

**Dr.Yousef & Dr.Abulmaaty labs**



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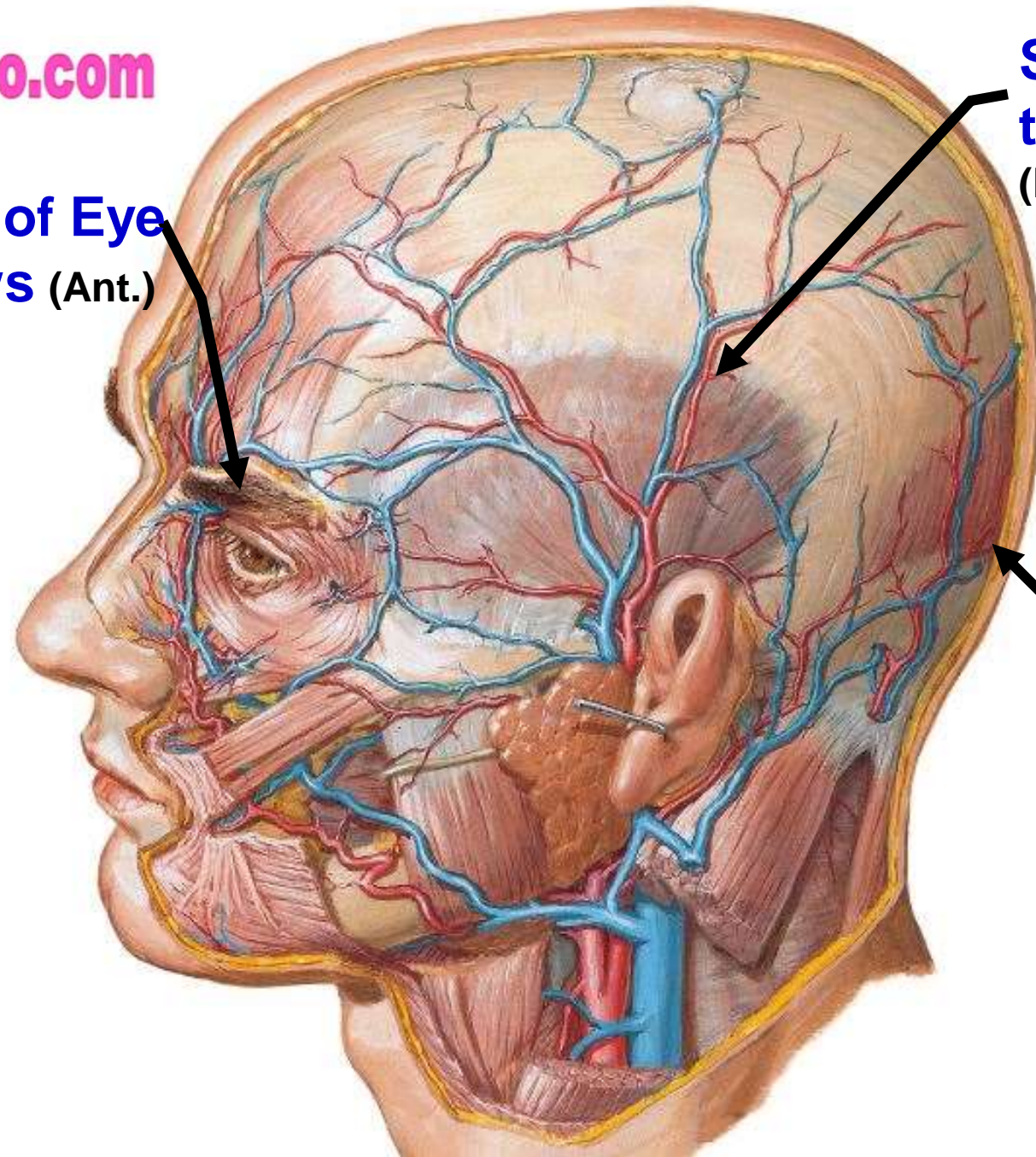
[dr\\_youssefhussein@yahoo.com](mailto:dr_youssefhussein@yahoo.com)

Extensions of scalp

Skin of Eye  
brows (Ant.)

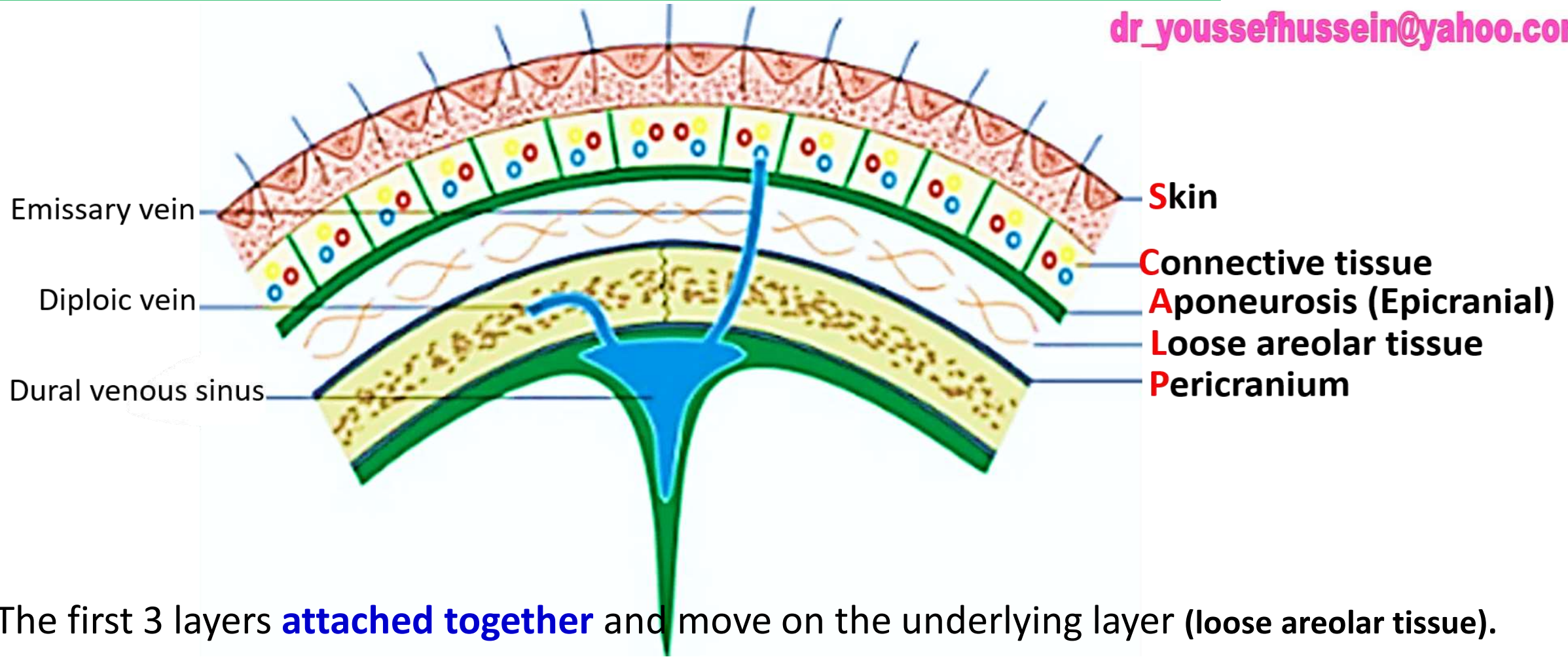
Superior  
temporal line  
(Lateral)

External  
occipital  
protuberance  
+ highest  
nuchal line  
(post.)



# Layers of the scalp : 5 layers (S.C.A.L.P.)

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- The first 3 layers **attached together** and move on the underlying layer (loose areolar tissue).
- \*Loose areolar tissue = **dangerous zone**
- **Pericranium (periosteum)**: adherent at the **sutures** of the skull

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# Occipitofrontalis muscle



**Epicranial aponeurosis**

**Occipitofrontalis Muscle**

**Frontal belly**

**Skin of the eye  
brow and root  
of the nose**

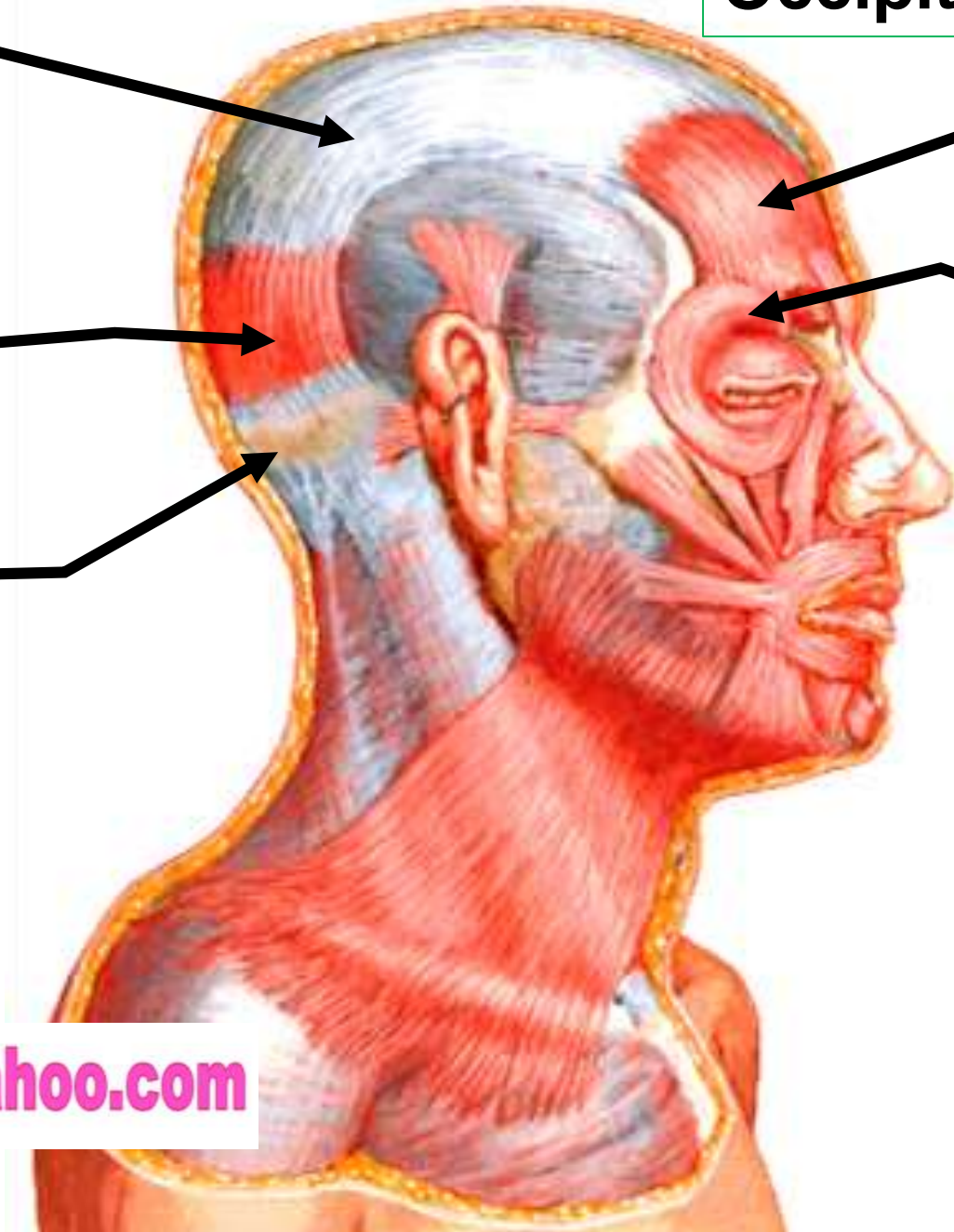
**No bony attachment**

**Occipital belly**

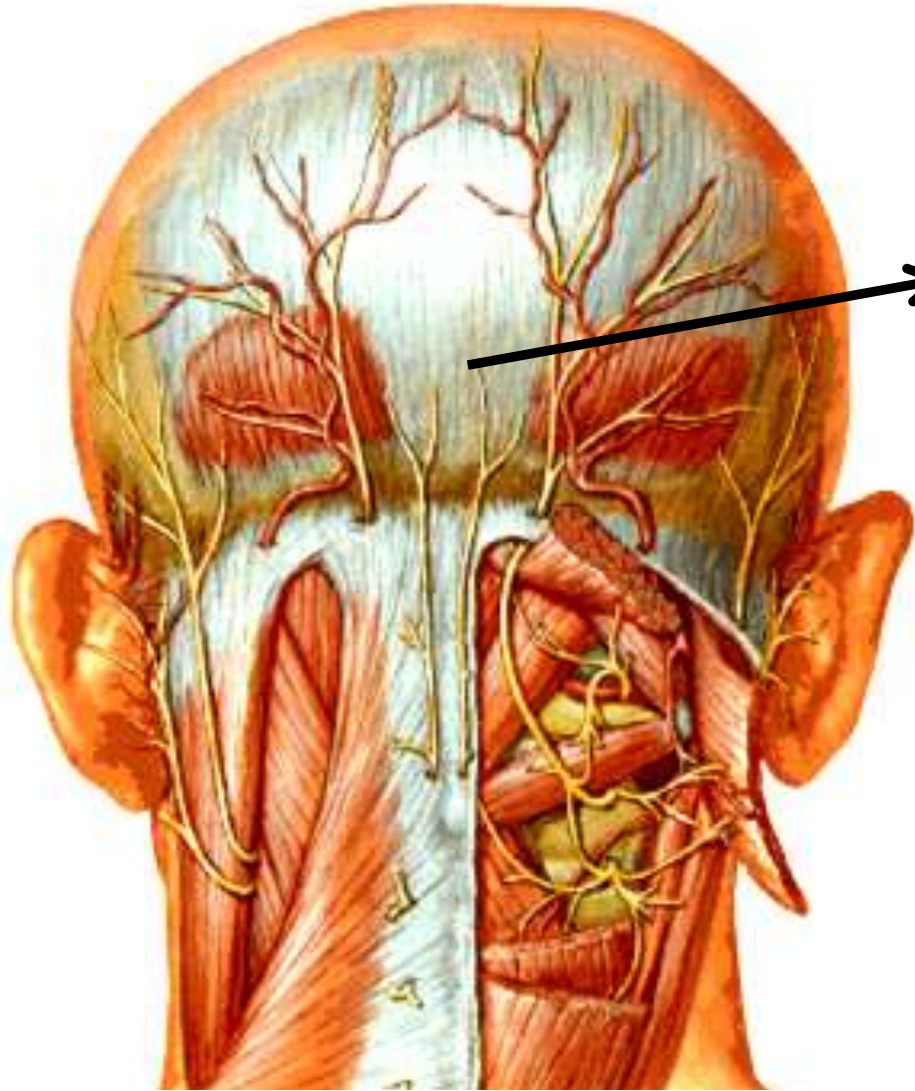
**Highest nuchal  
line**

**\*Epicranial aponeurosis:**  
insertion of occipital belly, origin  
of frontal belly

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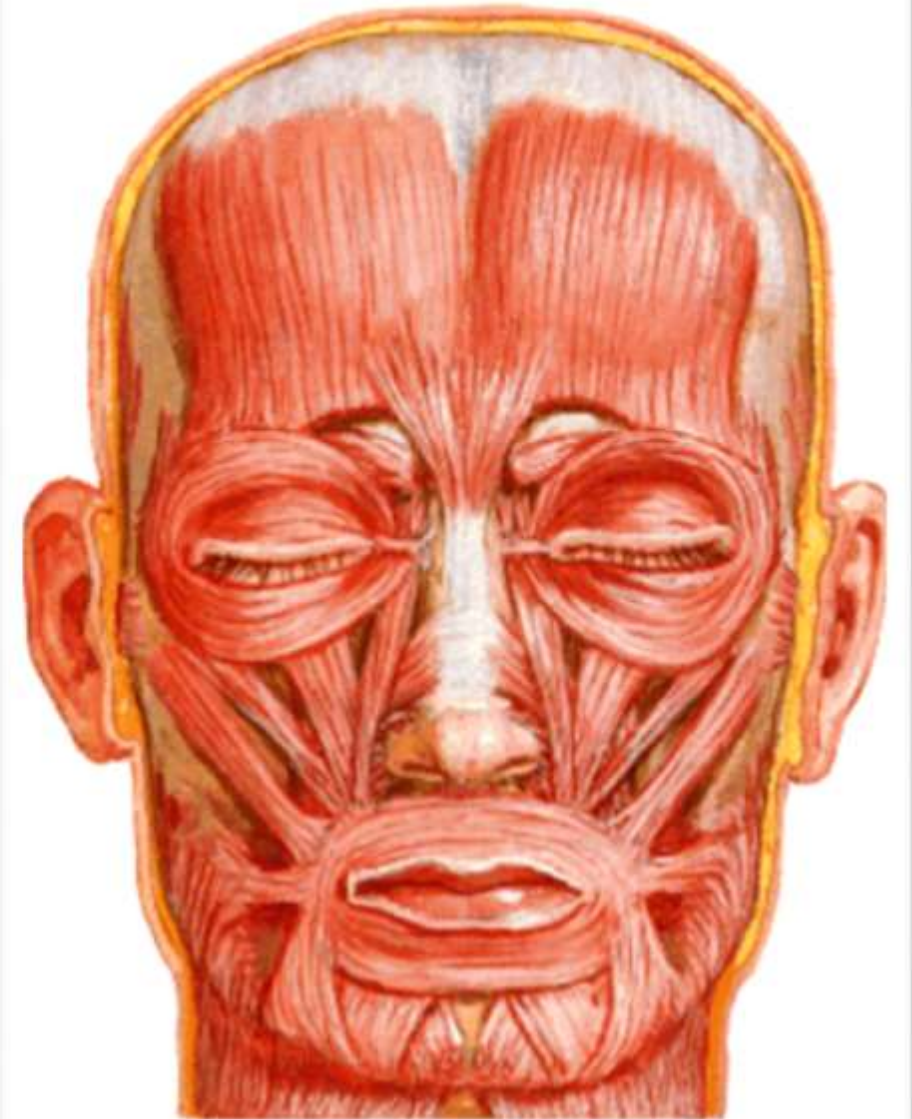


## Occipital bellies



epicranial aponeurosis  
(*galea aponeurotica*).

## Frontal bellies





- \* **Action of frontal belly**
- **Elevate the eye brows**  
(*expression of surprise*).



- \* **Action of occipital belly**
- **Pull the scalp backward**  
leading to smooth skin of  
forehead.

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- Bleeding under the first 3 layers forms diffuse hematoma extending throughout the scalp and reach the upper eye lids (Black eye).



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- Fracture of the skull bone produces a localized hematoma because the periosteum is firmly attached to the sutures.

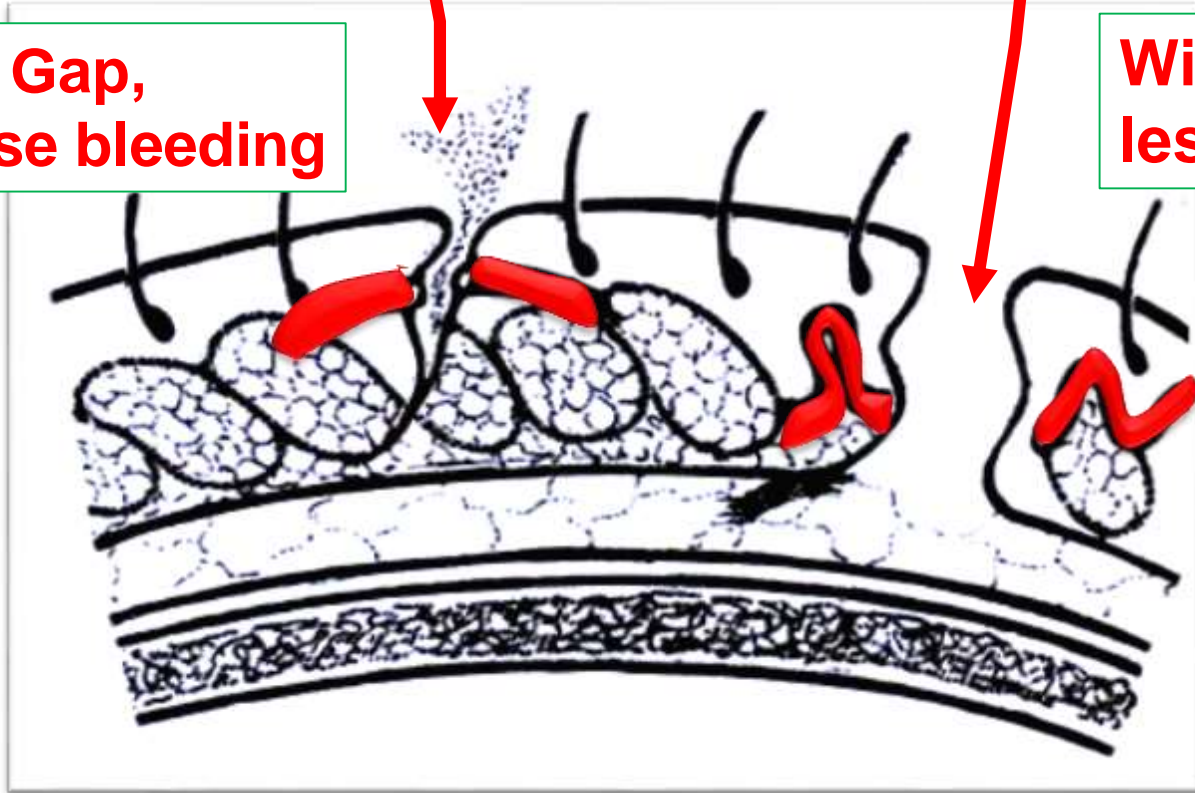
Cut wound in subcutaneous area

Cut wound involving epicranial aponeurosis



Small Gap,  
Profuse bleeding

Wide Gap,  
less bleeding



**Horizontal Cut wound** of The front of scalp leading to Wide Gap due to **retraction** of occipitofrontalis muscle

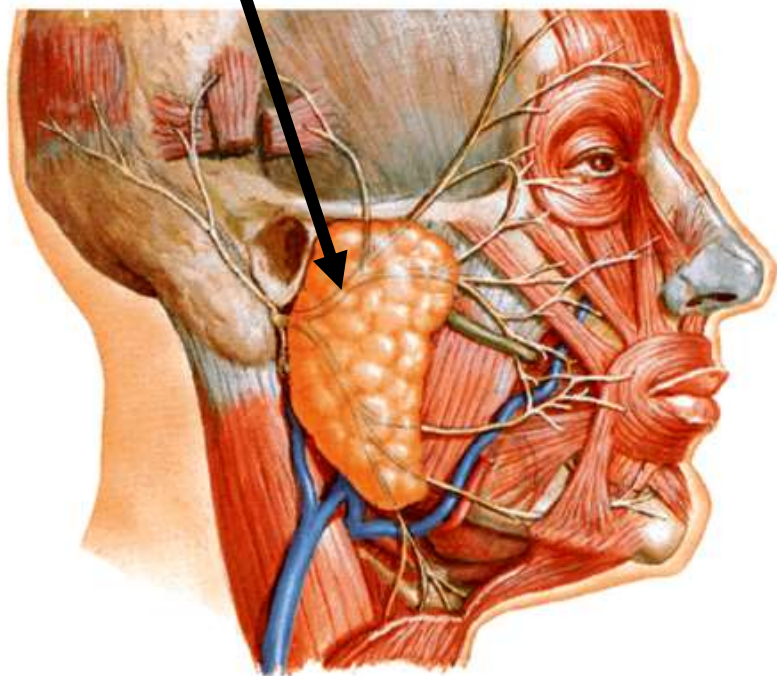
The image features a central red starburst shape with many sharp points. This starburst is set against a background that is a gradient of green and yellow, also with a starburst-like pattern. The text "Nerve supply of scalp" is written in white, bold, sans-serif font across the center of the red starburst.

