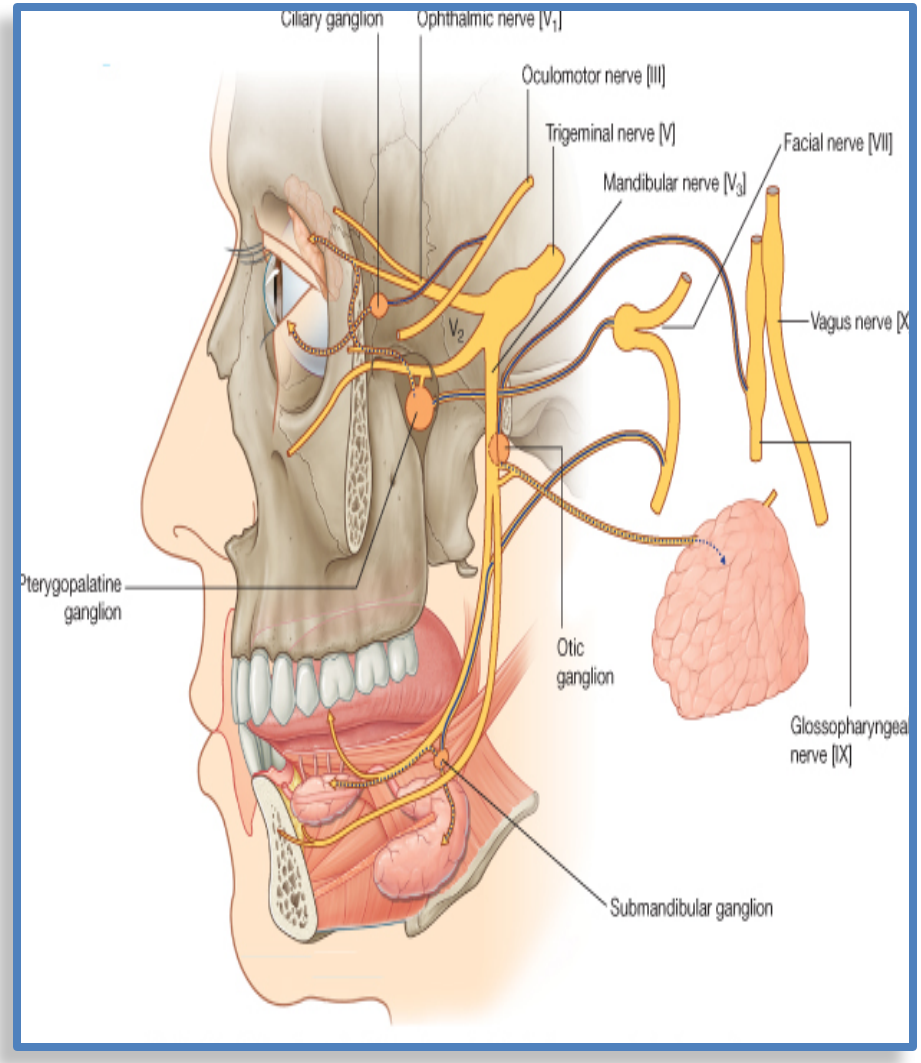
NERVE SUPPLY OF FACE

5TH & 7TH CRANIAL NERVES



By :
Prof Saeed Abuel Makarem
& Dr.Sanaa Alshaarawi

OBJECTIVES

By the end of the lecture, students shouldbe able to:

- List the nuclei of the deep origin of the trigeminal and facial nerves in the brain stem.
- Describe the type and site of each nucleus.
- Describe the superficial attachment of trigeminal and facial nerves to the brain stem.
- Describe the main course and distribution of trigeminal and facial nerves in the face.
- Describe the main motor & sensory manifestation in case of lesion of the trigeminal & facial nerves.

TRIGEMINAL NERVE

➢ **Type:**

Mixed

(sensory & motor).

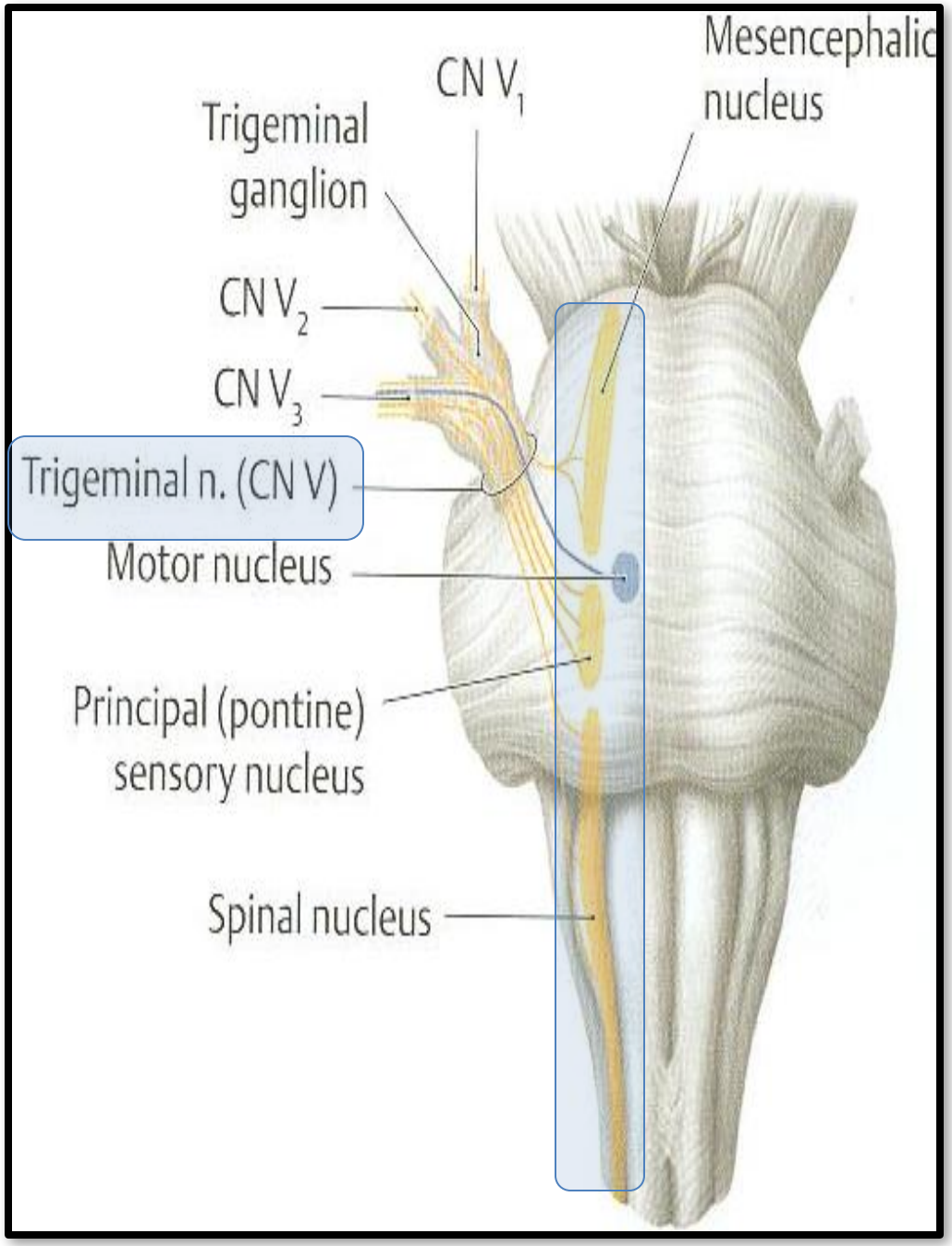
➢ **Fibers:**

1. **General somatic afferent:**

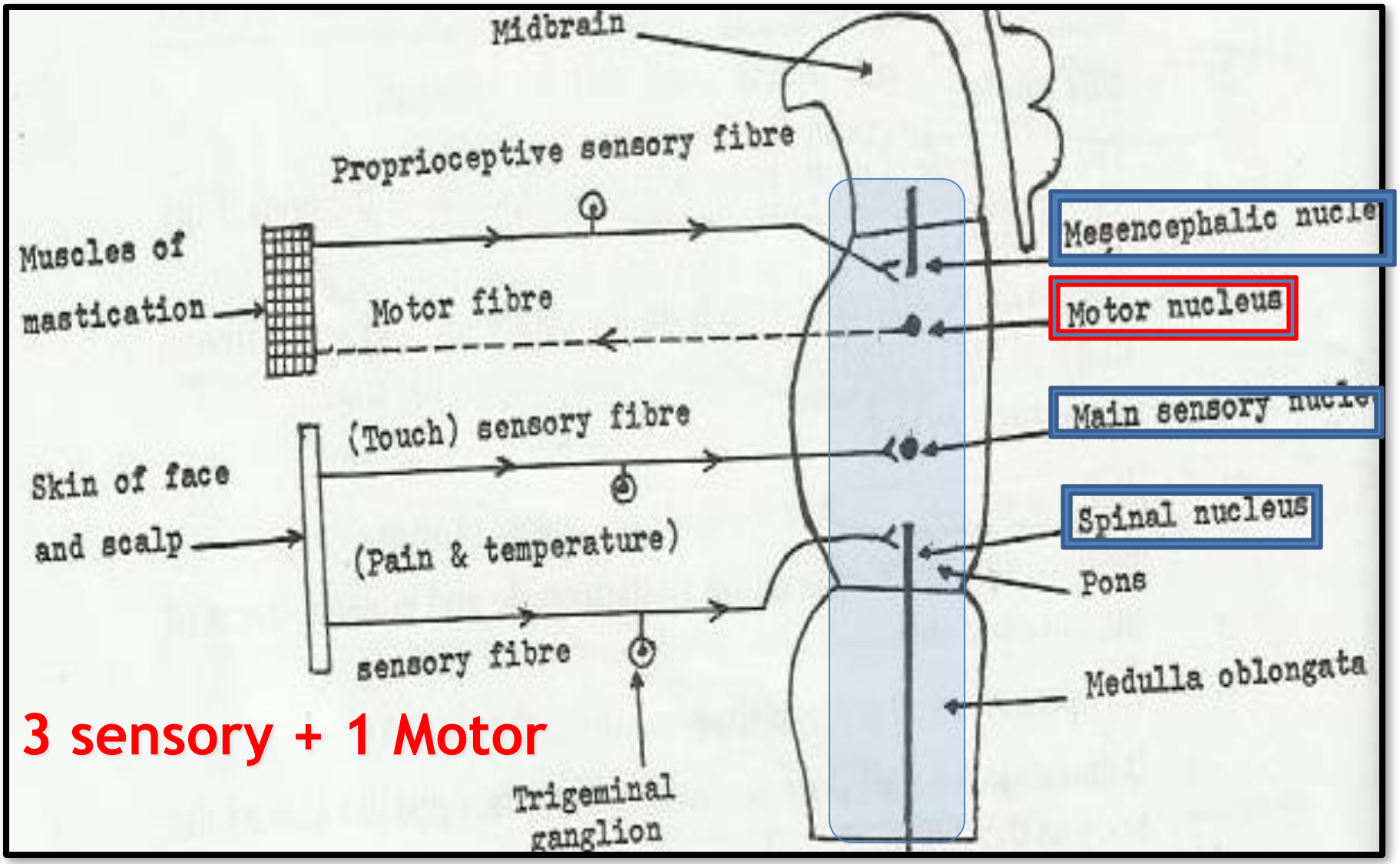
   Carrying general sensations from face.

