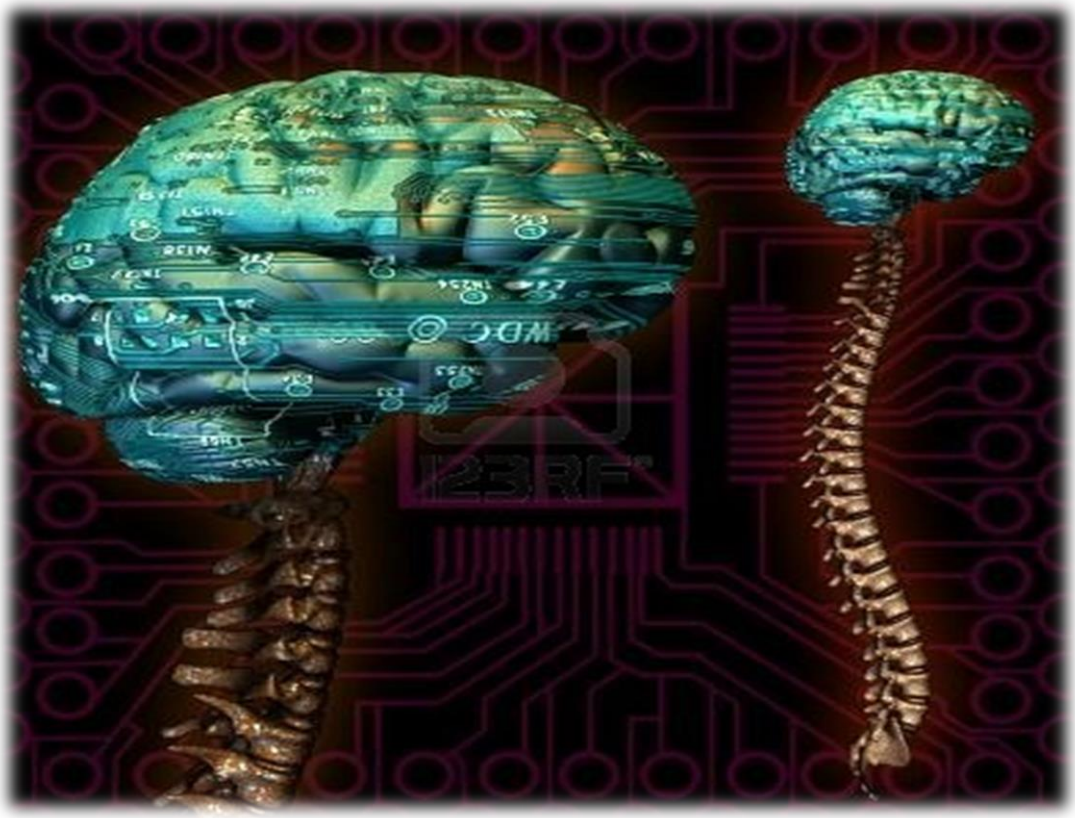
CNS Block



LECTURE (12)

THE EAR

هذا العمل مصدر شامل للمحاضرة

Done by: Shahad Alqreen

Reviewed by: ABDULLAH ALATAWI

IF THERE IS ANY MISTAKE PLEASE FEEL FREE TO CONTACT US:

ANATOMYTEAM32@GMAIL.COM

Both - Black
Male Notes - BLUE
Female Notes - GREEN
Explanation and additional notes - ORANGE
Very Important note - Red

