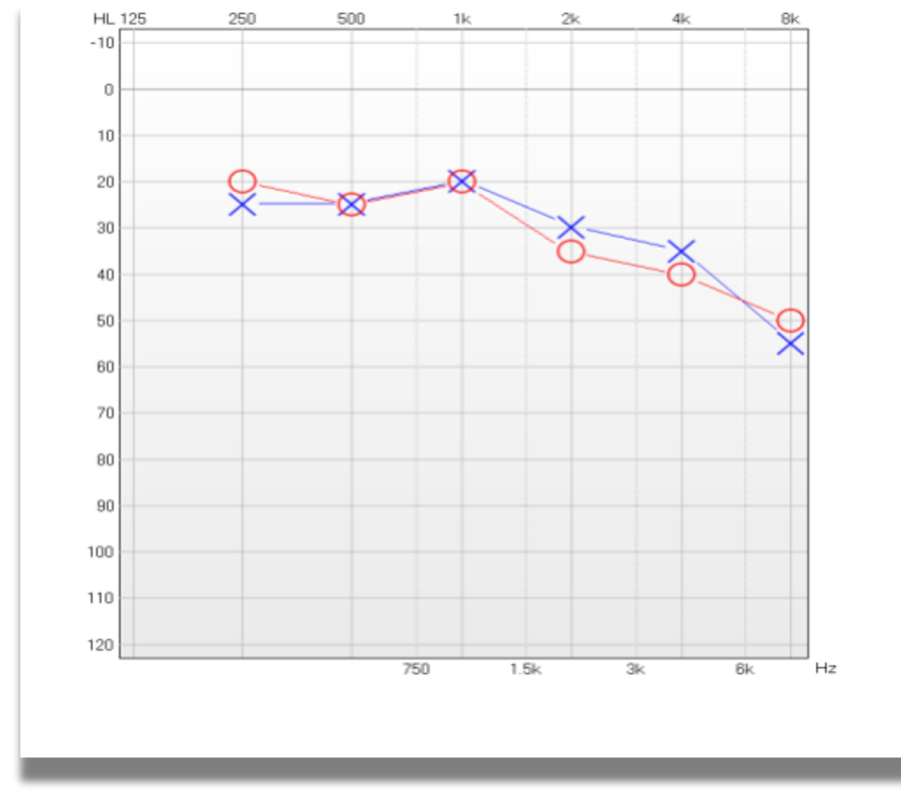
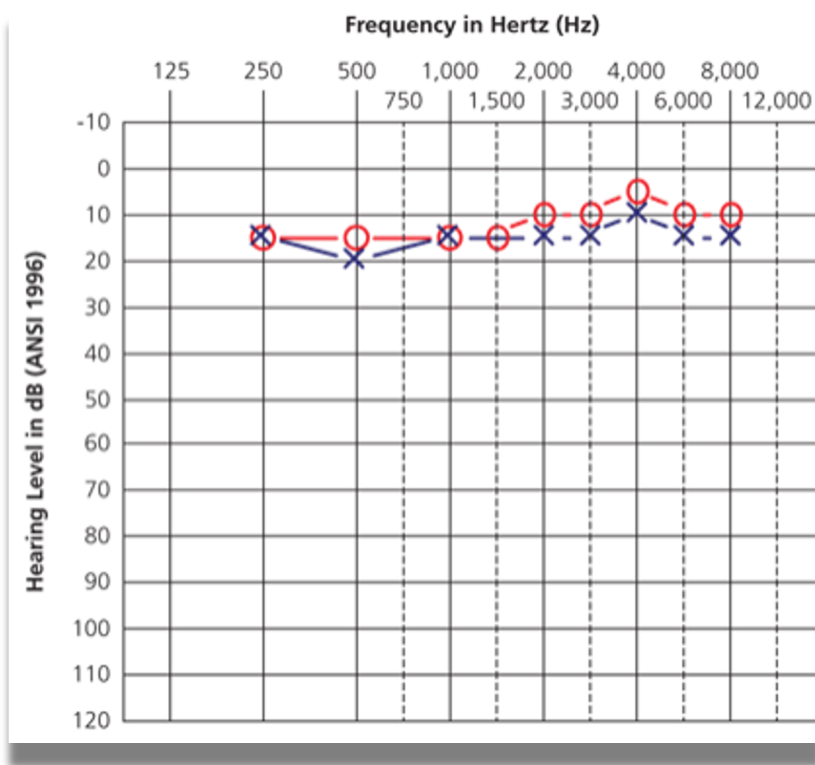
Is Medicare Non-coverage of Routine Hearing Exams Age Discrimination?

