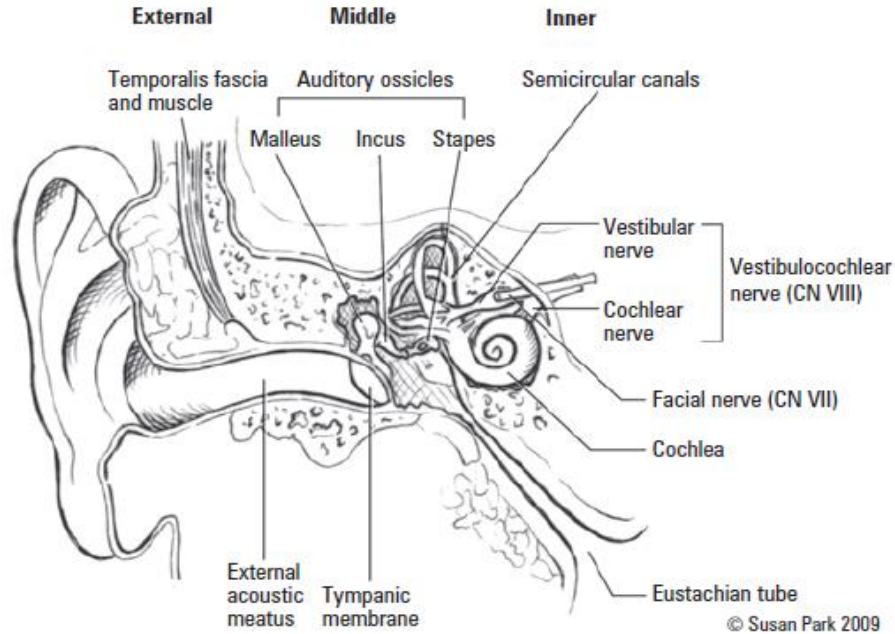




- **Anatomy of the ear:**

• **The ear is divided into 3 parts:**

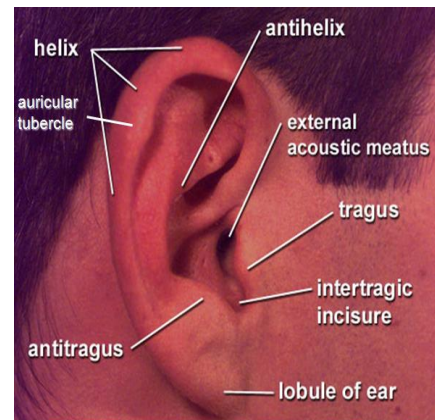
- ✓ External ear.
- ✓ Middle ear (which is also known as tympanic cavity).
- ✓ Inner ear (which is also known as labyrinth).



• **External ear (composed of the auricle, external auditory canal and outer portion of tympanic membrane):**

✓ **Auricle:**

- ❖ It is composed of elastic cartilage and functions in collecting sound waves.
- ❖ It has many parts:
  - Helix.
  - Antihelix.
  - Tragus.
  - Antitragus.
  - Lobule.



- ❖ The auricle has a thin skin which lacks a fatty layer and composed of 1 layer of blood vessels.

✓ **External auditory canal:**

- ❖ It is an S-shaped, curved tube which is 2-3 cm in long.
- ❖ It is composed of:
  - A cartilaginous (elastic) portion in the outer 1/3: this portion contains skin, hair, sebaceous glands and ceruminous glands.
  - Osseous portion in the inner 2/3: formed by the tympanic membrane. Notice that ceruminous glands are absent in this portion.
- ❖ Function: conducting sound waves and vibrations from the auricle to the tympanic membrane.



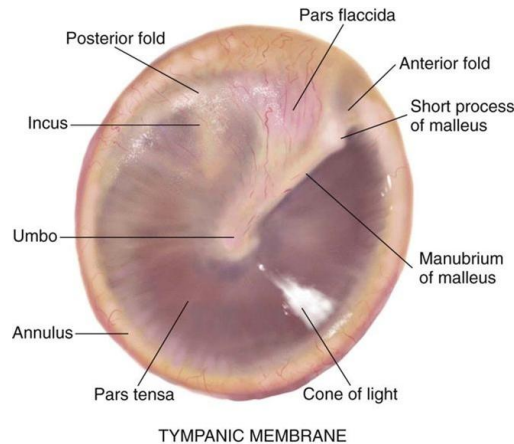
✓ Tympanic membrane:

❖ It is composed of 3 layers:

- Outer layer: stratified squamous epithelium (thin skin).
- Middle layer: fibrous. The area containing fibrous layer is known as pars tensa while the area which is devoid of fibrous layer is known as pars flaccida.
- Inner layer: cuboidal epithelium.

