

# CO-MANAGING COMORBIDITIES IN AUDIOLOGICAL MEDICINE

Pennsylvania Academy of Audiology (PAA)  
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# Disclosure Statements

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## Financial Disclosure

- Nothing to declare
- No known conflicts of interest

## Intellectual Disclosure

- Nothing to declare
- Just some facts ...
  - ▣ *Which are public domain*
- And some opinions ...
  - ▣ *Which are my own*

# The Unraveling of Hearing Healthcare Delivery

*Dr. Jerry Northern (2014)*

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- It's been happening around us for the past decade, but the sphincter is tightening more and more around the traditional audiology-based hearing aid dispensing system.
- I'm reminded of the story of the fight between the bear and the wolf over a rabbit-meal; it makes no difference who wins the battle to the rabbit – and in our case, audiology is “the rabbit.”
- Bam! What happened? The traditional audiology scope of hearing aid dispensing finds itself the victim of a number of unforeseeable and uncontrollable changes that we did not anticipate and, in fact, we stood blindly by watching the tsunami waves arrive.
- Obviously, we didn't see, or understand, the rampant growth of the converging forces chipping away at our position as the self-stated “owners of hearing healthcare.”

**ATTENTION!**

# Abstract (1 of 4)

- Audiology is striving to transition from allied-health status to physician-equivalent autonomy.
- Part of the transition was to move the Clinical Master's degree to the Clinical Doctorate degree.
- The next part of the transition is to use the expanded knowledge of the Clinical Doctorate in Audiology to become involved in Audiological Medicine.
- *This transition is supported by, but not dependent on, achieving LLPhysician status.*

# The Audiology Patient Choice Act

## *Endorsed by Pennsylvania Audiology Academy*

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### The passage of this federal legislation would allow for:

Limited License Physician Status within Medicare	Medicare Direct Access	Comprehensive Medicare Benefit
Would allow audiologists the autonomy to make clinical recommendations and practice the full scope of audiology and vestibular care as allowed by their state license and as dictated by their educational requirements and competencies.	Would eliminate the need for the physician order required for a Medicare beneficiary to receive coverage of medically necessary, covered audiology and vestibular services.	Would allow for expanded coverage to include all Medicare-covered audiological services that audiologists are licensed by their states to provide, including medically necessary, covered treatment services such as vestibular rehabilitation, cerumen removal, and aural rehabilitation.

### This legislation will not:

- Include a provision to add services that are not currently covered by Medicare
- Change, expand and/or enhance the scope of practice outlined in any state audiology licensure law.
- Change the practitioner status to a limited license physician at the state level.
- Allow for prescriptive rights.
- Allow for ordering rights.
- Include a provision for hearing aid coverage by Medicare.
- Place audiology services under a therapy cap.

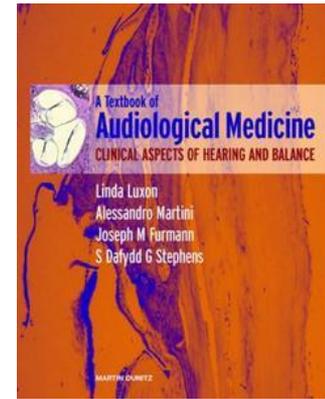
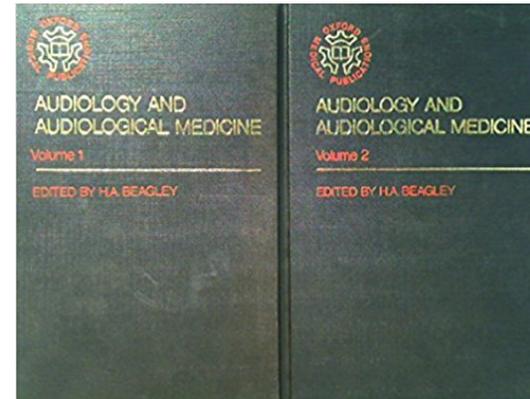
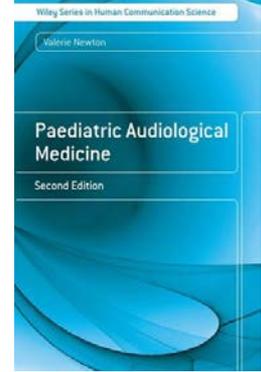
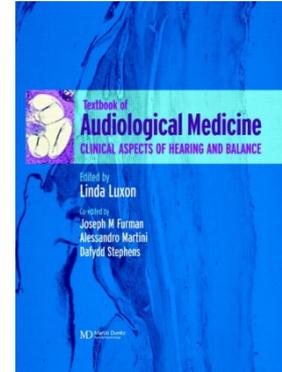
For more information, please contact Stephanie Czuhajewski at [sczuhajewski@audiologist.org](mailto:sczuhajewski@audiologist.org).

[www.audiologist.org](http://www.audiologist.org)

# Learning Objective

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- Transition the audiology private practice focus from selling products to providing services, including **audiological medicine** and the co-management of comorbid conditions with the other doctoring professions.



# OTC Hearing Aids

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## VIEWPOINT

### Over-the-Counter Hearing Aids The Path Forward

**Elizabeth Warren**  
United States Senate,  
Washington, DC.

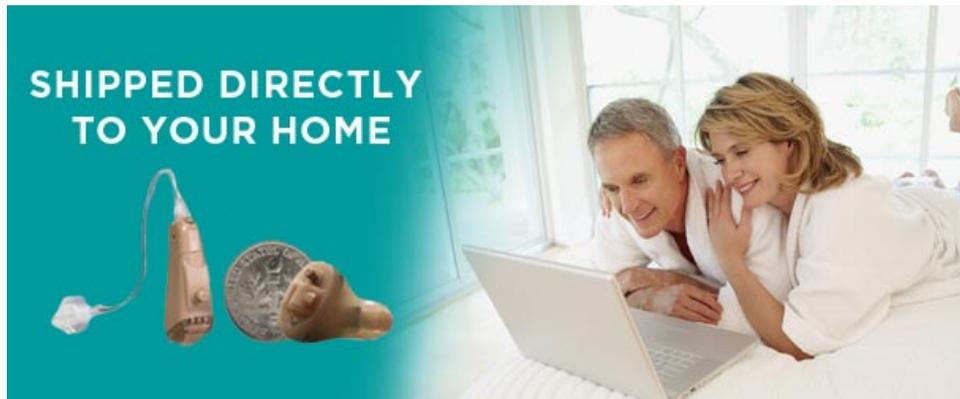
**Chuck Grassley**  
United States Senate,  
Washington, DC.

**Untreated hearing loss** is a major health problem in the United States, particularly for older Americans. Approximately 48 million Americans, including half of those in their 70s, have hearing loss in at least 1 ear.<sup>1</sup> The risk of hearing loss in older adults is about 10 to 20 times higher than the risk of heart disease and 100 times higher than the risk of cancer.<sup>2</sup> Despite the large numbers with hearing loss, only a small share—roughly 14%, according to one analysis—actually use a hearing aid.<sup>3</sup>

Many factors are responsible for this large gap, including the lack of routine hearing screenings for older adults and social stigma that discourages people with hearing loss from seeking treatment. But the way that hearing aids are regulated and sold is also to blame for this disparity. Researchers, consumer advocates, and

Second, the way that hearing aids are sold makes it difficult for consumers to compare costs and shop for the best value. Instead of being sold as stand-alone products that consumers purchase and then pay for à la carte fitting services, devices are typically sold as part of a "bundle" or package of services that include fees for evaluation, follow-up, and adjustments (whether or not individuals end up using these services).

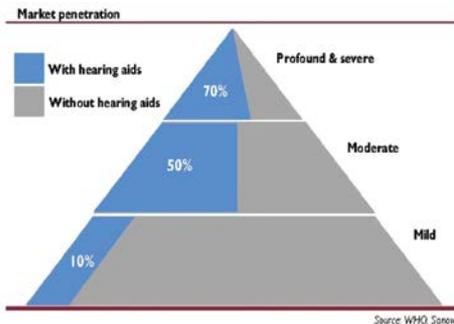
Finally, dispensers and audiology practices often present consumers with a limited range of products, sometimes all from a single manufacturer that may have provided incentives for the retailer to sell their products. Dispensers may then use proprietary software to tune the hearing aids, locking consumers in to coming



SHIPPED DIRECTLY  
TO YOUR HOME



## Over-the-Counter Hearing Aids



Source: WHO, Sonova

# Question 1

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Legal, over-the-counter (OTC) hearing aids are expected to become a part of the USA marketplace in \_\_\_\_\_ .

- A. Now
- B. 2019
- C. 2020
- D. 2021
- E. Never

# What is Audiological Medicine?

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- ***Audiological Medicine***

- 2003 - 2012

- ***Hearing, Balance and Communication***

- 2013 - current

- Published by the International Association of Physicians in Audiology (IAPA)

- Diagnosis, rehabilitation and medical management of auditory and vestibular disorders
- Communication disorders
- Otoneurological evaluation of children and adults
- Tinnitus
- Genetics of hearing and balance
- Internal ear pharmacology
- Neuroplasticity

# What is Audiological Medicine?

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## Pennsylvania Audiology SoP

- “Assessment and **nonmedical** diagnosis and treatment of hearing and vestibular disorders ...”
- “**Referral** of persons with auditory and vestibular dysfunction abnormalities **to an appropriate physician** for medical evaluation ...”

## LLPhysician Status?

- No changes planned in audiology scope of practice
- Become “point-of-entry” for healthcare
  - ▣ *Must identify and refer appropriately*
- Dependent on whether or not audiology can prove to multiple constituencies that
  - ▣ *We add public-health value, and*
  - ▣ *We are not a danger to patient safety*

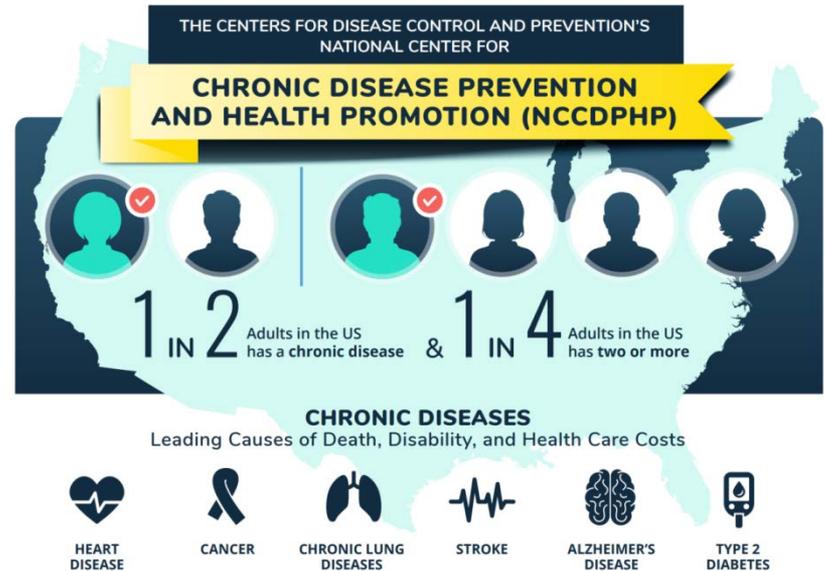
# Abstract (2 of 4)

- Approximately 1 in 2 audiology patients will present themselves with comorbid conditions that will require medical management that may be beyond the knowledge, skills, and scope-of-practice of the typical audiologist.
- *This knowledge is available to us today.*

# CDC – Chronic Disease Prevention

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- 1 in 2 adults in the USA has a chronic condition.
- 1 in 4 adults in the USA has two or more chronic conditions.
- These are your patients.
- *Do you want to co-manage?*



