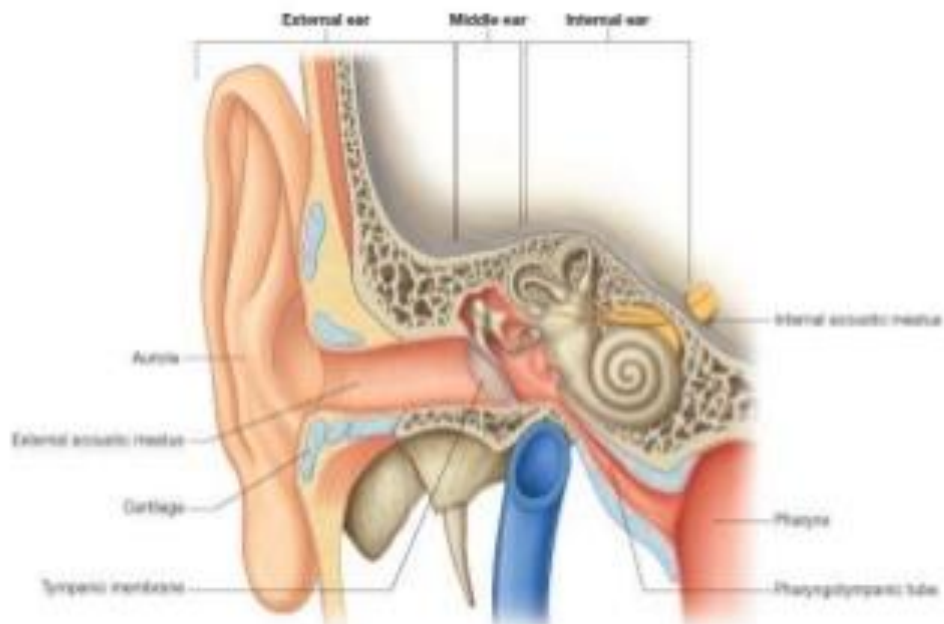


Anatomy of Ear

- External ear
- Middle ear
- Internal ear



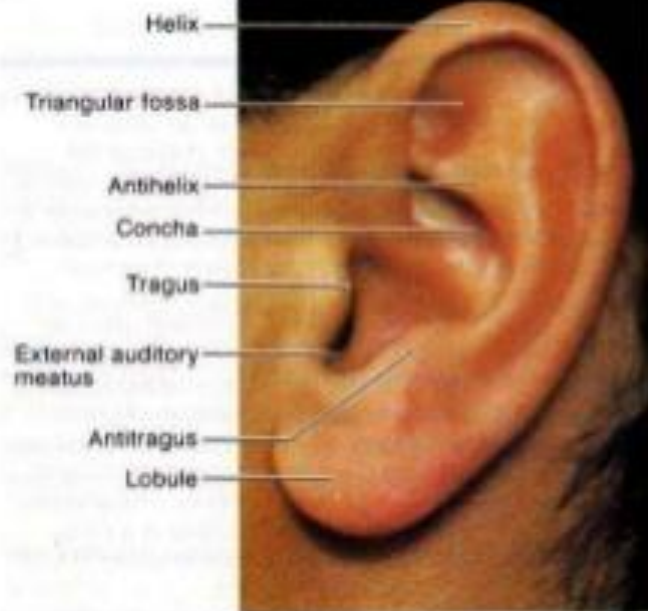
External Ear

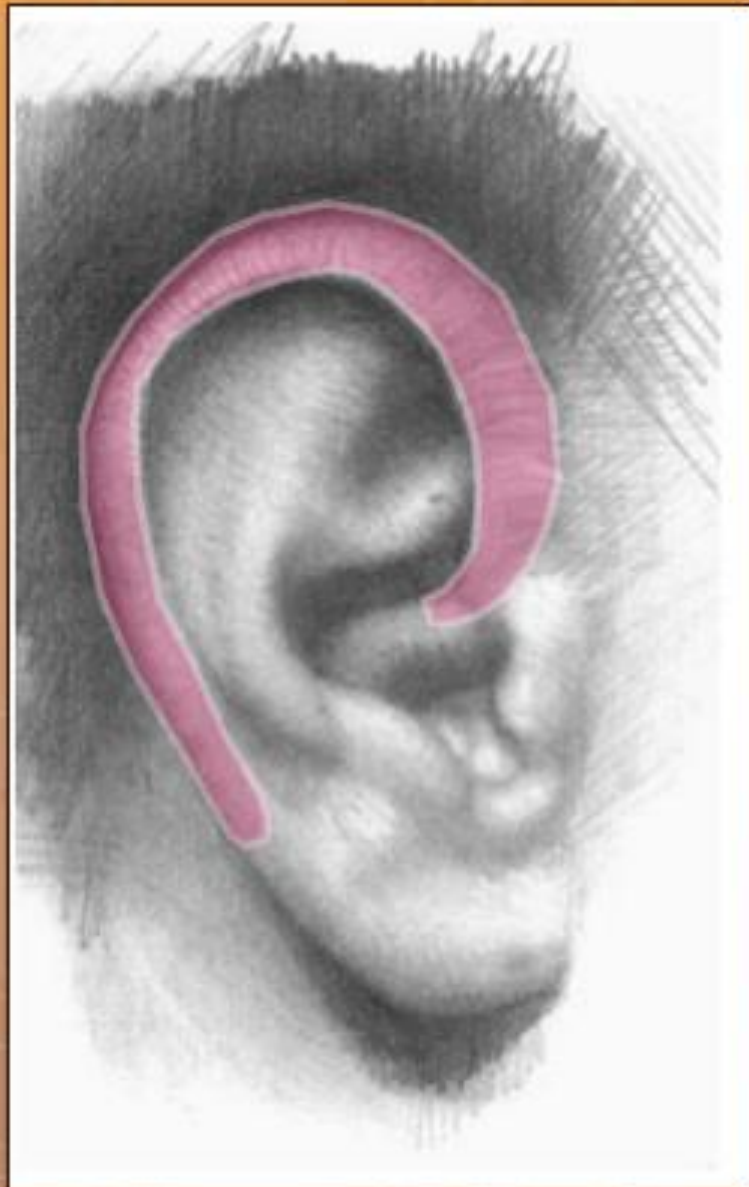


- Pinna
- External auditory canal
- Tympanic membrane

Parts of a pinna

The surface anatomy of the auricle of the ear.





HELIX

The prominent rim of the auricle is called the **helix**



Anti Helix

Another curved prominence parallel with and in front of the helix is called the **antihelix**