2. **Special visceral efferent:**

   Supplying muscles developed from the **1st pharyngeal** arch, (8 muscles).



TRIGEMINAL NERVE NUCLEI(Deep origin)



TRIGEMINAL NERVE NUCLEI

- Four nuclei: (3 sensory + 1 Motor).

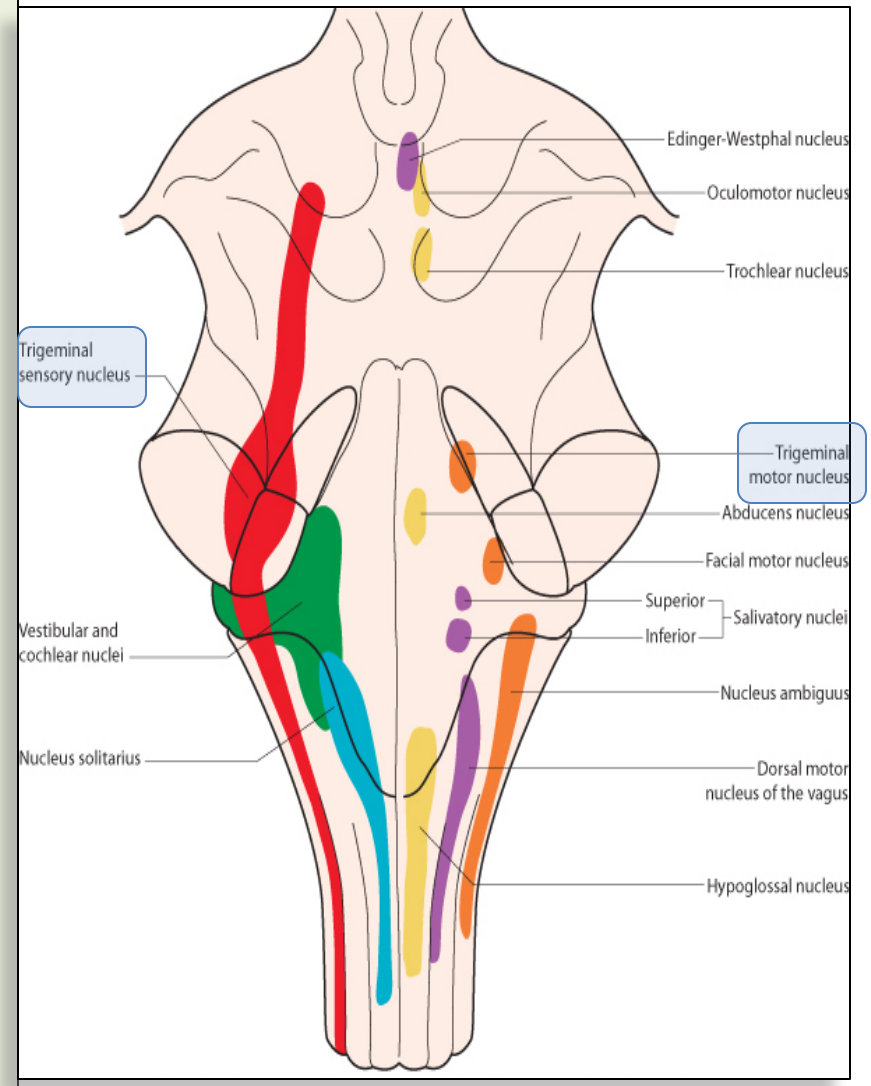
General somatic afferent:

1. ***Mesencephalic nucleus*** (midbrain &pons): receives proprioceptive fibers from muscles of mastication.
2. ***Principal (main) sensory nucleus*** (pons): receives **touch** fibers from face & scalp
3. ***Spinal nucleus*** (pons, medulla & upper 2-3 cervical segments of spinal cord): receives **pain & temperature sensations** from face & scalp.

Special visceral efferent:

4. *Motor nucleus* (pons): supplies:

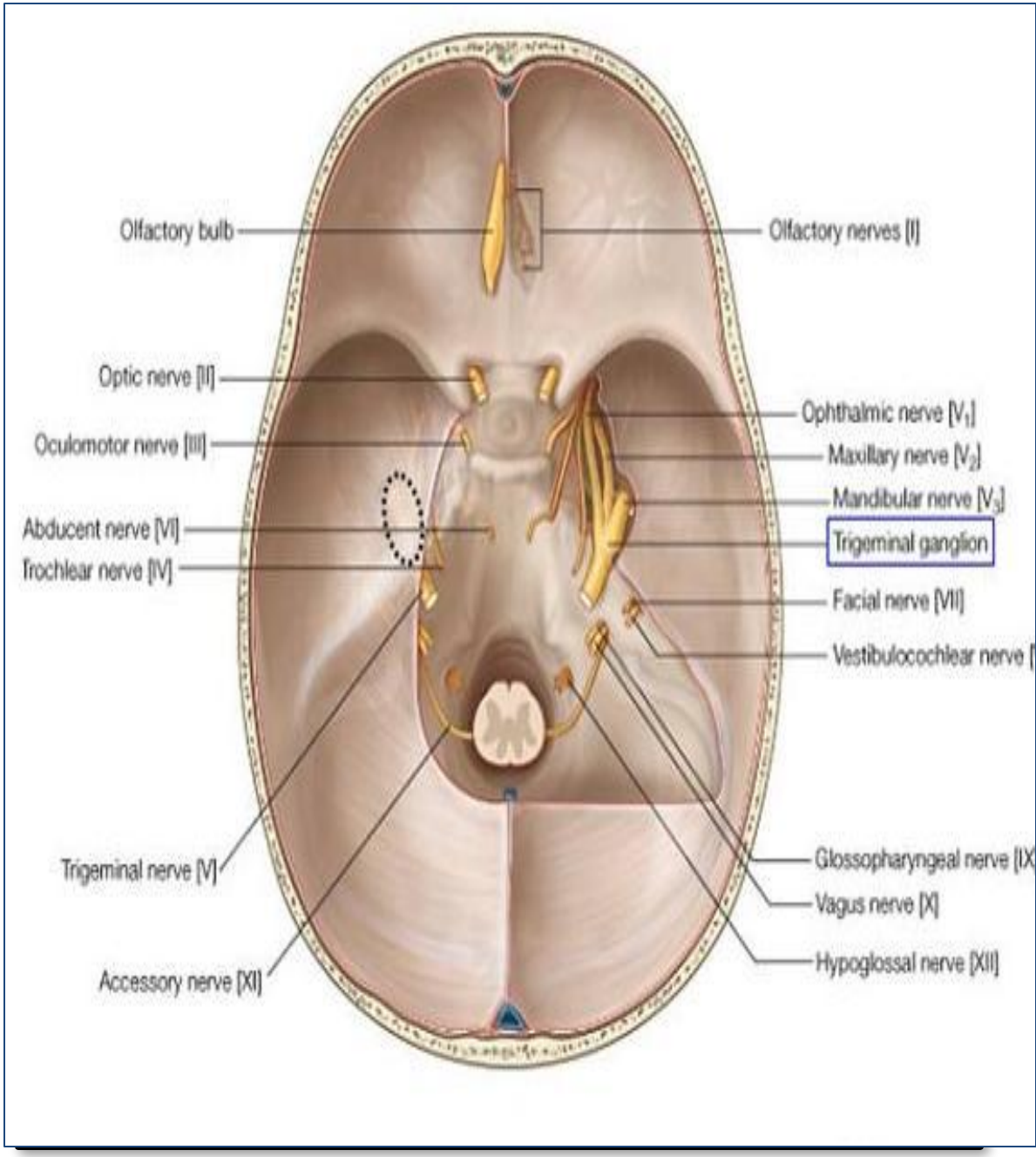
- ✓ **Four Muscles of mastication** (temporalis, masseter, medial & lateral pterygoid).
- ✓ **Other four muscles** (Anterior belly of digastric, mylohyoid, tensor palati & tensor tympani).



