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ACADEMY of DOCTORS of AUDIOLOGY®

Managing Comorbidities Symposium

Victor Bray, PhD
Richard Gans, PhD
Carol Knightly, AuD
Michelle McElhannon, PharmD
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ADA ACADEMY of DOCTORS of AUDIOLOGY®

Victor Bray, MSC, PhD, FNAP

- Associate Professor
- Salus University Osborne College of Audiology

“Overview of Comorbidities in the Audiologic Patient”

“Hearing Loss and Depression”

“Taking Action: Co-managing Comorbidities”

Managing Comorbidities Symposium

General Objective

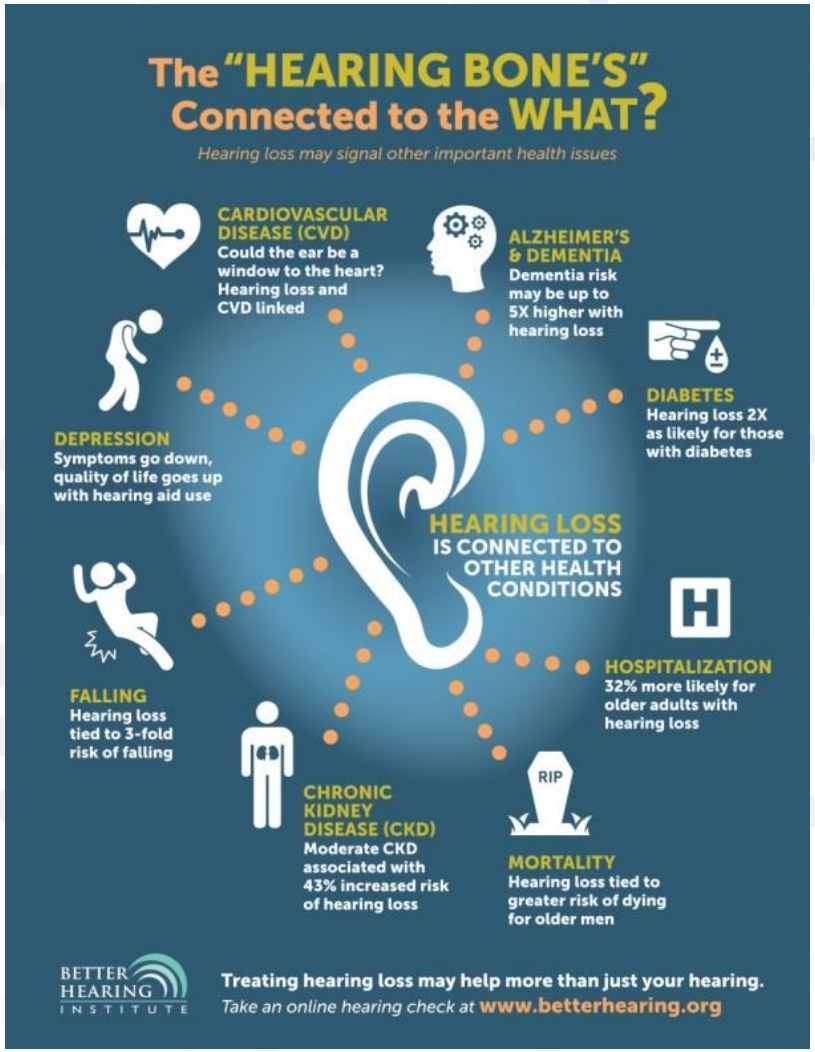
- An overview of systems and documentation will be presented following by information-packed sessions on the multiple conditions that can exist as comorbidities with hearing and balance disorders.

Relationship with Hearing Loss

- Brain / Dementia
- Brain / Depression
- Cancer / Ototoxicity
- Heart / Cardiovascular
- Pancreas / Diabetes
- Kidney / Dysfunction

Learning Objectives

- Acquire the knowledge base covering many comorbid conditions that audiology patients may present to audiologists.
- Develop awareness and take action, inside the audiology practice, as part of healthcare system and holistic patient care.



http://www.betterhearing.org/

Key Words for the Symposium …

Chronic

Comorbid

Co-management

Communications

Content Experts

Define Chronic Disease

- Chronic diseases are diseases of long duration and generally slow progression. (WHO)
- Chronic diseases have a long course of illness. They rarely resolve spontaneously, and they are generally not cured by medication or prevented by vaccine.
- Chronic diseases are ongoing, generally incurable illnesses or conditions, such as heart disease, asthma, cancer, and diabetes.
- Many chronic diseases are preventable, and often managed through early detection, improved diet, exercise, and treatment therapy.

Chronic Disease Lists *[Case History Items ?-VB]*

- Arthritis
- Brain Diseases
- Cancer
- Chronic Kidney Disease
- Diabetes Mellitus
- Heart Disease
- Hypertension
- Hyperlipidemia
- Lung Disease
- Neurological Disorders
- Obesity
- Osteoporosis
- Tooth Decay

Sources: CDC, CMS, WHO

Chronic Disease Lists *[Case History Items ?-VB]*

- Arthritis
- **Brain Diseases**
- **Cancer**
- **Chronic Kidney Disease**
- **Diabetes Mellitus**
- **Heart Disease**
- Hypertension
- Hyperlipidemia
- Lung Disease
- **Neurological Disorders**
- Obesity
- Osteoporosis
- Tooth Decay

Sources: CDC, CMS, WHO

Define Comorbidity

- Comorbidity is the simultaneous presence of two or more chronic conditions or diseases in a patient.
  - ***A chronic condition can be defined as a health condition or disease that is persistent or otherwise long-lasting in its effects.***
- Comorbidity is associated with worse health outcomes, more complex clinical management, and increased health care costs.
- Comorbidity also implies interactions between the illnesses that affect the course and prognosis of both.
- Audiologists must begin to think of audio-vestibular disorders as chronic diseases which can contribute to comorbidity effects in patients.

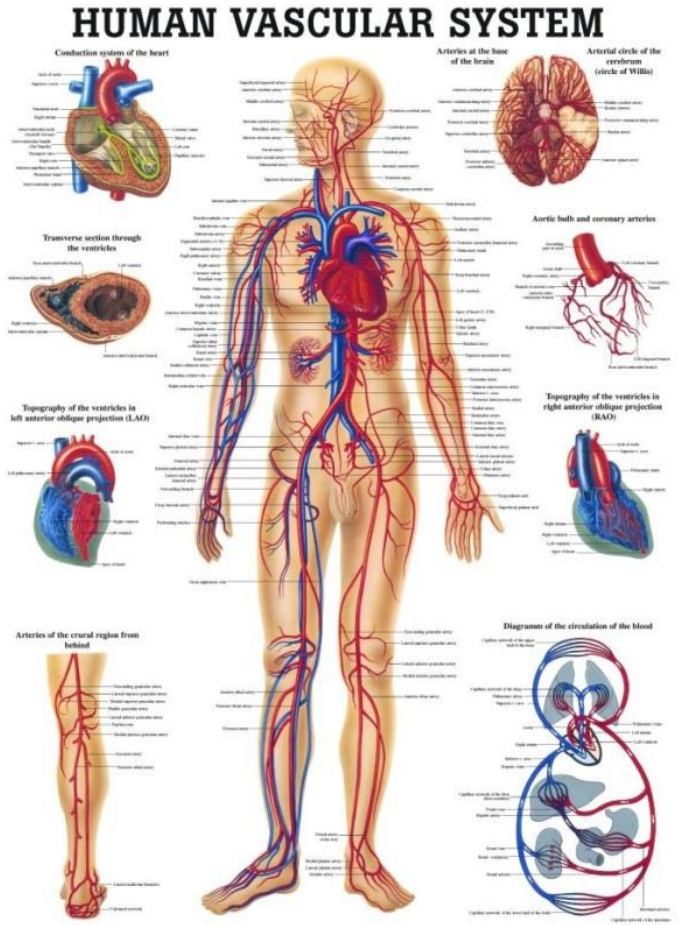
Understanding Odds Ratio

- **An odds ratio (OR)** is a measure of association between an exposure and an outcome.
- The **OR** represents the odds that an outcome will occur given a particular exposure, compared to the odds of the outcome occurring in the absence of that exposure.
- **Odds ratios** are used to compare the relative odds of the occurrence of the outcome of interest (e.g. disease or disorder), given exposure to the variable of interest (e.g. health characteristic, aspect of medical history).