Concha

the antihelix describes a curve around a deep, capacious cavity

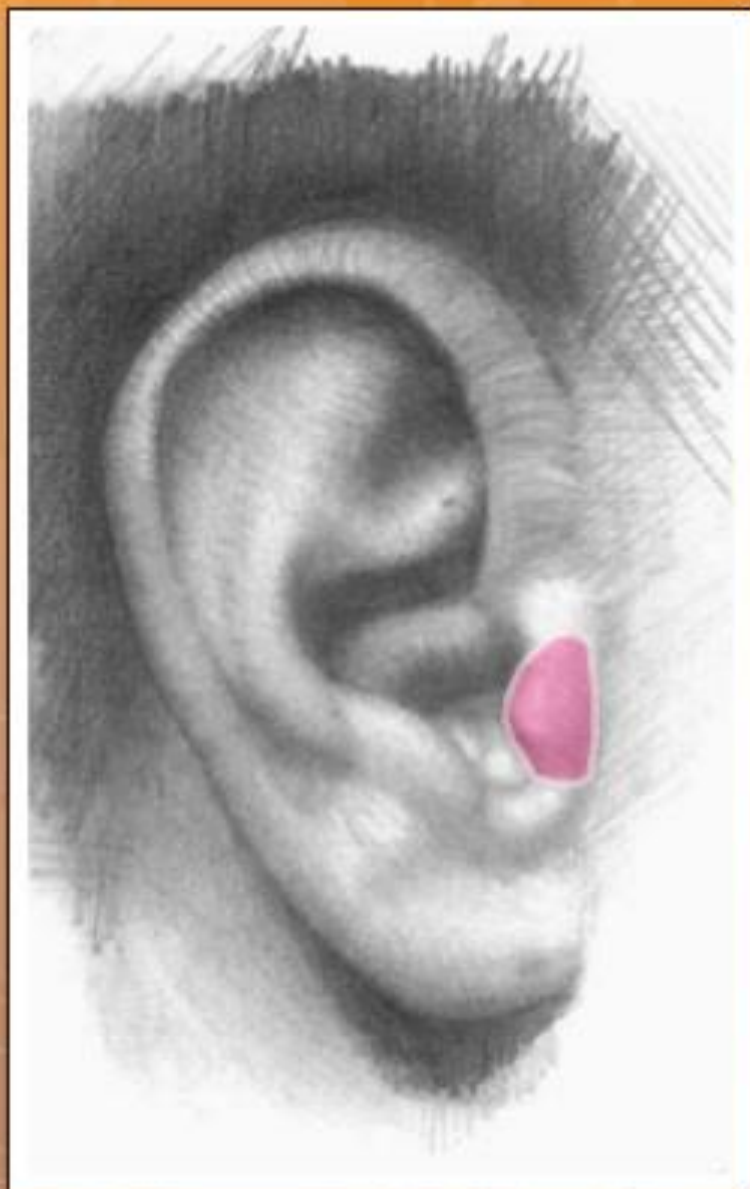
concha

the upper part

cymba conchae,

the lower part

cavum conchae



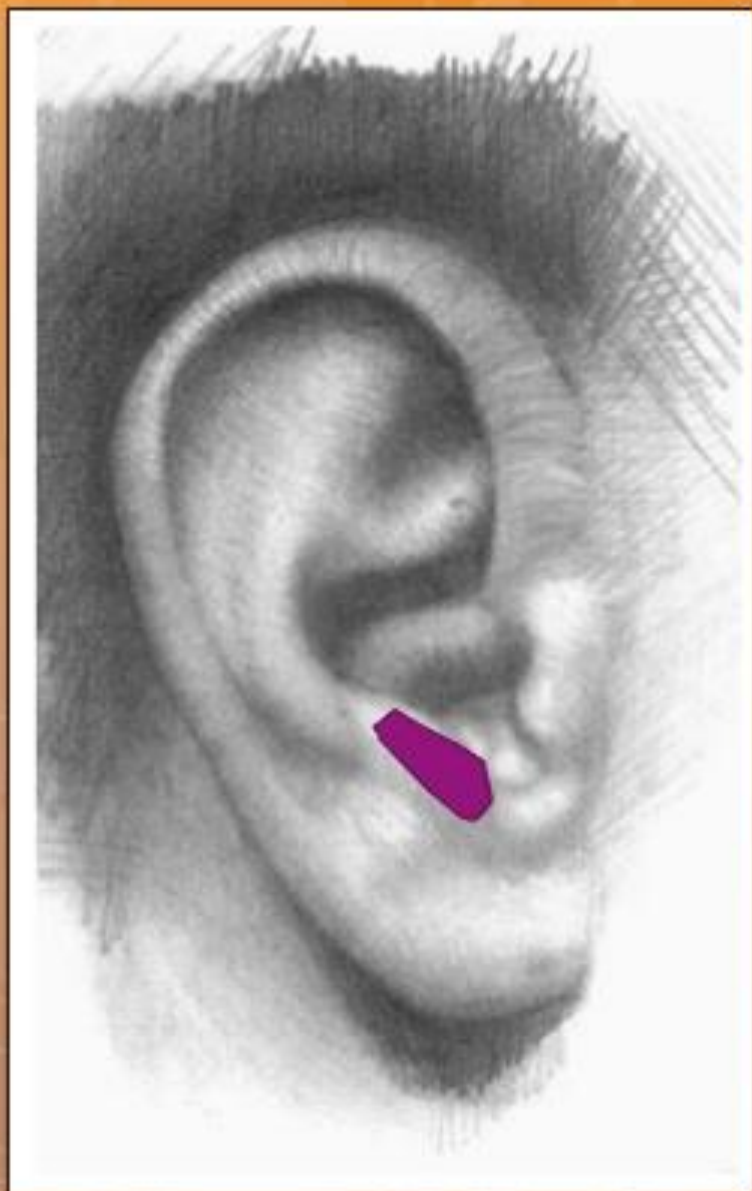
Tragus

small pointed eminence

In front of the concha, projecting
backward over the meatus



Ear lobule



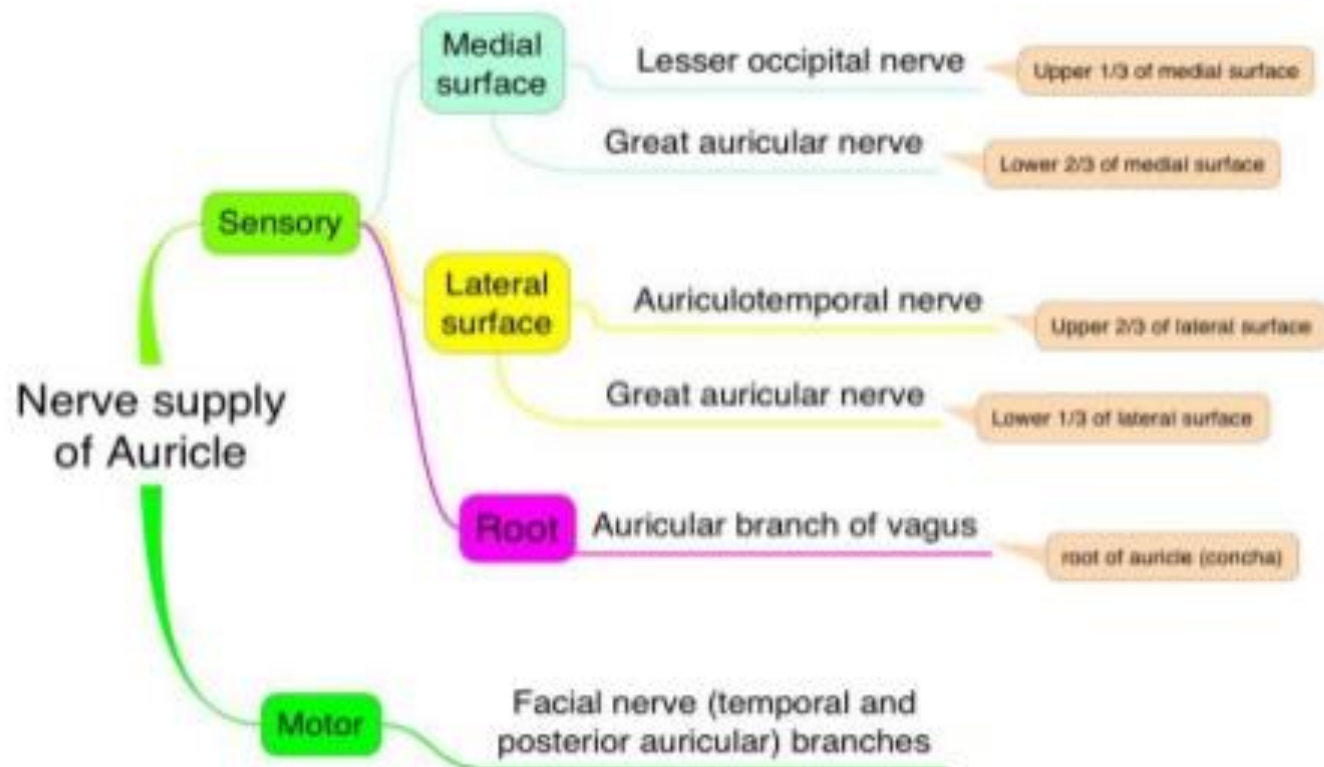
Anti tragus

6

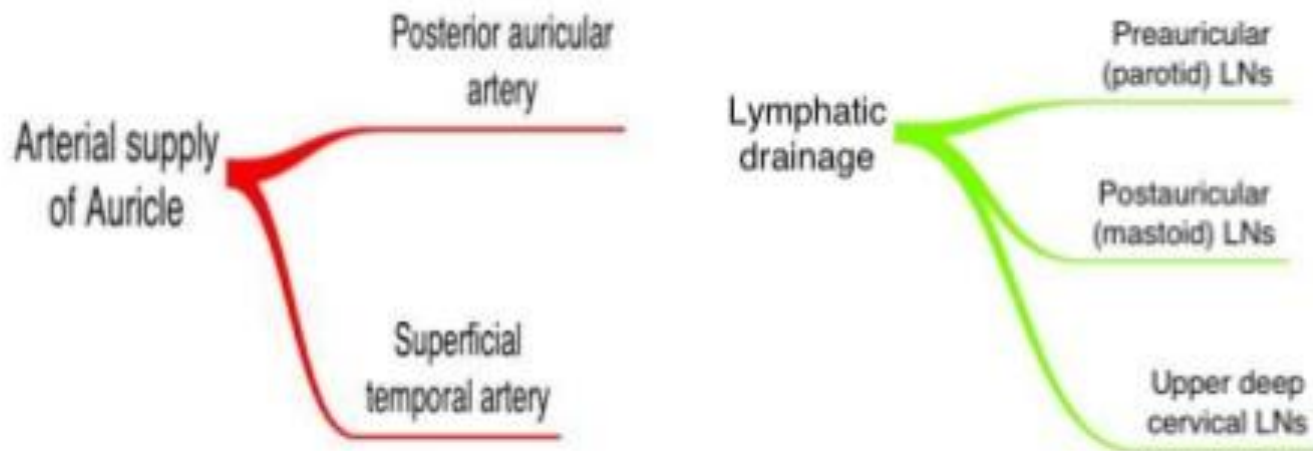
Pinna

- Skin :- thin, closely adherent to perichondrium on lateral surface covered with fine hairs which has sebaceous glands (most numerous in the concha and scaphoid fossa)
- Cartilage :- Yellow elastic fibrocartilage absent at lobule and deficient between crus of helix and tragus(**incisura terminalis**)connected to temporal bone by ligaments, 3 extrinsic & 6 intrinsic muscles.

Nerve supply

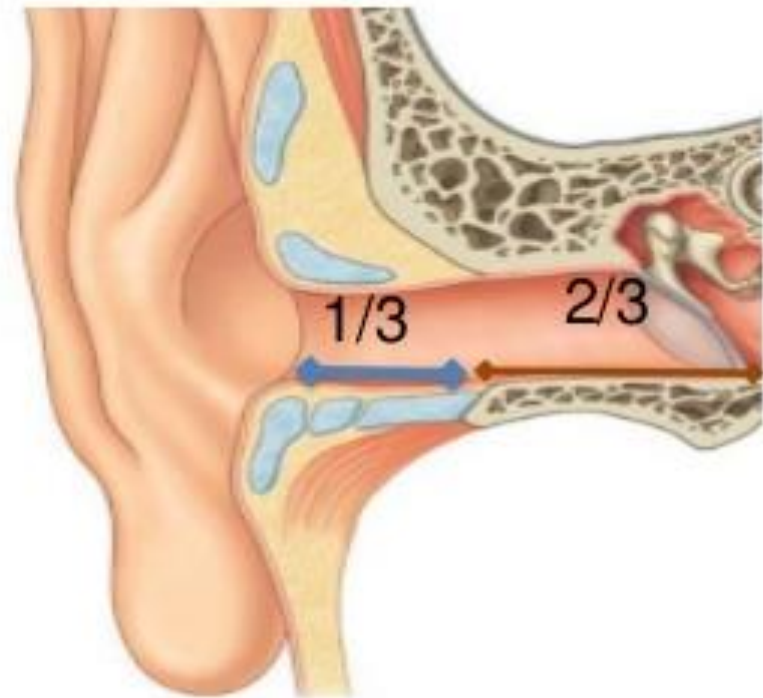


Blood & lymphatic supply of pinna



External auditory canal

- Extends from concha to tympan membrane
- Bony cartilaginous canal



Cartilaginous part

- 8 mm in adults. Continuous with auricular cartilage.
- Deficient superiorly space is occ. by int. ligament
- Two deficiencies (**fissures of Santorini**) :- infections from parotid and superficial mastoid can enter the canal and vice-versa.