- Beginning in 2000, Universal Newborn Hearing Screening was enacted, making it mandatory for all babies to undergo a hearing screening before being discharged
- In the State of NY, all children receive hearing screenings w/in 6 months of entry, during pre-k or kindergarten, and in 1st, 3rd, 5th, 7th, and 10th grade
- Unfortunately, **Medicare does NOT require routine hearing screening** for the over 65 age group.
 - What's wrong with this picture?
 - Screenings are necessary to identify hearing loss early
 - Early identification leads to better overall outcomes, including reduced healthcare costs



What Would You Recommend?

- Would your recommendations be different if this was a 10-year-old child vs a 75-year-old retiree?
 - Why or why not?



Hearing Aids and Cost Sharing



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- Most insurances have some coverage or cost share models for hearing aids
- Medicare does not have a hearing aid benefit
- The average Nationwide, price of a treatment with a single hearing aid is \$2,372 (Bailey, AuD. 2020)

- PSAPS
 - Primarily purchased online. Available since 2009
 - By 2020, FDA will make public official ruling on OTC HA's
 - 6/10 PSAP owners report using them daily
- Hearing Aids
 - Data reported that satisfaction is rising
 - 83% users surveyed reported that they are satisfied w their HA's
 - 9/10 HA users are more likely to recommend HA's and their provider to a peer. Providers must build loyalty
- 72% of non-users stated that they would consider purchasing hearing technology online. 38% stated that they want the latest technology plus professional service

PSAPS and OTC



Today's Hearing Devices

- Lifestyle enhancement.
- Smartphone compatibility
- HA's are moving to general wellness products
- Wearable technology is exploding in the marketplace
 - Fall detection
 - Optical sensors measure heart rate, steps, social engagement
 - Microphones monitor voice quality
 - Slurring words, elongating sounds, variations in nasal tones

Hearing Myths and Misconceptions

- A hearing aid will restore my hearing just like glasses correct my vision
- My hearing is normal for my age
- I can get by with just one hearing aid, even though I have hearing loss in both ears
- A hearing aid can make my hearing worse

REFLECTION

Ageism: Is hearing loss normal at any age?



Patient Experiences



Patient Quotes

“They shun me”

“You’re the only person I spoke to today”

“I have force myself to hear”

“When they say it’s not important, it means I’m not important”

“I feel like a real little girl”

“My family is fed up with me”

“Sometimes a phone call is better than any medicine”

“Michelangelo painted the Sixteenth Chapel”

Colleague's Mom

- Medication error
- Combined celebrex and ibuprofen
- Both NSAIDs--risk of GI bleeding
- She didn't hear instructions to d/c ibuprofen. She wanted to adhere, took both
- Lost 25% blood volume, became anemic, multiple procedures

Post HA fitting

- Restaurant visit
- Family members get back to normal way of interacting w pt
- Pts demeanor changed, smiling, more energy,
- Pt stopped talking about being at the end of her meaningful life. And stopped talking about taking her life. It saved her life.
- Remarkable visit, resulted in trusting providers
- Think beyond just evaluating and assessing HL.

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Story of Cousin Bob





Questions?

Resources

- Agarwal, S., Mishra, A., Jagade, M., Kasbekar, V., & Nagle, S. K. (2013). Effects of hypertension on hearing. Indian journal of otolaryngology and head and neck surgery : official publication of the Association of Otolaryngologists of India, 65(Suppl 3), 614–618. doi:10.1007/s12070-013-0630-1
- <https://www.asha.org/public/hearing/>
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- Duzel et al. <https://www.nature.com/articles/s41598-019-49888-2#Sec5>
- The airborne lifetime of small speech droplets and their potential importance in SARS-CoV-2 transmission. Valentyn Stadnytskyi, Christina E. Bax, Adriaan Bax, Philip Anfinrud. Proceedings of the National Academy of Sciences May 2020, 202006874; DOI: 10.1073/pnas.2006874117
- Asadi, S., Wexler, A.S., Cappa, C.D. et al. Aerosol emission and superemission during human speech increase with voice loudness. Sci Rep 9, 2348 (2019). <https://doi.org/10.1038/s41598-019-38808-z>
- <https://www.census.gov/newsroom/press-releases/2020/65-older-population-grows.html>
<https://www.interfaithcasestudy.org/chapters/chapter-1>

