



Age-related hearing loss

Age-related hearing loss (also known as presbycusis) is a decrease in hearing ability that happens with age. In most cases, the hearing loss affects both ears. It can begin as early as a person's thirties or forties and worsens gradually over time.

Age-related hearing loss first affects the ability to hear high-frequency sounds, such as speech. Affected people find it increasingly difficult to understand what others are saying, particularly when there is background noise (such as at a party). However, because the hearing loss is gradual, many people do not realize they cannot hear as well as they used to. They may turn up the television volume or start speaking louder without being aware of it.

As the hearing loss worsens, it affects more frequencies of sound, making it difficult to hear more than just speech. Determining where a sound is coming from (localization) and identifying its source become more challenging. Some affected individuals also experience a ringing sensation in the ears (tinnitus) or dizziness and problems with balance (presbystasis).

Age-related hearing loss often impacts a person's quality of life. Because affected individuals have trouble understanding speech, the condition affects their ability to communicate. It can contribute to social isolation, depression, and loss of self-esteem. Age-related hearing loss also causes safety issues if individuals become unable to hear smoke alarms, car horns, and other sounds that alert people to dangerous situations.

Frequency

Age-related hearing loss is one of the most common health conditions affecting older adults. Tens of millions of people worldwide are affected. In the United States, an estimated one-third of people over age 65, and half of those over 85, have some hearing loss.

Causes

The causes of age-related hearing loss are complex. This condition results from a combination of genetic, environmental, and lifestyle factors, many of which have not been identified. Age-related hearing loss is most commonly associated with changes in the inner ear, where sound waves are converted to nerve impulses that are sent to the brain. However, it can also be associated with nerve pathways that carry sound information in the brain or changes in the eardrum or in the small bones in the middle ear. In most cases, the exact cause of these changes is unknown.

Inherited variations in multiple genes likely influence whether age-related hearing loss occurs, the age at which it begins, and its severity. Some of these genes are important

for the normal structure or function of the inner ear. Mutations in a subset of these genes also cause forms of nonsyndromic hearing loss that begin earlier in life. Other genes that have been studied in people with age-related hearing loss play roles in aging and other age-related diseases. It is unclear how variations in these genes contribute to age-related hearing loss.

Among the best-studied genetic factors associated with age-related hearing loss are changes in mitochondrial DNA (mtDNA). Mitochondria are structures within cells that convert the energy from food into a form that cells can use. Although most DNA is packaged in chromosomes within the nucleus, mitochondria also have a small amount of their own DNA. As people age, mtDNA accumulates damaging mutations, including deletions and other changes. This damage results from a buildup of harmful molecules called reactive oxygen species, which are byproducts of energy production in mitochondria. Damage to mtDNA causes cells to malfunction and ultimately to die. Cells that have high energy demands, such as those in the inner ear that are critical for hearing, are particularly sensitive to the effects of mtDNA damage. This damage can irreversibly alter the function of the inner ear, leading to hearing loss.

Environmental and lifestyle factors also contribute to age-related hearing loss. These factors include long-term exposure to loud noise (particularly through earphones at high volume), smoking, and exposure to heavy metals such as mercury or lead. In addition, certain medications (such as some antibiotics and chemotherapy drugs) can damage cells in the inner ear that are necessary for hearing. For reasons that are not fully understood, some health conditions that are common in older people, including heart disease and diabetes, also influence age-related hearing loss. Nutritional factors (for example, a shortage of certain vitamins or minerals) may also play a role, although the exact relationship between diet and hearing is unclear.

Inheritance Pattern

Age-related hearing loss typically does not have a clear pattern of inheritance, although many affected individuals report a family history of the condition. Studies suggest that people who have close relatives with severe age-related hearing loss have an increased risk of developing severe hearing loss themselves as they age. However, it can be difficult to tell whether age-related hearing loss is inherited in a family because the condition is so common in the general population.