- Skin :- thick, hair follicles , sebaceous and ceruminous glands.

Bony part

- 16 mm in adults.
- Narrower than lat. part
- Medial end marked by tympanic sulcus (absent superiorly).
- Most part by tympanic bone (lateral projection of temporal bone) superiorly by squamous bone.
- Notch of Rivinus- junction of tympanosquamous and tympanomastoid suture lines.
- 2 constrictions :-
 - 1) BC junction
 - 2) 5 mm lateral to TM
- Skin is thin, devoid of hair and ceruminous glands.

Nerve supply of EAC

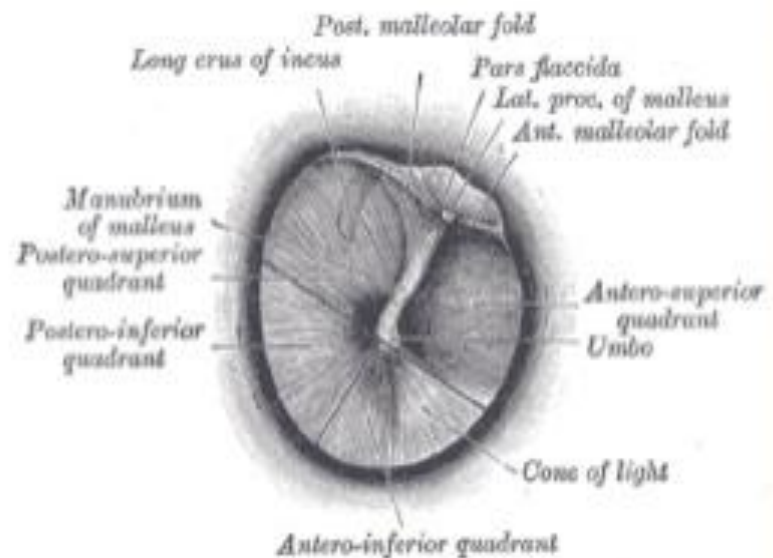
- The auriculotemporal nerve (from the **mandibular** branch of the trigeminal nerve) provides sensory information from the anterior wall and roof
- The posterior wall and floor sensibility is carried in the nerve fibres of the auricular **branch of vagus** (Arnold nerve)
- The **tympanic plexus** offers some contributions

Lymphatic drainage

- Anterior wall :- **Preauricular** lymph nodes
- Posterior wall :- LN at **mastoid tip**
- Rest :- **upper deep cervical** lymph nodes

Tympanic membrane

- Cone shaped, Thin, oval disc shaped.
- **55 degree** angled.
- Longest diameter :- 9-10 mm (i.e. posterosuperior to anterosuperior)
- Shortest diameter :- 8-9 mm (perp. To longest diameter)
- Width :- 0.1 mm



