

Educating Health Professionals about Hearing and Vestibular Issues in Diabetes

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Disclosures

Kathy Dowd

- Executive Director of the non profit The Audiology Project
- President of DBHZ Consulting, LLC

Pamela Allweiss: None

- **LEARNER OUTCOMES:**
- Understand the medical basis for changes in the cochlea, vestibular system, nerve, brain with diabetes
- Describe the audiology management process of Audiology management and monitoring with
 - Case history, audiology evaluation, recommendations
- List resources to a) identify and locate diabetes educators, b) share screening resources and c) provide educational training locally



What's the Burden of Diabetes in North Carolina

- **Prevalence of Self-reported Diagnosed Diabetes in Adults, Aged 18 Years or Older, North Carolina, 2013**
10.5%
- **Direct Costs: \$6 million**
- **Indirect Costs: \$7.5 million** (absenteeism, presenteeism, household productivity losses, inability to work, and premature mortality)
- **Total: \$13.6 million**
- <https://nccd.cdc.gov/Toolkit/DiabetesBurden/MedicalCost>



An Endocrinologist's Perspective

- **Yes, another recognized complication of diabetes which may affect quality of life, activity of daily living, productivity etc.**
- **Need to have hearing loss on our radar screens**
- **The condition needs to be recognized in order to be treated. Action step: Screen!**



Evidence: CDC and NIH papers on Hearing Impairment and Diabetes

- **Diabetes and Hearing Impairment in the United States: Audiometric Evidence from the National Health and Nutrition Examination Surveys, 1999–2004.** *Ann Intern Med.* 2008 July 1; 149(1): 1–10.
- **Three decade change in the prevalence of hearing impairment and its association with diabetes in the United States** *Preventive Medicine* 49 (2009) 360–364



How Are Diabetes and Hearing Loss Related?

- **Over time, high blood sugar levels can damage small blood vessels in the body.**
- **Parts of the body most affected by damage to small blood vessels are eyes, kidneys, and nerves of the body.**
- **Hearing depends on small blood vessels and nerves similar to those in other parts of the body that are affected by high blood sugar levels.**



Messages for Providers and Consumers: How Diabetes Can Affect Your Hearing

- Hearing loss is twice as common in people with diabetes and those with [prediabetes](#) have a 30 percent higher rate of hearing loss, compared with people with normal blood glucose
- If you have diabetes you are more likely to have hearing loss.
- Hearing loss may be an under-recognized complication of diabetes.



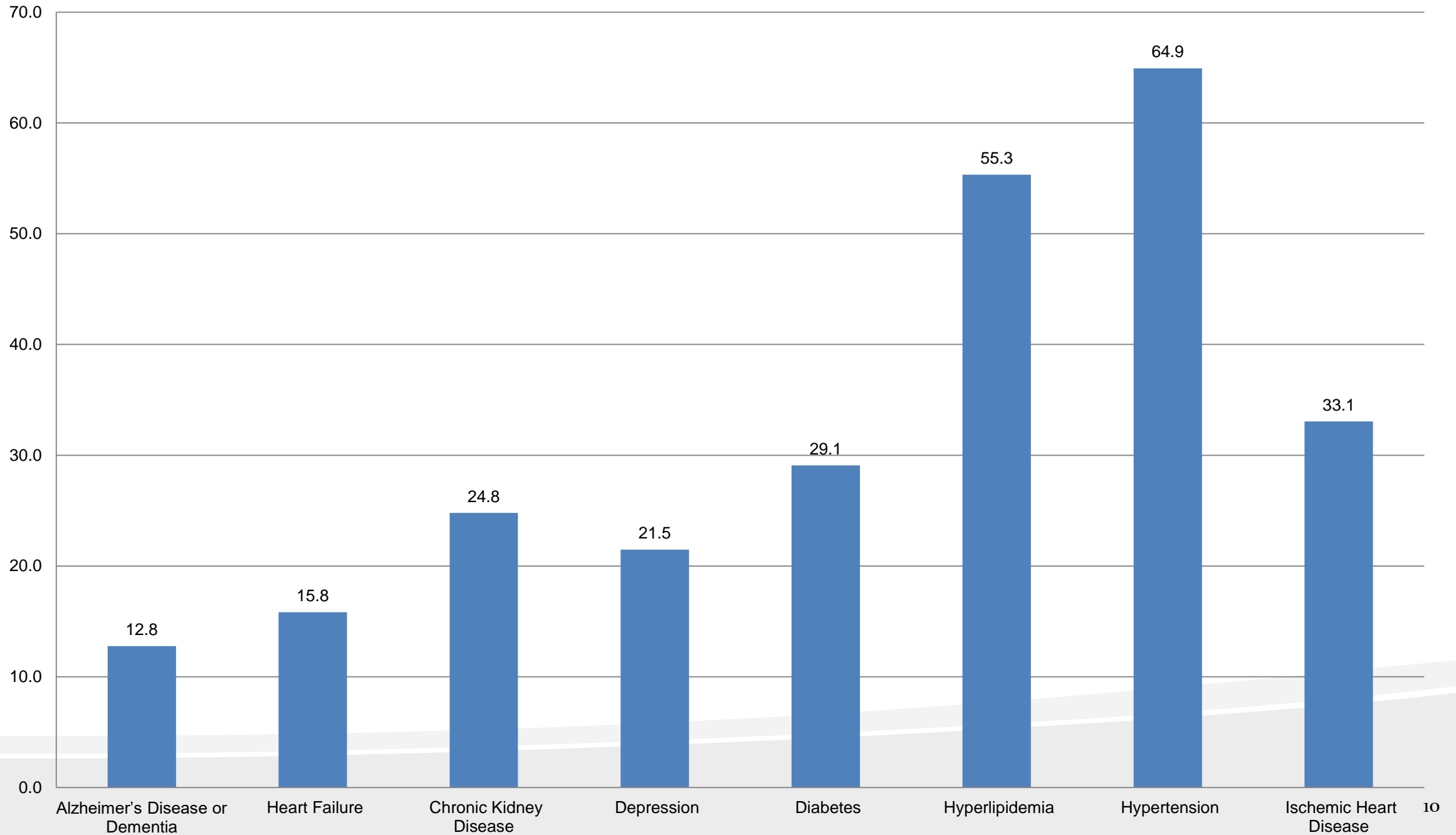
Messages: How Diabetes Can Affect Your Hearing

