

A decorative illustration of a human ear in profile, rendered in shades of red and orange. The ear is set within a white circular frame. Surrounding the ear are various botanical elements: green leaves, yellow leaves, and a blue swirl. The background is a light yellow with large, soft-edged green and yellow circles and scattered leaf-like shapes.

Hearing loss in adult

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- **Definition :**

- **Hearing loss** is a decrease in the ability to perceive sound or Any degree of impairment of the ability to apprehend sound.
- **May be present at birth or acquired at any time.**
- **May occur in one or both ears.**
- **Can be temporary or permanent.**
- **vin adults it can create difficulties with social interaction and at work.**

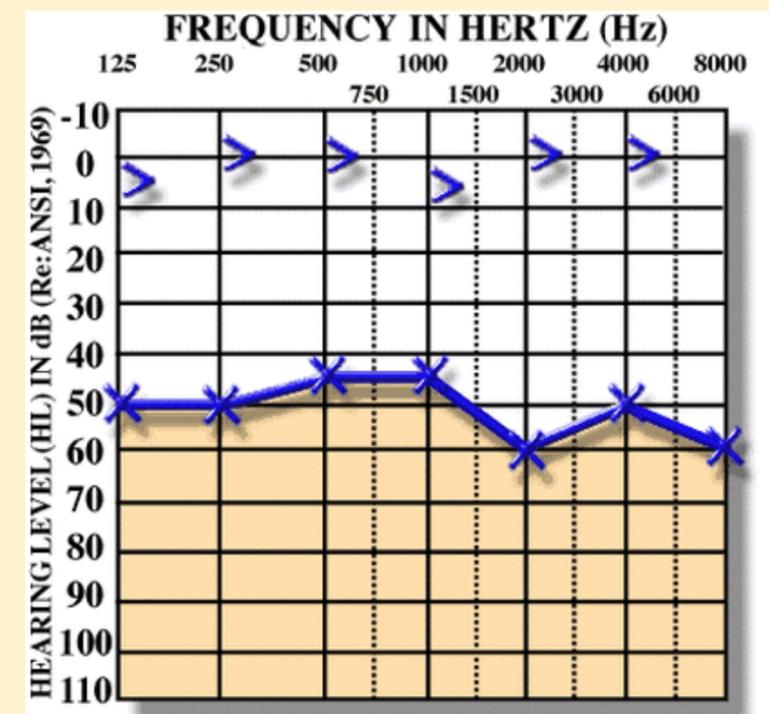


Conductive hearing loss

- It is caused by any disease process interfering with the conduction of sound from the external ear to the stapediovestibular joint.
- **Causes:**
 1. The external ear (**obstructions**).
 2. Tympanic membrane (**perforation**).
 3. Middle ear (**fluid**).
 4. Ossicles (**fixation or disruption**).
 5. The Eustachian tube (**obstruction**).

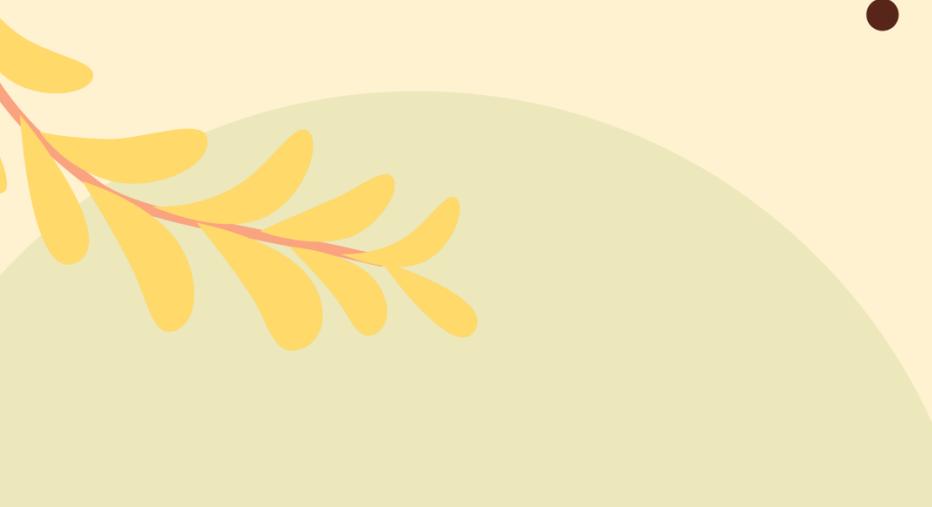
Characteristics of conductive hearing loss:

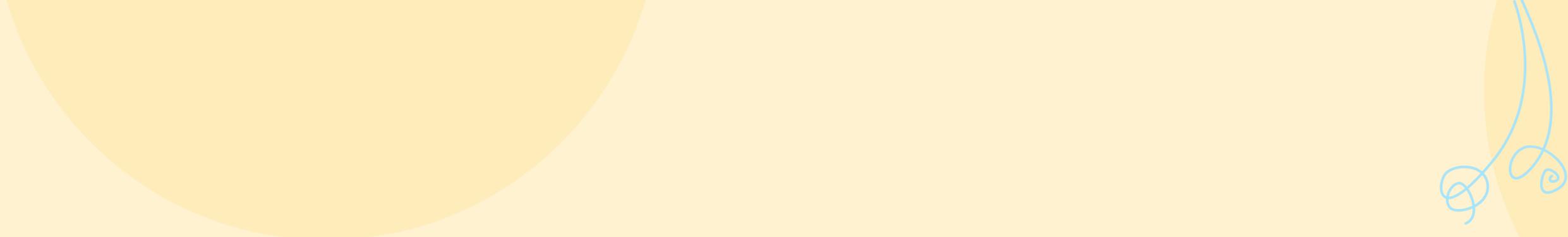
- Negative Rinne test.
- Weber lateralized to affected ear.
- Low frequencies affected more.
- Audiometry shows bone conduction better than air conduction with air-bone gap.



The background features a large yellow sun in the top right corner. On the left, there are stylized leaves in shades of green and yellow. In the bottom left, there are more leaves and a blue vine with spirals. In the bottom right, there are green and yellow leaves. Three blue teardrop shapes are scattered to the right of the sun.

Management

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- Removal of canal obstructions, e.g. impacted wax, foreign body, benign or malignant tumours.
 - Removal of fluid.
 - Removal of mass from middle ear.
 - Tympanoplasty (Repair of perforation).
 - Hearing aid, In cases where surgery is not possible, refused or has failed.

