

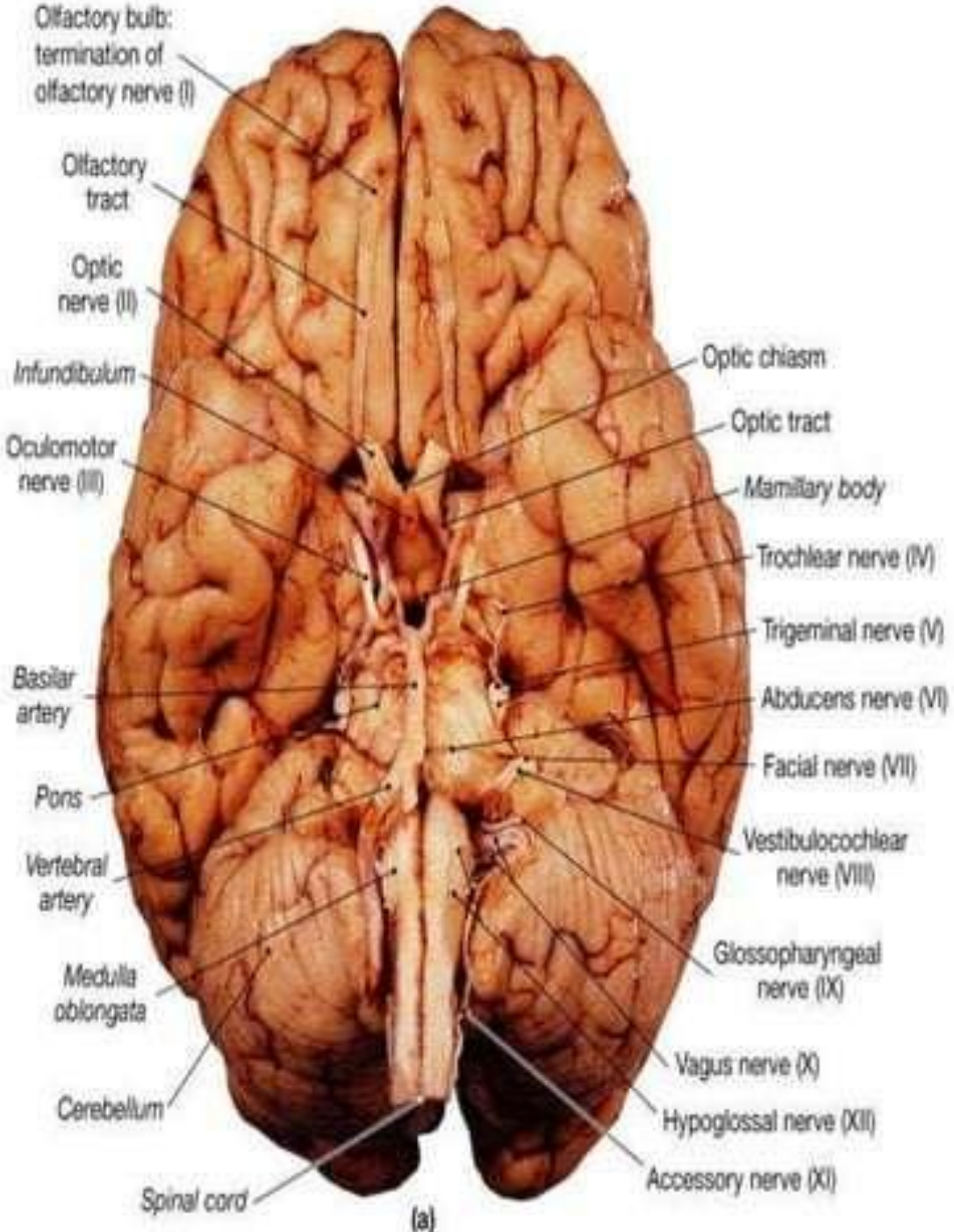


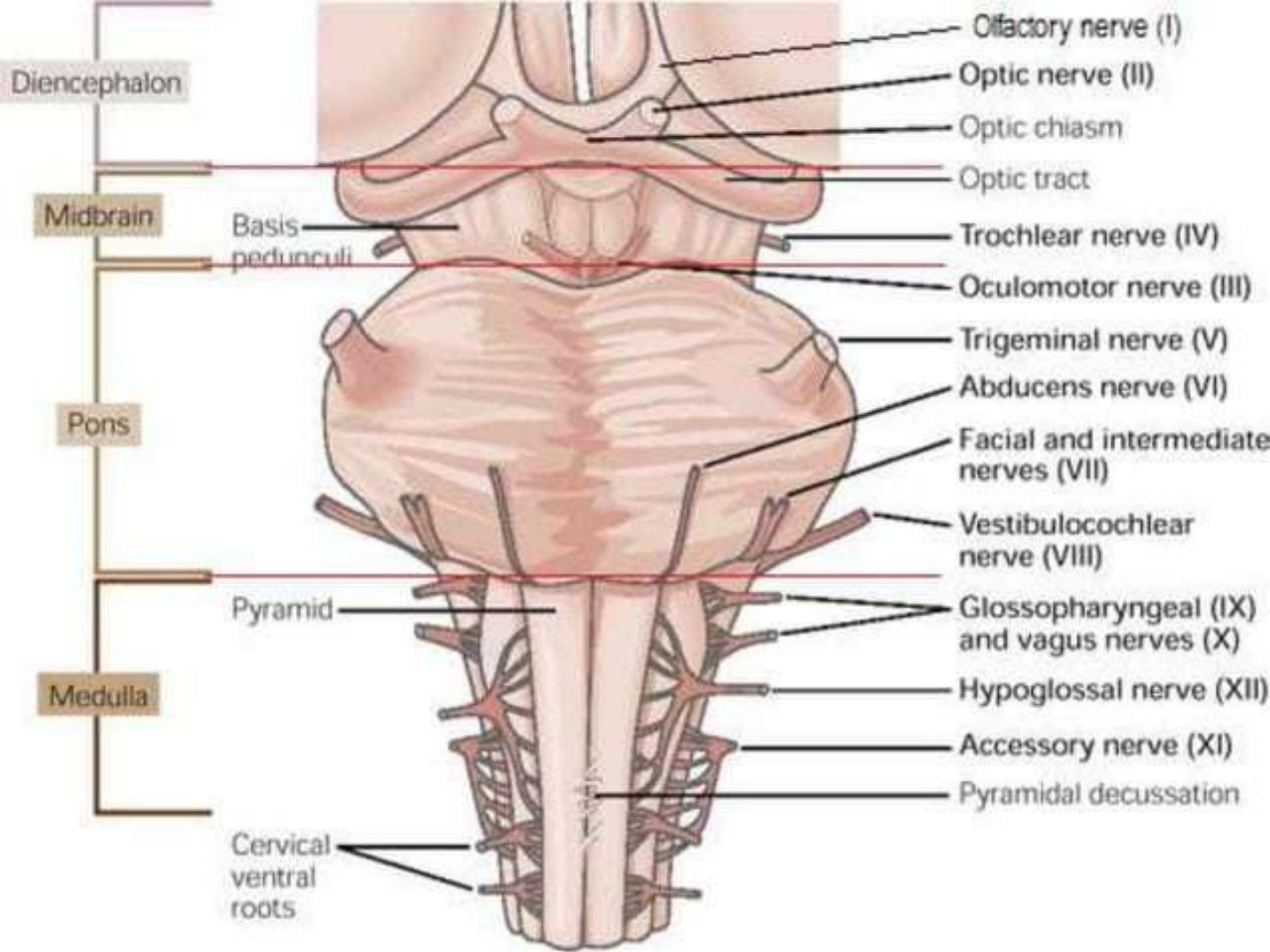
# **CRANIAL NERVES**

**PRESENTED BY : HINA KHALID**

# INTRODUCTION

- There are **12 pairs** of cranial nerves that supply structures in the head, neck, thorax and abdomen.
- A cranial nerve can be made up of a mixture of functions which are called **modalities** or may be made up of a single modality.
- A modality is **sensory, motor, special sensory, etc.**





Diencephalon

Midbrain

Pons

Medulla

Olfactory nerve (I)

Optic nerve (II)

Optic chiasm

Optic tract

Trochlear nerve (IV)

Oculomotor nerve (III)

Trigeminal nerve (V)

Abducens nerve (VI)

Facial and intermediate nerves (VII)

Vestibulocochlear nerve (VIII)

Glossopharyngeal (IX) and vagus nerves (X)

Hypoglossal nerve (XII)

Accessory nerve (XI)

Pyramidal decussation

Basis pedunculi

Pyramid

Cervical ventral roots



## How to Remember CN I-XII

Oh! Oh! Oh!

To Touch And Feel

Very Good Velvet!

Ah Heaven! \_\_\_\_\_

# Mnemonic for CN Function

- Some (CN I)
- Say (CN II)
- Marry (CN III)
- Money (CN IV)
- But (CN V)
- My (CN VI)
- Brother (CN VII)
- Says (CN VIII)
- Big (CN IX)
- Brains (CN X)
- Matter (CN XI)
- Most! (CN XII)

■ S = Sensory function

M = Motor function

■ B = BOTH (Sensory and Motor function)