- **Problems with your hearing may affect your ability to learn about how to manage your diabetes when you get diabetes education.**
- **Tell your diabetes educator about your hearing loss.**
- **Hearing loss can also make depression worse. And depression is more common in people with diabetes.**



The Audiologists' Perspective

% NC Medicare Comorbidities in 2017 Audiology Tests



Diseases Affecting Hearing & Balance



- Diabetes
- Chronic renal disease
- Cardiovascular disease
- Hypothyroidism
- Alzheimer's disease
- Paget's disease
- Crohn's disease

Complications of Diabetes

Auditory

30% hearing loss prevalence (NHANES)

80% among skilled nursing facility residents

Vestibular

54% have balance disorders

Fall risk higher with retinopathy and neuropathy

Cognitive

Comorbid with auditory and vestibular disorders

Audiological Concerns: Diabetes



Hearing Loss

- Cochlear microangiopathy
- Neural degeneration



Balance & Fall Risk

- Foot neuropathy and vision effects
- Vestibular effects of diabetes



Diabetic Pain & Infection Control

- Ototoxicity
- Vestibulotoxicity

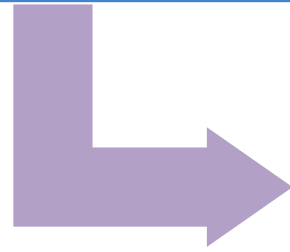


Weakened immunity with advancing age...