TRIGEMINAL GANGLION

- Site:
- Occupies a depression in the middle cranial fossa (temporal bone) known as Trigeminal cave.
- Importance: Contains cell bodies :

1. Whose dendrites carry sensations from the face.
2. Whose axons form the sensory root of trigeminal nerve.

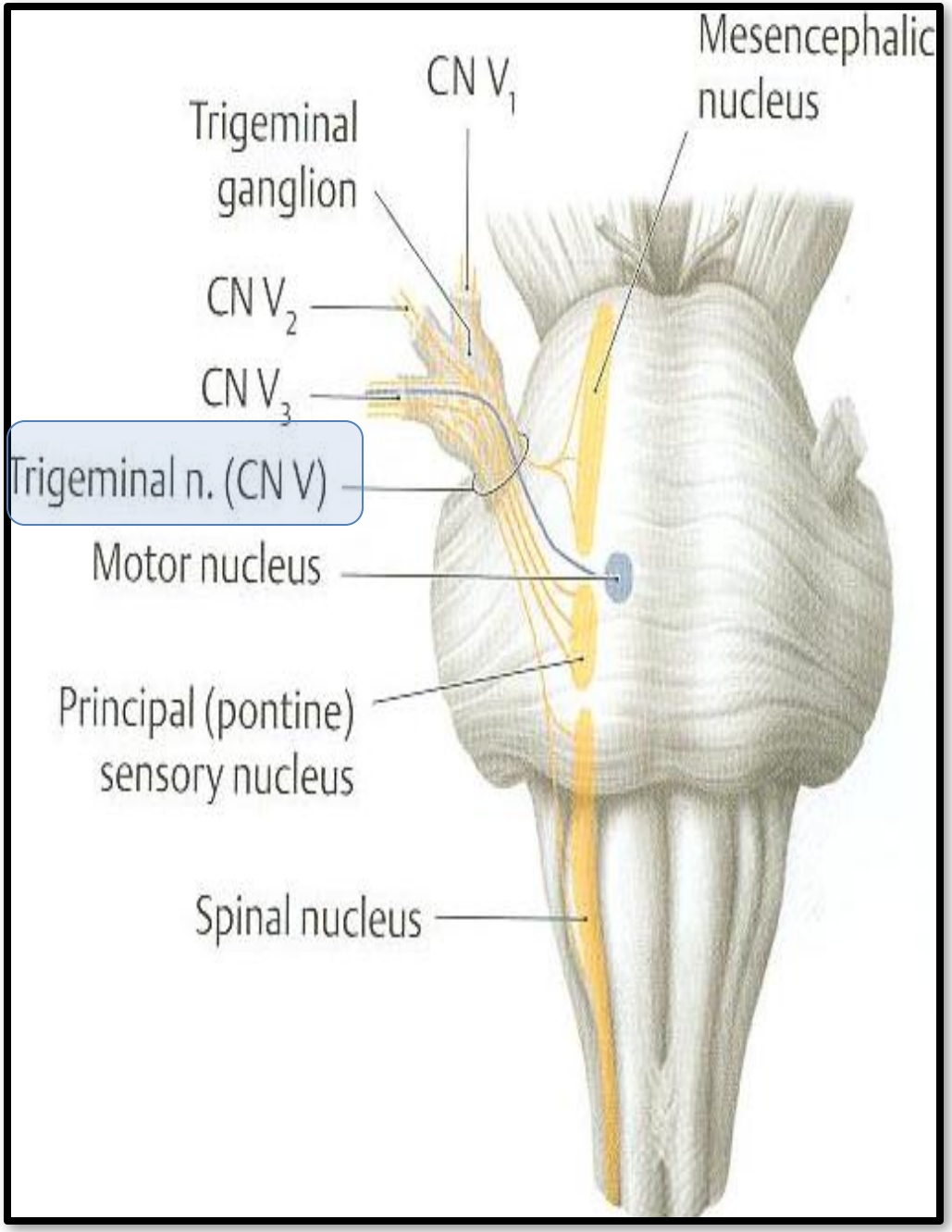


TRIGEMINAL NERVE

- ***Emerges*** from the **middle** of the **ventral surface of the pons** by 2 roots (Large Lateral sensory root & small medial motor root).
- Divides into 3 divisions (dendrites of trigeminal ganglion):

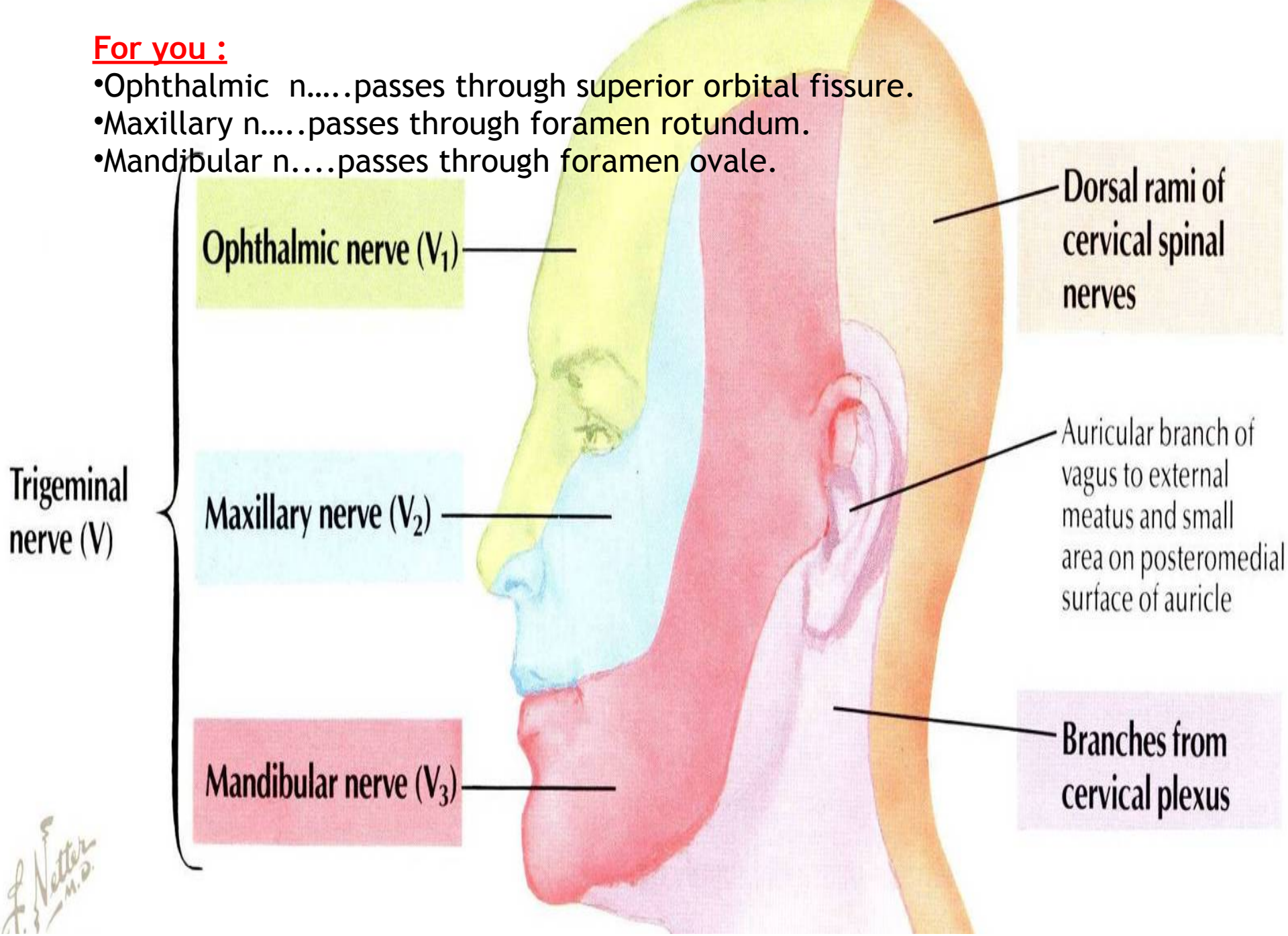
1. ***Ophthalmic.***
2. ***Maxillary.***
3. ***Mandibular.***

- Axons of cells of motor nucleus *join **only** the mandibular division.*



For you :

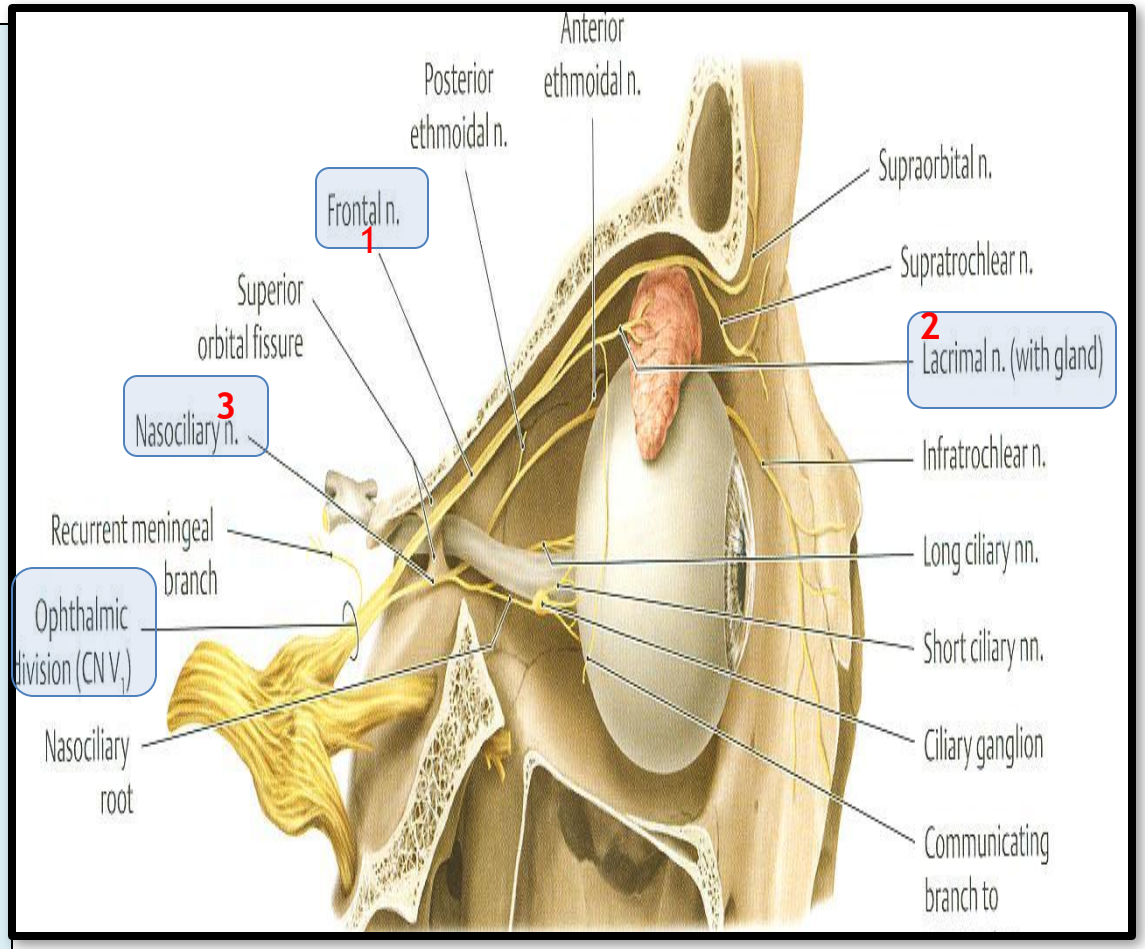
- Ophthalmic n…..passes through superior orbital fissure.
- Maxillary n…..passes through foramen rotundum.
- Mandibular n....passes through foramen ovale.