- The **odds ratio** can also be used to determine whether a particular exposure is a risk factor for a particular outcome, and to compare the magnitude of various risk factors for that outcome.
- **OR=1 Exposure does not affect odds of outcome**
- **OR>1 Exposure associated with higher odds of outcome**
- **OR<1 Exposure associated with lower odds of outcome**

https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2938757/

Bodily Systems Comorbid with Hearing Loss



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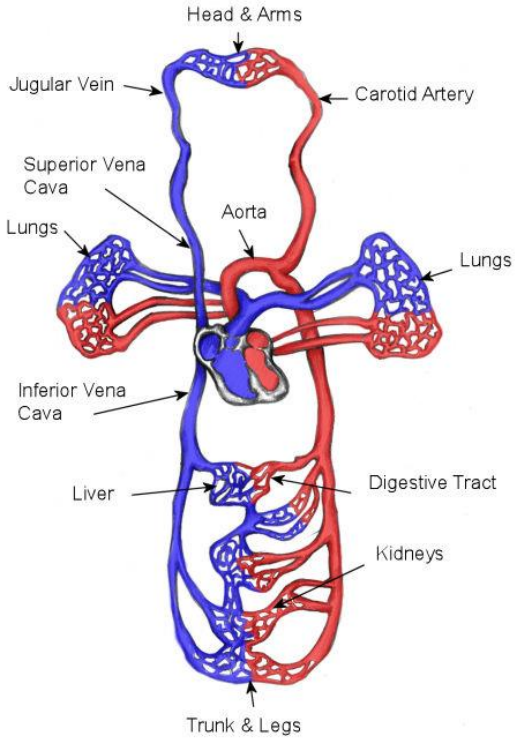
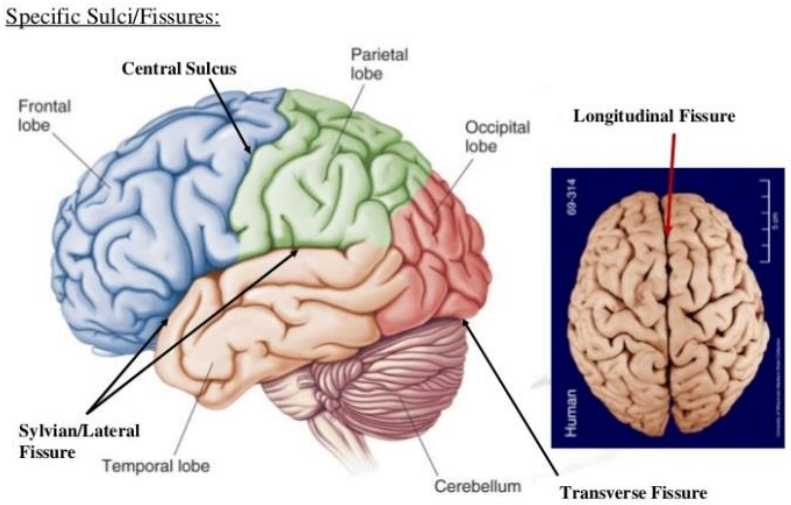
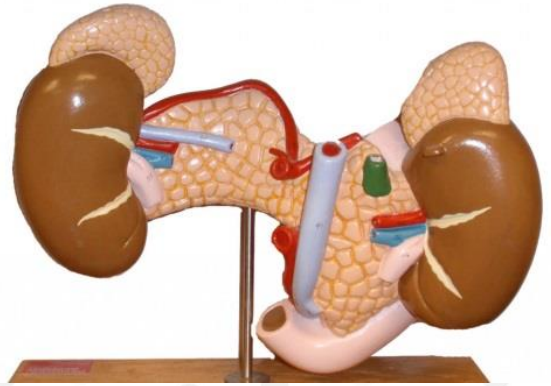


http://www.teachpe.com/images/anatomy-physiology





http://humananatomylibrary.com

https://image.slidesharecdn.com/humanbrain

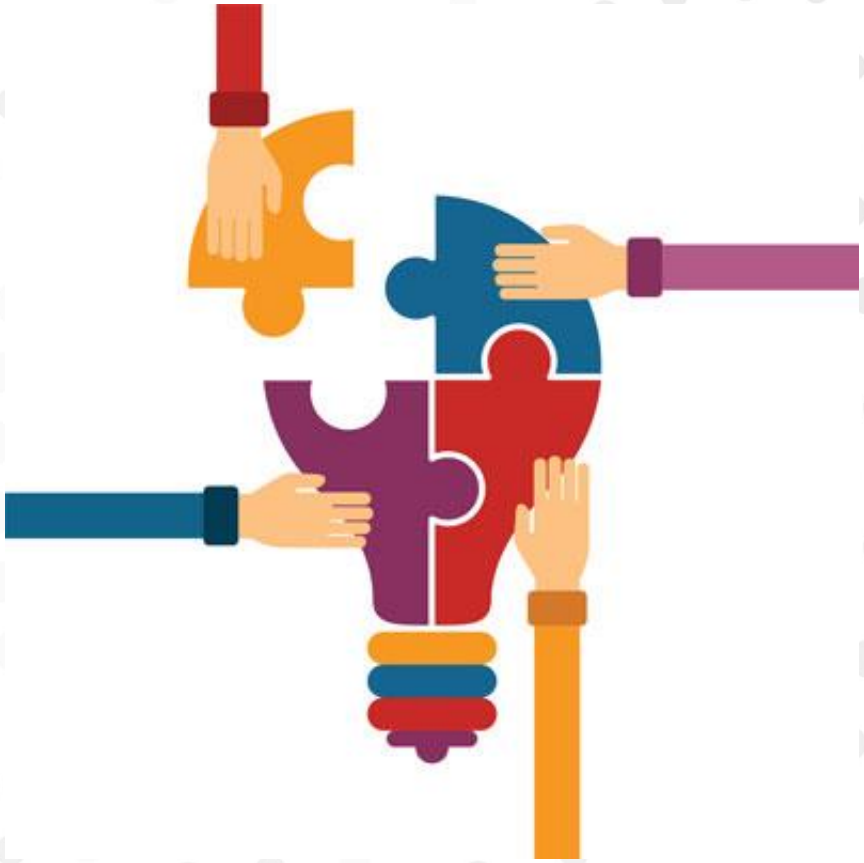
Define Co-management (medical, formal)

- Co-management is a hospital/physician alignment strategy to elevate hospital service line performance.
- A co-management arrangement is an organized and formal mechanism to actively engage a group of physicians to achieve greater operational efficiencies and improved patient care outcomes.
- The goal and objective of the co-management arrangement is to recognize and appropriately reward participating medical groups for their efforts in developing, managing and improving quality and efficiency of a hospital service line.

Hospital Association of South California

Define Co-management (informal)

- To manage jointly.
- Objective: The proactive sharing of patient information among healthcare professionals in order to improve patient treatment and patient outcomes.