Increased prevalence of
chronic disease



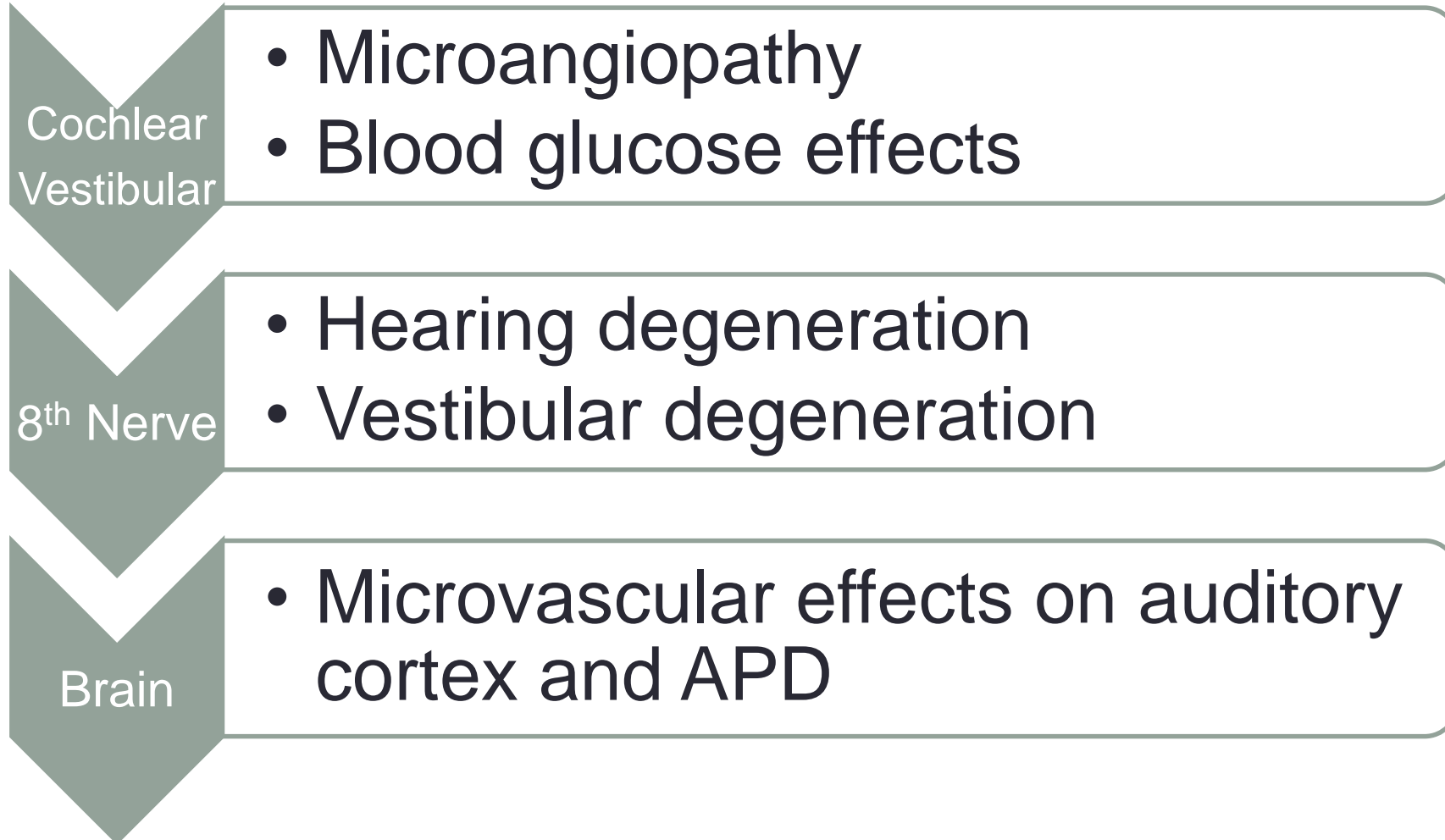
Ototoxic medications
more common



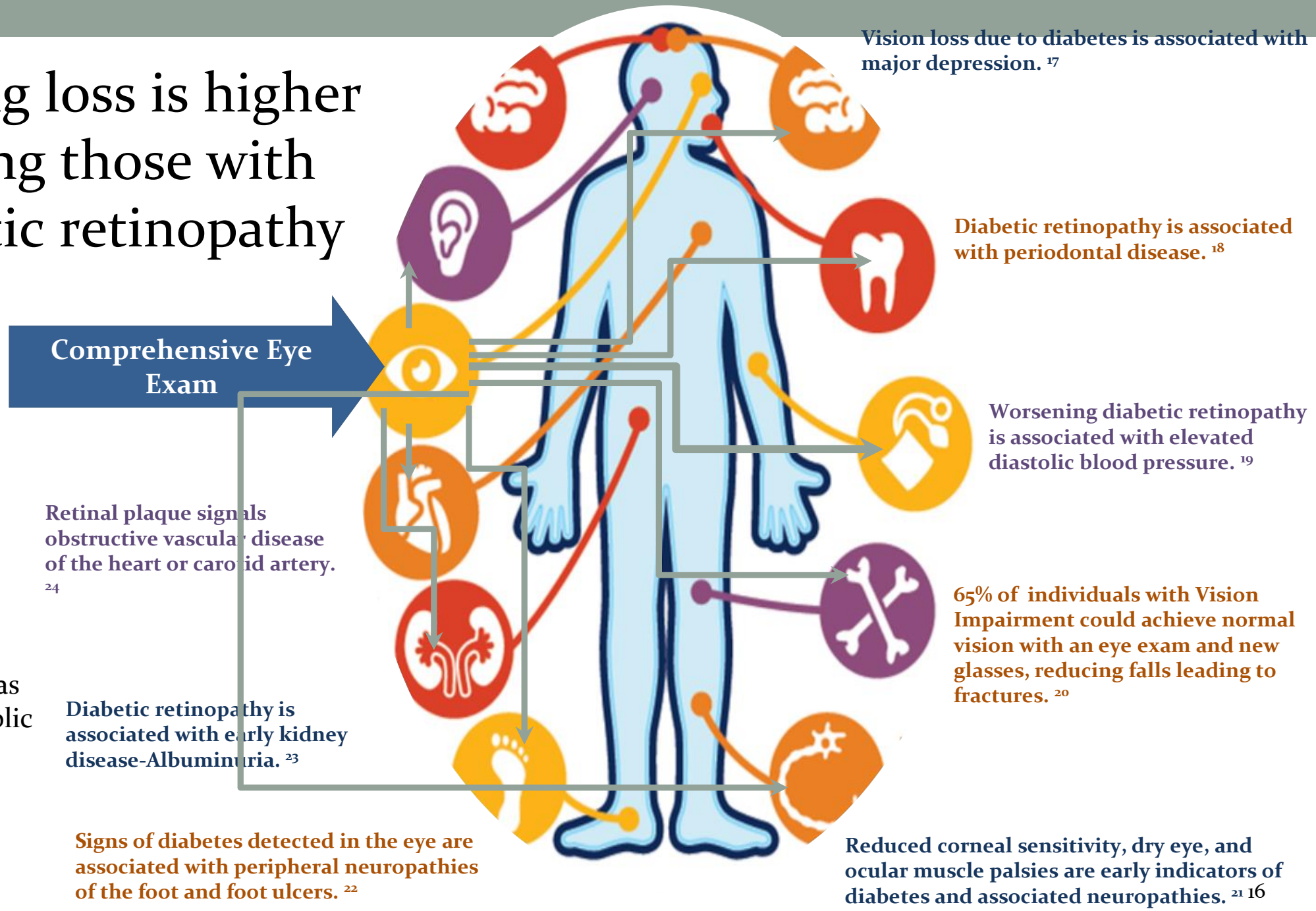