OPHTHALMIC (PURE SENSORY)

- Divides into 3 branches:
- *Frontal*, *Lacrimal* & *Nasociliary* which pass through superior orbital fissure to the orbit

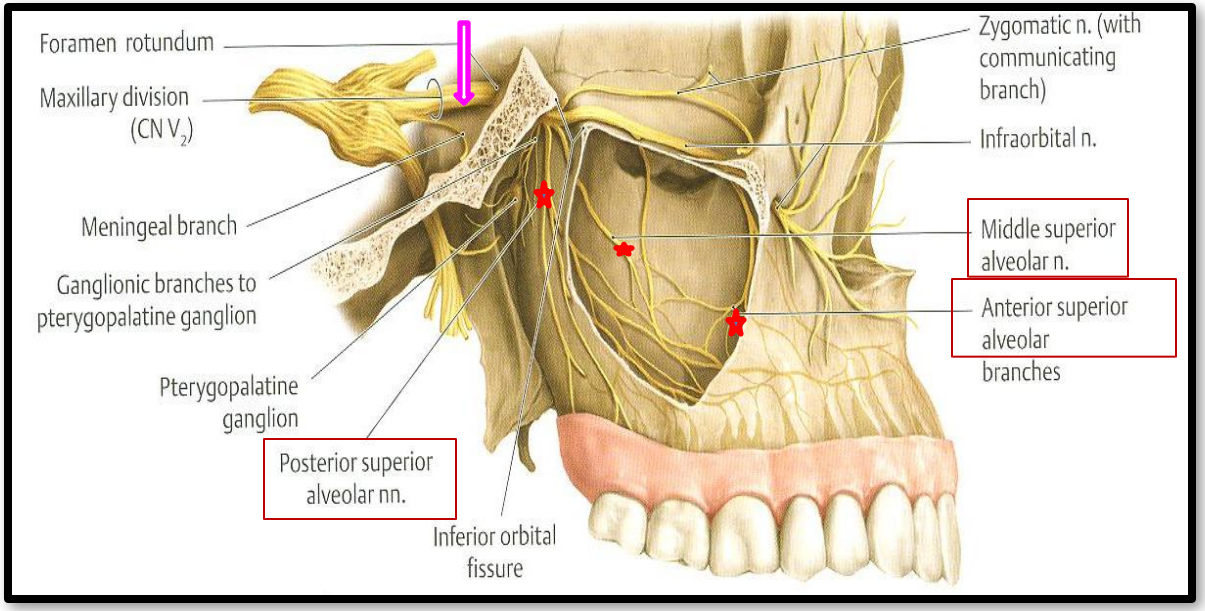
1. Frontal: supplies skin of face & scalp.
2. Lacrimal: supplies skin of face & lacrimal gland.
3. Nasociliary: supplies skin of face, nasal cavity & eyeball.

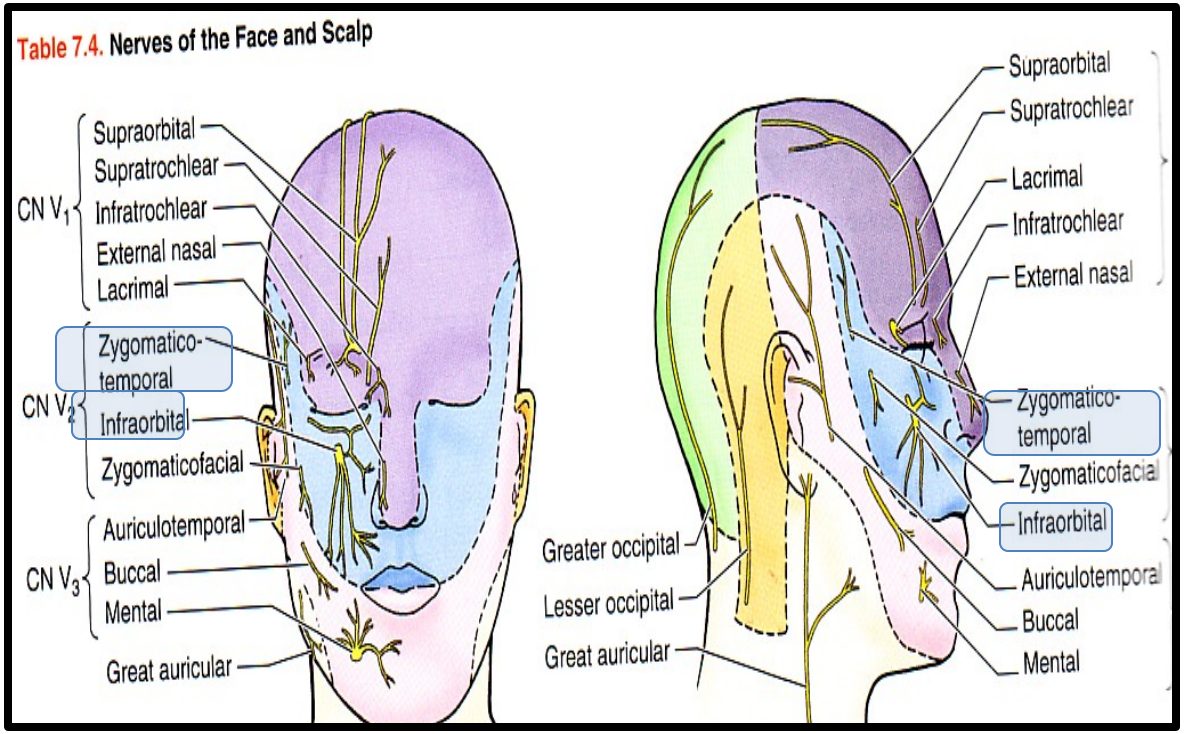


MAXILLARY (PURE SENSORY)

- **Supplies:**

1. Upper teeth, gums & maxillary air sinus (posterior, middle & anterior superior alveolar nerves).
1. Face: (zygomaticofacial & infraorbital nerves).





MANDIBULAR (MIXED)

- **SENSORY BRANCHES**: supplies various regions on the side of head.

1. Lingual: receives

   General sensations from anterior 2/3 the of tongue.

2. Inferior alveolar: supplies

   Lower teeth, gums & face (over mandible).

3. Buccal: supplies

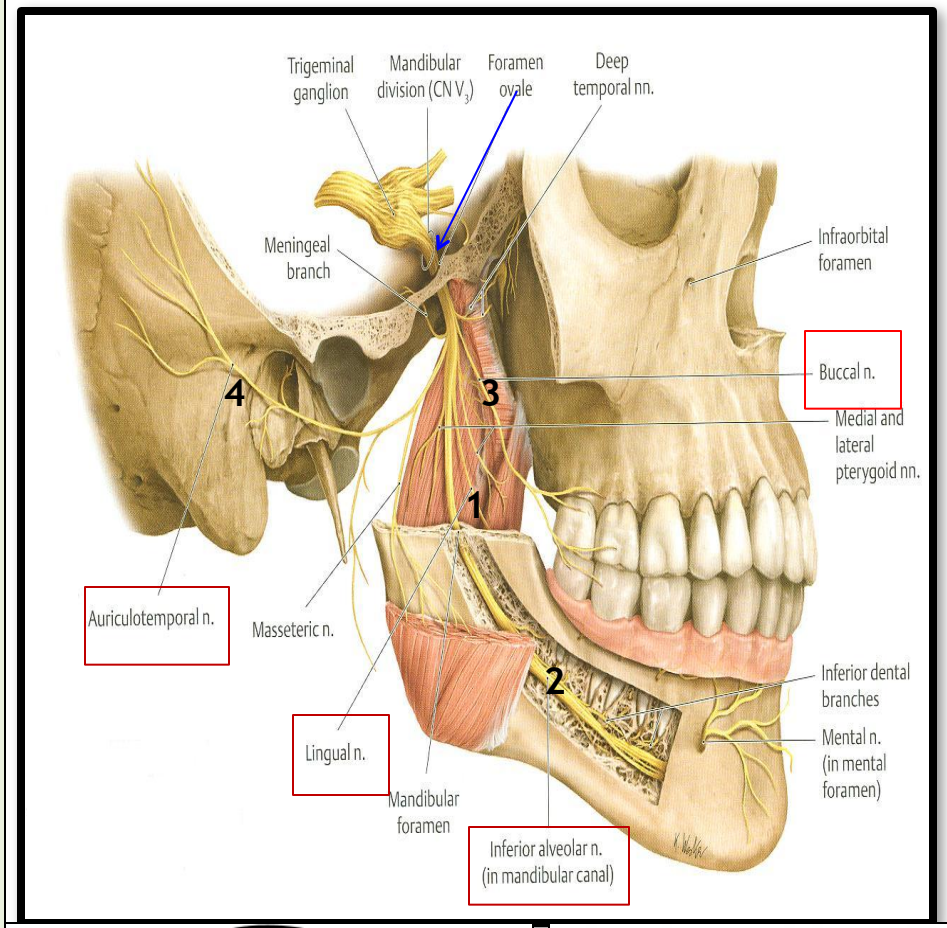
   Face (cheek on upper jaw)

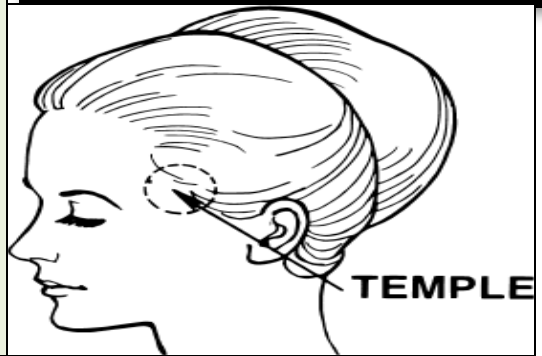
4. Auriculotemporal: supplies

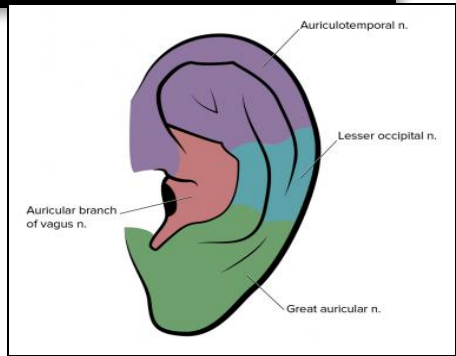
   auricle, temple, parotid gland & TMJ.