Content Experts

Dr. David Zapala

Dr. Nicholas Reed

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Dr. Michelle McEllhannon

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David Zapala, PhD

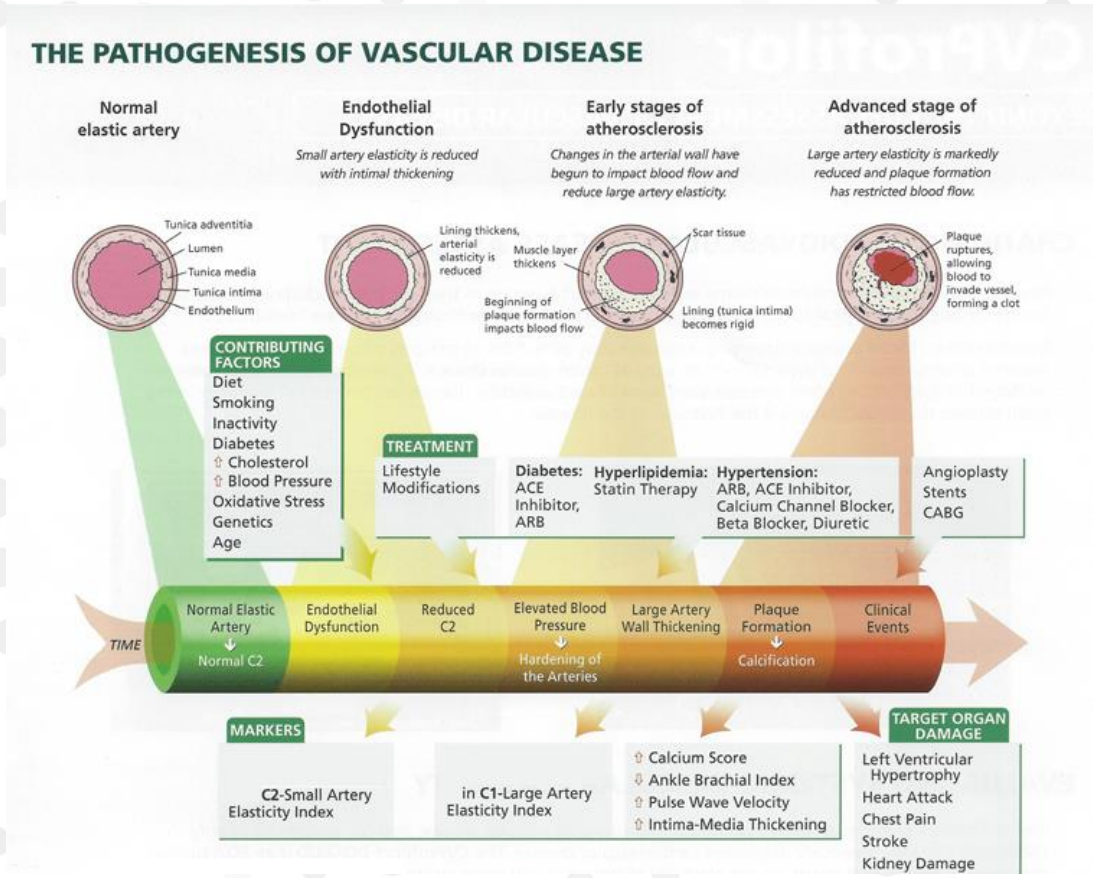
- Associate Professor of Audiology
- Mayo Clinic Department of Otolaryngology – Head & Neck Surgery / Audiology

“Documentation and Communications with Physicians”

AN INTRODUCTION TO COMORBID CHRONIC DISEASES ENCOUNTERED IN THE PRACTICE OF AUDIOLOGY

Vascular Disease (Blood Vessel Disease)

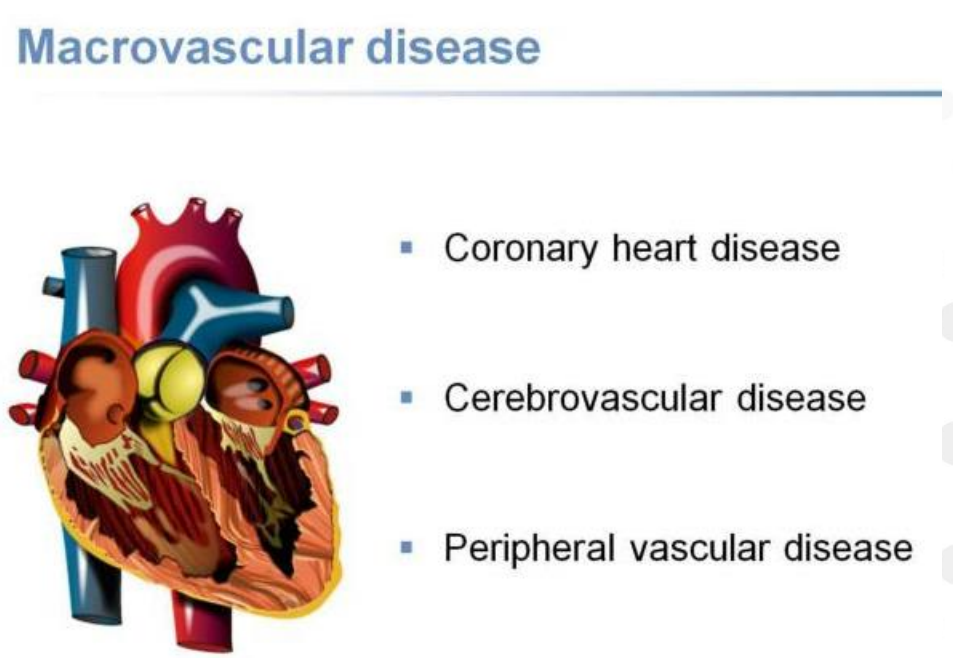
- Circulatory system vessels move fluids throughout your body.
- Arteries move blood away from the heart.
- Veins return blood to the heart.
- Lymph vessels and lymph nodes are part of a cleaning system that removes damaged cells from your body.



http://www.pedrokid.addr.com

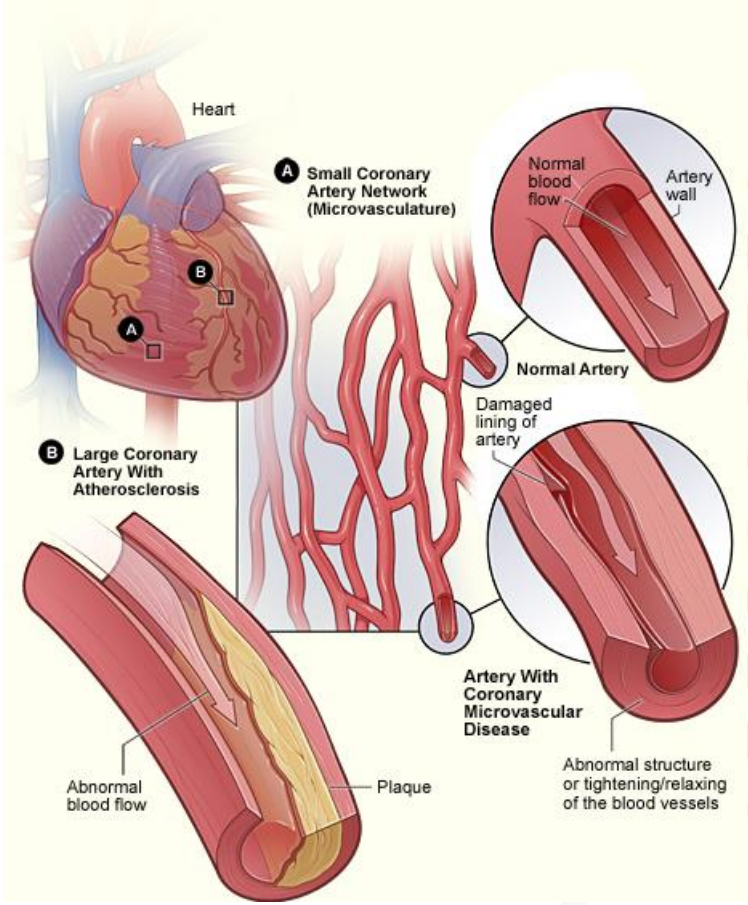
Macrovascular Disease

- Cerebrovascular (brain)
- Coronary (heart)
- Peripheral Artery Disease (limbs)
- Ischemic heart disease
  - Angina and death
- Ischemic brain disease
  - Stroke and dementia



https://www.slideserve.com/raja-mcgee/macrovascular-disease

Microvascular Disease



- Atrial fibrillation
- Diabetes
- Hyperlipidemia
- Hypertension
- Ischemic heart disease
- Ischemic brain disease

https://www.nhlbi.nih.gov/health-topics/coronary-microvascular-disease

Hearing Loss & Heart Disease

- Gates, G.A., Cobb, J.L., D'Agostino, R.B and Wolf, P.A. (1993). The relation of hearing in the elderly to the presence of cardiovascular disease and cardiovascular risk factors. Archives of Otolaryngology Head and Neck Surgery, 119:156-161.