Centers for Disease  
Control and Prevention  
National Center for Chronic  
Disease Prevention and  
Health Promotion

NATIONAL CENTER FOR  
CHRONIC DISEASE PREVENTION AND HEALTH PROMOTION  
@CDCChronic | www.cdc.gov/chronicdisease

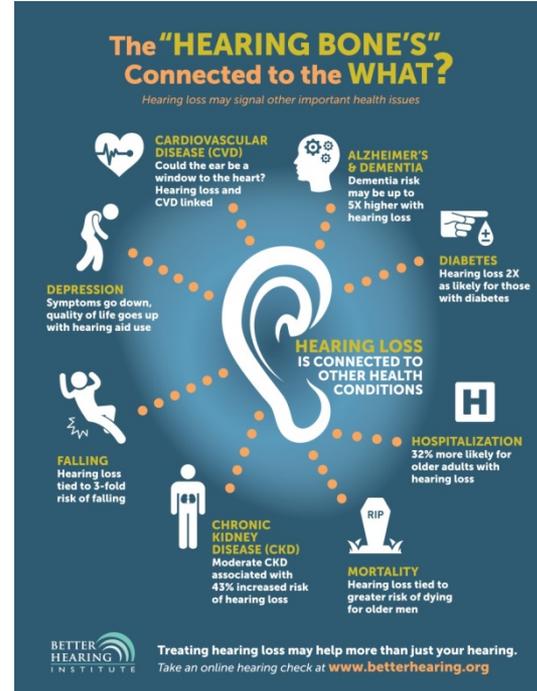
# Abstract (3 of 4)

- Audiologists, as part of the medical-management team, must identify these comorbid conditions, understand the comorbid impact on the audiology patient, and appropriately refer these patients for co-management of the comorbid conditions.
- *Foundational element of inter-professional practice (IPP).*

# Learning Objective

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- Acquire the knowledge base covering many comorbid conditions that audiology patients may present to audiologists as part of hearing and balance care in the audiology private practice.



<http://www.betterhearing.org/>

# Abstract (4 of 4)

- This requires that audiologists practice Audiological Medicine and properly identify, refer, communicate, and co-manage patient treatment plans.
- In doing so, we can demonstrate to physicians that we are capable of safely holding the point-of-entry position, thereby turning our professional adversaries into our professional colleagues.
- *This is certainly within our current scope of practice.*

# Learning Objective

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- Identify and utilize the healthcare professionals that the audiologist could be engaging with, in order to co-manage audiology patients with comorbid conditions.



# 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.

# Question 2

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Comorbidity is the simultaneous presence of two or more \_\_\_\_\_ conditions or diseases in a patient.

- A. Audiologic
- B. Chronic
- C. Lethargic
- D. Pathologic
- E. Psychotic

# 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.*

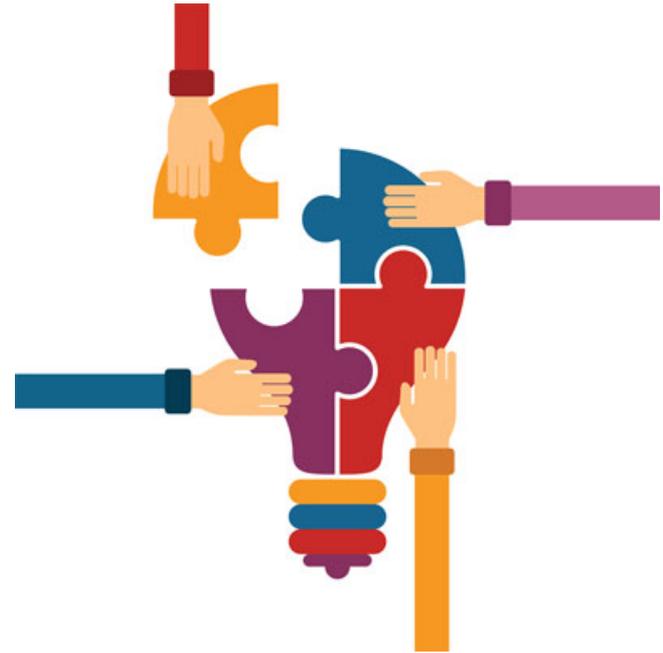
# Define Co-management (medical, formal)

- ❑ 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.

# Define Co-management (informal)

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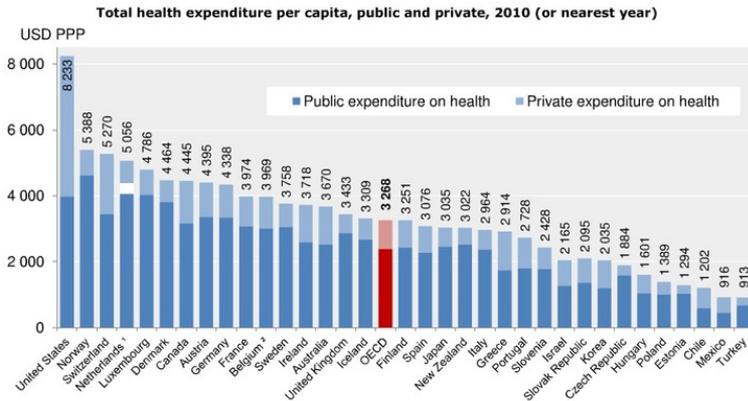
- To manage jointly
- The practice of managing something jointly
- Co-management Objective:
  - ▣ “To achieve greater operational efficiencies and improved patient care outcomes”



# We Have A Public Health Problem

## USA Healthcare Expenditures

US spends two-and-a-half times the OECD average



1. In the Netherlands, it is not possible to clearly distinguish the public and private share related to investments.  
 2. Total expenditure excluding investments.  
 Information on data for Israel: <http://dx.doi.org/10.1787/888932315602>.

Source: OECD Health Data 2012.

## USA Healthcare Outcomes

### COUNTRY RANKINGS

- Top 2\*
- Middle
- Bottom 2\*

	AUS	CAN	FRA	GER	NETH	NZ	NOR	SWE	SWIZ	UK	US
<b>OVERALL RANKING (2013)</b>	4	10	9	5	5	7	7	3	2	1	11
<b>Quality Care</b>	2	9	8	7	5	4	11	10	3	1	5
Effective Care	4	7	9	6	5	2	11	10	8	1	3
Safe Care	3	10	2	6	7	9	11	5	4	1	7
Coordinated Care	4	8	9	10	5	2	7	11	3	1	6
Patient-Centered Care	5	8	10	7	3	6	11	9	2	1	4
<b>Access</b>	8	9	11	2	4	7	6	4	2	1	9
Cost-Related Problem	9	5	10	4	8	6	3	1	7	1	11
Timeliness of Care	6	11	10	4	2	7	8	9	1	3	5
<b>Efficiency</b>	4	10	8	9	7	3	4	2	6	1	11
<b>Equity</b>	5	9	7	4	8	10	6	1	2	2	11
<b>Healthy Lives</b>	4	8	1	7	5	9	6	2	3	10	11
<b>Health Expenditures/Capita, 2011**</b>	\$3,800	\$4,522	\$4,118	\$4,495	\$5,099	\$3,182	\$5,669	\$3,925	\$5,643	\$3,405	\$8,508

Notes: \* Includes ties. \*\* Expenditures shown in \$US PPP (purchasing power parity); Australian \$ data are from 2010.  
 Source: Calculated by The Commonwealth Fund based on 2011 International Health Policy Survey of Sicker Adults; 2012 International Health Policy Survey of Primary Care Physicians; 2013 International Health Policy Survey; Commonwealth Fund Nutritional Scorecard 2011; World Health Organization; and Organization for Economic Cooperation and Development, OECD Health Data, 2013 (Paris, Nov. 2013).

# Understanding Odds Ratio

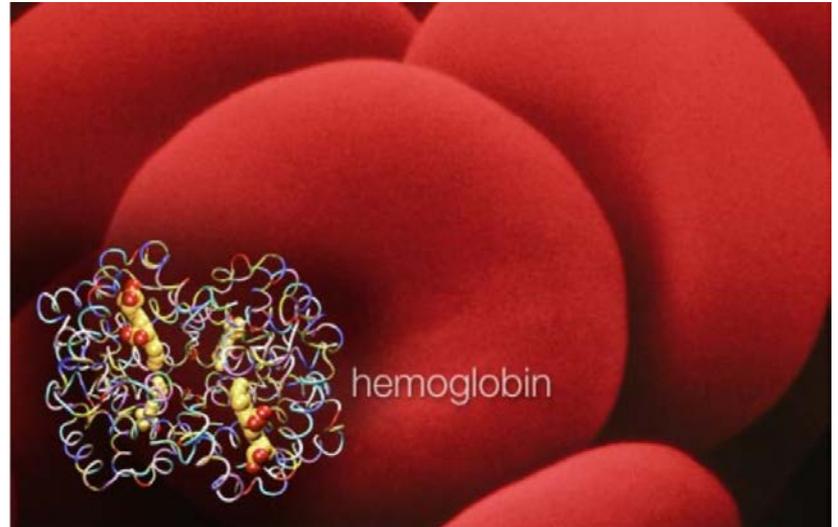
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- An odds ratio (OR) is a measure of association between an exposure and an outcome.
- The OR represents the odds that an outcome will occur given a particular exposure, compared to the odds of the outcome occurring in the absence of that exposure.
- 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**

# Anemia

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- ❑ Anemia develops from reduction of robust, healthy red blood cells to carry oxygen throughout the body.
- ❑ The blood cells may lack enough hemoglobin, the protein that gives blood its red color.
- ❑ Anemia affects about 7% of the US population.



# Anemia

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- ❑ Anemia is a condition that develops when the blood lacks enough healthy red blood cells or hemoglobin.
- ❑ Hemoglobin is a main part of red blood cells and binds oxygen.
- ❑ If there are too few or abnormal red blood cells, or the hemoglobin is abnormal or low, the cells in the body will not get enough oxygen.
- ❑ Symptoms of anemia, like fatigue, occur because organs aren't getting what they need to function properly.
- ❑ Anemia is the most common blood condition in the U.S.
- ❑ It affects about 3.5 million Americans.
- ❑ Women, young children, and people with chronic diseases are at increased risk of anemia.

# Hearing Loss & Anemia

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- **Sudden sensorineural hearing loss associated with iron-deficiency anemia: a population-based study.**
- [JAMA Otolaryngol Head Neck Surg.](#) 2014 May;140(5):417-22.
- [Chung, Chen, Lin, Hung](#)
- Vascular events play a big part in the development of sudden sensorineural hearing loss (SSNHL), but only those associated with sickle-cell anemia have been previously associated with SSNHL.
- **This study demonstrates an association between SSNHL and prior iron-deficiency anemia (IDA)**

# Hearing Loss and Anemia

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- We found that the OR for previous IDA among the participants with SSNHL was 1.34 (95% CI, 1.11-1.61) ( $P < .01$ )
- Adjustments for monthly income, geographic region, urbanization level, and comorbidities (*hypertension, diabetes, hyperlipidemia, renal disease, and coronary heart disease*).

## Conclusions and Relevance

- There is an association between SSNHL and prior IDA.
- **Patients with IDA, especially those younger than 60 years, should be more aggressively surveyed and managed to reduce hearing-related morbidities.**

*Sudden sensorineural hearing loss associated with iron-deficiency anemia: a population-based study.*

# Hearing Loss and Anemia

- Why Iron Deficiency Anemia (IDA) might be linked to hearing loss is not yet fully understood, but there are a few potential pathways.
- For instance, blood supply to the inner ear via the labyrinthine artery is highly sensitive to ischemic damage (damage caused by reduced blood flow), which could certainly play a role.
- Additionally, individuals with vascular disease are known to be more susceptible to sudden SNHL.
- Blood supply is, therefore, clearly an important factor in hearing loss.
- Another potential mechanism involves myelin, a waxy substance that coats nerves and which is important for the efficient conduction of signals along nerve fibers.
- Reduced iron in the body causes the breakdown of lipid saturase and desaturase, both of which are important in energy production and, consequently, the production of myelin.
- If the myelin coating the auditory nerve is damaged, hearing could be reduced.