**Nerve supply  
of scalp**

**Nerves in front auricle**

**Auriculotemporal nerve S**

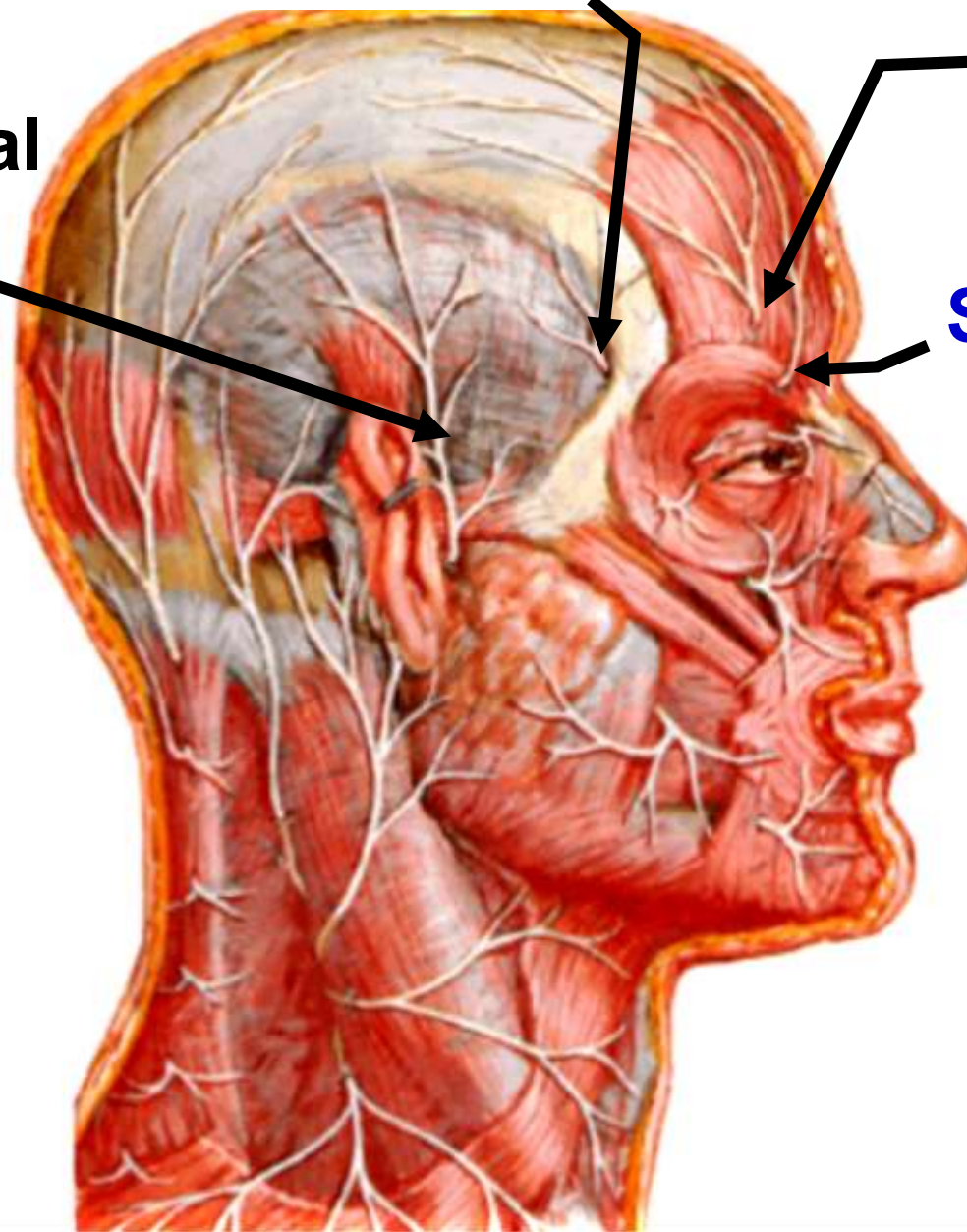
**Temporal nerve M**



**Zygomaticotemporal nerve S**

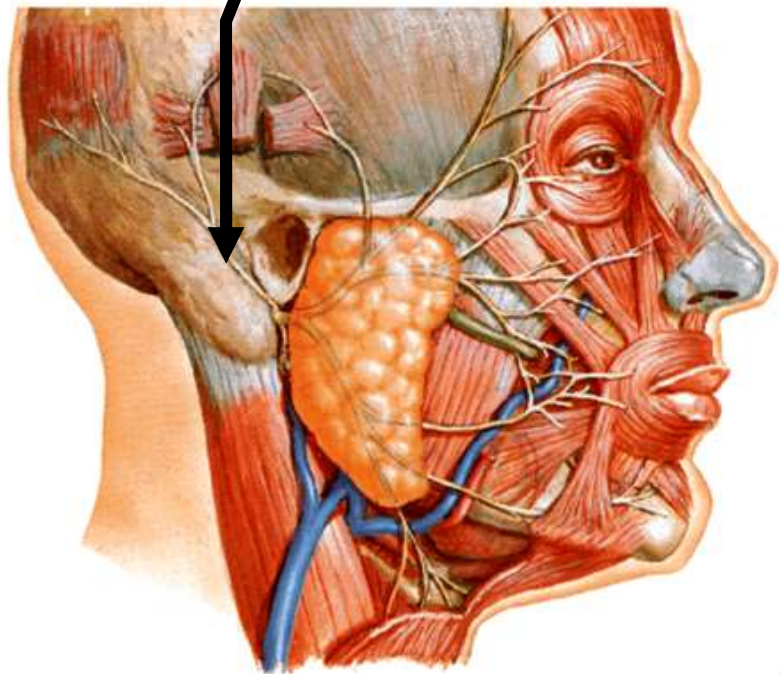
**Supraorbital nerve S**

**Supratrochlear nerve S**



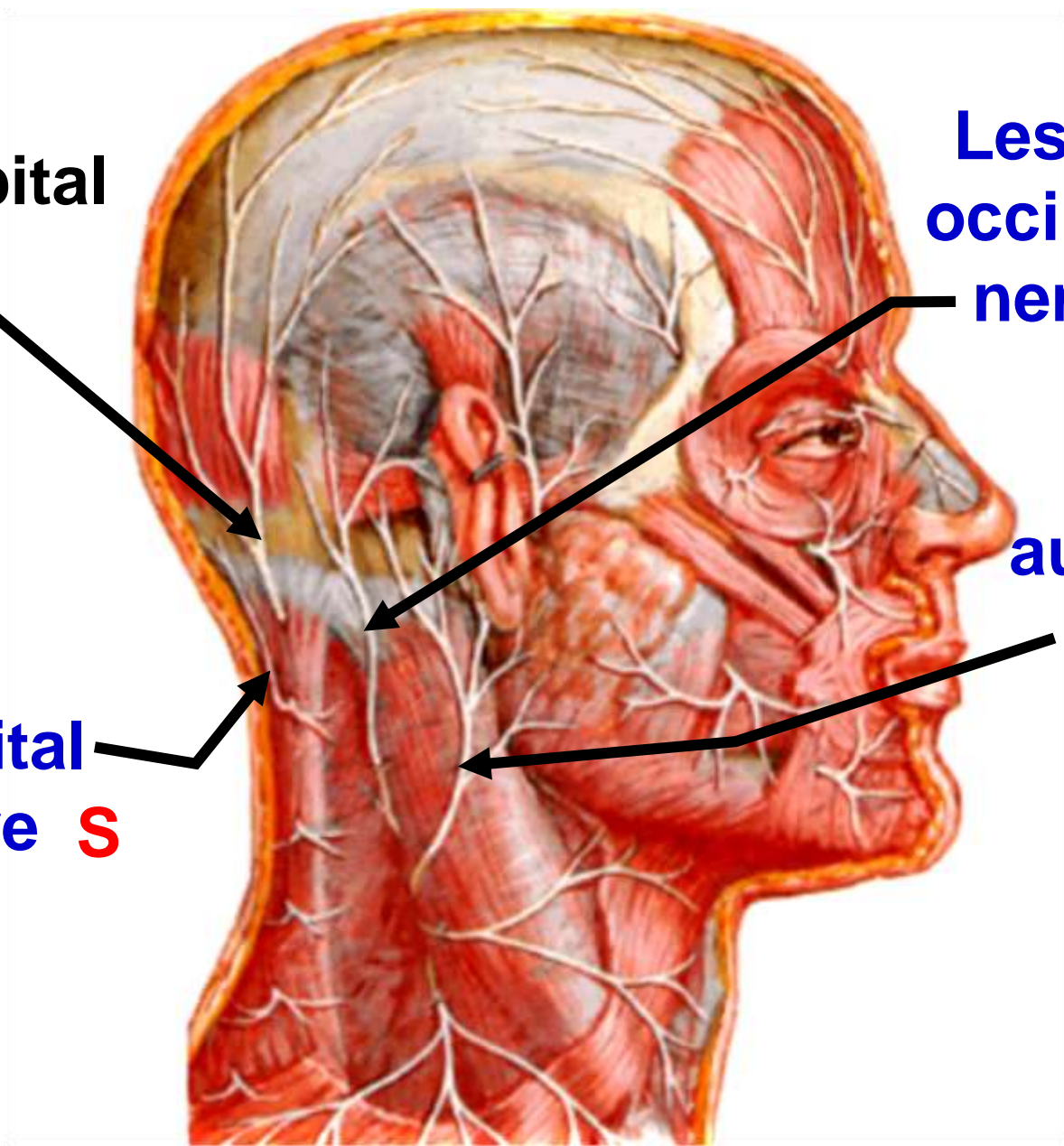
## Nerves behind auricle

Posterior  
auricular nerve  
**M**



Greater occipital  
nerve **S**

3rd  
occipital  
nerve **S**



Lesser  
occipital  
nerve **S**

Great  
auricular  
nerve **S**



**Blood supply  
of scalp**

**1) Posterior Auricular artery**

**3) Supratrochlear artery**

**Ophthalmic artery**

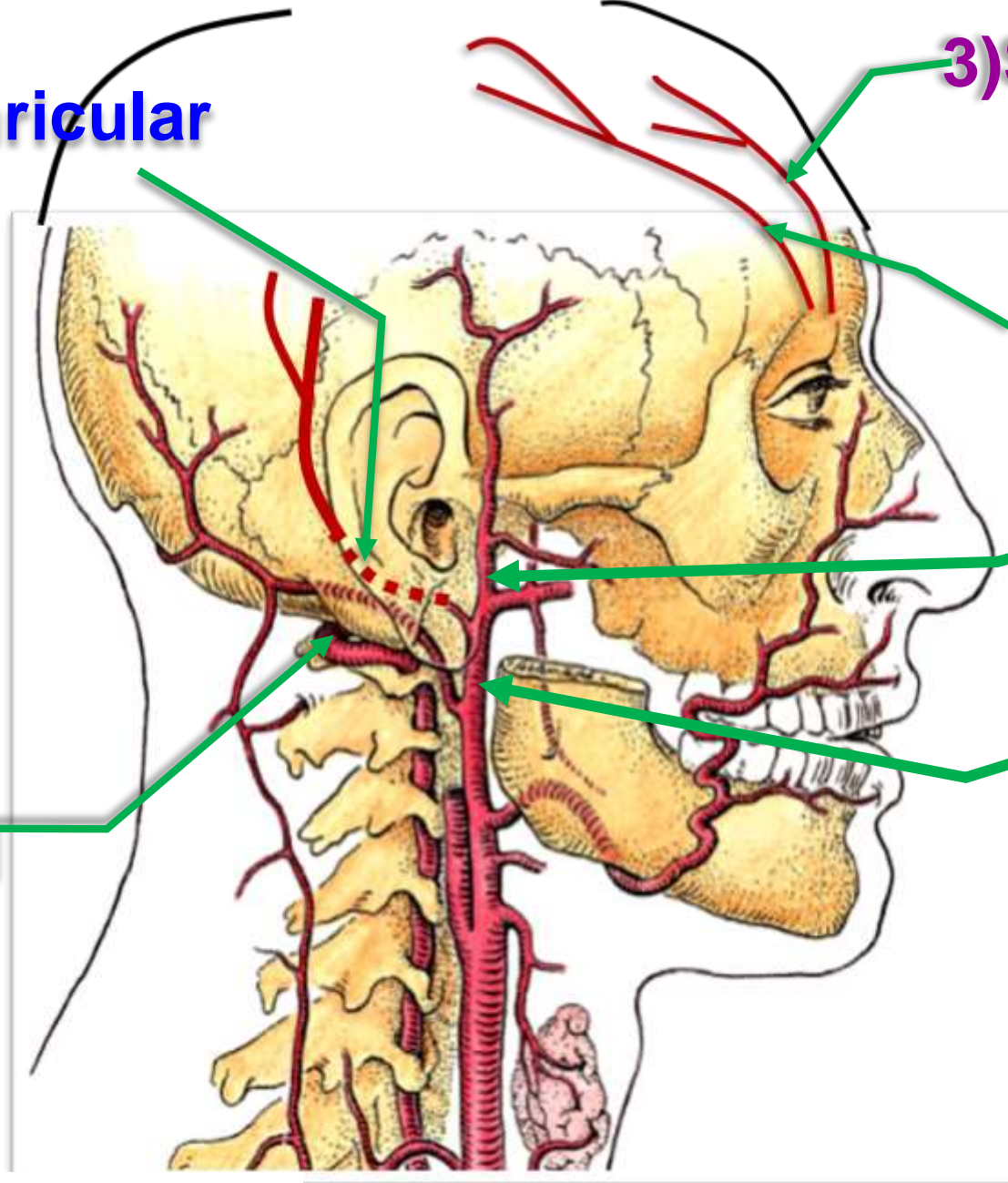
**4) Supraorbital artery**

**5) Superficial temporal artery**

**External carotid artery**

**2) occipital artery**

**1+2: behind the auricle**  
**3+4+5: in front of the auricle**





- **Superficial temporal artery:**

-Smallest terminal branches of the external carotid artery

- **Branches:**

(1) **Glandular** to the parotid gland.

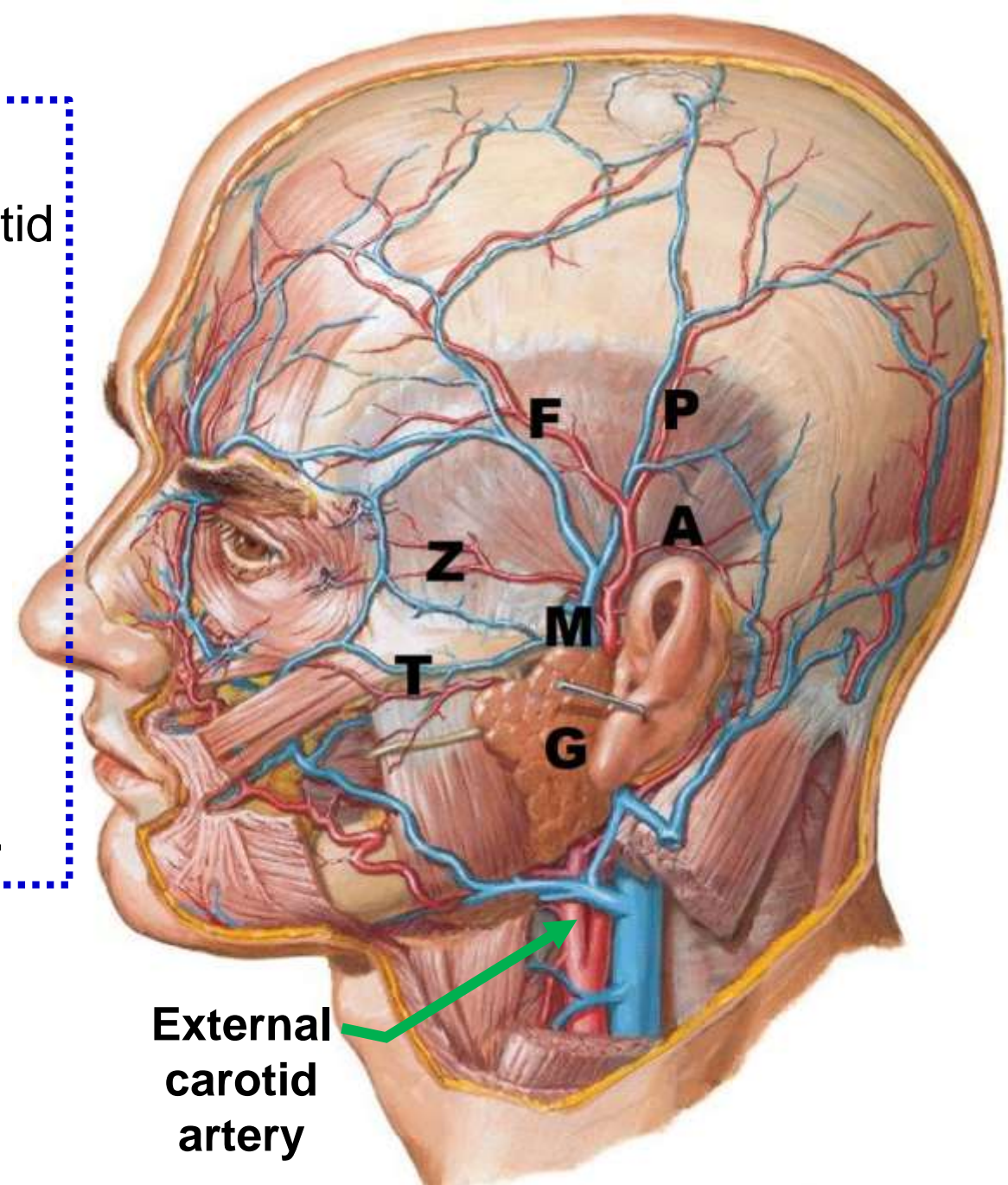
(2) **Transverse facial** artery.

(3) **Zygomaticoorbital** artery.

(4) **Anterior auricular** artery.

(5) **Middle temporal** artery (the largest branch)

(6) **Terminal** branches (Frontal & Parietal) : to scalp.

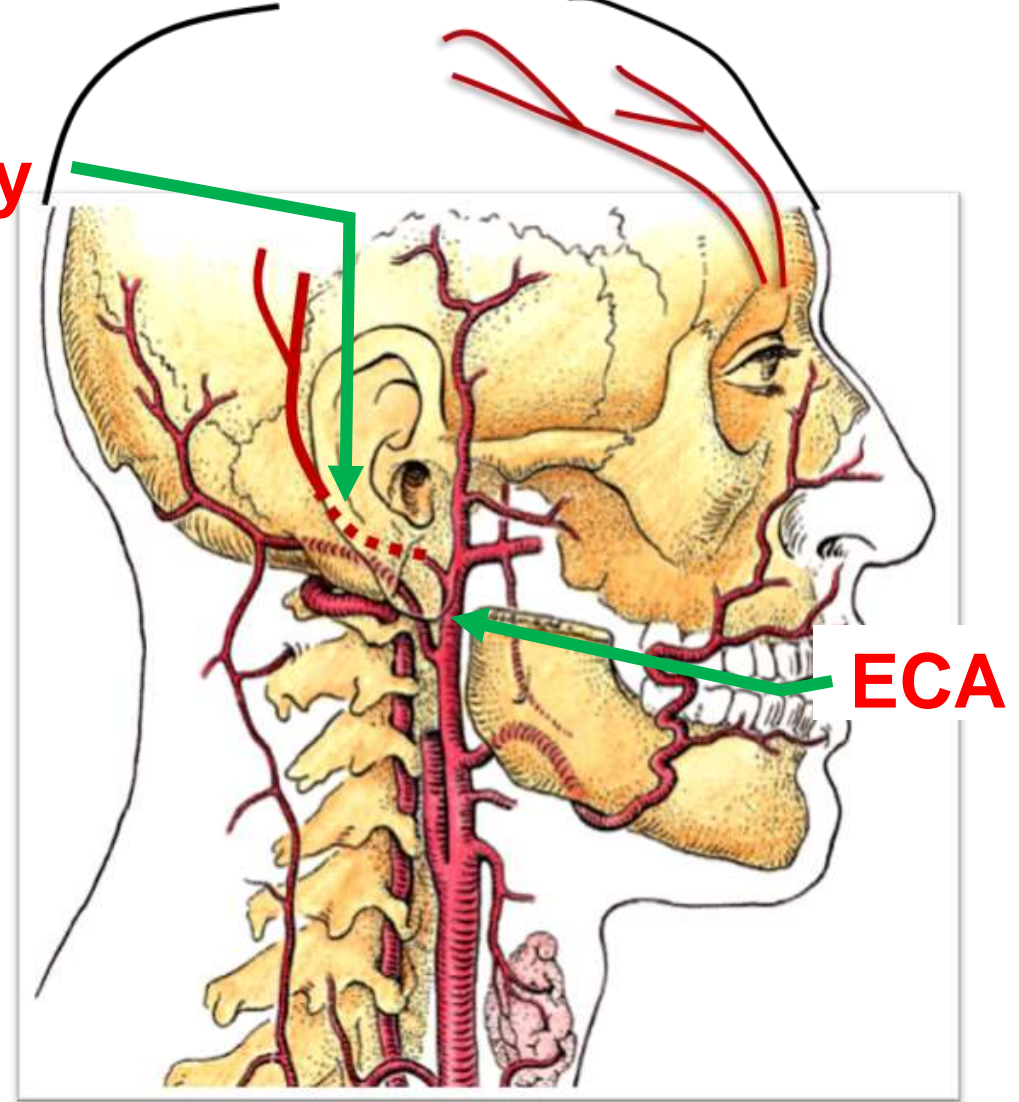


External  
carotid  
artery

## Posterior auricular artery

- **Posterior auricular artery**

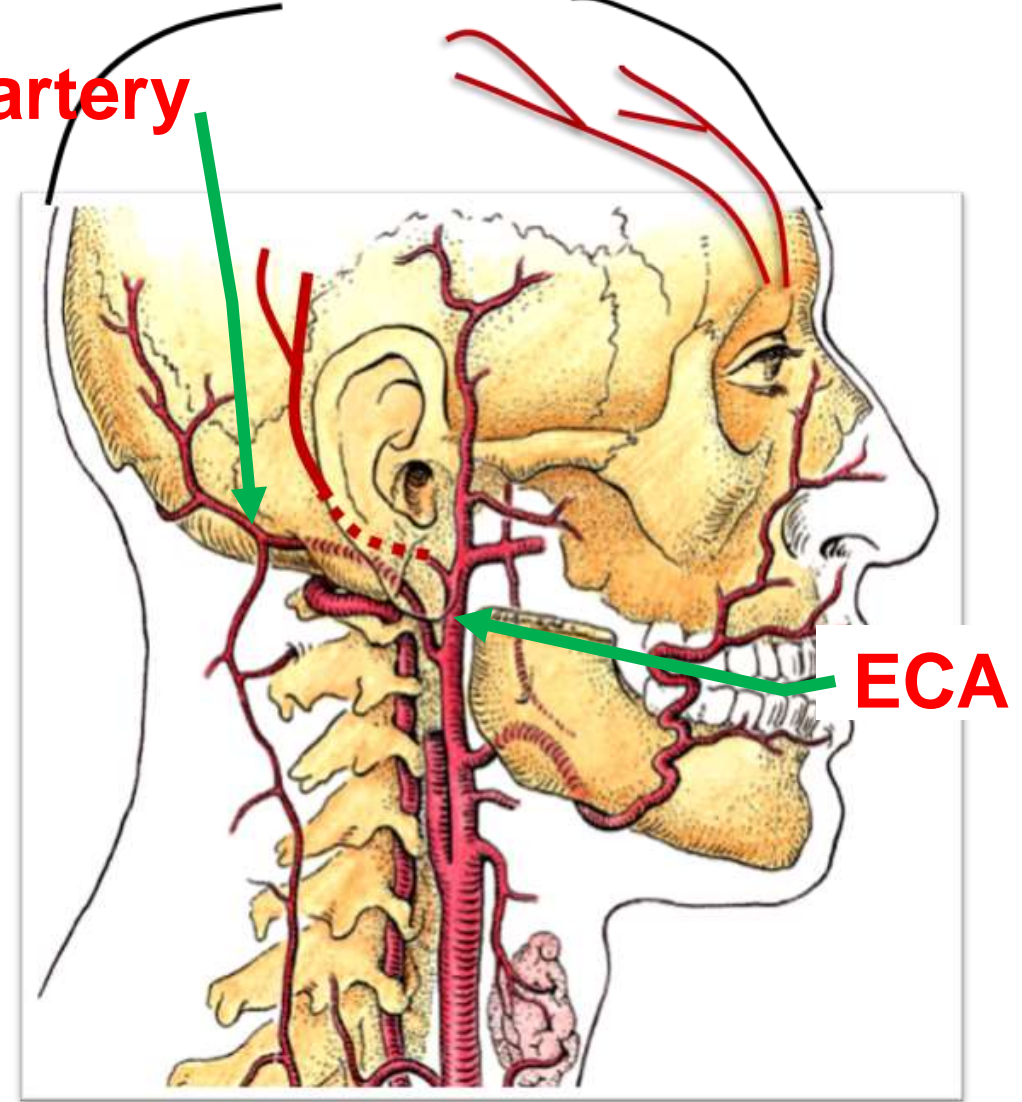
-branch of the external carotid artery.

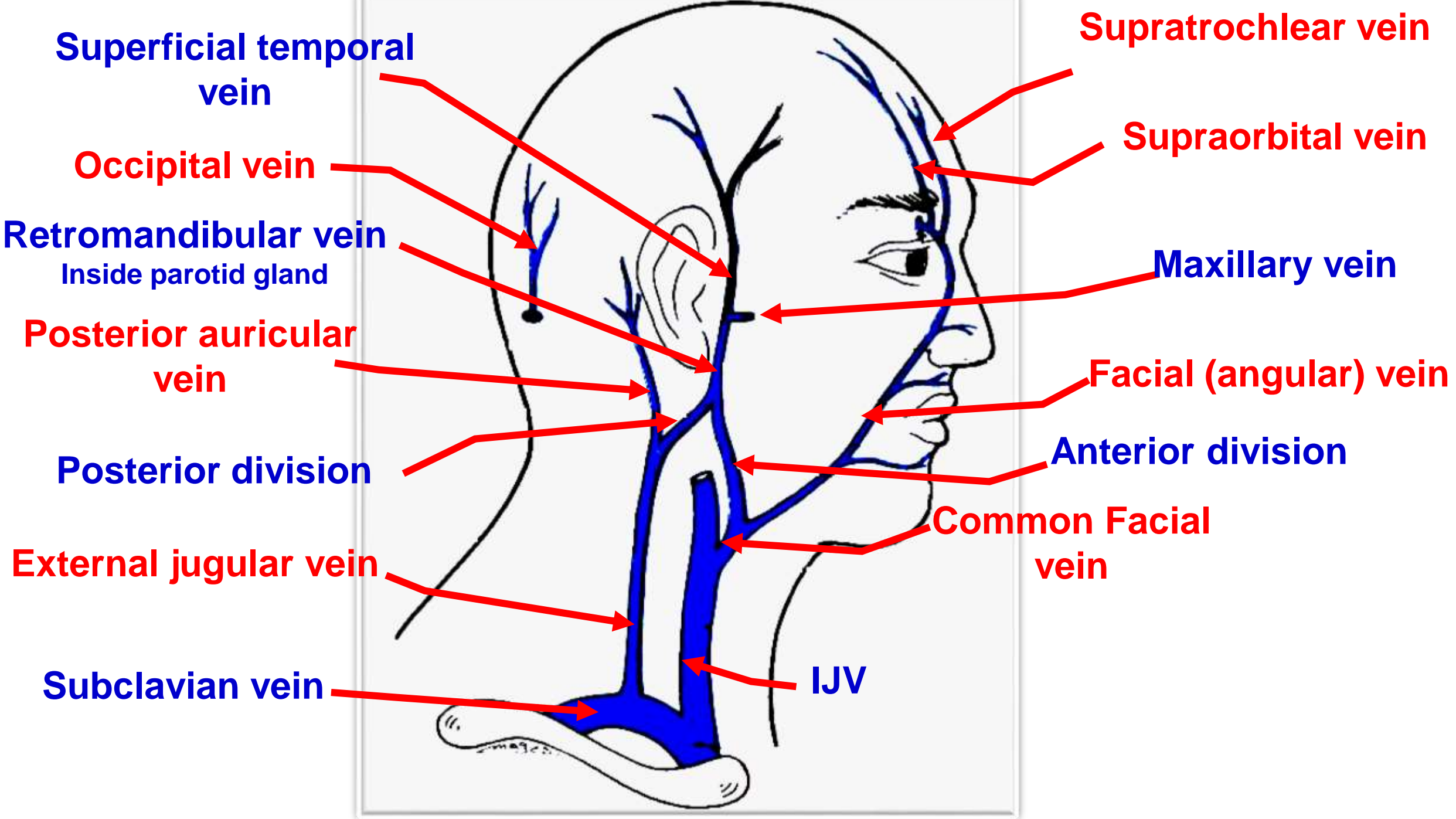


## Occipital artery

- **Occipital artery**

-: branch of the external carotid artery.





**Superficial temporal vein**

**Occipital vein**

**Retromandibular vein**  
Inside parotid gland

**Posterior auricular vein**

**Posterior division**

**External jugular vein**

**Subclavian vein**

**Supratrochlear vein**

**Supraorbital vein**

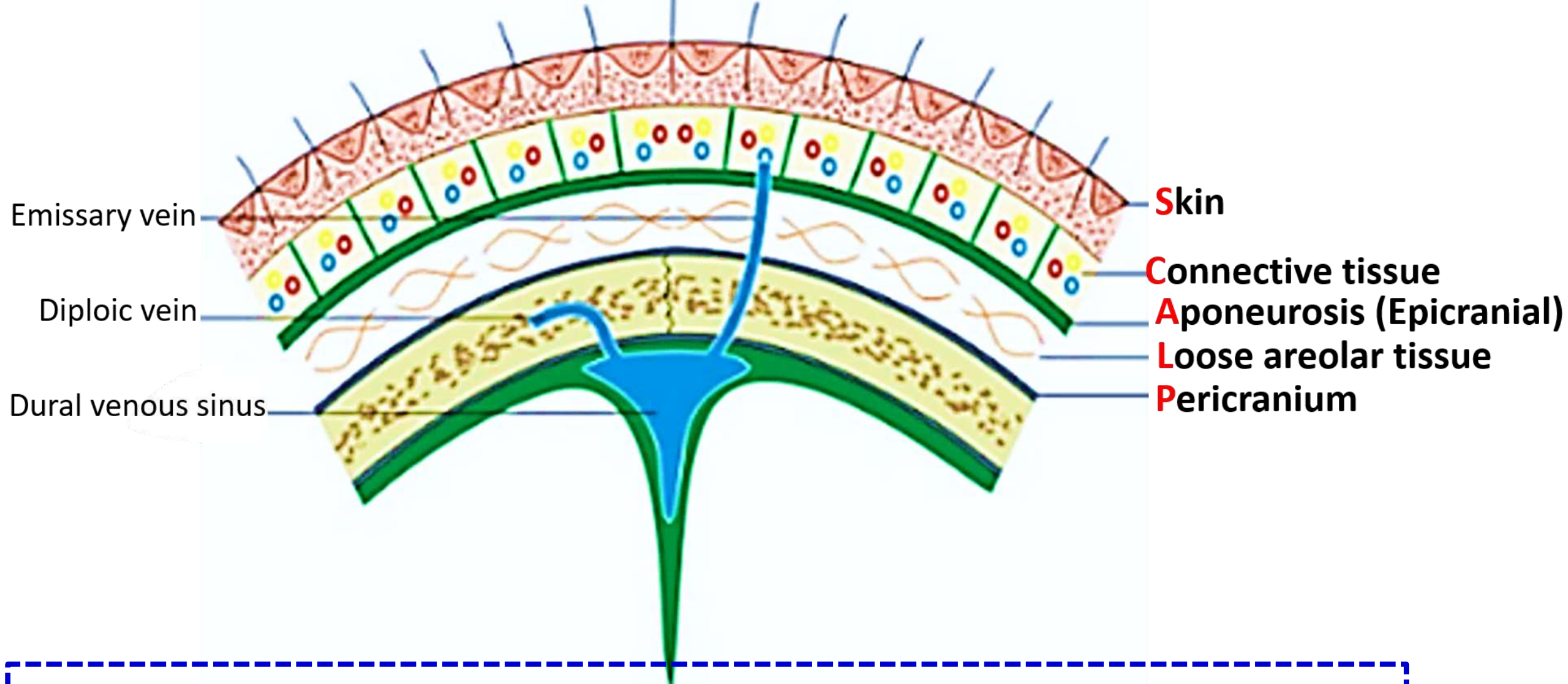
**Maxillary vein**

**Facial (angular) vein**

**Anterior division**

**Common Facial vein**

**IJV**



- **Scalp infection** localized in the **loose areolar layer** spreads to the intracranial dural venous sinuses through emissary veins (valveless), causing **meningitis** or **septicemia**.

boundaries  
of face



# STRUCTURE OF SKIN:

## 3 layers:

- 1) skin
- 2) superficial fascia
- 3) muscles of face

## **Fascia:**

### superficial:

-contains fat, muscles of face, vessels and nerves of face.

### deep:

absent



**superficial fascia contain:**  
-facial muscles  
-vessels & nerves



# STRUCTURE \*\*\*

## skin:

1-wounds of face tend to gap.

2-Horizontal wrinkles of forehead

3-Crow's foot wrinkles at lateral angle of the eye.



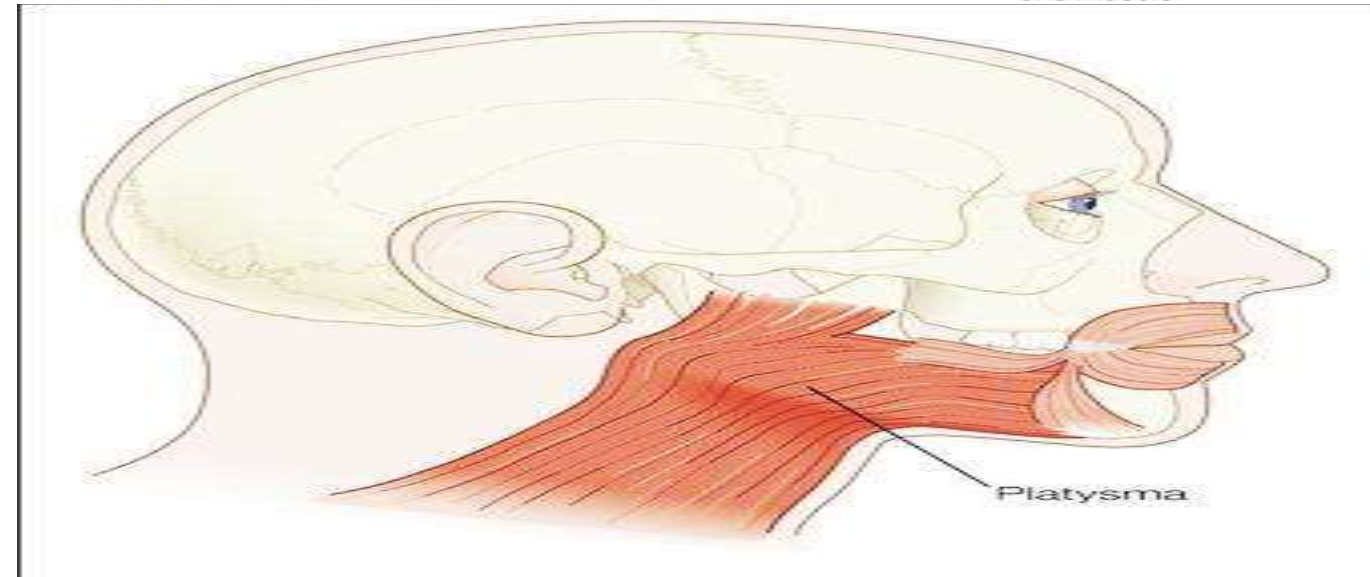
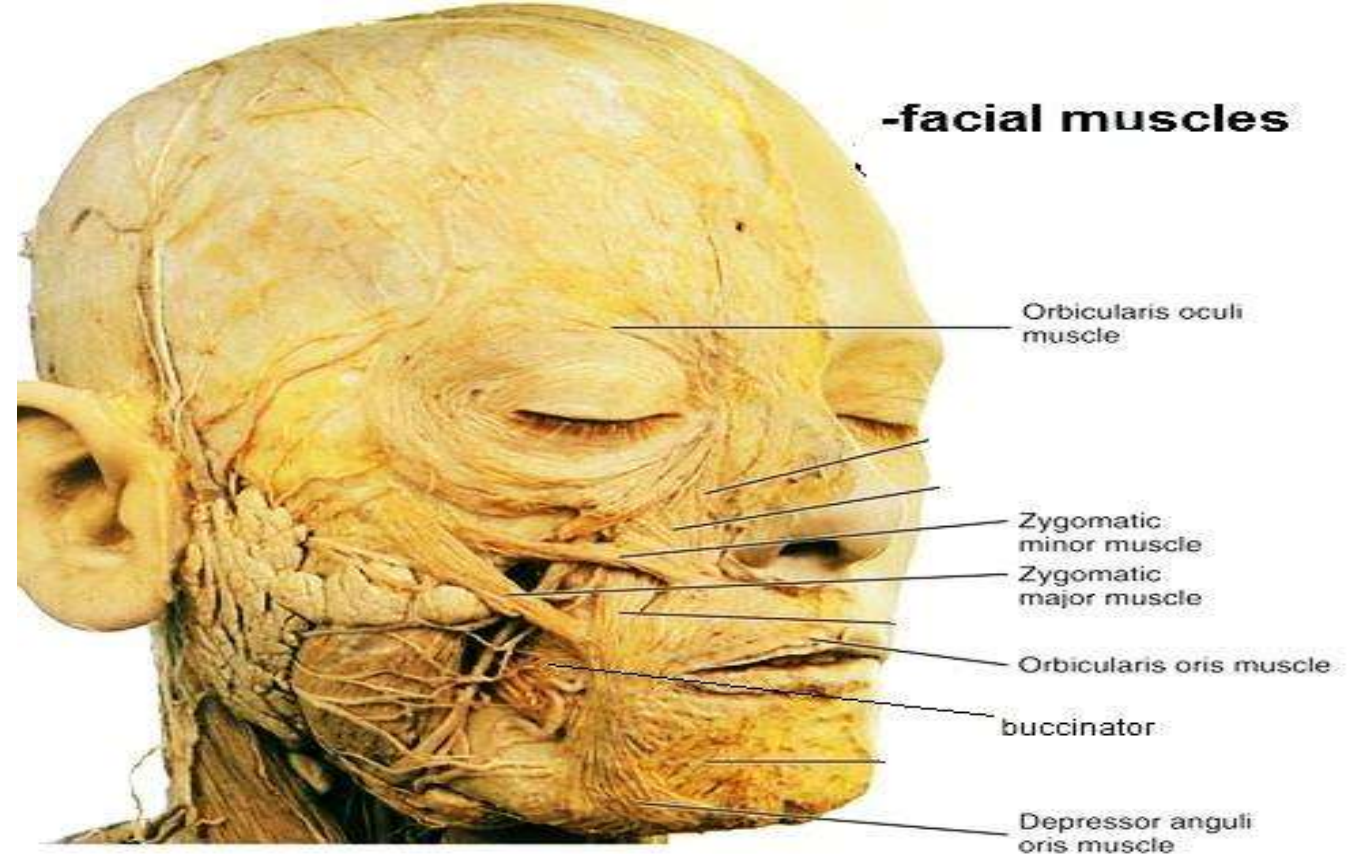


# STRUCTURE

## Muscles

- present in superficial fascia

\*platysma included in muscles of facial expression.