- **MOTOR BRANCHES:**

  to 8 muscles (4 muscles of mastication & other 4 muscles).

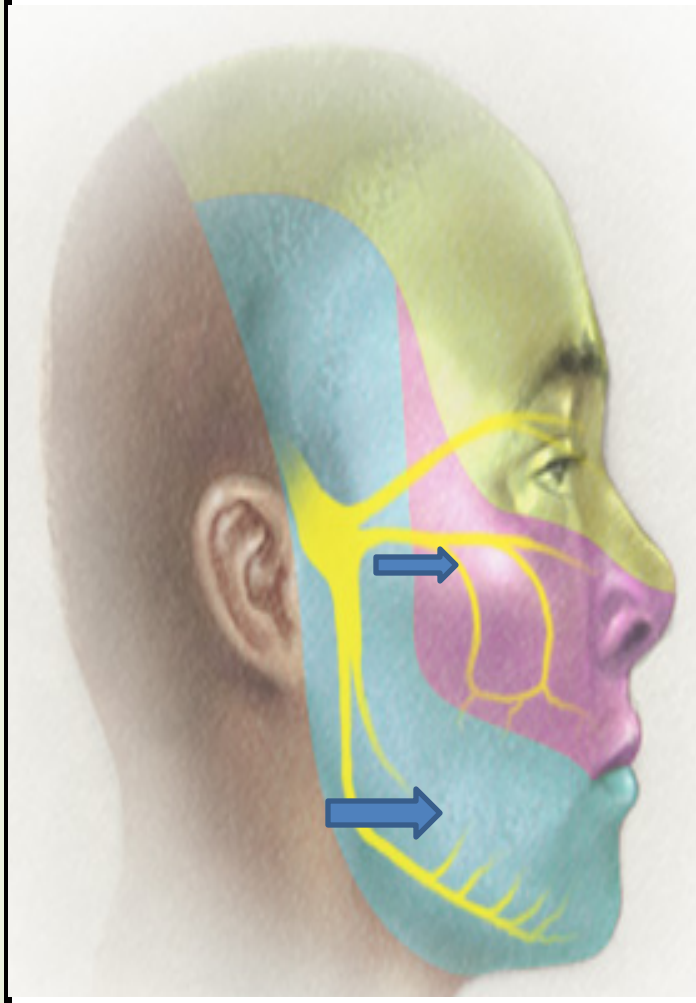






Trigeminal Neuralgia

- **Compression, degeneration or inflammation** of the **5th cranial nerve** may result in a condition called **trigeminal neuralgia** or **tic douloureux** (spasmodic contraction of the muscles in the face)
- This condition is characterized by **recurring episodes (recurrent attacks) of intense stabbing pain** radiating **from** the angle of the jaw **along** a branches of the trigeminal nerve.
- **Usually involves maxillary & mandibular branches,** rarely in the ophthalmic division.



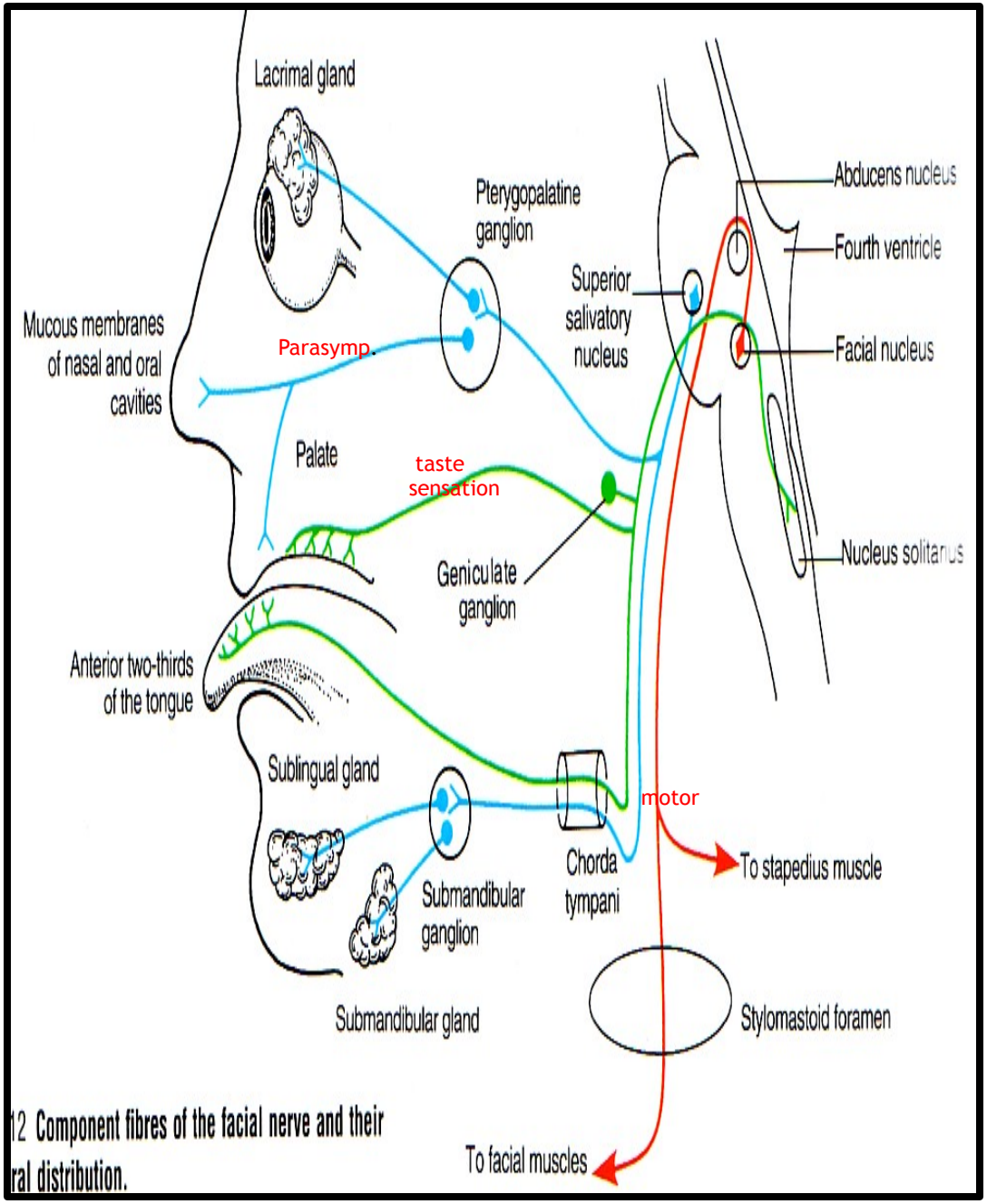
FACIAL NERVE

FACIAL NERVE

- **Type:** Mixed **(Motor, special sensory, parasympathetic).**

➢ **Fibers:**

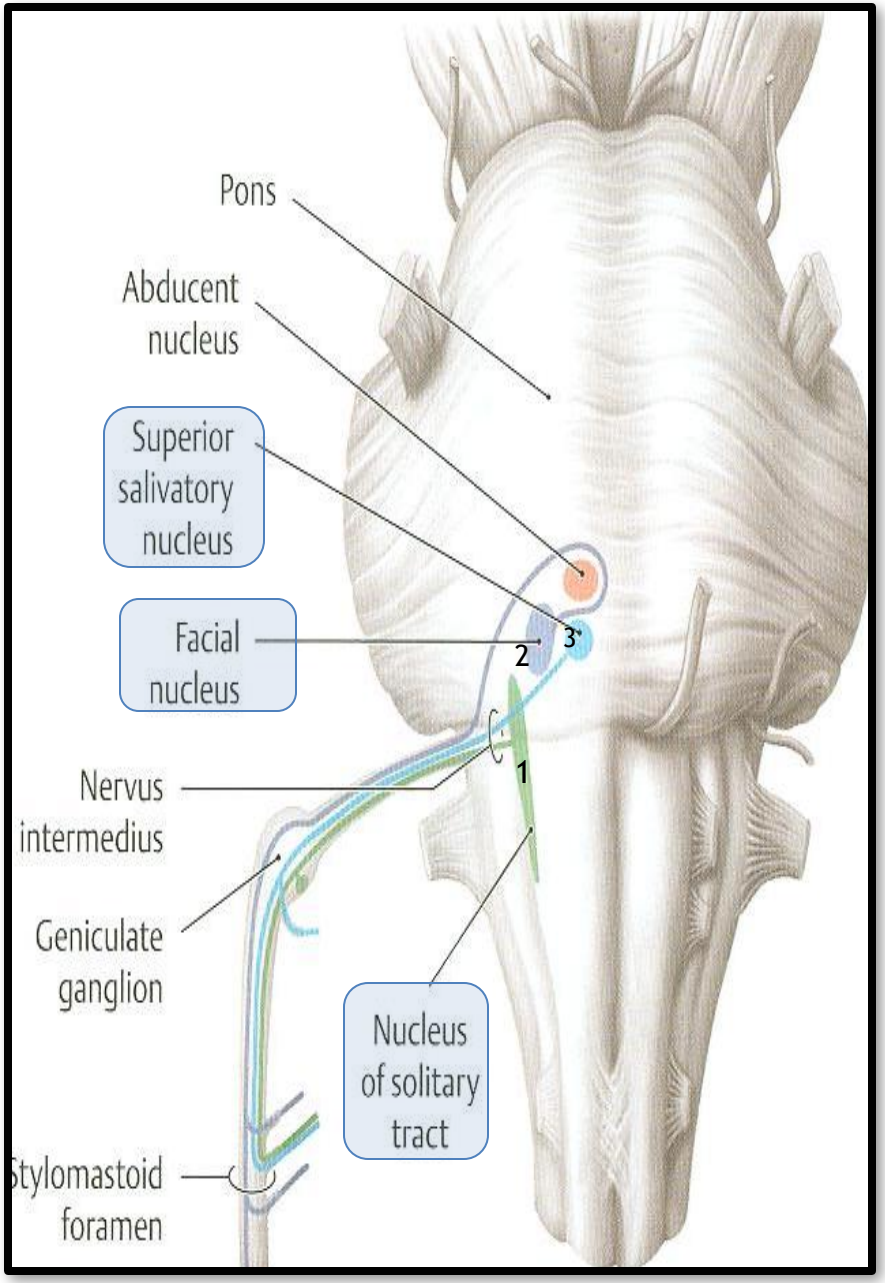
1. Special visceral **afferent**: carrying **taste sensation** from **anterior 2/3 of the tongue.**
2. Special visceral **efferent**: supplying muscles developed from **the 2nd pharyngeal arch.**
3. General visceral **efferent:** supplying **parasympathetic secretory fibers** to submandibular, sublingual, lacrimal, nasal & palatine glands.