# Cognitive Decline & Dementia

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- 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.



# Cognitive Decline & Dementia

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- ❑ 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.

**Wearing hearing aids reduces the risk** of cognitive decline associated with hearing loss.



Source: Journal of the American Geriatrics Society  
© Starkey Hearing Technologies. All Rights Reserved.



# Hearing Loss & Cognitive Decline

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## □ How does hearing loss affect the brain?

- [\*Aging Health. 2012 Apr; 8\(2\): 107–109.\*](#)
- [\*Wingfield\*](#) and [\*Peelle\*](#)

- *“There is ample evidence linking hearing loss to changes in cognitive ability, particularly when listeners are faced with the task of understanding speech that is acoustically or linguistically challenging.”*

# Hearing Loss & Cognitive Decline

- A striking finding from a recent large-scale population study has revealed a **strong statistical connection between the appearance and degree of hearing loss and all-cause dementia.**
  - ▣ *Lin FR. Hearing loss and cognition among older adults in the United States. J. Gerontol. Med. Sci. 2011*
- Indeed, as Lin and colleagues have shown, this relationship persists even when *adjusted for sex, age, race, education, diabetes, smoking history and hypertension.*
  - ▣ *Lin FR, et al. Hearing loss and incident dementia. Arch. Neurol. 2011*
- Examination of the effect of subtle individual differences in hearing ability and the function and structure of brain regions supporting speech comprehension.
- Discovered relationship between hearing ability and regional brain volume, *one is bound to ask whether improving hearing ability through the use of hearing aids might help in preserving either cortical health or cognitive ability.*
- *Although this is an appealing suggestion, at this point it is too early to draw any firm conclusions.*

***How does hearing loss affect the brain?***

# Hearing Loss & Cognitive Decline

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## □ **Hearing Loss and Cognitive Decline in Older Adults**

- *JAMA Intern. Med.* 2013;173(4):293-299.
- *Lin, Yaffe, Xia, et al.*
- **Background:** Whether hearing loss is independently associated with accelerated cognitive decline in older adults is unknown.

- **Conclusions:** Hearing loss is independently associated with accelerated cognitive decline and incident cognitive impairment in community-dwelling older adults.
- *Further studies are needed to investigate what the mechanistic basis of this association is and whether hearing rehabilitative interventions could affect cognitive decline.*

# Hearing Loss & Dementia

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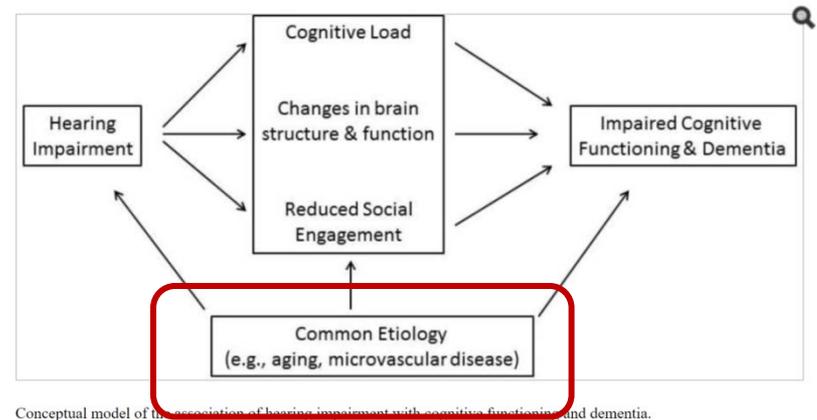
- **Hearing Loss and Dementia – Who’s Listening?**
- *Aging Ment Health. 2014 Aug; 18(6): 671–673.*
- *Frank R. Lin and Marilyn Albert*
- *The potential public health impact of hearing loss in the context of dementia is substantial given the high worldwide prevalence of hearing loss in older adults and the ready availability of existing hearing rehabilitative interventions which remain risk-free and underutilized.*
- 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., 2011*).
- Neuroimaging studies have also demonstrated independent associations of hearing impairment with reduced cortical volumes in the auditory cortex (*Peelle, et al., 2011*) and accelerated rates of lateral temporal lobe and whole brain atrophy (*Lin et al., 2014*).

# Hearing Loss & Dementia

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- **While definitive evidence of the effects of hearing treatment on dementia is years away**, the benefits of early screening and management of hearing loss are likely significant and without risk.
- Importantly, challenges currently exist in developing affordable and accessible approaches toward hearing health care, but these issues are increasingly coming to the forefront and being addressed at the national level ([\*Institute of Medicine, 2014\*](#)).

Figure 1



**Hearing Loss and Dementia – Who’s Listening?**

# Causes of Dementia

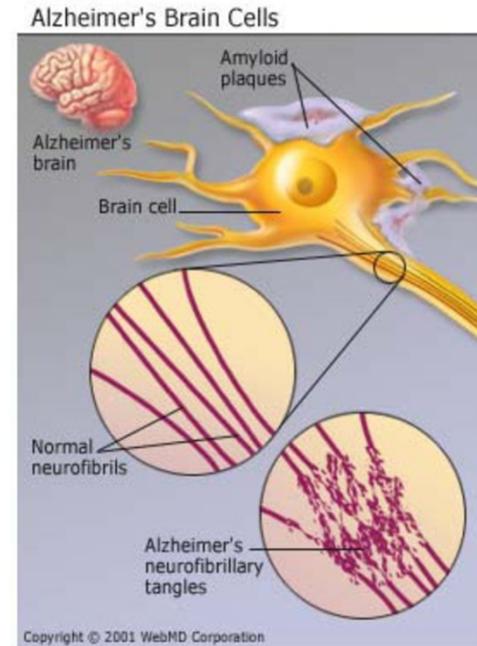
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- ❑ Alzheimer's disease (most common form of dementia)
- ❑ Brain fluid buildup (hydrocephalus)
- ❑ Brain infection, meningitis, syphilis
- ❑ Brain injury, tumors, stroke
- ❑ Drug toxicity
- ❑ HIV infection
- ❑ Multiple Sclerosis
- ❑ Parkinson's Disease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

# Alzheimer's Disease

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- ❑ 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.



# Cardiovascular Disease

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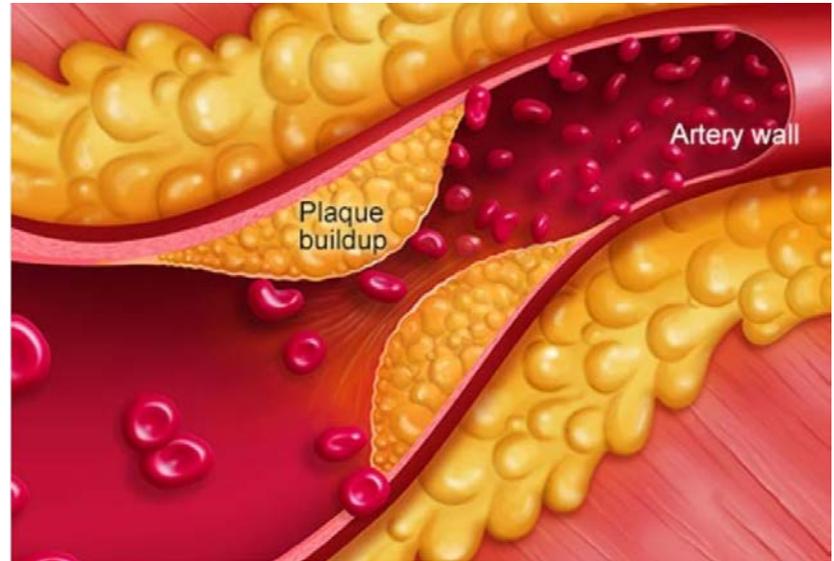
- ❑ Heart disease, such as coronary heart disease, heart attack, congestive heart failure, and congenital heart disease, is the leading cause of death for men and women in the U.S.
- ❑ Prevention includes quitting smoking, lowering cholesterol, controlling high blood pressure, maintaining a healthy weight,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



# Coronary Artery Disease

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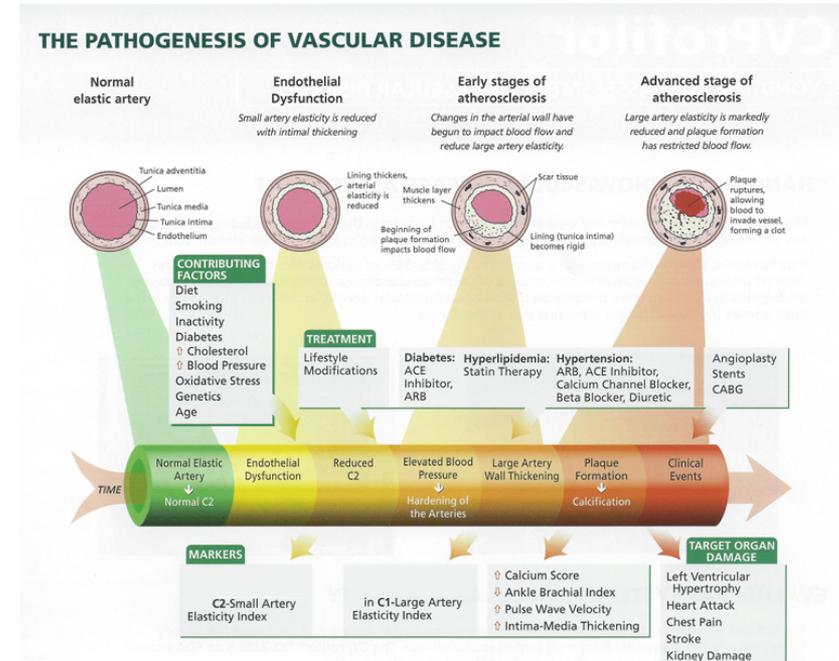
- ❑ The arteries, which start out smooth and elastic, get plaque on their inner walls, which can make them more rigid and narrowed.
- ❑ This restricts blood flow to the heart, which can then become starved of oxygen.
- ❑ The plaque could rupture, leading to a heart attack or sudden cardiac death.



# Vascular Disease (Blood Vessel Disease)

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- ❑ 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.



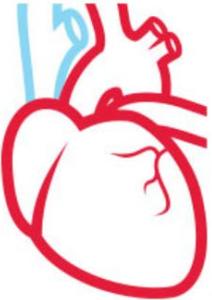
# Vascular Disease (Blood Vessel Disease)

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- ❑ Blockage in coronary arteries can cause chest pain (angina).
- ❑ Blockage in the carotid arteries that supply the brain can lead to a stroke (transient ischemic attack, TIA).
- ❑ Blockage in the kidneys can lead to uncontrolled high blood pressure and heart failure.

**Heart disease can lead to hearing loss because of decreased blood flow to the cochlea.**

[#KnowTheFacts](#)



*EarQ*

SHARE THIS:   

# Question 3

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Which of the following choices is not directly associated with heart health and disease?

- A. Cardiovascular Disease
- B. Cerebrovascular Disease
- C. Coronary Artery Disease
- D. Vascular Disease (Blood Vessel Disease)

# Hearing Loss & Heart Disease

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## □ Hearing loss and ischemic heart disease.