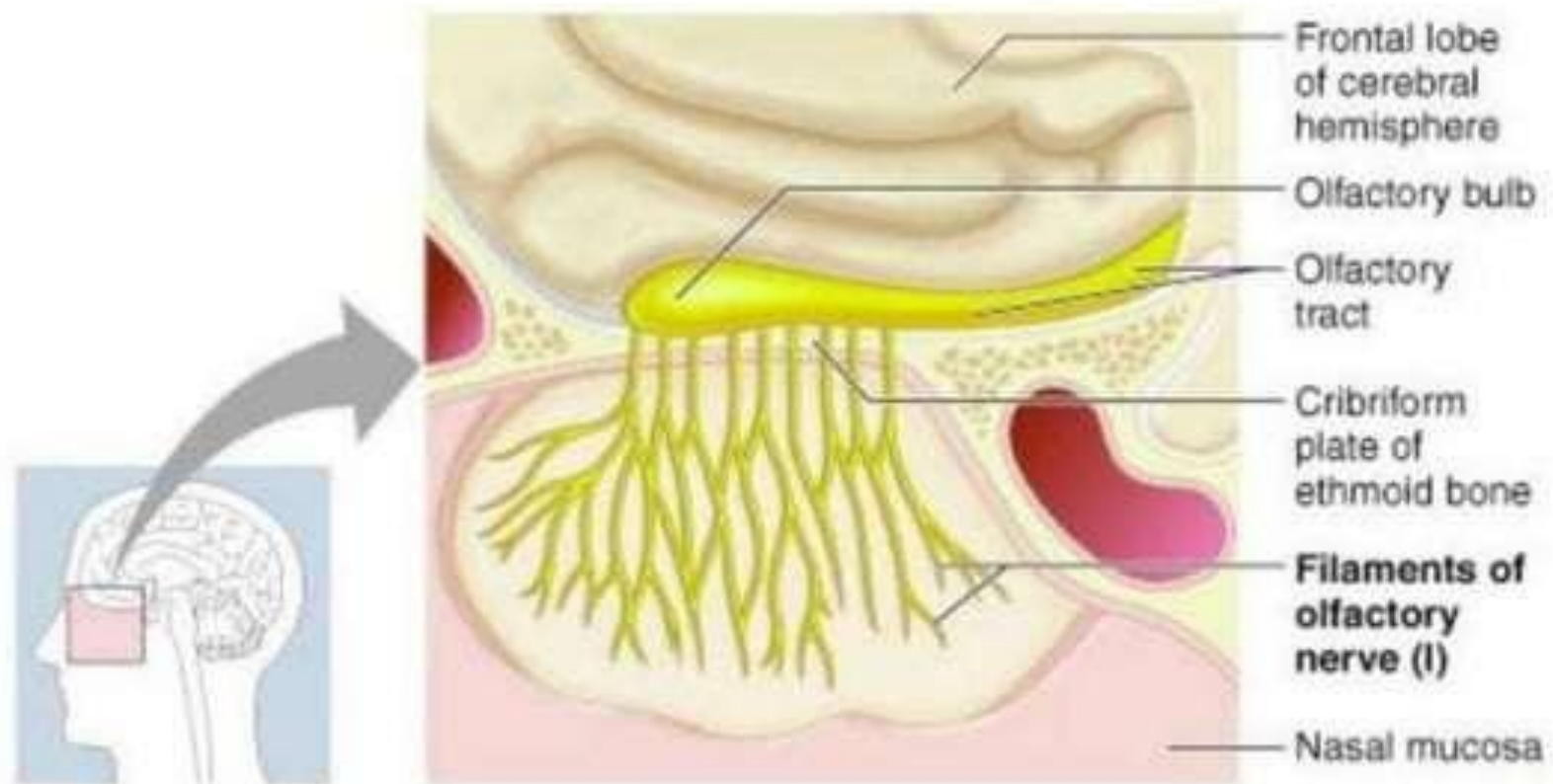
# I. OLFACTORY NERVE



- It is **sensory** nerve
- Carries impulses for **sense of smell**
- **ORIGIN:** olfactory epithelium
- **OPENING IN SKULL:** opens in cribriform plate of ethmoid bone to receptors in roof of nasal cavity.
- Attaches to cerebrum.
- Lesion leads to **bilateral anosmia** can be caused by disease of olfactory mucous membrane, such as the common cold .



# CRANIAL NERVE I: OLFACTORY



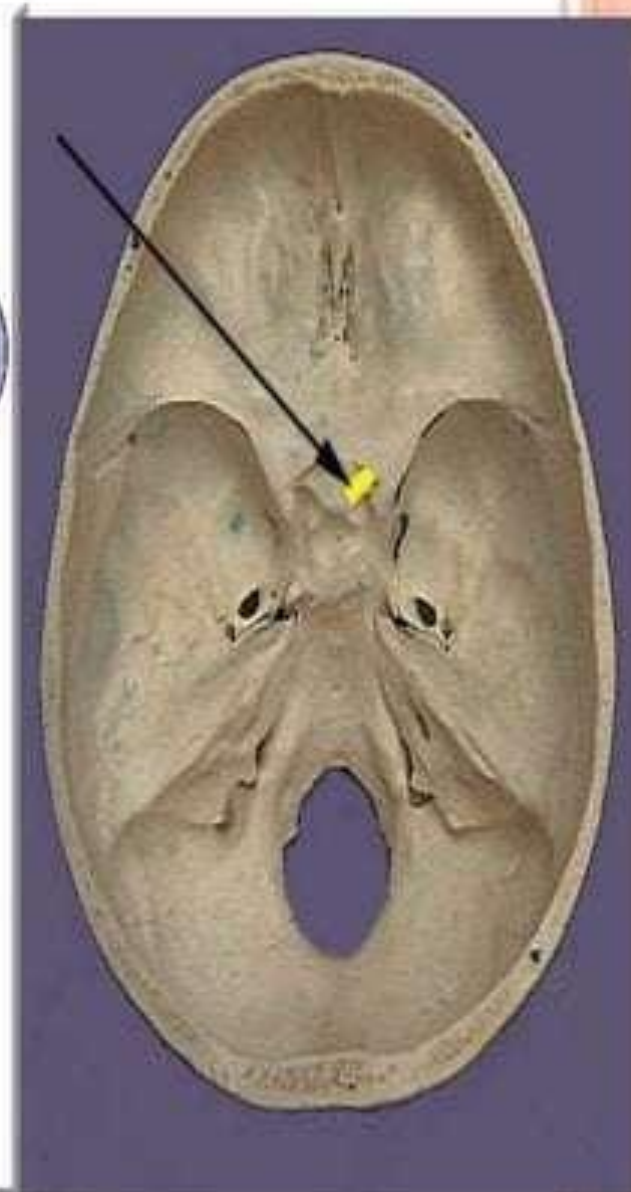
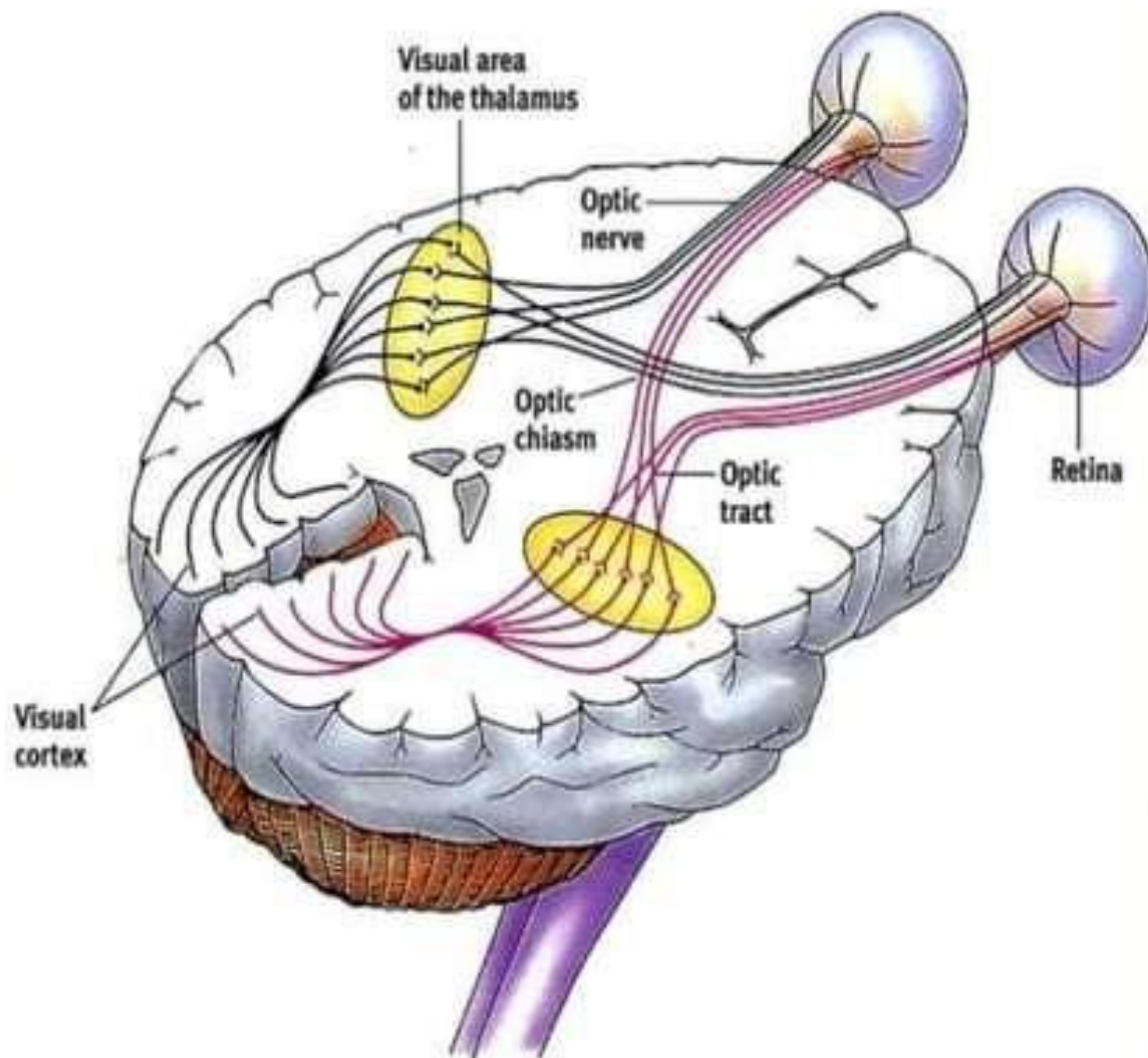
## II.OPTIC NERVE

- It is **sensory** nerve.
- It carry **impulses for vision**.
- **Origin:** Back of eye ball/ retina of eye.
- **Opening to skull:** Optic canal and from there it converge to form optic chiasm.
- Attaches to diencephalon.
- Reflexes generated by this nerve are light reflex by lateral geniculate body, visual reflex & corneal reflex by blinking of eyes.
- Lesion leads to total blindness of one eye, hemianopia(partial lesion of optic chiasma on its lateral side.