Increased prevalence
of hearing loss?

Hearing and Balance

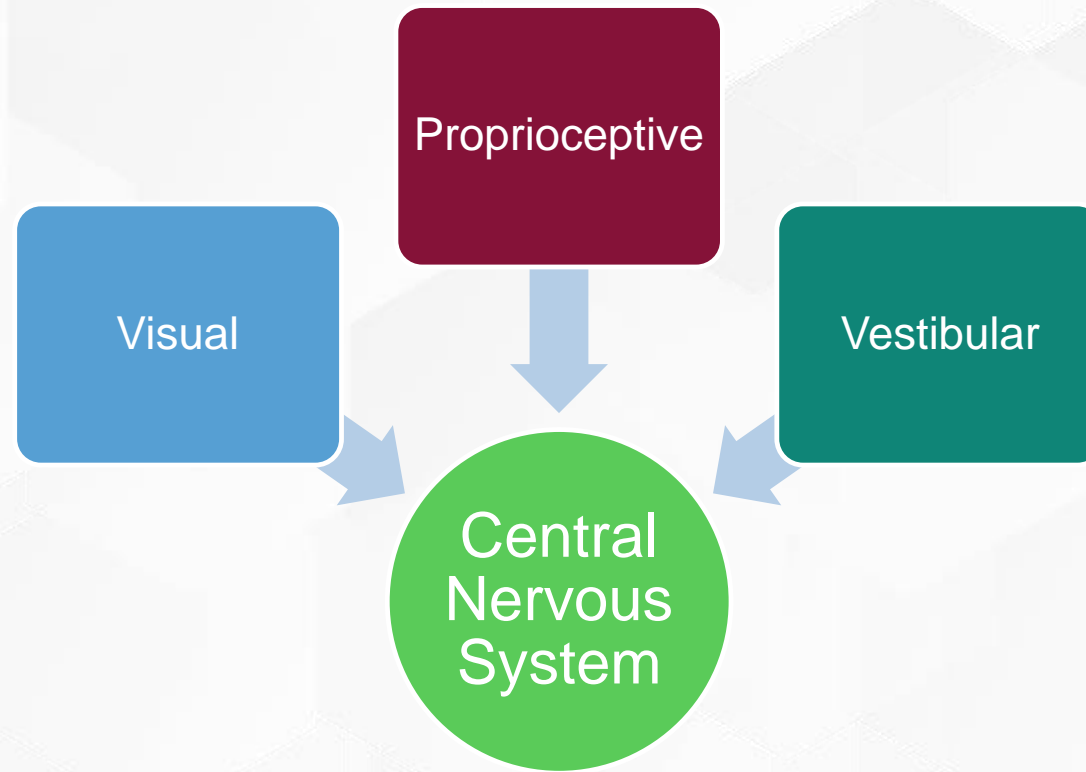
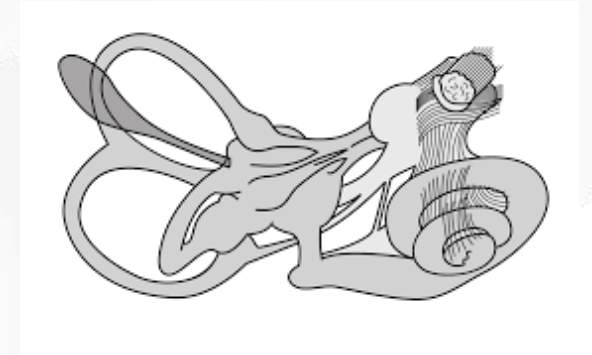
IDDM/NIDDM Common Pathophysiology