- [\*Am J Otol.\* 1988 Sep;9\(5\):403-8.](#)
- [\*Susmano A, Rosenbush SW.\*](#)

- One hundred three patients with ischemic heart disease (IHD) were compared with 29 patients with organic heart disease and normal coronary arteries (OHD) and with a control group of 101 patients free of heart disease and matched for age and sex.
- **HL always preceded the clinical manifestation of IHD and appears to be an important "early marker" of a vascular or generalized arteriosclerotic process.**

Some of those blood vessels are big, like highways. Others are small, like back roads.

But if any of them gets stopped up, you have a serious problem called [ischemia](#).

This means some part of your body isn't getting enough blood, so it's not getting enough oxygen, either.

It can happen in your [brain](#), legs, and just about everywhere in between. WebMD

# Hearing Loss & Heart Disease

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- **Audiometric pattern as a predictor of cardiovascular status: Development of a model for assessment of risk**
  - *Laryngoscope Volume 119, Issue 3, March 2009, Pages 473–486*
  - *Friedland, Cederberg, Tarima*
- **Objectives/Hypothesis:** This study hypothesizes that low-frequency hearing loss is associated with underlying cardiovascular disease.
- **Results: A significant association was found between low-frequency hearing loss and cardiovascular disease and risk factors.**

# Hearing Loss & Heart Disease

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- When controlling for age, *hypertension, diabetes, smoking, and hyperlipidemia*, **low-frequency presbycusis was significantly associated with intracranial vascular pathology such as stroke and transient ischemic attacks.**
- **Significant associations were also seen with *peripheral vascular disease, coronary artery disease, and a history of myocardial infarction.***
- Audiogram pattern correlates strongly with cerebrovascular and peripheral arterial disease and may represent a screening test for those at risk.
- Patients with low-frequency hearing loss should be regarded as at risk for cardiovascular events, and appropriate referrals should be considered.

*Audiometric pattern as a predictor of cardiovascular status: Development of a model for assessment of risk*

# Hearing Loss & Heart Disease

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

- *Otolaryngology 2:e108.*
- *Bishop*

- There are current studies that show a compelling relationship between acquired hearing impairment and poor cardiovascular fitness and hypertension.
- Additionally, cardio-metabolic disorders (e.g., metabolic syndrome, Type 2 diabetes) and high risk behaviors, such as smoking, have been implicated in acquired hearing impairments.
- Conversely, moderate alcohol consumption has been described as a potential protective factor.

# Hearing Loss & Heart Disease

- 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<sup>VB</sup>] 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<sup>VB</sup>] 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.

# Depression

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- ❑ Feelings of intense sadness, including feeling *helpless, hopeless, and worthless*, lasting for many days to weeks that keep the patient from functioning normally may be indications of clinical depression.
- ❑ Depression commonly occurs with other illnesses such as anxiety, obsessive compulsive disorder, panic disorder, phobias, and eating disorders.

## DEPRESSION

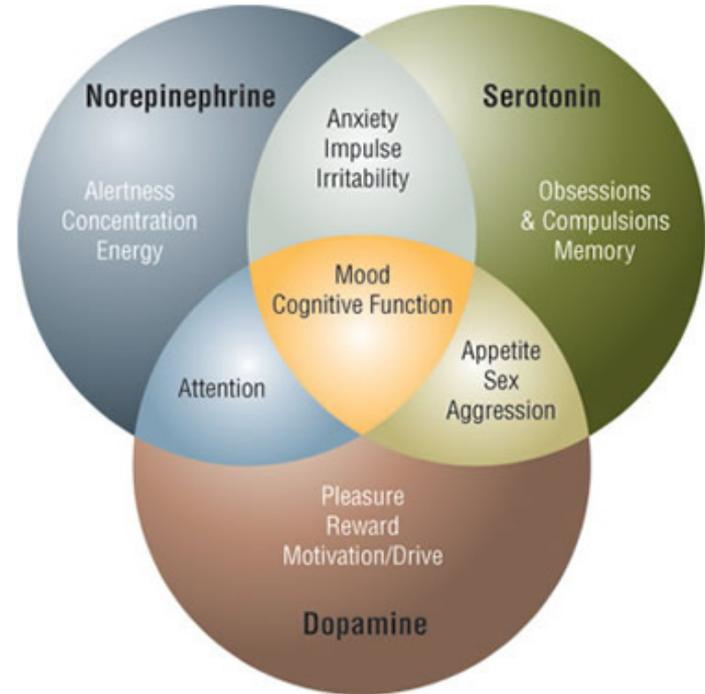


Uncorrected hearing loss gives rise to **poorer quality of life**, isolation and reduced social activity, leading to depression.

# Depression

49

- Because certain brain chemicals or neurotransmitters, specifically serotonin and norepinephrine, influence both mood and pain, it's not uncommon for depressed individuals to have physical symptoms.
- These symptoms may include joint pain back pain, gastrointestinal problems, sleep disturbances, and appetite changes.



# Question 4

50

- Which of the following choices is not a neurotransmitter directly associated with mental health or disease?
  - A. Calcium
  - B. Dopamine
  - C. Norepinephrine
  - D. Serotonin

# Clinical Depression:

## ≥ 5 Symptoms, ≥ 2 Weeks

51

- A depressed mood during most of the day, particularly in the morning
- Fatigue or loss of energy almost every day
- Feelings of worthlessness or guilt almost every day
- Impaired concentration, indecisiveness
- Insomnia (an inability to sleep) or hypersomnia (excessive sleeping) almost every day
- Markedly diminished interest or pleasure in almost all activities nearly every day
- Recurring thoughts of death or suicide (not just fearing death)
- A sense of restlessness or being slowed down
- Significant weight loss or weight gain

# Hearing Loss & Depression

**The National Council on the Aging**  
May 1999

Study conducted by the  
**Seniors Research Group,**  
An alliance between The National Council on the Aging  
and Market Strategies Inc.

**The National Council on the Aging**  
409 Third Street, SW Suite 200  
Washington, DC 20024  
202-479-1200

[www.ncoa.org](http://www.ncoa.org)

## Results

Older people with hearing impairments that go untreated suffer many negative effects. Compared to older, hearing-impaired people who use hearing aids, those who do not use hearing aids are more likely to report

- sadness and depression;
- worry and anxiety;
- paranoia;
- less social activity;
- emotional turmoil and insecurity.

These difference remains when controlling for other factors such as the respondent's age, gender, and income.

On the other hand, seniors whose hearing loss is treated often report benefits that include

- better relationships with their families;
- better feelings about themselves;
- improved mental health;
- greater independence and security.

# Hearing Loss & Depression

53

- **Hearing Impairment Associated With Depression in US Adults, National Health and Nutrition Examination Survey 2005-2010**
- *JAMA Otolaryngol Head Neck Surg. 2014;140(4):293-302.*
- *ChuanMing Li, Xinzhi Zhang, Hoffman, et al.*
- Objective: To estimate the prevalence of and risk factors for depression among adults with hearing loss.
- Design, Setting, and Participants: Adults aged 18 years or older (N = 18,318) who participated in the National Health and Nutrition Examination Survey (NHANES), 2005-2010, a nationally representative sample.
- Interventions: Multistage probability sampling of US population.

# Hearing Loss & Depression

54

- Using excellent hearing as the reference, after adjusting for all covariates, multivariate odds ratios (ORs) for depression were
  - 1.4 (95% CI, 1.1-1.8) for good hearing,
  - 1.7 (1.3-2.2) for a little trouble,
  - 2.4 (1.7-3.2) for moderate trouble,
  - 1.5 (0.9-2.6) for a lot of trouble, and
  - 0.6 (0.1-2.6) for deaf.
- Conclusions and Relevance: After accounting for health conditions and other factors, including trouble seeing, **self-reported HI and audiometrically determined HI were significantly associated with depression, particularly in women.**
- Health care professionals should be aware of an increased risk for depression among adults with hearing loss.

# Hearing Loss & Depression

55

- **Hearing Loss and Depression in Older Adults**
- *J Am Geriatr Soc. 2013 Sep; 61(9): 1627–1629.*
- *Mener, Betz, Genter, Chen, Lin*
- **MDD: Major Depressive Disorder**
- Compared to other medical co-morbidities, HL is more strongly associated with the development of depression in older adults.
- Whether hearing rehabilitative treatment may mitigate the possible effects of HL on depression remains unclear.

# Hearing Loss & Depression

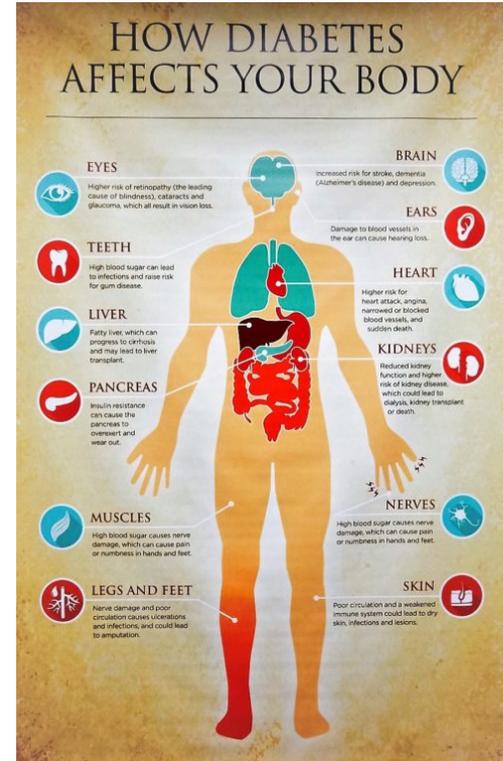
- Data were analyzed using stepwise multivariate logistic models to investigate the association of HL as a continuous variable (per 25 dB) and hearing aid use with MDD and any depressive symptoms, *adjusting for demographic characteristics and cardiovascular risk factors.*
- Hearing aid use was defined as wearing a hearing aid at least 5 hours a week in the twelve months prior to the interview.
- **In summary, hearing aid use is independently associated with reduced odds of MDD and depressive symptoms.**
- The basis of this association and whether hearing rehabilitative interventions could actually reduce depressive symptoms will require further study in other prospective studies or a randomized clinical trial.

# Diabetes

57

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://fenuro.com>



# Hearing Loss & Diabetes

59

- **Diabetes and Hearing Impairment in the United States: Audiometric Evidence from the National Health and Nutrition Examination Survey, 1999 to 2004**
- *Ann Intern Med.* 2008;149(1):1-10.
- *Bainbridge, Hoffman, Cowie*
- Background: Diabetes might affect the vasculature and neural system of the inner ear, leading to hearing impairment.
- Objective: To determine whether hearing impairment is more prevalent among U.S. adults with diabetes.
- Design: Cross-sectional analysis of nationally representative data.
- Participants: 5,140 noninstitutionalized adults age 20 to 69 years who had audiometric testing.

# Hearing Loss & Diabetes

- Results: Hearing impairment was more prevalent among adults with diabetes.
- Age-adjusted prevalence of low- or mid-frequency hearing impairment of mild or greater severity in the worse ear was 21.3% (95% CI, 15.0% to 27.5%) among 399 adults with diabetes compared with 9.4% (CI, 8.2% to 10.5%) among 4741 adults without diabetes.
- Similarly, age-adjusted prevalence of high-frequency hearing impairment of mild or greater severity in the worse ear was 54.1% (CI, 45.9% to 62.3%) among those with diabetes compared with 32.0% (CI, 30.5% to 33.5%) among those without diabetes.
- The association between diabetes and hearing impairment was independent of known risk factors for hearing impairment, *such as noise exposure, ototoxic medication use, and smoking* (adjusted odds ratios for low- or mid-frequency and high-frequency hearing impairment were 1.82 [CI, 1.27 to 2.60] and 2.16 [CI, 1.47 to 3.18], respectively).