## II. OPTIC NERVE



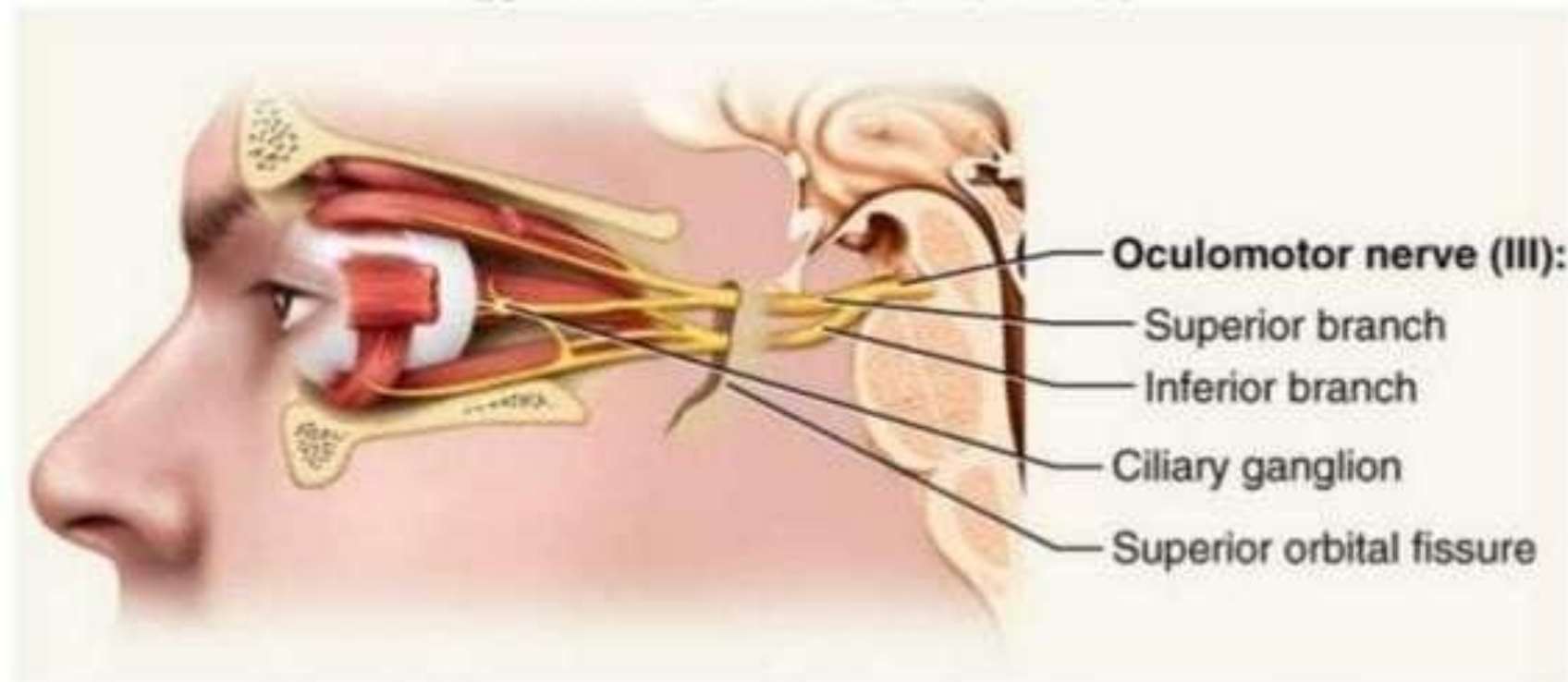
### III. OCULOMOTOR NERVE



- It is **motor** nerve.
- **Function:**
  1. raises the upper eyelid.
  2. turn eye ball upward, downward & medially.
  3. constricts pupil.
  4. accommodates the eye
- The later **two functions** are parasympathetically controlled.
- Parasympathetic cell bodies are in **ciliary ganglia**.
- **Origin:** anterior surface of midbrain.
- **Opening in skull:** Superior orbital fissure.
- Lesion leads to **drooping of the upper eyelid (ptosis)** due to paralysis of levator palpebrae superioris muscle.
- Conditions effecting oculomotor nerve are diabetes, aneurysm, tumor, trauma, inflammation & vascular disease



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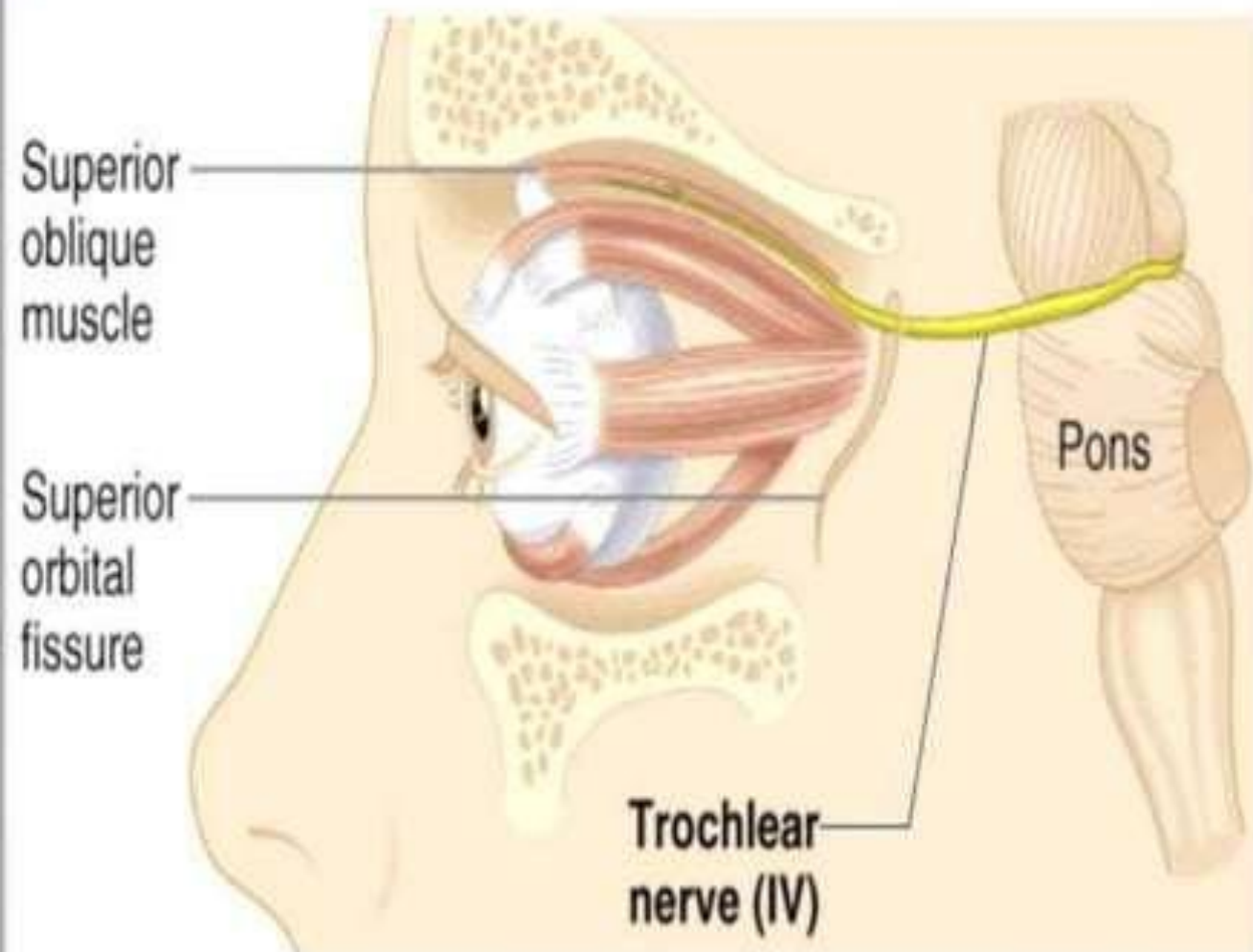


## IV.TROCHLEAR NERVE

- It is motor nerve.
- **Function:** Assisting in turning eyeball downward and
- **Origin:** Posterior surface of the midbrain & innervate superior oblique muscle.
- **Opening to the Skull:** Superior orbital fissure.
- Attaches to midbrain.
- Lesion is due to aneurysm of internal carotid artery & vascular lesion of dorsal part of midbrain.
- Patient complains of double vision on looking downward.

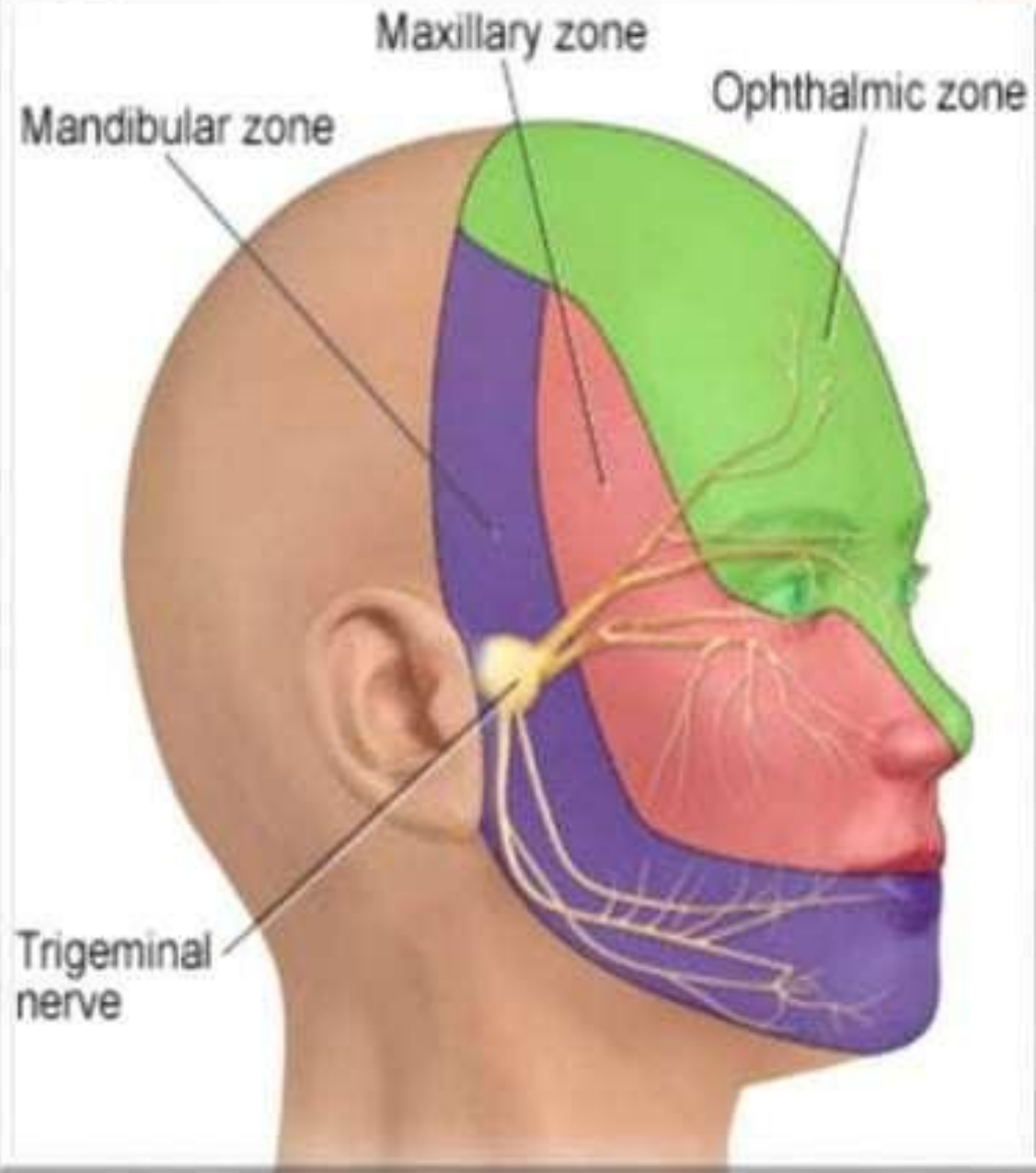


## IV. TROCHLEAR NERVE



# V. TRIGEMINAL NERVE

- It has **three** divisions as:
- Ophthalmic division
- Maxillary division
- Mandibular division