❖ In otoscopy:

- It is cone-shaped, pearly gray in color, positioned obliquely, concave from outside and convex from inside.



• **Middle ear:**

✓ It is composed of 2 parts:

- ❖ Tympanic cavity proper.
- ❖ Epitympanic recess: where the bodies of the incus and malleus are located.

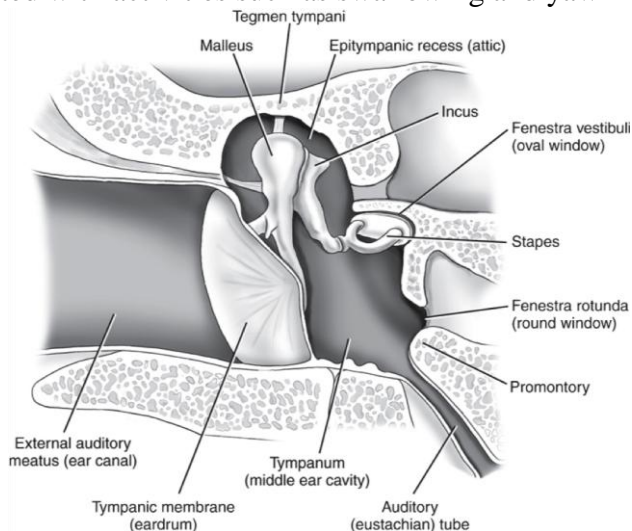
✓ Function: transmission of vibrations from tympanic membrane.

✓ Boundaries:

- ❖ Roof: tegmen tympani (a thin part of the temporal bone).
- ❖ Floor: jugular wall (in relation to the internal jugular vein).
- ❖ Medial wall: promontory (projection formed by the cochlea).
- ❖ Lateral wall: tympanic membrane.
- ❖ Anterior wall: auditory tube + canal of tensor tympani.
- ❖ Posterior wall: aditus to antrum + pyramid of stapedius.

✓ Pharyngotympanic tube:

- ❖ It is connecting the tympanic cavity to the nasopharynx.
- ❖ It functions to equalize pressure in the middle ear with atmospheric pressure and balances it on both sides of the membrane (this is associated with activities such as swallowing and yawning).



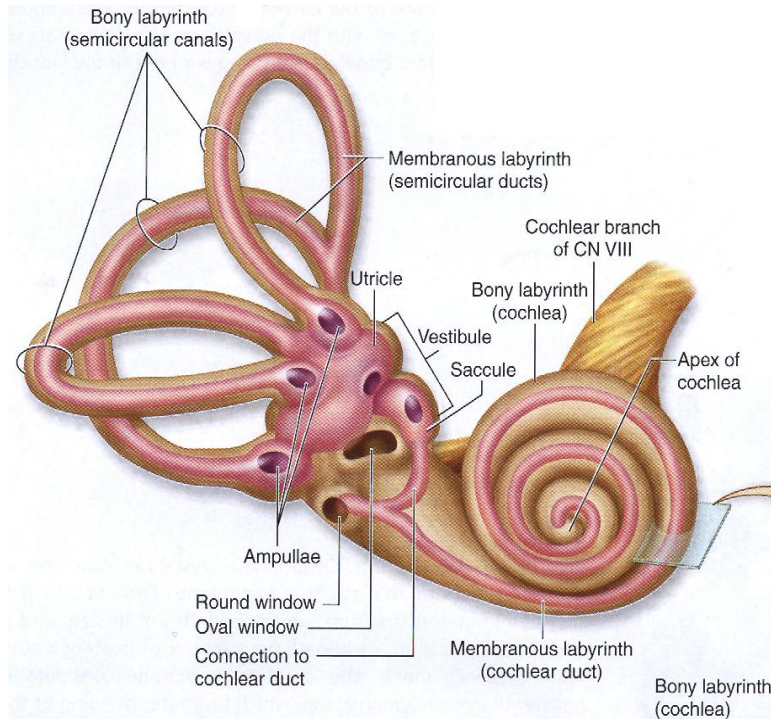


- **Inner ear:**

- ✓ It is composed of 3 parts:

- ❖ Vestibule: which contains the utricle and saccule and concerned with balance.
- ❖ Semicircular canals: these are 3 (superior, posterior and lateral).
- ❖ Cochlea: a spiral shell making 2.5 turns around a central bony pillar called the modiolus where the nerve cell bodies of the cochlear nerve are located. The cochlea is concerned with hearing and the tube is divided into 3 cavities:

- ✚ Scala vestibule.
- ✚ Scala media.
- ✚ Scala tympani.



- **Acute otitis media:**

- **Definition and etiology:** it is the acute inflammation of middle ear cavity with viral causes being most common followed by bacteria (S.pneumoniae, H.influenzae and M.catarrhalis).

- **What are the risk factors predisposing a person to develop acute otitis media?**

- ✓ Craniofacial or skull base abnormalities (e.g. Down syndrome).
- ✓ Adenoid hypertrophy.
- ✓ Bottle feeding (notice that Eustachian tube is more horizontal in children predisposing them to infections).
- ✓ Allergy.
- ✓ GERD (Gastro-Esophageal Reflux Disease).
- ✓ Passive smoking.

- **What are the clinical features of acute otitis media?**

- ✓ Fever (especially in younger children), otalgia and conductive hearing loss.
- ✓ Infants/toddlers will have:
  - ❖ Ear-tugging.
  - ❖ Irritability and poor sleeping.
  - ❖ Vomiting/diarrhea/anorexia.

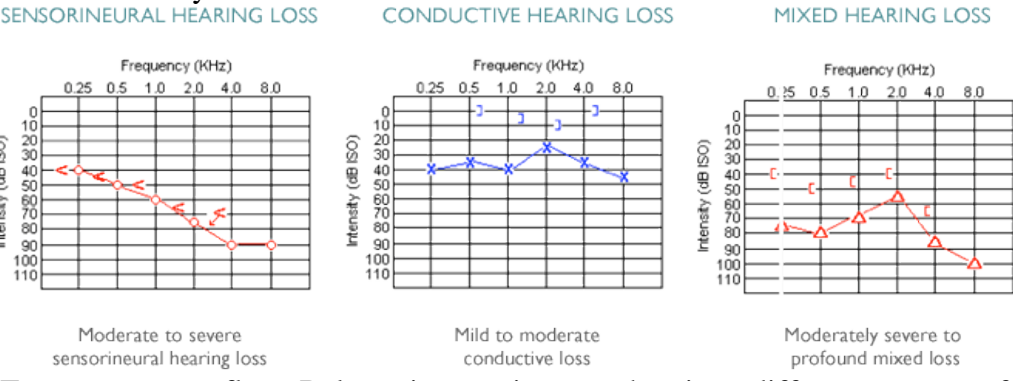
- **Diagnosis:**

- ✓ Examination of the ear with otoscope will show: bulging, erythematous tympanic membrane with loss of light reflex.



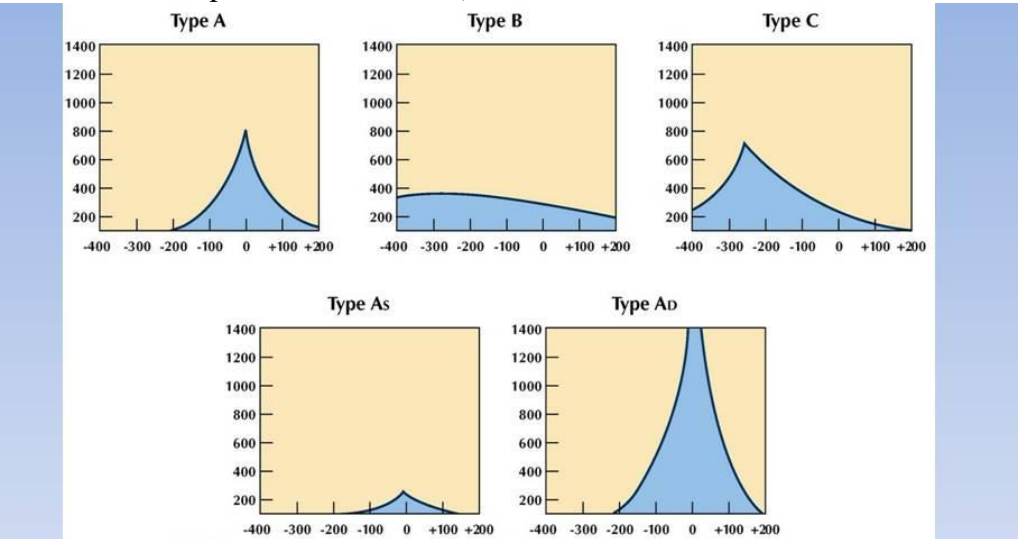
✓ Audiogram: conductive hearing loss (< 20 dB). Below is an image showing different types of audiograms:

- ❖ Air conduction: (X) = left ear; (O) = right ear.
- ❖ Bone conduction: ] = left ear; [= right ear.
- ❖ Intensity is abnormal if < 20 dB



✓ Tympanogram: flat. Below is an image showing different types of tympanograms:

- ❖ Normal compliance: 0.3 – 1.3 ml
- ❖ Normal pressure: from -50 (or even -100 in children) to +50 H<sub>2</sub>O



Type	Implications
Type A	Normal tympanogram/ sensorineural hearing loss where conductive mechanism is normal.
Type B	Flat curve, no change in compliance with pressure changes. Seen in fluid in the middle ear.
Type C	Maximum compliance in negative pressure. Seen in eustachian tube obstruction.
Type As	Compliance is lower at or near ambient air pressure. Seen in otosclerosis or malleus fixation.
Type Ad	High compliance at or near ambient pressure. Seen in ossicular discontinuity.

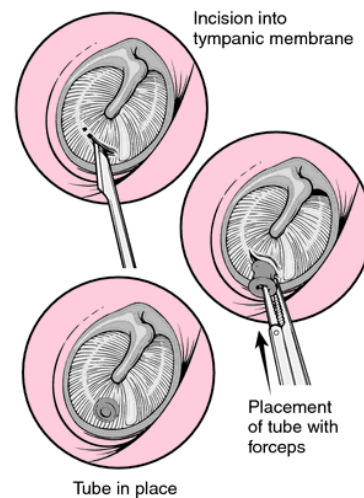




- **Treatment:**
  - ✓ If there is discharge → swab for culture.
  - ✓ Clean the ear under magnification with irrigation/suction and keep it dry.
  - ✓ Bacterial etiology: Ciprofloxacin ear drops.
  - ✓ Fungal etiology: repeated debridement with topical antifungals.
  - ✓ ± analgesia.

- **Otitis media with effusion:**

- **Definition:** it is defined by the accumulation of fluid in middle ear cavity without evidence of infection.
- **Clinical features:**
  - ✓ Sensation of fullness.
  - ✓ Conductive hearing loss.
  - ✓ Tinnitus.
- **Examination of the ear with otoscope will show:** dull tympanic membrane with appearance of bubbles.
- **Treatment:**
  - ✓ OBSERVATION, nasal decongestants, anti-histamines, ± antibiotics.
  - ✓ If patient not responding → myringotomy + Grommet insertion ± adenoidectomy.



- **Chronic serous otitis media (CSOM):**

- **Definition:** recurrent drainage of middle ear with perforation for > 6 weeks.
- **Pathogens (bacterial):** Pseudomonas (most common), Klebsiella, S.aureus or anaerobes.
- **Types:**
  - ✓ WITH cholesteotoma: which can further by active (draining) or inactive (dry).
  - ✓ WITHOUT cholesteotoma.
- **Diagnosis:** audiogram, tympanogram and CT-scan of temporal bone.
- **Treatment:**
  - ✓ Clear the ear with irrigation-suction and keep it dry.
  - ✓ Antibiotics: ciprofloxacin.
  - ✓ If patient is not responding:
    - ❖ Tympanoplasty for: CSOM with perforation but NO cholesteotoma.
    - ❖ Mastoidectomy for: CSOM WITH cholesteotoma.



- What are the complications of otitis media?

- Acute mastoiditis.
- Subperiosteal abscess. When reaching posterior triangle of the neck → Bezold's abscess.
- Facial nerve paralysis.

