

Hearing Loss: Causes, Treatments and Prevention

Hana T. Bui, MD

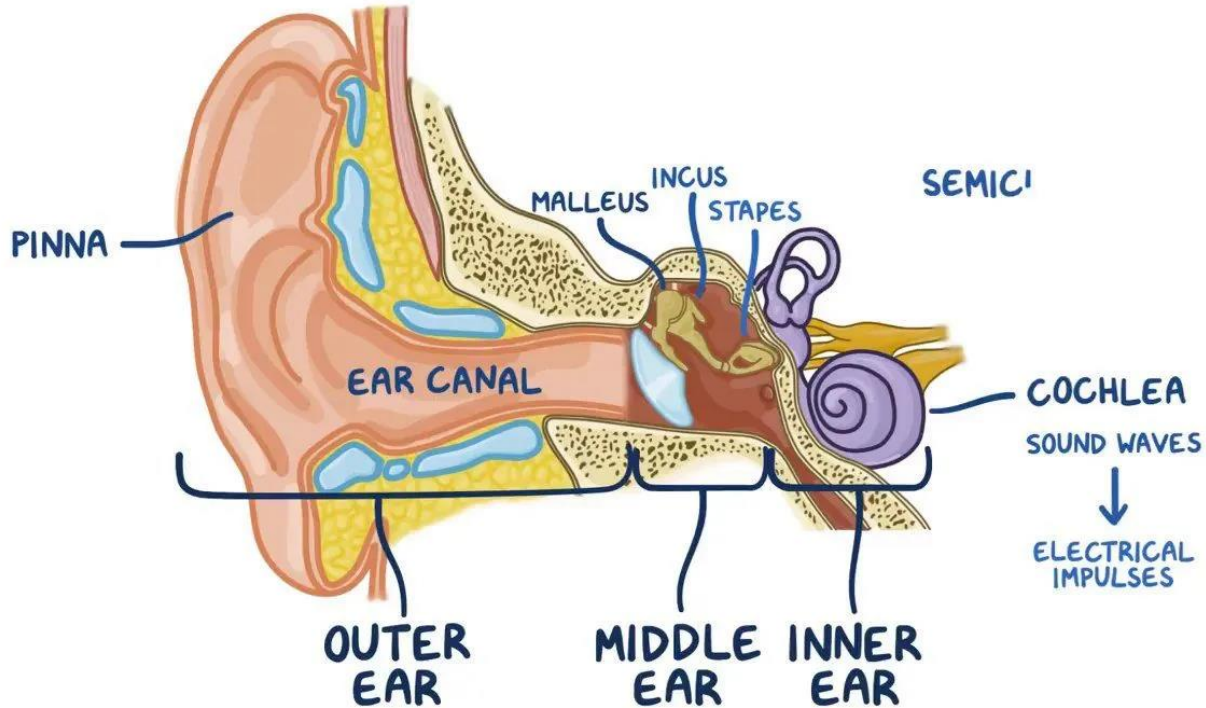
Disclosures

I have no financial interests or relationships to any medical, surgical, or hearing aid companies.

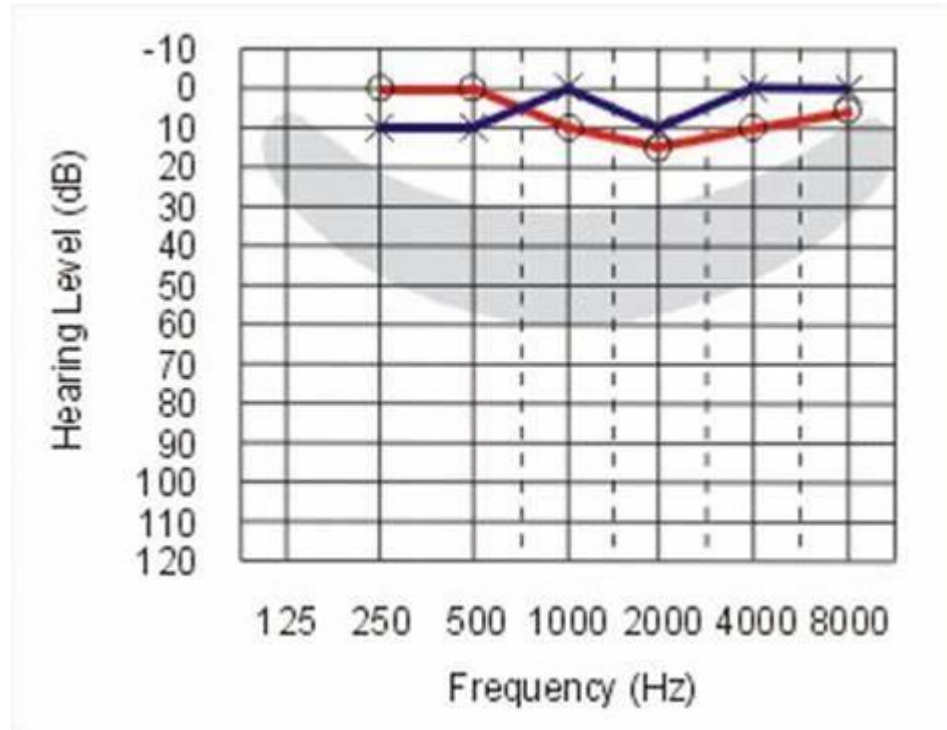
Objectives

1. Anatomy of the ear
2. Diseases affecting hearing:
 - a. Outer ear
 - b. Middle ear
 - c. Inner ear
3. Medical treatments
4. Surgical treatments
5. Hearing amplification

Anatomy of the Ear



Audiogram: normal hearing



Outer Ear: Ear canal diseases

Wax impaction

Eczema and debris impaction

Swimmer's ears

Exostoses

Foreign bodies

Cholesteatoma

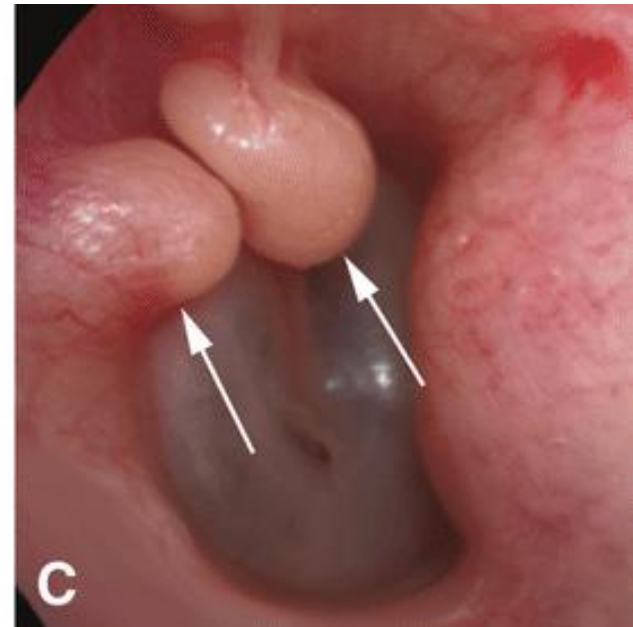
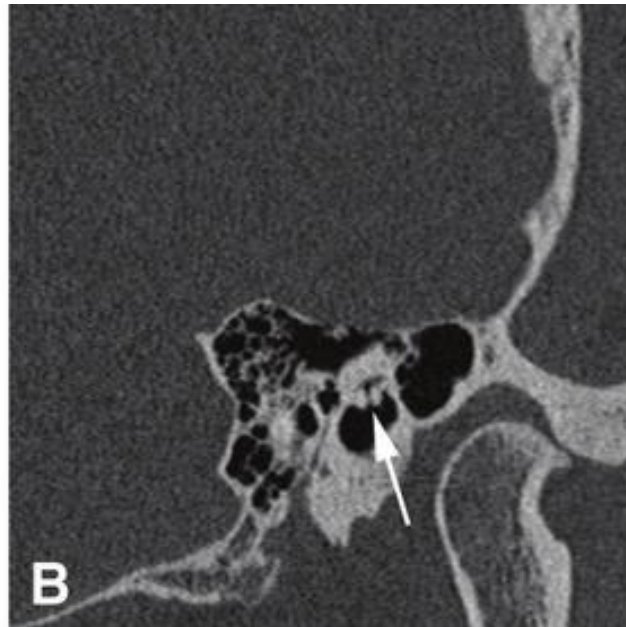