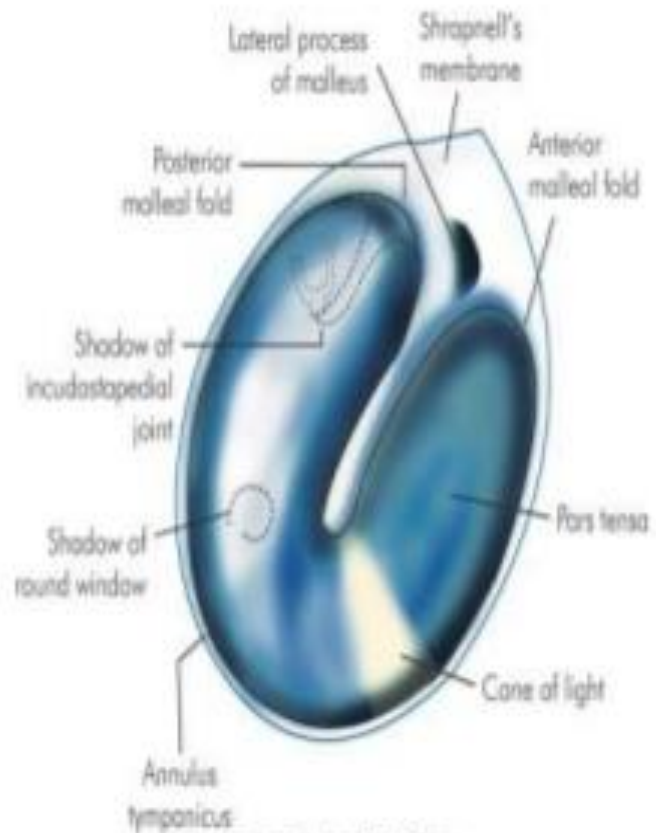
Tympanic membrane

- Circumference is thickened to form **tympanic annulus**, which fits in the groove **tympanic sulcus**
- Tympanic sulcus is deficient superiorly
- Annulus becomes a fibrous band which runs centrally as ant. and post. malleolar folds to the lat. process and handle of malleus.
- This region is called as **pars flaccida** and the rest of tympanic membrane is called as **pars tensa**.



Tympanic membrane

- Umbo :- maximum depression seen at the inf. tip of handle of malleus.
- Cone of light :- radiating from umbo into the anteroinferior quadrant.



Layers of the TM

- TM has 3 layers :-
- **Epithelial** (outer)- continuous with skin of EAC
- **Fibrous**/lamina propria(middle) – missing in upper part
- **Mucosal** (inner) – continuous with middle ear mucosa

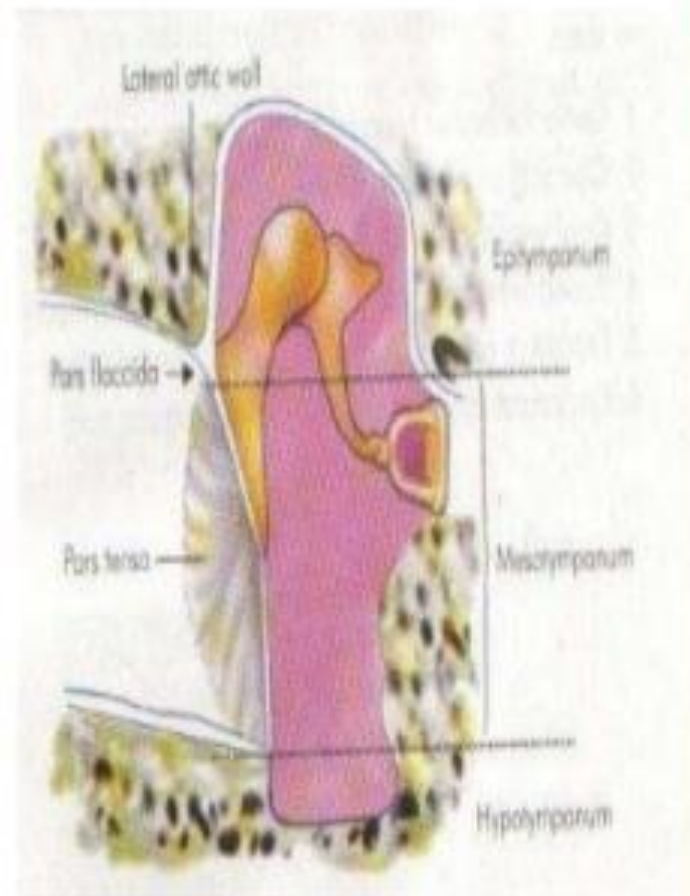
Did you know...



The right ear is better at hearing speech, and the left ear is better at hearing music.

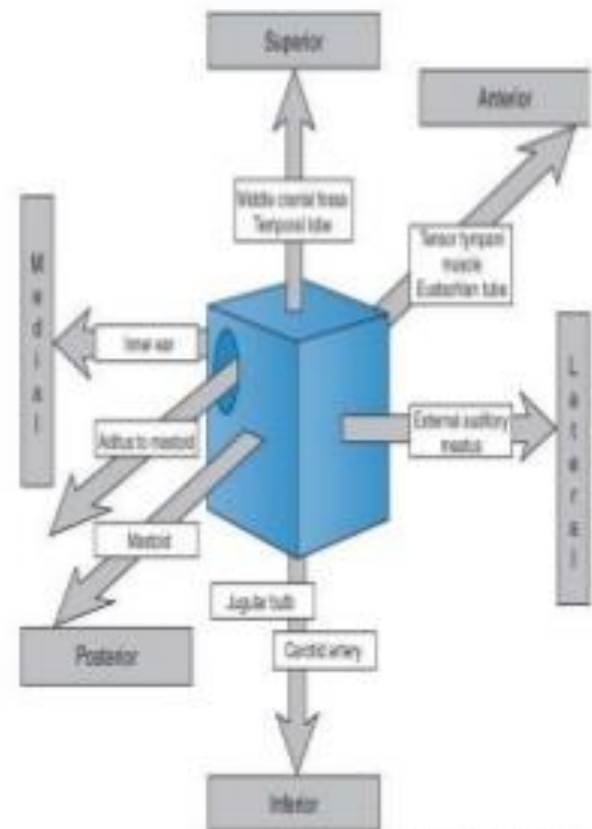
Middle ear

- Tympanic cavity – six sided cavity
 1. **Epitympanum** - above malleolar folds of TM
 2. **Mesotympanum**- medial to pars tensa of TM
 3. **Hypotympanum**- below the level of TM



Six sided cavity

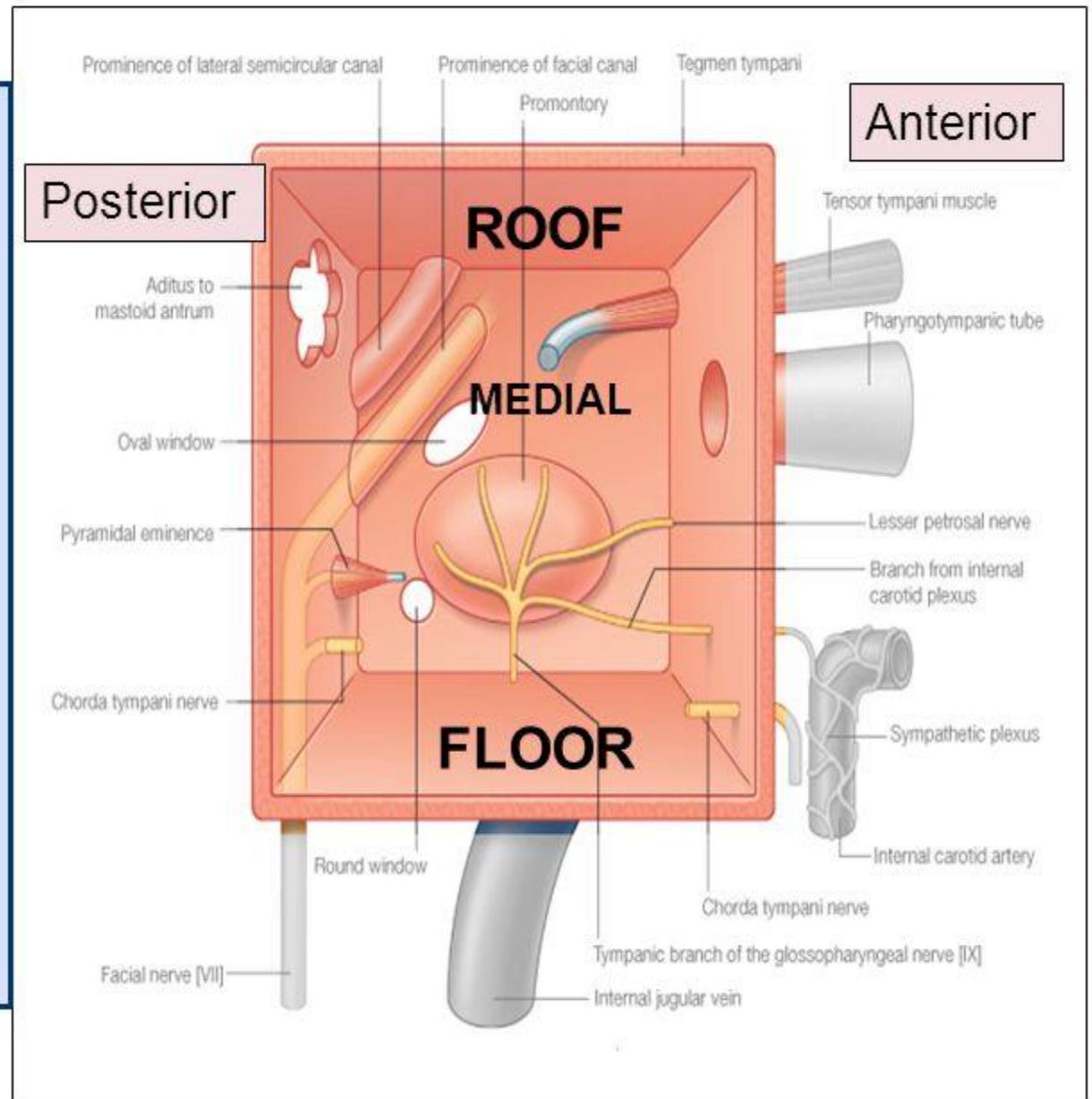
- Roof – separated from MCF – **tegmen tympani**
- Floor – separated from IJV – **thin plate of bone**
- Anterior wall
- Posterior wall
- Medial wall
- Lateral wall



