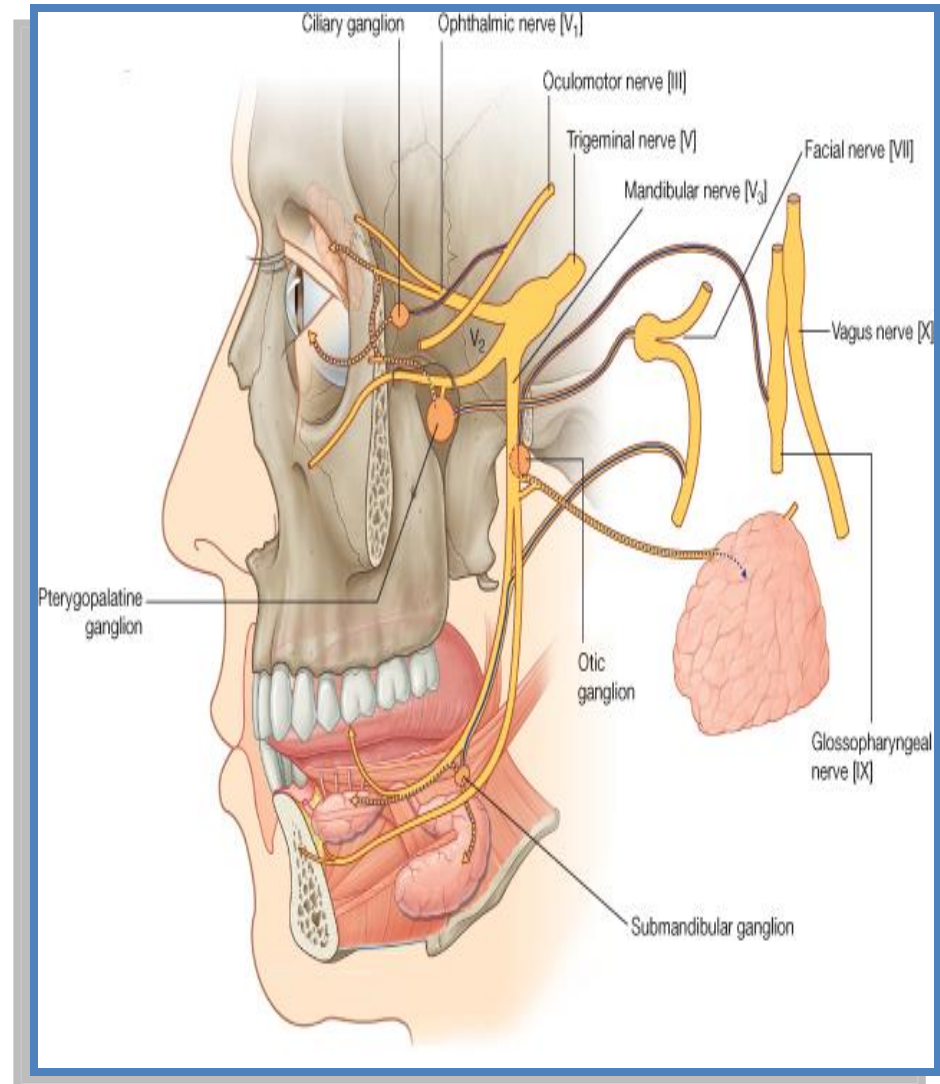


NERVE SUPPLY OF FACE

5TH & 7TH CRANIAL NERVES

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OBJECTIVES

By the end of the lecture, students should be 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).