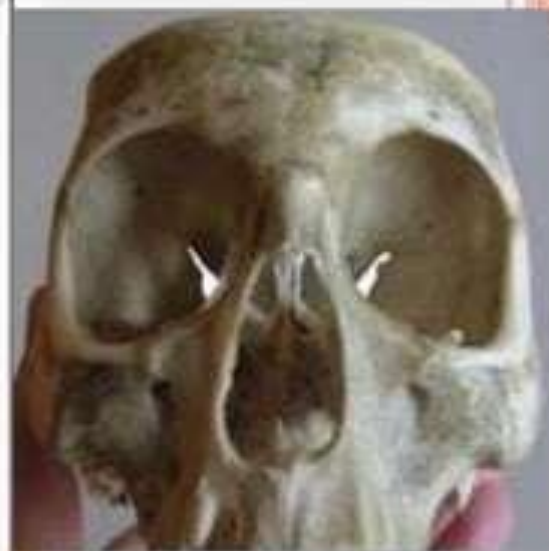
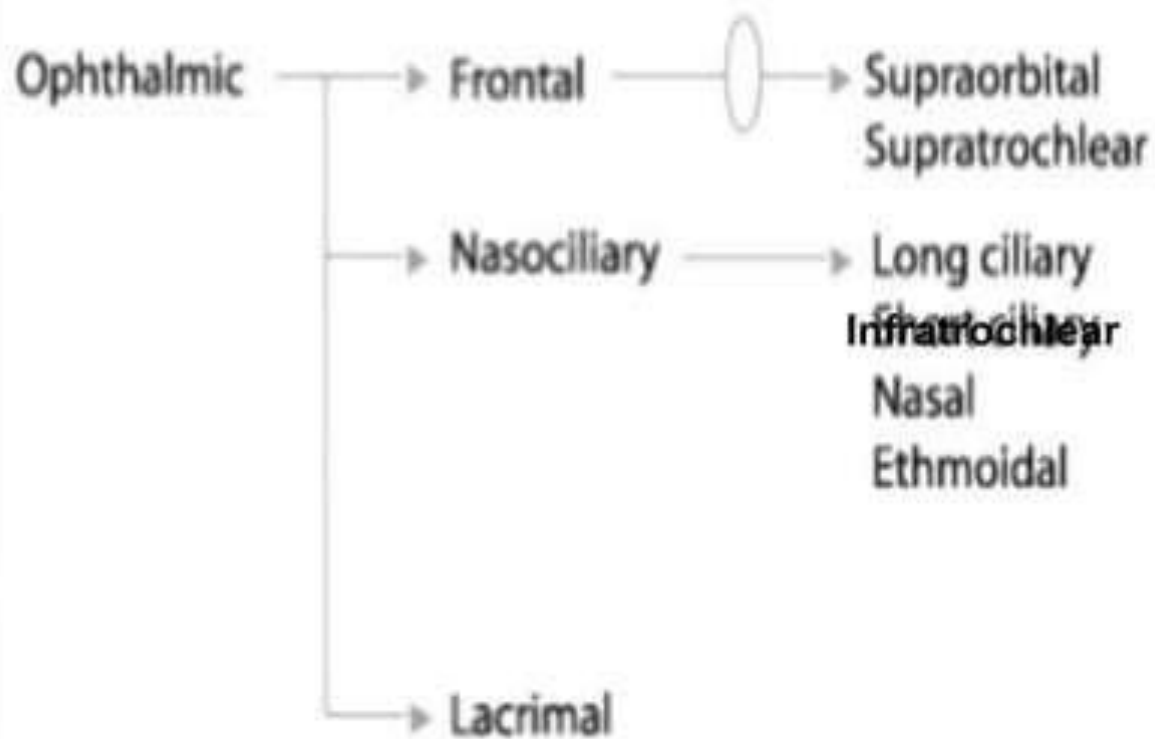
# V1.OPHTHALMIC NERVE

- It is sensory.
- **Function:**  
cornea, skin of forehead, scalp, eyelids, nose, also mucous membrane of paranasal sinuses & nasal cavity.
- **Origin:** Anterior aspect of pons.
- **Opening in skull:** Superior orbital fissure.
- Exit orbit through supra orbital foramen.
- In lesion of this nerve cornea & conjunctiva will be insensitive to touch.

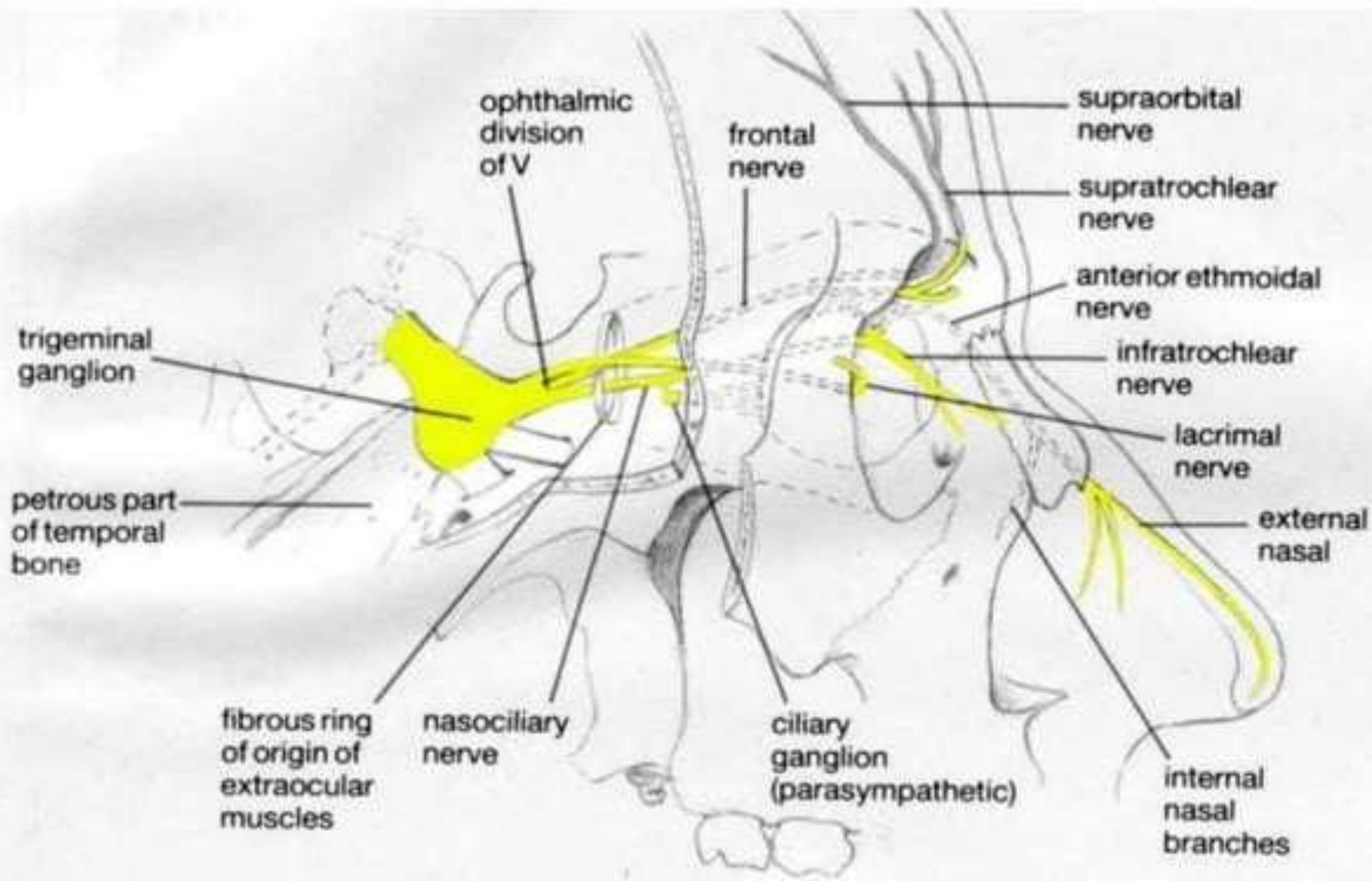


# V1. OPHTHALMIC NERVE

Supraorbital



# V1. Ophthalmic Nerve





## V2.MAXILLARY NERVE

- It is sensory nerve.

- **Function:**

  - skin of face over maxilla.

  - Teeth of upper jaw.

  - Mucous membrane of nose , the maxillary sinus & palate.

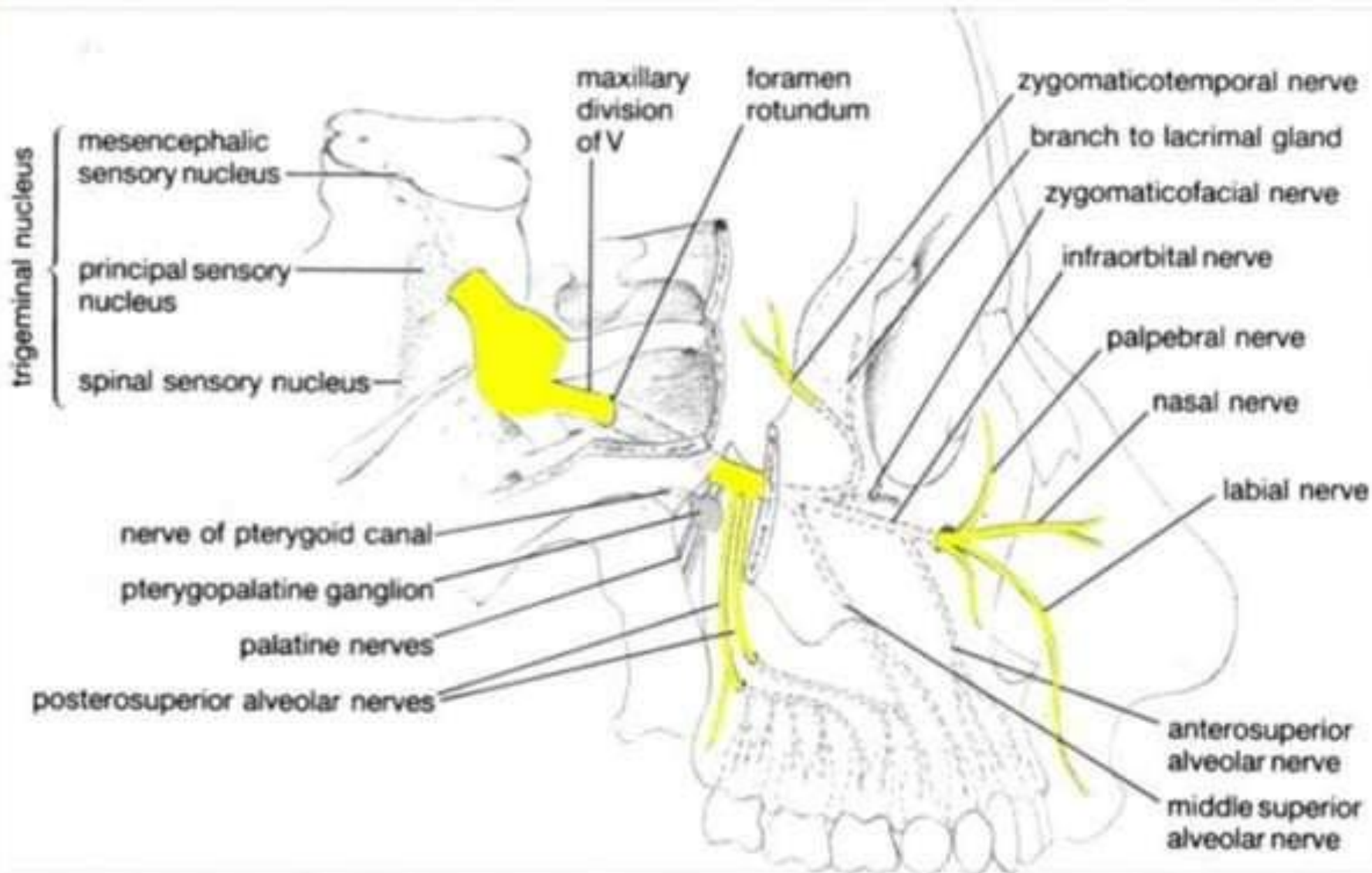
- **Origin:** Anterior aspect of pons.