# Hearing Loss & Diabetes

- **Diabetes and risk of hearing impairment in adults: a meta-analysis.**
- *J Clin Endocrinol Metab.* 2013  
*Jan; 98(1):51-8*
- *Horikawa, Kodama, Tanaka, et al.*
- **Objective:** Our objective was to compare the prevalence of hearing impairment between diabetic and nondiabetic adults.
- **Data Sources:** We performed a systematic literature search using MEDLINE (1950 to May 30, 2011) and EMBASE (1974 to May 30, 2011).
- **Study Selection:** Cross-sectional studies were included if data on numbers of hearing-impaired and non-hearing-impaired cases with diabetes were presented.
- **Hearing impairment** was limited to that assessed by pure-tone audiometry that included at least 2 kHz of frequency range and was defined as progressive, chronic, sensorineural, or without specified cause.

# Hearing Loss & Diabetes

- Data Synthesis: Data were obtained from 13 eligible studies (20,194 participants and 7,377 cases).
- Overall pooled OR (95% confidence interval) of hearing impairment for diabetic participants compared with nondiabetic participants was 2.15 (1.72-2.68).
- OR was higher in younger participants (mean age,  $\leq 60$  yr) than in those over 60 yr among which the OR remained significant (2.61 and 1.58,  $P = 0.008$ ).
- The strength of the association between diabetes and prevalence of hearing impairment was not significantly influenced by whether participants were matched for age and gender ( $P = 0.68$ ) or whether participants chronically exposed to noisy environments were excluded ( $P = 0.19$ ).
- **Conclusions: Current meta-analysis suggests that the higher prevalence of hearing impairment in diabetic patients compared with nondiabetic patients was consistent regardless of age.**

*Diabetes and risk of hearing impairment in adults: a meta-analysis.*

# American Diabetes Association (ADA)

63

- 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.

# Fibromyalgia

64

- ❑ Fibromyalgia syndrome affects the muscles and soft tissue.
- ❑ Symptoms include chronic muscle pain, fatigue, sleep problems, and painful tender points or trigger points, which can be relieved through medications, lifestyle changes and stress management.

## What is Fibromyalgia?

10 million  
Americans

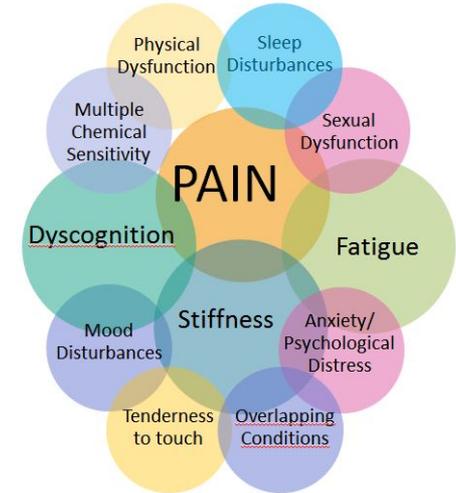
### Women, Men & Children

A chronic life-altering disorder characterized by widespread pains along with other symptoms such as unrefreshing sleep, stiffness and cognitive dysfunction.

2-4%

### Population

Cultural attitudes and stigmatization of people with chronic pain issues often cause individuals with fibromyalgia to become withdrawn from family and friends. Isolation and feeling alone to manage fibromyalgia can contribute to depression.



# Hearing Loss & Fibromyalgia

65

- **Are persons with fibromyalgia or other musculoskeletal pain more likely to report hearing loss? A HUNT study**
- *BMC Musculoskeletal Disorders BMC series – 2016, 17:477*
- *Stranden, Solvin, Fors, Getz and Helvik*
- **Methods:** The study includes 44,494 persons from the second health survey in Nord-Trøndelag (HUNT2) who had undergone audiometry and answered a comprehensive questionnaire that mapped fibromyalgia, musculoskeletal pain at various sites and subjective hearing loss.

# Hearing Loss & Fibromyalgia

66

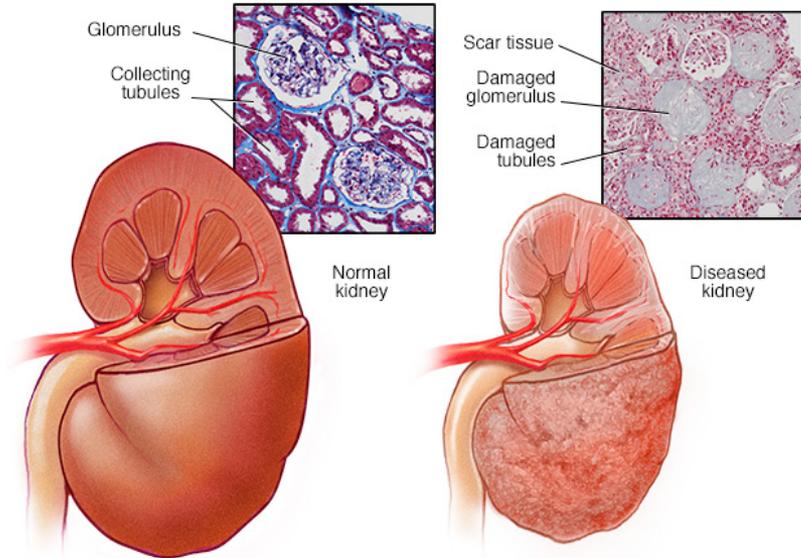
- **Results:** In adjusted analysis, **individuals with fibromyalgia had increased likelihood to report subjective hearing loss**, compared to persons without fibromyalgia or other musculoskeletal pain
  - ▣ Female OR 4.6, 95% CI 3.6–5.8
  - ▣ Male OR 4.5, 95% CI 3.1–6.6
- **Conclusions:** Our findings are consistent with the hypothesis that fibromyalgia is related to a general dysregulation of the central nervous system.
- The same might also be the case for other local and, in particular, other widespread, musculoskeletal pain.

*Are persons with fibromyalgia or other musculoskeletal pain more likely to report hearing loss? A HUNT study*

# Kidney Disease

67

- ❑ 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 and fluid can build up in the body. That can cause swelling in the ankles, vomiting, weakness, poor sleep, and shortness of breath.
- ❑ Without treatment, the damage can get worse, and the kidneys may eventually stop working which can be life-threatening.



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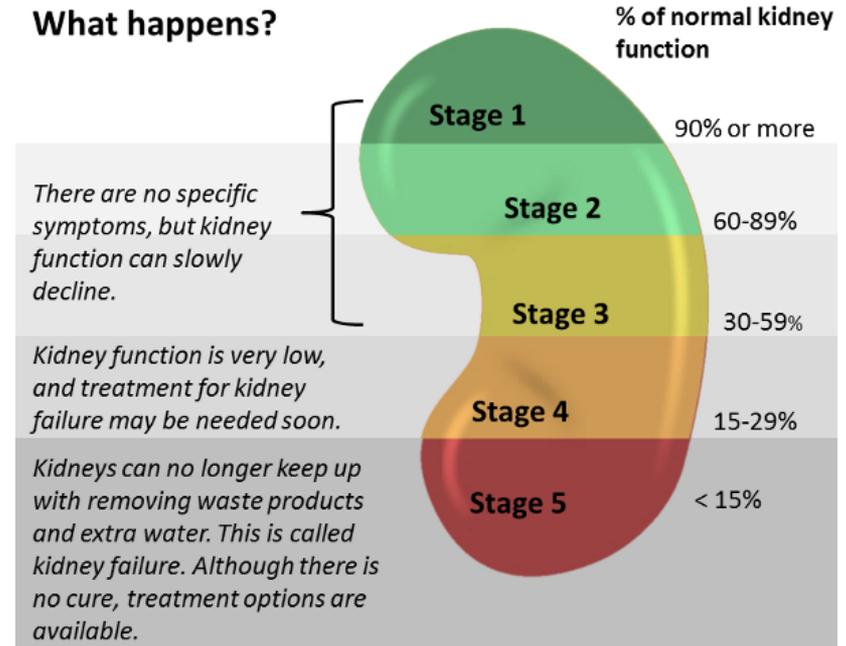
# Kidney Disease

68

## 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

## What happens?



# Chronic Kidney Disease

69

- ❑ Chronic kidney disease occurs when the kidneys don't work well for longer than 3 months
- ❑ Diabetes (types 1 and 2) and high blood pressure are the most common culprits.
- ❑ High blood sugar levels over time can harm the kidneys.
- ❑ High blood pressure creates wear and tear on the blood vessels, including those that go to the kidneys.



# Hearing Loss & Kidney Disease

- **The Association Between Reduced GFR and Hearing Loss: A Cross-sectional Population-Based Study**
- *American Journal of Kidney Diseases. Volume 56, Issue 4, October 2010, Pages 661-669*
- *Vilayur, Gopinath, Harris, Burlutsky, McMahon, Mitchell*
- Background: Chronic kidney disease (CKD) has long been associated with hearing loss in certain syndromes.
- Reported evidence to date has come from only small observational studies.
- We present the first community-based study to show an association between nonsyndromal CKD and hearing loss.

# Hearing Loss & Kidney Disease

71

- Study Design: Cross-sectional population-based study to examine the relationship between CKD and age-related hearing loss.
- Setting & Participants: The Blue Mountains Hearing Study is a survey of age-related hearing loss conducted in 1997-2004; a total of 2,564 participants had audiometric testing and complete renal data.
- Predictor or Factor: Moderate CKD, defined as estimated glomerular filtration rate (eGFR)  $<60$  mL/min/1.73 m<sup>2</sup>.
- Outcomes: Bilateral hearing loss, defined as average pure-tone threshold  $>25$  dB for measurements at frequencies of 0.5, 1.0, 2.0, and 4.0 kHz.
- Results: Moderate CKD was independently associated with hearing loss (OR, 1.43; 95% CI, 1.10-1.84;  $P = 0.006$ ) after adjusting for age; sex; noise exposure; education; diabetes, hypertension, and stroke histories; and smoking.
- **Conclusions: Moderate CKD per se was associated independently with hearing loss.**
- Recognizing this link could lead to earlier hearing assessment with appropriate interventions to preserve the hearing of patients with CKD.

*The Association Between Reduced GFR and Hearing Loss:  
A Cross-sectional Population-Based Study*

# National Kidney Foundation

72

- “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.”

*See previous slide, study coauthor Professor David Harris*

# Rheumatoid Arthritis

73

- Arthritis means inflammation in a joint. That inflammation causes redness, warmth, swelling, and pain within the joint.
  - Rheumatoid arthritis affects joints on both sides of the body, such as both hands, both wrists, or both knees. This symmetry helps to set it apart from other types of arthritis.
  - RA can also affect the skin, eyes, lungs, heart, blood, or nerves.
- What Causes RA?
  - We don't know the exact cause.
  - Something seems to trigger the immune system to attack the joints and sometimes other organs.
  - Some experts think that a virus or bacteria may change the immune system, causing it to attack the joints.

# Hearing Loss & Rheumatoid Arthritis

74

## □ Is Hearing Impairment Associated with Rheumatoid Arthritis? A Review

- [\*Open Rheumatol J.\* 2016; 10: 26–32.](#)
- [\*Emamifar, Bjoerndal, Hansen\*](#)

- **Conclusion:** Based on our review it can be postulated that patients with RA are at higher risk of hearing impairment compared to healthy subjects in their course of the disease.
- The hearing impairment in RA seems to be a multifactorial condition; however the mechanisms of injury, as well as the relative risk factors, are not completely clear.