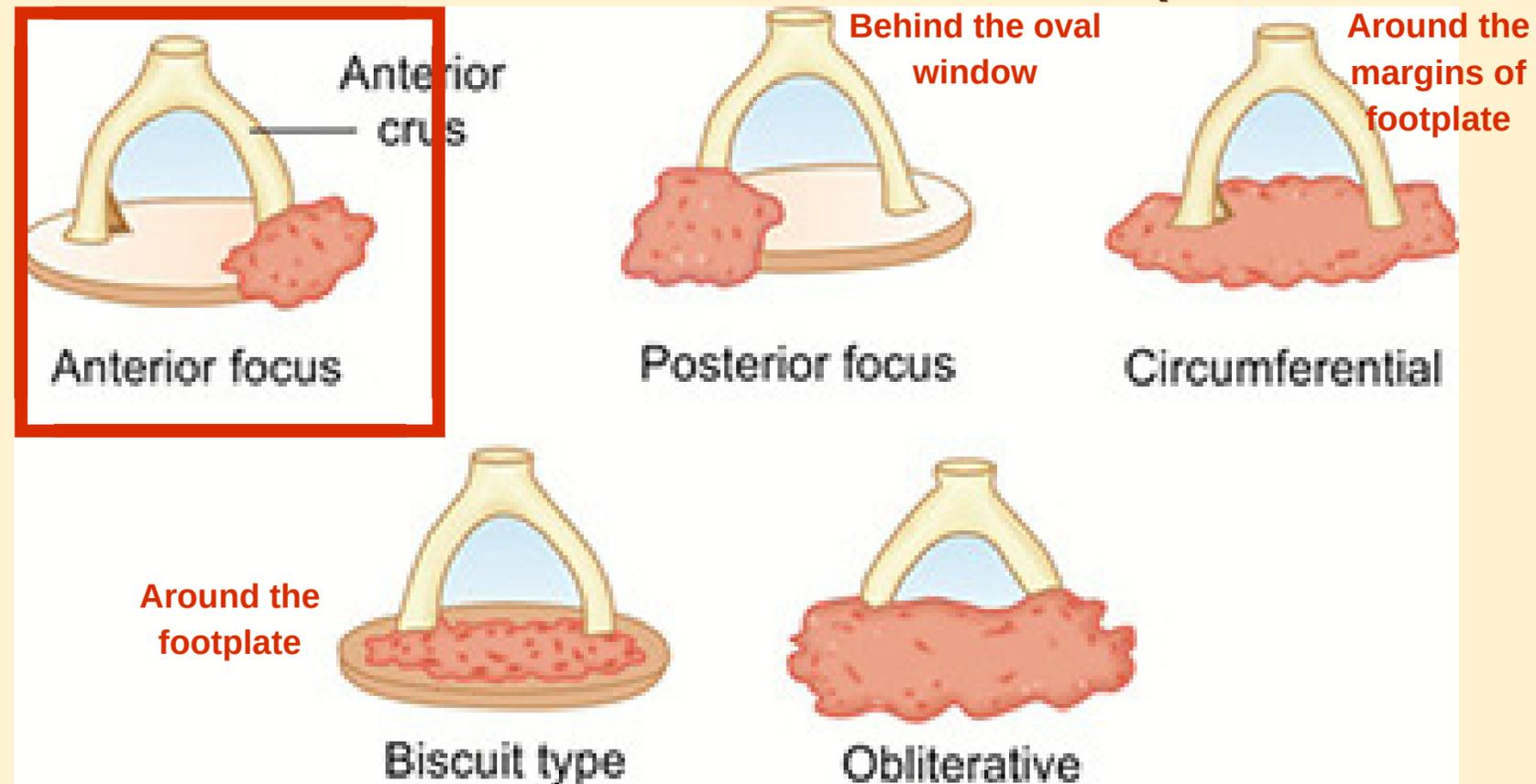


Otosclerosis (Otospongiosis)

- Common **middle ear** disease.
 - Is a primary disease of the **bony labyrinth**.
 - In this, one or more foci of irregularly spongy bone replace part of normally dense enchondral layer of bony otic capsule.
 - Most often, otosclerotic focus involves the stapes region leading to stapes fixation and conductive deafness.
 - Exact cause of otosclerosis is not known; however, the following facts have been documented :
 - Anatomical basis / Heredity / Race / Sex.
 - Viral infection :Electron microscopic and immunohistochemical studies have shown RNA related to **measles virus**. It is likely that otosclerosis is a viral disease.
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- **Stapedial otosclerosis:** causing stapes fixation and conductive deafness is the most common variety.
- Here lesion starts just in front of the oval window in an area called "fissula ante fenestram." (anterior focus).



Grossly appears Chalky white or yellow.

Cochlear otosclerosis: involves region of round window or other areas in the otic capsule, and may cause sensorineural hearing loss probably due to liberation of toxic materials into the inner ear fluid.



Symptoms of Otosclerosis :

1. Hearing loss. This is the presenting symptom and usually starts in twenties.
2. Tinnitus.
3. Vertigo.

Differential diagnosis :