- **Opening in skull:** Foramen rotundum

- Exit through infraorbital foramen.



# V2. Maxillary Nerve



### V3. MANDIBULAR NERVE

○ **Component:** a. Motor

- **Function:**
- Muscles of mastication
  - Mylohyoid
  - Anterior belly of digastric
  - Tensor veli palatine
  - Tensor tympani

○ **Origin:** Anterior aspect of the pons

○ **Opening to the Skull:** Foramen ovale



### V3. MANDIBULAR NERVE

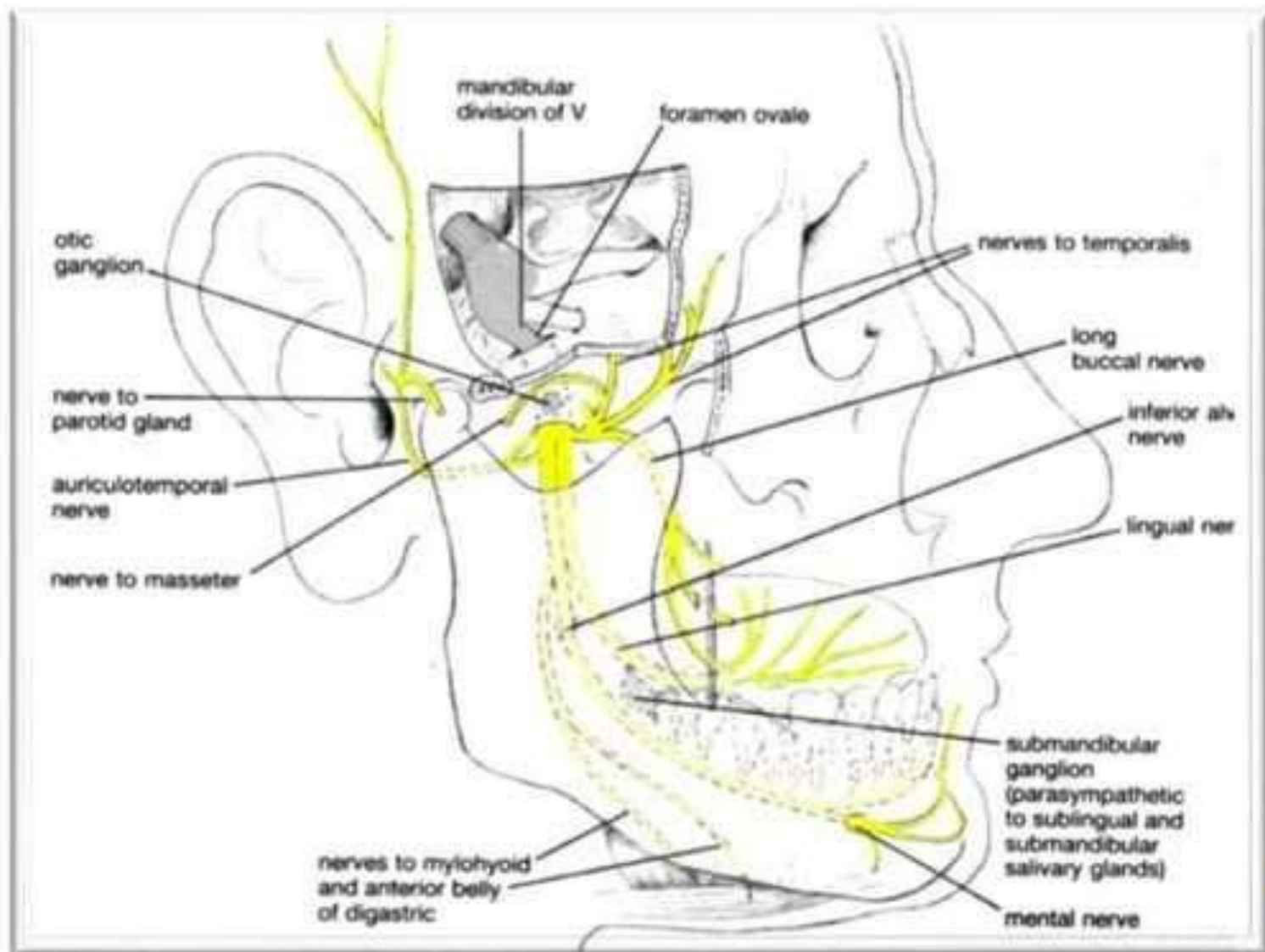
- **Component:** b. Sensory

- **Function:**
  - Skin of cheek
  - Skin over mandible and side of head
  - Teeth of lower jaw and TMJ
  - Mucous membrane of mouth and anterior part of tongue

- **Origin:** Anterior aspect of the pons

- **Opening to the Skull:** Foramen ovale

# V3. Mandibular Nerve



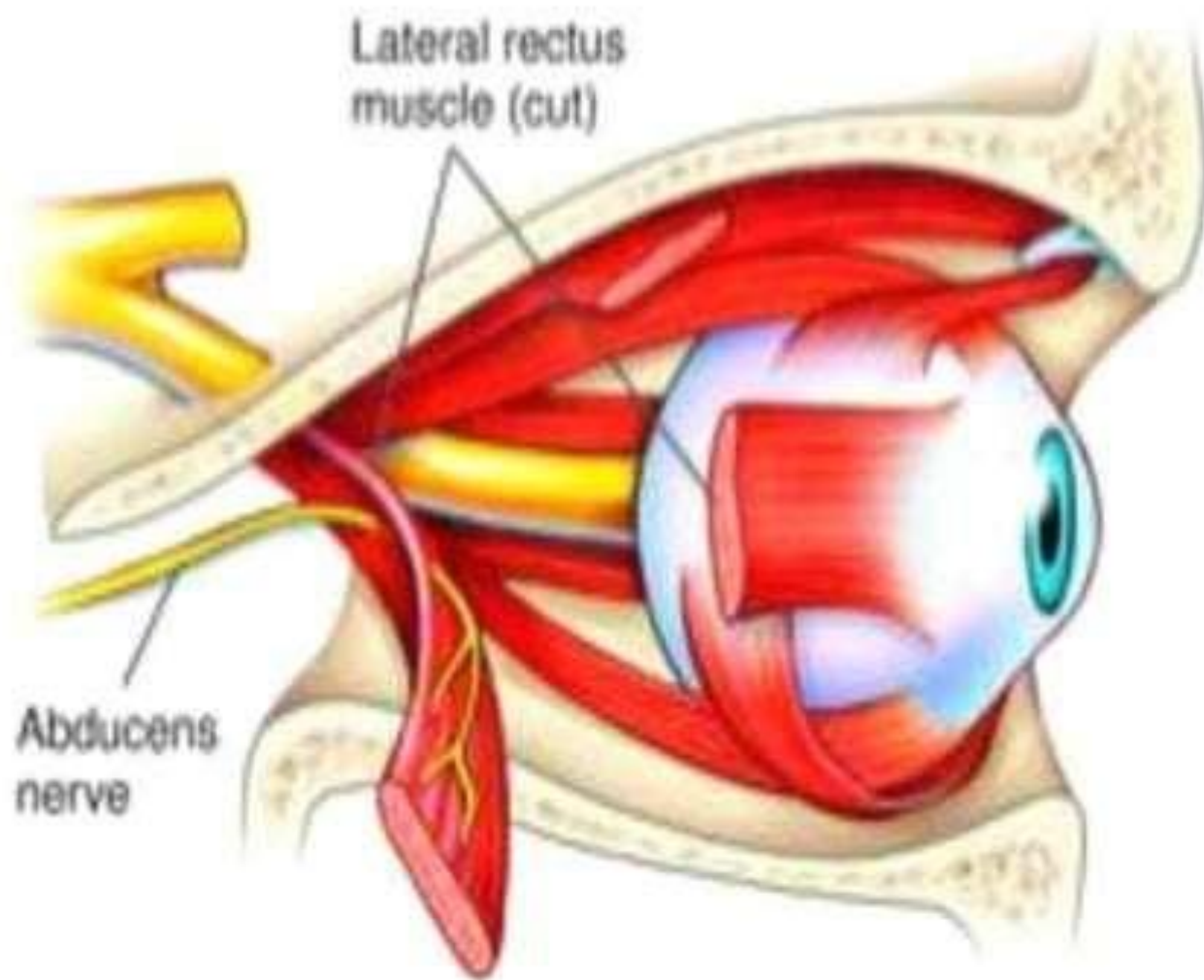
## VI. ABDUCENT NERVE

- It is motor nerve
- **Function:** Lateral rectus muscle turns eyeball laterally
- **Origin:** Anterior Surface of hindbrain between pons and medulla
- **Opening to the Skull:** Superior orbital fissure
- Fibers leaves the inferior pons & enter orbit via superior orbital fissure.
- Patient can't turn the eye laterally.
- Lesions include damage due to head injuries, cavernous sinus thrombosis or aneurysm of internal carotid artery & vascular lesions of pons.






# VI. Abducent Nerve



## VII.FACIAL NERVE

- It is mixed nerve.
  - **Function:-**
  - **Motor:** Muscles of face & scalp, stapedius muscle, posterior belly of digastric & stylohyoid muscle.
  - **Sensory:** Taste from anterior 2/3<sup>rd</sup> of tongue, from floor of mouth & palate.
  - **Secretomotor parasympathetic:** submandibular & sublingual salivary glands, the lacrimal gland & glands of nose & palate.
  - **Opening in the skull:** internal acoustic meatus, facial & stylomastoid foramen.
  - Attaches to pons.
  - **Effects of damage:** inability to control facial muscles; distorted sense of taste.
- 