# American Arthritis Foundation

- Clinical trials have found higher rates of sensorineural hearing loss – a type of hearing loss usually caused by poor function of the hair cells in the cochlea – in patients with rheumatoid arthritis (RA).
- For example, one study published in 2006 detected hearing impairment, which was overwhelmingly sensorineural, in 42.7 percent of patients with RA. By contrast, only 15.9 percent of the control group showed that type of hearing loss.
- The drugs used to treat the aches and pains of arthritis could also be to blame. A 2012 study published in *The American Journal of Epidemiology* found that women who took ibuprofen (*Advil, Motrin*) or acetaminophen (*Tylenol*) two or more days per week were more likely to report hearing loss than those who rarely took the painkillers.

# Thyroid Disease

76

- ❑ Hypothyroidism is when the thyroid gland does not produce enough thyroid hormone, leading to fatigue, constipation, dry skin, and depression.
- ❑ The underactive gland can cause slowed development in children.
- ❑ Some types of hypothyroidism are present at birth.
- ❑ Hyperthyroidism results when the thyroid gland, located in the front of the neck, produces too much thyroid hormone.
- ❑ The thyroid controls metabolism, so if it is overactive, it may lead to weight loss, hair loss, a fast heartbeat, sweating, tiredness, shakiness, and moodiness.

# Hearing Loss & Graves' Disease (Thyroid)

77

## □ Evaluation of hearing loss in patients with Graves' disease.

- *Endocrine*. 2012 Feb;41(1):116-21.
- Berker, Karabulut, Isik, Tutuncu, Ozuguz, Erden, Aydin, Dagli, Guler

- Hearing loss has commonly been reported in association with thyroid disorders.
- The aim of this cross-sectional, case-control study was to investigate hearing loss in patients with Graves' Disease (GD).
- **Our results are highly suggestive of a decrease in hearing ability in patients with GD, particularly at high frequencies.**

# Comorbid Conditions Related to Hearing Loss

78

## Physiological Conditions

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

## Psychosocial Conditions

- ❑ Alzheimer's Disease
- ❑ Cognitive Decline
- ❑ Communication Disorders
- ❑ Dementia
- ❑ Depression
- ❑ Quality of Life
- ❑ Social Isolation

# Comorbidity Co-management Team

79

## Physiological Conditions

- Audiologists
- Endocrinologists
- Gerontologists
- Nephrologists
- Neuropsychologists
- Primary Care Physicians

## Psychosocial Conditions

- Audiologists
- Gerontologists
- Neuropsychologists
- Primary Care Physicians
- Psychiatrists
- Psychologists

# Top 10 Chronic Conditions in Adults 65+

80

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*

# Top 10 Chronic Conditions in Adults 65+

81

1. **Hypertension (high blood pressure)**
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4. **Coronary Artery Disease (ischemic heart disease)**
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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*

# 20 Tracked Chronic Diseases (OASH)

## Office of the Assistant Secretary for Health

82

- Blood
  - HIV / AIDS
  - Hypertension
  - Hyperlipidemia
- Bone
  - Arthritis
  - Osteoporosis
- Brain
  - Autism Spectrum Disorder
  - Dementia / Alzheimer's
  - Schizophrenia
  - Stroke
- Heart
  - Cardiac Arrhythmias
  - Congestive Heart Failure
  - Coronary Artery Disease
- Kidney
  - Chronic Kidney Disease
- Liver
  - Hepatitis
- Lungs
  - Asthma
  - COPD
- Mental Health
  - Depression
  - Substance Abuse
- Pancreas
  - Diabetes
- Whole Body
  - Cancer

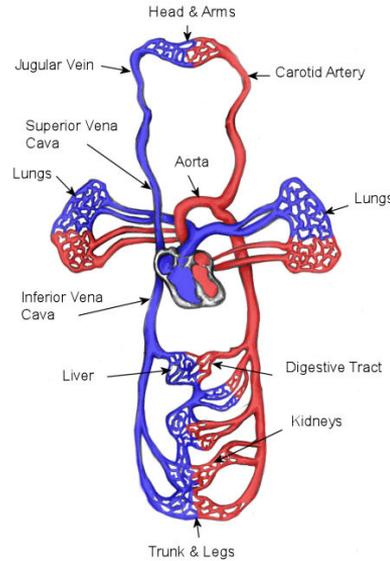
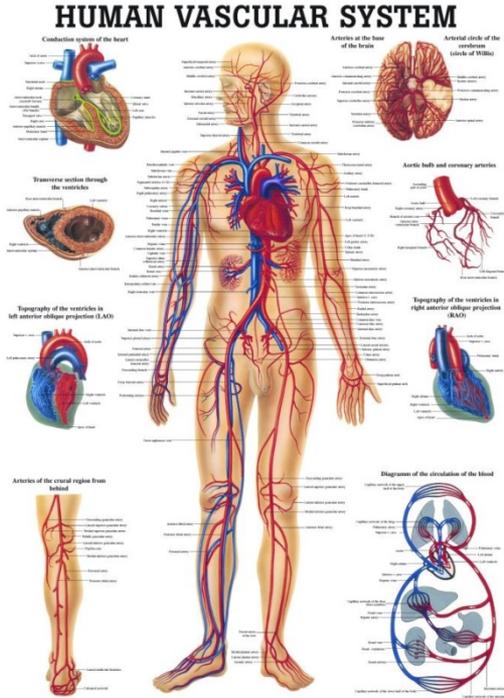
# 20 Tracked Chronic Diseases (OASH)

## Office of the Assistant Secretary for Health

83

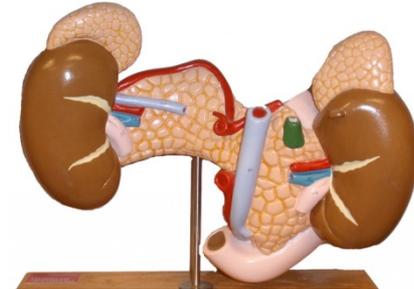
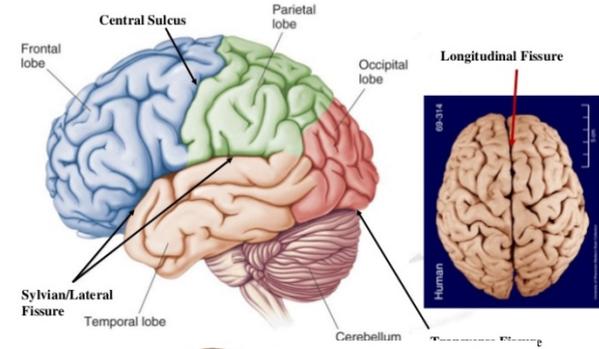
- Blood
  - *HIV / AIDS*
  - *Hypertension*
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- Bone
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  - *Osteoporosis*
- Brain
  - *Autism Spectrum Disorder*
  - *Dementia / Alzheimer's*
  - *Schizophrenia*
  - *Stroke*
- Heart
  - *Cardiac Arrhythmias*
  - *Congestive Heart Failure*
  - *Coronary Artery Disease*
- Kidney
  - *Chronic Kidney Disease*
- Liver
  - *Hepatitis*
- Lungs
  - *Asthma*
  - *COPD*
- Mental Health
  - *Depression*
  - *Substance Abuse*
- Pancreas
  - *Diabetes*
- Whole Body
  - *Cancer*

# Bodily Systems Comorbid with Hearing Loss



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

## Specific Sulci/Fissures:



<http://humananatomylibrary.com>

# *Think of the Ear as a Canary in the Coal Mine*

85



[https://share.america.gov/wp-content/uploads/2014/11/canary\\_art22.jpg](https://share.america.gov/wp-content/uploads/2014/11/canary_art22.jpg)

# Question 5

86

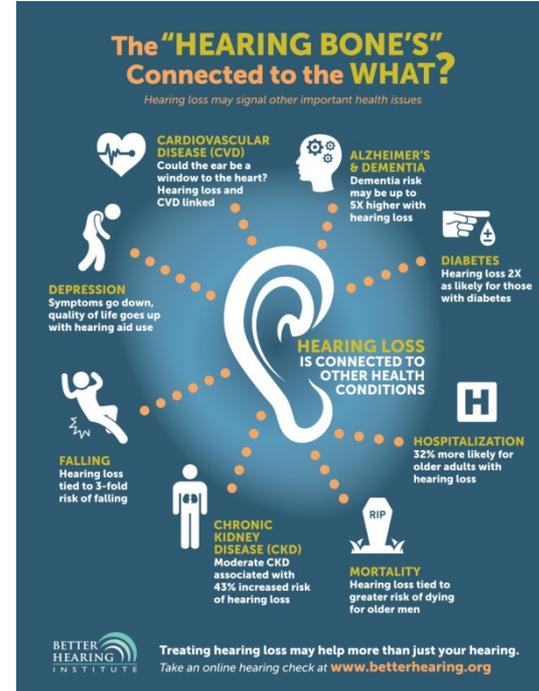
The canary in the coal mine is an early warning system due to its relative sensitivity to \_\_\_\_\_ .

- A. Carbon Dioxide Level
- B. Carbon Monoxide Level
- C. Nitrogen Level
- D. Oxygen Level
- E. Toxic Gasses

# Learning Objective 1

87

- Acquire the knowledge base covering many comorbid conditions that audiology patients may present to audiologists as part of hearing and balance care in the audiology private practice.



<http://www.betterhearing.org/>

# Learning Objective 2

88

- Identify and utilize the healthcare professionals that the audiologist could be engaging with, in order to co-manage audiology patients with comorbid conditions.



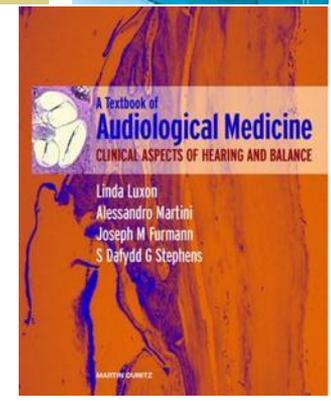
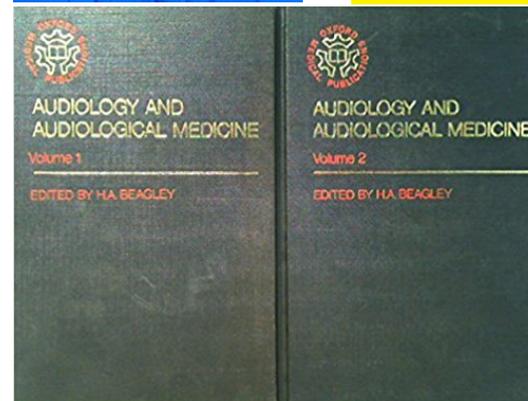
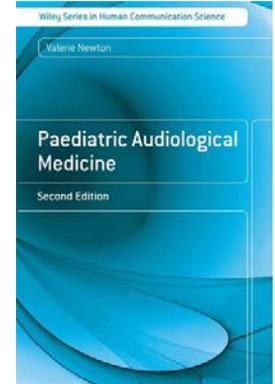
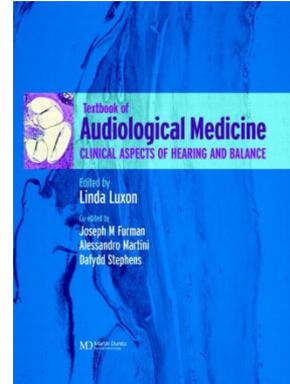
The Audiology Project

Audiology Medical Management of Hearing Loss and Balance

# Learning Objective 3

89

- Transition the audiology private practice focus from selling products to providing services, including audiological medicine and the co-management of comorbid conditions with the other doctoring professions.