# STRUCTURE

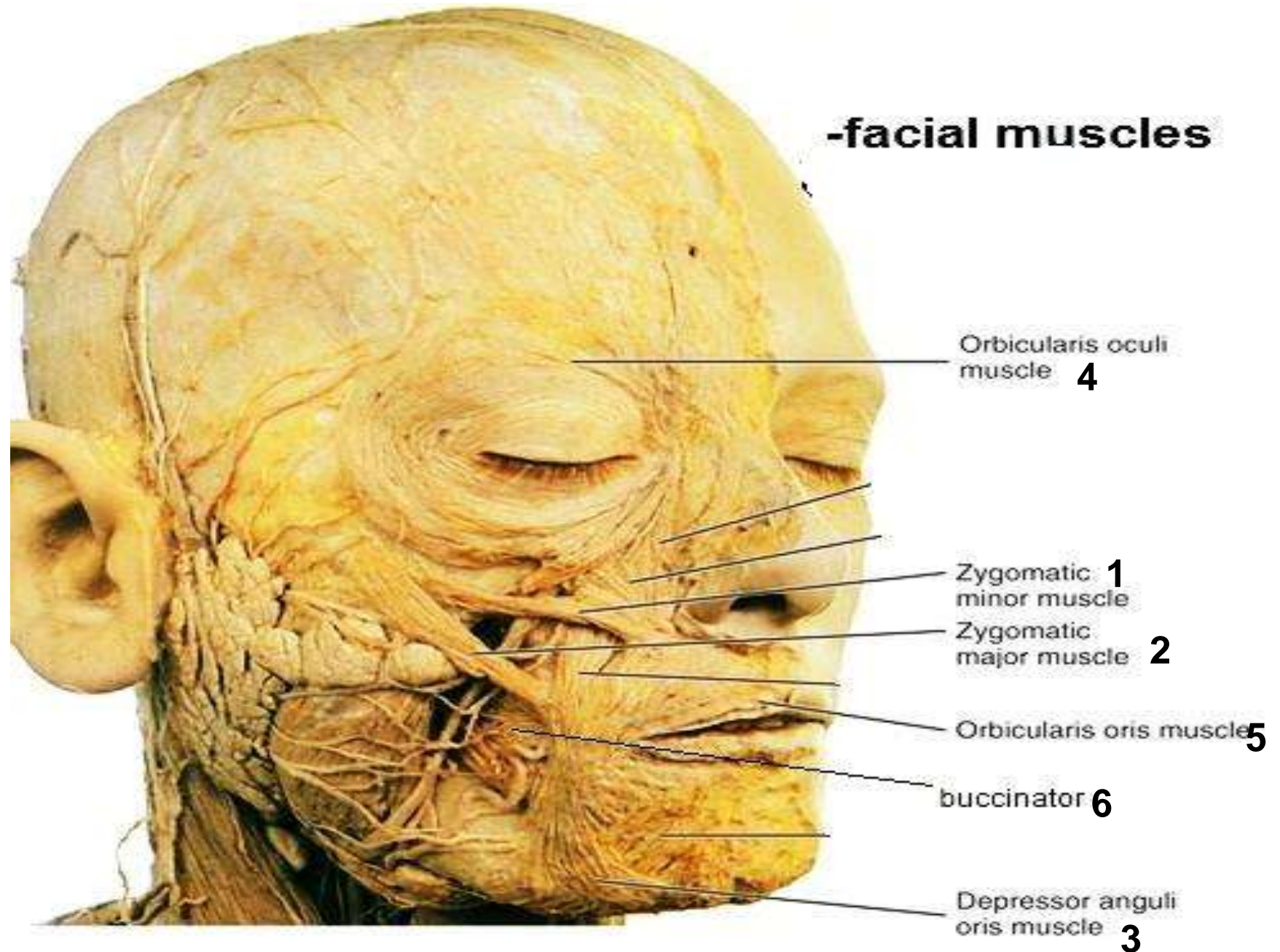
## Muscles

Small muscles

1+ 2+ 3

Large muscles

4+ 5+ 6

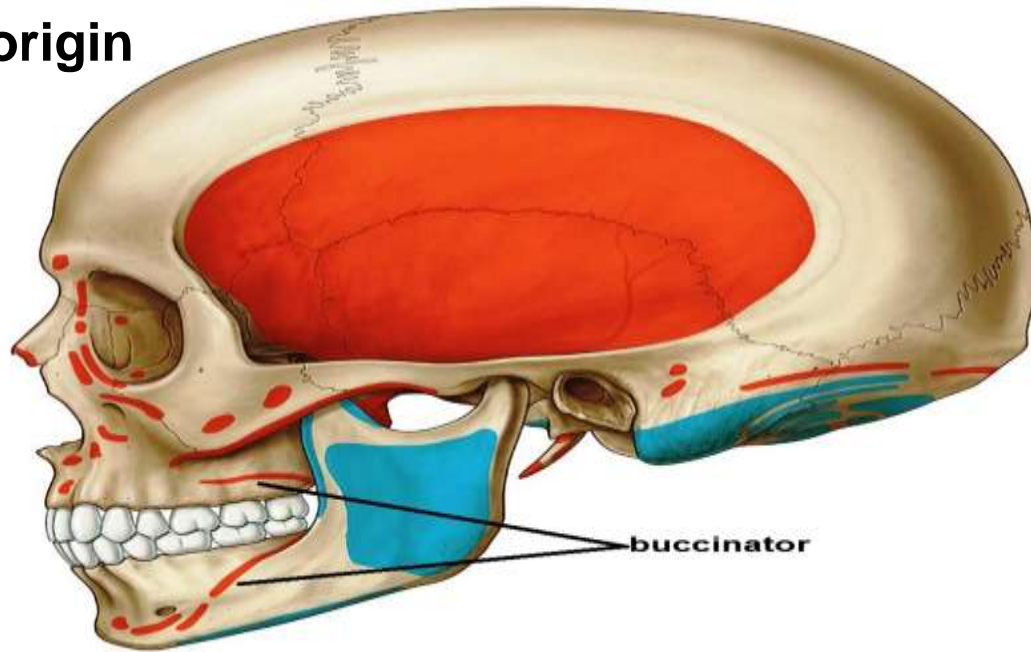


# STRUCTURE

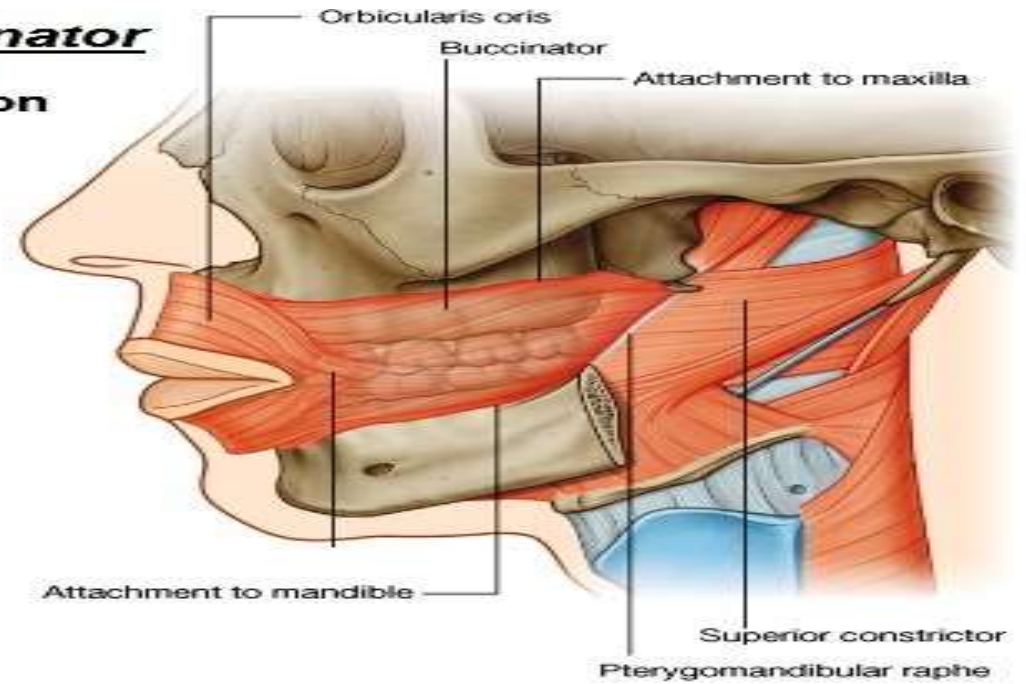
## Muscles

### Buccinator: muscle of cheek

origin



**buccinator**  
-origin  
-insertion

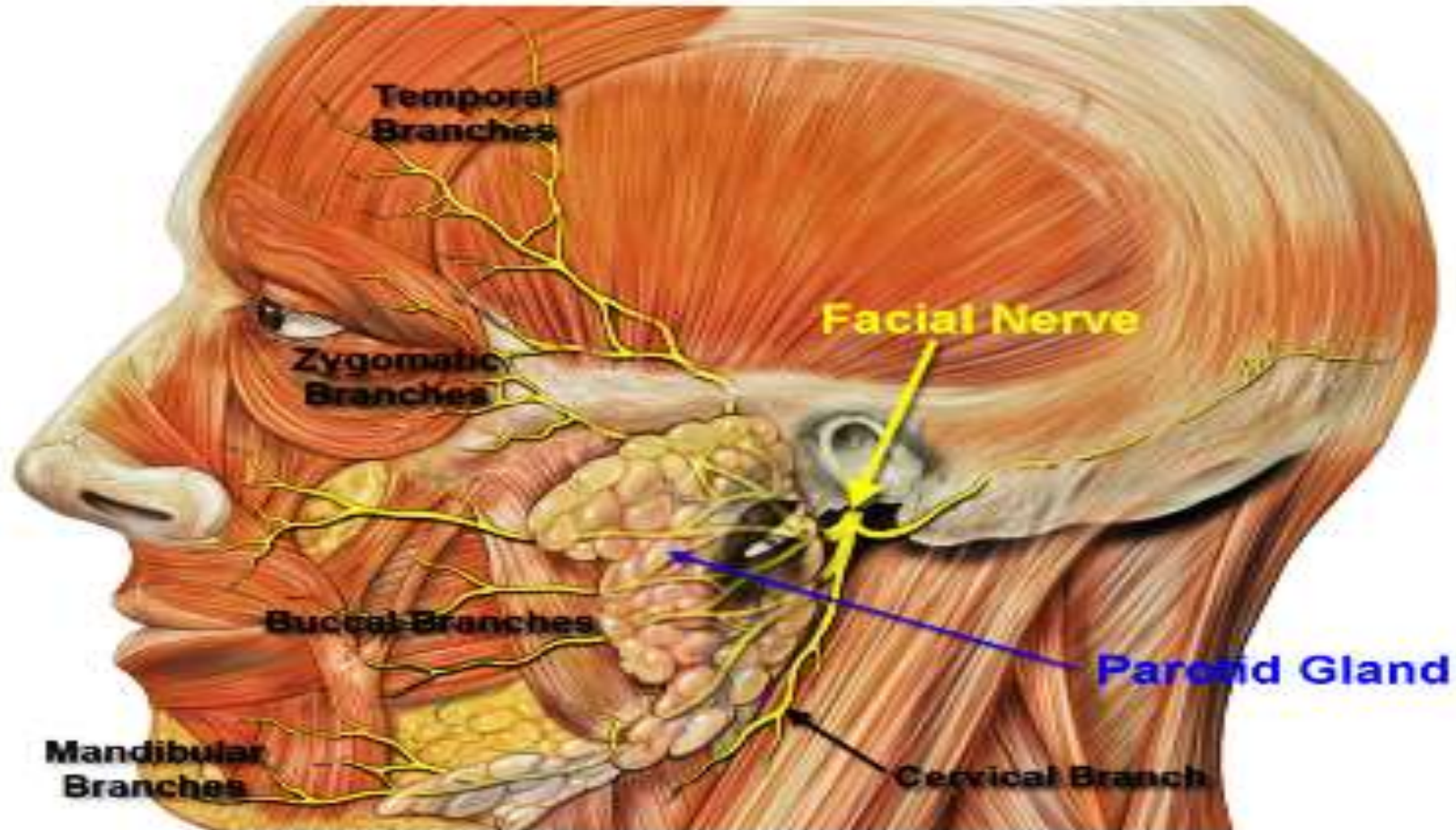


# STRUCTURE

## Muscles

## N.S of Buccinator

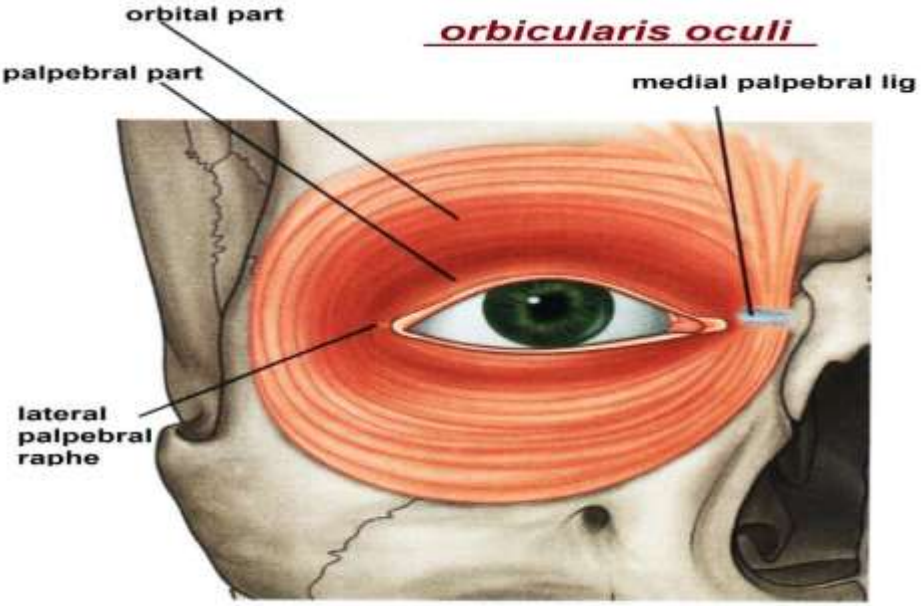
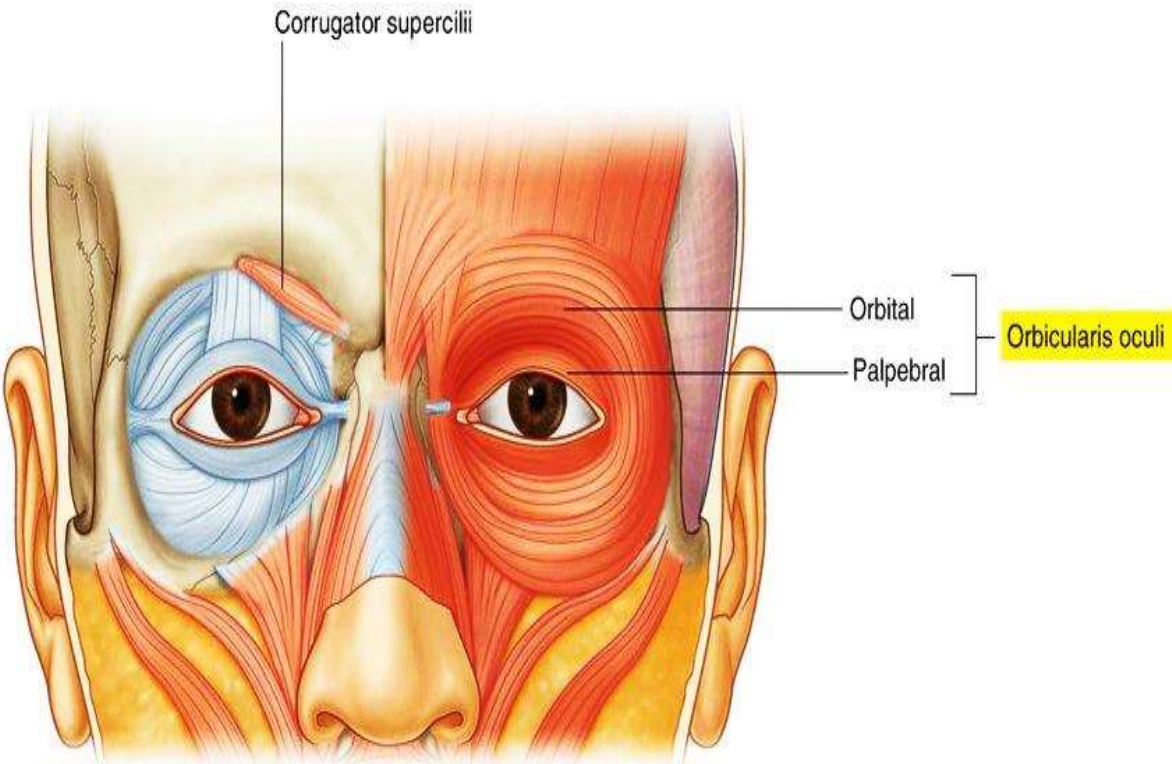
buccal br. of facial n.



# STRUCTURE

## Muscles

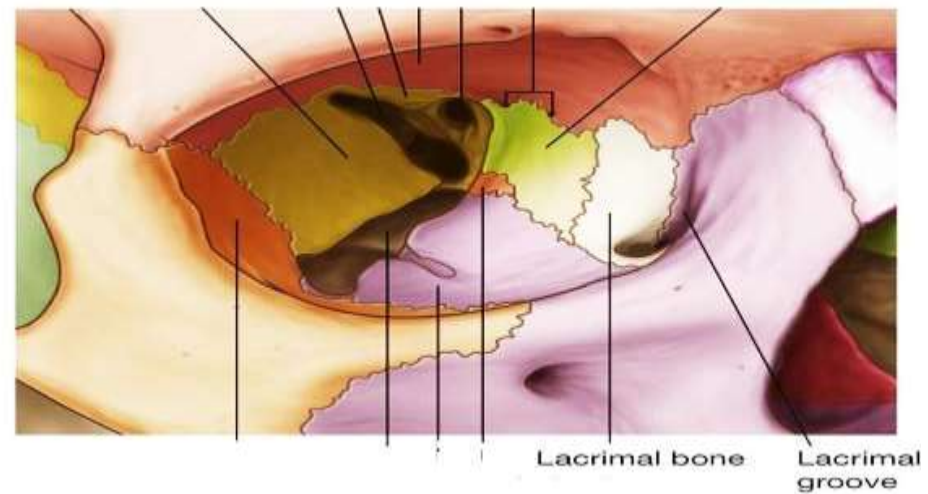
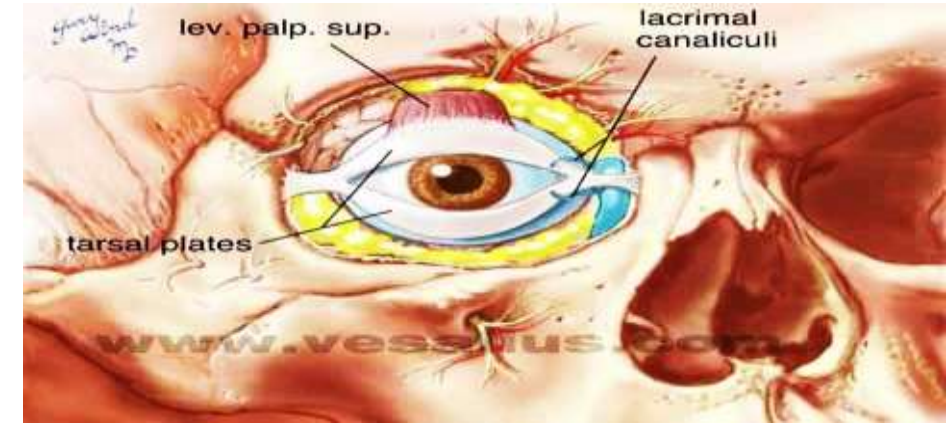
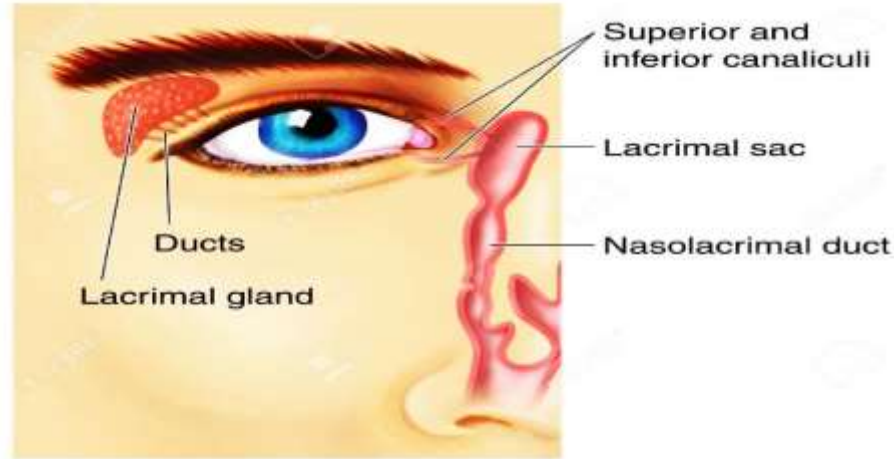
### Orbicularis Oculi: sphincter of eye



# STRUCTURE

## Muscles

## orbicularis oculi.



# STRUCTURE

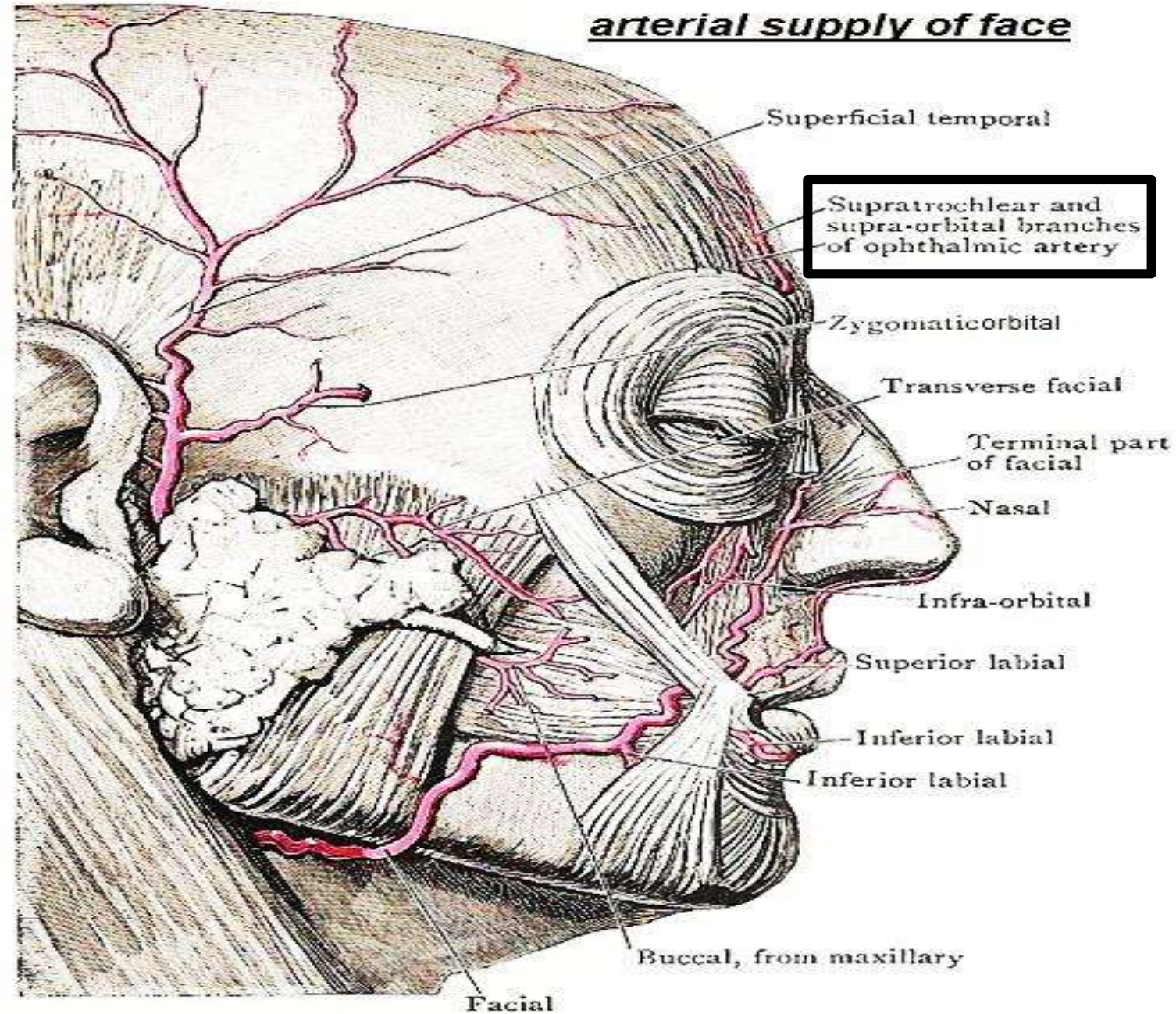
## Muscles

**Orbicularis oris: sphincter of mouth**



# ARTERIAL SUPPLY OF FACE

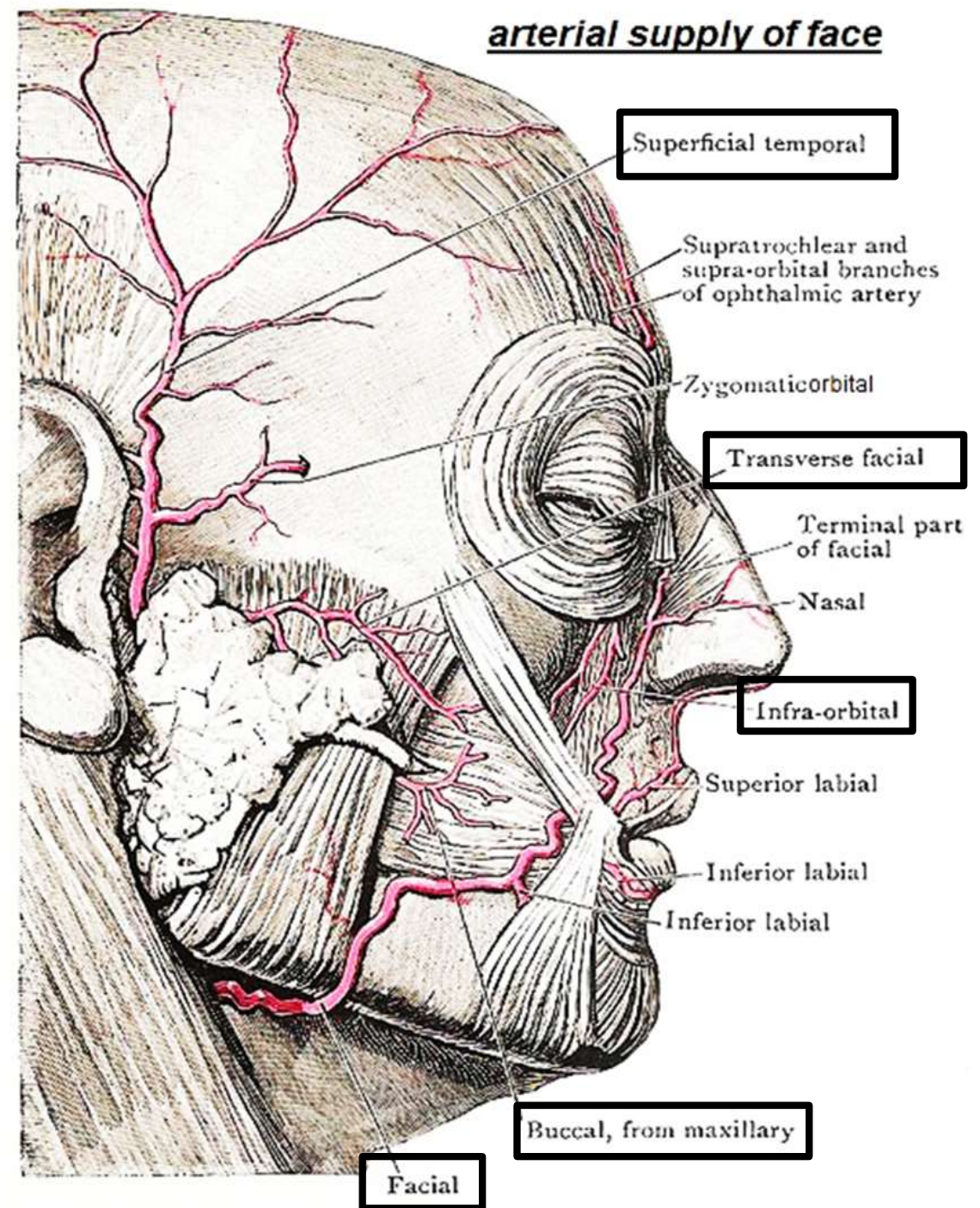
- internal carotid art:** gives  
**ophthalmic art.** Which gives
- supratrochlear art.
  - supraorbital art.





# ARTERIAL SUPPLY OF FACE

**External carotid art:** gives  
**superficial temporal art.** gives  
transverse facial art.  
**maxillary art.:** gives  
infra orbital art.  
inferior alveolar art.  
buccal art.  
**facial art. (main)**



# ARTERIAL SUPPLY OF FACE

facial art. (main)