Hearing loss is higher among those with diabetic retinopathy

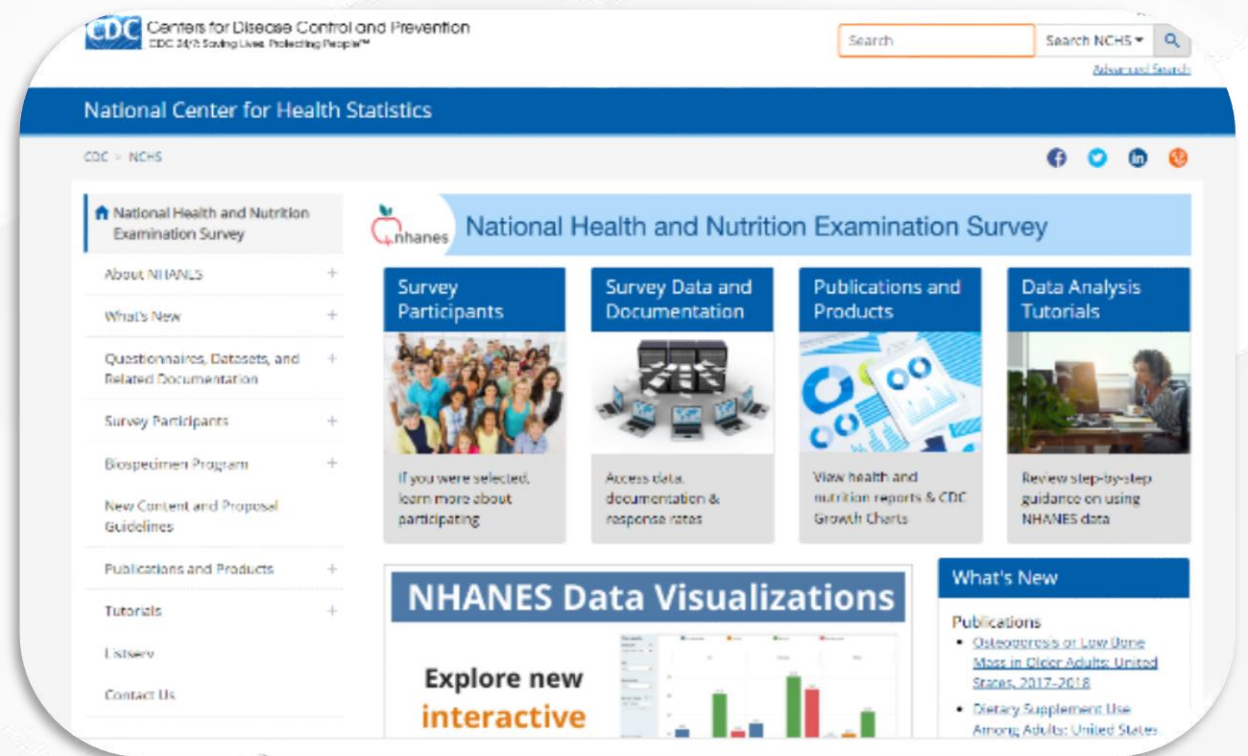


References available by request: Michael R. Dueñas OD, FNAP, AOA Chief Public Health Officer, mduenas@aoa.org