© Hodder Arnold / Scott Brown Ltd

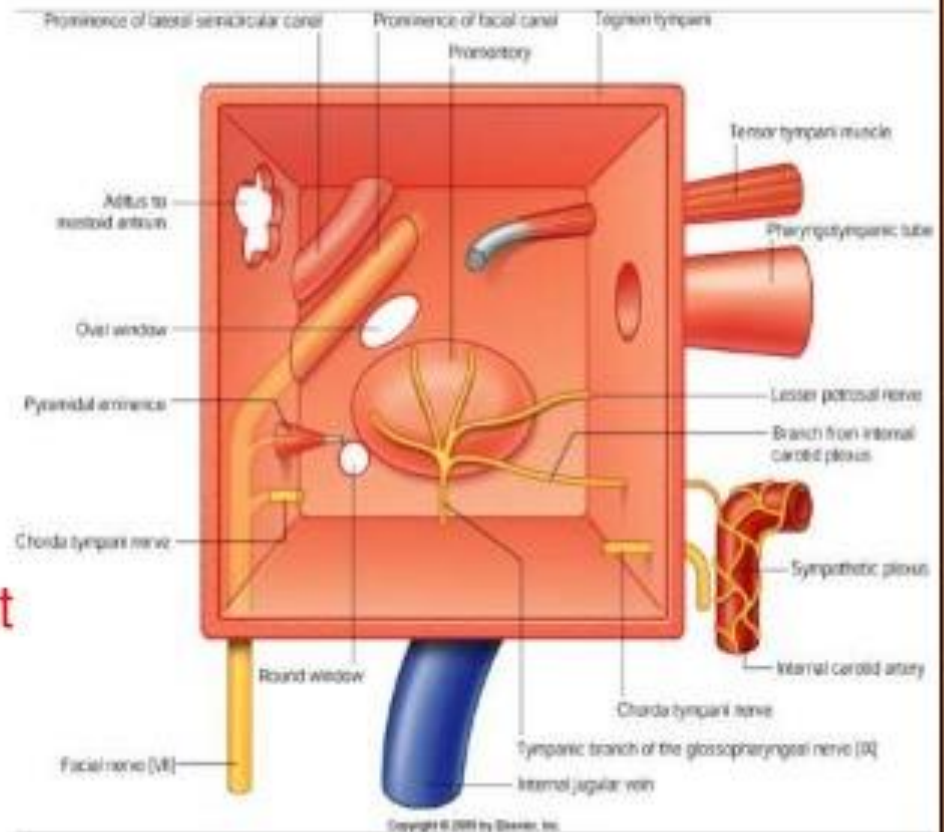
The middle ear **has:**

- **Roof,**
- **Floor,**
- **and 4**
- **walls:**
- **Anterior,**
- **Posterior,**
- **Lateral,**
- **and**
- **Medial.**



Anterior wall

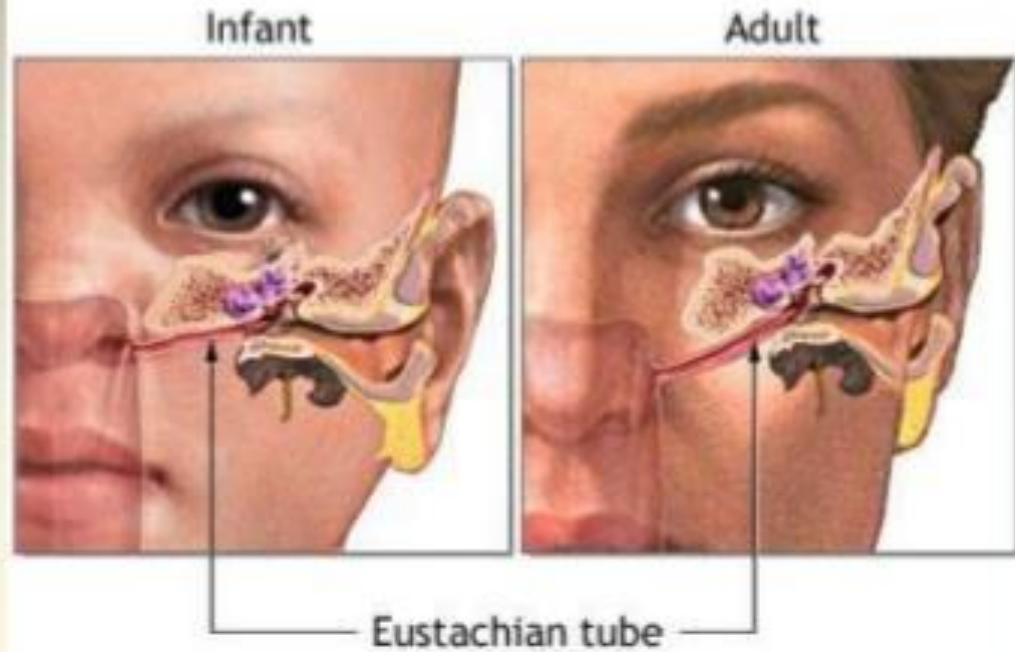
- Will separate ME from ICA
- Structures passing are
 1. Canal for chorda tympani .N
 2. Canal for tensor tympani .M
 3. Eustachian tube
 4. Ant malleolar ligament
 5. Ant tympanic artery



- **Auditory Tube**
(Eustachian tube)