- Freidland, D.R., Cederberg, C., Tarima, S. (2009). Audiometric pattern as a predictor of cardiovascular status: development of a model for assessment of risk. Laryngoscope, 119(3) 473-86.

- Bishop, C.E. (2012). The Ear is a Window to the Heart: A Modest Argument for a Closer Integration of Medical Disciplines. Editorial in Otolaryngology, 2(4).

Hearing Loss & Heart Disease (Bishop, 2012)

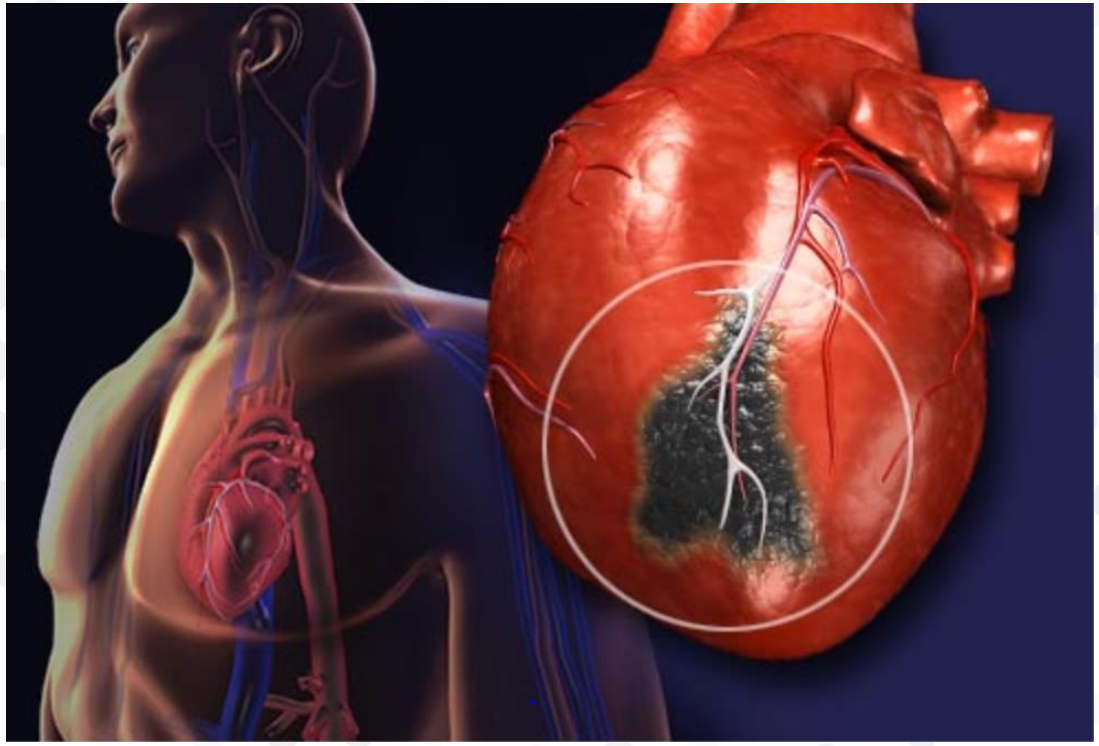
- Does cardiovascular disease cause hearing loss, or not?
- Can hearing loss be an indication, or biomarker, for underlying cardiovascular disease?
- **What we can say with confidence is that states of disease, whether cardiovascular or cardio-metabolic in nature, which result from patterns of behavior generally linked to poor nutrition, lack of exercise, stress, and smoking, are clearly related to loss of hearing acuity in older adults.**

- What the current data shows is that *the specialized medical professions,* including the specialty of otolaryngology [audiology^{VB}] and her allied disciplines, *can no longer function in a vacuum.*
- One should not argue for a new model of care, but rather, for an enhanced model, *where all otolaryngology [audiology^{VB}] professionals seek out and maintain collaborations with other specialties*, making it a point to routinely engage patients on all aspects of their general health and wellness.

The Ear is a Window to the Heart: A Modest Argument for a Closer Integration of Medical Disciplines

Cardiovascular Disease

- Heart disease, such as coronary heart disease, heart attack, congestive heart failure, and congenital heart disease, is the leading cause of death for men and women in the U.S.
- Prevention includes quitting smoking, lowering cholesterol, controlling high blood pressure, maintaining a healthy weight, and exercising.



WebMD

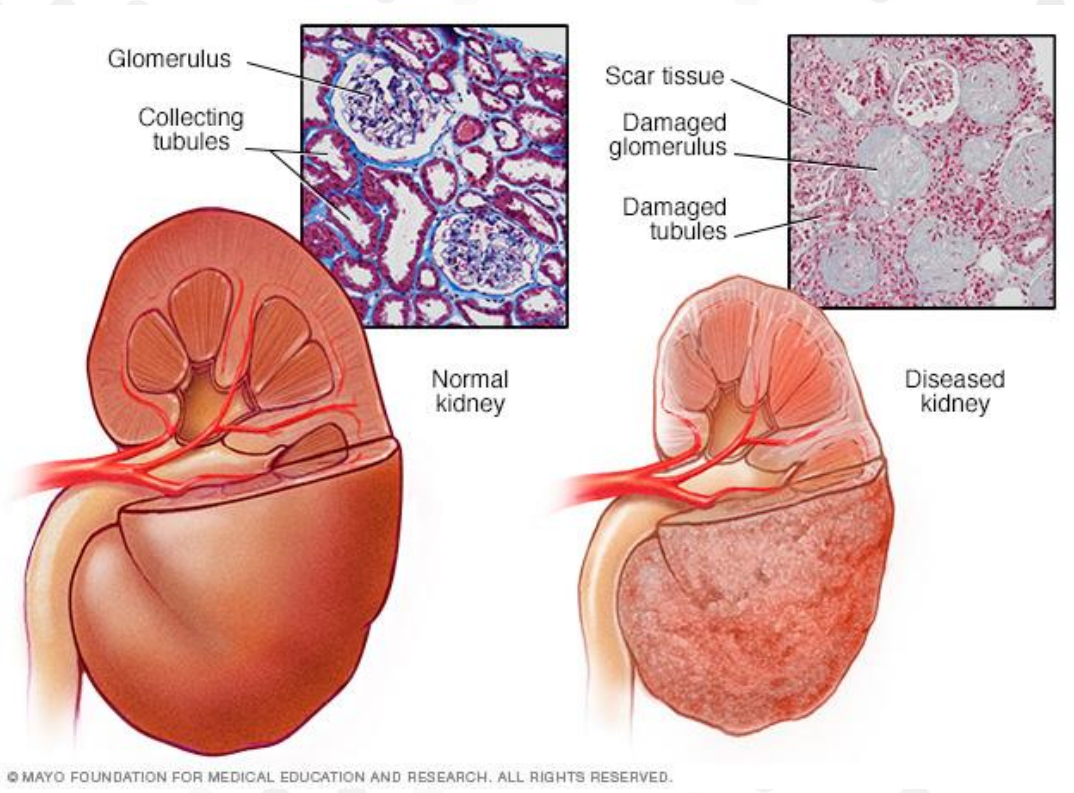
Carol Knightly, AuD

- Senior Director, Center for Childhood Communication and Center for Rehabilitation
- Children's Hospital of Philadelphia

"Hearing Loss and Cardiovascular Disease"