Diabetes and Vestibular Pathology

- National Health and Nutrition Examination Survey (NHANES)⁴
- N = 1,136; 17% had diabetes
- Peripheral neuropathy
 - Mild 19%
 - Severe 7.1%
- Retinopathy
 - Mild 54%
 - Severe 22%
- **Vestibular dysfunction 54%**



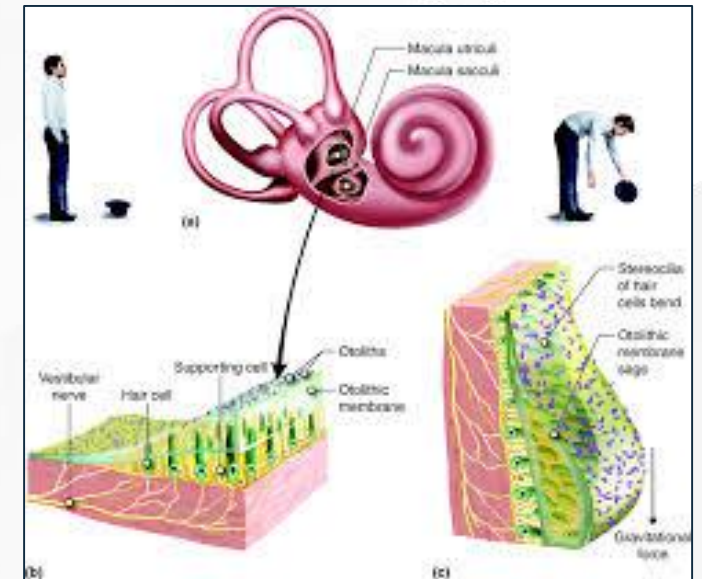
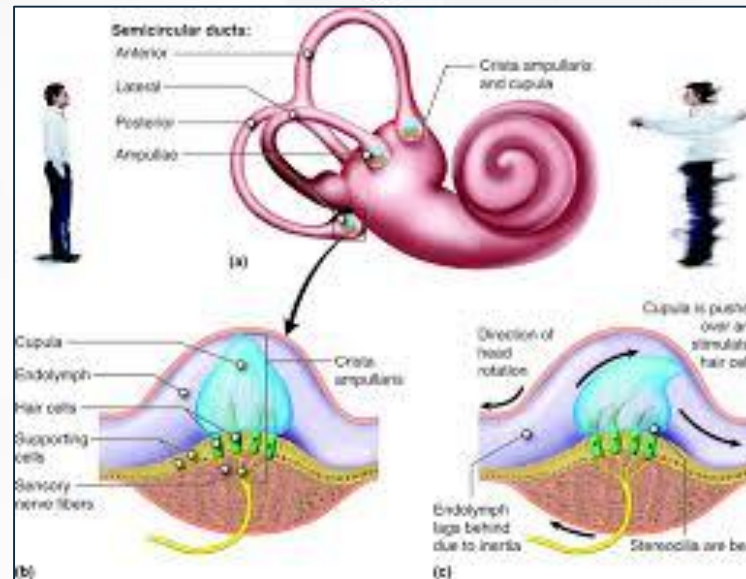
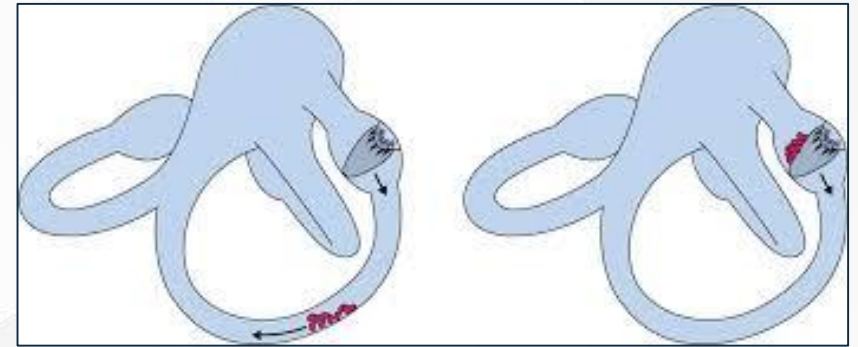
The screenshot shows the NHANES website interface. At the top, there is a search bar and the CDC logo. The main header reads 'National Center for Health Statistics'. Below this, there is a navigation menu on the left with categories like 'National Health and Nutrition Examination Survey', 'About NHANES', 'What's New', 'Questionnaires, Datasets, and Related Documentation', 'Survey Participants', 'Biospecimen Program', 'New Content and Proposal Guidelines', 'Publications and Products', 'Tutorials', 'Listserv', and 'Contact Us'. The main content area is titled 'National Health and Nutrition Examination Survey' and includes four primary sections: 'Survey Participants' (with a photo of a group of people), 'Survey Data and Documentation' (with a photo of a server rack), 'Publications and Products' (with a photo of charts), and 'Data Analysis Tutorials' (with a photo of a person at a computer). Below these are 'NHANES Data Visualizations' and 'What's New' sections.