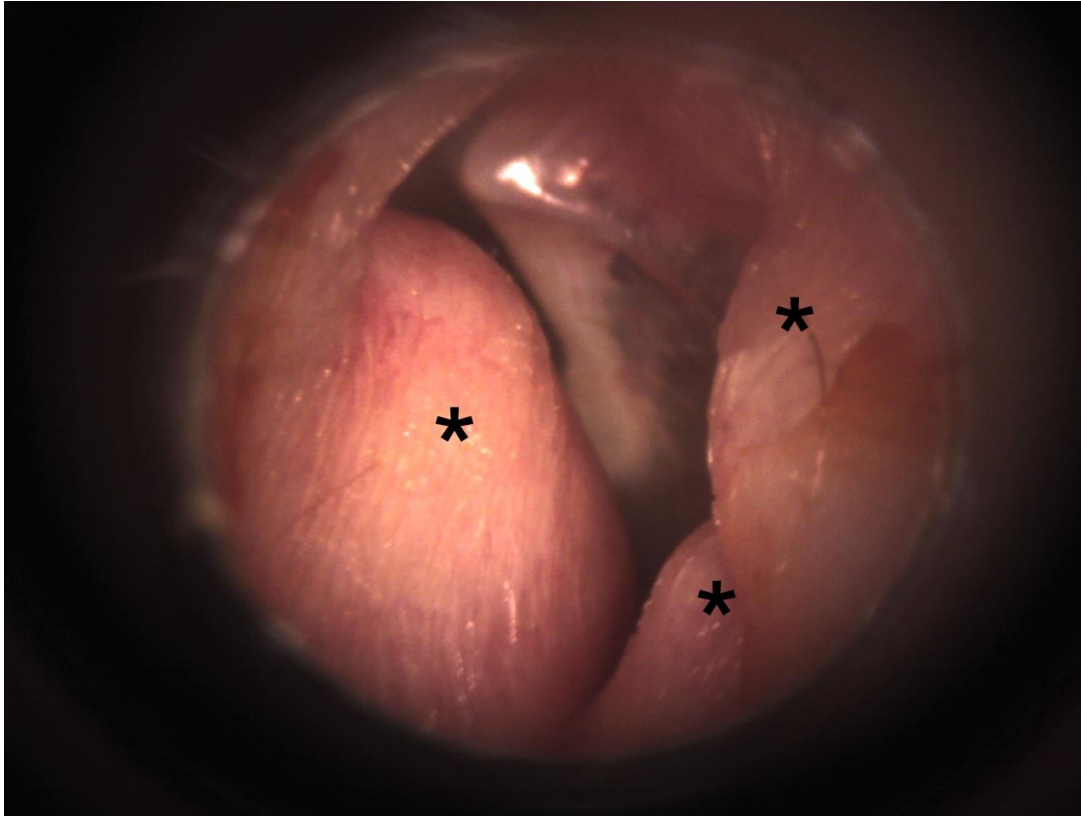




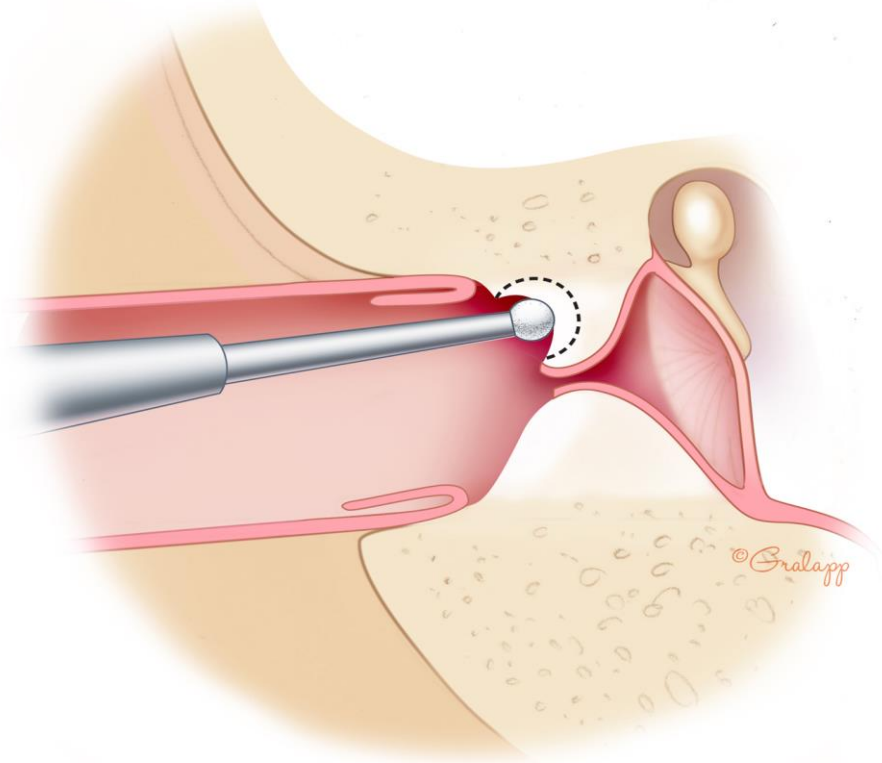
Small ear canal exostoses



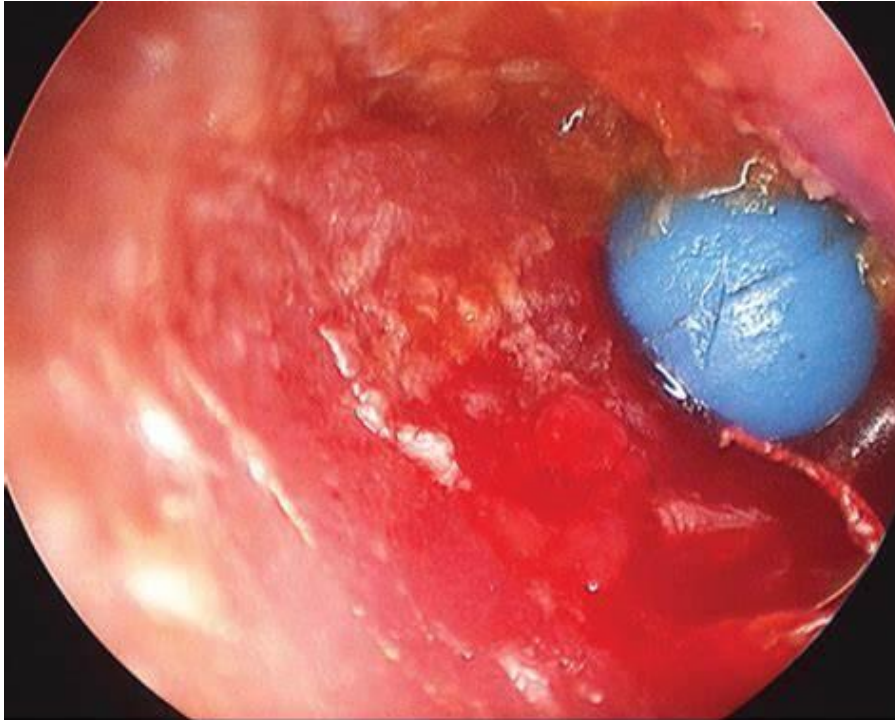
Large ear canal exostoses



Surgery to remove exostoses



Ear canal foreign body



Source: Usatine RP, Smith MA, Mayeaux EJ, Chumley HS: *The Color Atlas of Family Medicine, Second Edition*: www.accessmedicine.com
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Ear canal foreign body