Kidney Disease

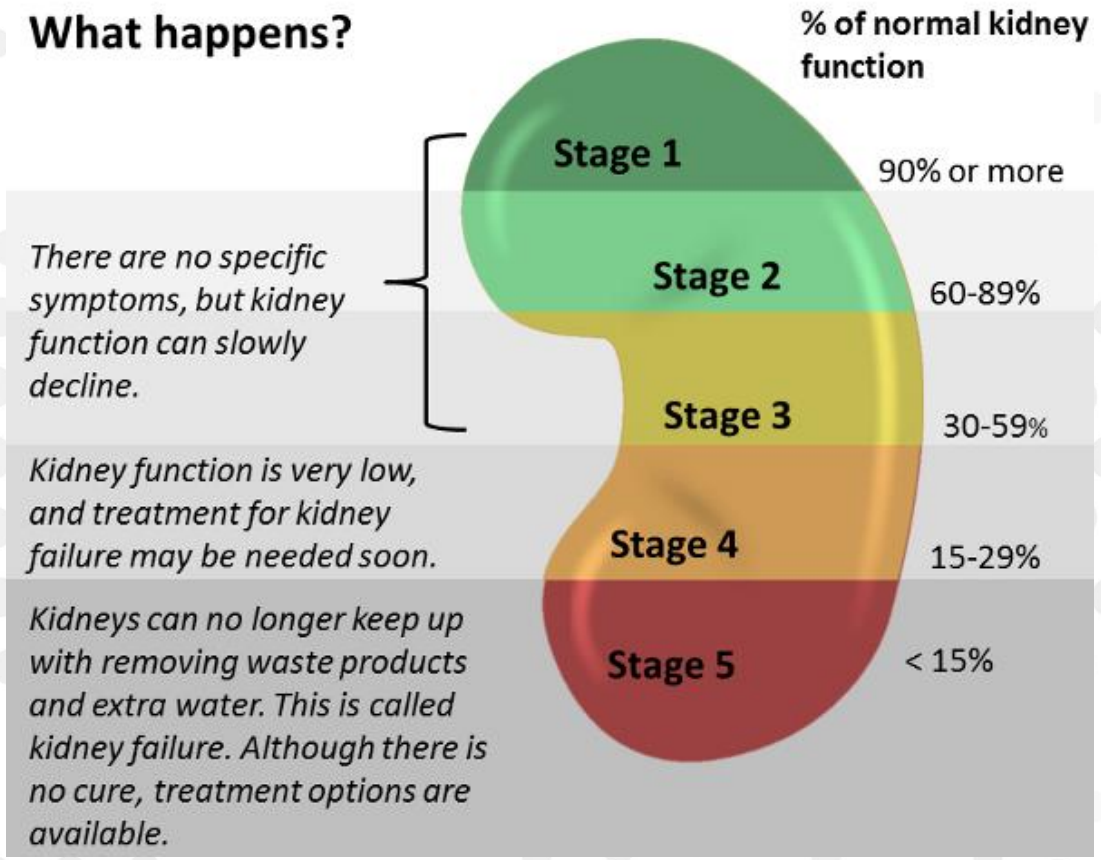
- Kidney disease affects the body's ability to clean blood, filter extra water out of blood, and help control blood pressure.
- When kidneys are damaged:
  - waste products build up in the body
  - swelling in the ankles,
  - vomiting, weakness,
  - poor sleep, shortness of breath.
- Without treatment, the kidneys eventually stop working.



Kidney Disease *[Case History: What Stage? –VB]*

Healthy kidneys:

- Keep a balance of water and minerals (such as sodium, potassium, and phosphorus) in your blood
- Remove waste from your blood after digestion, muscle activity, and exposure to chemicals or medications
- Make renin, which your body uses to help manage your blood pressure
- Make a chemical called erythropoietin, which prompts your body to make red blood cells
- Make an active form of vitamin D, needed for bone health and other things



http://choosingdialysis.org

Chronic Kidney Disease

- Chronic kidney disease from poor function for > than 3 mo.
- Most common culprits:
  - Diabetes (types 1 and 2)
  - High blood pressure
  - High blood sugar levels
- High blood pressure stresses the blood vessels of the kidneys.

http://www.360balance.com/

Hearing Loss & Kidney Disease

- The Association Between Reduced GFR and Hearing Loss: A Cross-sectional Population-Based Study
- Vilayur, Gopinath, Harris, Burlutsky, McMahon, Mitchell (2010)

- **Results: Moderate Chronic Kidney Disease (CKD) was independently associated with hearing loss.**
  - OR:1.43; $p = 0.006$
  - Adjustments for: age, sex, noise exposure, education, diabetes, hypertension, stroke histories, smoking.

National Kidney Foundation

- “Hearing loss is commonly linked to syndromal kidney disease, however, this study suggests a strong tie to CKD in general.
- The link can be explained by structural and functional similarities between tissues in the inner ear and in the kidney.
- Additionally, toxins that accumulate in kidney failure can damage nerves, including those in the inner ear.
- Another reason for this connection is that kidney disease and hearing loss share common risk factors, including diabetes, high blood pressure and advanced age."

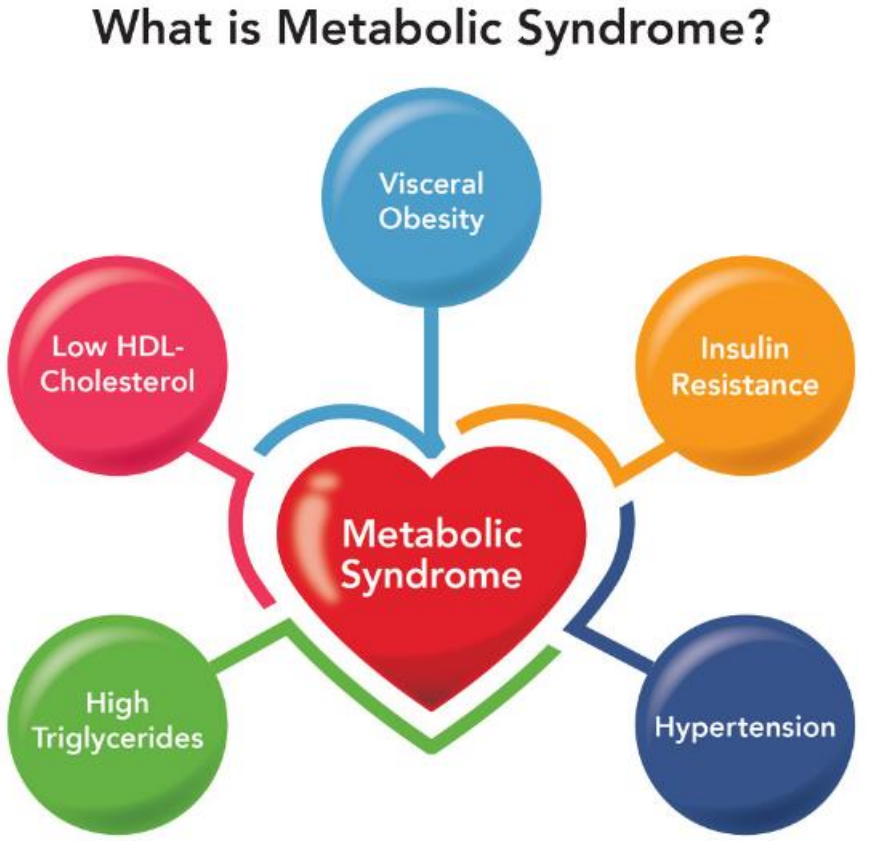
Richard E. Gans, PhD

- Founder and CEO
- The American Institute of Balance

“Kidney Dysfunction and Balance”

Metabolic Syndrome

- Metabolic syndrome increases the risk of cardiovascular disease, ischemic brain disease, **diabetes** and other diseases related to hyperlipidemia.
- Causes of metabolic syndrome:
  - Overweight, obesity, physical inactivity
  - Genetic factors, age
- Metabolic syndrome has elevated odds ratio of comorbidities of vascular diseases, neurological disorders, and audio-vestibular disorders.