⁴Agrawal et al. (2010)

Diabetes and Vestibular Pathology

- SCC dysfunction⁵⁻⁷
- Semi-circular canal dysfunction
- Otolith dysfunction⁸⁻¹⁰
- BPPV¹¹⁻¹⁴

Benign Positional Paroxysmal Vertigo



Risk Factors for Falls

EXTRINSIC | Factors

- Lack of stair handrails
- Poor stair design
- Lack of bathroom grab bars
- Dim lighting or glare
- Obstacles & tripping hazards
- Slippery or uneven surfaces
- Psychoactive medications
- Improper use of assistive device

INTRINSIC | Factors

- Advanced age
- Previous falls
- Muscle weakness
- Gait & balance problems
- Poor vision
- Postural hypotension
- Chronic conditions including arthritis, stroke, incontinence, diabetes, Parkinson's, dementia
- Fear of falling

Risk of Falls and Diabetes

- Independent risk factor for falling
- Annual incidence of falls 39%³
- **Can affect vision, proprioception, and vestibular**



³Yang et al. (2016)

Vestibular/Balance Screening Strategies

Self-report

- “Have you fallen”, “do you have a fear of falling”
- Dizziness Symptom Profile – can pick up cases of BPPV
- Counseling and information
- Refer for vestibular assessment

The Dizziness Symptom Profile

The following pages contain statements with which you can agree or disagree. To what extent do you personally agree or disagree with these statements in regards to your dizziness? Use the following scale: 0 = Strongly disagree, 1 = Disagree, 2 = Not sure, 3 = Agree, 4 = Strongly Agree

		Strongly Disagree		Not Sure		Strongly Agree
1	My dizziness is intense but only lasts for seconds to minutes.	0	1	2	3	4
2	I have had a single severe spell of spinning dizziness that lasted days or weeks.	0	1	2	3	4
3	I have spells where I get dizzy and also have irregular heartbeats (palpitations).	0	1	2	3	4

https://www.vumc.org/balance-lab/sites/vumc.org.balance-lab/files/public_files/Dizziness%20Symptom%20Profile%20-%20Vanderbilt%20UMC.pdf



The Message Counts!



For All Medical Professionals:

Consequences of Hearing Loss

Symptoms

- Asks for repetition
- Brings 3rd-party interpreter
- Associated with cognitive decline and depression
 - Social isolation
 - Stress
 - Confusion

Medical Management

Misses verbal instructions

Noncompliance

Worse patient outcomes



2011 Survey of Diabetes Educators

- Unknown complication (**49% of CDEs aware** of the relationship between diabetes and hearing loss)
- 95% rarely or never refer patients for hearing screening
- 98% do not use any hearing screening tools



2017 Survey of Diabetes Educators

- Known complication: **95% of CDEs are aware**
- 76% rarely or never refer patients for hearing screening
- 96% do not use any hearing screening tools

In 2013 Joanne Rinker CDE presented on diabetes and hearing loss in J&J Diabetes Institute webinar:

Impact of one CDE in AADE raising awareness!!



Audiology recommendations to persons with diabetes (Type 1 or Type 2)

- Baseline test when diagnosed to establish record of hearing status. Test for Central Auditory Processing Disorders : neurocognitive affect
- Refer for diabetes education (Medicare covers)
- Keep blood pressure and blood glucose as close to normal as possible.
- Retest in ___ years based on _____ (test results, noise, other diseases, medications, syndromes) or sooner if change in hearing is noted.



National agencies

- CDC, ADA, NIDDK, NIDCD
- NCQA www.ncqa.org
 - Diabetes Recognition Program, Heart/Stroke Recognition
 - <https://www.ncqa.org/programs/health-care-providers-practices/diabetes-recognition-program-drp/>

Audiology Scope of Practice



Audiology evaluation & management of hearing

Balance screening and evaluation

Treatment of hearing loss and balance problems

Counseling for social, job and personal

Tinnitus, cochlear implants, pediatric specialties



Symptoms of Hearing Loss Can Often Be Hard to Notice.

- **Family members and friends sometimes notice the hearing loss before the person experiencing it.**

What are the signs and symptoms of hearing loss?