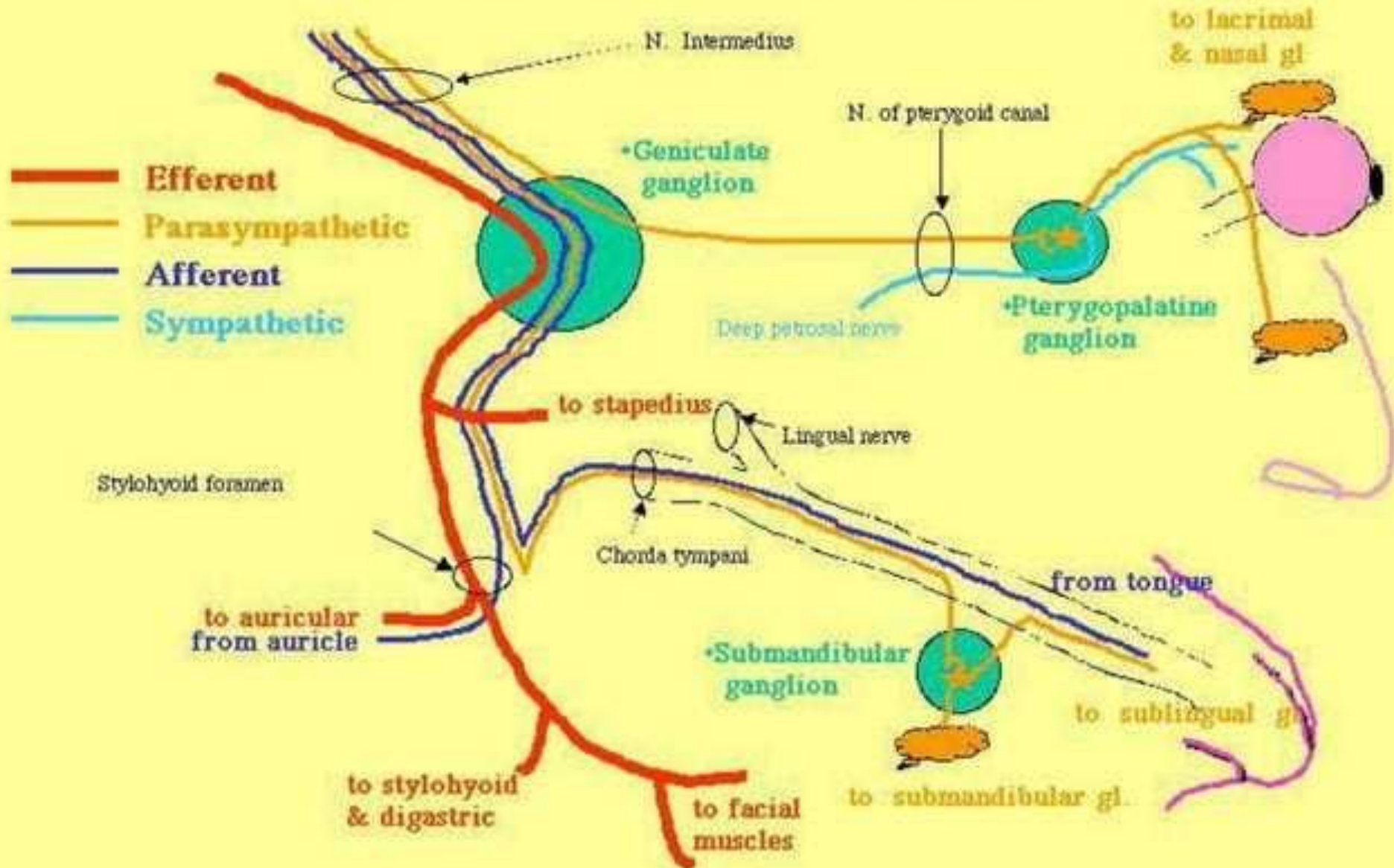
## BELL'S PALSY

- Paralysis of facial muscles of affected side
- Loss of taste sensation
- Caused by herpes simplex virus.
- Lower eyelids droops.
- Corner of mouth sags.
- Tears drips continuously & eye cannot be completely closed.
- Condition may disappear spontaneously without treatment.





# Facial Nerve



## VII.VESTIBULOCOCHLEAR

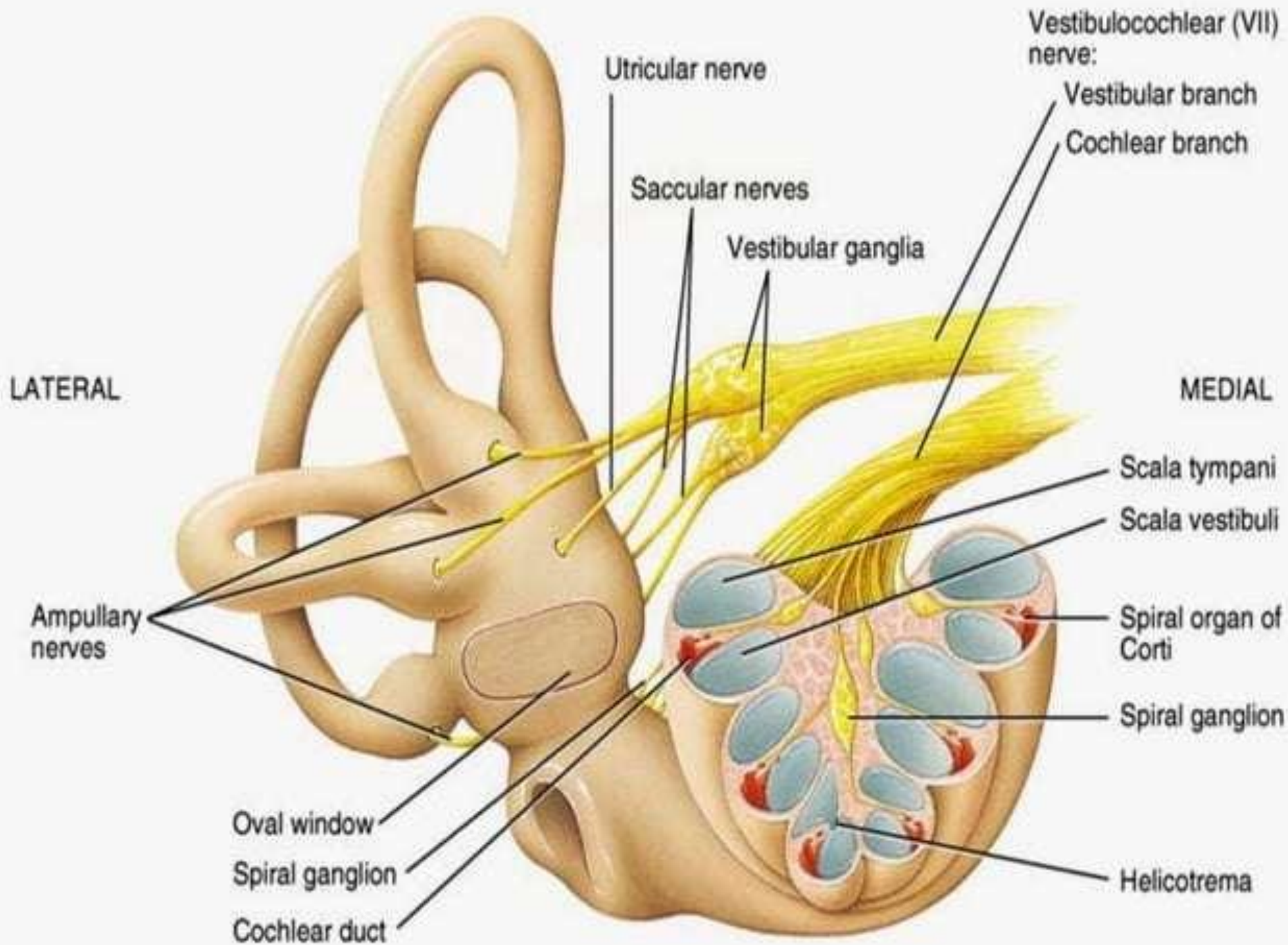
### ○ *VESTIBULAR NERVE:-*

- It is sensory nerve.
- *Function:* Position & movement of head.
- *Opening in the skull:* Internal acoustic meatus

### ○ *COCHLEAR NERVE:-*

- It is sensory nerve.
- *Function:* Organ of corti\_ hearing.
- *Opening in the skull:* internal acoustic meatus.