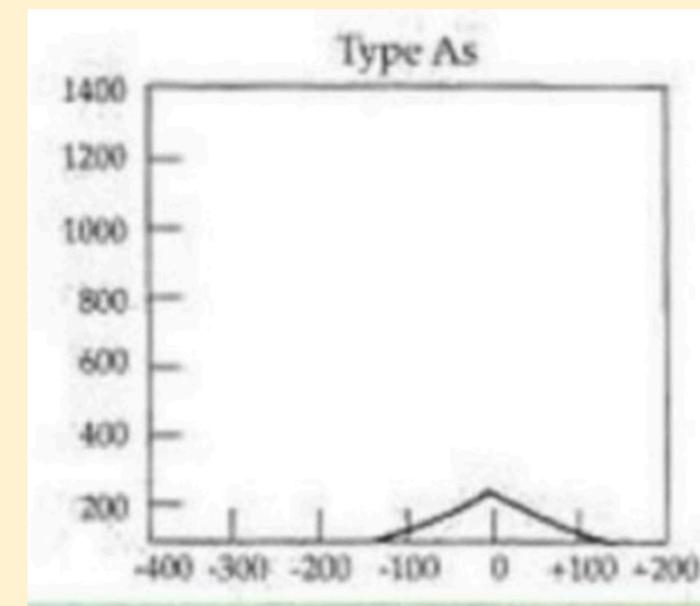
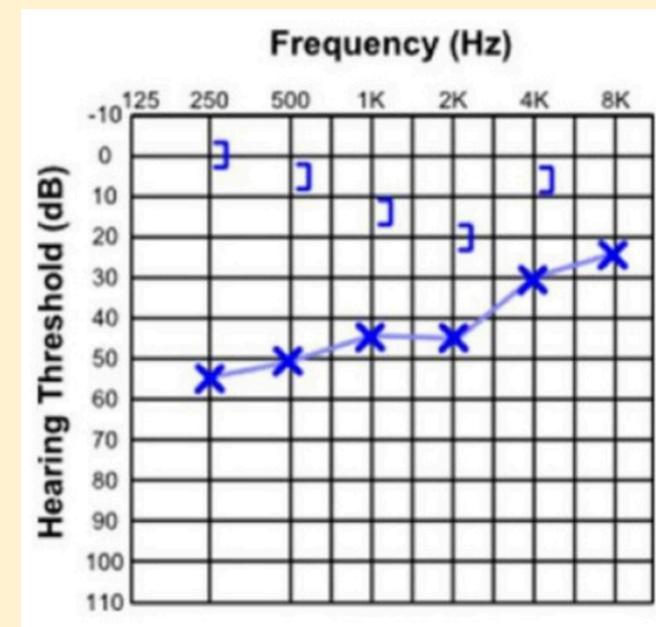
1. Serous otitis media.
 2. Adhesive otitis media.
 3. Tympanosclerosis.
 4. Attic fixation of head of malleus.
 5. Ossicular discontinuity or congenital stapes fixation.
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Treatment :

- Medical :There is no medical treatment that cures otosclerosis
- Surgical: Stapedectomy/stapedotomy.

The characteristics of Otosclerosis (Otospongiosis)are :

- Negative Rinne test.
- Weber lateralized to affected ear.
- Audiometry shows Carhart sign.
- Tympanogram As.