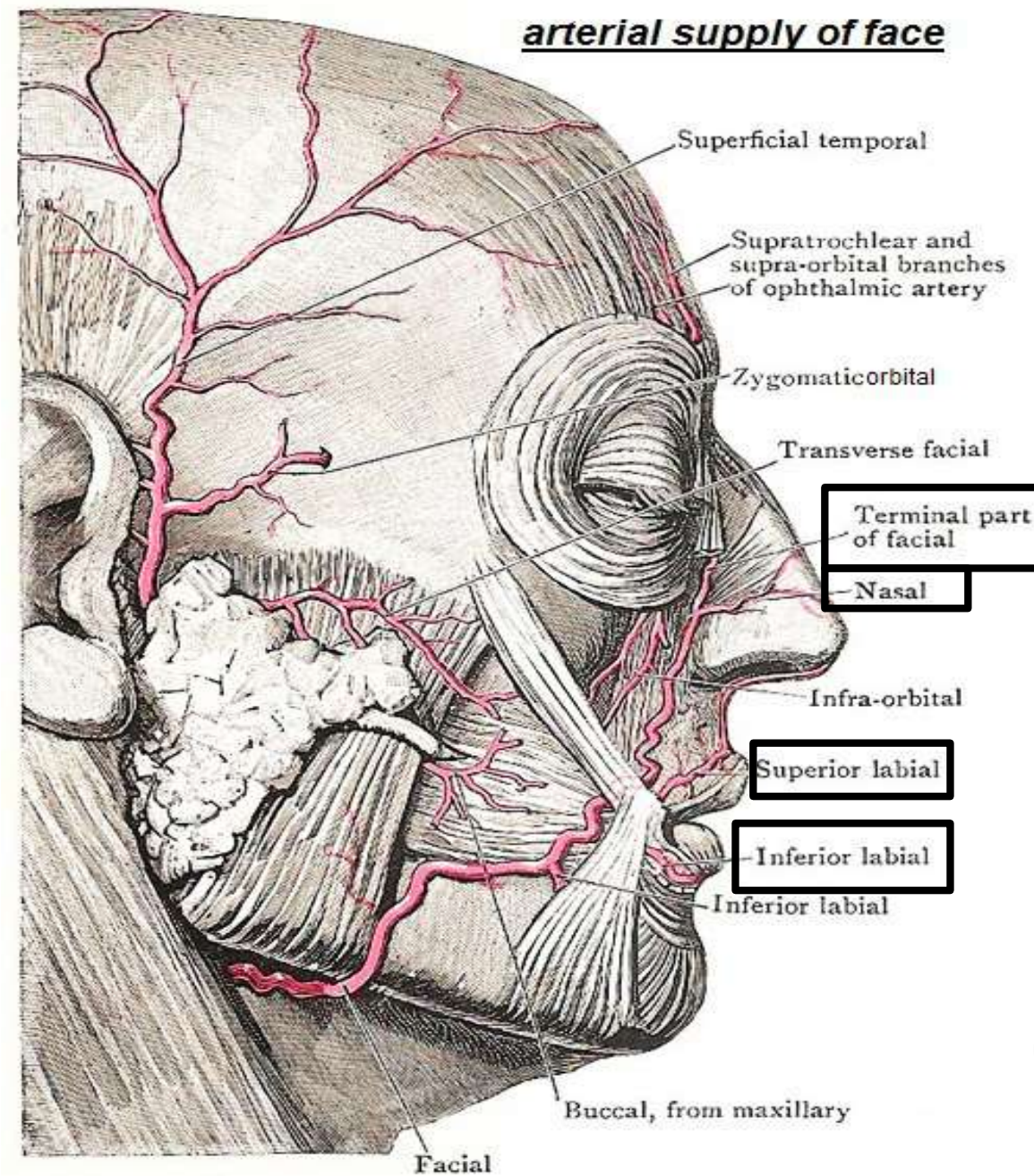
**Brs: in face**

inferior labial:

superior labial: gives septal br

lateral nasal :

angular : the terminal part at  
medial angle of eye



# VENOUS DRAINAGE OF THE FACE

## Connections:

ant. facial v. is connected to **cavernous sinus**

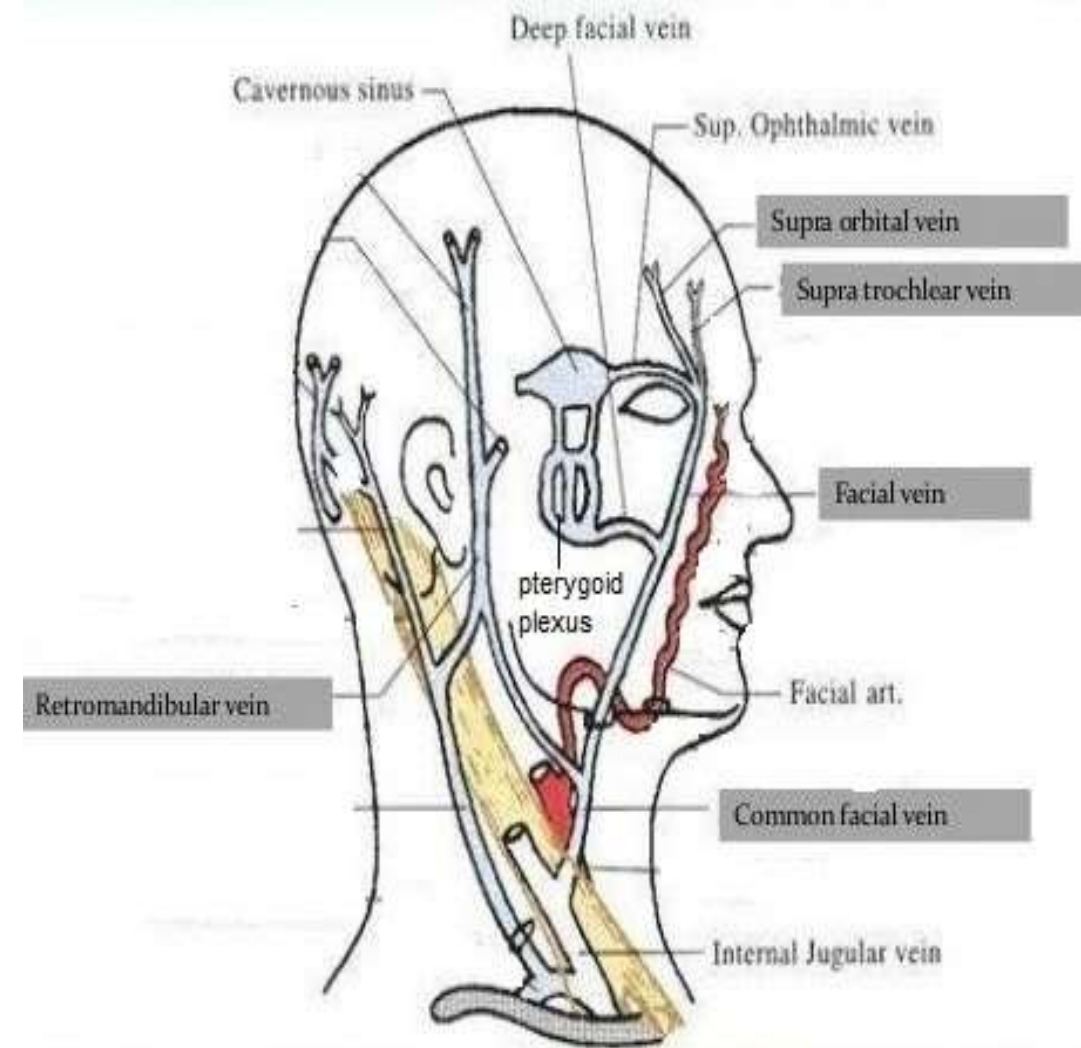
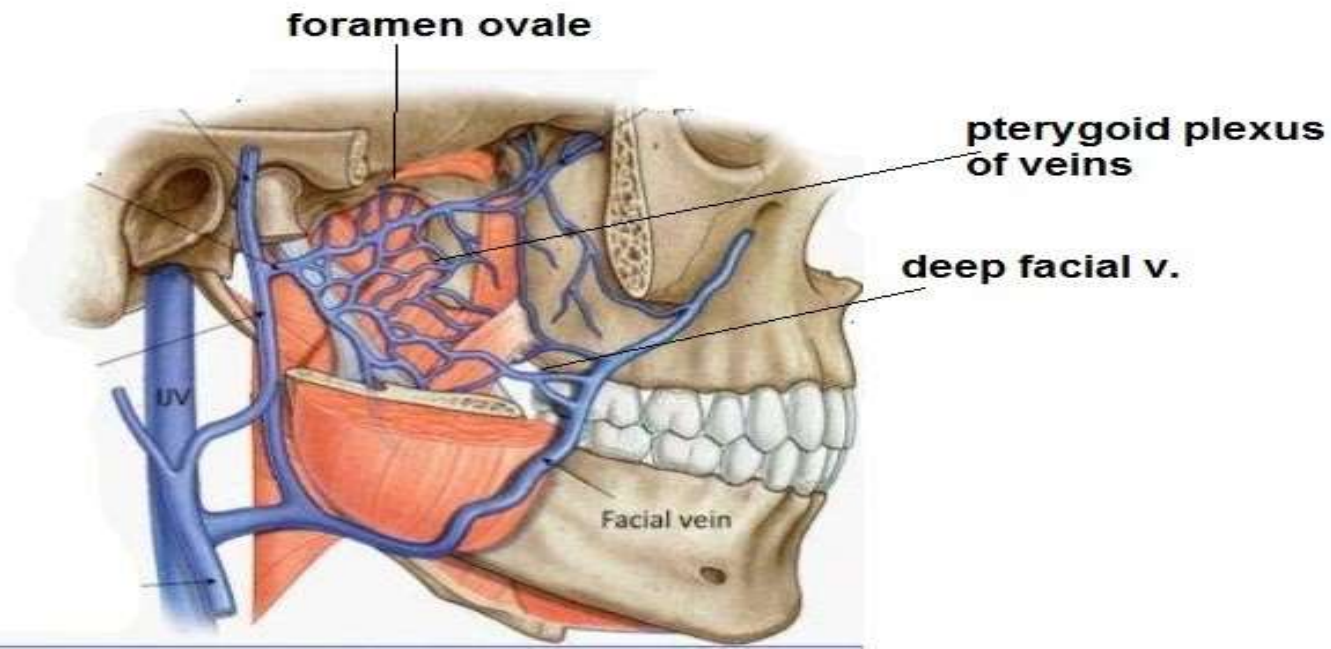
by 2 valveless veins

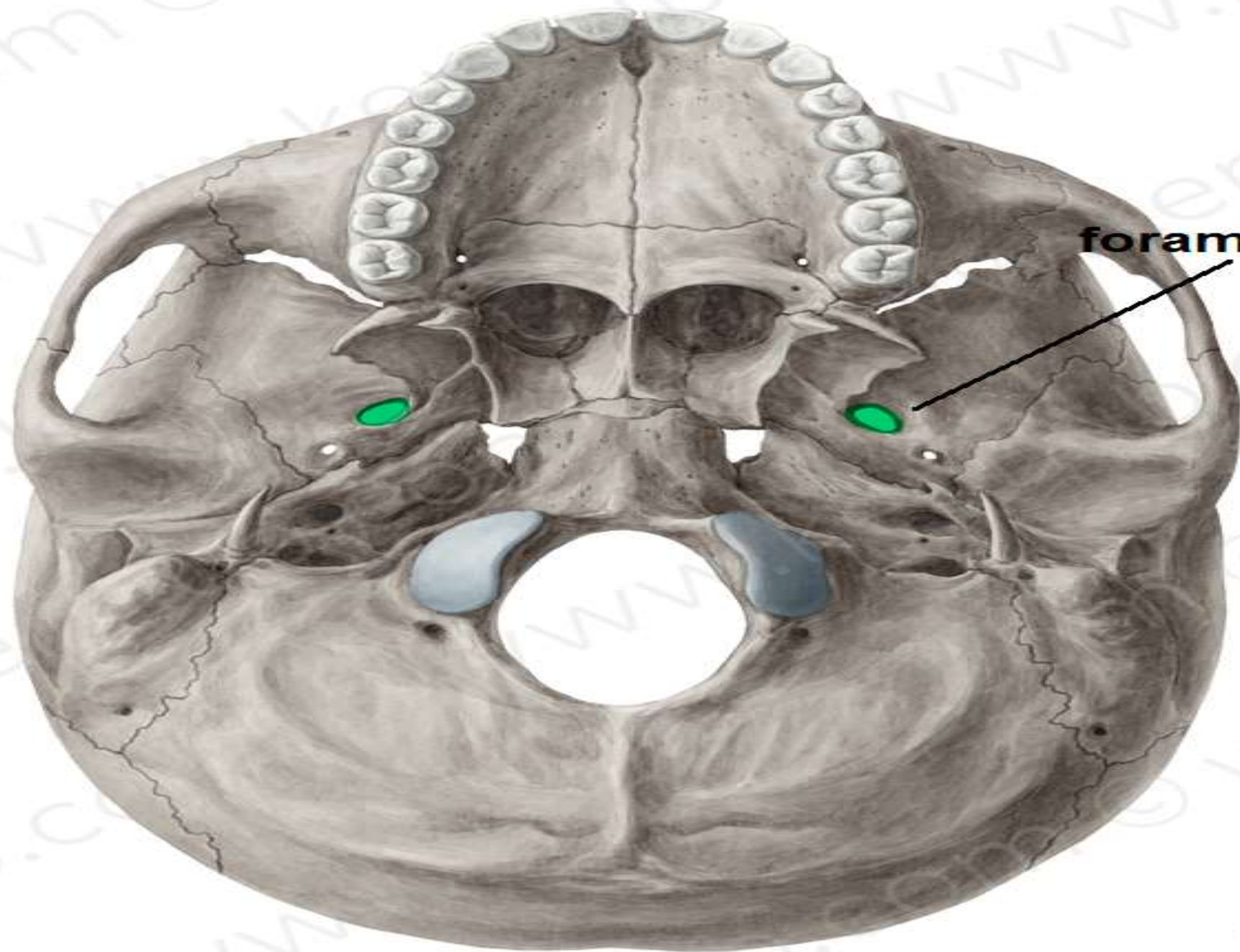
1-superior ophthalmic v.

2-deep facial v. to pterygoid plexus of veins

to cavernous sinus through emissary v.

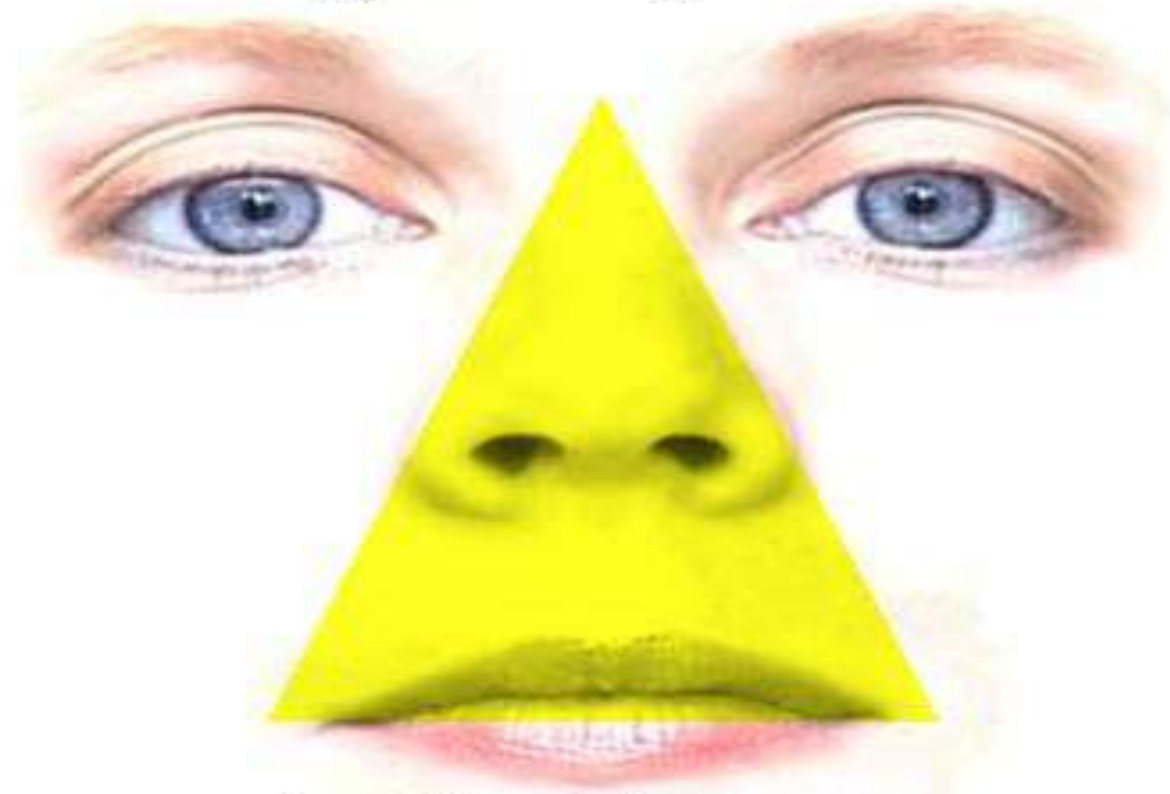
pass through foramen ovale





**foramen ovale**

**Danger Triangle of Face**



<http://medchrome.com>

وسهلا

أهلا



## الأستاذ الدكتور يوسف حسين

أستاذ التشريح وعلم الأجنة - كلية الطب - جامعة الزقازيق - مصر

رئيس قسم التشريح و الأنسجة و الأجنة - كلية الطب - جامعة مؤتة - الأردن

كتوراة من جامعة كولونيا المانيا

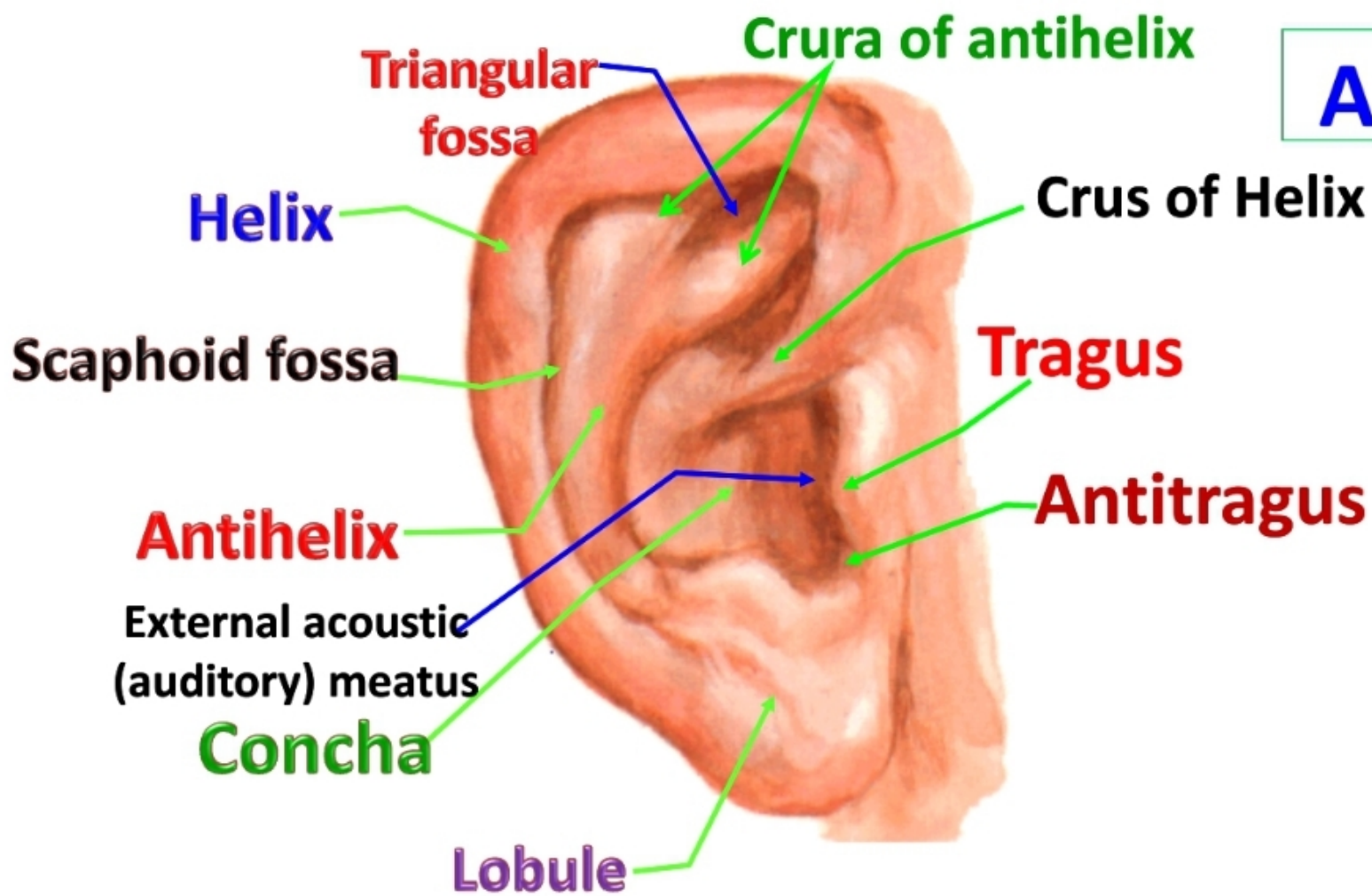
**Prof. Dr. Youssef Hussein Anatomy** اليوتيوب

جروب الفيس د. يوسف حسين (استاذ التشريح)

[dr\\_youssefhussein@yahoo.com](mailto:dr_youssefhussein@yahoo.com)

# External Ear

# Auricle

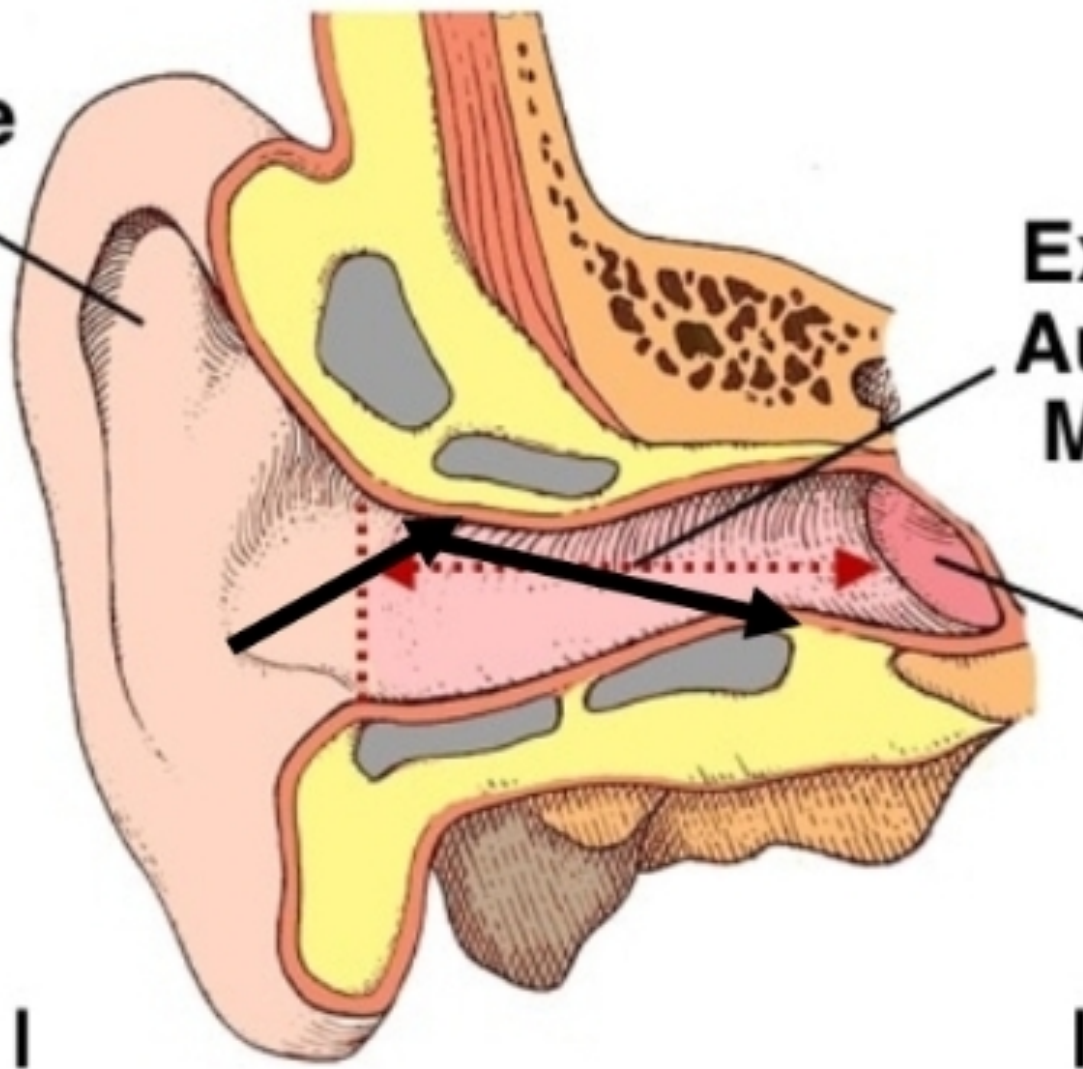


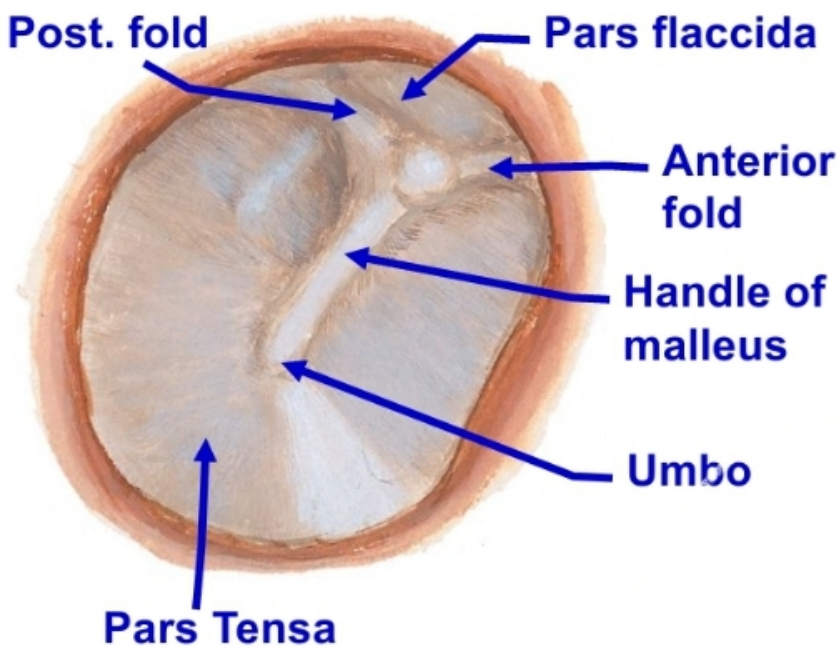
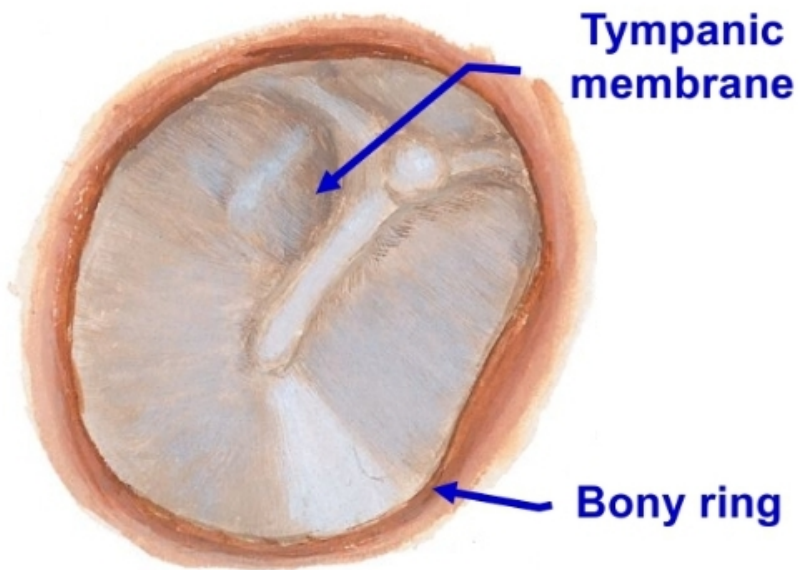


**Auricle**

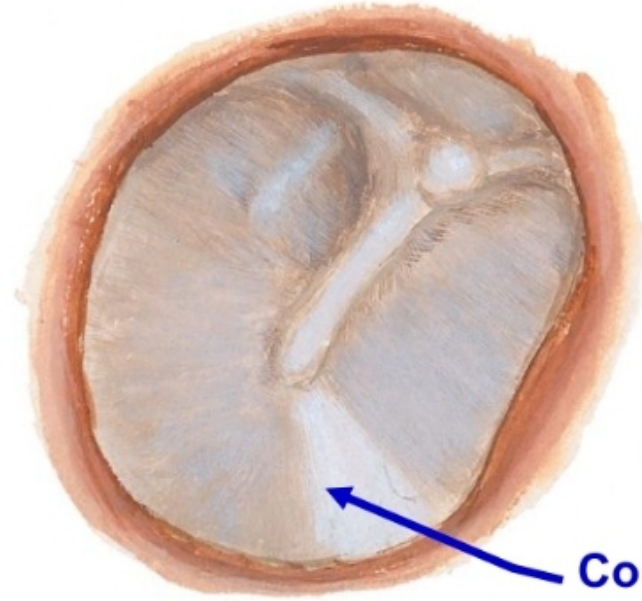
**External  
Auditory  
Meatus**

**Tympanic  
Membrane**





• **Cone of light**, Shining light on tympanic membrane causes a cone-shaped reflection of light in **anterior inferior quadrant** during examination of tympanic membrane with an Otoscope.



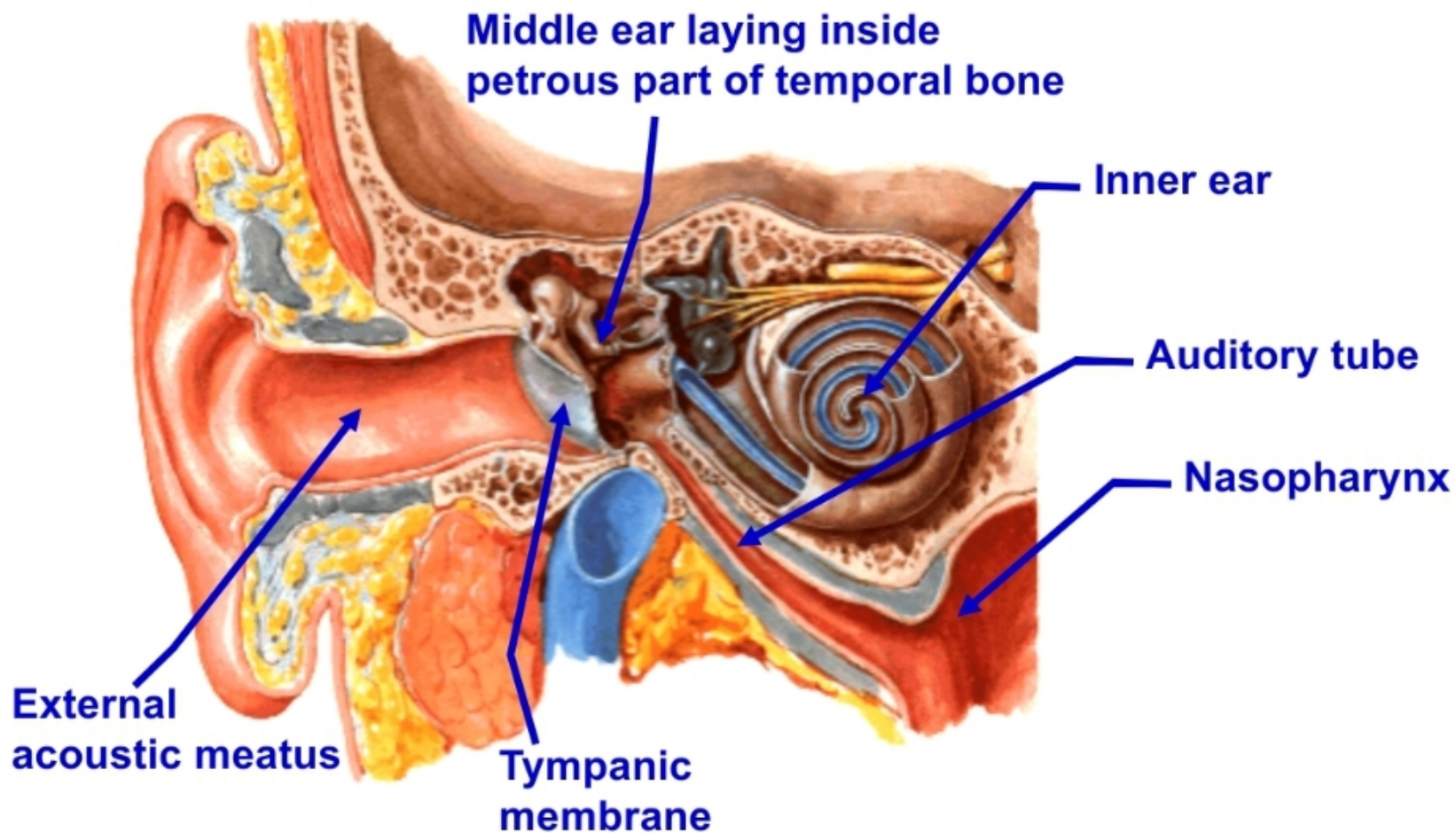
Cone of light

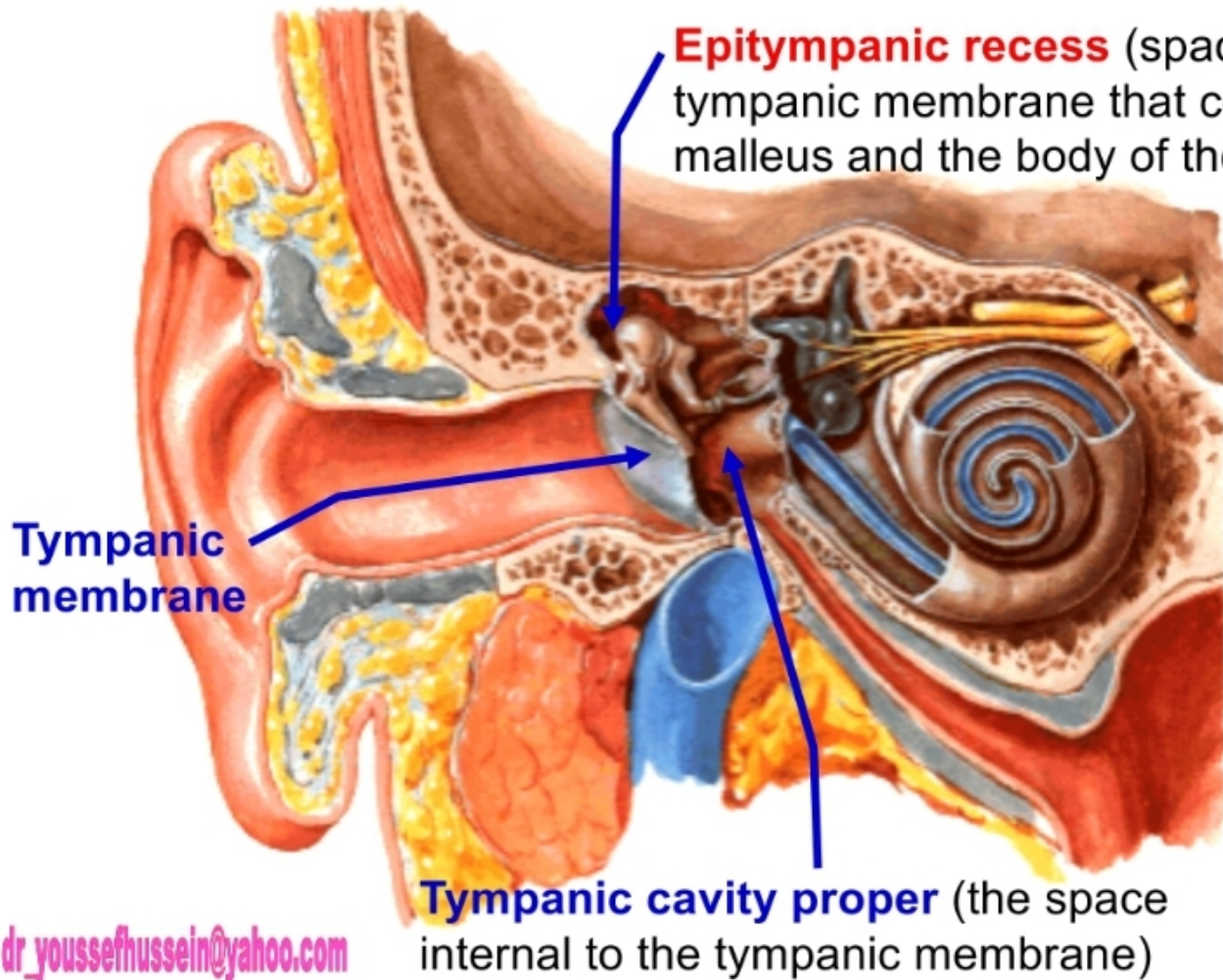


**Otoscopic  
examination**

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# Middle Ear





**Epitympanic recess** (space superior to the tympanic membrane that contains the head of the malleus and the body of the incus)