# Example of Co-management

90

ENGLISH

Working Together to Manage Diabetes:

A GUIDE FOR PHARMACY, PODIATRY,  
OPTOMETRY, AND DENTISTRY



- ❑ Diabetes Management
- ❑ CDC PPOD
  - ▣ Pharmacy
  - ▣ Podiatry
  - ▣ Optometry
  - ▣ Dentistry

# Vital and Health Statistics

## Collins (1997) HHS / CDC / NSHS

91

Series 10  
No. 194



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## Vital and Health Statistics

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From the CENTERS FOR DISEASE CONTROL AND PREVENTION / National Center for Health Statistics

Prevalence of  
Selected Chronic  
Conditions:  
United States, 1990–92

This report presents an update of the prevalence of selected chronic conditions in the United States. Its purpose is to provide prevalence data by age, sex and age, race and age, family income, and geographic region for major chronic condition systems. It further assesses the percent of selected conditions that cause activity limitation, the percent for which a physician was consulted, and the percent that caused hospitalization. Conditions with the highest prevalence and those causing the most disability days are also analyzed. Trends in prevalence rates for the conditions with highest prevalence are examined as well.

# Vital and Health Statistics (1990 – 1992)

## Collins (1997) HHS / CDC / NSHS

92

### Chronic Conditions

1. Deformities or orthopedic impairments
2. Chronic sinusitis
3. Arthritis
4. High blood pressure
5. Hay fever or allergic rhinitis
6. **Deafness / hearing impairment**
7. Heart disease
8. Chronic bronchitis
9. Asthma
10. Other headache (non-tension)

### Causes of Death

1. Diseases of the heart
2. Malignant neoplasms
3. Cerebrovascular diseases
4. Chronic obstructive pulmonary disease
5. Accidents and adverse effects
6. Pneumonia and influenza
7. Diabetes mellitus
8. Human immunodeficiency viral infection
9. Suicide
10. Homicide and legal intervention

# Vital and Health Statistics (1990 – 1992)

## Prevalence of Chronic Conditions

Table D. Selected chronic conditions with highest prevalence in rank order, by family income and geographic region: United States, 1990–92

Chronic condition	Family income					Geographic region				
	All persons <sup>1</sup>	Less than \$10,000	\$10,000–\$19,999	\$20,000–\$34,999	\$35,000 and over	Northeast	Midwest	South	West	
	Rank									
Deformities or orthopedic impairments . . . . .	1	1	2	1	2	1	2	3	1	
Chronic sinusitis . . . . .	2	4	3	2	1	4	1	1	6	
Arthritis . . . . .	3	2	1	3	4	2	3	2	3	
High blood pressure . . . . .	4	3	4	4	5	3	4	4	5	
Hay fever or allergic rhinitis without asthma . . . . .	5	7	7	6	3	5	7	5	2	
Deafness and other hearing impairments . . . . .	6	5	5	5	6	6	5	6	4	
Heart disease . . . . .	7	6	6	7	7	7	6	7	7	
Chronic bronchitis . . . . .	8	9	8	8	8	8	8	8	9	
Asthma . . . . .	9	8	10	10	9	9	9	9	8	
Other headache (excludes tension headache) . . . . .	10	10	9	9	(2)	(2)	10	10	10	
Dermatitis . . . . .	(2)	(2)	(2)	(2)	10	(2)	(2)	(2)	(2)	
Migraine headache . . . . .	(2)	(2)	(2)	(2)	(2)	10	(2)	(2)	(2)	

<sup>1</sup>Includes unknown family income.

<sup>2</sup>Indicated rank is not in top 10.

NOTE: This table shows rank by condition prevalence, not person prevalence. A person may have more than one condition in some group.

**Deafness & hearing impairment = 6<sup>th</sup> most prevalent chronic condition**

# Question 6

94

According to the 1997 Collins report from the CDC, the sixth most prevalent chronic condition is \_\_\_\_\_

- A. Arthritis
- B. Asthma
- C. Bronchitis
- D. Deafness and other hearing impairments
- E. Dermatitis

# Vital and Health Statistics (1990 – 1992)

## Prevalence of Chronic Conditions

Table C. Selected chronic conditions with highest prevalence in rank order, by sex, race, and age: United States, 1990–92

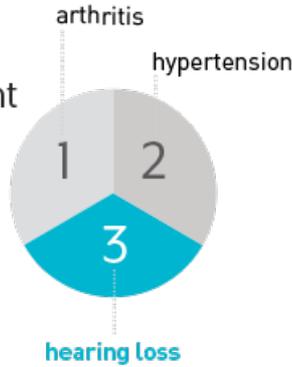
Chronic condition	All persons <sup>1</sup>	Sex		Race		Age					
		Male	Female	White	Black	Under 18 years	18–44 years	45–64 years	65–74 years	75 years and over	
		Rank									
Deformities or orthopedic impairments . . . . .	1	1	3	1	3	6	1	3	5	5	
Chronic sinusitis . . . . .	2	2	2	2	2	2	2	4	6	7	
Arthritis . . . . .	3	5	1	3	4	(2)	8	1	1	1	
High blood pressure . . . . .	4	4	4	4	1	(2)	6	2	2	3	
Hay fever or allergic rhinitis without asthma . . . . .	5	6	5	6	5	1	3	7	10	(2)	
<b>Deafness and other hearing impairments . . . . .</b>	<b>6</b>	<b>3</b>	<b>7</b>	<b>5</b>	<b>8</b>	<b>10</b>	<b>7</b>	<b>5</b>	<b>3</b>	<b>2</b>	
Heart disease . . . . .	7	7	6	7	6	9	(2)	6	4	4	
Chronic bronchitis . . . . .	8	9	8	8	9	4	9	9	(2)	(2)	
Asthma . . . . .	9	8	(2)	9	7	3	10	(2)	(2)	(2)	
Other headache (excludes tension headache) . . . . .	10	(2)	10	10	10	(2)	4	(2)	(2)	(2)	
Blindness and other visual impairments . . . . .	(2)	10	(2)	(2)	(2)	(2)	(2)	(2)	(2)	8	
Migraine headache . . . . .	(2)	(2)	9	(2)	(2)	(2)	5	(2)	(2)	(2)	
Dermatitis . . . . .	(2)	(2)	(2)	(2)	(2)	5	(2)	(2)	(2)	(2)	
Acne . . . . .	(2)	(2)	(2)	(2)	(2)	7	(2)	(2)	(2)	(2)	
Chronic disease of tonsils and adenoids . . . . .	(2)	(2)	(2)	(2)	(2)	8	(2)	(2)	(2)	(2)	
Speech impairments . . . . .	(2)	(2)	(2)	(2)	(2)	10	(2)	(2)	(2)	(2)	
Hemorrhoids . . . . .	(2)	(2)	(2)	(2)	(2)	(2)	(2)	8	(2)	(2)	
Diabetes . . . . .	(2)	(2)	(2)	(2)	(2)	(2)	(2)	10	8	9	
Cataracts . . . . .	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	7	6	
Tinnitus . . . . .	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	9	10	

**Deafness & hearing impairment**  
**3<sup>rd</sup> most prevalent chronic condition**  
**in the elderly**  
**(65 years of age and older)**

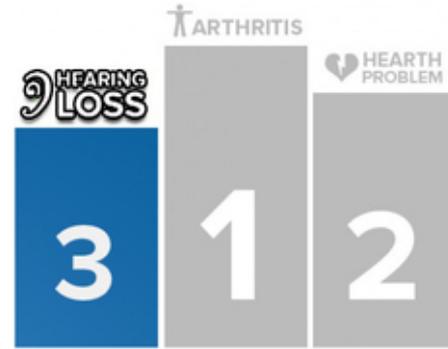
# Public Information (?)

96

Hearing loss is the **THIRD MOST** prevalent age-related disability following arthritis and hypertension suffered by adults 75+.



<http://www.starkey.com>



<http://www.starthearingnow.com>

# Public Misinformation

97

Hearing loss is a major public health issue.

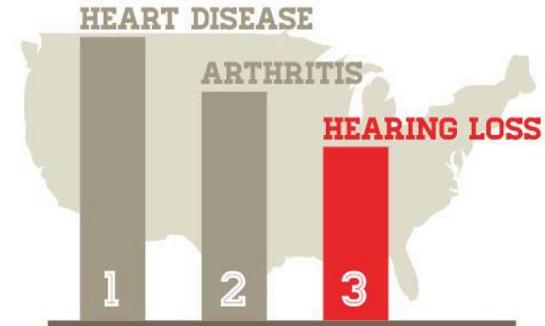


It is the **third most common physical condition** after arthritis and heart disease.

Source: Hearing Loss Association of America



**HEARING LOSS IS THE THIRD MOST COMMON HEALTH PROBLEM IN THE UNITED STATES.**



AMERICAN  
ACADEMY OF  
AUDIOLOGY



**FACT:** Audiologists are the primary health-care professionals who evaluate, diagnose, treat, and manage hearing loss and balance disorders in adults and children.

# Question 7

98

According to the 1997 Collins report from the CDC, the third most prevalent chronic condition in the elderly is \_\_\_\_\_

- A. Arthritis
- B. Deafness and other hearing impairments
- C. Heart Disease
- D. High Blood Pressure

# Our Call-to-Action to Others ...

- **Age-Related Hearing Loss and Communication Breakdown in the Clinical Setting**
- *JAMA Otolaryngol Head Neck Surg. Published online August 24, 2017.*
- *Cudmore, Henn, Colm, O'Tuathaigh, et al.*
- **Hearing Loss and Patient-Physician Communication**
  - *The Role of an Otolaryngologist [Audiologist<sup>VB</sup>]*
- *JAMA Otolaryngol Head Neck Surg. Published online August 24, 2017.*
- *Weinreich*

# Our Call-to-Action to Others ...

- Recent analyses have highlighted a significant increase in the rate of hearing loss in patients 60 years and older.<sup>1</sup>
- The estimated prevalence of bilateral hearing loss greater than 25 dB is 27% among patients age 60 to 69 years; 55%, 70 to 79 years; and 79%, 80 years and older.<sup>1</sup>
- The prevalence of medical errors is higher among older patients, and they are also among the most dependent users of the health care system.<sup>2</sup>

# Our Call-to-Action to Others ...

- ❑ Failures in clinical communication are considered to be the leading cause of medical errors.<sup>2</sup>
- ❑ Walsh and colleagues<sup>3</sup> reported that improved communication between the medical teams and families could have prevented 36% of medical errors.
- ❑ However, the contribution of hearing loss to medical errors among older patients is nascent.

# Our Call-to-Action to Others ...

- While audiometry is an effective method of diagnosis of hearing impairment, not all impaired listeners will have the same speech comprehension, despite having similar pure-tone thresholds and configurations.<sup>4</sup>
- In the present study, qualitative analysis was applied to semi-structured interview data collected in 100 older adults 60 years and older.

# Our Call-to-Action to Others ...

103

- Baseline prevalence was calculated for communication breakdown in hospital and primary care settings among adults reporting hearing loss.
- We also identified common, discrete aspects of a clinical consultation that older adults with hearing loss may find difficult and which may be contributing toward medical error.