- **Frequently asking others to repeat themselves.**
- **Trouble following conversations that involve more than two people.**
- **Thinking that others are mumbling.**
- **Problems hearing in noisy places such as busy restaurants.**
- **Trouble hearing the voices of women and small children.**
- **Turning up the TV or radio volume too loud for others who are nearby.**



Implementing Audiology in Diabetes Care

Materials: www.theaudiologyproject.com/hearscreenusa

- Hearscreen app 3 minute validated pass/fail and refer

Methods: www.theaudiologyproject.com/education-materials

- Questionnaires for hearing and balance

Motivation:

- Will better hearing and lower risk of falls help your patients?



Education

- **Education for consumers**
 - New CDC flyer Healthy Ears
- **Education for providers:**
 - What do audiologists want other providers to know? Make the case.



Working Together to Manage Diabetes

- **Team Care**
- **Primary care providers and diabetes educators can work with many other providers like Pharmacists, Optometrists, Dentists, Podiatrists, AND Audiologists**



So how do we start involving the audiology world?

Examples of Audiology Working with Other Professions



Align with **Pharmacy** for otovestibulotoxic monitoring

Collaborate with **Podiatry** for better balance and foot care

Ensure **Optometry** Evaluation to help lower risk of falls

Counsel patients for **Dentistry** several times a year



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What Should You Do If You Think You May Have Hearing Loss?

- **Talk to your doctor.**
- **You may want to have your hearing checked**
- **Get help from hearing specialist like: an audiologist, or a doctor who specializes in hearing problems. You'll learn more about your hearing loss from a full hearing exam.**
- **You will also be told what can be done to treat it.**
 - **Watch out for other causes of hearing loss such as: loud noises, certain medicines, and smoking.**

TAKE CHARGE OF YOUR **DIABETES**



Healthy Ears

Did you know that diabetes can harm your hearing and your balance? The good news is you can take steps to hear well and reduce your risk of falls. You've already taken an important step by finding this guide!

Tips to Keep Your Ears Healthy

- **Make an appointment with a health care provider called an audiologist (aw-dee-OL-uh-jist) to check your hearing and balance as soon as you are diagnosed with diabetes.**
 - Bring a list of your medicines and any illnesses and hospitalizations.
 - Your audiologist will look at your history and test results to help you





Make New Friends

- **Establish public and private partnerships.**
- **Professional orgs: ADCES, ADA, AACE, other professional orgs such as Pharmacists, Podiatrists, Optometrists, Dentists and Audiologists**
- **Consumer groups**
- **Leverage resources in the public domain:**
- <https://www.cdc.gov/diabetes/pdfs/library/Diabetes-Ears-h.pdf>



Key Message to Prevent Diabetes Complications: Control the ABCs

- A_{1c}: Blood glucose control
- B: Blood pressure control
- C: Cholesterol (Blood lipid) control
- S: Smoking (and use of other tobacco products) cessation
(and don't start)



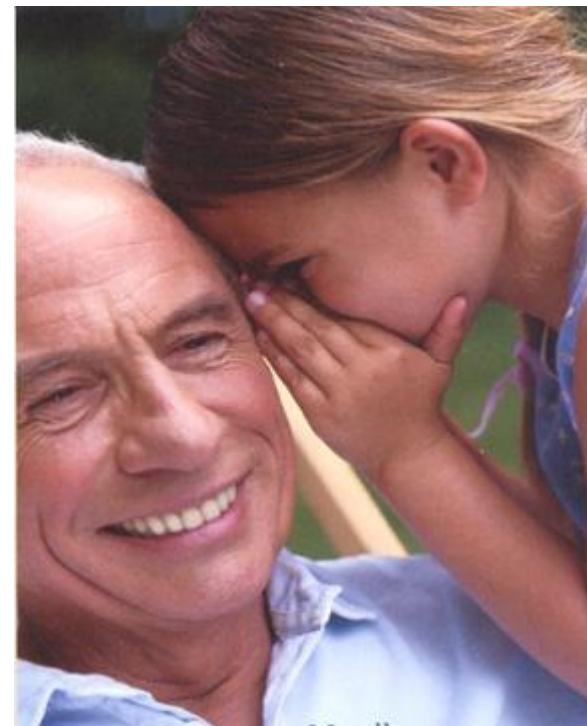
Key Message to Identify Diabetes Complications: Hearing and Balance

- Always screen for hearing and balance issues
- Refer to an audiologist for baseline hearing test at time of diabetes diagnosis
- Invite audiologists to your diabetes education classes or professional meetings
- Remember: Hearing and Balance are invisible!!



Thank you!

Questions?



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