Other Names for This Condition

- age-related hearing impairment
- deafness due to old age
- hearing loss, age-related
- old-aged sensorineural hearing impairment
- presbycusis
- presbycusis

Diagnosis & Management

Genetic Testing Information

- What is genetic testing?
[/primer/testing/geneticTesting](#)
- Genetic Testing Registry: Age-related hearing impairment 1
<https://www.ncbi.nlm.nih.gov/gtr/conditions/C2676230/>
- Genetic Testing Registry: Age-related hearing impairment 2
<https://www.ncbi.nlm.nih.gov/gtr/conditions/C2751814/>

Research Studies from ClinicalTrials.gov

- ClinicalTrials.gov
<https://clinicaltrials.gov/ct2/results?cond=%22age-related+hearing+loss%22+OR+%22Presbycusis%22>

Other Diagnosis and Management Resources

- Health in Aging: Hearing Loss Care & Treatment
<https://www.healthinaging.org/a-z-topic/hearing-loss/care-treatment>
- Health in Aging: Hearing Loss Diagnosis & Tests
<https://www.healthinaging.org/a-z-topic/hearing-loss/tests>
- Health in Aging: Hearing Loss Lifestyle & Management
<https://www.healthinaging.org/a-z-topic/hearing-loss/lifestyle>
- National Institute on Deafness and Other Communication Disorders: Age-Related Hearing Loss: What Treatments and Devices Can Help?
<https://www.nidcd.nih.gov/health/age-related-hearing-loss#7>

Additional Information & Resources

Health Information from MedlinePlus

- Encyclopedia: Age-Related Hearing Loss
<https://medlineplus.gov/ency/article/001045.htm>
- Health Topic: Hearing Disorders and Deafness
<https://medlineplus.gov/hearingdisordersanddeafness.html>

Additional NIH Resources

- National Institute on Deafness and Other Communication Disorders
<https://www.nidcd.nih.gov/health/age-related-hearing-loss>

Educational Resources

- American Diabetes Association: Diabetes and Hearing Loss
<http://www.diabetes.org/living-with-diabetes/treatment-and-care/seniors/diabetes-and-hearing-loss.html>
- American Speech-Language-Hearing Association
<http://www.asha.org/uploadedFiles/AIS-Hearing-Loss-Age-Related.pdf>
- Health in Aging: Hearing Loss
<https://www.healthinaging.org/a-z-topic/hearing-loss>
- Johns Hopkins Medicine
<https://www.hopkinsmedicine.org/health/conditions-and-diseases/presbycusis>
- MalaCards: age-related hearing impairment 1
https://www.malacards.org/card/age_related_hearing_impairment_1
- MalaCards: age-related hearing impairment 2
https://www.malacards.org/card/age_related_hearing_impairment_2
- University of Washington Medical Center: Presbystasis
https://healthonline.washington.edu/document/health_online/pdf/Presbystasis_3_10.pdf
- World Health Organization
<https://www.who.int/features/qa/83/en/>

Patient Support and Advocacy Resources

- Hearing Health Foundation: Seniors
<https://hearinghealthfoundation.org/seniors>
- National Association of the Deaf
<https://www.nad.org/>
- Resource List from the University of Kansas Medical Center
<http://www.kumc.edu/gec/support/hearing.html>

Scientific Articles on PubMed

- PubMed
https://www.ncbi.nlm.nih.gov/pubmed?term=%28Presbycusis%5BMAJR%5D%29+AND+%28%28genetic*%5BTIAB%5D%29+OR+%28gene%5BTI%5D%29+OR+%28genes%5BTI%5D%29%29+AND+english%5Bla%5D+AND+human%5Bmh%5D+AND+%22last+3600+days%22%5Bdp%5D

Catalog of Genes and Diseases from OMIM

- AGE-RELATED HEARING IMPAIRMENT 1
<http://omim.org/entry/612448>
- AGE-RELATED HEARING IMPAIRMENT 2
<http://omim.org/entry/612976>

Medical Genetics Database from MedGen

- Age-related hearing impairment 1
<https://www.ncbi.nlm.nih.gov/medgen/382794>
- Age-related hearing impairment 2
<https://www.ncbi.nlm.nih.gov/medgen/416639>

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