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Ear canal extensive cholesteatoma





Middle Ear Causes of Hearing Loss

Eardrum perforation

Middle ear fluid

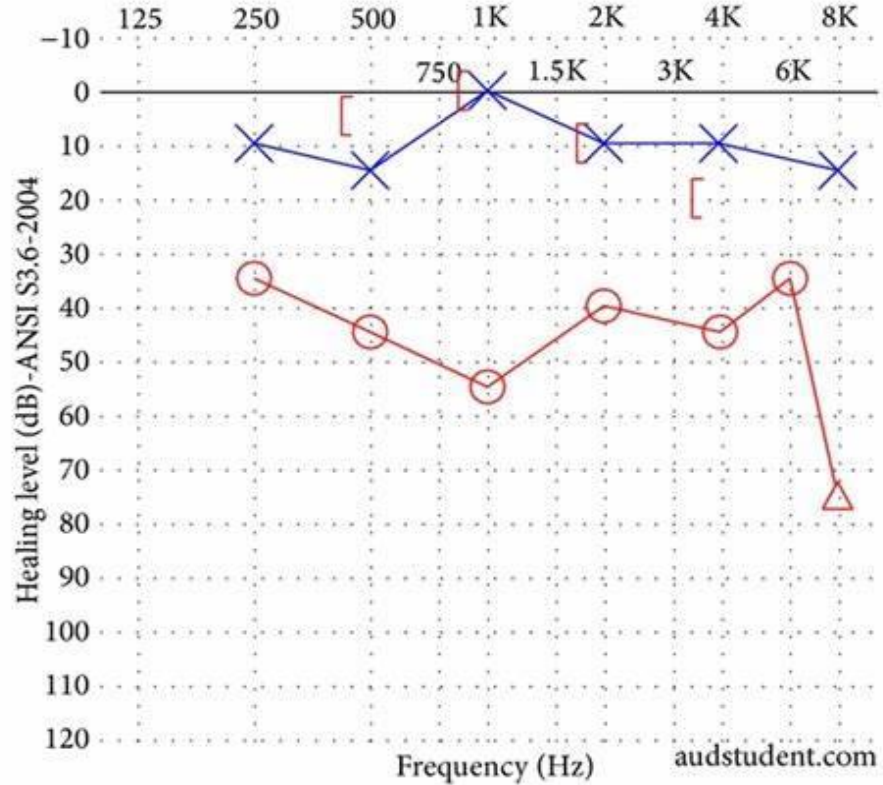
Cholesteatoma

Trauma: dislodged middle ear bones

Otosclerosis

Tumors

Conductive hearing loss



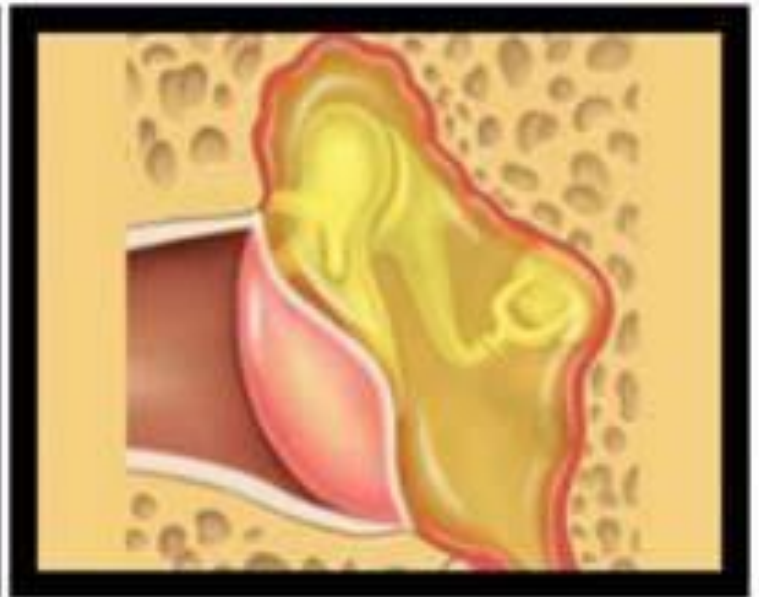
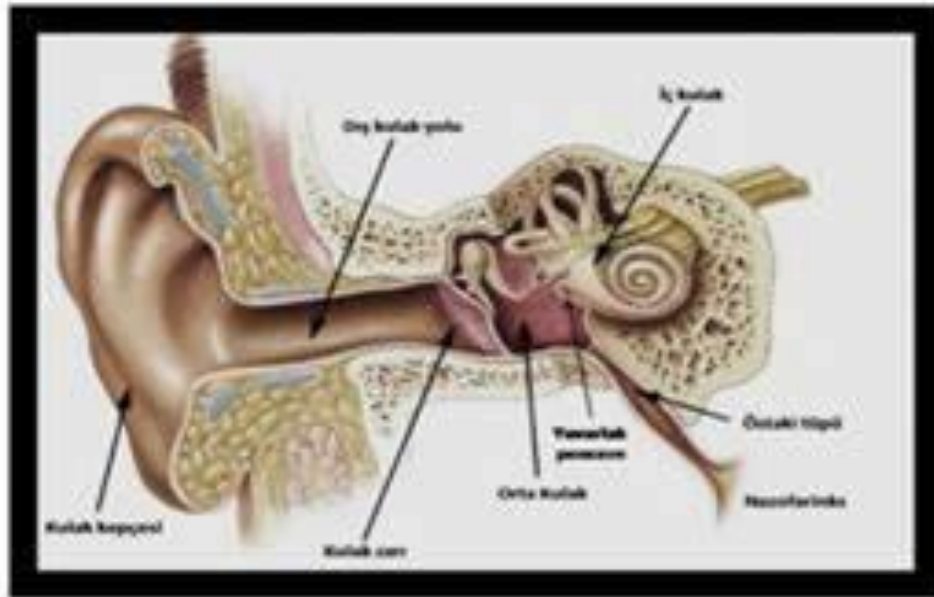
Small eardrum perforation



Large eardrum perforation



Middle ear fluid



Middle ear fluid



Normal Ear
(no fluid)



Some Fluid
(air-fluid levels)



Effusion
(full of fluid)