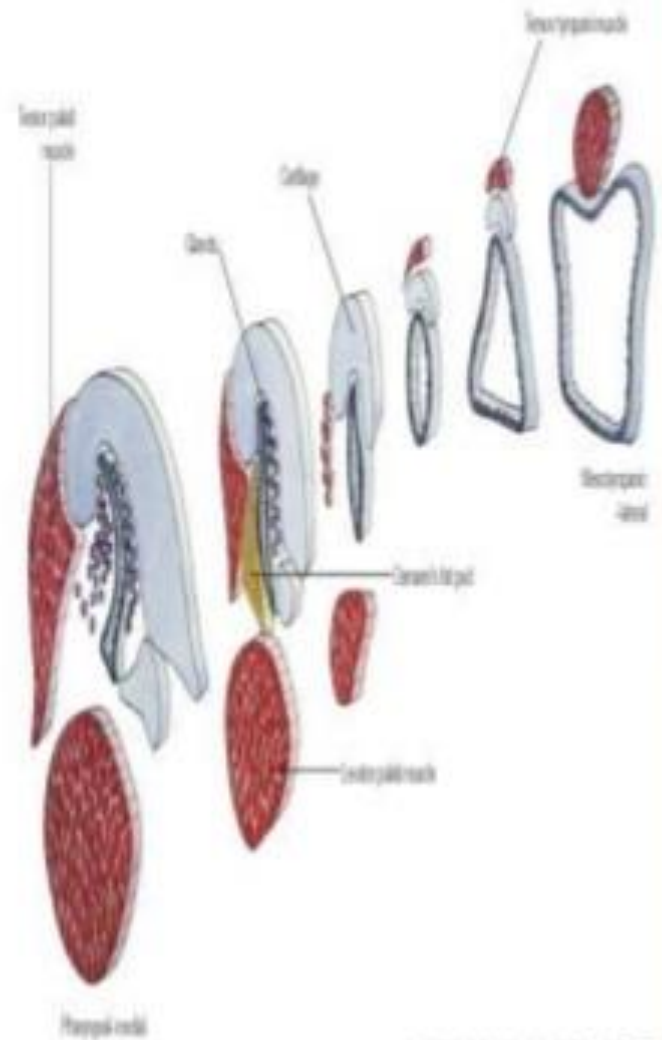
- Is a route for pathogens to travel from nose and throat to ear causing **Otitis Media**

- During swallowing and yawning it opens to equal pressure in middle ear.



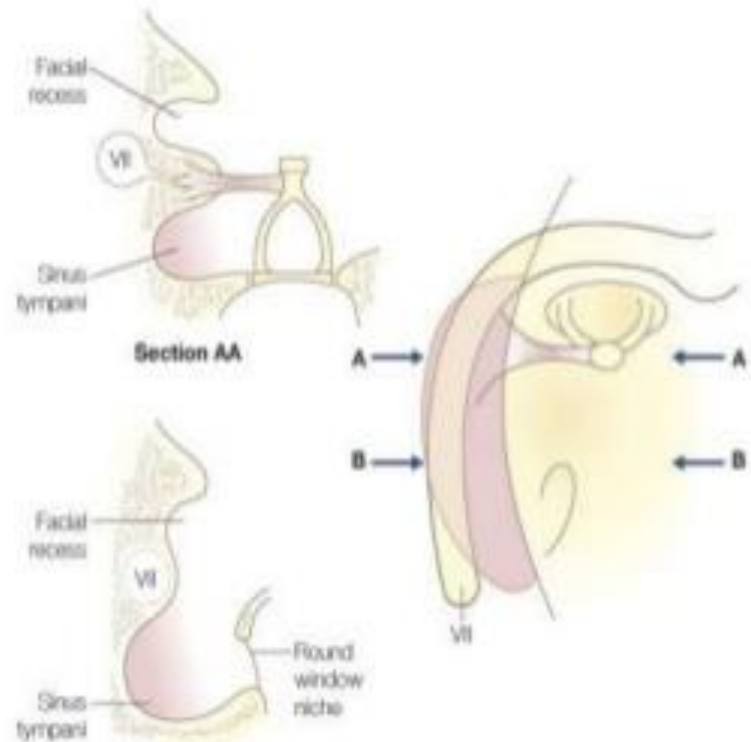
Eustachian tube

- Passage between tym. cavity & nasopharynx
- Runs downwards, forwards & medially from middle ear at 45degree angle
- **36 mm long**, two unequal cones connected at apices
- **Lat. bony 1/3rd (12mm)**, widest-tympanic end, at ant wall of tym. cavity, narrowest-isthmus(diam. 0.5mm)
- **Med.Cart. 2/3rd(24mm)**, open medially, 1-1.25cm behind & below post. end of inf. turb. at nasoph., torus tubaris, behind it- pharyngeal recess(fossa of Rosenmuller)



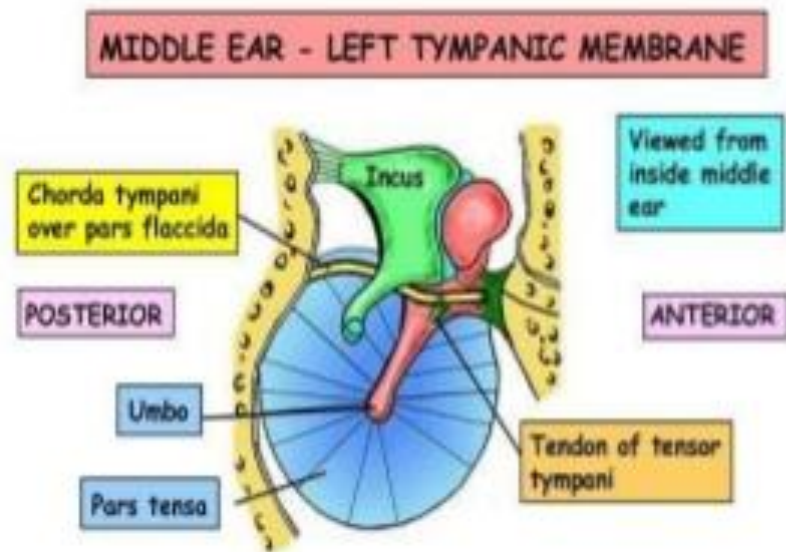
Posterior wall

- Upper part – **aditus** which leads to mastoid antrum
- Below aditus triangular projection **processus pyramidalis**
- **Facial recess** – supra pyramidal recess
- **Sinus tympani** – infra pyramidal recess



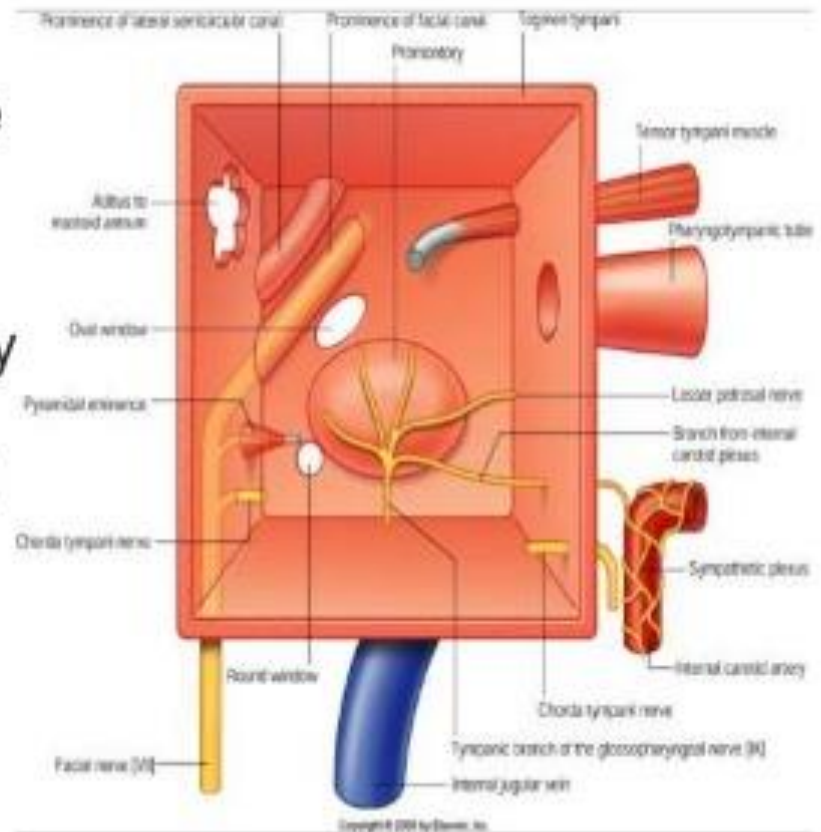
Lateral wall

- Separate external ear from middle ear
- Formed by TM and squamous part of temporal bone