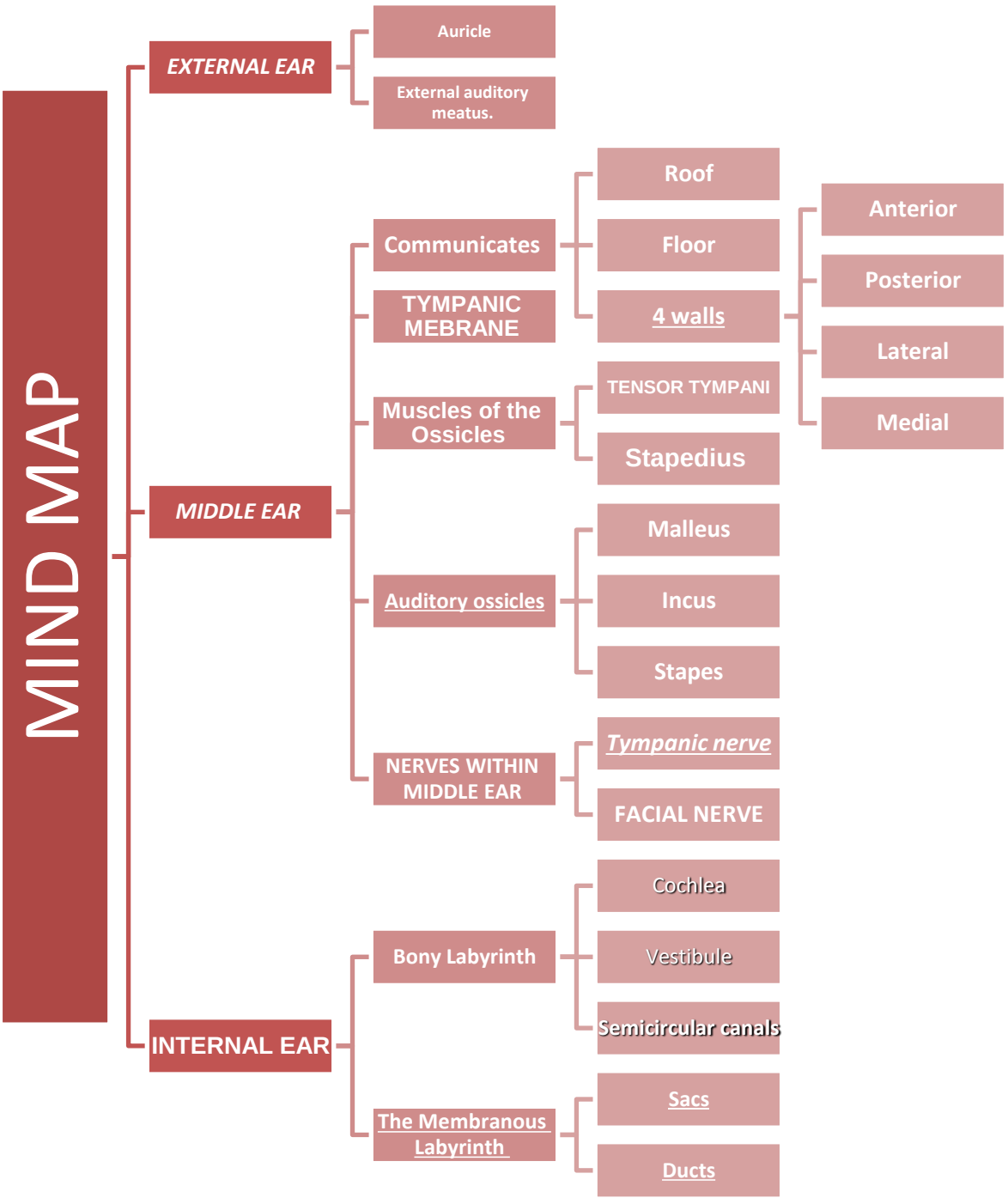
Objectives:

BY THE END OF THE LECTURE THE STUDENT SHOULD BE ABLE TO:

- List the parts of the ear: External, Middle (tympanic cavity) and Internal (labyrinth).
- Describe the parts of the external ear: auricle and external auditory meatus.
- Identify the boundaries of the middle ear : roof, floor and four walls (anterior, posterior, medial and lateral).
- Define the contents of the tympanic cavity:

I. Ear ossicles,: (malleus, incus and stapes)
II. Muscles, (tensor tympani and stapedius).
III. Nerves (branches of facial and glossopharyngeal).

List the parts of the inner ear, bony part filled with perilymph (Cochlea, vestibule and semicircular canals), in which is suspended the membranous part that filled with endolymph).
List the organs of hearing and equilibrium.


MIND MAP
EXTERNAL EAR
Auricle
External auditory meatus.
MIDDLE EAR
Communicates
Roof
Floor
4 walls
Anterior
Posterior
Lateral
Medial
TYMPANIC MEBRANE
Muscles of the Ossicles
TENSOR TYMPANI
Stapedius
Auditory ossicles
Malleus
Incus
Stapes
NERVES WITHIN MIDDLE EAR
Tympanic nerve
FACIAL NERVE
INTERNAL EAR
Bony Labyrinth
Cochlea
Vestibule
Semicircular canals
The Membranous Labyrinth
Sacs
Ducts

EXTERNAL EAR

IT IS FORMED OF THE:

Auricle

The Auricle has a characteristic shape and collects air vibrations.

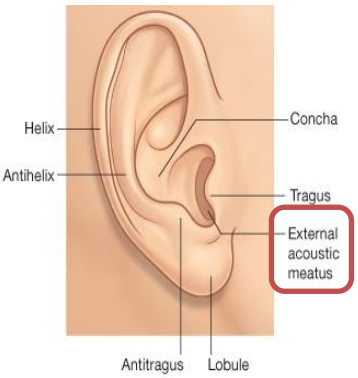
It consists of a thin plate of *elastic cartilage* covered by a double layer of skin.

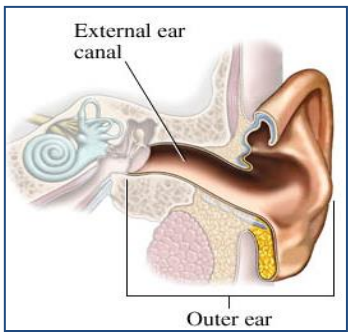
It receives the insertion of extrinsic muscles, which are supplied by the facial nerve. Sensation is carried by great auricula & auriculotemporal nerves

External auditory meatus.

The external auditory canal is a curved S-shaped tube about 2.5 cm that conducts & collects sound waves from the auricle to the tympanic membrane. Its outer 1/3rd is elastic cartilage, while its inner 2/3rds are boney.

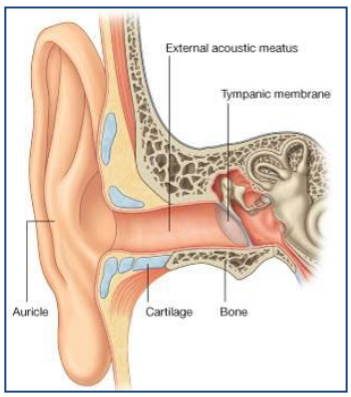
It is lined by skin, and its outer 1/3rd is provided with hairs, sebaceous and Ceruminous Glands: (modified sweat glands that secrete a yellowish brownish substance called the ear wax).