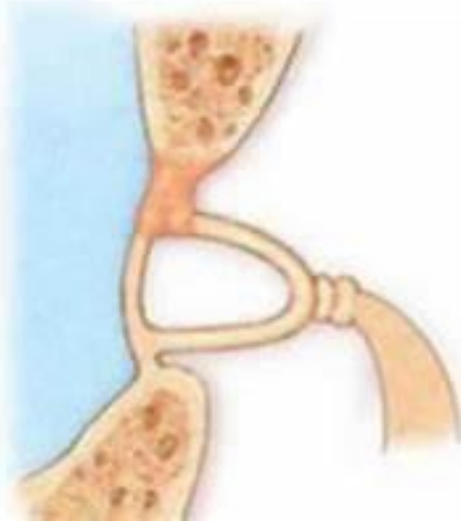
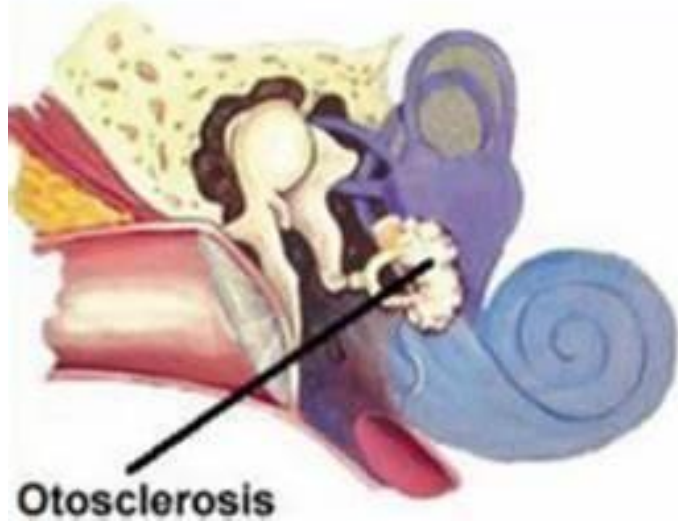
Cholesteatoma of middle ear



Middle ear prosthesis to improve hearing



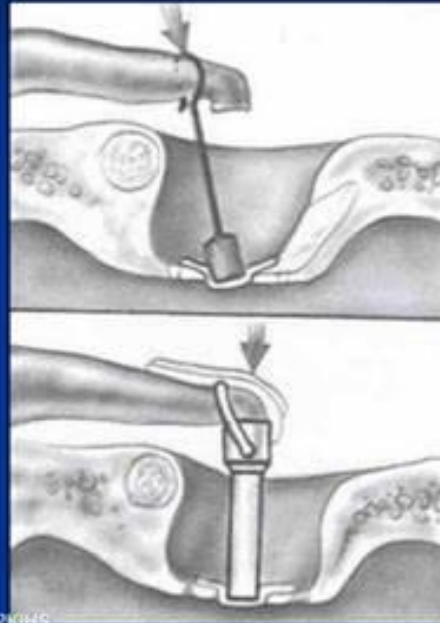
OTOSCLEROSIS



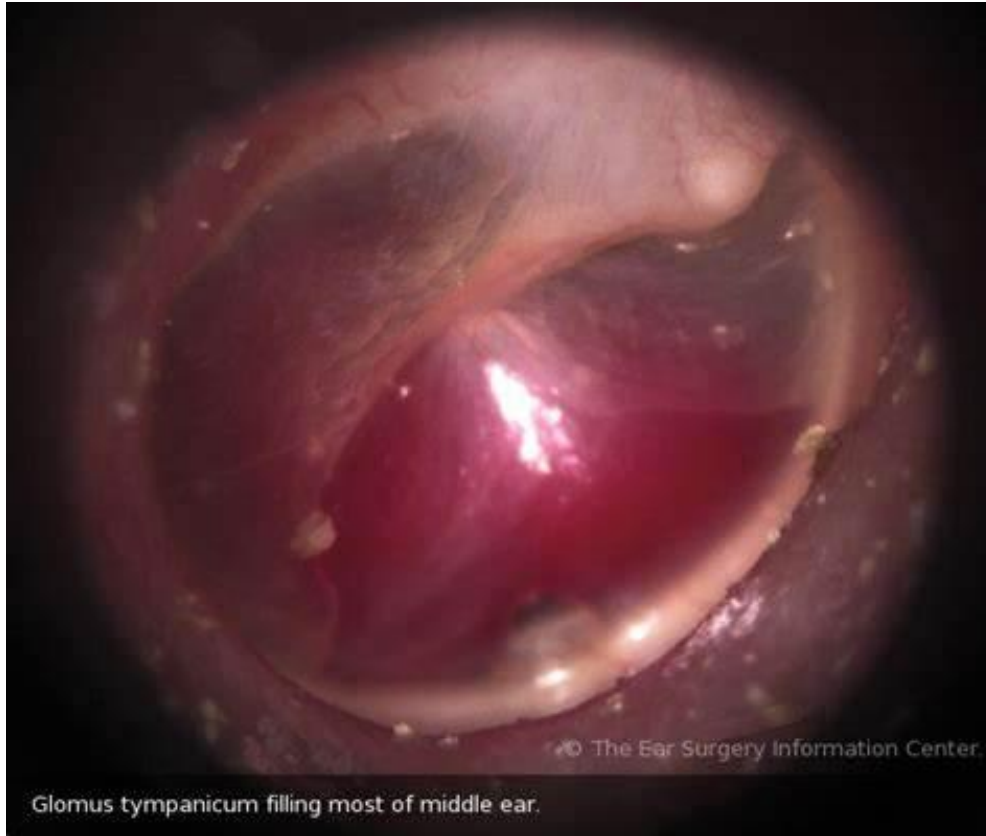
Surgery for Otosclerosis: Stapes prosthesis to improve hearing

Placement of the Prosthesis

- Prosthesis is chosen and length picked
- Some prefer bucket handle to incorporate the lenticular process of the incus