12 Component fibres of the facial nerve and their
ral distribution.

FACIAL NERVE NUCLEI

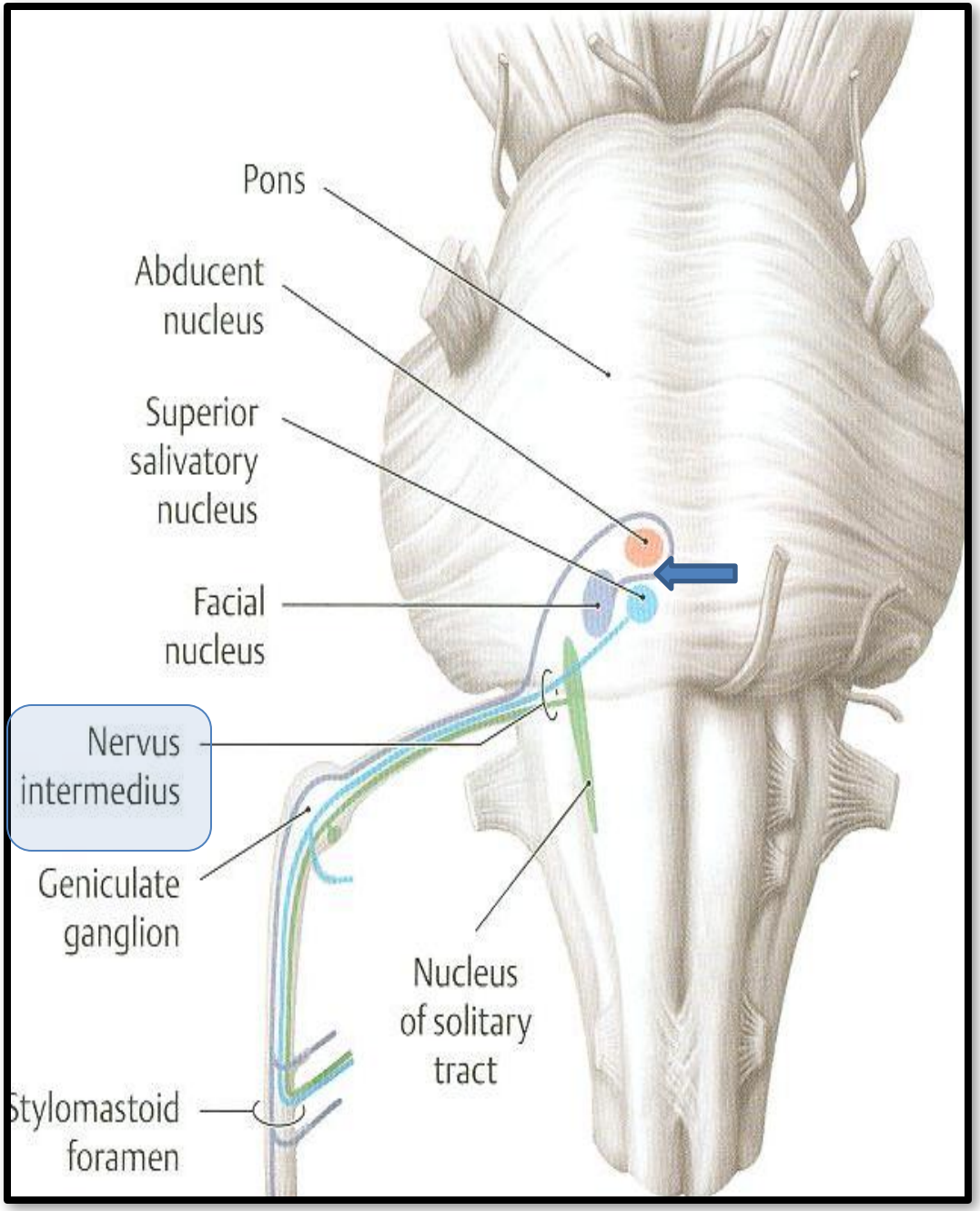
- 3 Nuclei :
- **Special visceral afferent: (nucleus solitarius):** receives taste from the anterior 2/3 of tongue.
- **Special visceral efferent: motor nucleus of facial nerve:** supplies: muscles of face, posterior belly of digastric, stylohyoid, platysma, stapedius, and occipitofrontalis.
- **General visceral efferent: superior salivatory nucleus:** sends preganglionic **parasympathetic secretory fibers** to sublingual, submandibular, lacrimal, nasal & palatine glands.



COURSE OF FACIAL NERVE

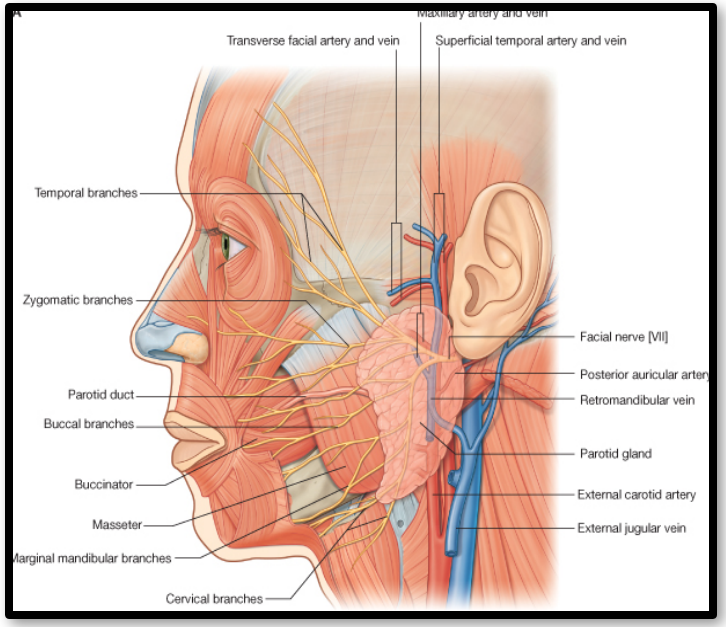
- Emerges from the **cerebellopontine angle** by 2 roots:

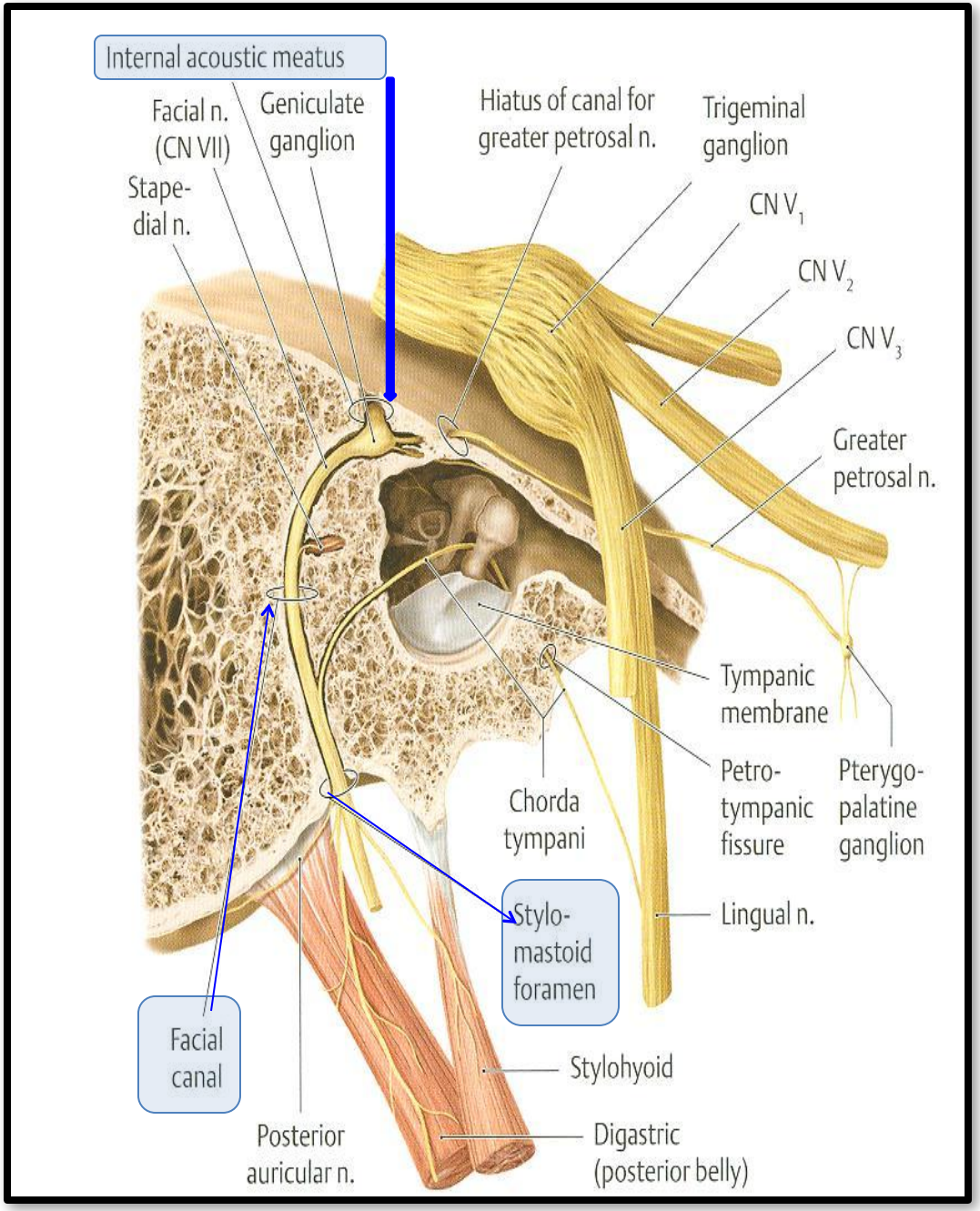
1. **Medial motor root:** contains motor fibers.
2. **Lateral root (nervous intermedius):** contains **parasympathetic** & **taste fibers.**