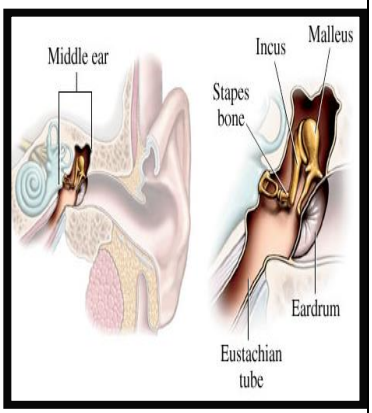


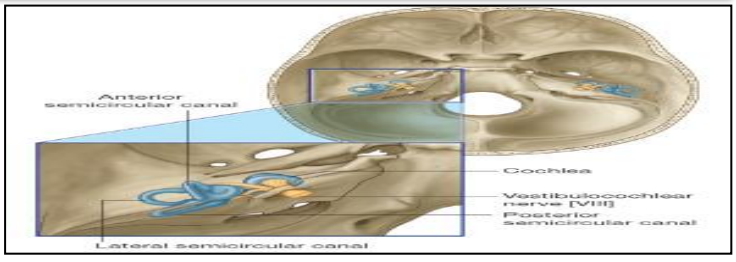


MIDDLE EAR (TYMPANIC CAVITY)

- **Middle ear** is a narrow, oblique, slit- like cavity (air-filled) in the petrous temporal bone & lined with mucous membrane.
- It contains the ***auditory ossicles***, which transmit the vibrations of the tympanic membrane (eardrum) to the internal ear.

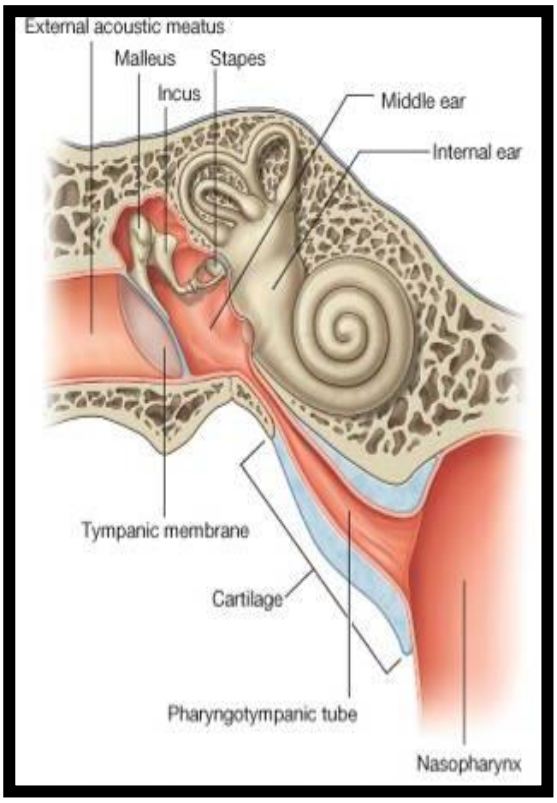






MIDDLE EAR (TYMPANIC CAVITY)

- **Communicates *Anteriorly***
- With the **Nasopharynx** through the **Auditory Tube (Eustachian tube), this extends from the anterior wall downward, forward, and medially to the nasopharynx).** Infection can transmitted from pharynx to inner ear through auditory tube
- The posterior 1/3rd of the canal is bony, and its anterior 2/3rds are cartilaginous.
- Its function is to equalize the pressure on both sides of the ear drum.



THE MIDDLE EAR HAS:

The Roof ★

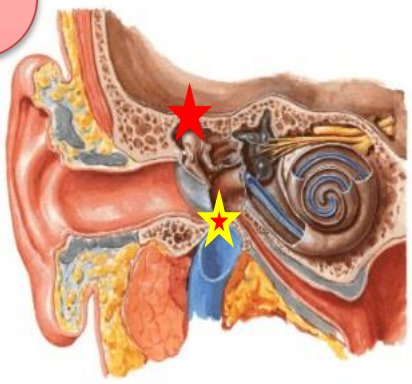
Is formed by a **thin plate of bone**, called tegmen **tympani, which is part of the petrous temporal bone.It separates the tympanic cavity from the temporal lobe of the brain.** . Because that infection can transmitted from inner ear to brain

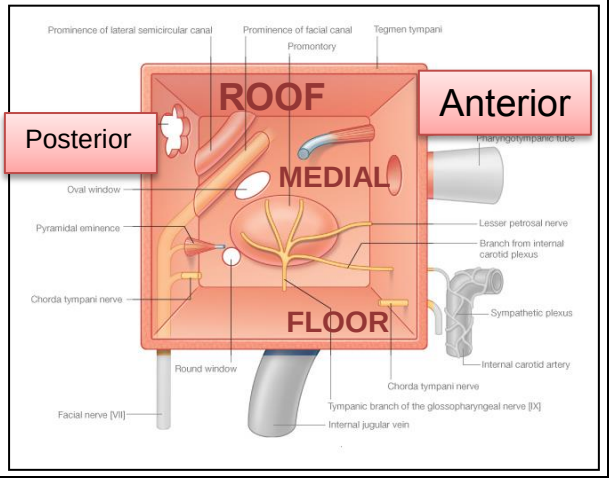
4 wallS:

Anterior, Posterior, Lateral, and Medial.