**Tympanic membrane**

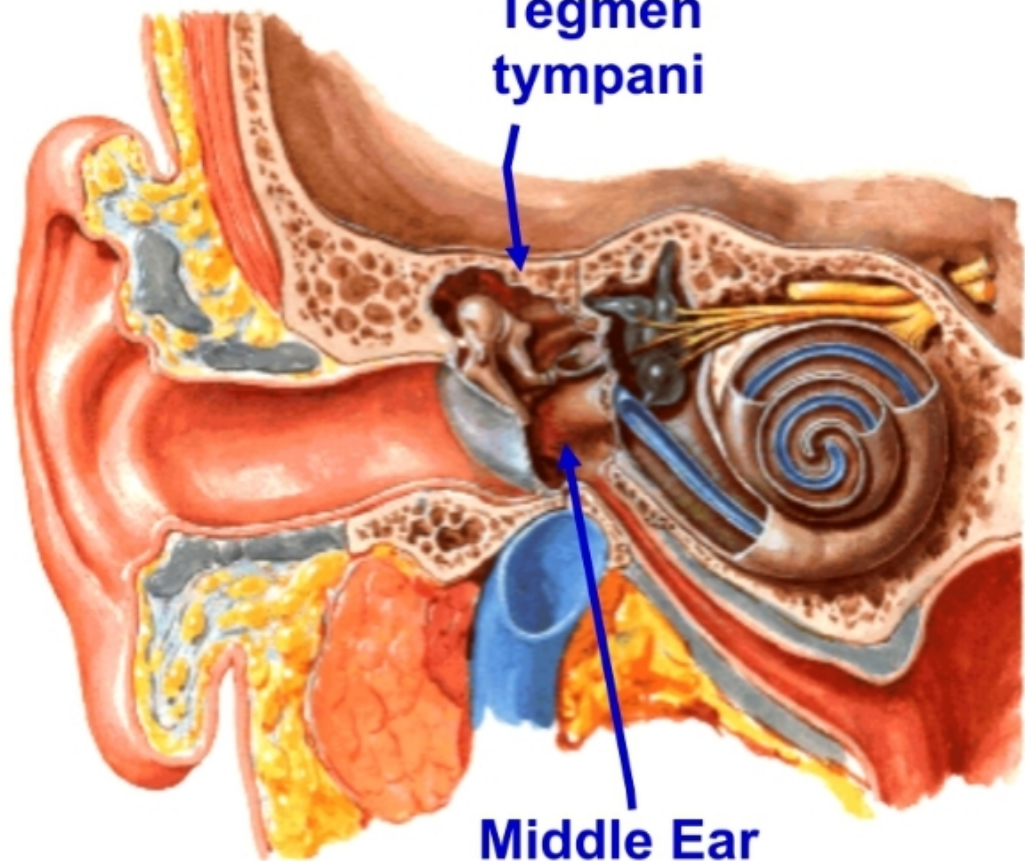
**Tympanic cavity proper** (the space internal to the tympanic membrane)

**Parts of tympanic cavity**

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# Boundaries of Middle East

**Tegmen tympani**



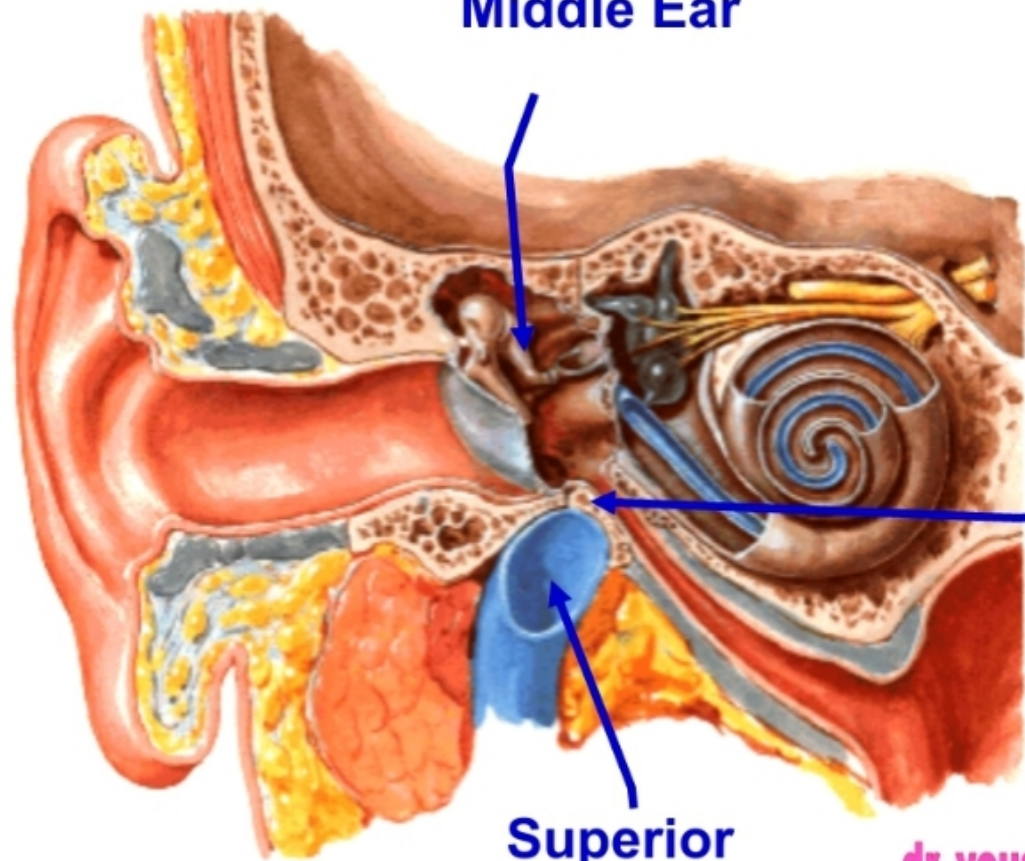
**Middle Ear**

- **Roof (tegmental wall)**

- It is formed by a thin plate of the **petrous part of the temporal bone** (called **tegmen tympani**) which separates it from the **middle cranial fossa**.



## Middle Ear

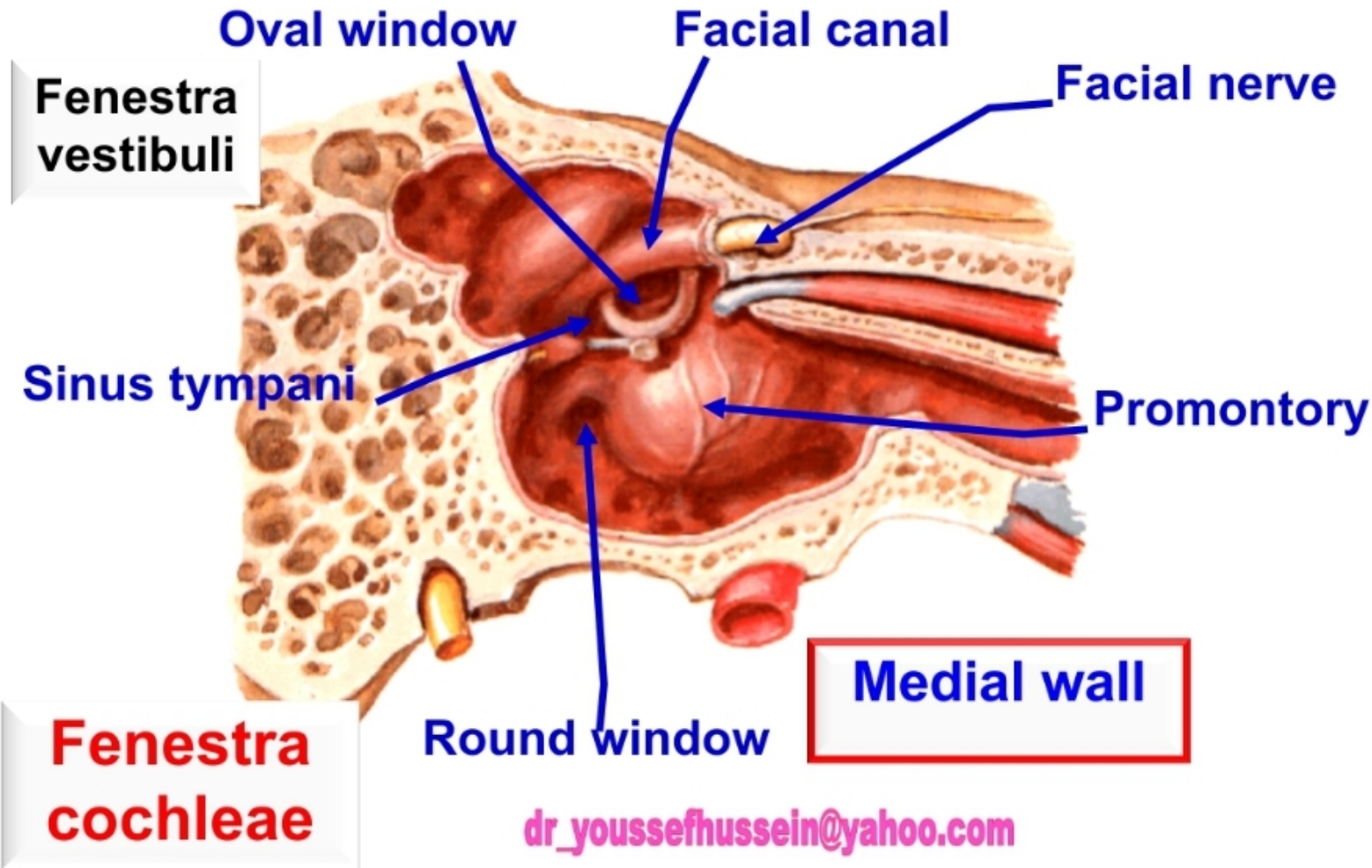


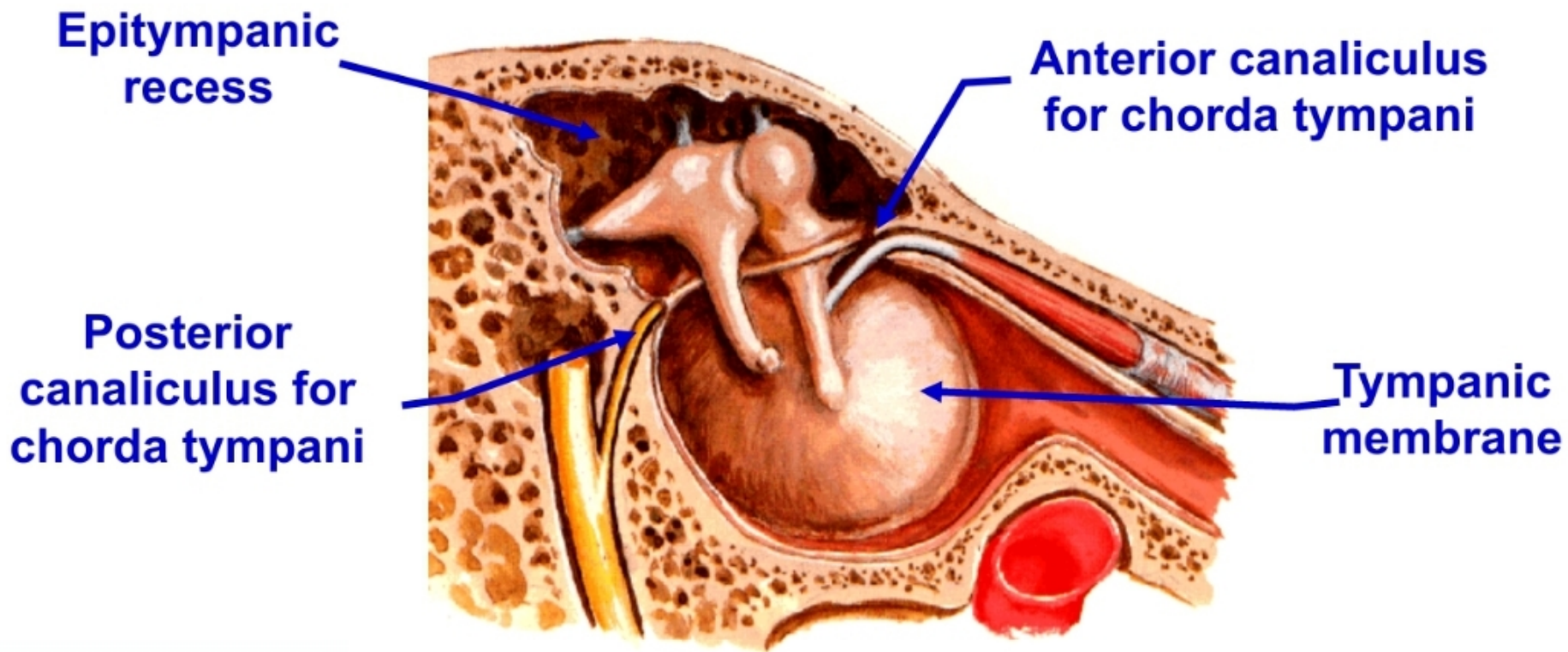
Superior  
bulb of IJV

- Floor (jugular wall)**
- It is formed by a **thin plate of bone** which separates it from superior bulb of internal jugular vein.
  - It is **pierced by tympanic branch of glossopharyngeal nerve.**

Thin plate of  
bone

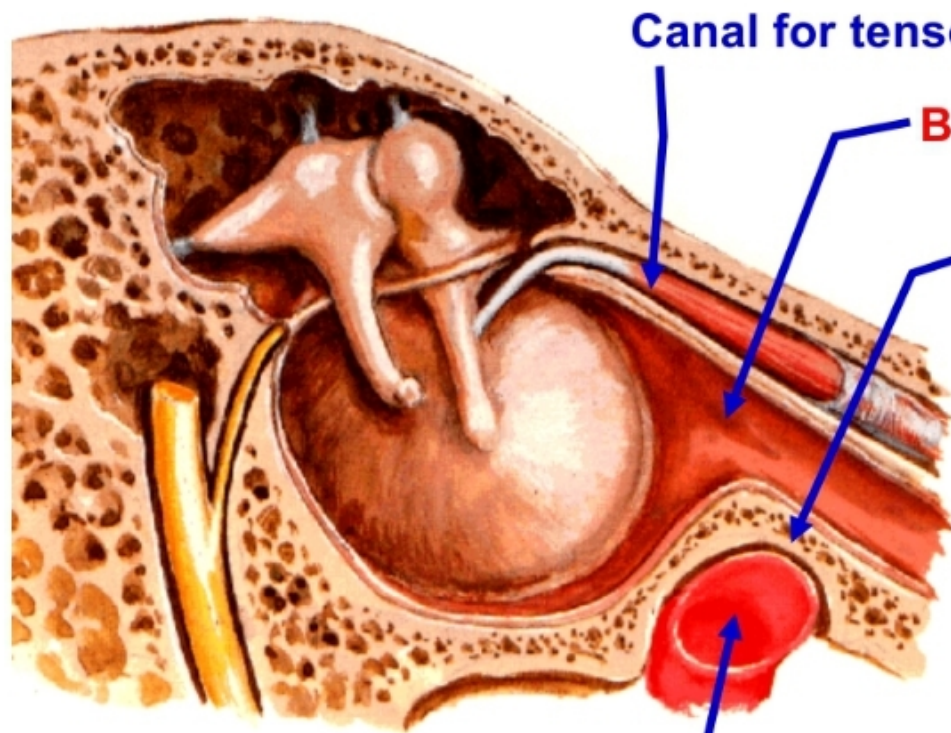
[dr\\_youssefhusseini@yahoo.com](mailto:dr_youssefhusseini@yahoo.com)





**Lateral wall**

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**Canal for tensor tympani M**

**Bony part of Auditory (Eustachian) tube**

**Thin plate of bone which separates cavity from ICA within carotid canal.**

It is pierced by:

- a) **Caroticotympanic artery** (branch of internal carotid artery).
- b) Caroticotympanic nerve (sympathetic plexus around internal carotid artery).

**Anterior wall**

**Internal carotid artery**

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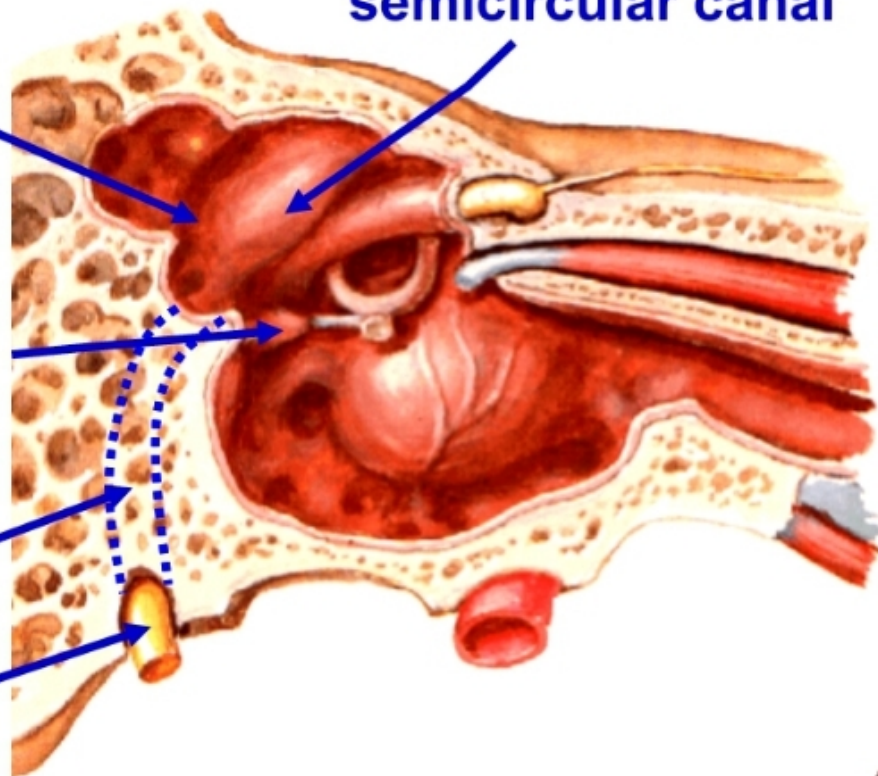
**Elevation of lateral  
semicircular canal**

**Aditus to  
mastoid antrum**

**Pyramid containing  
stapedius muscle**

**Vertical part of  
facial canal**

**Facial nerve**



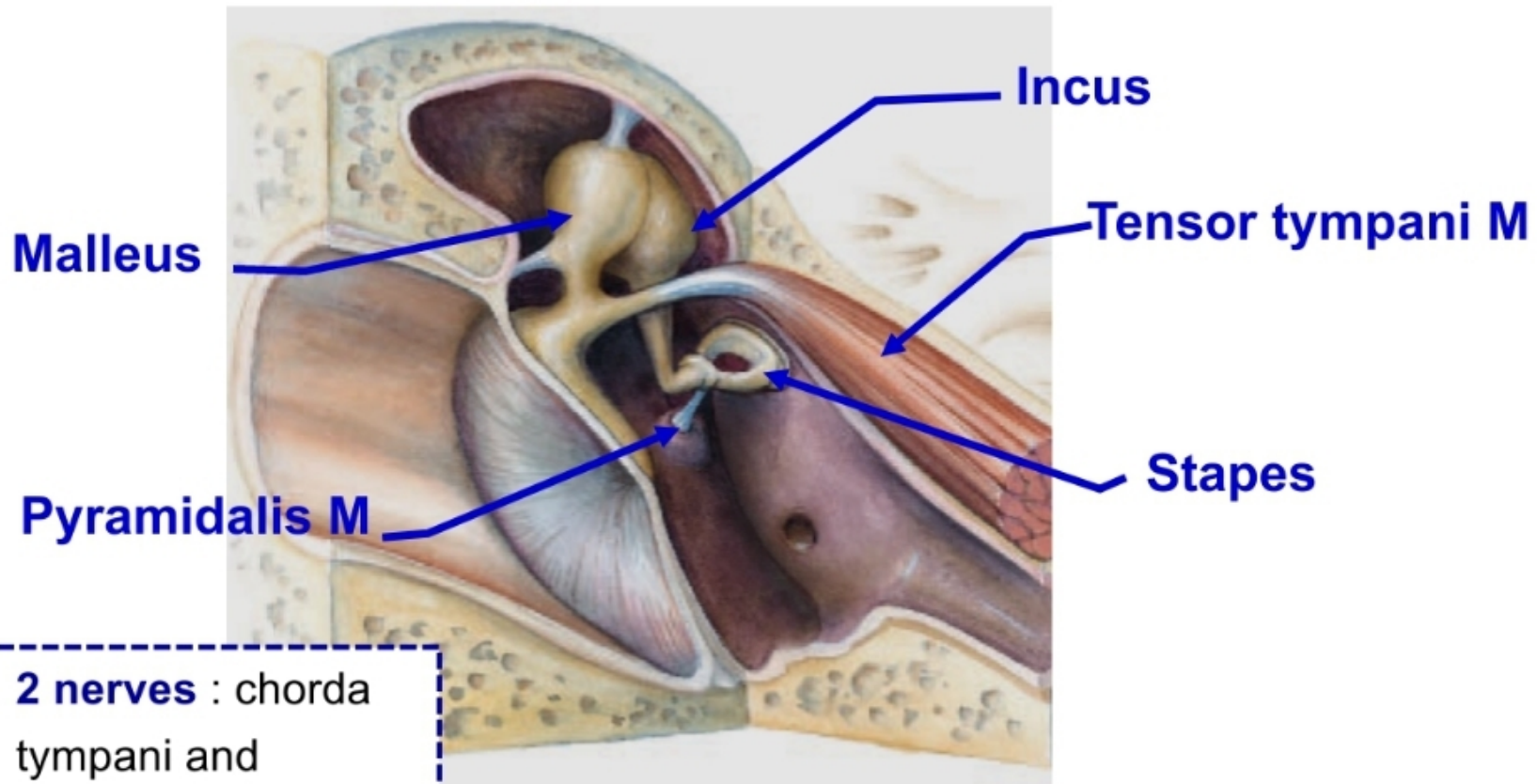
**Posterior wall**

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*dr. Youssef Hussein*

[dr\\_youssefhussein@yahoo.com](mailto:dr_youssefhussein@yahoo.com)

# Contents of Middle Ear



- **2 nerves** : chorda tympani and tympanic plexus
- **Air**

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• **Malleus:** المطرقة

- It is hammer-shaped. It is the largest one.

- It is formed of

**a- Head** articulates with the incus.

**b- Neck** is the narrow constriction just below the head.

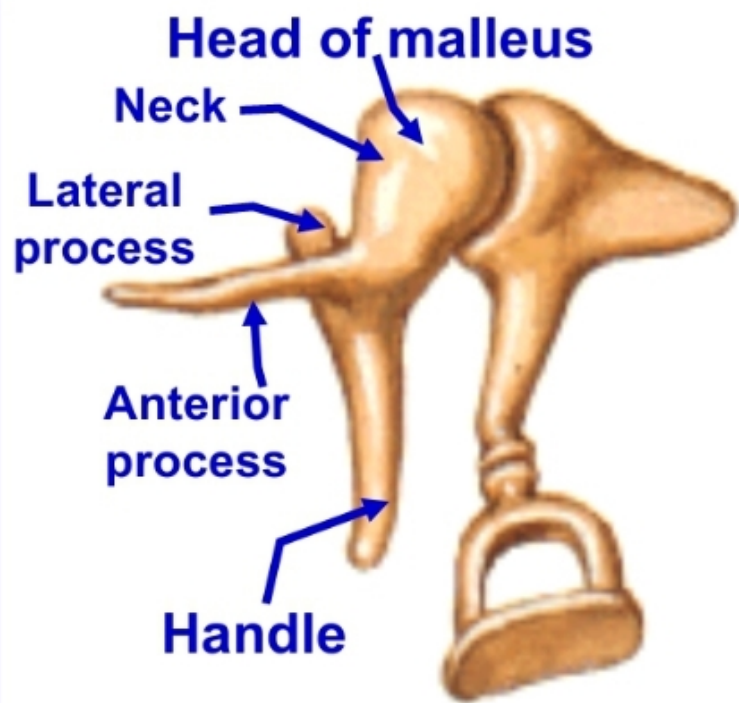
**c- Handle** is attached to inner surface of tympanic membrane.

\* The handle receives the **insertion** of the **tensor tympani** muscle.

**d- Anterior process** connected to the petrotympanic fissure by a ligament.

**e- Lateral process** attached to the tympanic membrane.

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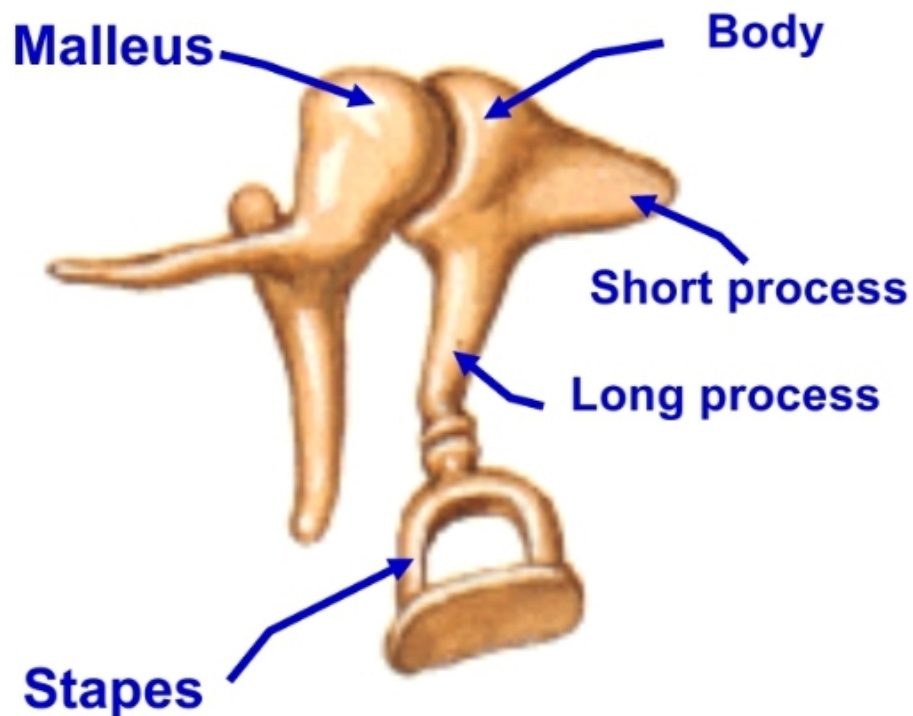




▪ **Incus: (intermediate ossicle):**

السندان

- It is anvil-like
- \* It is formed of
- \* **Body** articulates with the malleus.
- \* **Long process** articulates with the head of stapes.
- \* **Short process** conical in shape.



- **Stapes: (the medial ossicle):** الركاب

- It is stirrup- like.

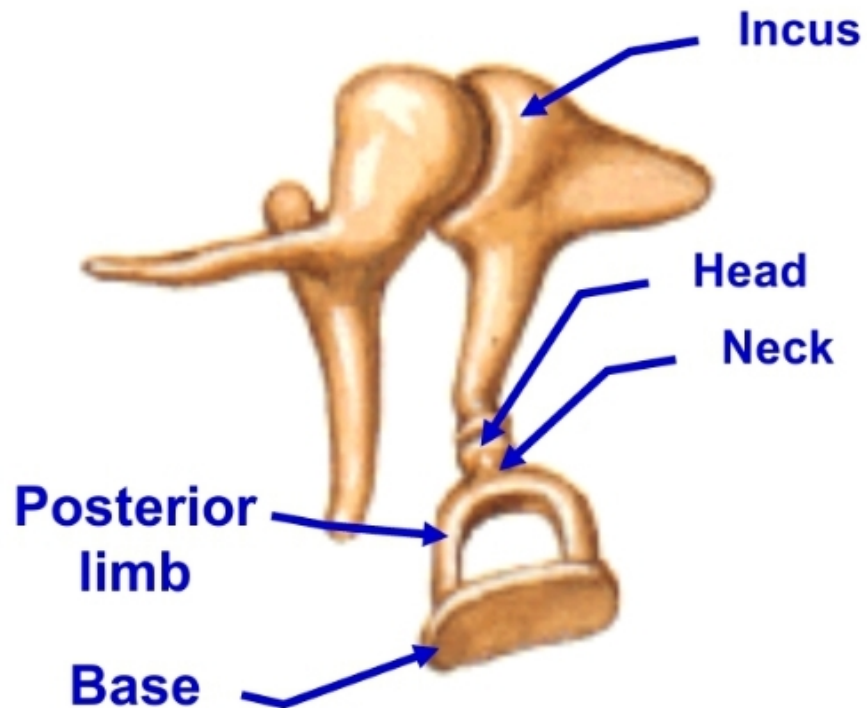
- It is formed of.

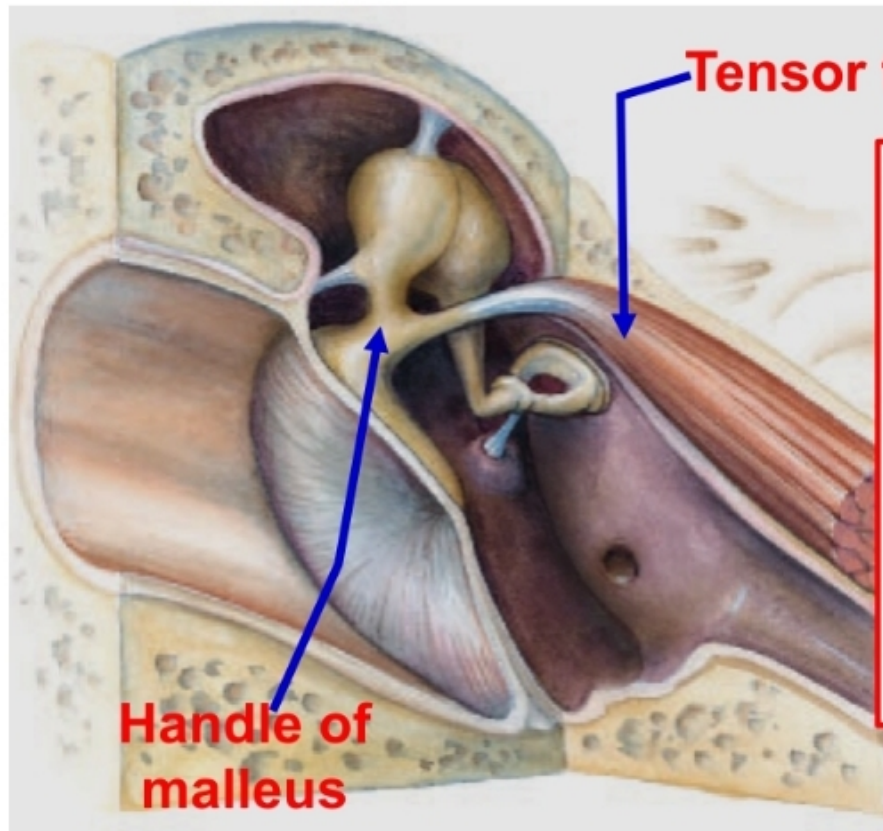
- \* **Head** articulates with the long process of the incus.

- \* **Neck** is a narrow part below head, revolved insertion of stapedius muscle.

- \* **Two limbs (posterior and anterior)** extend from the neck to the base.