Cutting-edge epigenetics research reveals new genes linked to metabolic syndrome in humans

Diabetes

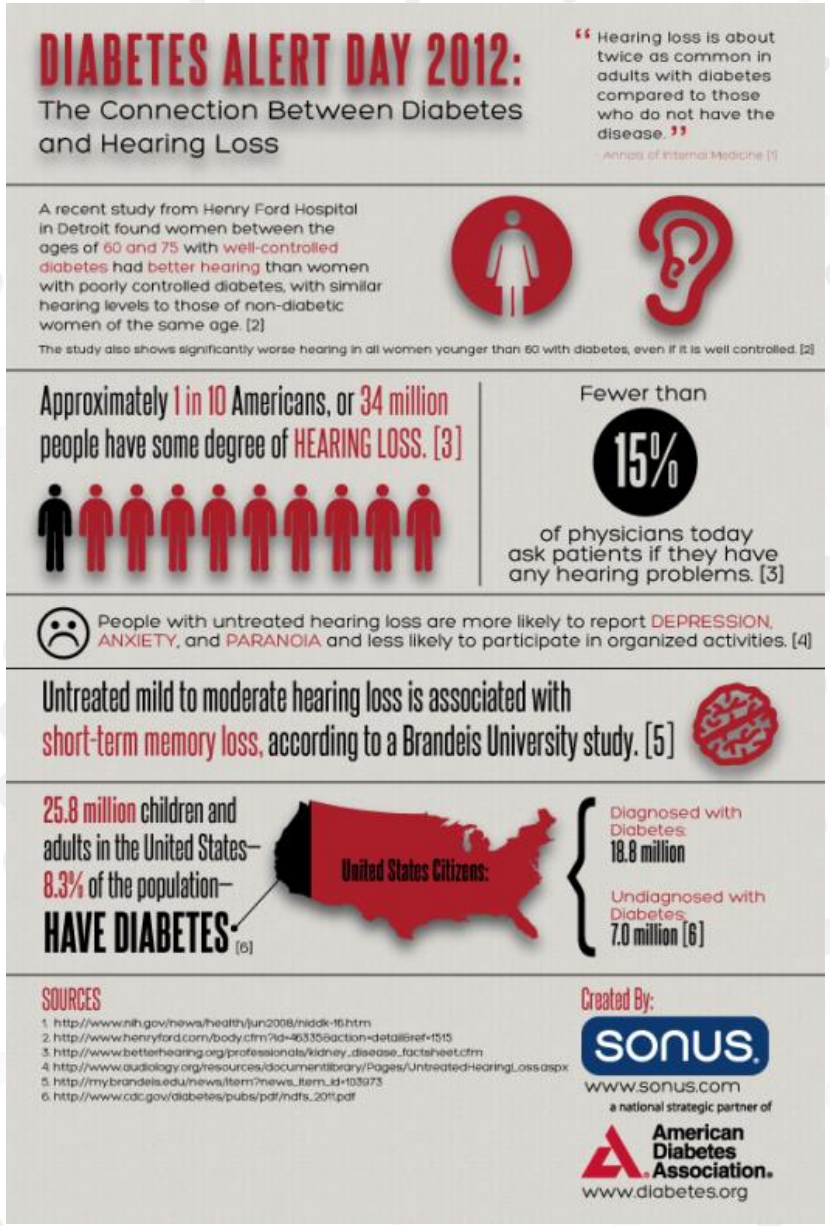
Diabetes occurs when one of the following occurs:

- When the pancreas does not produce any insulin
- When the pancreas produces very little insulin
- When the body does not respond appropriately to insulin, a condition called “insulin resistance”

https://fenfuro.com

Diabetes

- Diabetes is a lifelong disease.
- 18 million Americans diabetes.
- 5 million are unaware.
- 41 million people pre-diabetes.
- Disease management is critical to stay in good health.



Hearing Loss & Diabetes

- Diabetes and Hearing Impairment in the United States: Audiometric Evidence from the National Health and Nutrition Examination Survey, 1999 to 2004
- Bainbridge, Hoffman, Cowie (2008) Ann Intern Med.

- **Results: Hearing impairment was more prevalent among adults with diabetes.**
- Prevalence of low- or mid-frequency HL
  - 21% among adults with diabetes
  - 9% among adults without diabetes.
- Prevalence of high-frequency HL
  - 54% among those with diabetes
  - 32% among those without diabetes
- The association between diabetes and hearing impairment was independent of known risk factors for hearing impairment
  - aOR:1.82 for LF/MF HL
  - aOR:2.16 for HF HL

American Diabetes Association (ADA)

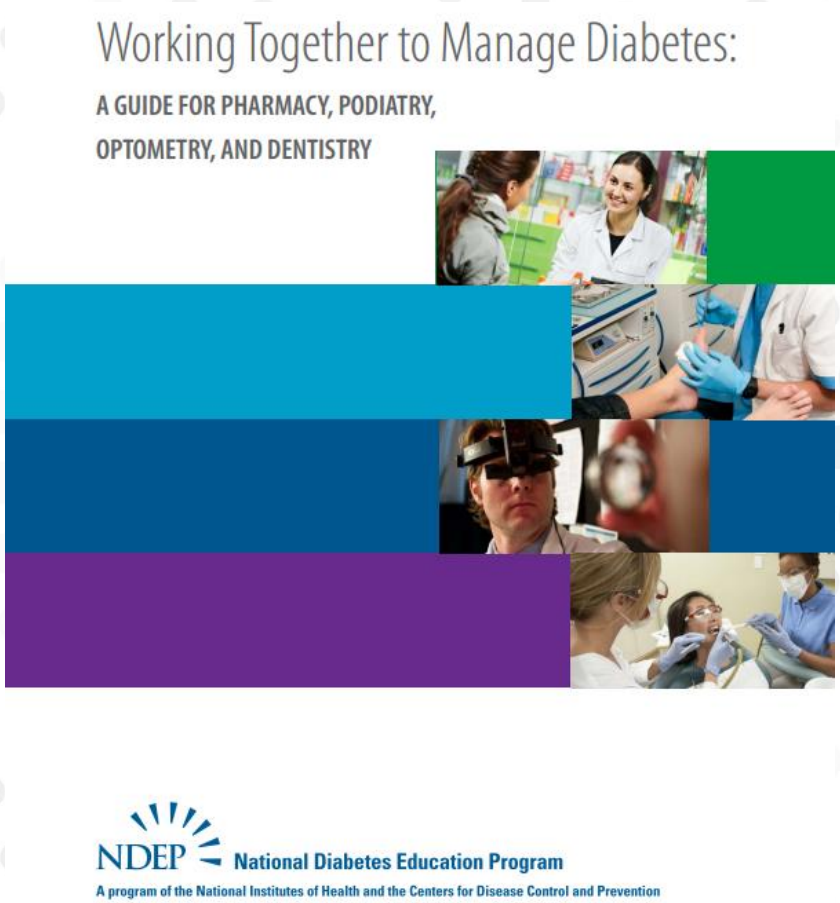
- Right now we don't know how diabetes is related to hearing loss.
- It's possible that the high blood glucose levels associated with diabetes cause damage to the small blood vessels in the inner ear, similar to the way in which diabetes can damage the eyes and the kidneys.
- But more research needs to be done to discover why people with diabetes have a higher rate of hearing loss.

Diabetes Management Team

Working Together to Manage Diabetes: A Toolkit for Pharmacy, Podiatry, Optometry, and Dentistry (PPOD).

- Pharmacy monitoring of meds
- Podiatry for foot care
- Optometry for eye care
- Dentistry for oral care

https://www.cdc.gov/diabetes/ndep/toolkits/ppod.html

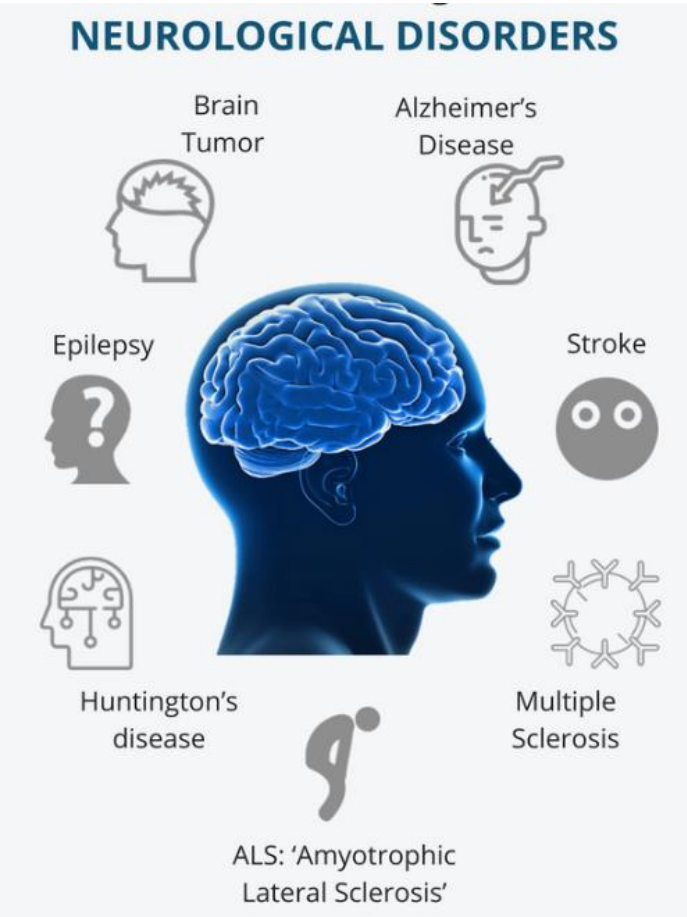


Christopher Spankovich, AuD, PhD, MPH

- Associate Professor
- The University of Mississippi School of Medicine – Department of Otolaryngology and Communicative Sciences