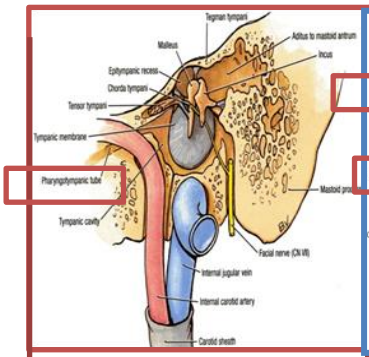
The Floor ★

Is formed by a thin plate of bone, which separates the middle ear from **the bulb of the internal jugular vein**. Because that infection can transmitted from inner ear to internal jugular vein





4 walls:



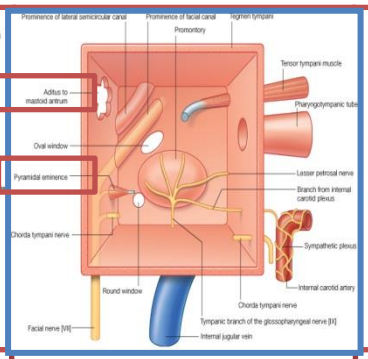
The *anterior wall*

Is formed below by a thin plate of bone that separates tympanic cavity from the internal carotid artery.

There are 2 canals at the upper part of the anterior wall.

The upper smaller is the canal for the tensor tympani muscle.

The lower larger is for the auditory tube.

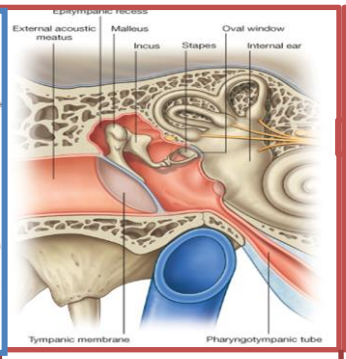


The posterior wall

Has in its Upper part a large, irregular opening, the aditus to the mastoid antrum (a cavity behind the middle ear, within mastoid process, it contains air cells)

.Below : a small, hollow, conical projection, the pyramid, which houses the stapedius muscle and its tendon.

The tendon emerges from the apex of the pyramid.



The lateral wall :

Is largely formed by the tympanic membrane.

The membrane is obliquely placed, facing downward, forward, & laterally.

It is **extremely sensitive to pain.**

Nerve supply of ear drum:

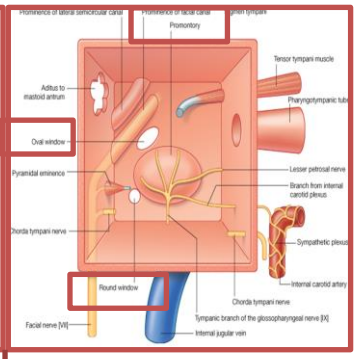
Outer surface:

1- **Auriculotemporal nerve.**

2- Auricular branch of vagus.

Inner surface:

***Tympanic branch* of the glossopharyngeal nerve.**

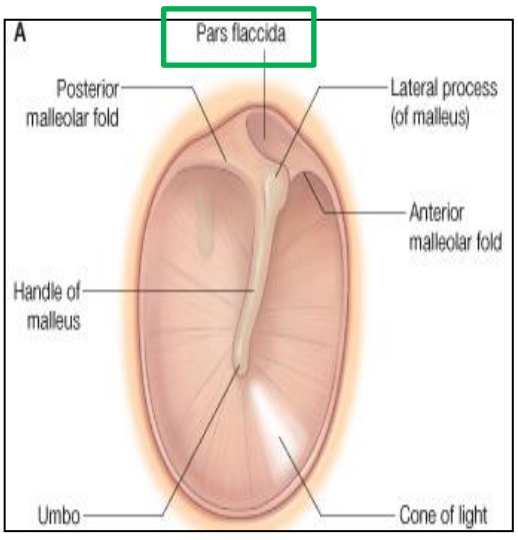


Medial wall

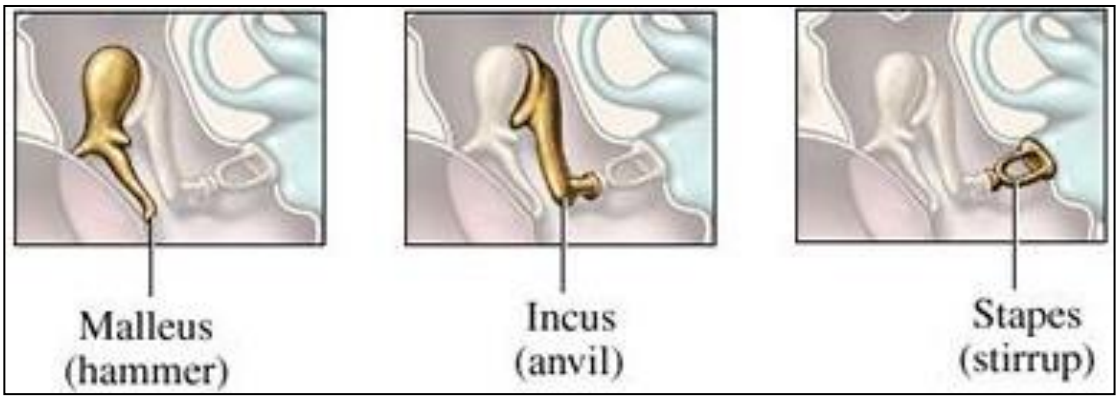
Greater part of the medial wall shows a rounded projection, (Promontory) Above and behind the promontory lies the Oval window (Fenestra Vestibuli), Below and behind the promontory lies the Round window (Fenestra Cochleae),