COURSE OF FACIAL NERVE

- Passes through internal auditory meatus to inner ear where it runs in facial canal.
- Emerges from the stylomastoid foramen & enters the parotid gland where it ends.





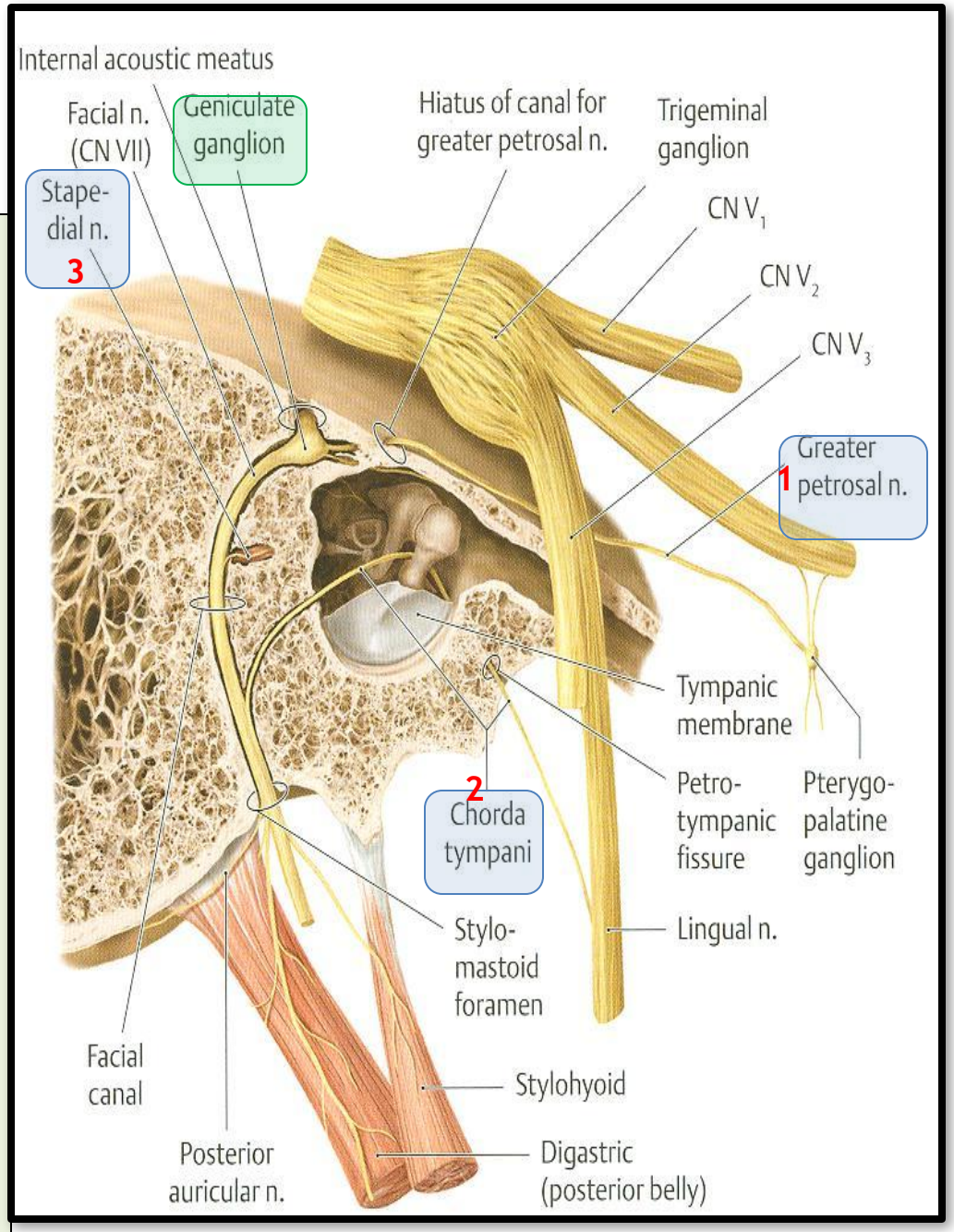
BRANCHES OF FACIAL NERVE

➢ In facial canal:

1. **Greater petrosal nerve:** carries preganglionic parasympathetic fibers to lacrimal, nasal & palatine glands.
2. **Chorda tympani:** carries:
   a) preganglionic parasympathetic fibers to submandibular & sublingual glands.
   b) taste fibers from anterior 2/3 of tongue.
3. **Nerve to stapedius.** control the amplitude of sound waves from the external environment to the inner ear.

N.B.: Geniculate ganglion: contains cell bodies of neurones of facial n. ; its fibres carrying taste sensations from anterior 2/3 of tongue; ending in solitary nucleus in M.O .

Lies in internal acoustic meatus.



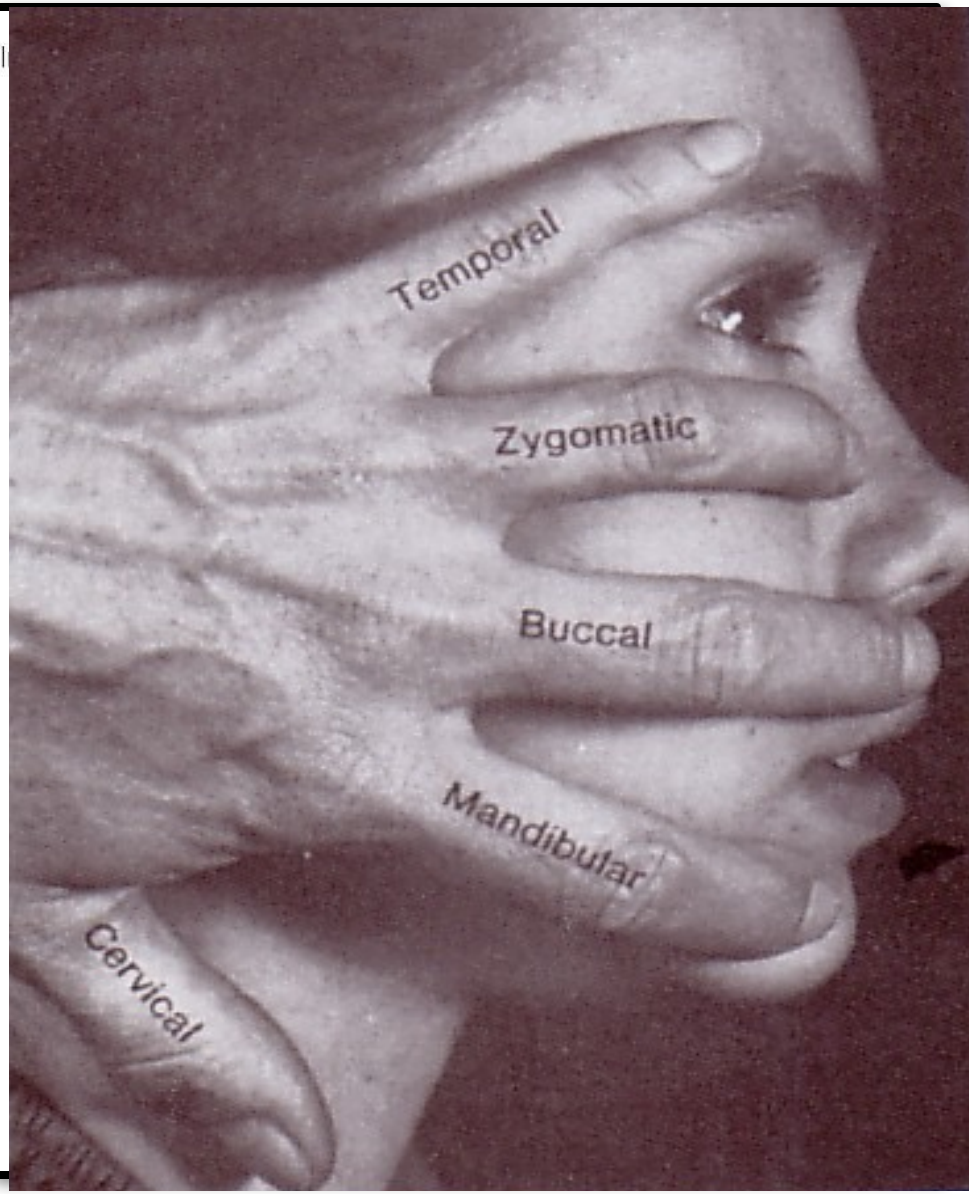
BRANCHES OF FACIAL NERVE

- Just as it **emerges** from the **stylomastoid foramen** it gives:

1. **Posterior auricular:** to occipitofrontalis muscle.
2. **Muscular** branches to posterior belly of digastric & stylohyoid.