Glomus tumor in middle ear



Inner Ear: Cochlea and beyond

Sudden hearing loss

Age-related hearing loss

Extension of middle ear infection

Viral inner ear infection

Trauma causes

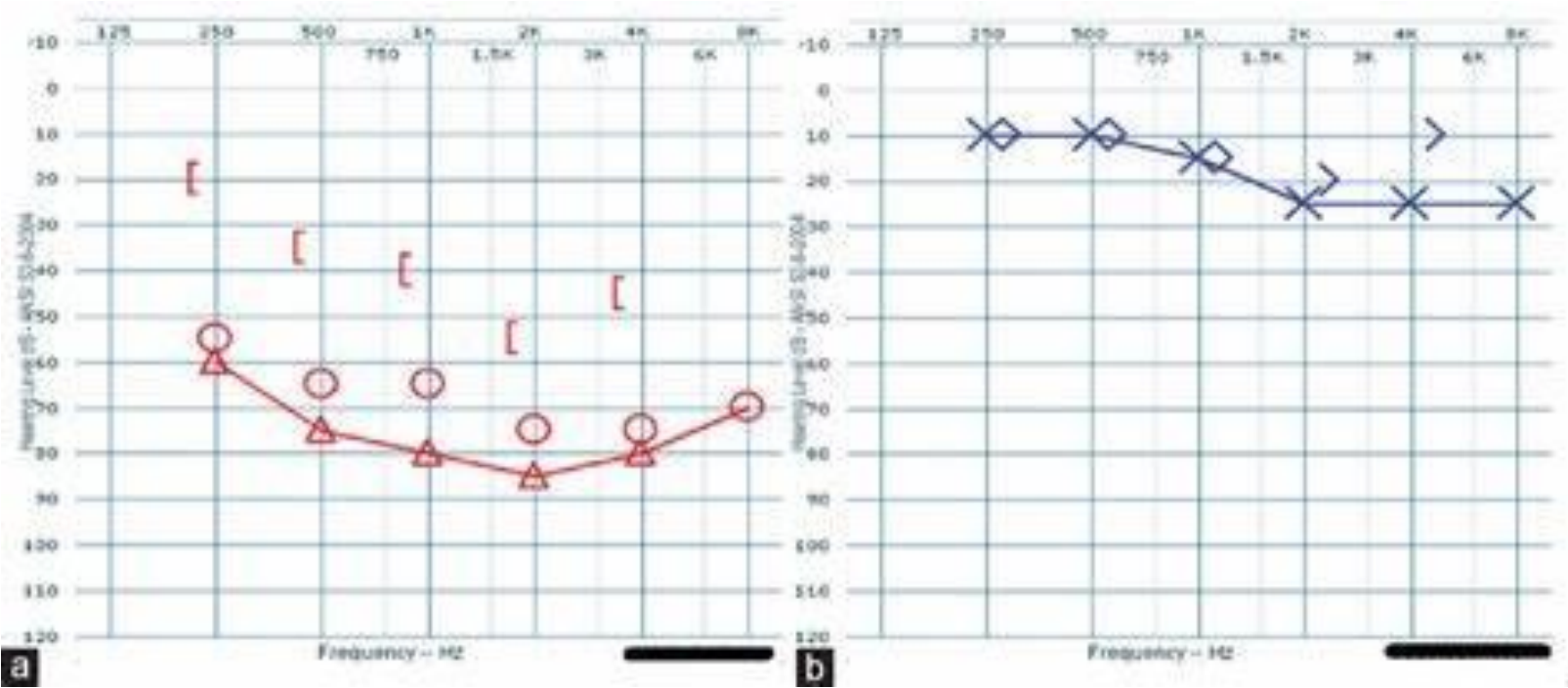
Ménière's disease

Tumors: acoustic neuroma

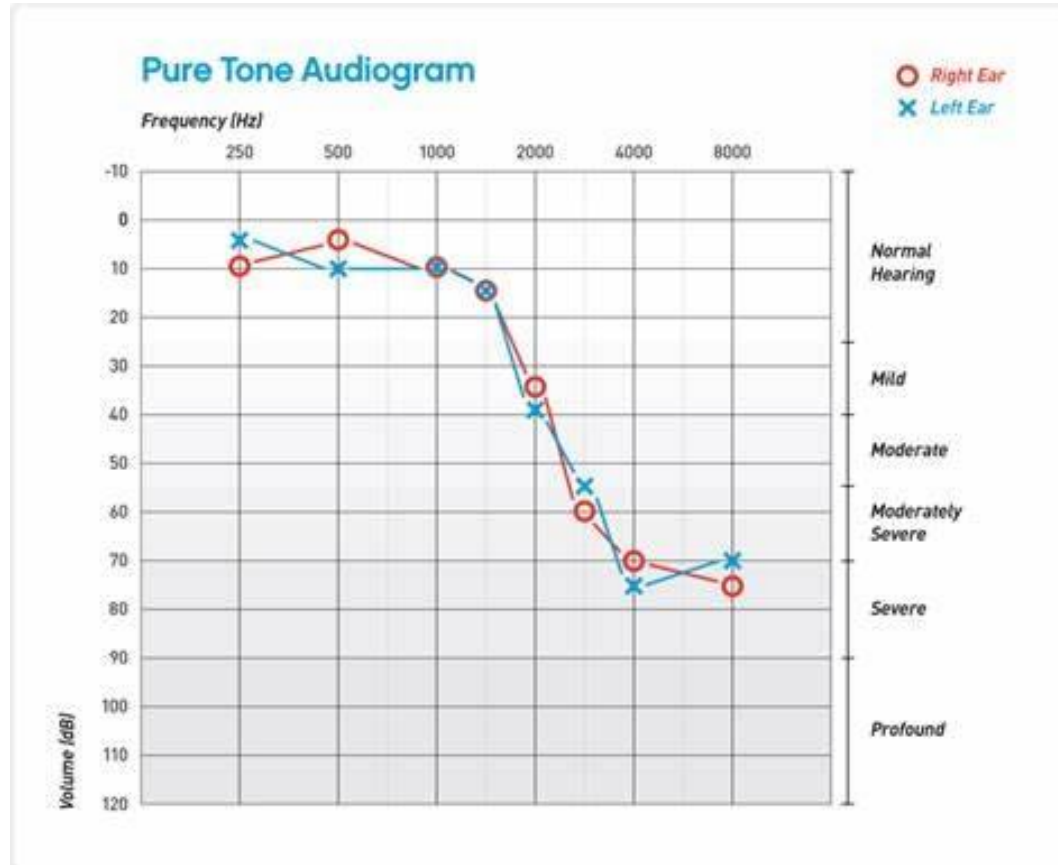
Stroke, autoimmune disorders

Lead poisoning