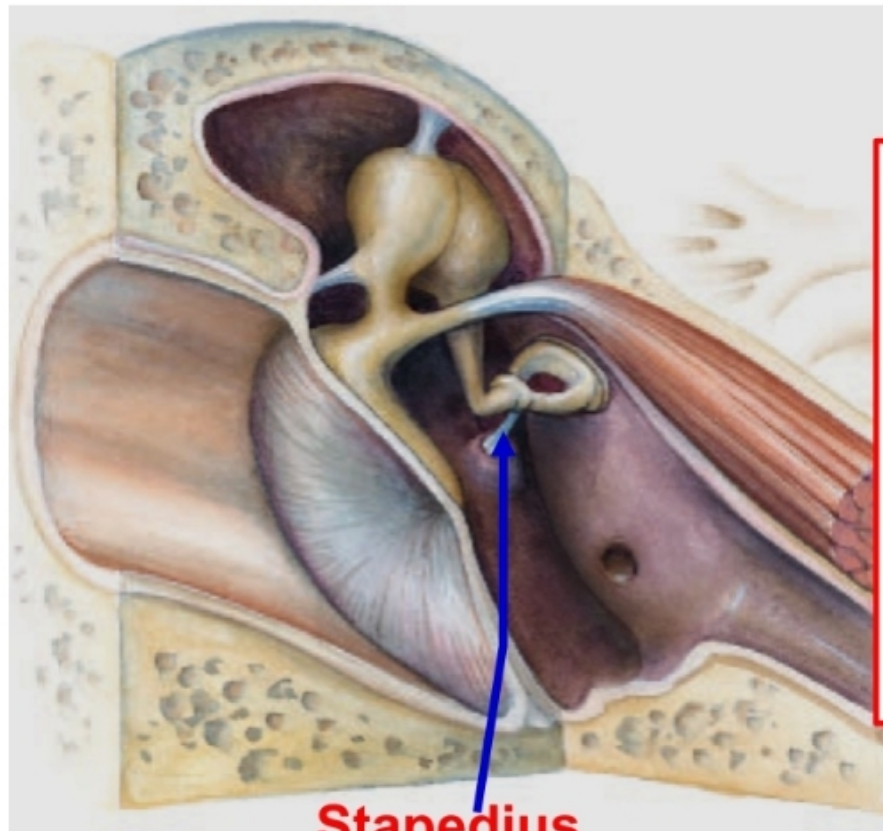
- \* **Base (foot plate)** closed the **Fenestra vestibule** of the inner ear.





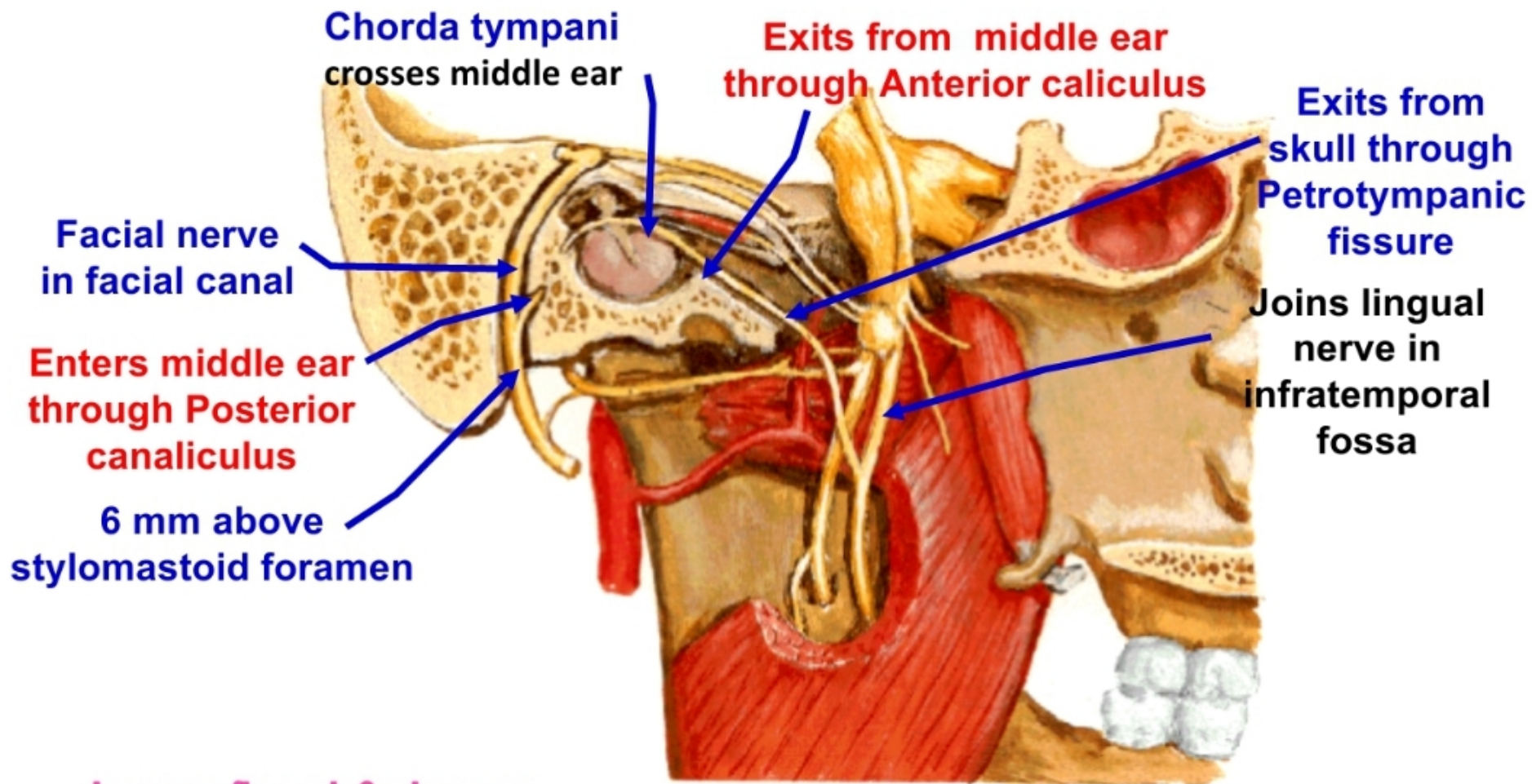
## Tensor tympani M

- \* **Origin:** from cartilaginous part of the auditory tube.
- \* **Insertion:** into the handle of malleus.
- **Nerve supply:** nerve to the medial pterygoid muscle (from trunk of mandibular nerve)
- **Action:** pulls and tens the tympanic membrane



**Stapedius**

- \* **Origin:** from the inner walls of the pyramid.
- \* **Insertion:** into the posterior aspect of neck of stapes.
- **Nerve supply:** branch from the facial nerve within the facial canal.
- **Action:** pulls the stapes, damping down (protective effect against high pitched sound vibration).

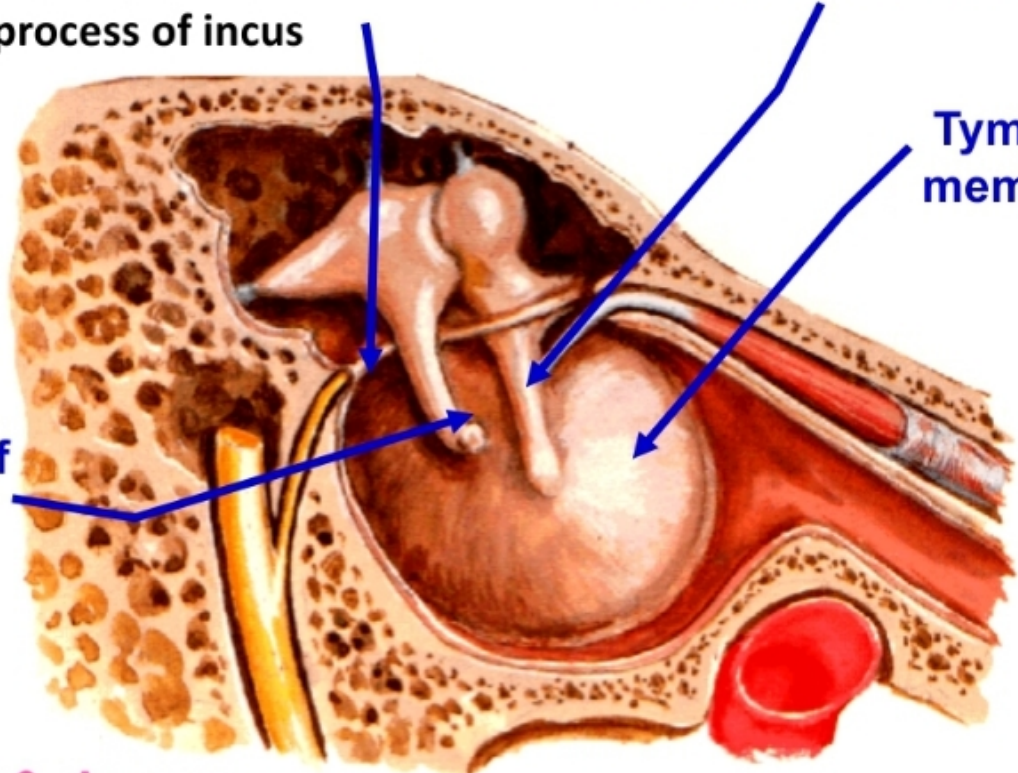


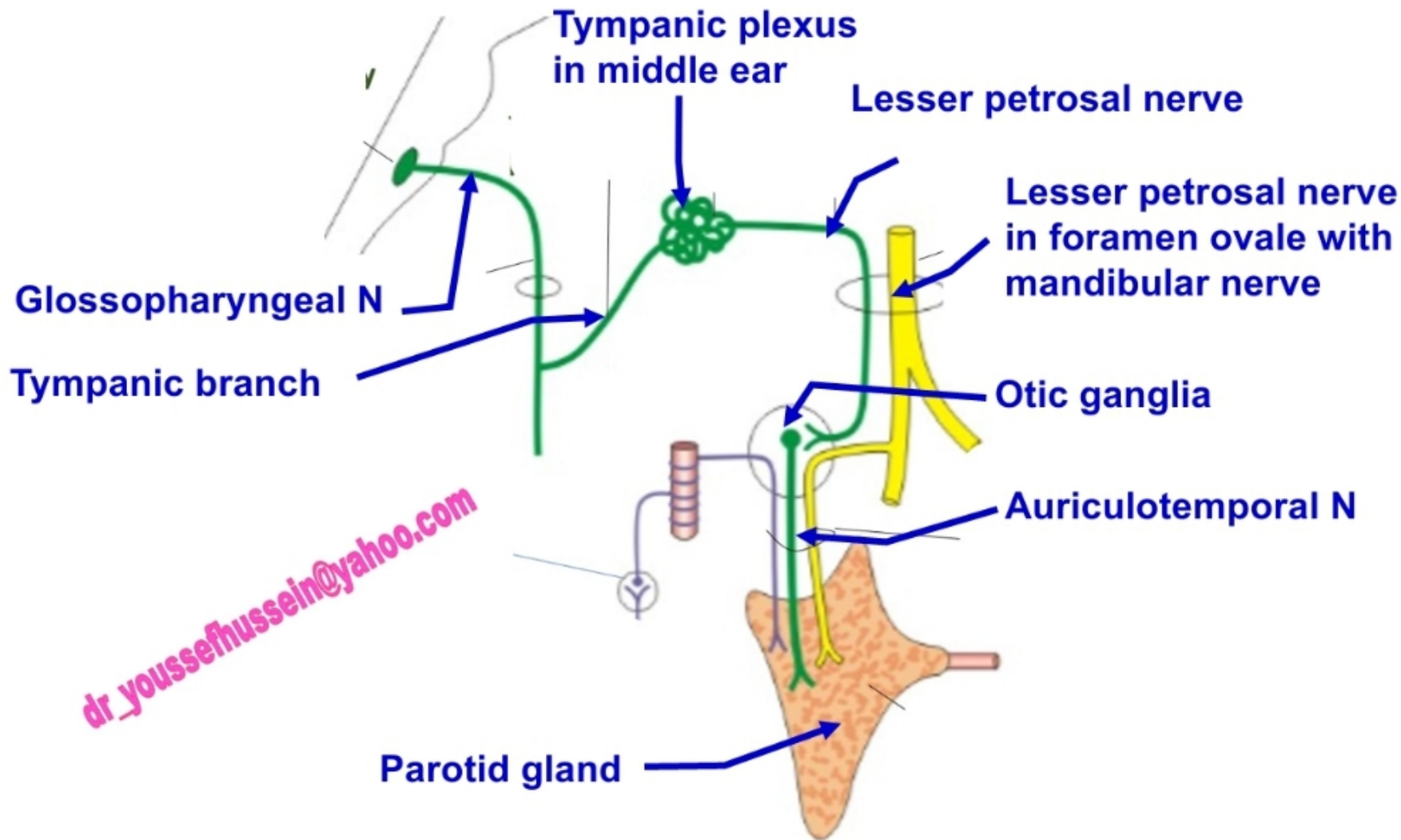
**Chorda tympani** crosses tympanic cavity , related to tympanic membrane, between handle of malleus and long process of incus

**Handle of malleus**

**Tympanic membrane**

**Long process of incus**

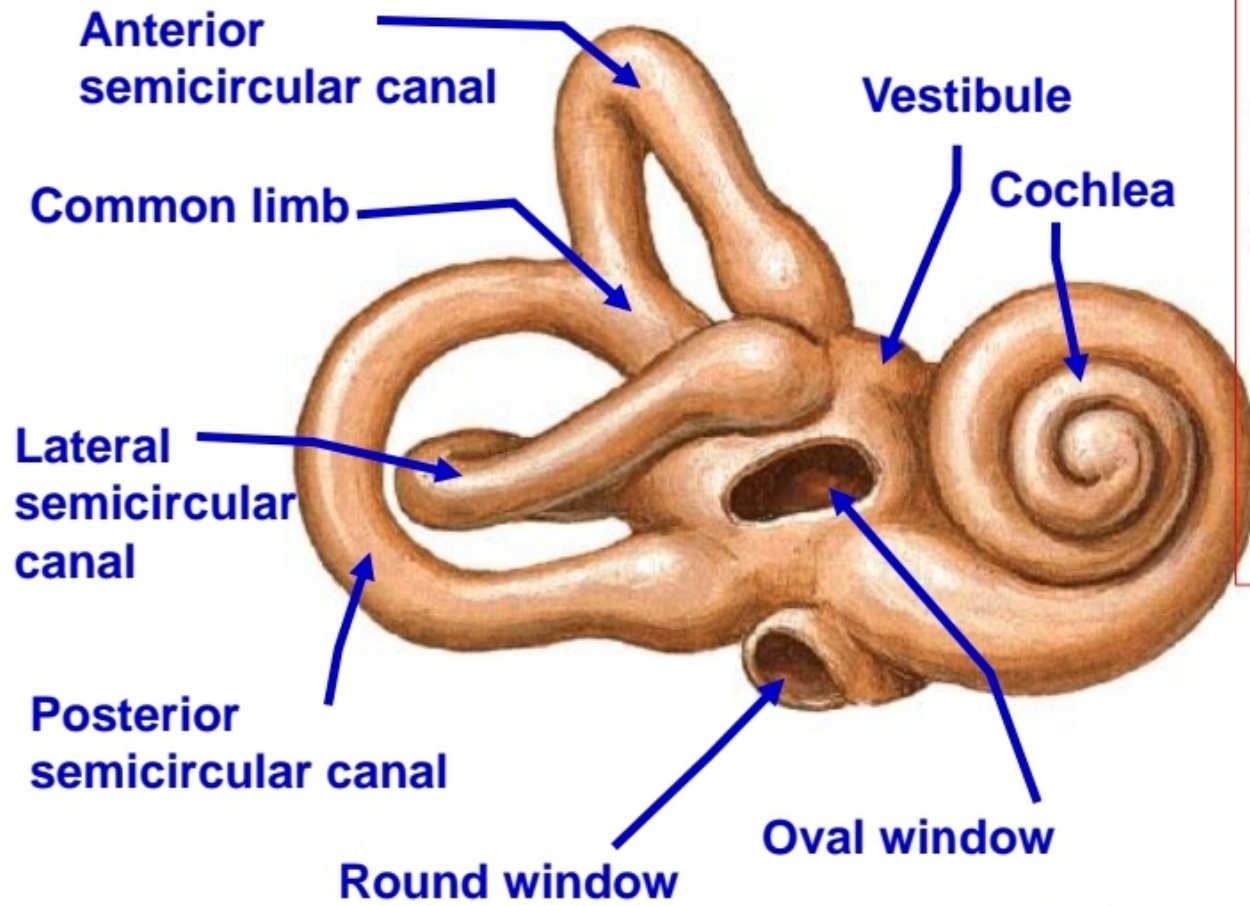




# Inner Ear

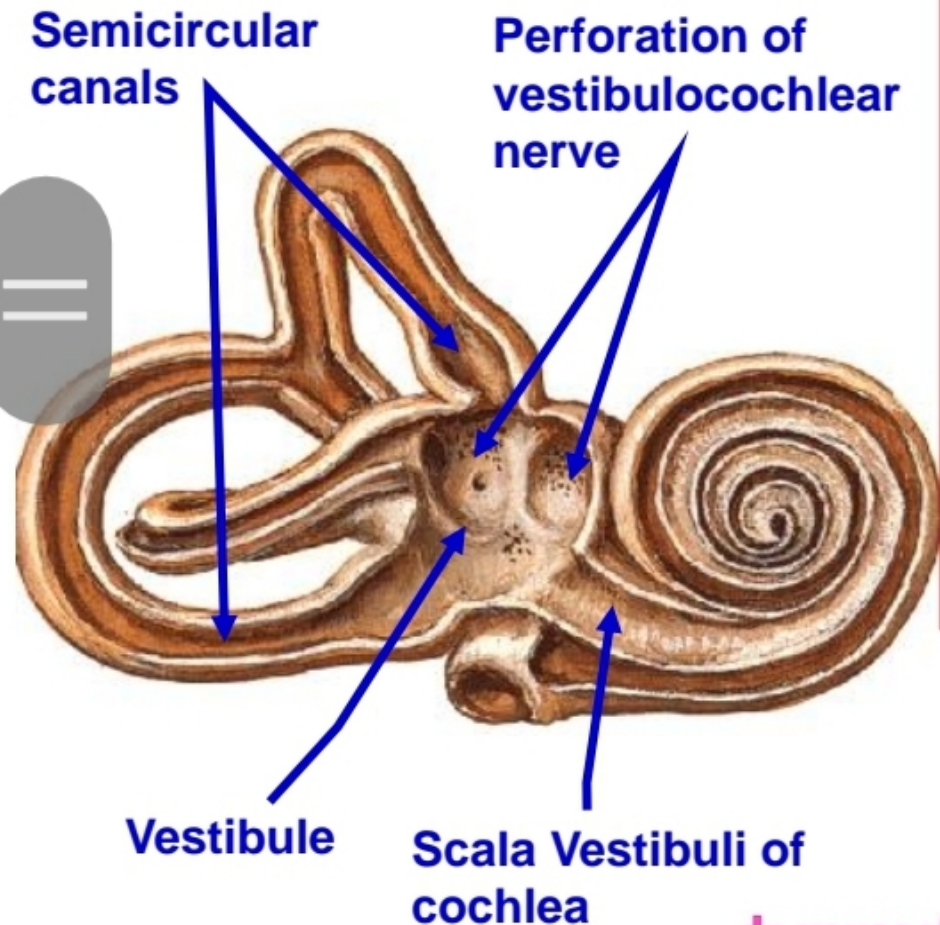
- it consists of 2 parts:
  - (1) **Bony labyrinth:** boney cavities inside the petrous part of temporal bone.
  - (2) **Membranous labyrinth:** interconnected sacs and ducts inside the bony labyrinth.





- 3 arched Semicircular canals

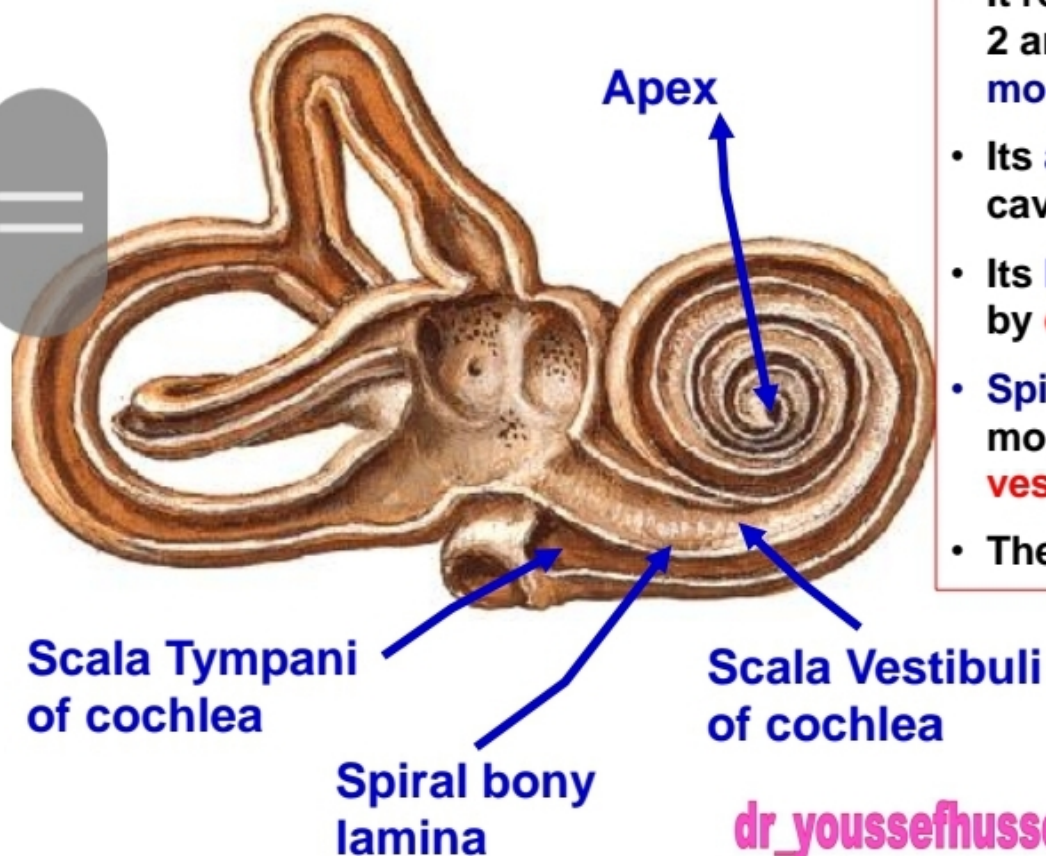
- 1) **Anterior** in vertical plane.
  - 2) **Posterior** in vertical plane.
  - 3) **Lateral** in horizontal plane.
- These 3 canals open in the posterior aspect of the **vestibule** by **5 orifices** (common limb from anterior and posterior canals).



- **Vestibule:** central part of bony labyrinth.
  - Its **posterior wall** receives the 5 openings of the 3 semicircular canals.
  - Its **anterior wall** shows the opening of the scala vestibuli of the cochlea.
  - Its **lateral wall** is related to the middle ear and shows **fenestra vestibuli** (oval window) which is closed by the foot of stapes.
  - Its **medial wall** forms the bottom of the internal auditory meatus and is perforated by the 8<sup>th</sup> cranial nerve.

## • Cochlea القوقعة

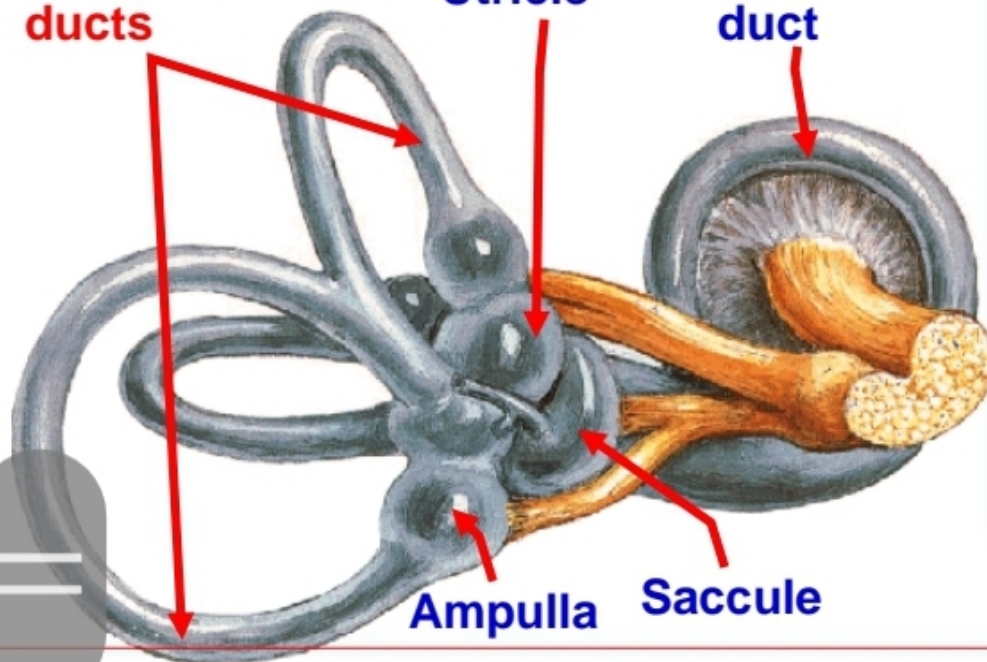
- Anterior part of boney labyrinth
- It resembles **shell of a common snail** forming 2 and 1/2 turns around its axis called **modiolus**.
- Its **apex** is directed laterally towards tympanic cavity.
- Its **base** is directed medially and is perforated by **cochlear nerve**.
- **Spiral bony lamina** projects from the modiolus dividing cochlear canal into **Scala vestibuli** above and **Scala tympani** below.
- The cochlear canal lodges **cochlear duct**.



**Semicircular ducts**

**Utricle**

**Cochlear duct**



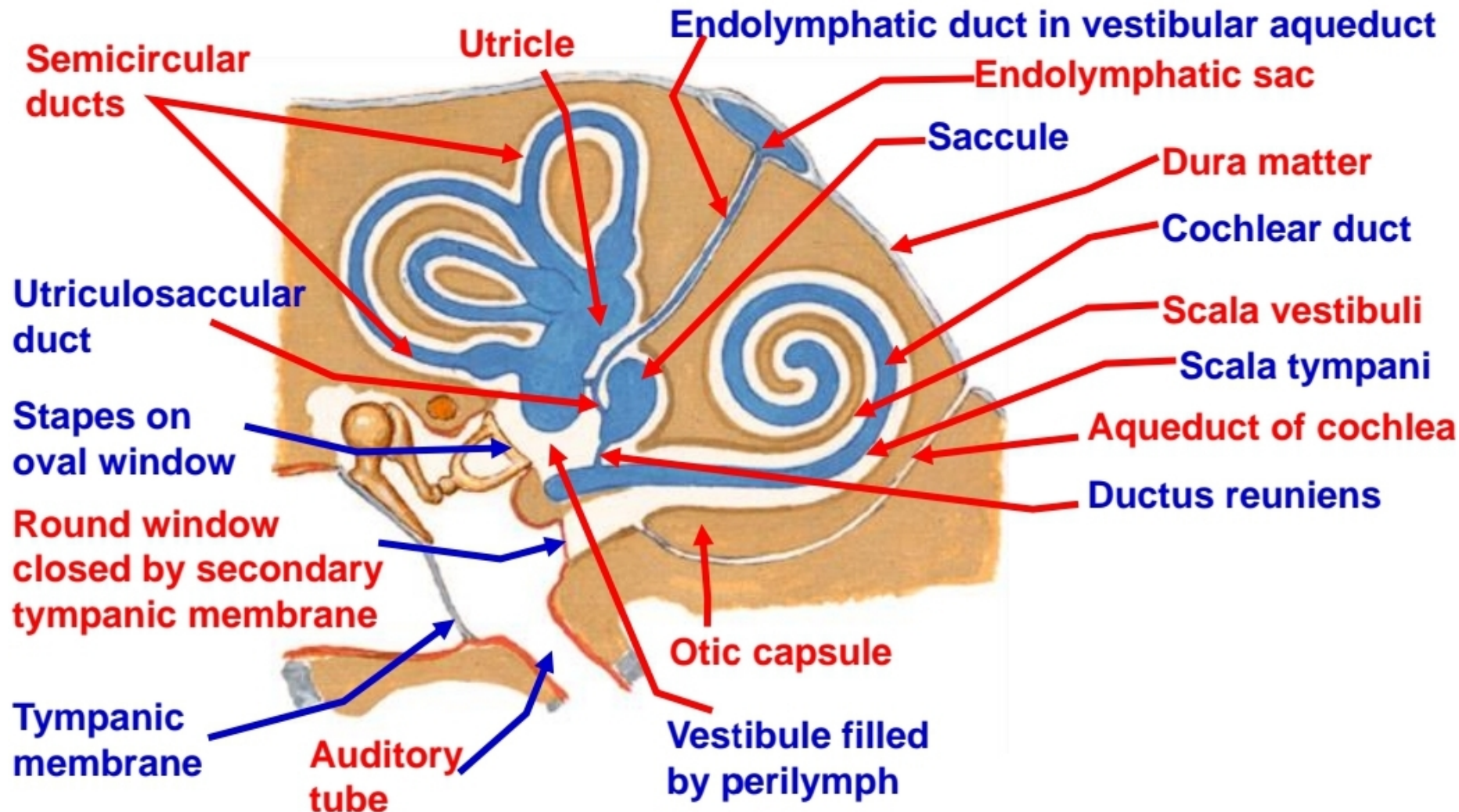
**Ampulla** **Saccule**

## ❖ MEMBRANOUS LABYRINTH

- \* It consists of number of membranous cavities inside the bony labyrinth.
- These cavities are filled with fluid called **endolymph**.
- They are separated from the bony labyrinth by fluid called **perilymph** that **communicate with subarachnoid space** through **aqueduct of cochlea**

## ❖ 3 semicircular ducts

- They lie within the corresponding semicircular canals.
- They open in the utricle.
- Each duct has a dilatation at one of its ends called **ampulla**



Semicircular ducts

Utricle

Endolymphatic duct in vestibular aqueduct

Endolymphatic sac

Saccule

Dura matter

Cochlear duct

Utriculosaccular duct

Scala vestibuli

Scala tympani

Stapes on oval window

Aqueduct of cochlea

Ductus reuniens

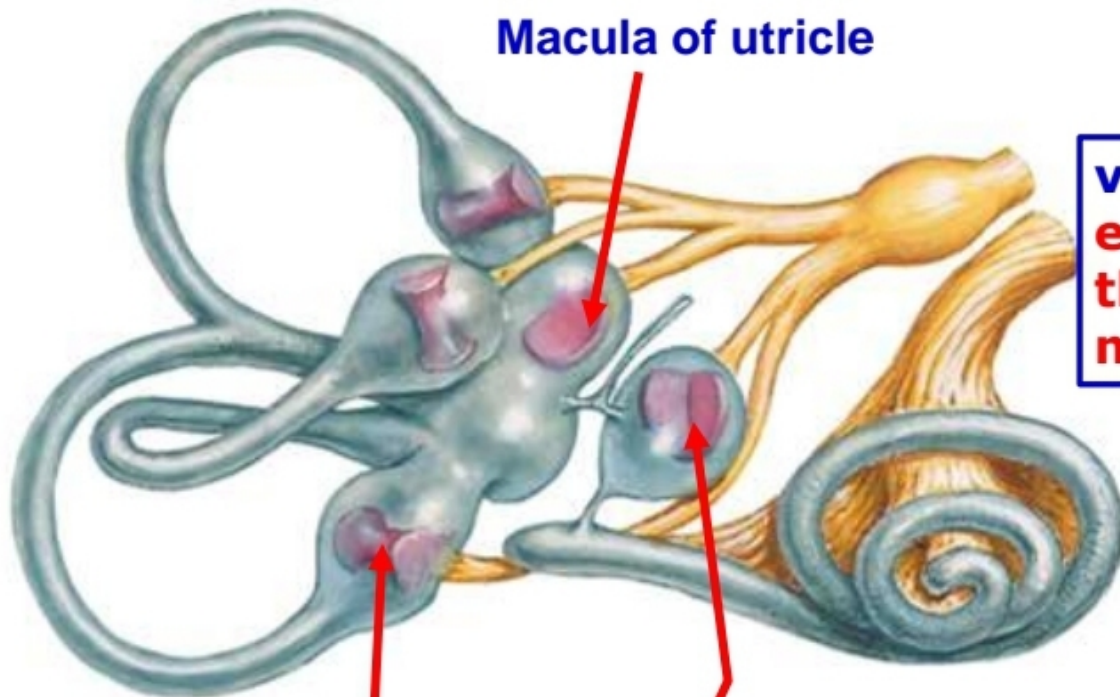
Round window closed by secondary tympanic membrane