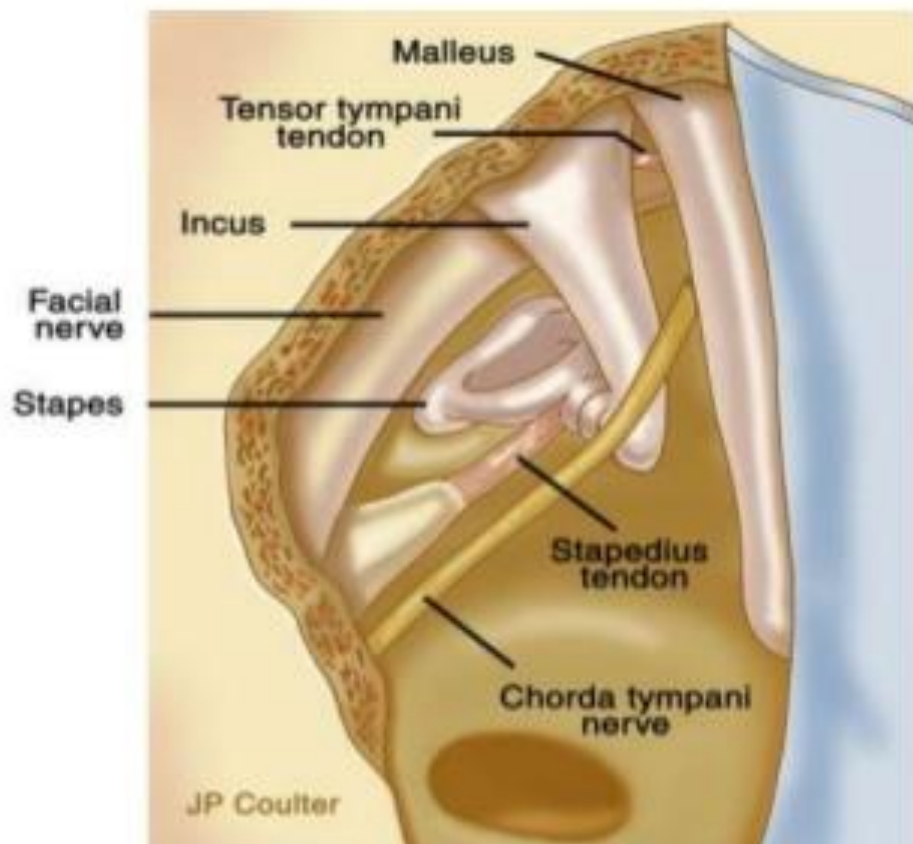
Medial wall

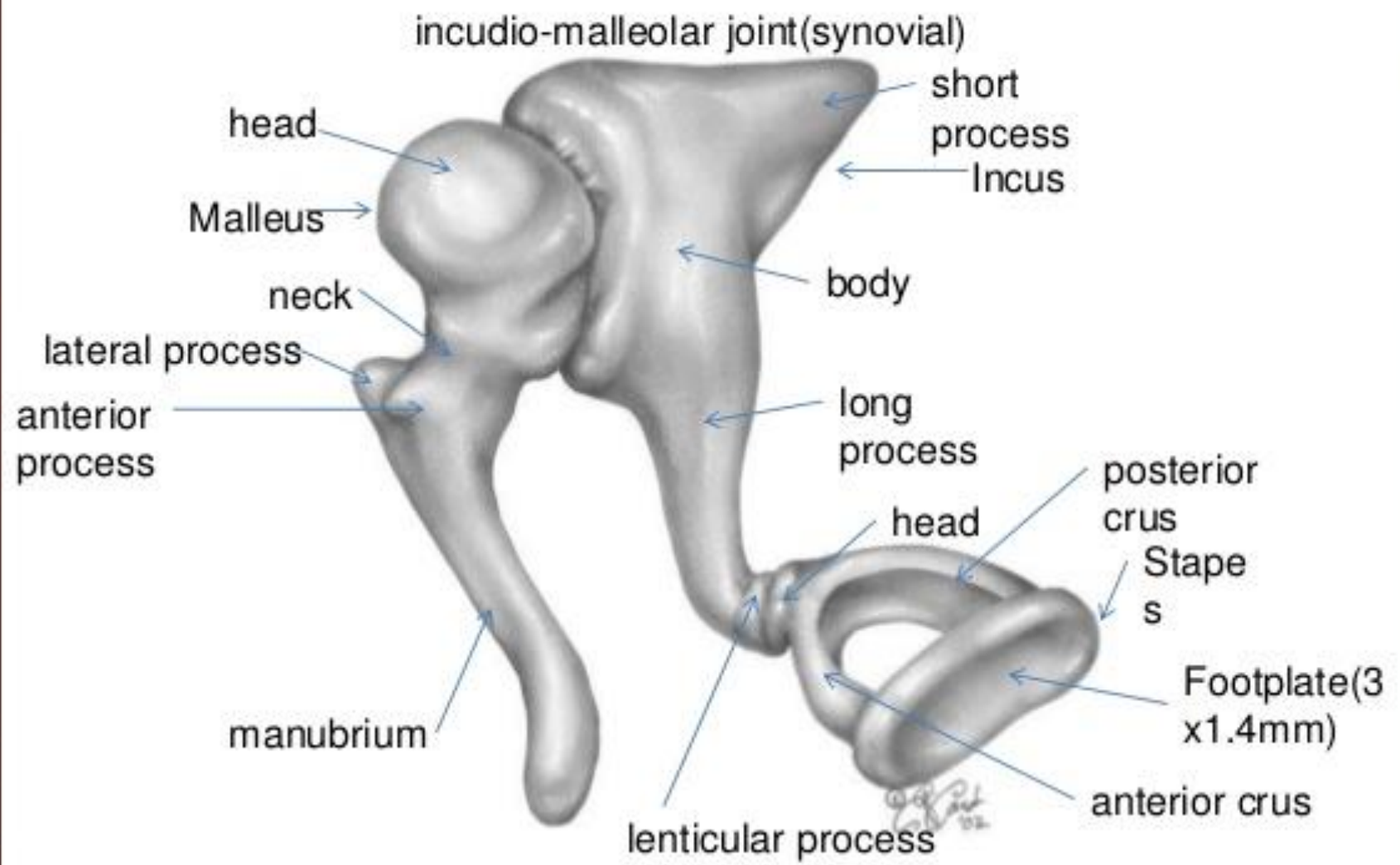
- Separate middle ear from inner ear
- Important structures are
 1. **Promontory**
 2. **Bony lat SCC**
 3. **Oval window** – closed by footplate of stapes
 4. **Round window** – closed by secondary TM
 5. **Facial nerve**



Contents of the middle ear

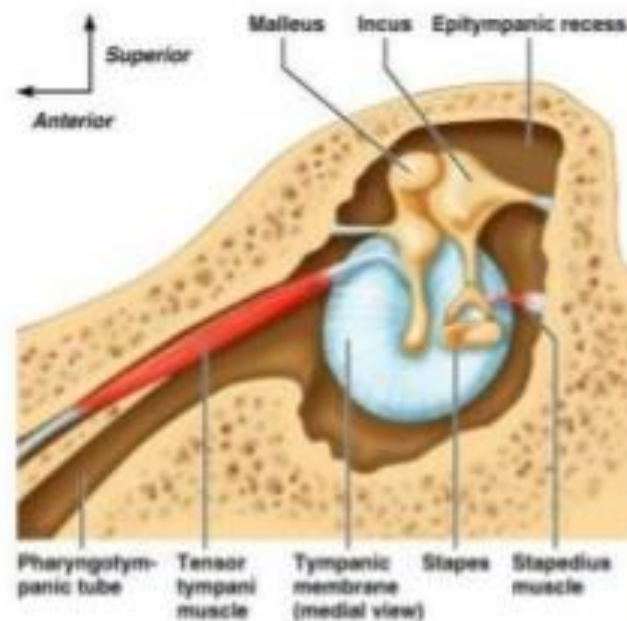
- **Ear ossicles**
 1. Malleus (hammer)
 2. Incus (anvil)
 3. Stapes (stirrup)
- **Muscles**
 1. Tensor tympani
 2. Stapedius
- **Mucosal folds**
- **Nerves**
- **vessels**