“Hearing Loss and the Pancreas: Screening, Diagnosis and Treatment/Monitoring”

Neurological Disorders



- Diseases of the central nervous system /peripheral nervous system.
- Brain disorders can result
  - from neurological injury;
  - from brain tumors;
  - as neurodegenerative diseases;
  - as mental disorders.
- Also epilepsy, migraine headaches, multiple sclerosis.
- Of particular interest to the audiologist:
  - demyelination of nerve fibers (multiple sclerosis),
  - neurological disorders resulting from infectious organisms (bacterial meningitis and viral meningitis),
  - degenerative neurological disorders accompanied by loss of sensory function in vision, hearing and/or balance.

https://blog.thryveinside.com/a-quick-guide-to-7-fascinating-neurological-disorders/

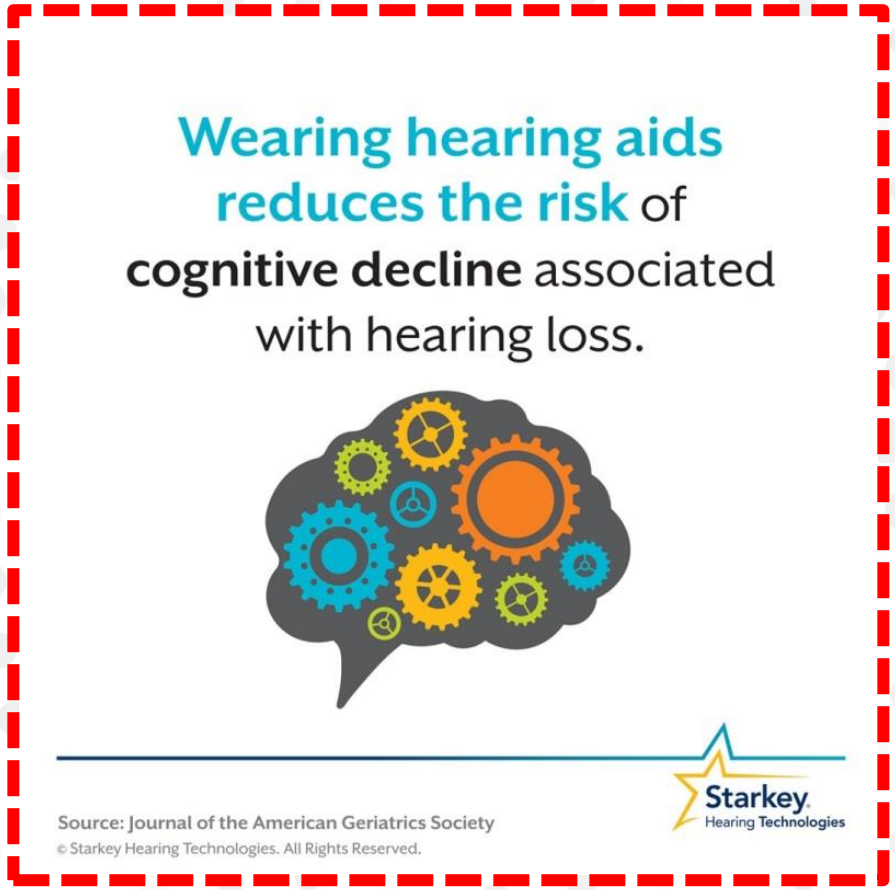
Cognitive Decline & Dementia

- Dementia is a syndrome that involves a significant global impairment of cognitive abilities such as attention, memory, language, logical reasoning, and problem-solving severe enough to interfere with social or occupational functioning.

http://www.dsnonline.co.uk/wp-content

Cognitive Decline & Dementia

- Dementia is not temporary confusion or forgetfulness that might result from a self-limited infection, underlying illness, or side effects of medications.
- Dementia typically worsens over time.

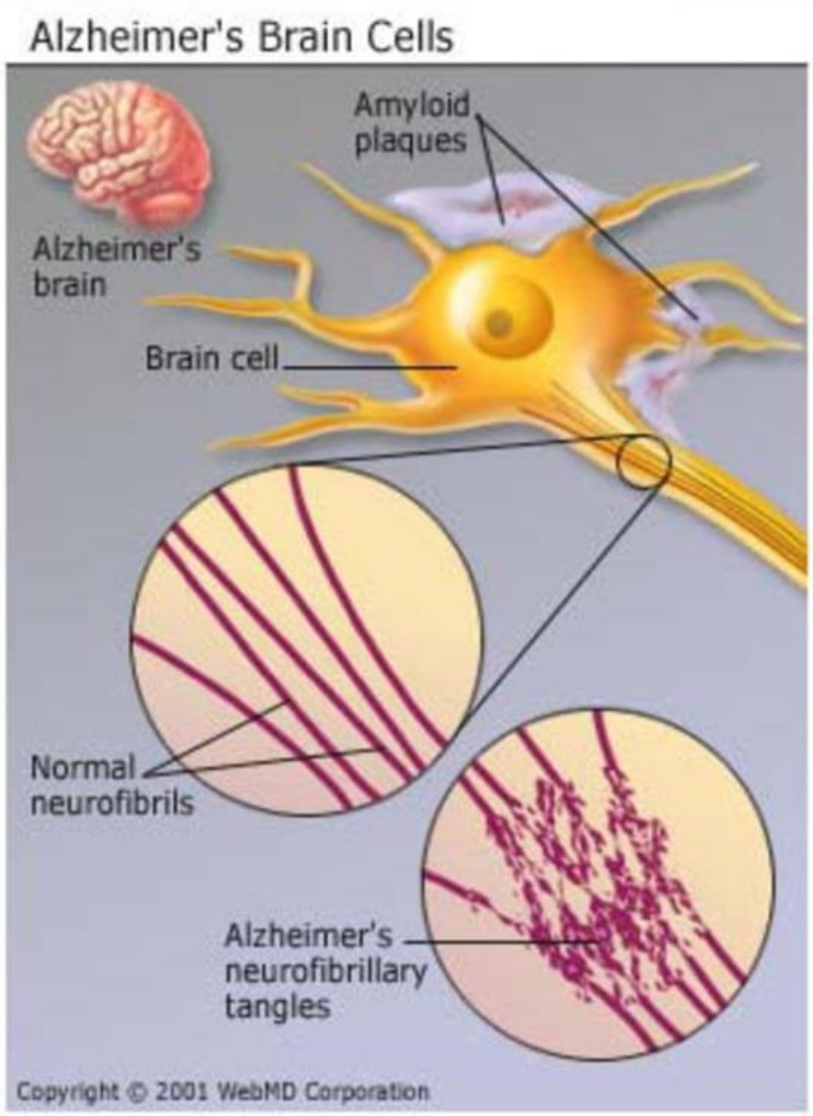


Causes of Dementia

- Alzheimer's disease (most common form of dementia)
- Brain fluid buildup (hydrocephalus)
- Brain infection, meningitis, syphilis
- Brain injury, tumors, stroke
- Drug toxicity
- HIV infection
- Multiple Sclerosis
- Parkinson's Disease
- Thiamine deficiency with alcoholism
- Vascular dementia
- Thyroid disease

Alzheimer’s Disease

- The disease isn’t a normal part of aging.
- The symptoms seem to come from two main types of nerve damage:
  - Nerve cells get tangles, called neurofibrillary tangles.
  - Protein deposits called beta-amyloid plaques build up in the brain.
- Damage could be associated with a protein in blood called ApoE (for apolipoprotein E), which the body uses to move cholesterol in the blood.