*Age-Related Hearing Loss and Communication Breakdown in the Clinical Setting*

- **RECOMMEND A FUNCTIONAL NEEDS ASSESSMENT<sup>VB</sup>**

# The Grand Opportunity for Audiology

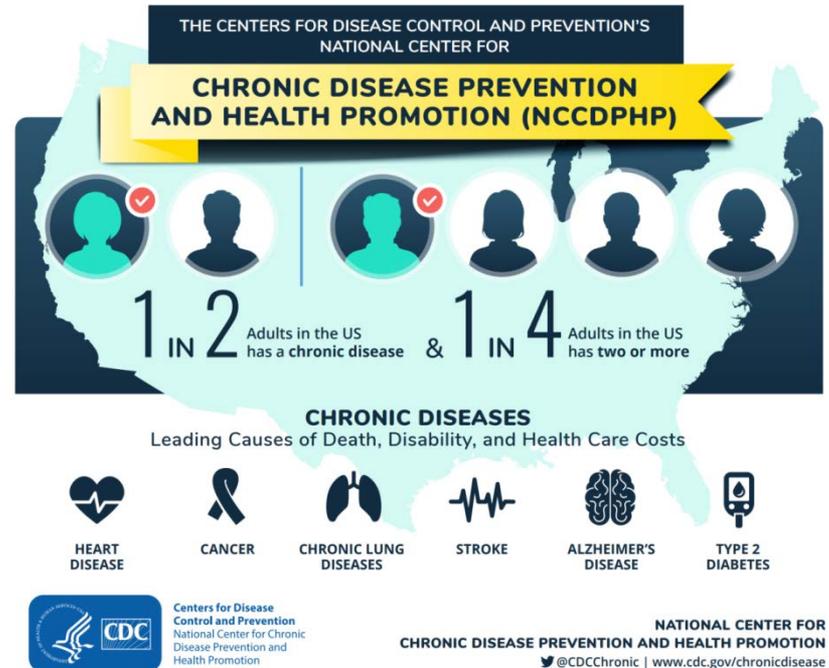
104

- Probability is high that a majority of your audiology patients have one or more comorbid conditions.
  - ▣ *Check for this in your case history*
- Many comorbid conditions, especially if vascular in nature, involved hearing and balance disorders.
  - ▣ *Check for this in your database*
- For the comorbid conditions, communicate with the treating physician, mentioning the comorbidity.
  - ▣ *Goal is to co-monitor status*
- Convey in your messaging the importance of communication in the doctor-patient relationship.
  - ▣ *Goal is to have them to refer to you for Needs Assessment*

# CDC – Chronic Disease Prevention

105

- 1 in 2 adults in the USA has a chronic condition.
- 1 in 4 adults in the USA has two or more chronic conditions.
- *These are your patients.*



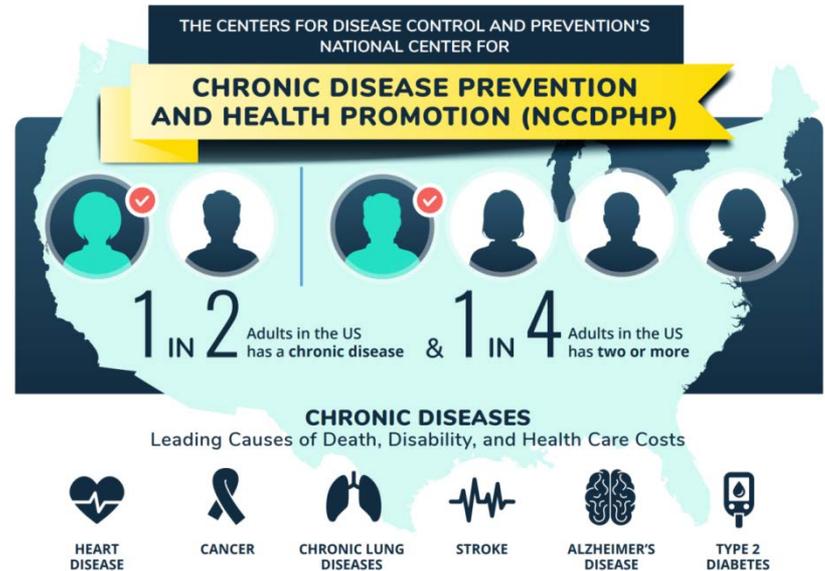
# CDC – Chronic Disease Prevention

106

Chronic Diseases are the leading causes of

- ▣ death,
- ▣ disability, and
- ▣ health care costs

in the USA.

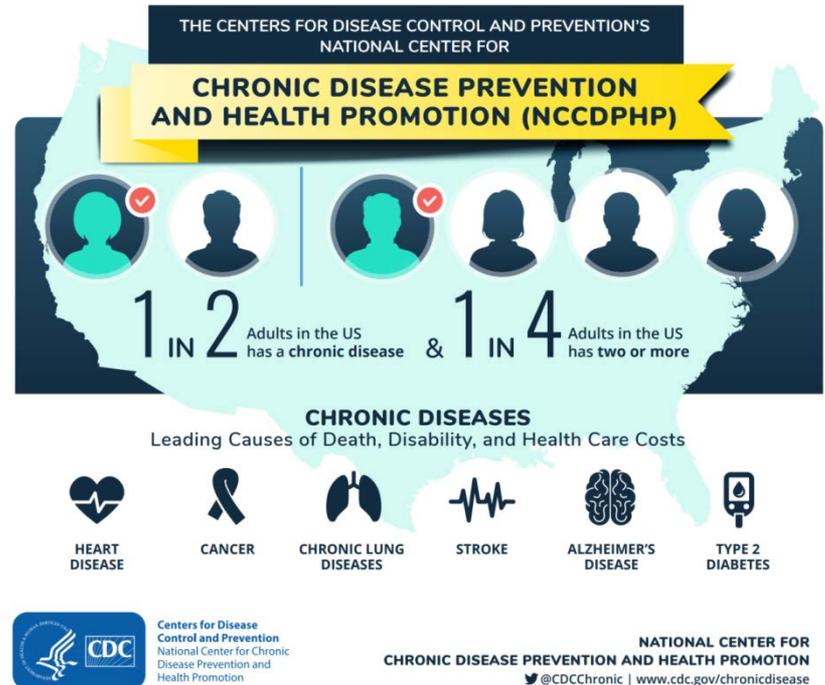


# CDC – Chronic Disease Prevention

107

Major chronic conditions of concern are:

- ❑ Heart disease
- ❑ Cancer
- ❑ Chronic Lung Disease
- ❑ Stroke
- ❑ Alzheimer's Disease
- ❑ Type 2 Diabetes

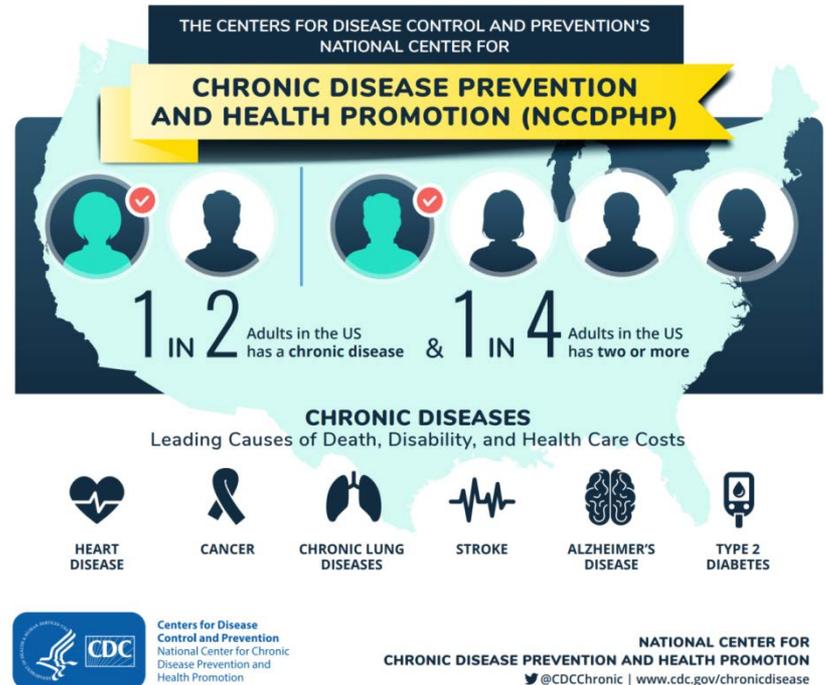


# CDC – Chronic Disease Prevention

108

Major chronic conditions of concern are:

- ▣ *Heart disease*
- ▣ *Cancer*
- ▣ *Chronic Lung Disease*
- ▣ *Stroke*
- ▣ *Alzheimer's Disease*
- ▣ *Type 2 Diabetes*



# CDC – Chronic Disease Prevention

109

## Prevent Chronic Disease

## Promote Health & Wellness

- ❑ Improving Quality of Life
- ❑ Increasing Healthy Life Expectancy
- ❑ Reducing Health Care Costs



**NCCDPHP PREVENTS  
CHRONIC DISEASE  
AND PROMOTES HEALTH**  
for all ages



Centers for Disease  
Control and Prevention  
National Center for Chronic  
Disease Prevention and  
Health Promotion

**NATIONAL CENTER FOR  
CHRONIC DISEASE PREVENTION AND HEALTH PROMOTION**  
@CDCChronic | www.cdc.gov/chronicdisease

# CDC – Chronic Disease Prevention

110

## Prevent Chronic Disease

## Promote Health & Wellness

- *Improving Quality of Life*
- *Increasing Healthy Life Expectancy*
- *Reducing Health Care Costs*



**NCCDPHP PREVENTS  
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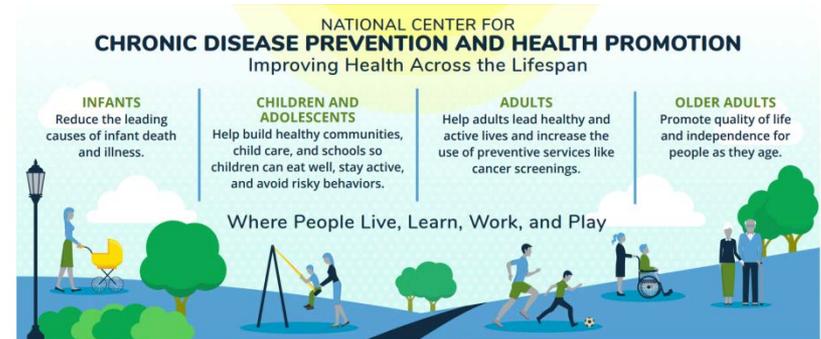
**NATIONAL CENTER FOR  
CHRONIC DISEASE PREVENTION AND HEALTH PROMOTION**  
@CDCChronic | www.cdc.gov/chronicdisease

# CDC – Chronic Disease Prevention

111

## Older Adults

- Promote Quality of Life and Independence for People as They Age



Centers for Disease  
Control and Prevention  
National Center for Chronic  
Disease Prevention and  
Health Promotion

**NATIONAL CENTER FOR  
CHRONIC DISEASE PREVENTION AND HEALTH PROMOTION**

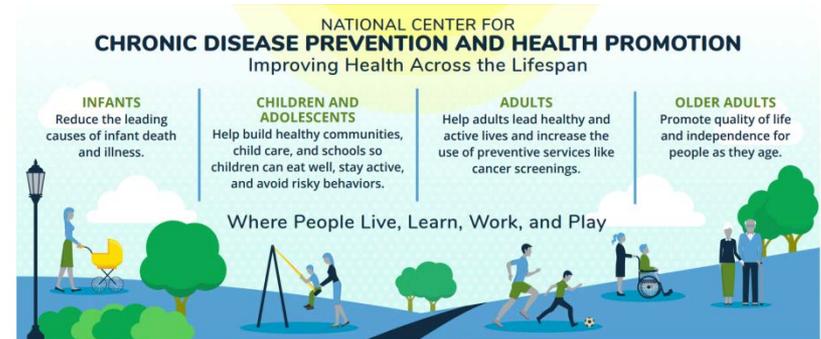
@CDCChronic | [www.cdc.gov/chronicdisease](http://www.cdc.gov/chronicdisease)

# CDC – Chronic Disease Prevention

112

## Older Adults

- **Promote Quality of Life and Independence for People as They Age**



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