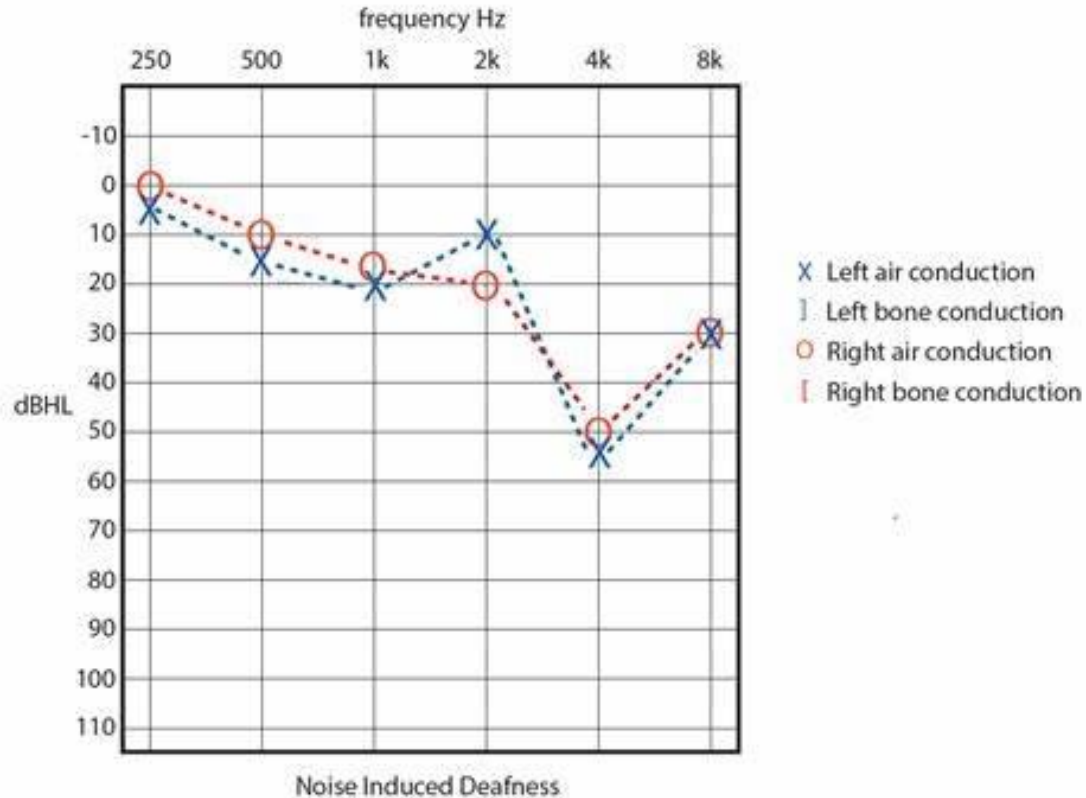
Right ear sudden hearing loss



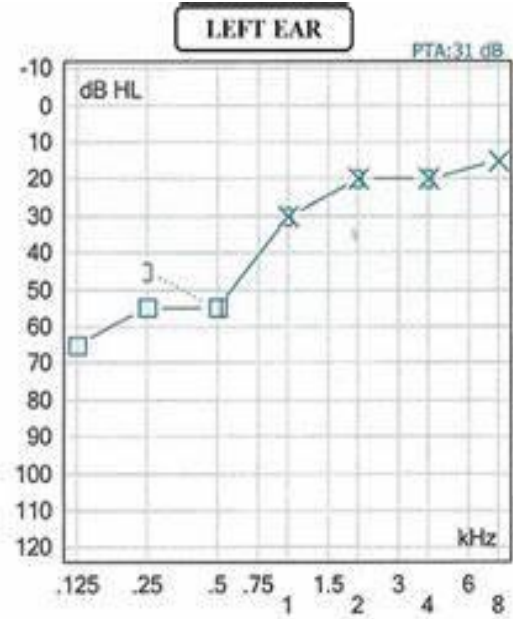
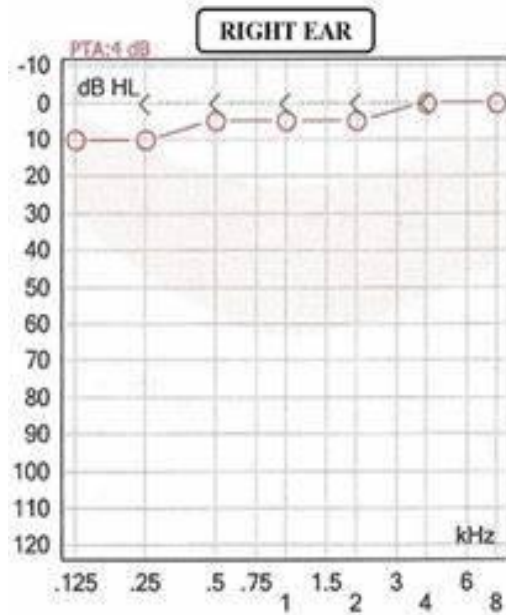
Typical audiogram of age-related hearing loss



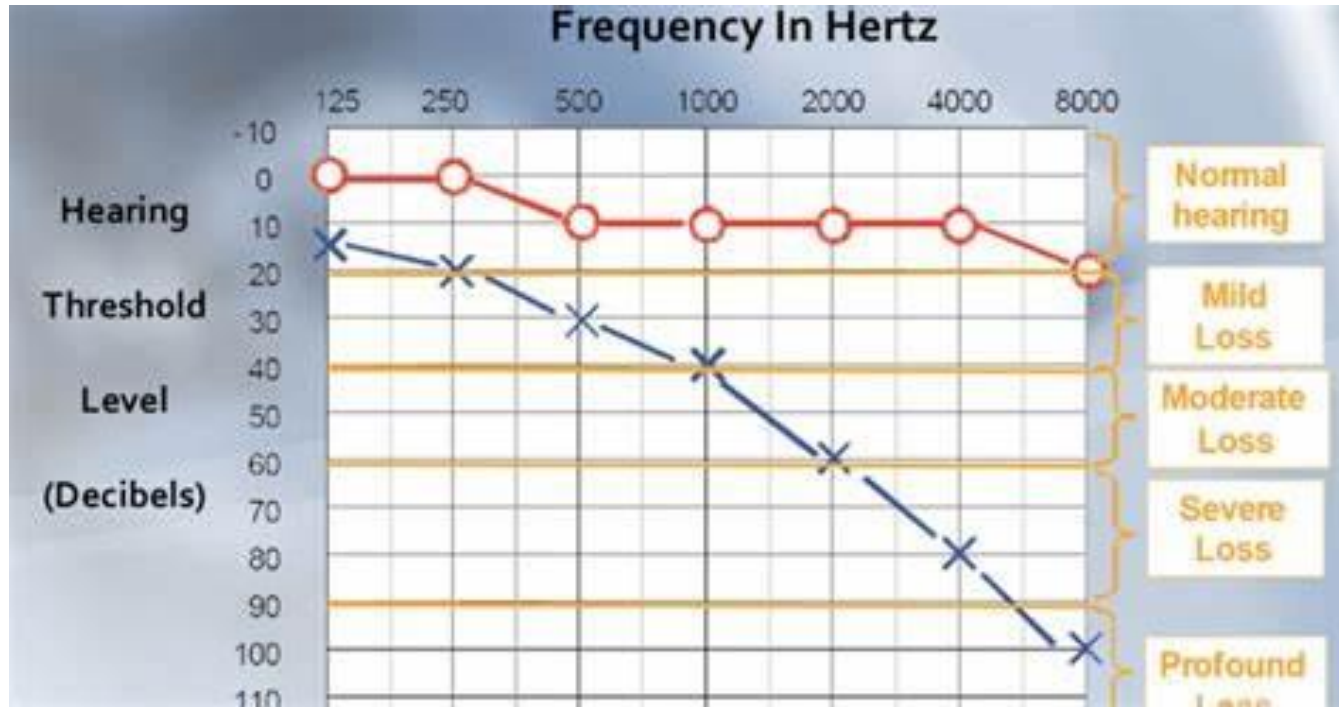
Typical noise-induced hearing loss



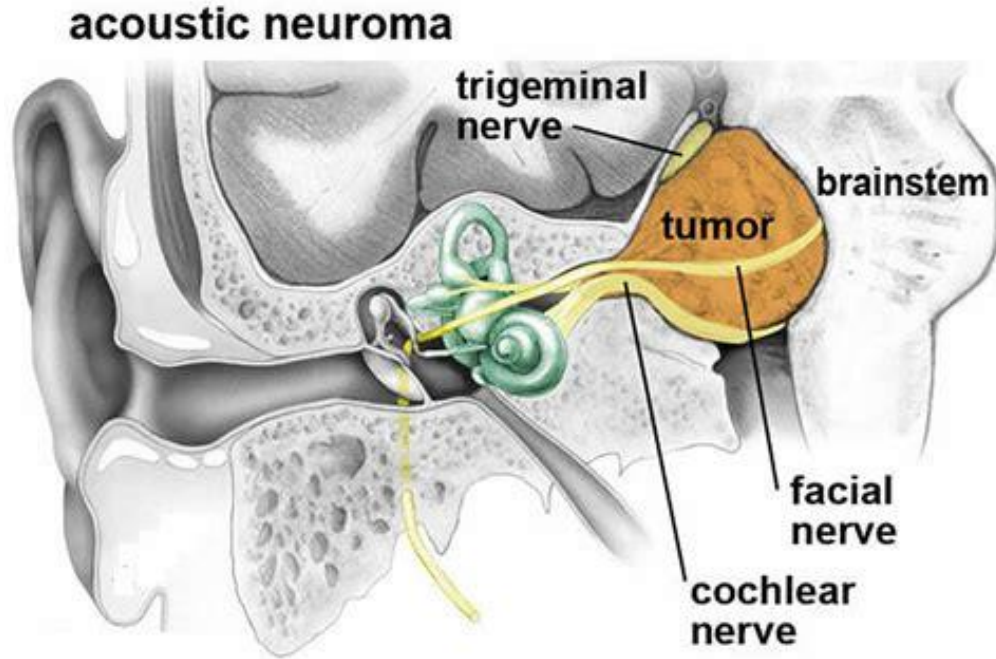
Typical low tone hearing loss in Meniere's disease