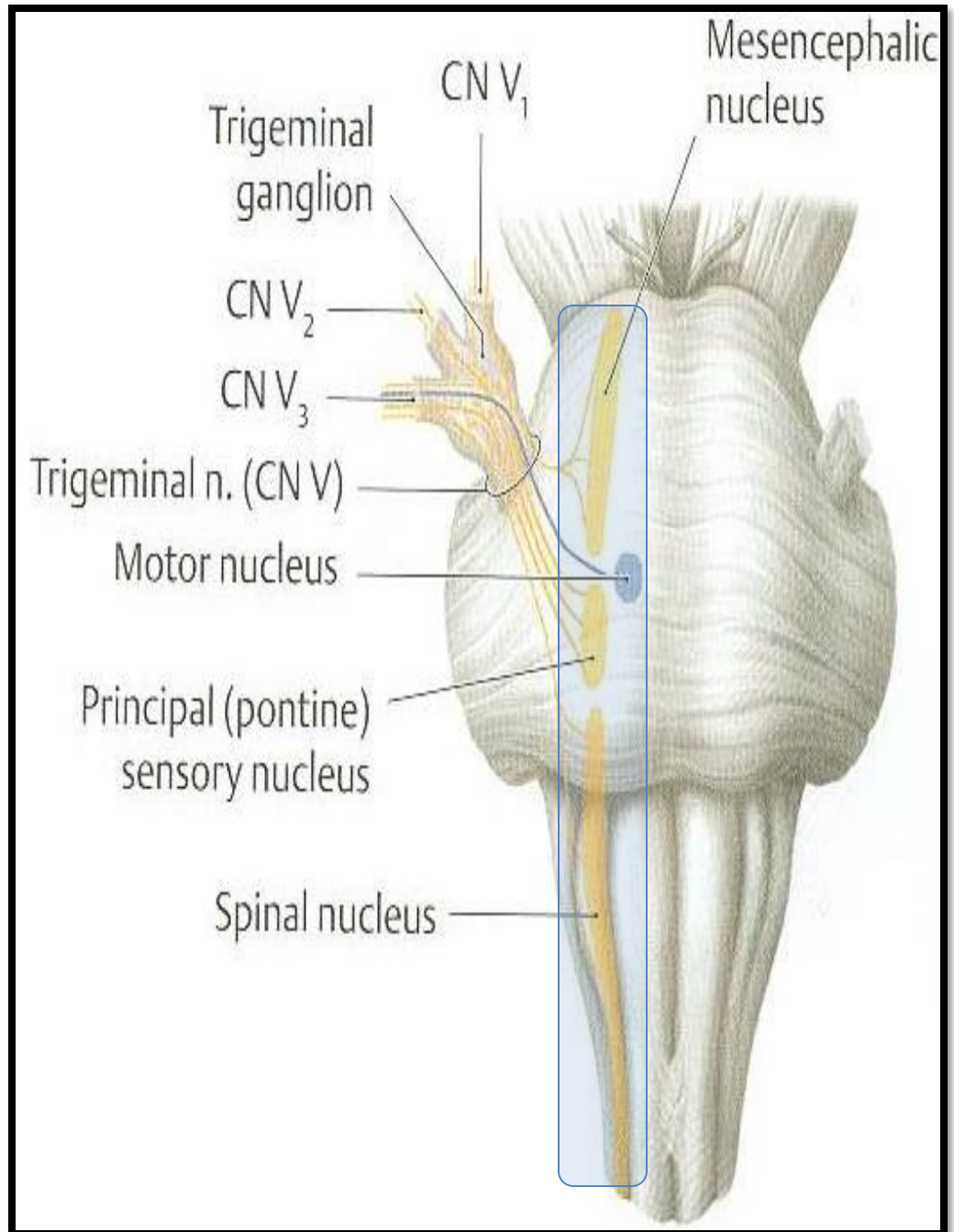
➤ Fibers:

1. **General somatic afferent:**

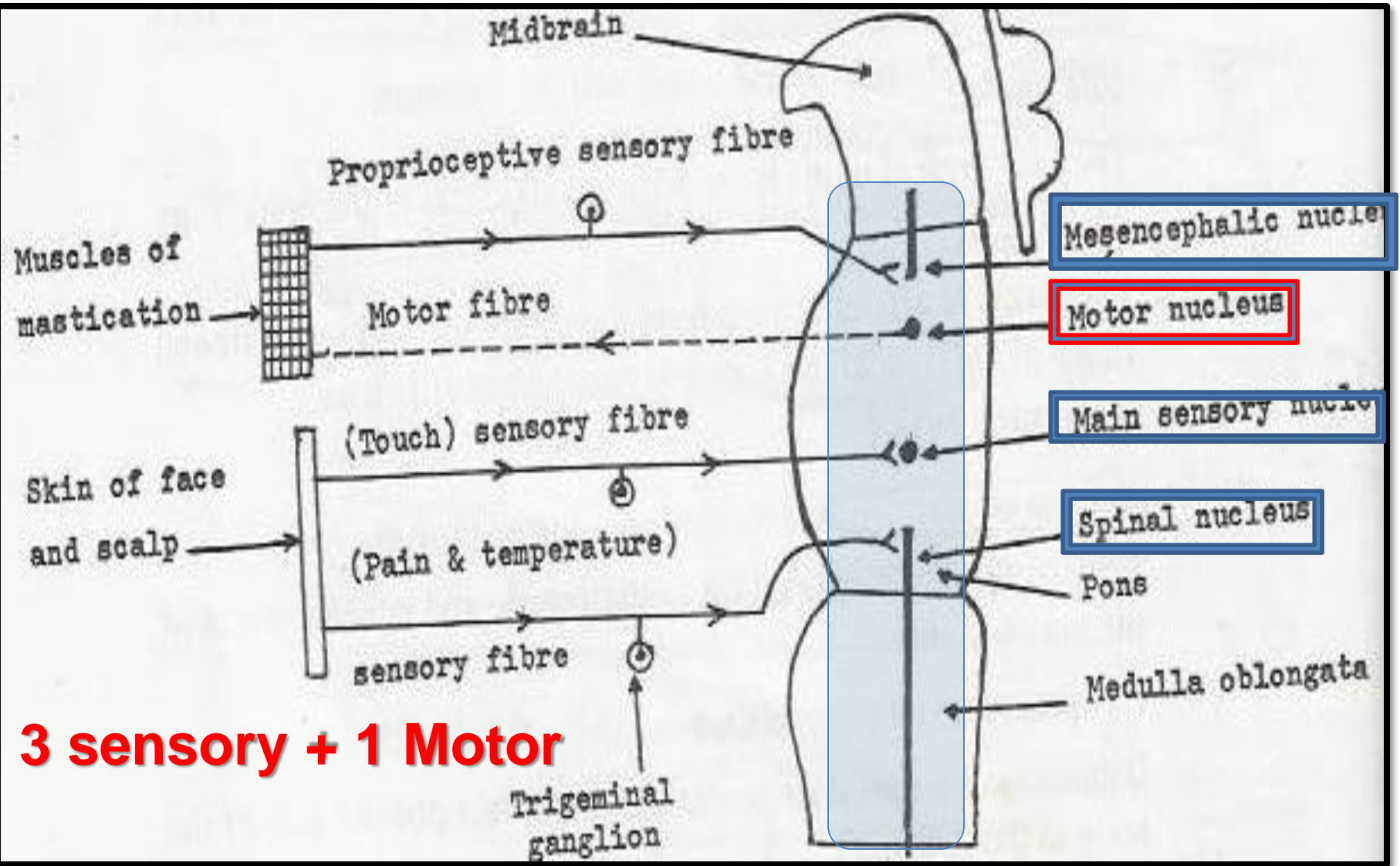
Carrying general sensations from face.

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:**

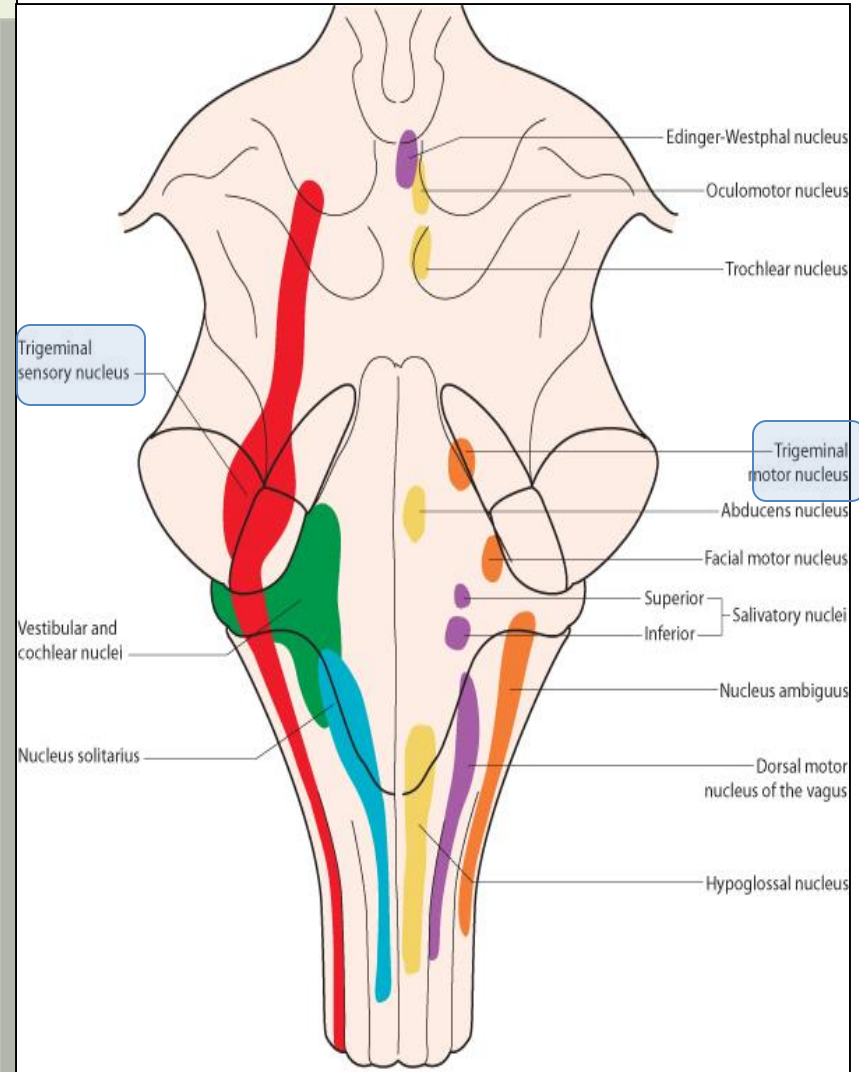
1. **Mesencephalic nucleus** (midbrain & pons): receives proprioceptive fibers from muscles of mastication.
2. **Principal (main) sensory nucleus** (pons): receives touch fibers from face & scalp
3. **Spinal nucleus** (pons, medulla & upper 2-3 cervical segments of spinal cord): receives pain & temperature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