TYMPANIC MEBRANE

- Normally, It is **concave** laterally, and at the depth of its concavity there is a small depression, " the **Umbo**" produced by the tip of the handle of the malleus.
- When the membrane is illuminated through an otoscope, the concavity produces a **"Cone of Light,"** which radiates anteriorly and inferiorly from the umbo.
- Most of the of the membrane is tense and is called the **Pars Tensa.**
- A small triangular area on its upper part is slack and called the **Pars Flaccida**



Auditory Ossicles



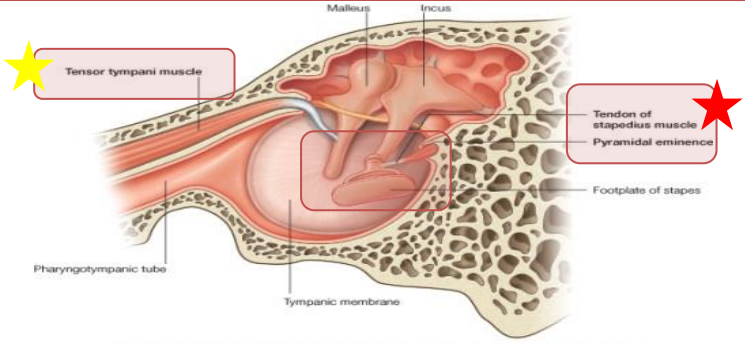
The auditory ossicles are (3) malleus, incus, and stapes.

They transmit sound waves from tympanic membrane to the perilymph of the internal ear.

They are covered by mucous membrane & articulate by synovial joints.

Muscles of the Ossicles

	TENSOR TYMPANI ★	Stapedius (the smallest voluntary muscle) ★
Origin:	Cartilage of the auditory tube and the bony walls of its own canal	Internal walls of the hollow pyramid
Insertion:	*into the handle of the malleus*	The tendon emerges from the apex of the pyramid and *is inserted into the neck of the stapes.*
Nerve supply:	Mandibular nerve	Facial nerve
Action:	Contracts reflexly in response to loud sounds to limit the excursion of the tympanic membrane.	Reflexly damps down the vibrations of the stapes by pulling on the neck of that bone.



NERVES WITHIN MIDDLE EAR

Tympanic nerve

It is a branch of the **glossopharyngeal nerve.**

It gives:

Tympanic plexus

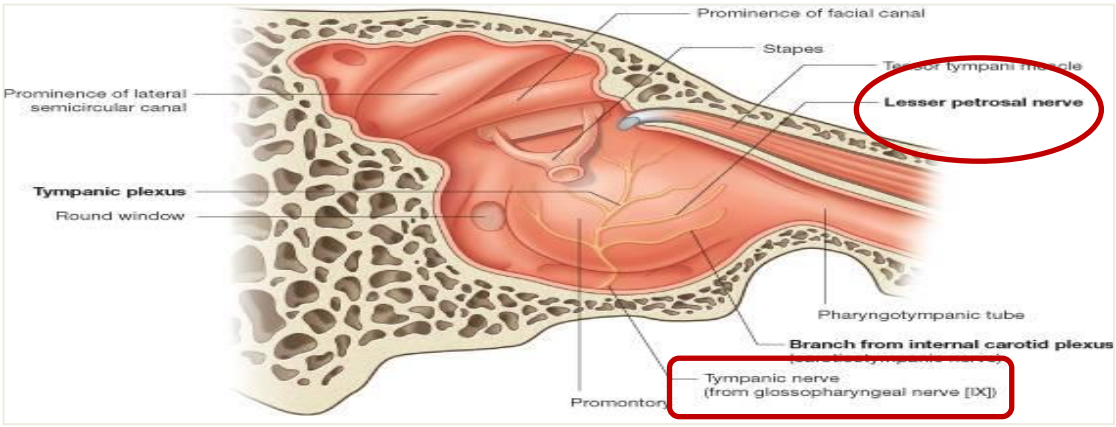
on the promontory

The tympanic gives the:plexus

Lesser petrosal

nerve which relays in the otic ganglion.

It gives secretomotor supply to the **parotid gland**



FACIAL NERVE

FACIAL NERVE

Enters through the

Internal acoustic meatus with the 8th nerve.

It expands to form Geniculate ganglion.

It passes vertical behind the pyramid.

It leaves the middle ear through the stylomastoid foramen.

BRANCHES OF FACIAL NERVE

Greater Petrosal nerve.