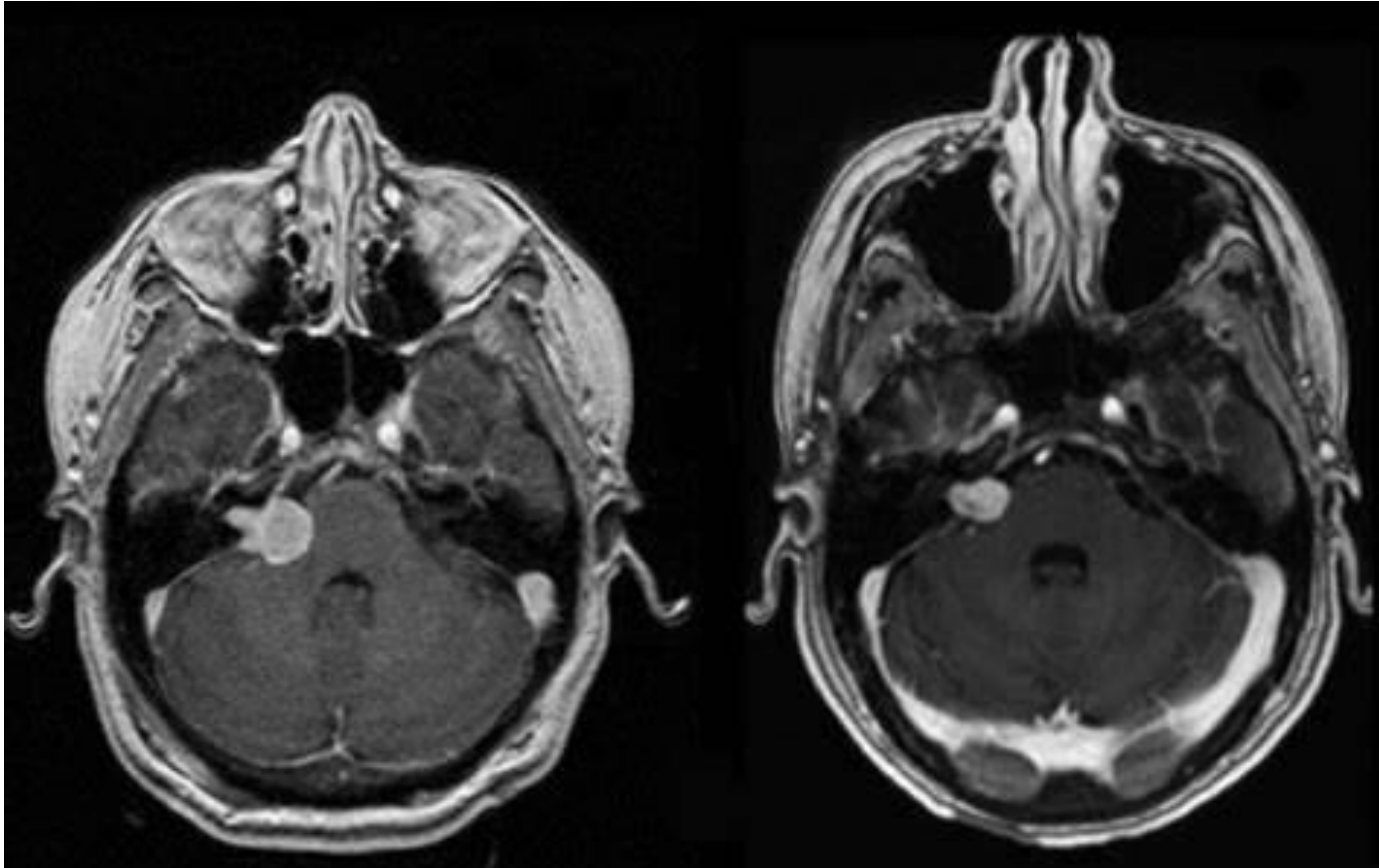
Hearing loss in one ear



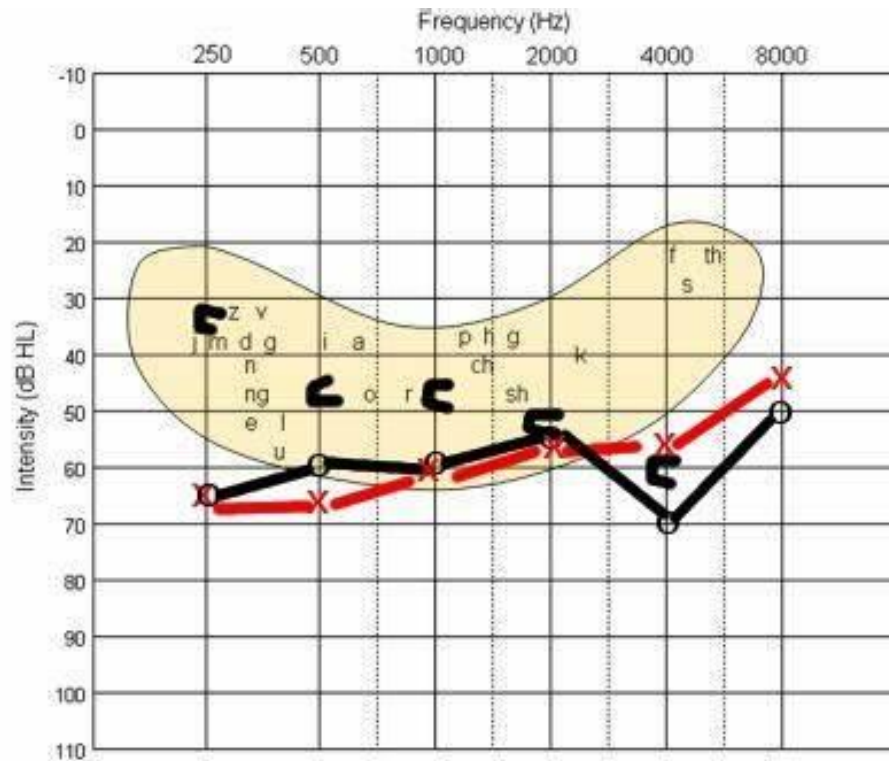
Acoustic neuroma: a benign tumor



MRI: Acoustic neuroma



Severe to profound hearing loss



Severe hearing loss in both ears



['Last words,' referring to his deafness:] I shall
hear in heaven.

(Ludwig van Beethoven)

Bone conduction for severe hearing loss



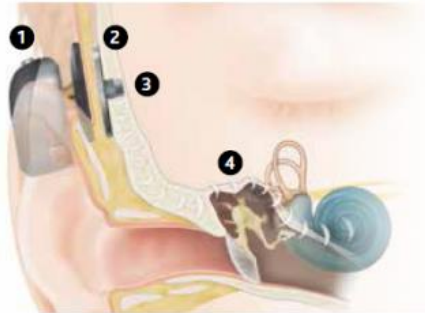
After Beethoven went deaf, he realized that he could attach a metal rod to his piano and bite down on it while he played, allowing him to hear pitch through the vibrations in his jawbone – This is called "bone conduction."

Bone Anchored Hearing Aid

INVISIBLE CONNECTION

The Baha Attract System uses a magnetic connection to attach the sound processor to the implant.

Baha Attract System

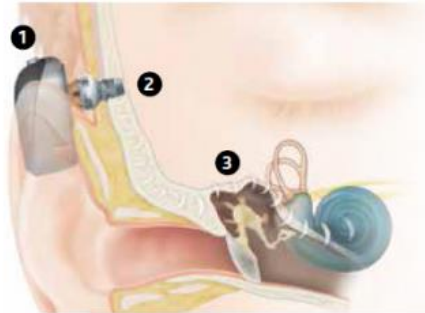


- 1 The sound processor picks up sound vibrations from the environment.
- 2 The sound processor passes the sound vibrations to the attached external magnet that attracts to the internal magnet.
- 3 The sound vibrations are transferred through the magnetic attachment to the small titanium implant inserted in the bone behind the ear.
- 4 The sound vibrations are then sent directly through the bone to the inner ear (cochlea) where they are converted into electrical impulses by tiny hair cells inside the cochlea. These impulses travel to the brain, allowing you to perceive sound naturally.

MAXIMUM PERFORMANCE

The Baha Connect System uses a small abutment to attach the sound processor directly to the implant.