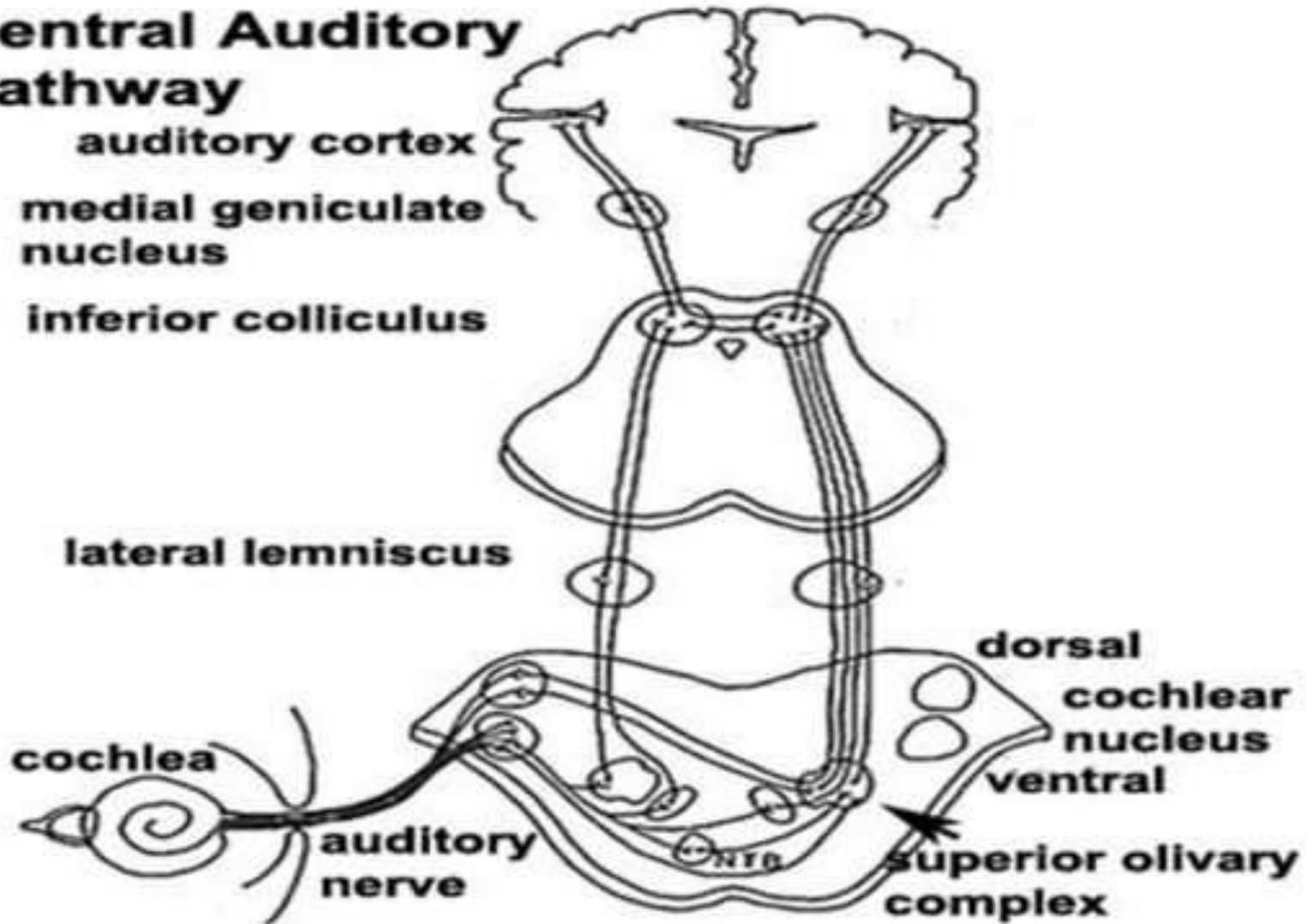




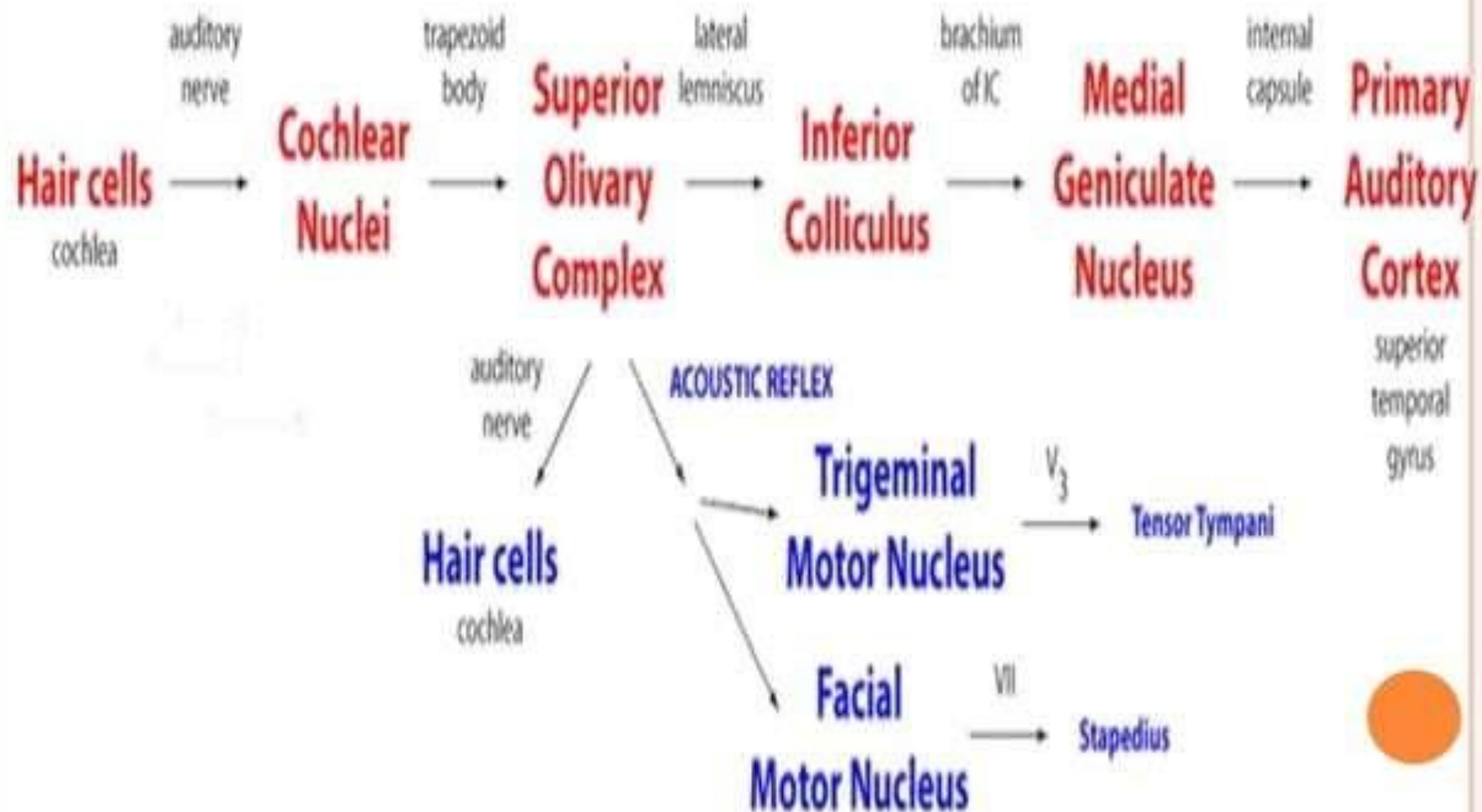
# AUDITORY PATHWAY

## Central Auditory Pathway

auditory cortex  
medial geniculate nucleus  
inferior colliculus



# AUDITORY PATHWAY



# SYMPTOMS

- Damage to the vestibulocochlear nerve may cause the following symptoms:
- hearing loss
- vertigo
- false sense of motion
- loss of equilibrium (in dark places)
- nystagmus
- motion sickness
- gaze-evoked tinnitus.




# PATHOLOGIES

- Hearing loss
- Central auditory processing disorders (**CAPD**)
- Tinnitus
- Presbycusis
- Nystagmus

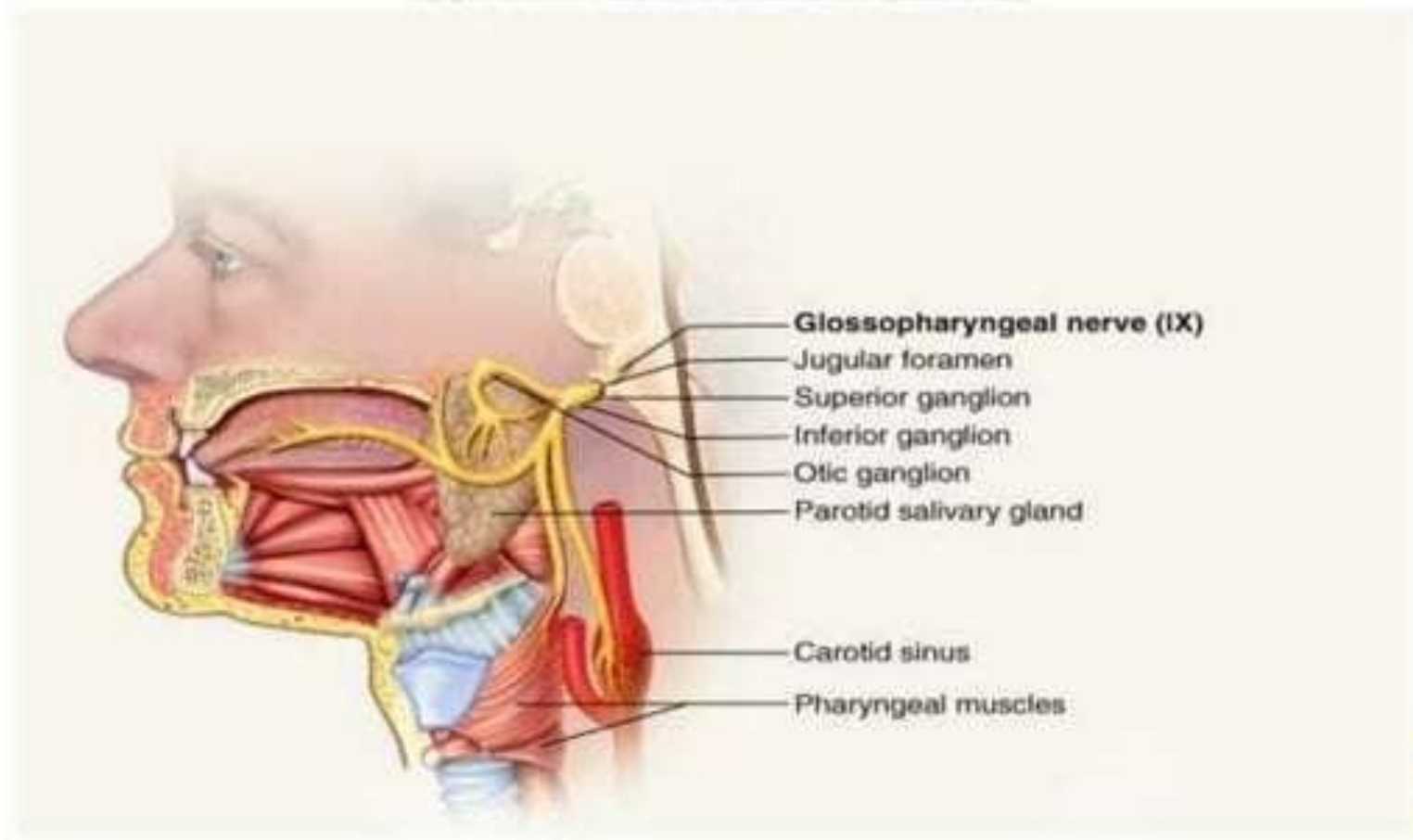




## XI.GLOSSOPHARYNGEAL

- It is mixed nerve.
  - **Function:-**
  - **Motor:** Stylopharyngeus muscle assists swallowing.
  - **Secretomotor parasympathetic:** parotid salivary gland.
  - **Sensory:** general sensation & taste from posterior 1/3 of tongue & pharynx, carotid sinus & carotid body(chemoreceptor).
  - **Opening in the skull:** Jugular foramen.
  - It attaches to medulla oblongata.
  - **Clinical tests:** gag reflex, swallowing, and coughing
  - **Effects of damage:** difficulty swallowing
- 

# CRANIAL NERVE IX: GLOSSOPHARYNGEAL



## X.VAGUS

- It is mixed nerve.
- **Nick name:** Wanderer.
- **Function:-**
- **Motor & sensory:** Heart & great thoracic blood vessels, larynx, trachea, bronchi & lungs, alimentary tract from pharynx to splenic flexure of colon, liver, kidneys & pancreas.
- **Opening in the skull:** Jugular foramen.
- Effects of damage: hoarseness or loss of voice; dysphagia, cardiovascular problems, digestive problems, urinary incontinence, deafness, palatal function, gag reflex, spastic dysarthria.
- **Gag Reflex:**
- A normal reflex consisting of elevation of the palate, retraction of the tongue, and contraction of the throat muscles.