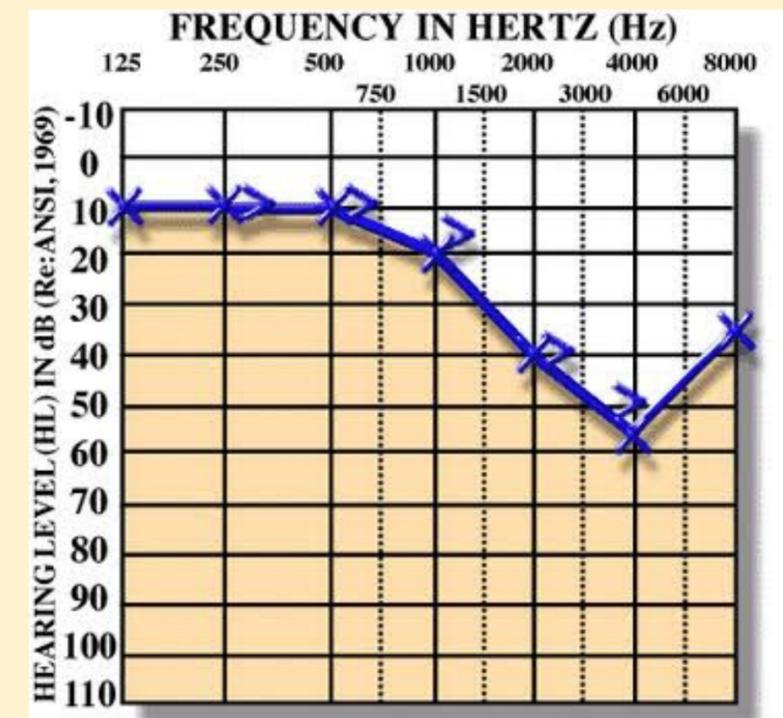


Sensorineural hearing loss

- Sensorineural hearing loss (SNHL) results from lesions of the **cochlea, VIII (8th) nerve or central auditory pathways**. It may be present at birth (**congenital**) or start later in life (**acquired**).
 - Acquired: It appears later in life. The cause may be genetic or nongenetic.
 - The genetic hearing loss may manifest late (delayed onset) and may affect only the hearing, or be a part of a larger syndrome affecting other systems of the body as well (syndromal).
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Characteristics of Sensorineural hearing loss:

- Positive Rinne test.
- Weber lateralized to better ear.
- More often involving high frequencies.
- No gap between air and bone conduction curve on audiometry.





Inflammation of the Labyrinth

1. Viral labyrinthitis: Measles + Mumps + CMV.
2. Bacterial: Bacterial infections reach labyrinth through the middle ear (tympanogenic) or through CSF (meningogenic).
3. Syphilitic.

Familial progressive sensorineural hearing loss

- It is a genetic disorder in which there is progressive degeneration of the cochlea starting in late childhood or early adult life.
 - Hearing loss is bilateral with flat or basin-shaped audiogram.
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Ototoxicity

- Various drugs and chemicals can damage the inner ear and cause sensorineural hearing loss:
 1. Aminoglycoside antibiotics (Gentamycin).
 2. Diuretics.
 3. Salicylates.
 4. Quinine.
 5. Cytotoxic drugs (Cisplatin).
 6. Topical ear drops.
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Noise trauma

1. **Acoustic trauma:** single brief exposure to very intense sound without this being preceded by a temporary threshold shift. Also called **impulse noise**, such noise can arise from an explosion, gun fire or a powerful cracker and may reach or cross 140 dB.
 2. **Noise-induced hearing loss (NIHL)** : follows chronic exposure to less intense sounds than seen in acoustic trauma and is mainly a hazard of noisy occupations.
Noise of 90 dB (A) SPL, 8 h a day for 5 days per week is the maximum safe limit, No exposure in excess of 115 dB is to be permitted.
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Noise trauma

The damage caused by noise trauma depends on several factors:

1. Frequency of noise.

Intensity and duration of noise :As the intensity increases, permissible time for exposure is reduced.

Continuous noise is more harmful.

1. Susceptibility of the individual.

2. Pre-existing ear disease.

*The "**4 P's**" of noise induced hearing loss:

Painless Progressive Permanent Preventable.