- **Inside parotid gland:** gives 5 terminal motor branches:
- *Temporal,*
- *Zygomatic,*
- *Buccal,*
- *Mandibular &*
- *Cervical….*

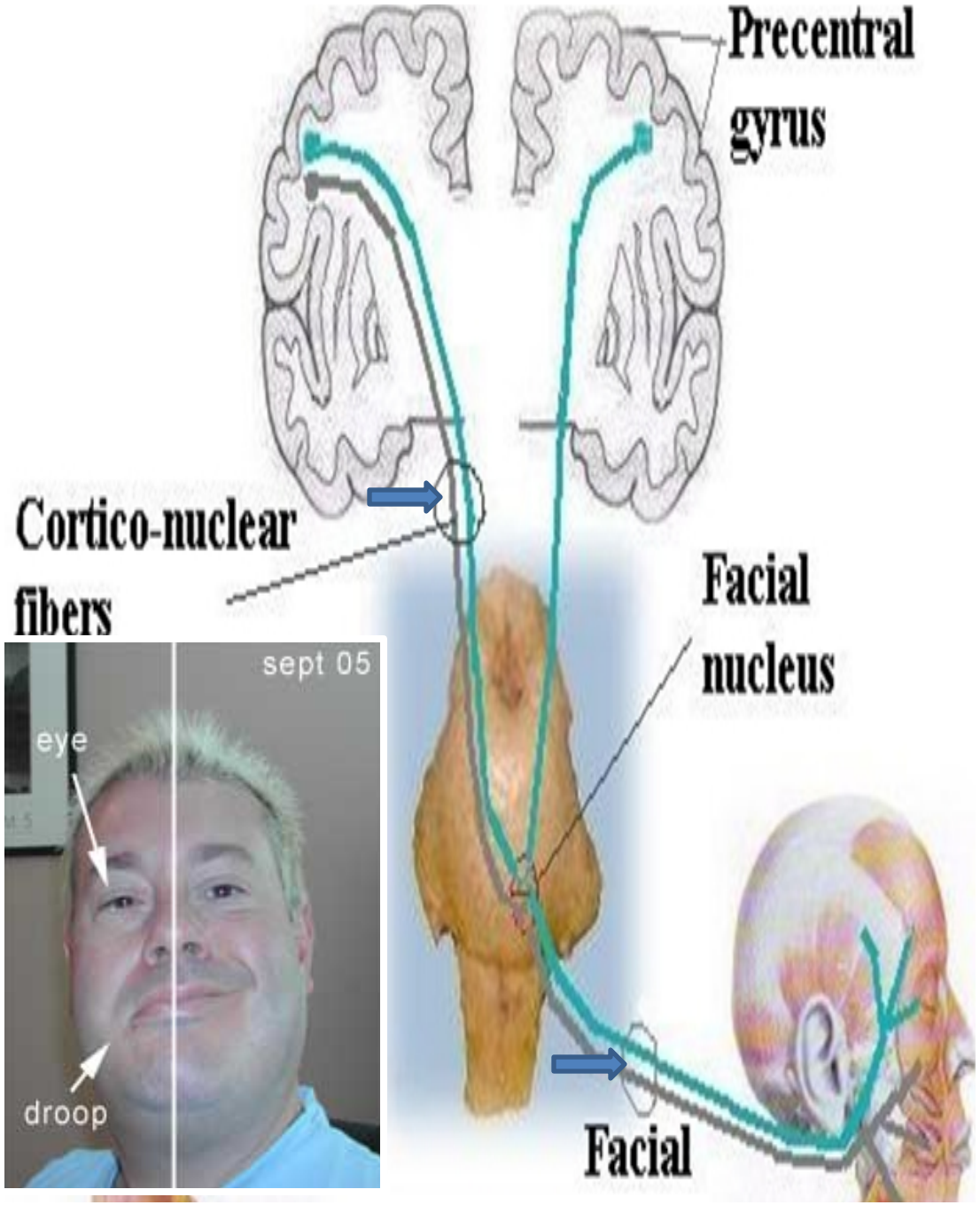
To the muscles of the face.



Bell's Palsy

- Damage of the facial nerve results in paralysis of muscles of facial expressions : Facial (Bell's) palsy; lower motor neuron lesion *(whole face affected)*
- NB. In upper motor neuron lesion (upper face is intact) .

- Face is distorted:
- Drooping of lower eyelid,
- Sagging of mouth angle,
- Dribbling of saliva,
- Loss of facial expressions,
- Loss of chewing,
- Loss of blowing,
- Loss of sucking,
- Unable to show teeth or close the eye on that side.



THANK YOU & BEST LUCK

SUMMARY

- Both trigeminal & facial nerves are mixed.
- **Nuclei of trigeminal** nerve are found in midbrain, pons & medulla. They are of the general somatic afferent & special visceral efferent types.
- **The trigeminal nerve** emerges from the pons and **divides into**: ophthalmic, maxillary & *mandibular divisions* that **receive sensory supply from the face** (with an exception of a small area over ramus of mandible by great auricular nerve C2,3).
- **All motor fibers** are included in the mandibular division & supply muscles of mastication.

SUMMARY

- **Nuclei of facial nerve** are found in **pons.** They are of the special visceral afferent & efferent types, as well as general visceral efferent type.
- **The facial nerve** emerges from the **cerebellopontine angle**, gives **motor fibers** to **muscles of facial expression**, **secretory fibers** to submandibular, sublingual, lacrimal, nasal & palatine glands & receives **taste fibers** from anterior 2/3 of tongue.

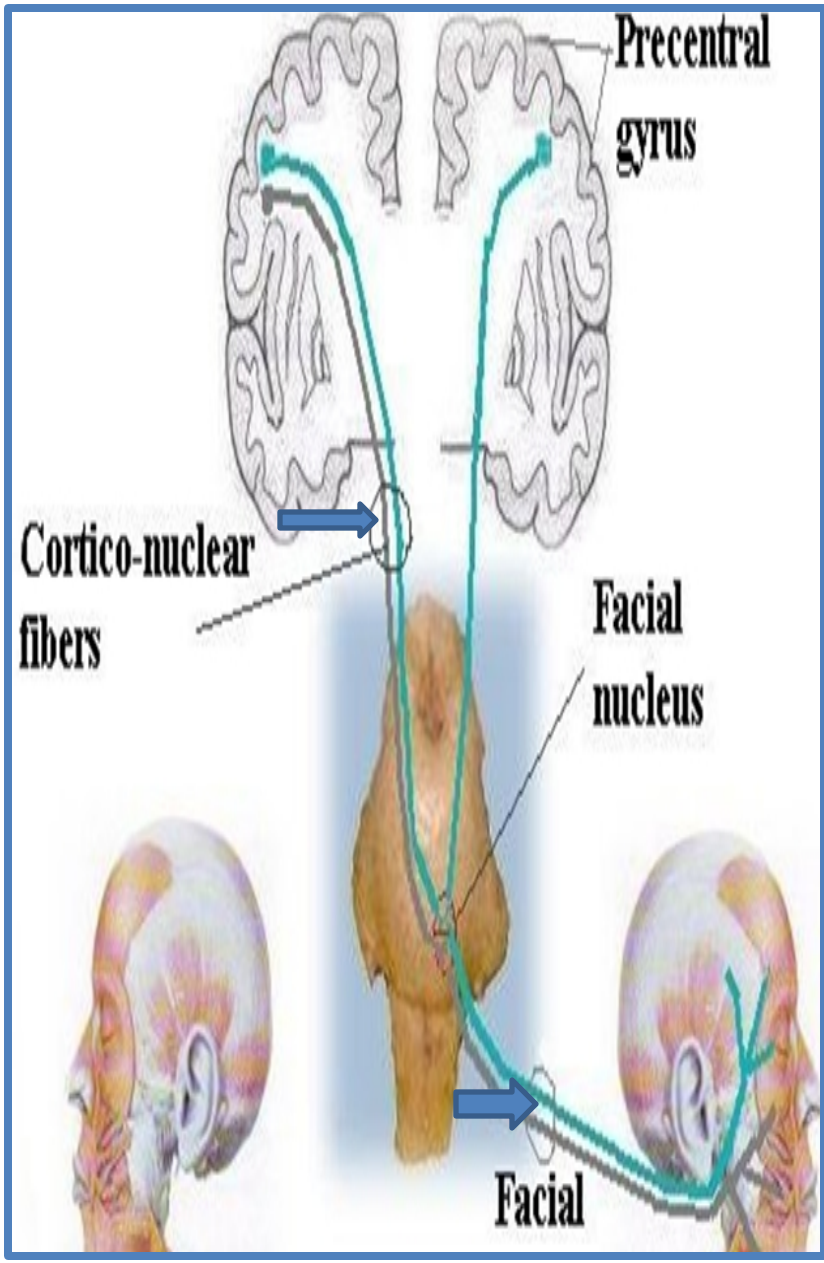
Lower Motor Neuron Lesion

- Results from injury of facial nerve fibres below facial nucleus in internal acoustic meatus;in the middle ear;in the facial canal or in parotid gland.
- Manifested by complete paralysis of facial muscles on the same side of lesion.

Upper Motor Neuron Lesion

- This occurs after injury to the pyramidal tract (corticonuclear) above facial nucleus...
- Leads to paralysis of facial muscles of lower ½ of face of opposite side but the upper ½ of the face intact because :
- Ms.of lower ½ of face receive pyramidal fibres from opposite cerebral cortex only,
- While Ms..of upper ½ of face receive pyramidal fibres from both cerebral hemispheres (Bilateral represented).

For the Students



TEST YOUR SELF !

- **Stimulation of which of the following nerves could lead to salivation and lacrimation?:**

a) Facial.
b) Glossopharyngeal.
c) Trigeminal.
d) Vagus.

- **Lesion of mandibular nerve may result in:**

a) Loss of sensation of skin over the nose.
b) Loss of lacrimation.
c) Loss of sensory supply of upper teeth.
d) Loss of general sensations of anterior 2/3 of tongue.