➤ **Special visceral efferent:**

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

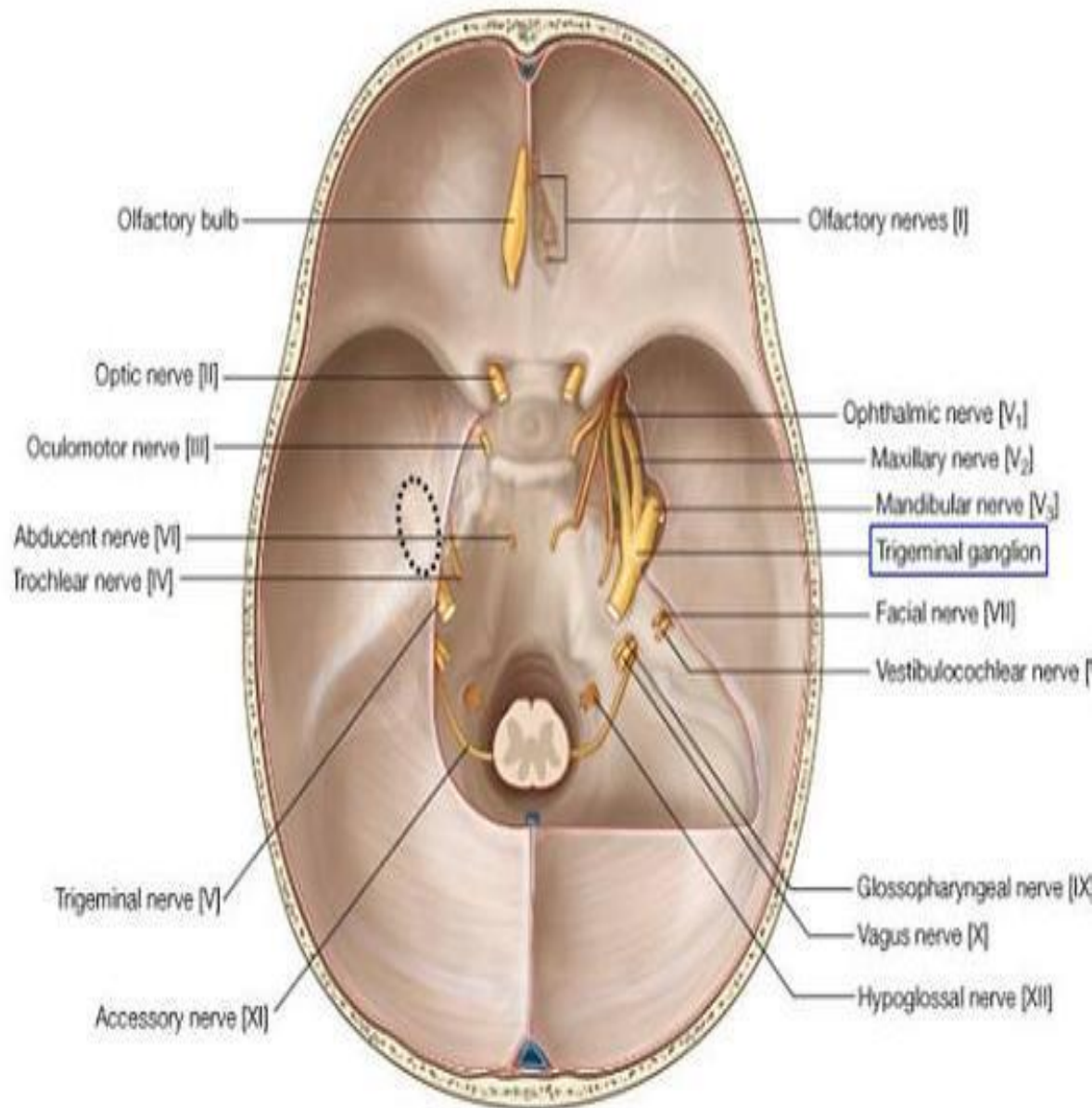
✓ **Four Muscles of mastication** (temporalis, masseter, medial & lateral pterygoid).