Otic capsule

Vestibule filled by perilymph

Tympanic membrane

Auditory tube



Macula of utricle

**vestibular sensory epithelium is located in the walls of the membranous labyrinth**

Crista in ampulla of semicircular duct

Macula of saccule

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Continued

# Cochlear duct

Scala vestibuli  
containing perilymph

Vestibular membrane

Cochlear duct  
containing endolymph

Organ of Corti

Basilar membrane

Bony cochlea

Hair cells

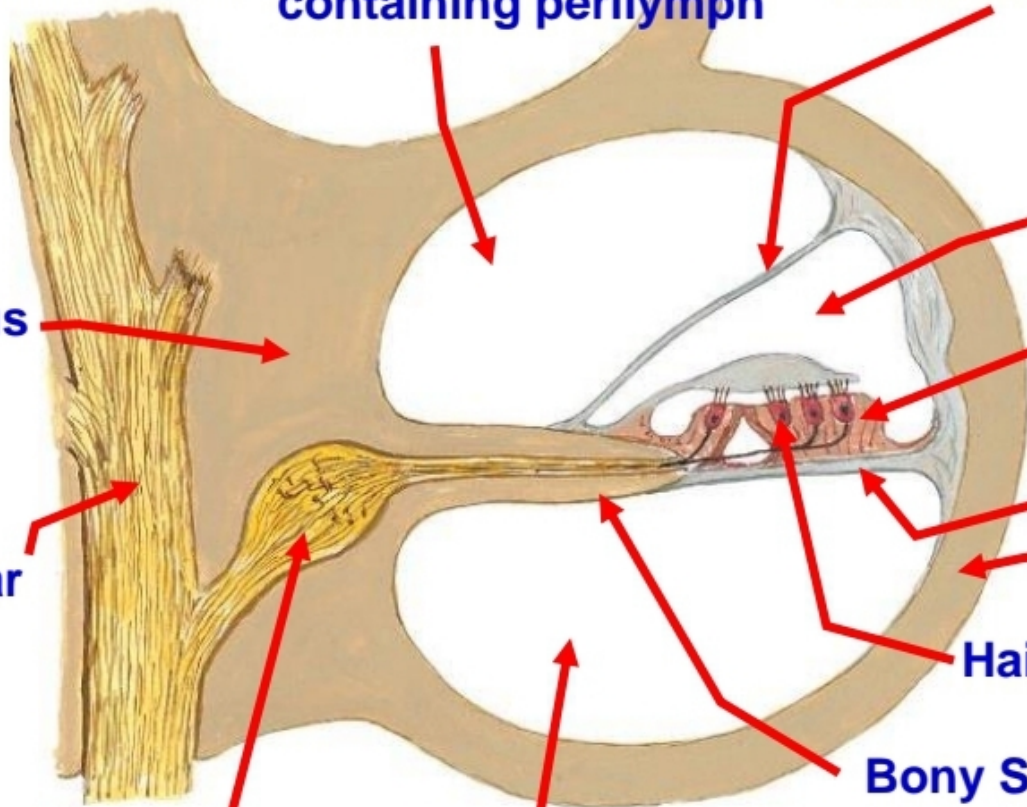
Bony Spiral  
lamina

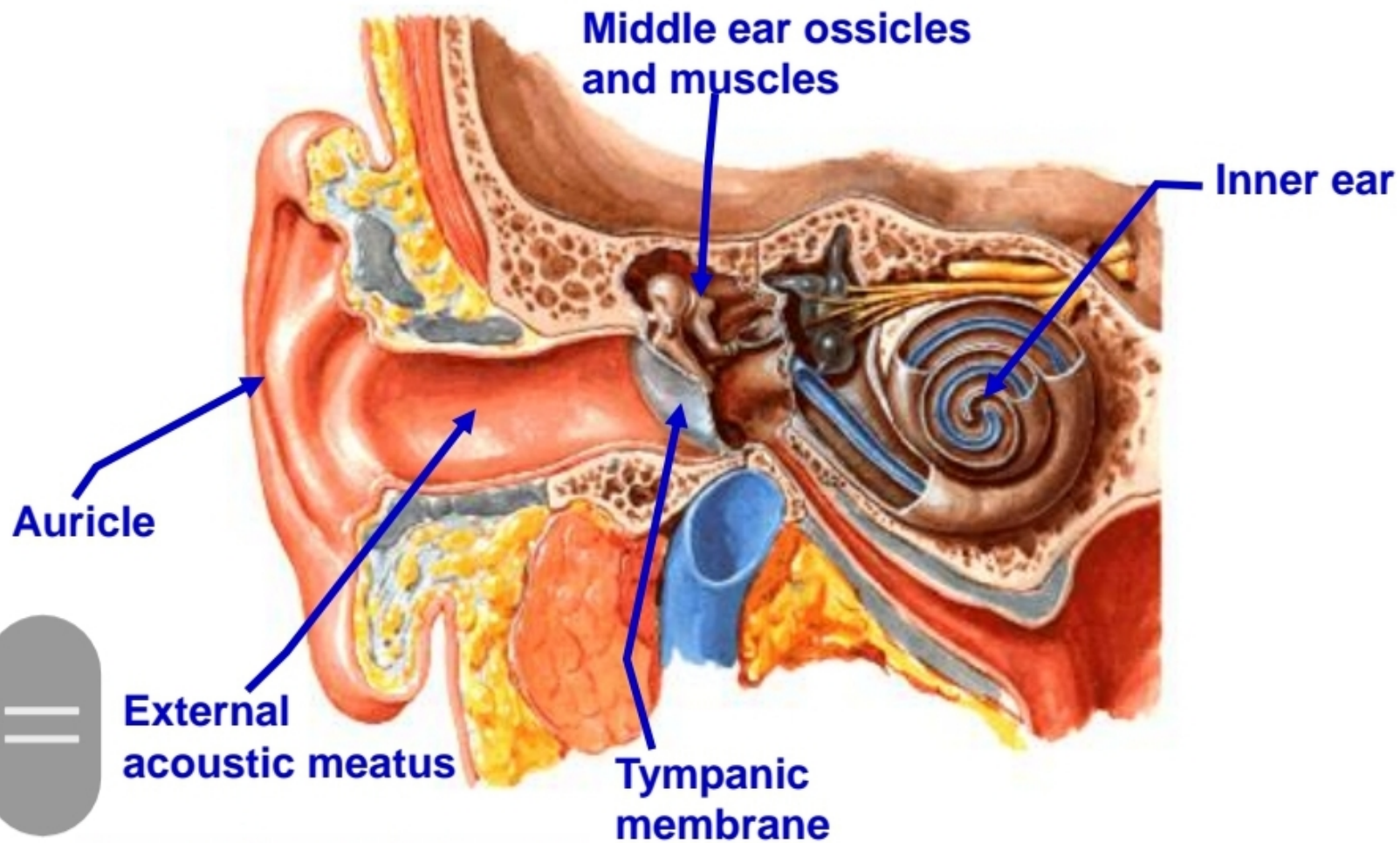
Scala tympani  
containing perilymph

Modiolus

Cochlear  
nerve

Spiral ganglia





Auricle

Middle ear ossicles and muscles

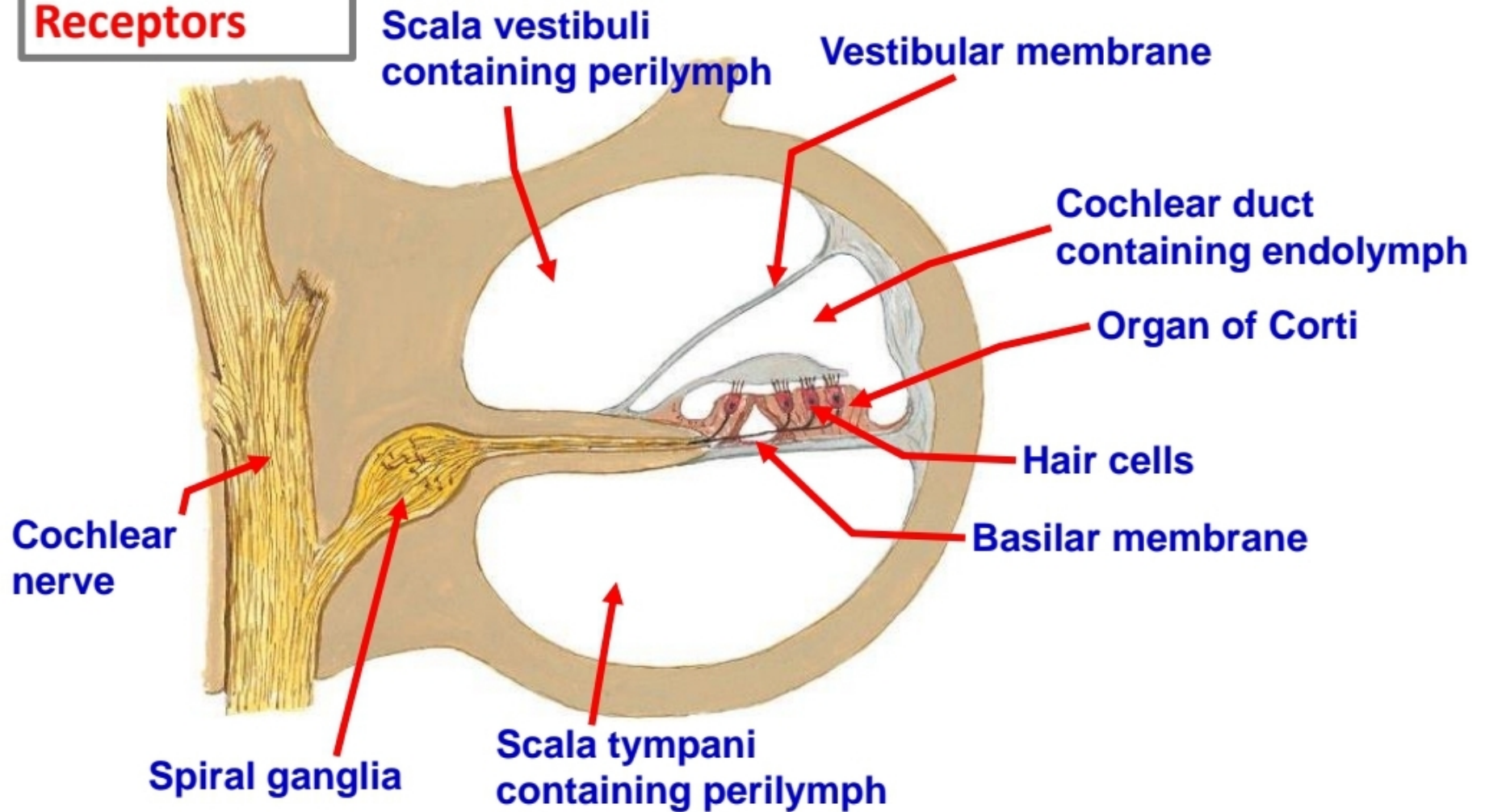
Inner ear

External acoustic meatus

Tympanic membrane



# Receptors



## Cochlear nerve

Spiral ganglia

Facial nerve

Cochlear nerve

Vestibulocochlear nerve

Enters brain stem at Pontomedullary junction

Ventral and dorsal cochlear nuclei in pons

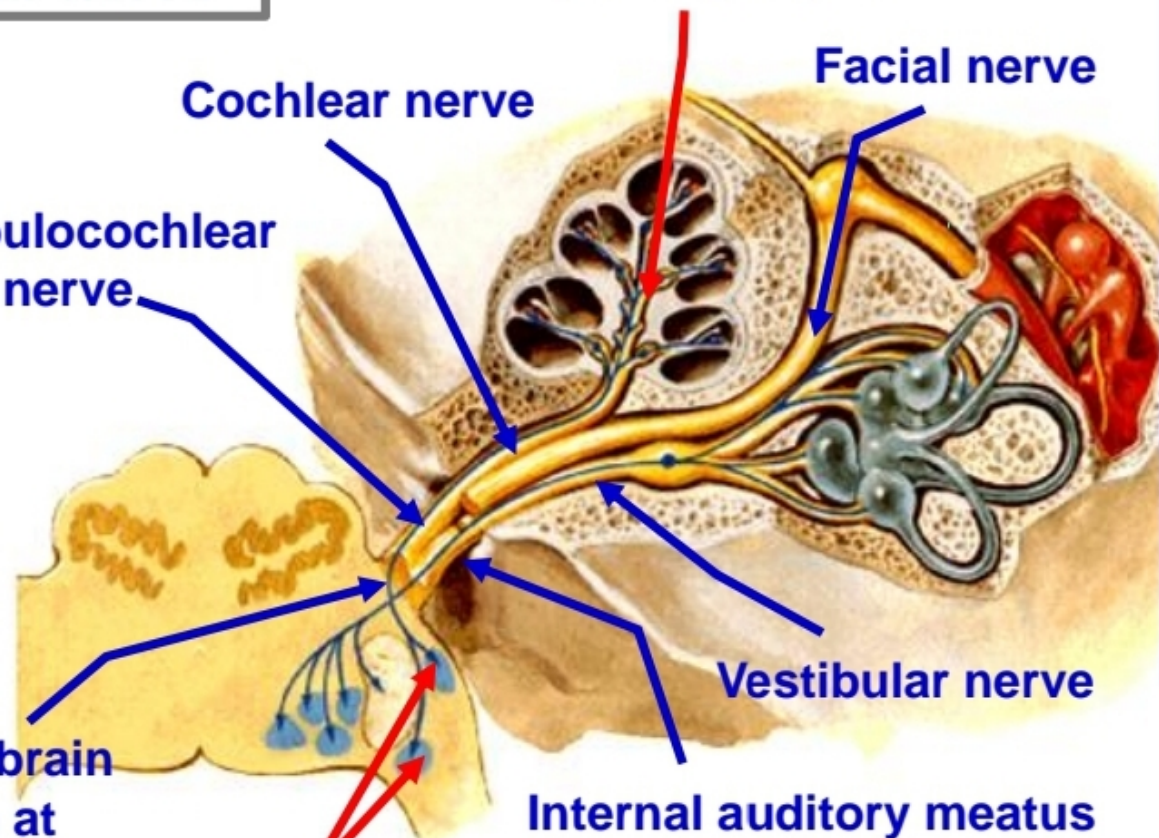
Vestibular nerve

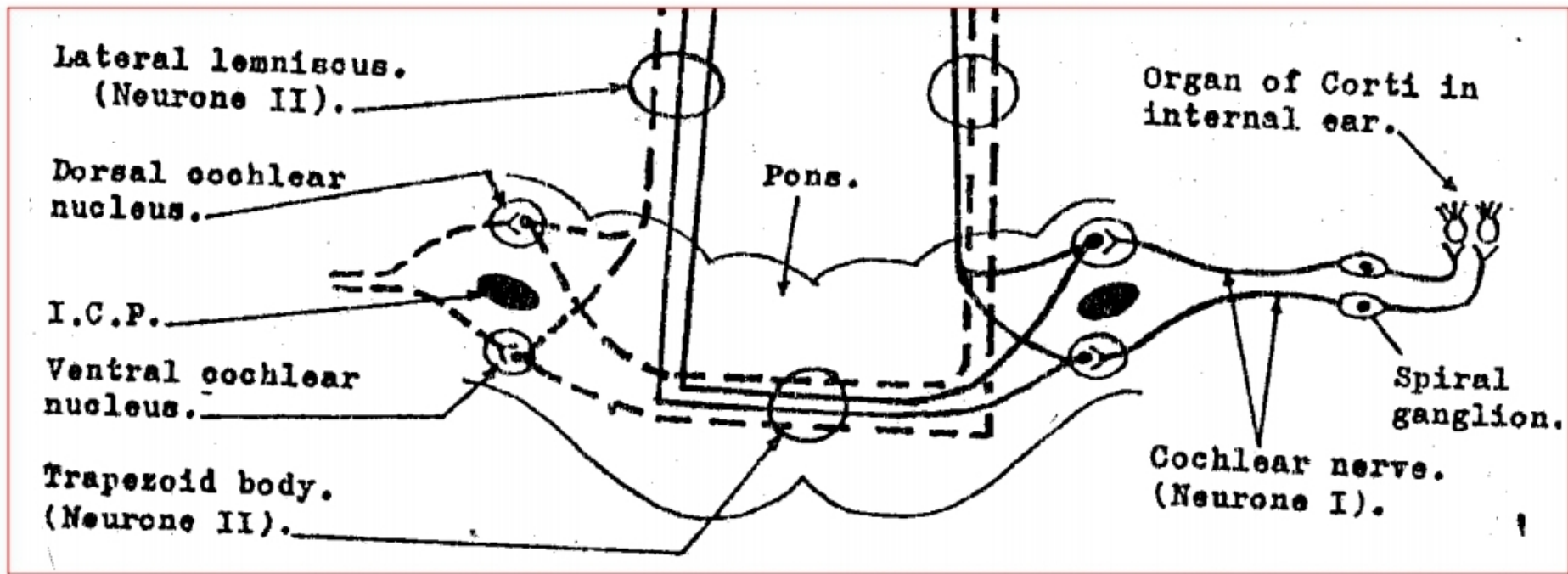
Internal auditory meatus

**1- First neuron:** bipolar cells of **spiral ganglion of the cochlea.**

- Peripheral processes receive the sensation from the receptors.

- Their axons form **cochlear nerve** which ends in ventral and dorsal cochlear nuclei in pons.





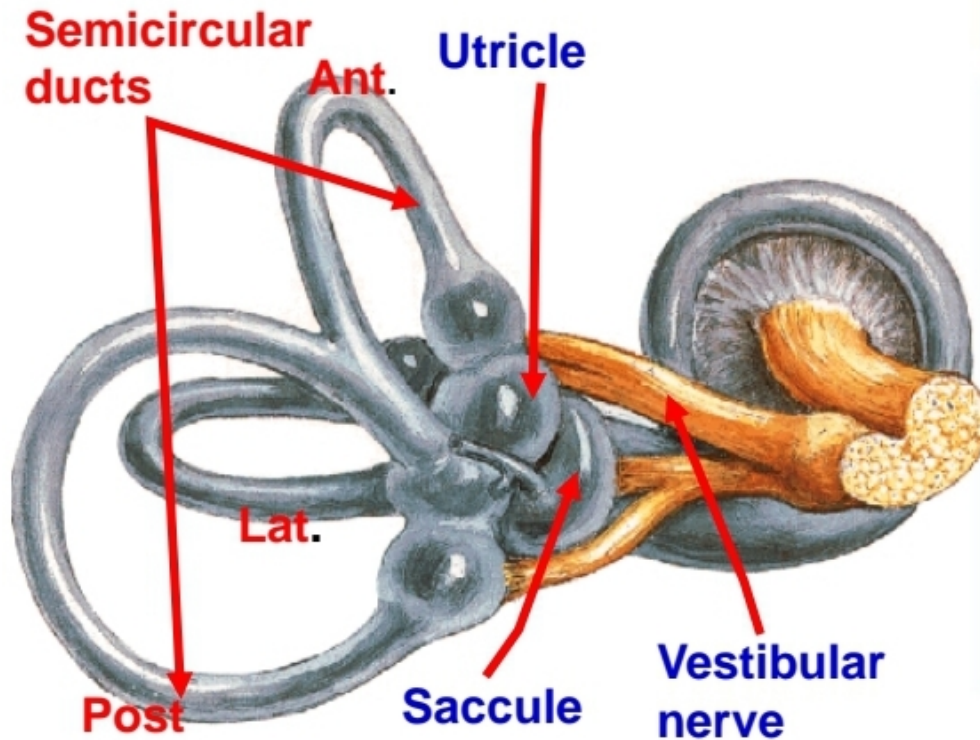
## 2- Second neuron: ventral and dorsal cochlear nuclei.

- **Most of the axons of these cells cross to the opposite side** → decussate with their fellows of the opposite side to form **trapezoid body** → ascend as a **lateral lemniscus** with **some fibres from the same side** → medial geniculate body of the thalamus.

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# Vestibular System

## ❖ Vestibular apparatus



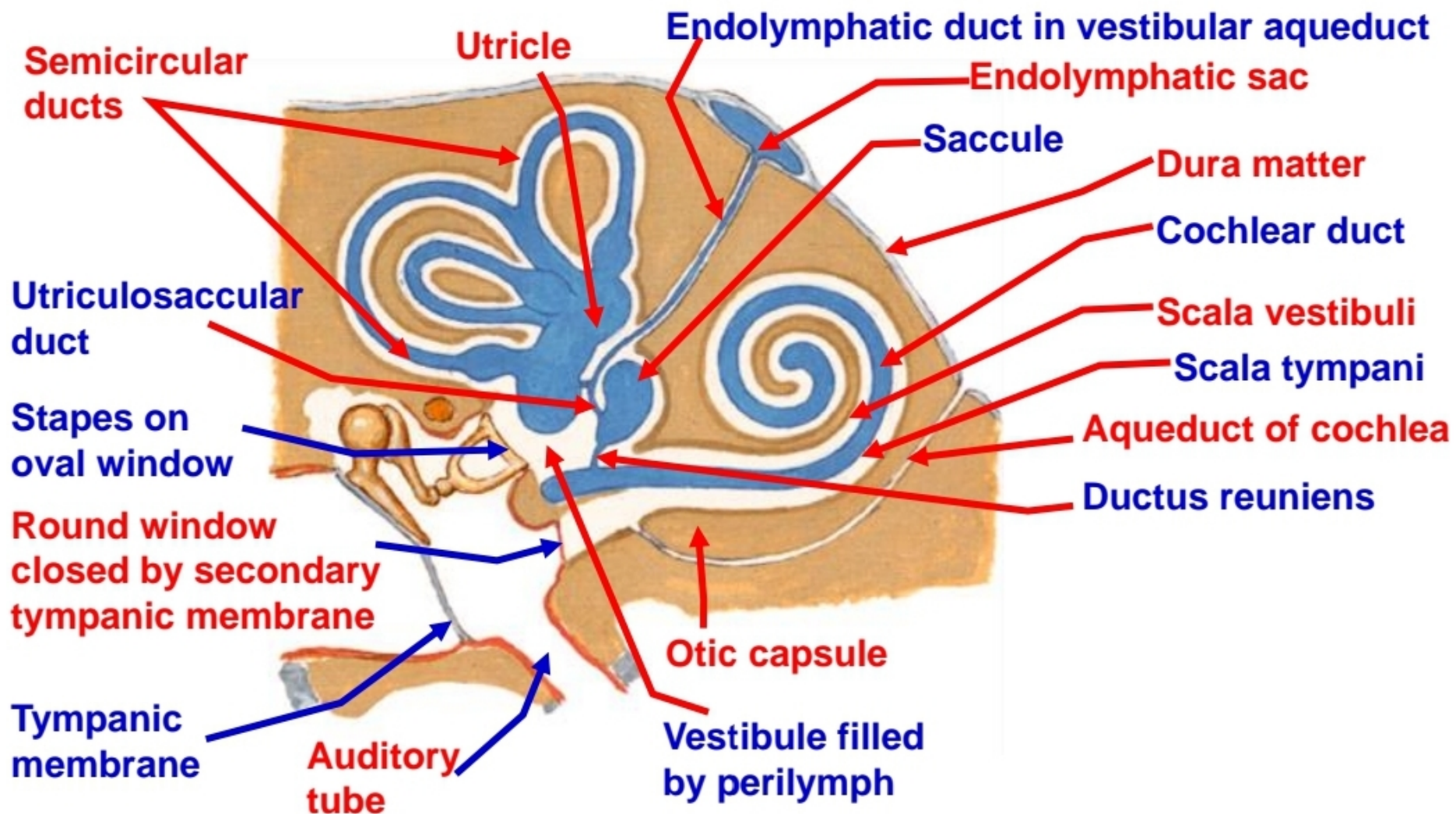
- **3 semicircular ducts** (anterior, posterior and lateral)
- **Otolith organ** (utricle and saccule)
- These cavities inside the bony labyrinth.
- These cavities are filled by **endolymph**.
- They are separated from the bony labyrinth by **perilymph**

### ❖ 3 semicircular ducts

- They lie within the corresponding semicircular canals.
- They open in the utricle.

They open in the utricle.

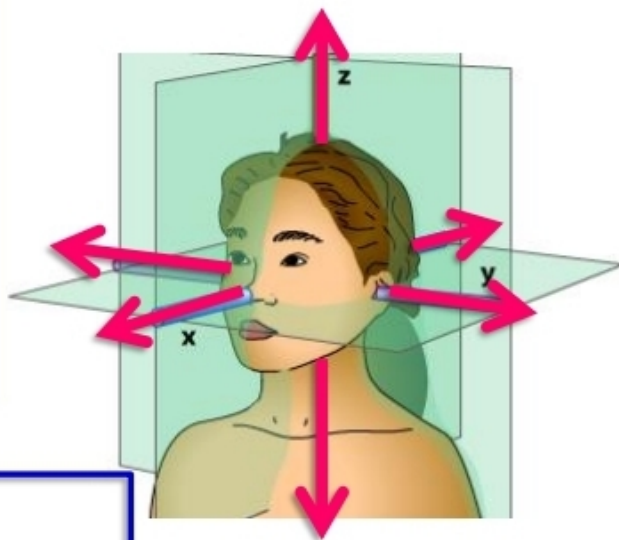
dr\_youssemassene@yahoo.com

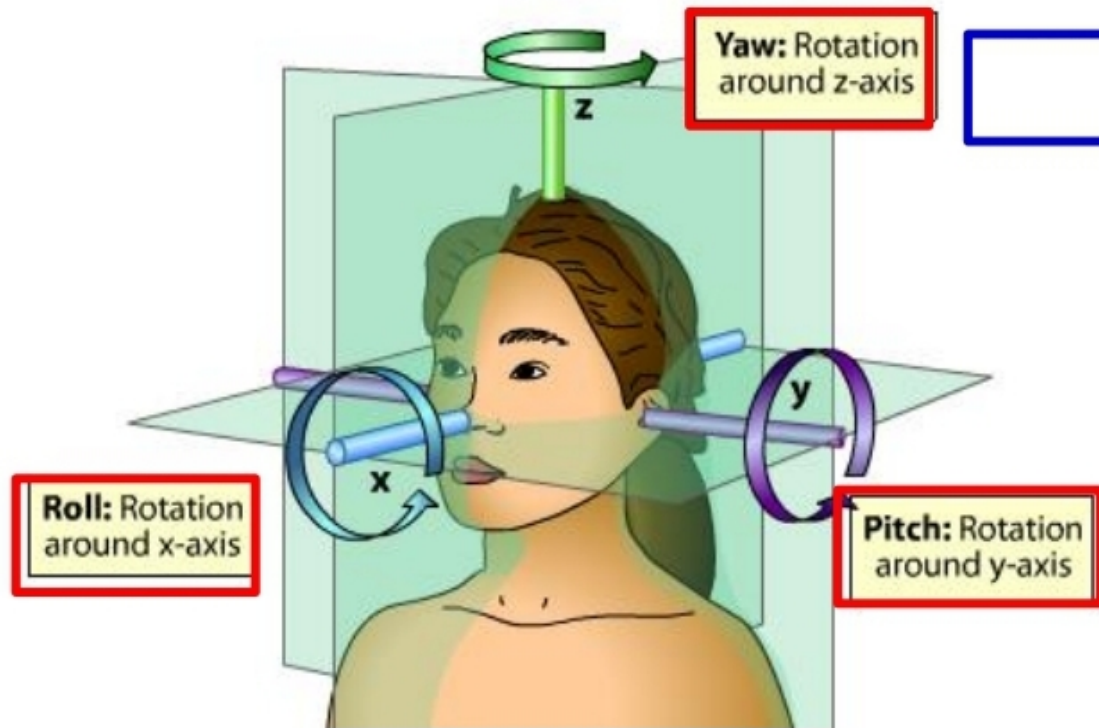


## ❖ Vestibular apparatus

- **Utricle senses acceleration in the horizontal plane: forward and backward, right and left movement or combination.**

- **Sacculle senses acceleration in the sagittal vertical plane: up and down**



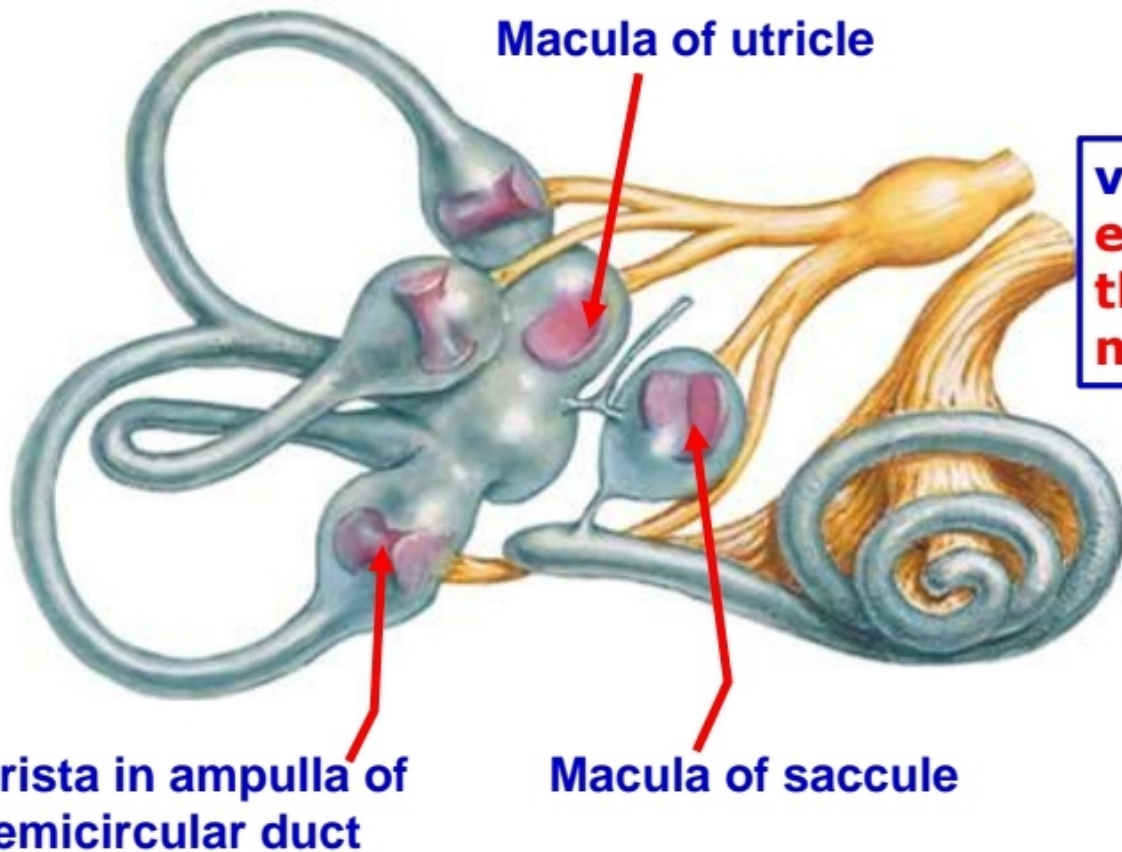


## ❖ Vestibular apparatus

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**3 semicircular canals are sensitive to angular accelerations (head rotations) around 3 axes.**





**Macula of utricle**

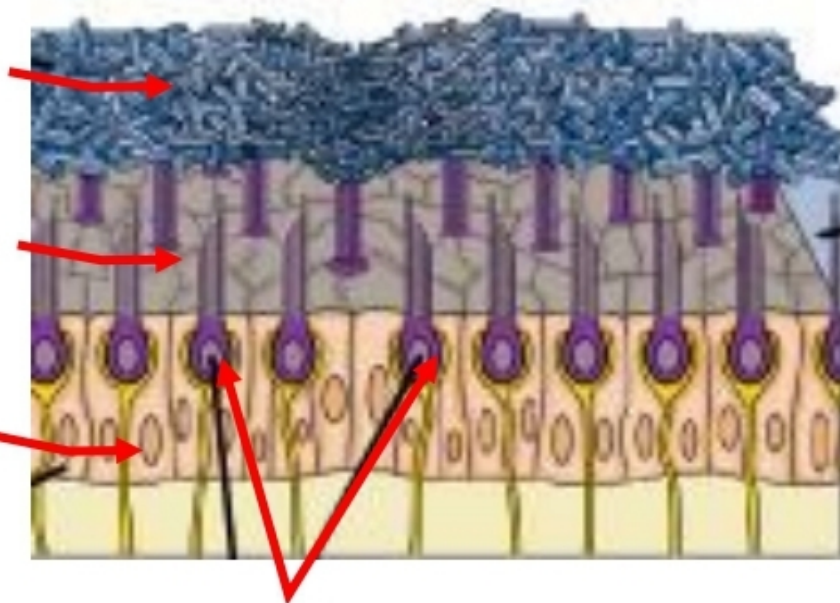
**vestibular sensory  
epithelium is located in  
the walls of the  
membranous labyrinth**