✂**Treatment:**

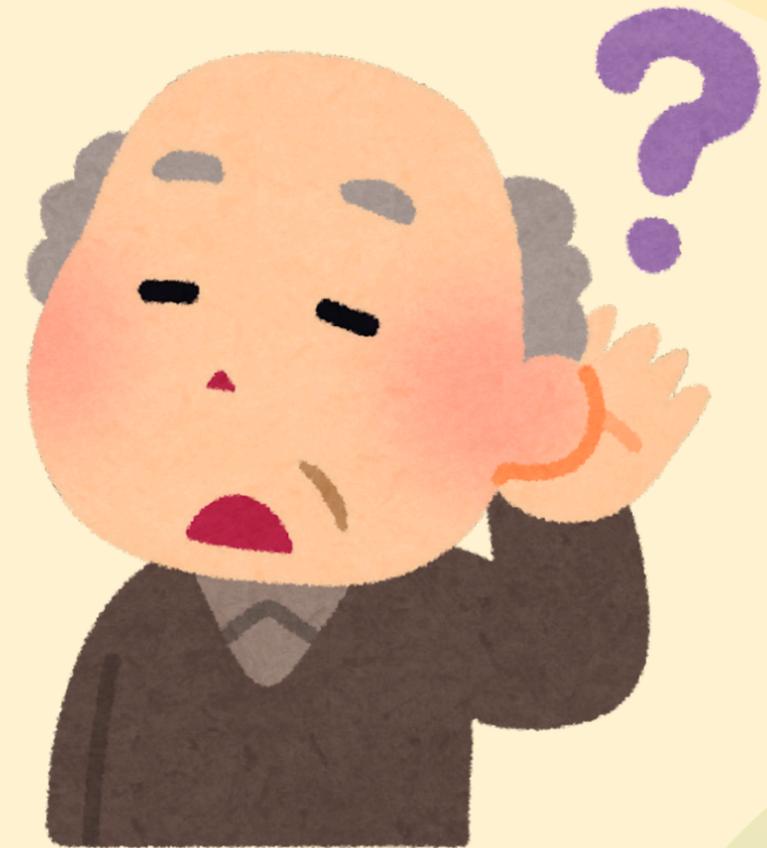
/ Noise-induced hearing loss is preventable. Persons who have to work at places where noise is above 85 dB (A) should have pre-employment and then annual audiograms for early detection. **Ear protectors (ear plugs or ear muffs)** should be used where noise levels exceed 85 dB (A). They provide protection up to 35 dB noise-related hearing loss tend to be permanent, Your doctor may recommend a hearing aid or an implant to improve your ability to communicate with others.

Presbycusis

- Sensorineural hearing loss associated with **physiological aging process** in the ear.
- V It usually manifests at the age of 65 years but may do so early if there is hereditary predisposition, chronic noise exposure or generalized vascular disease.
- Four pathological types: Sensory, Neural, Strial or metabolic, Cochlear conductive.
- **Patients of presbycusis have great difficulty in hearing in the presence of background noise though they may hear well in quiet surroundings.**
- **They may complain of speech being heard but not understood.**
- Tinnitus is another problem and in some it is the only complaint.

Treatment:

- Patients of presbycusis can be helped by a **hearing aid**. They should also have lessons in speech reading through visual cues. Cutting off smoking and stimulants like tea and coffee may help to decrease tinnitus.



Sudden sensorineural hearing loss

- This is a medical emergency (sensorineural).
- Hearing loss of 30 dB or more at least (3) contiguous frequencies over a period of (3) days or less.
- In most cases, **only one ear** is affected.
- The most common cause is **idiopathic**.
- The underlying problem may be a viral infection.

Treatment: 

- Steroid + antiviral.