✓ **Other four muscles** (Anterior belly of digastric, mylohyoid, tensor palati & tensor tympani).



TRIGEMINAL GANGLION

- **Site:**
- **Occupies a depression in the middle cranial fossa.**
- **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).

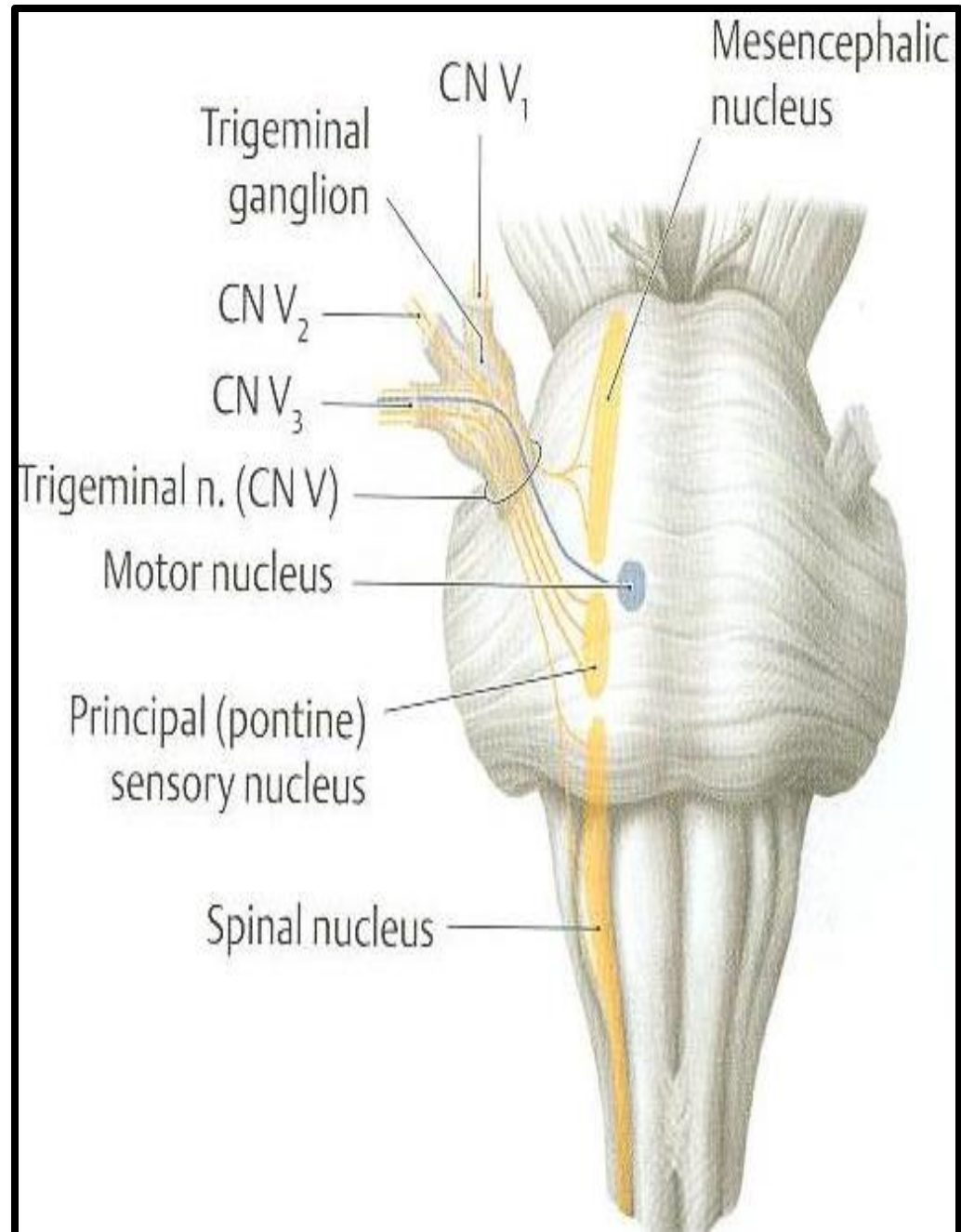
➤ Divides into 3 divisions (dendrites of trigeminal ganglion):