**Crista in ampulla of  
semicircular duct**

**Macula of saccule**

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Otoconia



Gelatinous layer

Supporting cells

Hair cells

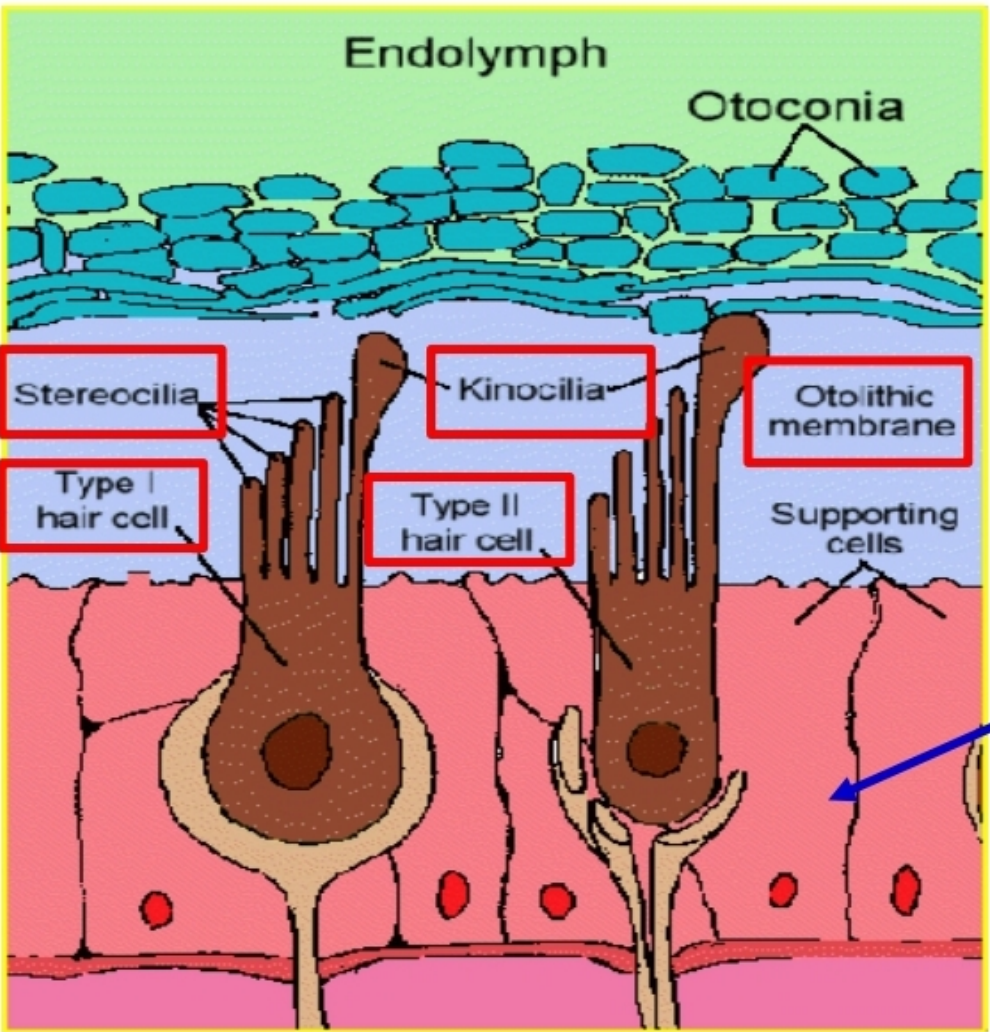
**Vestibular Sensory Epithelium**

Otolithic membrane

**macula** is a specialized area of neurosensory epithelium lining the membranous wall of **utricle and saccule**

- The epithelial surface is covered by a **gelatinous layer**
- **A**bove this layer is a **fibrous structure**, in which many small crystals of **calcium carbonate**, are embedded (**otoconia**)

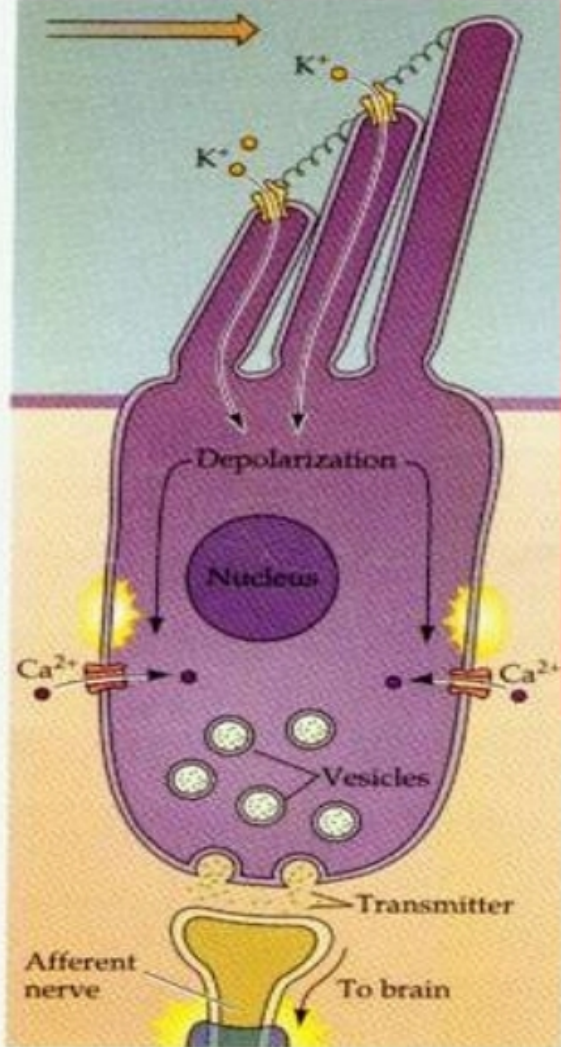
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- **Macula** showing Type I and Type II hair cells
- Their hair bundles which are embedded in **otolithic membrane** called **stereocilia**.
- The large cilium in each bundle is called **kinocilia**.

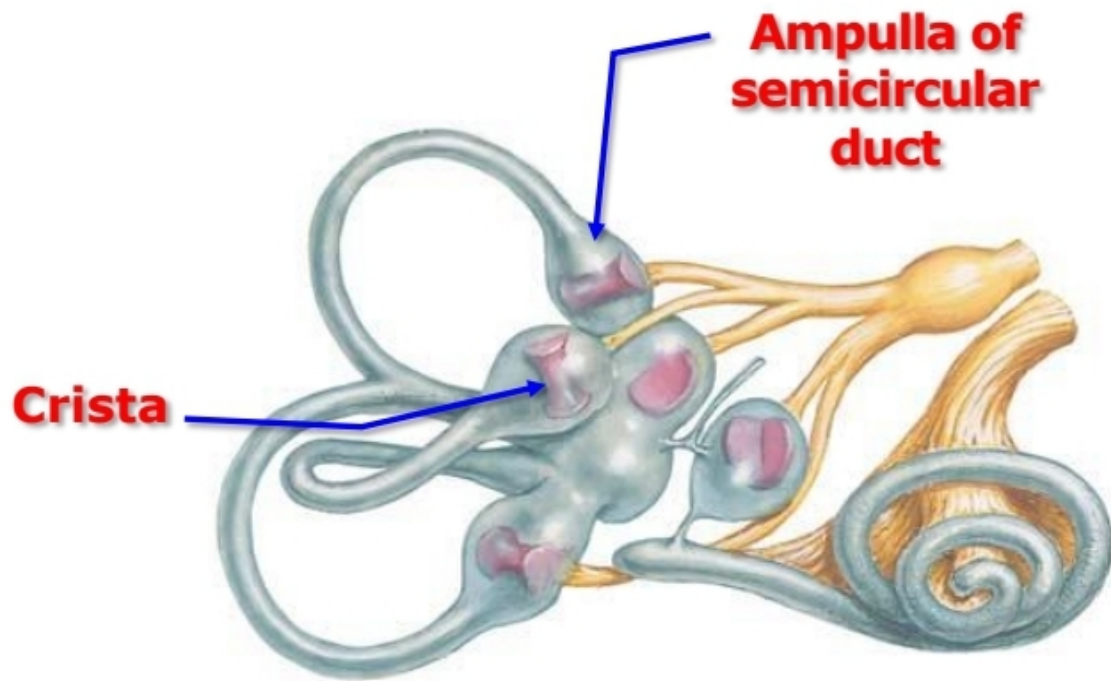
**Macula**

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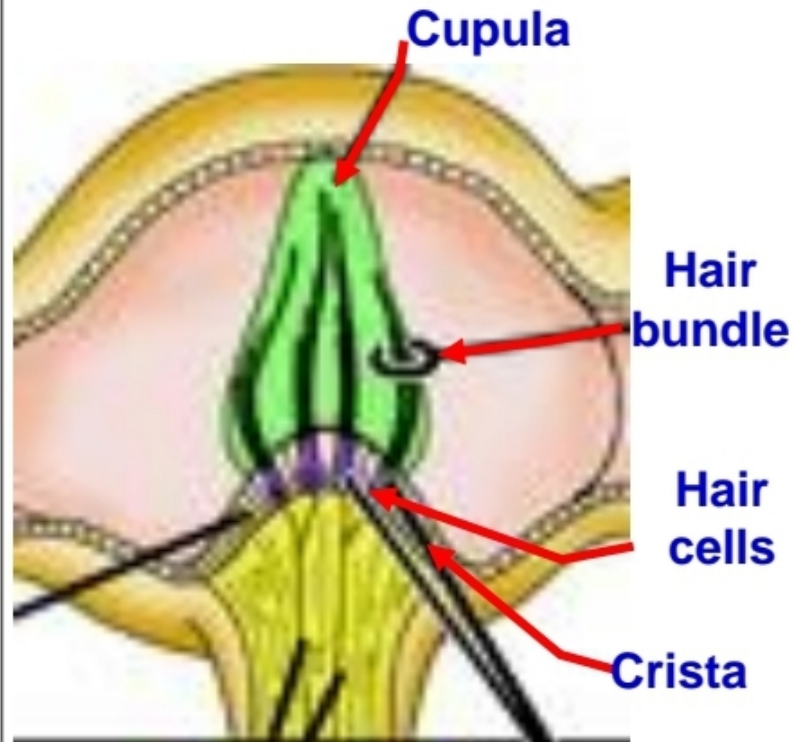
- **Depolarized (stimulation) or Hyperpolarized (inhibition) depending upon movements of the stereocilia**
- **Movement of stereocilia towards kinocilium open potassium channels and depolarization** of hair cells thus causing neurotransmitter release and so increasing vestibular activity afferents to brainstem
- **Movement of stereocilia away from kinocilium closes potassium channels with hyperpolarization of hair cell and** thus reducing vestibular activity

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- The lateral end of each semicircular ducts dilated to form an **ampulla**
- **The crista** lies within the ampulla of each duct

- **The Crista** has many **hair cells**
- **Hair bundles** are covered by a gelatinous structure, **cupula**.
- **The cupula** forms a viscous barrier through which the endolymph cannot circulate.
- **When the head turns to the left, For example:** the **cupula** is **pushed toward the kinocilia in the left** lateral (horizontal) canal, So **depolarization** occurs and the firing rate of left vestibular nerve increases. In contrast, the cupula in the **right** lateral canal is pushed **away** from **kinocilia**, So **hyperpolarization** occurs
- If the head turns to the right, the result is the opposite.



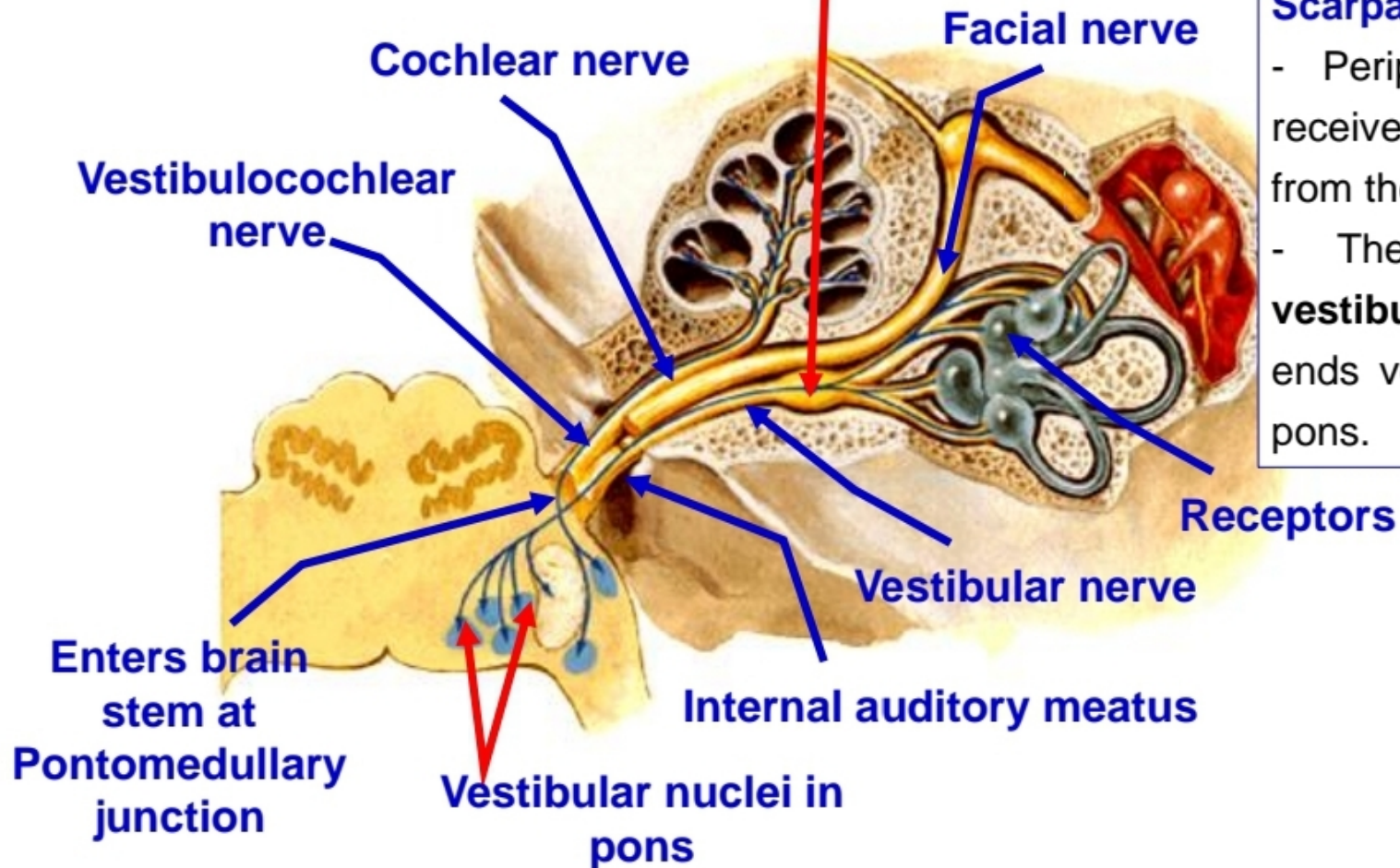
## Cochlear nerve

## Scarpa's ganglia

## 1- First neuron:

### Scarpa's ganglion.

- Peripheral processes receive the sensation from the receptors.
- Their axons form **vestibular nerve** which ends vestibular nuclei in pons.



# Cervical

- It is formed by the ventral rami of upper four cervical nerves (C1 to C4)
- It is formed in the posterior triangle



# Cutaneous branch

**Sternomasto  
id**

**Lesser occipital  
nerve (C2)**

**Middle  
Supraclavicular  
nerve**

**Lateral  
Supraclavicular  
nerve**

**Great auricular  
nerve (C2-  
C3)**

**Transverse  
cervical  
nerve (C2-  
C3)**

**Supraclavicular  
nerves  
(C3-C4)**

**Medial**



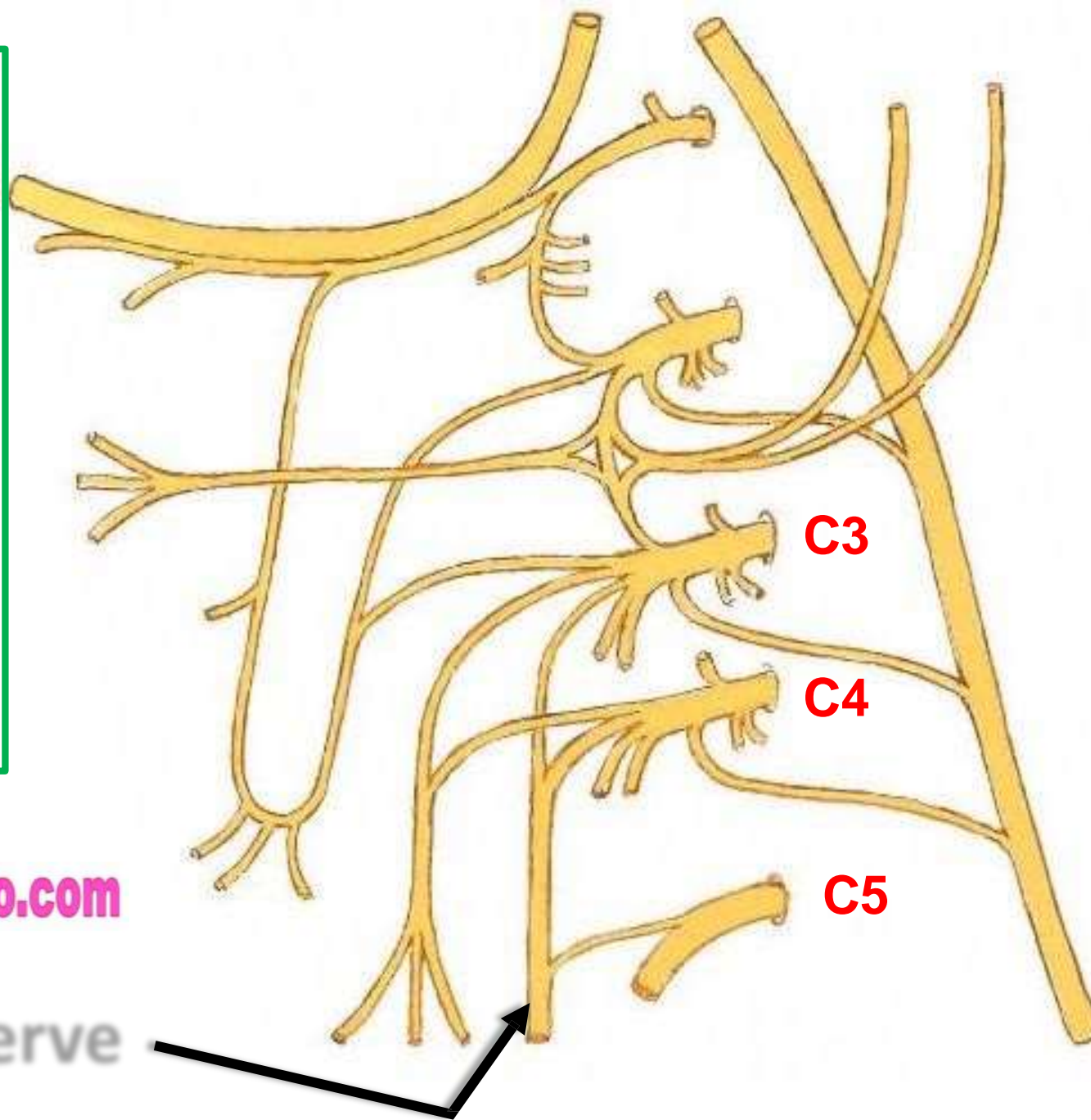


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- **Phrenic nerve** is a mixed nerve.
- **Roots**, they arise from the ventral rami of C3, C4 and C5 (mainly from C4).
- **C3 and C4** from cervical plexus
- **C5** from brachial plexus



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**Phrenic**  
**nerve**

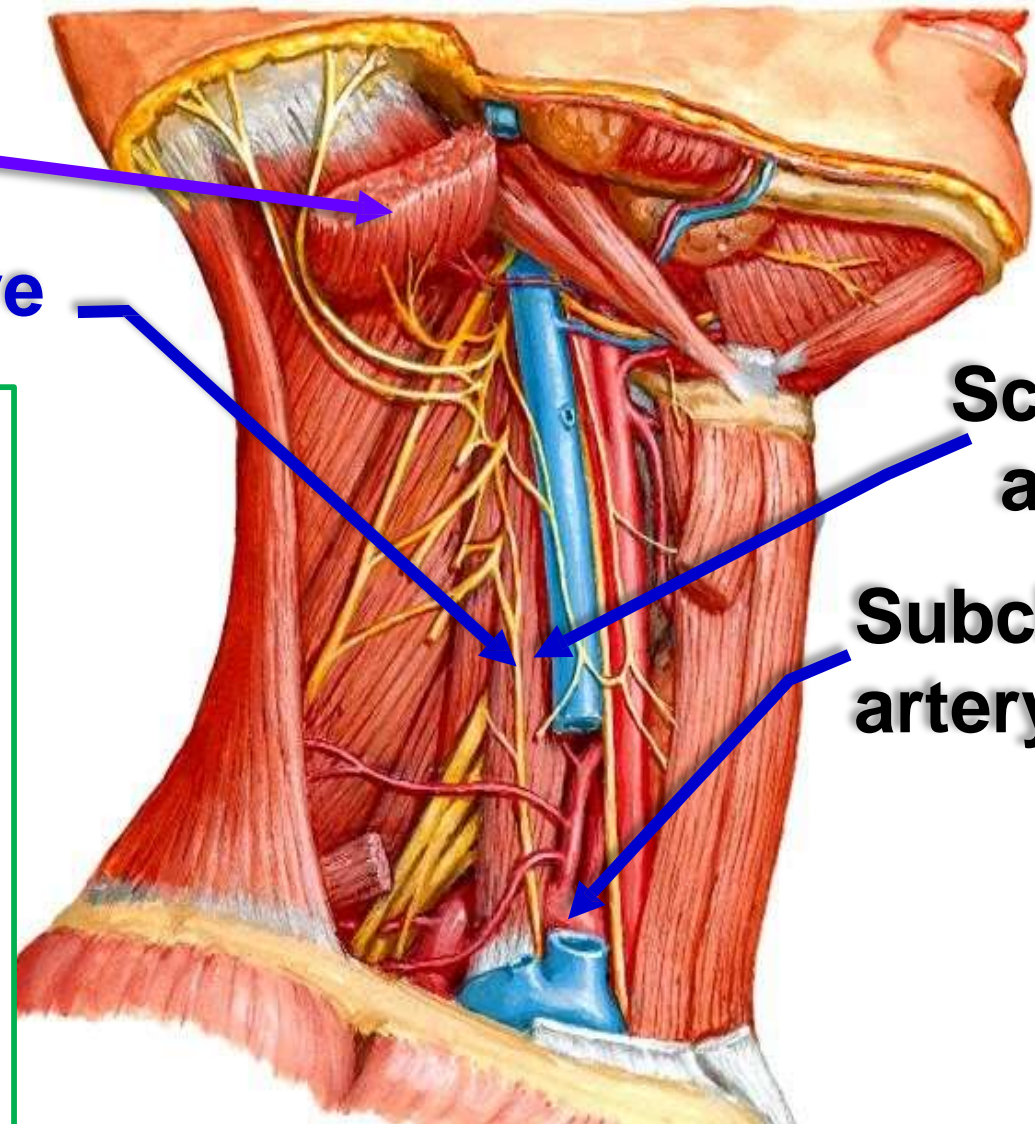
**Sternomastoid**

**Phrenic nerve**

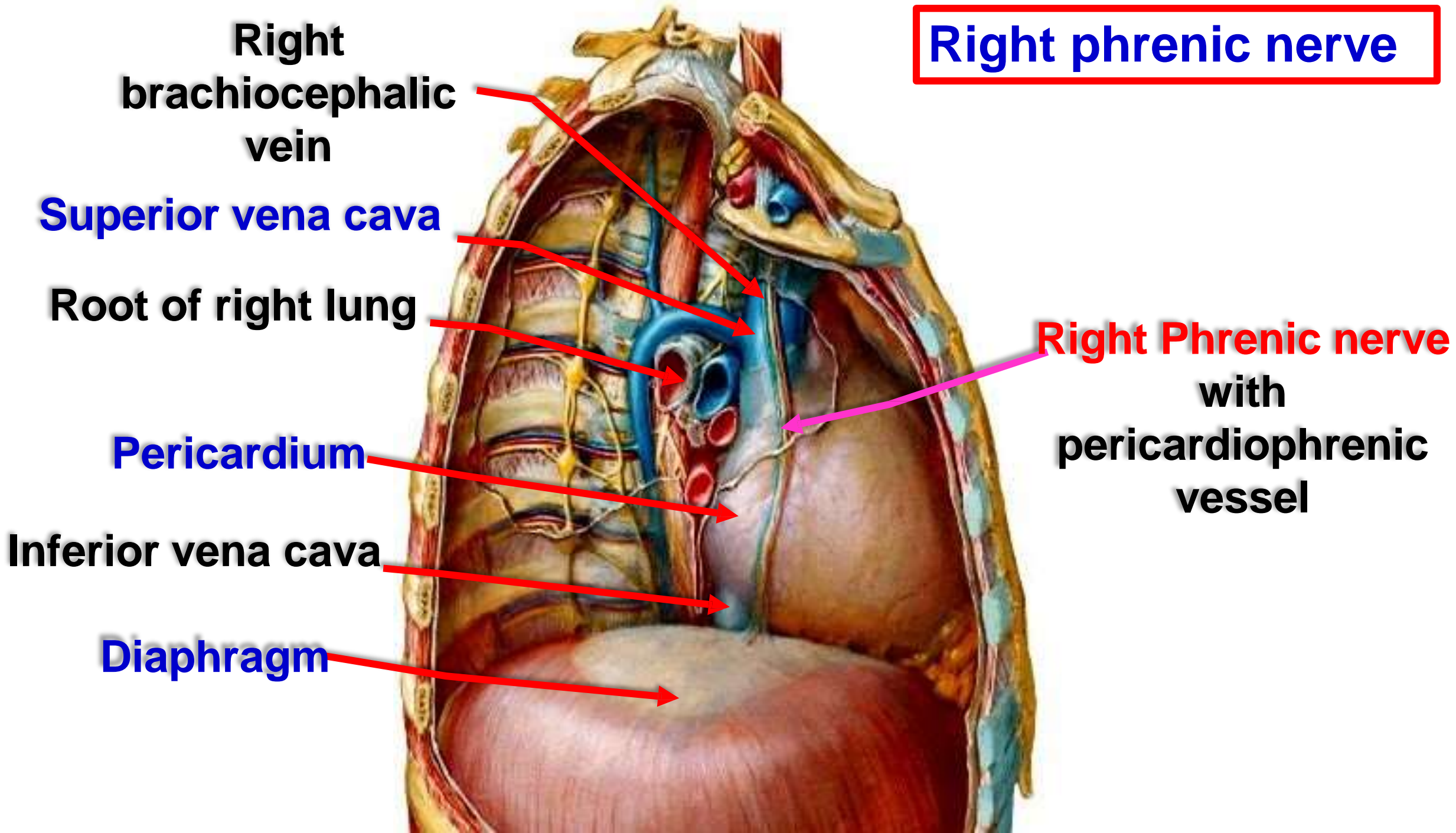
**Scalenus anterior**

**Subclavian artery**

- **Course In the neck,**
  - It descends **in front of** scalenus anterior between muscle and its fascia.
  - **Behind** carotid sheath and sternomastoid muscle.
  - Then **cross** the first part of subclavian artery.
  - It **enters the thorax by crossing** the internal thoracic artery.



**Right phrenic nerve**



**Left phrenic nerve**

**Left Phrenic nerve  
with  
pericardiophrenic  
vessel**

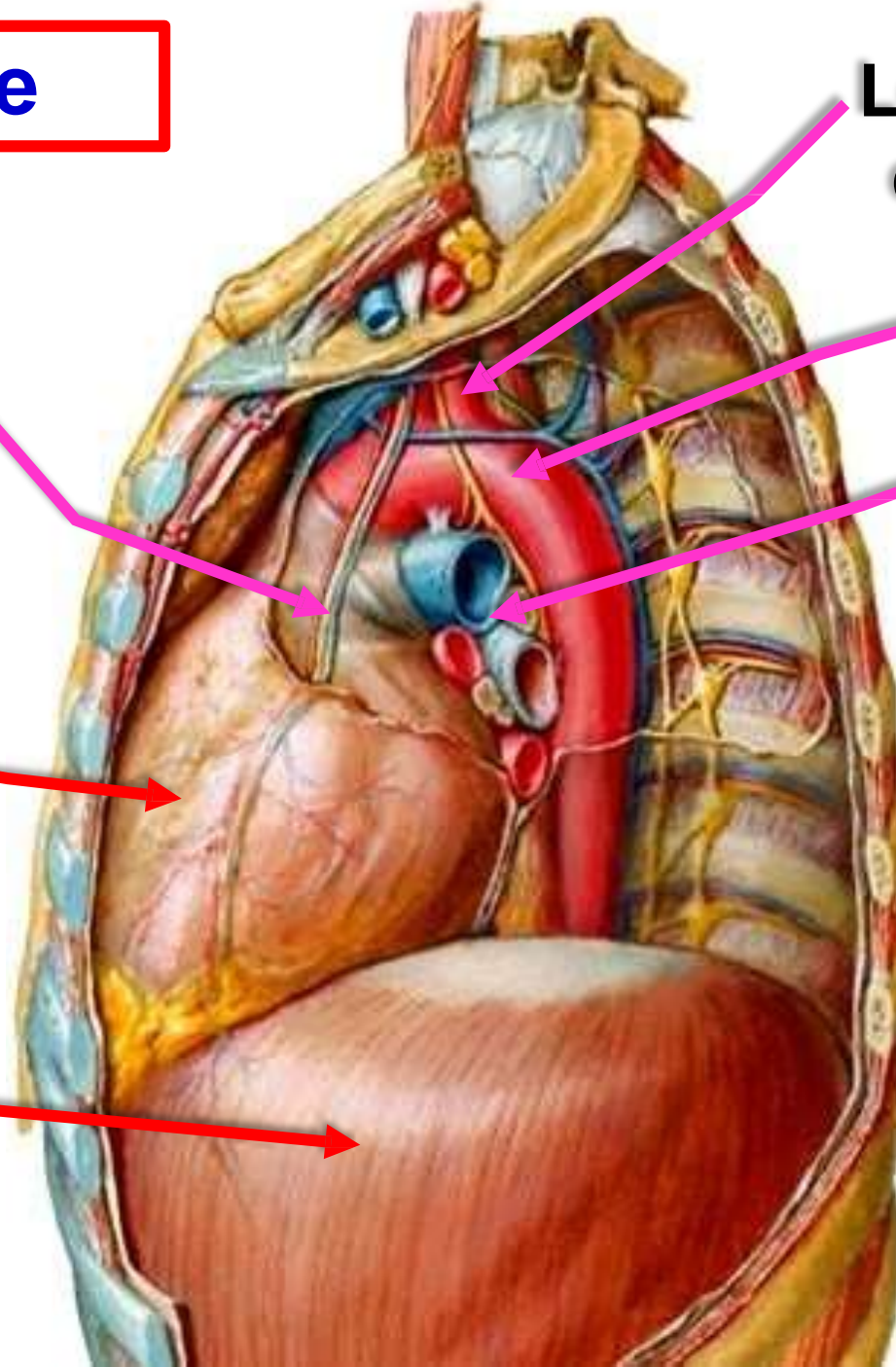
**Pericardium**

**Left copula of  
Diaphragm**

**Left subclavian  
carotid artery**

**Arch of aorta**

**Root of left lung**



تَعَلَّمُوا الْعِلْمَ فَإِنَّ تَعَلُّمَهُ لِلَّهِ خِشْيَةٌ  
وَطَلَبُهُ عِبَادَةٌ، وَمُذَاكَرَتُهُ تَسْبِيحٌ،  
"وَالْبَحْثُ عَنْهُ جِهَادٌ".

• | معاذ بن جبل - رضي الله عنه



# الطب والجراحة لجنة