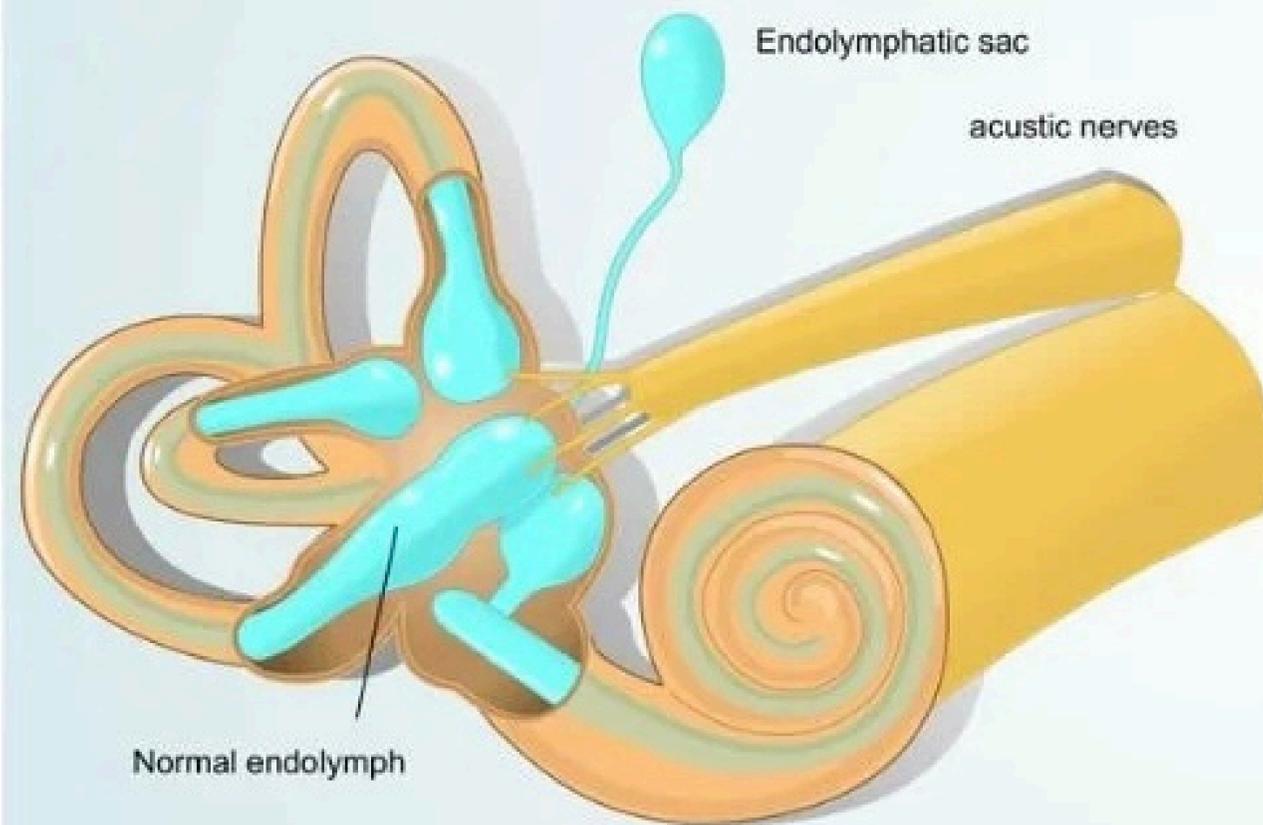




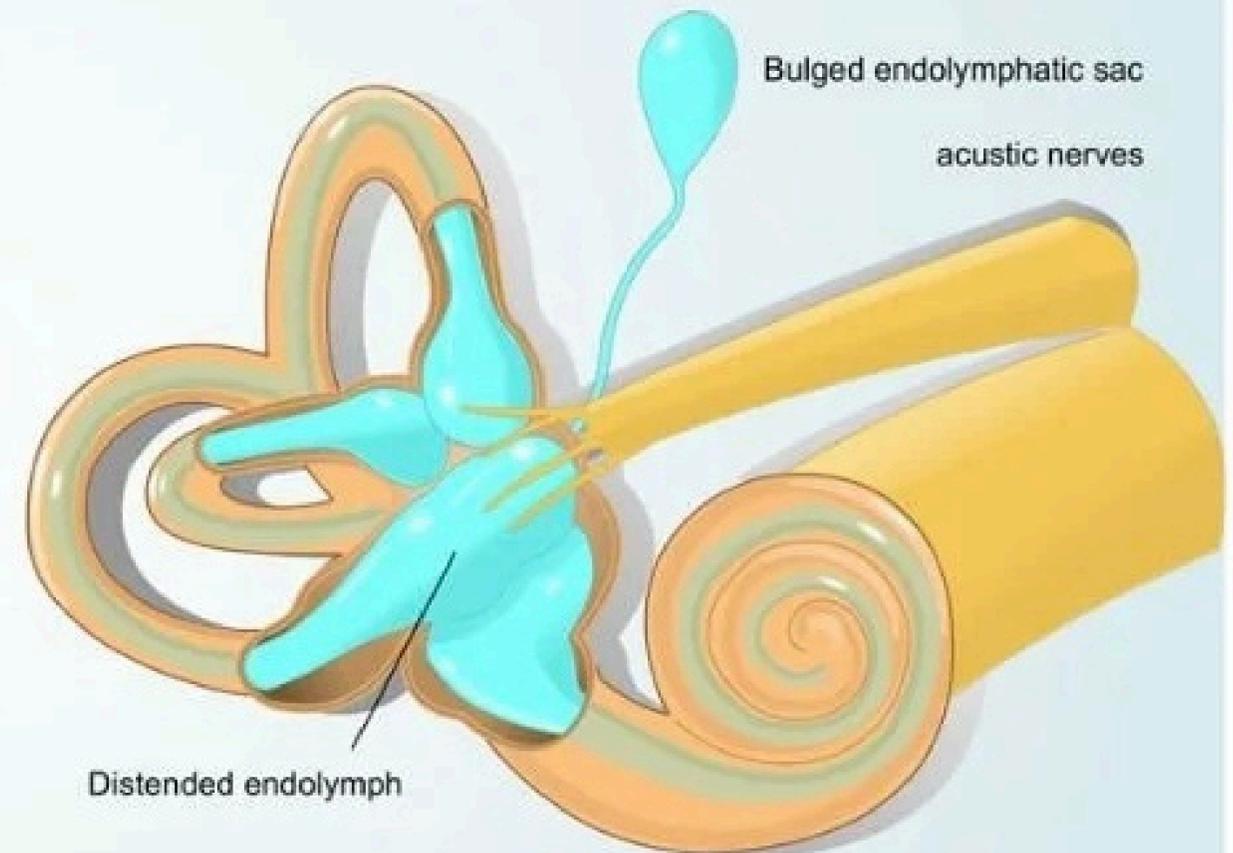
Meniere's disease

- It affects the membranous labyrinth of the inner ear .
 - This typically causes dizziness, hearing loss ,air fullness and (tinnitus) in one or both ears. **The attacks every 20min-24h.**
 - People with Meniere's disease have a buildup of excess fluid within the inner ear (**endolymphatic hydrops**).
 - The cause of Meniere's disease is not known.
 - It usually starts in people between **30 and 50 years** old.
 - Sensitivity to loud sounds may also happen (**Recruitment**).
 - The hearing loss comes and goes, but over time some loss becomes permanent.
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Normal Inner Ear



Meniere's Disease



Swelling distorts sound information

• Treatment:

The goal of treatment is to relieve pressure in the ears to reduce symptoms. Some people improve by limiting intake of salt, caffeine or alcohol or quitting smoking.

Medications to reduce fluid retention in the ear may help (**Thiazide diuretics**).

Intratympanic injection of aminoglycoside like Gentamycin (Ototoxic drug which damages the dark cells that produce the endolymph). In some cases, surgery may be considered (labrinthectomy or endolymphatic sac drainage).

- Betahistine hydrochloride (anti vertigo).
- Tympanometry :Normal (Type A).
- Rinne test: Positive.
- Weber test : Lateralized to the contralateral side.
- Hearing loss: Sensorineural at low frequencies

Acoustic neuroma

- This noncancerous tumor grows on part of the **8th cranial nerve (vestibulocochlear nerve)**.
- Acoustic neuroma often causes dizziness and equilibrium problems in addition to gradual hearing loss.
- Monitoring depending on the size of your tumor, hearing status and other factors.

Treatment:

- Surgery: The goal of surgery is to remove the tumor, preserve the facial nerve to prevent facial paralysis and preserve hearing when possible.
- Highly focused radiation therapy to stop the growth of tumor (Gamma knife).

Characteristic:

- Tympanometry? Type A.
- Rinne test? Positive.
- Weber test? Lateralized to the contralateral side.



Hearing aids

- hearing aid amplifies sounds electronically and is effective for many people with age related hearing loss.
- Hearing aids today are very small, so small that other people often do not notice you are wearing them.
- Cochlear implant is a small electronic device that electrically stimulates the cochlear (nerve in ear for hearing).
The implant has external and internal parts.
The external part sits behind the ear. It picks up sounds with a microphone. It then processes the sound and transmits it to the internal and external parts of the implant.



Cochlear Implant