Muscles

- **Stapedius** origin- pyramid, Insertion- into posterior part of neck & upper part of posterior crus, supplied by **small br. of FN**
- **Tensor Tympani** origin- walls of bony canal above ET, cart. part of ET, greater wing of sphenoid Insertion- medial aspect of upper end of handle of malleus supplied by branch of **mandibular nerve**



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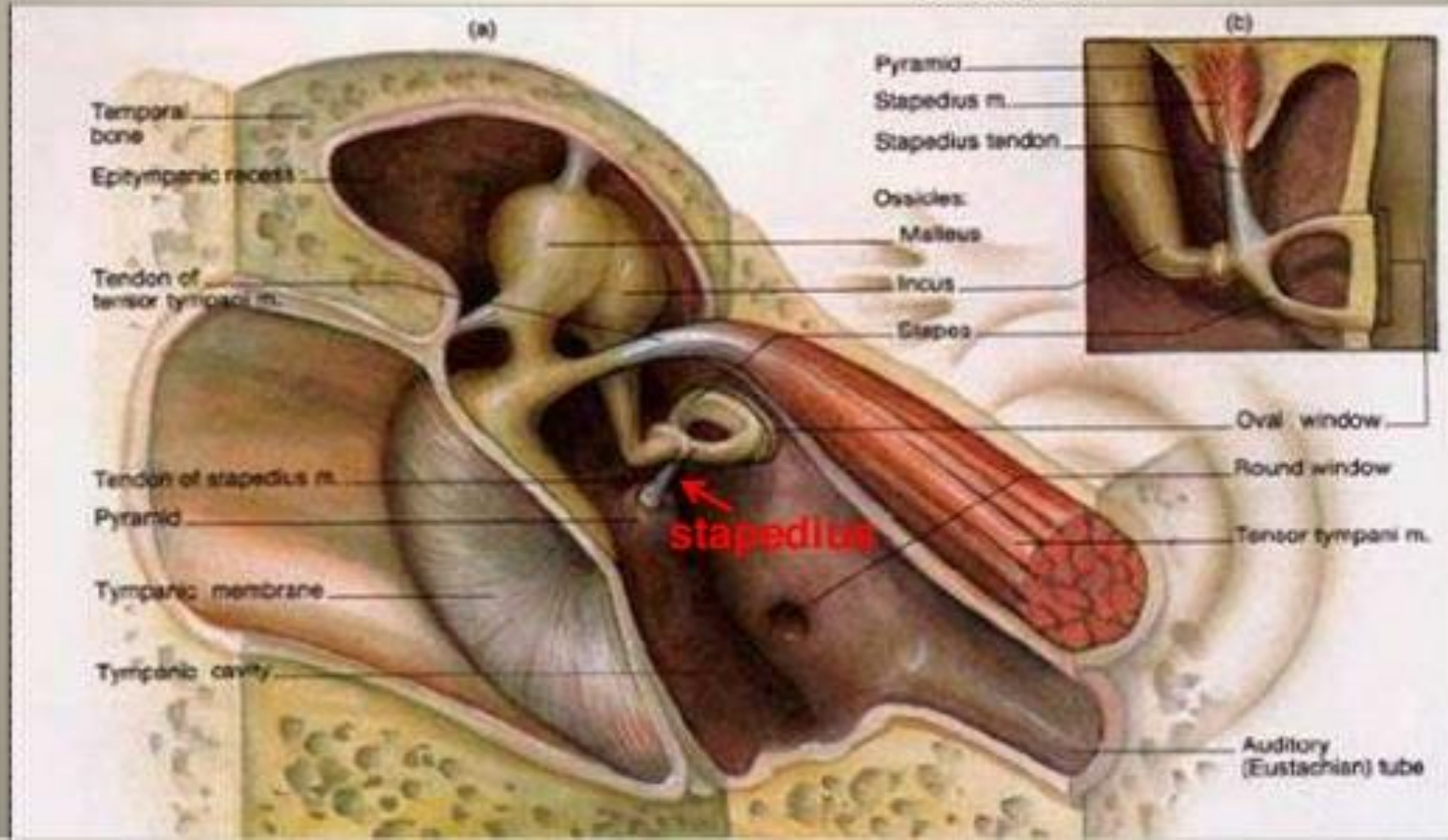
Protection by Two Tiny Muscles

- Tensor Tympani

- Attaches to Malleus to increase tension on ear drum & prevent damage to inner ear.

- Stapedius

- Smallest skeletal muscle
- Dampens large vibrations of stapes to protect oval window.

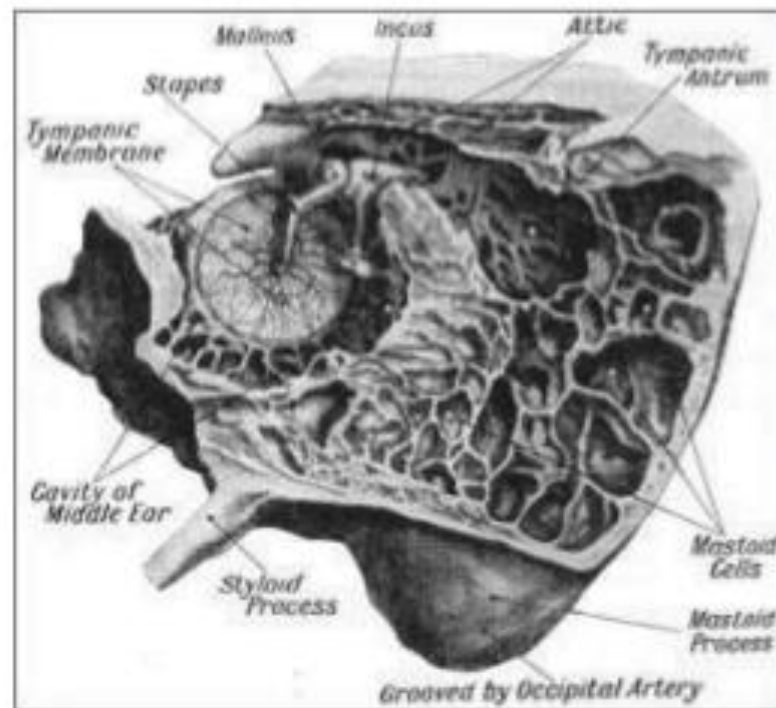


Nerves & vessels of middle ear

- Chorda tympani nerve
- Tympanic plexus
- Plexus of vessels of stylomastoid artery
- Carotico tympanic artery

Mastoid

- 3 important parts
 1. **Aditus** – connects epitympanum with mastoid
 2. **Antrum** – largest air cell in the mastoid bone
 3. **Mastoid air cells**



**Wearing
headphones
for just an hour
will increase
the bacteria
in your ear
by 700 times.**



innervation

- *external surface of the tympanic membrane is supplied;*
- ✓ *the auriculotemporal nerve (a branch of CN V₃) {main contribution}*
- ✓ *a small auricular branch of the vagus (CN X)*
- *The internal surface of the tympanic membrane is supplied by the glossopharyngeal nerve (CN IX)*

Clinical anatomy

External Ear Injury

- *Bleeding within the auricle resulting from trauma may produce an auricular hematoma*

Acute Otitis Externa

- *Otitis externa is an inflammation of the external acoustic meatus*
- *The infection often develops in swimmers who do not dry their meatus after swimming and/or use ear drops*
- *it may also be the result of a bacterial infection of the skin lining the meatus*

Middle Ear

- *is the narrow air-filled chamber in the petrous part of the temporal bone*
- *It has a cavity called **tympanic cavity***

parts

- *The cavity has 2 parts:*
 - ✓ *tympanic cavity proper*
 - ✓ *epitympanic recess*
- ***Tympanic cavity proper** is the space directly internal to the tympanic membrane*
- *while the space superior to the membrane is called the **epitympanic recess***
- *The middle ear communicates with the **mastoid area/ mastoid antrum** posteriorly*
- *It communicates anteriorly with the **nasopharynx** via the **pharyngotympanic tube***