Hearing Loss & Dementia

- Compared to individuals with normal hearing, those individuals with a mild, moderate, and severe hearing impairment, respectively, had a 2-, 3-, and 5-fold increased risk of incident all-cause dementia over >10 years of follow-up
- Lin, Metter, et al. (2012)

- Hearing loss is independently associated with accelerated cognitive decline and incident cognitive impairment in community-dwelling older adults.
- Lin, Yaffe, Xia, et al. (2013)

Nicholas S. Reed, AuD

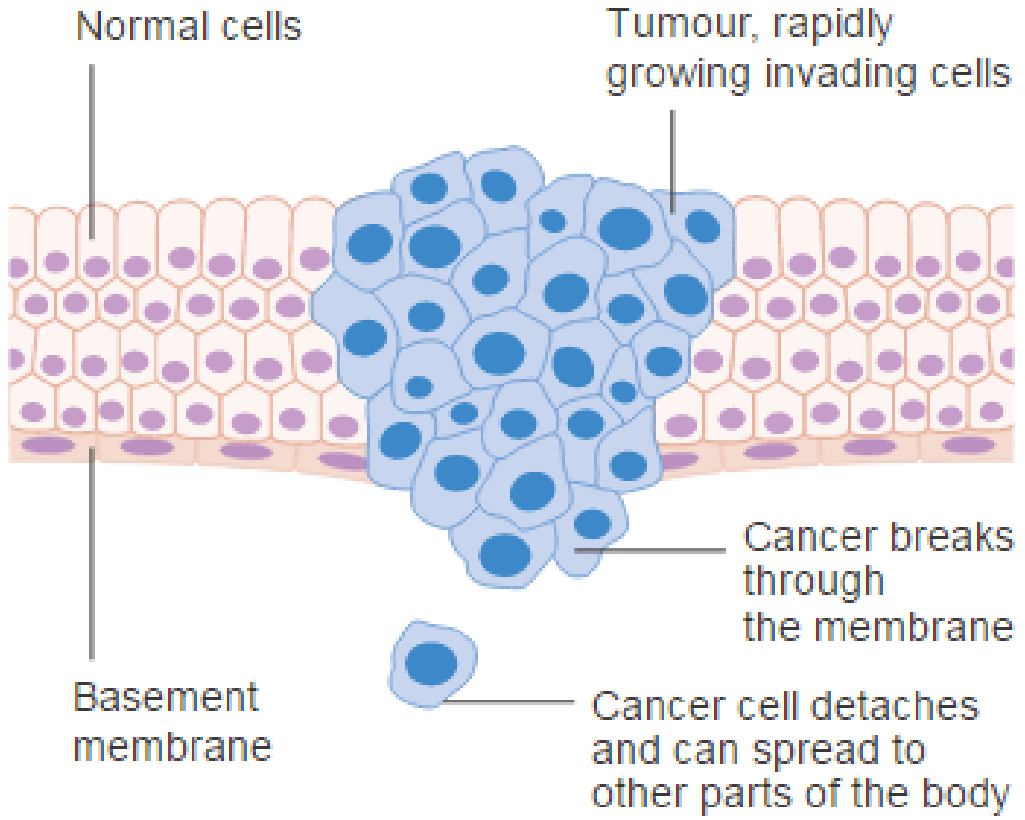
- Assistant Professor
- Johns Hopkins University School of Medicine Department of Otolaryngology – Head and Neck Surgery

“Hearing Loss and Dementia:

Audiologic Implications”

Cancer

- A collection of related diseases.
- Some of the body's cells begin to divide without stopping and spread into surrounding tissues.
- When cancer develops, the orderly process of cell growth and death breaks down.
- As cells become more and more abnormal, old or damaged cells survive when they should die.
- These extra cells can divide without stopping and may form growths called tumors.



https://www.cancer.gov/

Cancer Research UK / Wikimedia Commons

Ototoxicity

- **Ototoxicity** is the property of being toxic to the ear, specifically the cochlea or auditory nerve and sometimes the vestibular system.
- The effects of ototoxicity can be reversible and temporary, or irreversible and permanent.
- Symptoms of ototoxicity include partial or profound hearing loss, vertigo, and tinnitus.

https://thehearingconsultancy

Michelle McElhannon, PharmD

- Public Service Assistant, Division of Experience Programs
- University of Georgia College of Pharmacy

“Cancer, Treatment and Ototoxicity”

Some Comorbid Conditions with Hearing Loss

[Are you asking about these? –VB]

Physiological Conditions

- Anemia
- Arthritis
- Cardiovascular Disease
- Diabetes
- Kidney Disease
- Thyroid Disease
- Vascular Disease

Psychosocial Conditions

- Alzheimer's Disease
- Cognitive Decline & Dementia
- Anxiety & Worry
- Depression & Loneliness
- Social Isolation & Withdrawal

Top 10 Chronic Conditions in Adults 65+

[Are you asking about these? –VB]

1. Hypertension (high blood pressure)
2. High Cholesterol
3. Arthritis
4. Coronary Artery Disease (ischemic heart disease)
5. Diabetes
6. Chronic Kidney Disease (CKD)
7. Heart Failure
8. Depression
9. Alzheimer's Disease and Dementia
10. Chronic Obstructive Pulmonary Disease (COPD)

National Council on Aging, NCOA Blog, February 2017

Comorbidity Co-management Team

Physiological Conditions

- Audiologists
- Nurse Practitioners
- Optometrists
- Pharmacists
- Physician Assistants
- Podiatrists
- Primary Care Physicians

Psychosocial Conditions

- Audiologists
- Gerontologists
- Primary Care Physicians
- Psychiatrists
- Psychologists
- Social Workers

The Audiology Oath

I will collaborate with my fellow audiologists and other professionals for the benefit of our patients.

I will practice when competent to do so, and refer all others to practitioners capable of providing care in keeping with this Oath.

As a Doctor of Audiology, I agree to be held accountable for any violation of this Oath and the ethics of the profession.

- *"As a Doctor of Audiology, I pledge to practice the art and science of my profession to the best of my ability and be ethical in conduct.*
- *I will respect and honor my teachers, and also those how have forged the path I freely follow.*
- *According to their example, I will continue to expand my knowledge and improve my skills.*
- *I will collaborate with my fellow audiologists and other professionals for the benefit of our patients.*
- *I will, to the best of my ability and judgement, evaluate, manage, and treat my patients.*
- *I will willingly do no harm, but rather always strive to provide care according to the standards of the profession.*
- *I will act to the benefit of those needing care, striving to see that none go untreated.*
- *I will practice when competent to do so, and refer all others to practitioners capable of providing care in keeping with this Oath.*
- *I will aspire to personal and professional conduct free of corruption.*
- *I will keep in confidence all information made known to me about my patients.*
- *As a Doctor of Audiology, I agree to be held accountable for any violation of this Oath and the ethics of the profession.*
- *While I keep this oath unviolated, may it be granted to me to enjoy life and the practice of the art and science of audiology, respected be all persons, in all times."*

Steiger, J., Saccone, P. & Freeman, B. (2002). A Proposed Oath for Audiologists. Audiology Today 14(5):12-14.

Think of the Ear as a Canary in the Coal Mine

https://share.america.gov/wp-content/uploads/2014/11/canary_art22.jpg

LETS MAKE IT A GAME! BINGO ANYONE?

AuDacity Co-Morbidities BINGO				
Pancreas	Function	Radiation	Heart	Syndrome
Diet	Chemotherapy	Kidney	Risk	Metabolism
Falls	Etiology	Brain	Communication	BLSA
Treatment	Geriatric	Vessel	Cisplatin	Smoking
Diagnose	Ototoxicity	CDC	Cholesterol	Alzheimer's

AuDacity Co-Morbidities BINGO				
Pharmacist	Function	Smoking	Geriatric	Alcohol
Falls	Glucose	Co-management	Cancer	Metabolism
Immune	Communication	Vertigo	Diabetes	Hyperglycemia
Screening	Syndrome	Epidemiology	OAE	Documentation
Congenital	CDC	Cholesterol	Exercise	Genetic

Managing Comorbidities Symposium

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