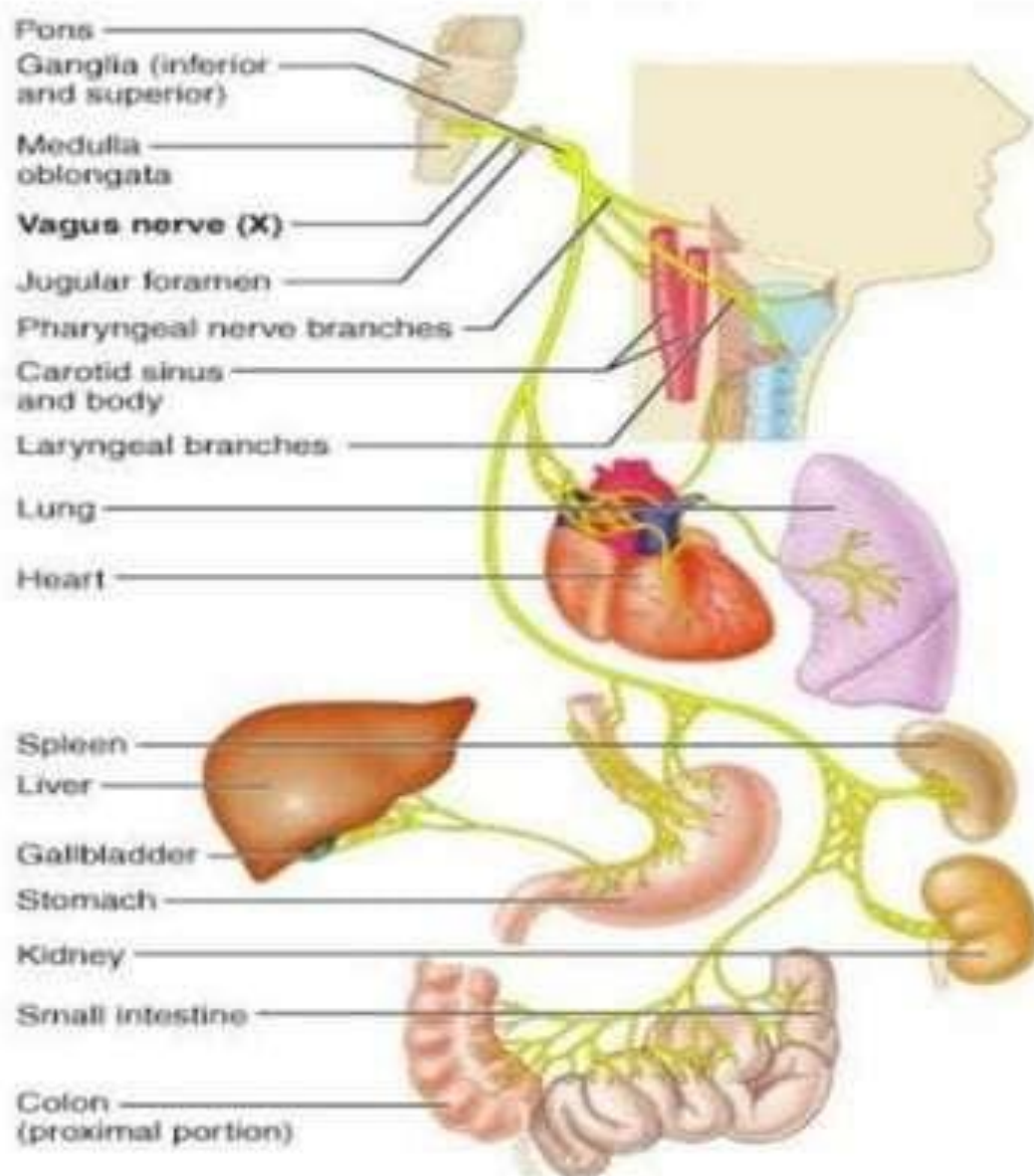
# BRANCHES OF VAGUS NERVE

- Auricular nerve
- Pharyngeal nerve
- Superior laryngeal nerve
- Superior cervical cardiac branches of vagus nerve
- Inferior cervical cardiac branch
- Recurrent laryngeal nerve
- Thoracic cardiac branches
- Branches to the pulmonary plexus
- Branches to the esophageal plexus
- Anterior vagal trunk
- Posterior vagal trunk





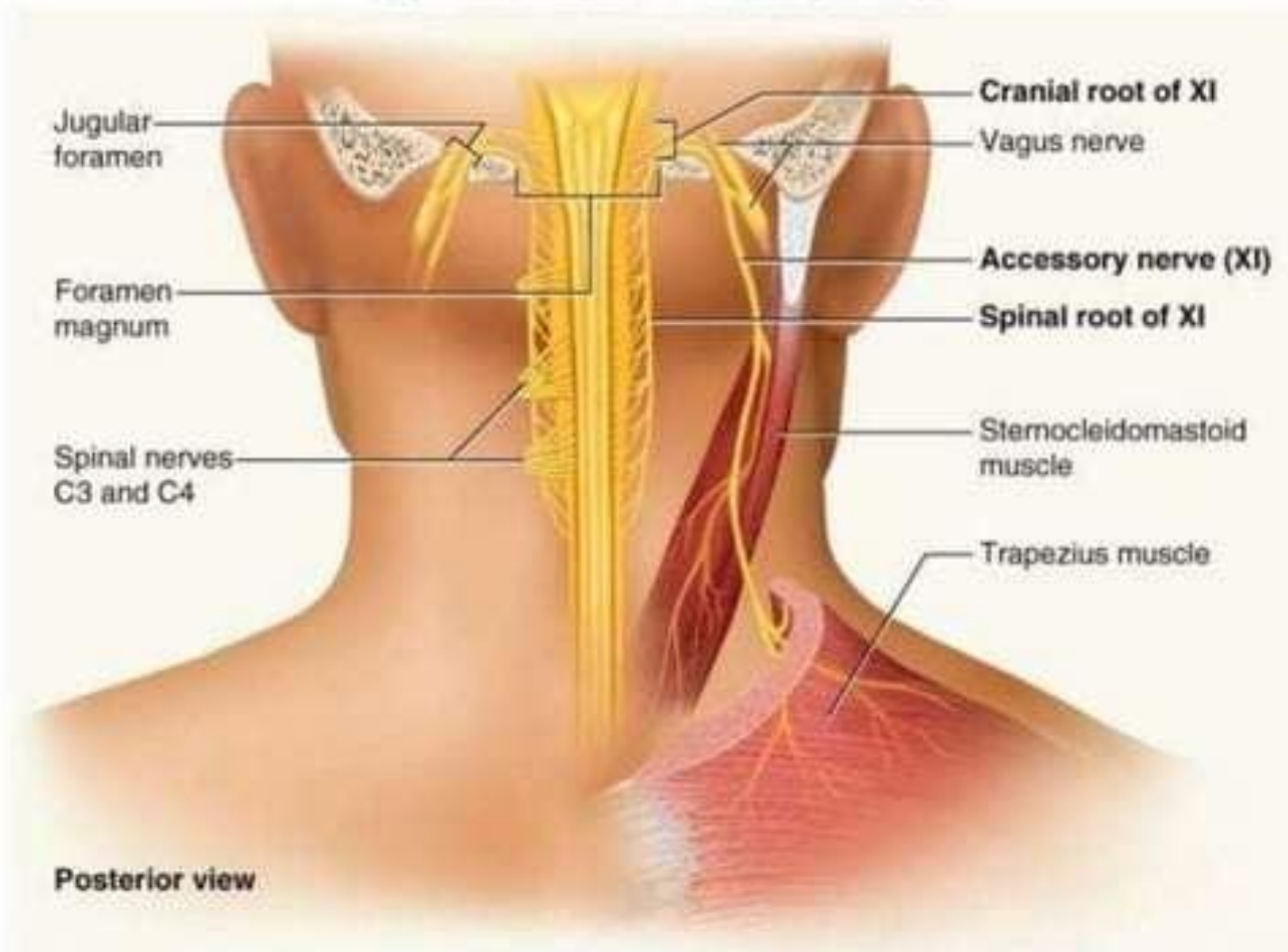
# CRANIAL NERVE X: VAGUS



## XI.ACCESSORY


- It is motor nerve.
- Formed from **cranial root** emerging from medulla & a **spinal root** arising from the superior region of spinal cord.
- **Function:** swallowing; head, neck, and shoulder movements.
- **Opening in the skull:** Jugular foramen.
- Spinal root passes upward into cranium via the foramen magnum.
- Accessory nerve leaves the foramen via the jugular foramen.
- **Clinical tests:** rotate head and shrug shoulders against resistance
- **Effects of damage:** impaired movement of head, neck, and shoulders; paralysis of sternocleidomastoid

# CRANIAL NERVE XI: ACCESSORY



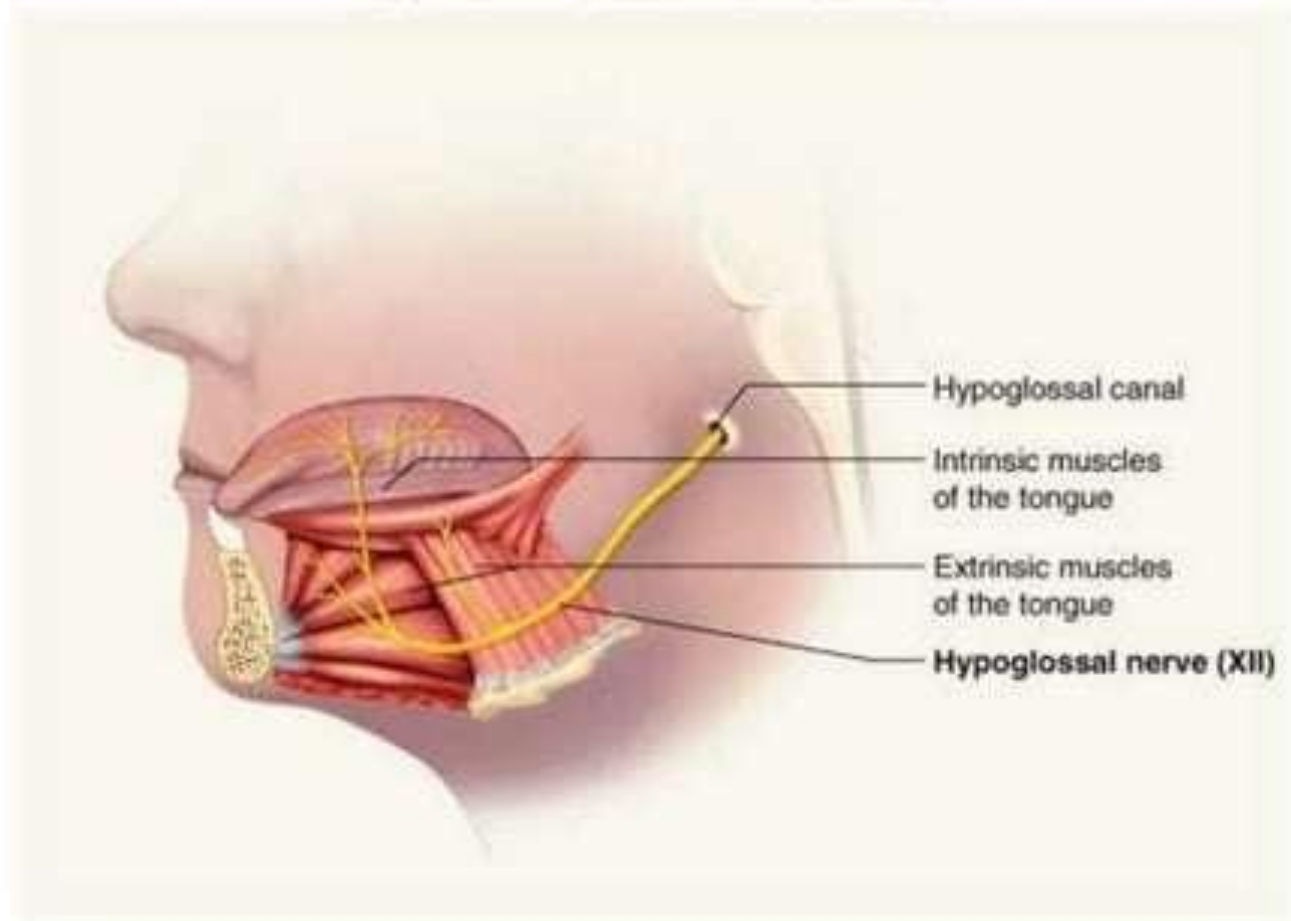


## XII.HYPOGLOSSAL

- It is motor nerve.
  - **Function:-** Muscles of tongue (except palatoglossus) controlling its shape & movement.
  - **Opening in the skull:** Hypoglossal canal.
  - Innervates both extrinsic & intrinsic muscles of tongue.
  - **Clinical test:** tongue function
  - **Effects of damage:** difficulty in speech and swallowing; atrophy of tongue; inability to stick out (protrude) tongue
  - Lesions occur from demyelinating diseases & vascular accidents.
- 



# CRANIAL NERVE XII: HYPOGLOSSAL



**THANK YOU**