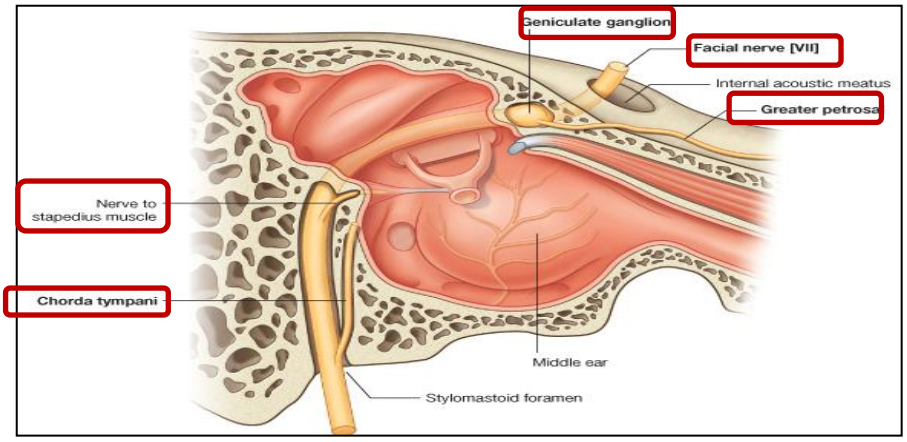
Arises from Geniculate Ganglion.Carries preganglionic parasympathetic to supply:

Lacrimal, NasalPalatine glands.

Nerve to Stapedius.

Chorda Tympani:

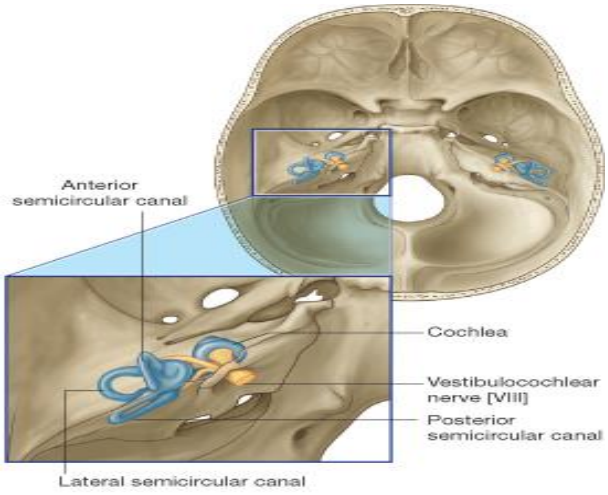
Arises just before the facial nerve exits.



INTERNAL EAR, OR LABYRINTH

Labyrinth is situated in the petrous part of the temporal bone, medial to the middle ear.

It consists of : **Bony** & **Membranous** labyrinth



Bony Labyrinth

It is a series of bony chambers lined by endosteum.

They contain a clear fluid, the perilymph,

It consists of:

Cochlea

Its first turn produces the promontory on the medial wall of the tympanic cavity.

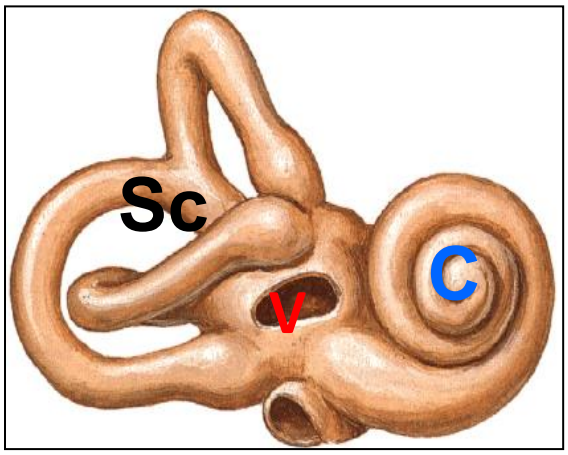
It contains the cochlear duct

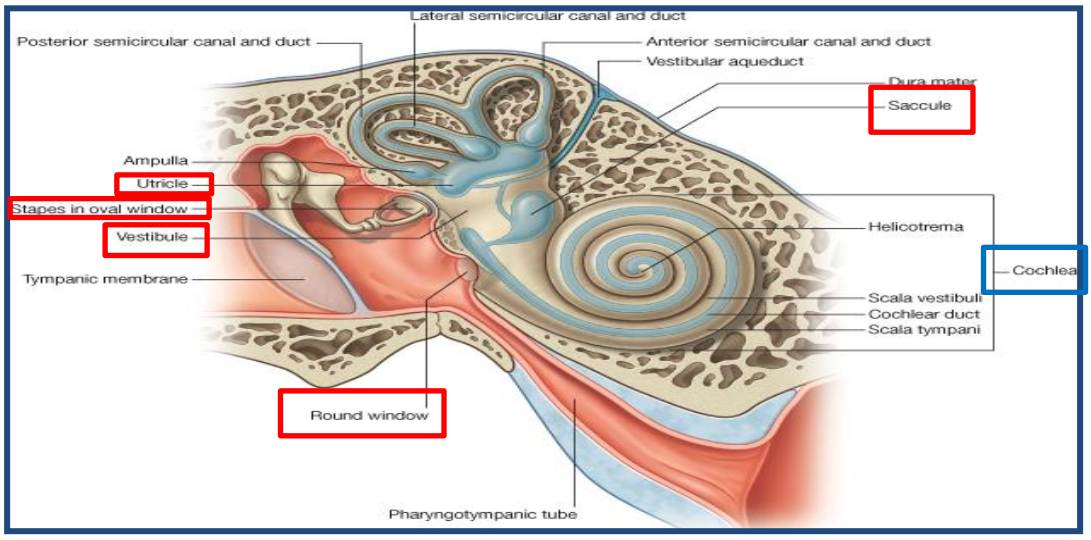
Semicircular canals,

Vestibule,

Is the central part of the bony labyrinth.