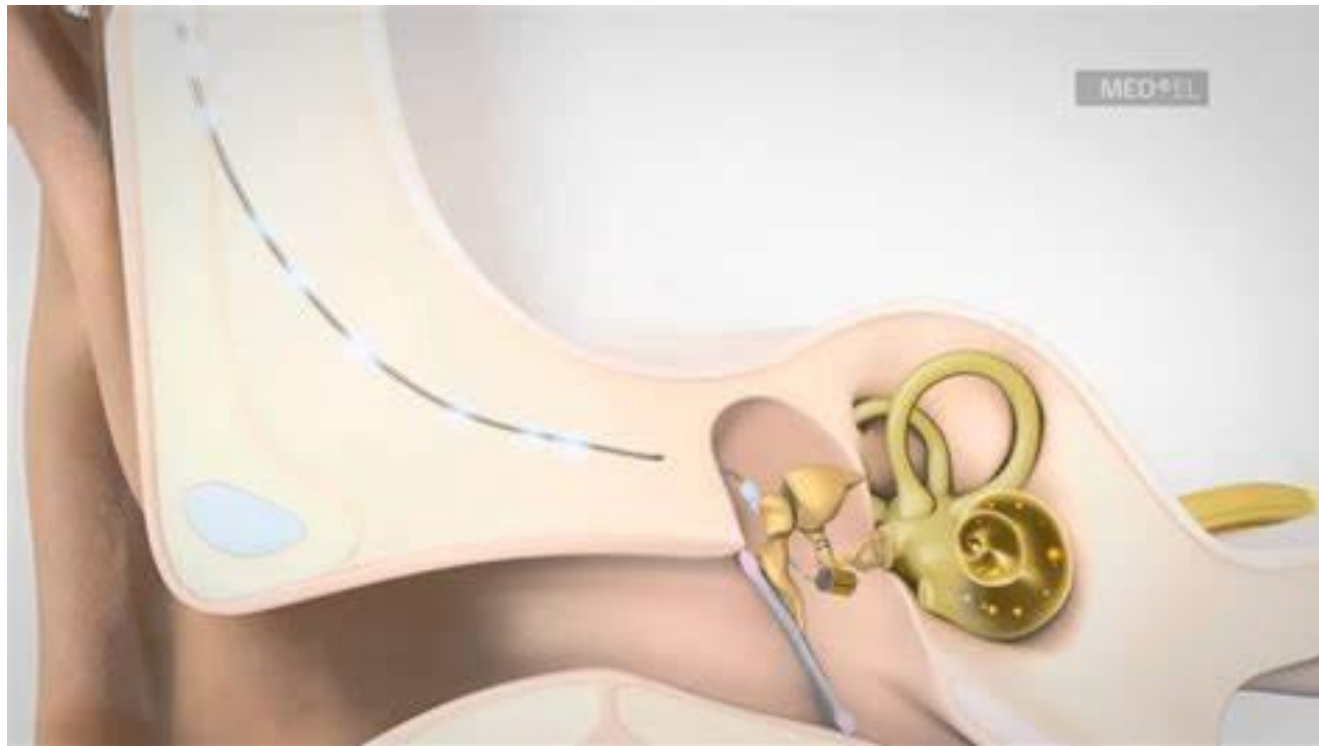
Baha Connect System



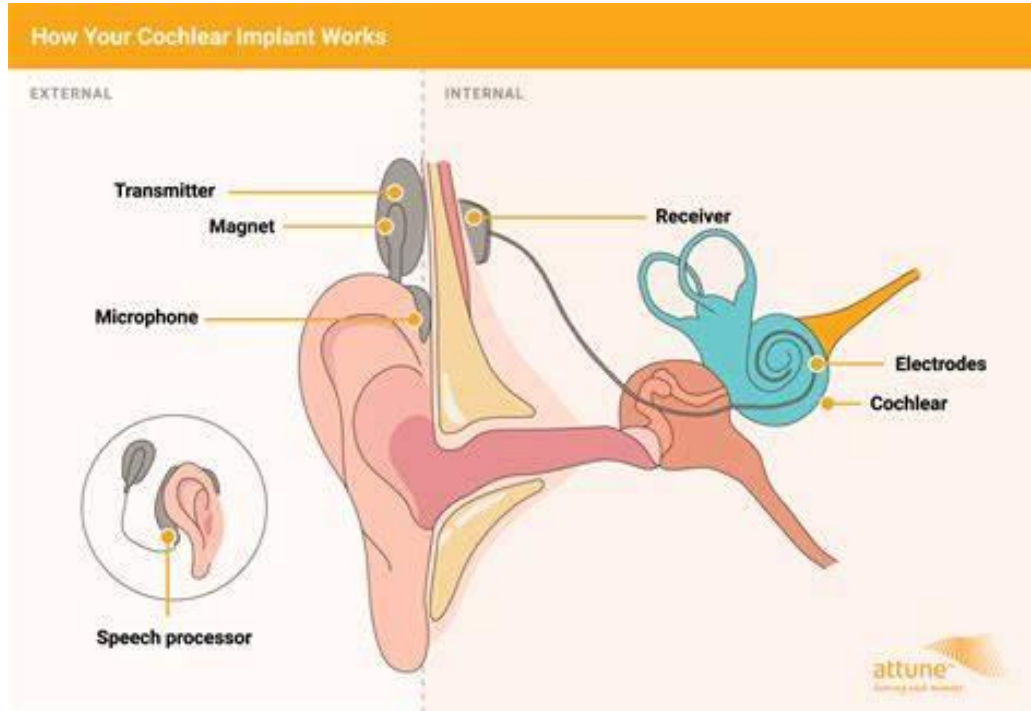
- 1 The sound processor picks up sound vibrations from the environment.
- 2 The sound vibrations are transferred through an abutment to a small titanium implant inserted in the bone behind the ear.
- 3 The sound vibrations are then sent directly through the bone to the inner ear (cochlea) where they are converted into electrical impulses by tiny hair cells inside the cochlea. These impulses travel to the brain, allowing you to perceive sound naturally.

Your Hearing Implant Specialist will recommend which system is best suited to your individual needs.

Middle ear Soundbridge Implant



Cochlear Implants



PREVENTION OF HEARING LOSS

1. Avoid Q-tips (cotton tip) use
2. Avoid constant loud noises
3. Avoid excessive intake of Tylenol, Motrin, Aleve, Aspirin.
4. Minimize risks of head trauma
5. Lipoflavonoid vitamins
6. Flu shot, COVID vaccine

Consequences of untreated hearing loss

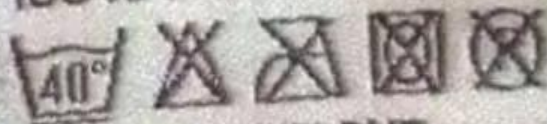
1. Poor mental cognition
2. Poor quality of life
3. Low self-esteem
4. Depression, anxiety, anger
5. Social isolation, paranoia
6. Impair relationship
7. Mental fatigue
8. Memory loss
9. Dementia
10. Alzheimer

Beethoven's Deafness

“Though born with a fiery, active temperament I was soon to withdraw from society, to live a life alone. If at times I tried to forget all this, oh how harshly was I flung back by the doubly sad experience of my bad hearing. Yet it wasn't possible for me to say to people, “Speak Louder, shout for I am deaf! Ah, how could I possibly admit to an infirmity in the one sense that ought to be more perfect in me than in others, a sense that I once possessed in the highest degree.”

SIZE: 3-4 Y / 104

100% POLYESTER



WASH INSIDE OUT
REMOVE CHILD
BEFORE WASHING
MADE IN CHINA

Hearing amplification

Kendall Caminiti, AuD