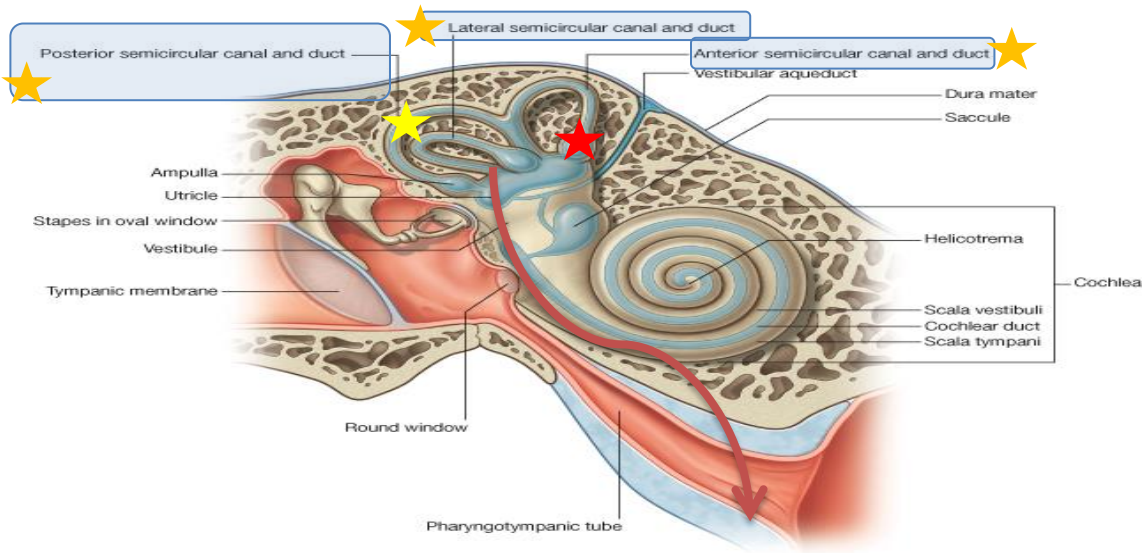
Contains the utricle & saccule





In the lateral wall of the vestibule are the **fenestra vestibuli**, **which is closed by the base of the stapes**, and the **fenestra cochleae**, which is closed by the **secondary tympanic membrane**.

Semicircular Canals



Semicircular canals: superior (anterior), posterior & lateral.

The canals open into the vestibule by five orifices, one of which is common to two of the canals

Each canal has a swelling at one end called the ampulla

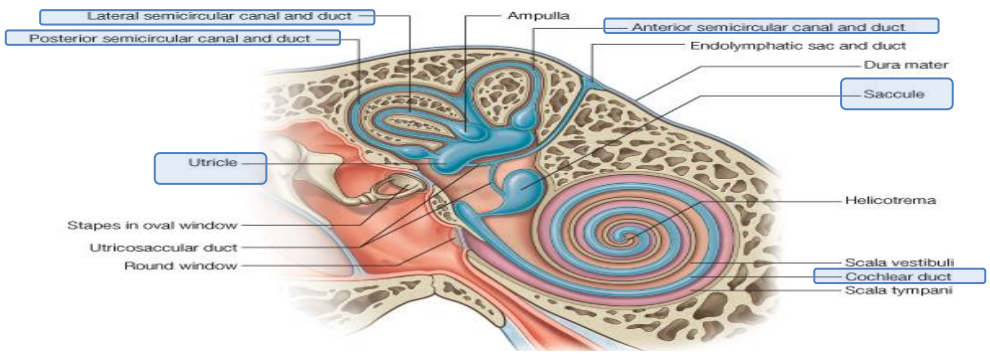
Lodged within the canals are the semicircular ducts

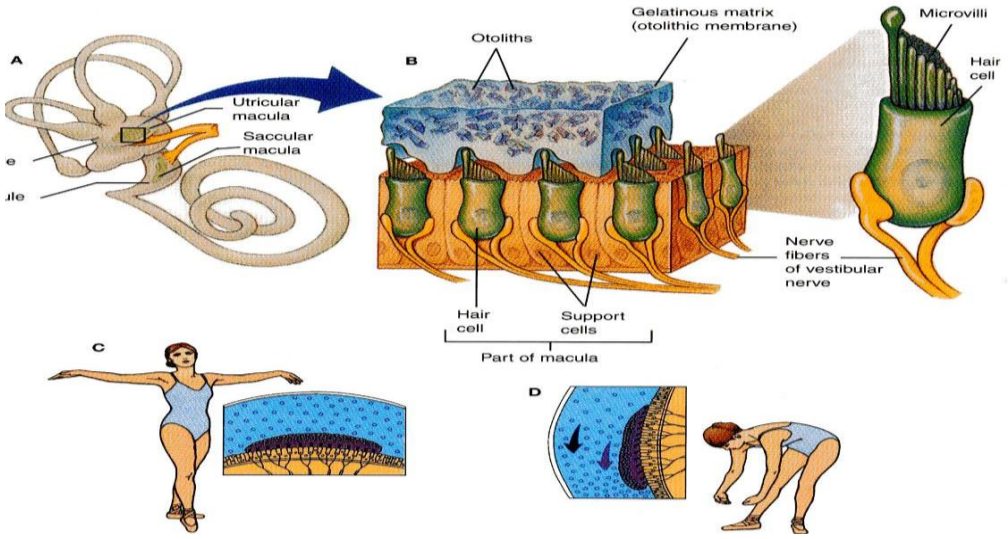
The Membranous Labyrinth

The Membranous Labyrinth consists of series of membranous sacs and ducts within the bony labyrinth, It is filled with ***endolymph***.

(**Four ducts & Two sacs**) Which are freely communicate with one another :

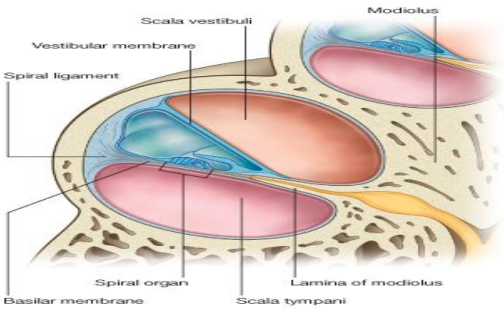
- **Sacs**: **Utricle & Saccule (**lodged in the bony vestibule).
- **Ducts**: **Three semicircular Ducts ,**(lie within the bony semicircular canals),
- **Cochlear Duct: (**lies within the bony cochlea).

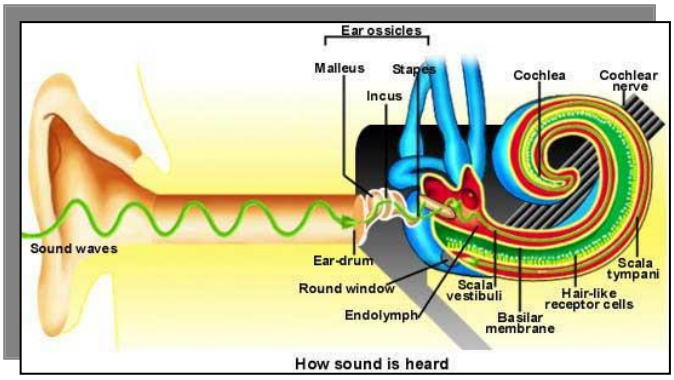




Located on the walls of the **utricle and saccule** are specialized sensory receptors, which are sensitive to the orientation of the head to gravity or other acceleration forces.

The utricle, saccule and semicircular ducts are concerned with maintenance of Equilibrium





- The highly specialized epithelium on the floor of cochlear duct forms **the Spiral organ of Corti** that
- **contains the sensory receptors for Hearing.**

MCQ

1- the ear wax is secreted by :
A. sebaceous and Ceruminous Glands.
B. the ossicles .
C. the tympanic membrane .
D. the Auditory Tube .

2-the auricle consist of thin plate of ……. Covered by double layers of skin.
A. Hyline cartilage.
B. Elastic crtilage .
C. Fibros cartilage .
D. Membranous tissue .

3-The function of auditory ossicles is :
A. Production of wax.
B. Work against collapse .
C. Transmit the vibration .
D. Protection from infection.

4-The Membranous Labyrinth consists of series of membranous sacs and ducts within the bony labyrinth, It is filled with:
A. Air .
B. Blood.
C. Endolymph.
D. Wax.

5-In Semicircular Canals Each canal has a swelling at one end called the :
A. Utricle.
B. Ampulla .
C. Cochlea .
D. Vestibule.

6-Below the floor of tympanic cavity we can find
A. Internal jugular vein
B. internal cortoid artery
C. brachiocephalic
D. maxillary artery

7-The utricle, saccule and semicircular ducts are concerned with maintenance of :
A. Pressure.
B. vision.
C. Temperature.
D. Equilibrium.

8-Infection can transmitted from pharynx to inner ear through :
A. auditory tube.
B. the tympanic membrane.
C. oral cavity .
D. Cranial cavity .

9-In the floor of cochlear duct we found the Spiral organ of Corti that Contains the sensory receptors for
A. Touch .
B. Temperature.
C. Hearing .
D. Movments.

10-The nerve suplly of Stapedius (the smallest voluntary muscle) is:
A. Auricular branch of vagus
B. Mandibular nerve.
C. Facial nerve .
D. Auriculotemporal nerve.

1	A
2	B
3	C
4	C
5	B
6	A
7	D
8	A
9	C
10	C

رابط يوتيوب مفيد

EAR ANATOMY

http://www.youtube.com/watch?v=sv7n-hEfBfA

GOOD LUCK

ANATOMY TEAM LEADERS:

FAHAD ALSHAYHAN & EMAN AL-BEDIEA.