1. Ophthalmic.

2. Maxillary.

3. Mandibular.

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



Trigeminal nerve (V)

Ophthalmic nerve (V₁)

Maxillary nerve (V₂)

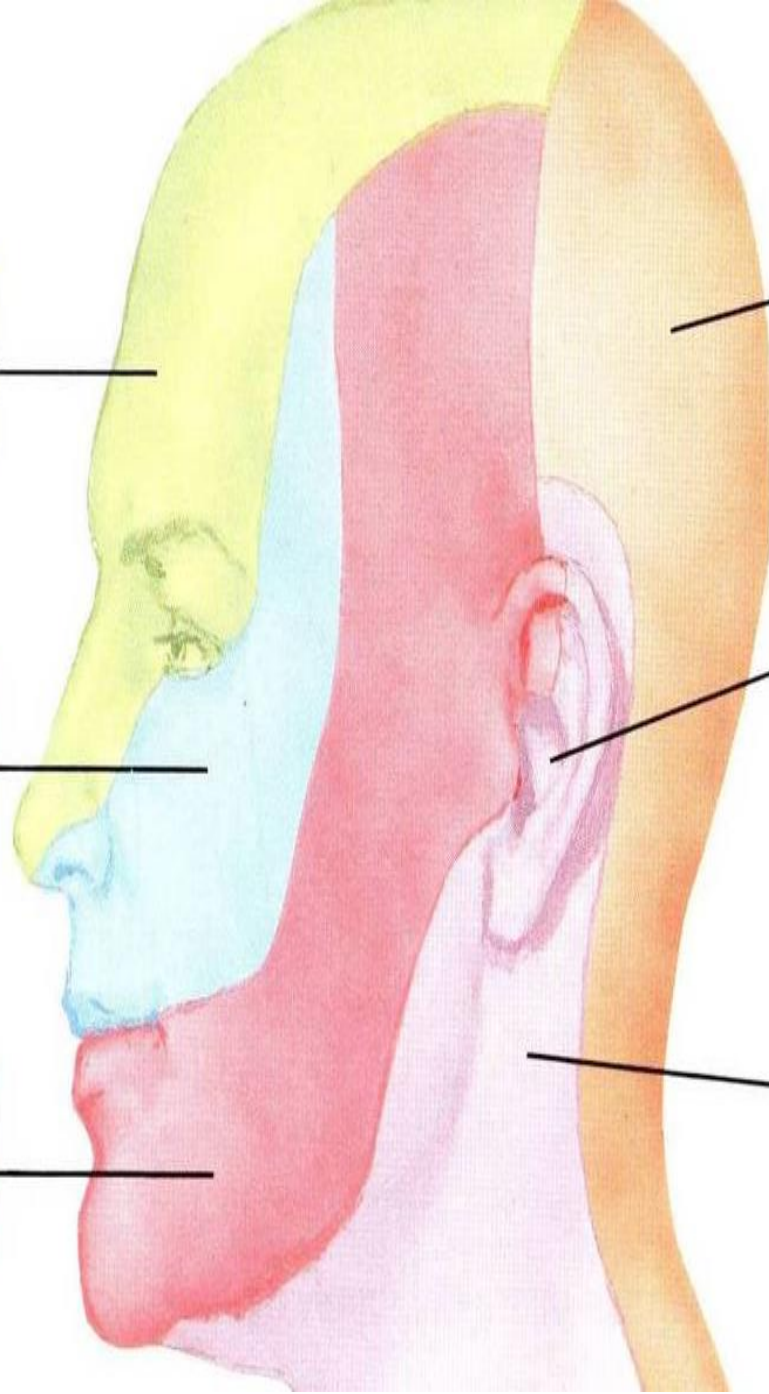
Mandibular nerve (V₃)

Dorsal rami of cervical spinal nerves

Auricular branch of vagus to external meatus and small area on posteromedial surface of auricle

Branches from cervical plexus

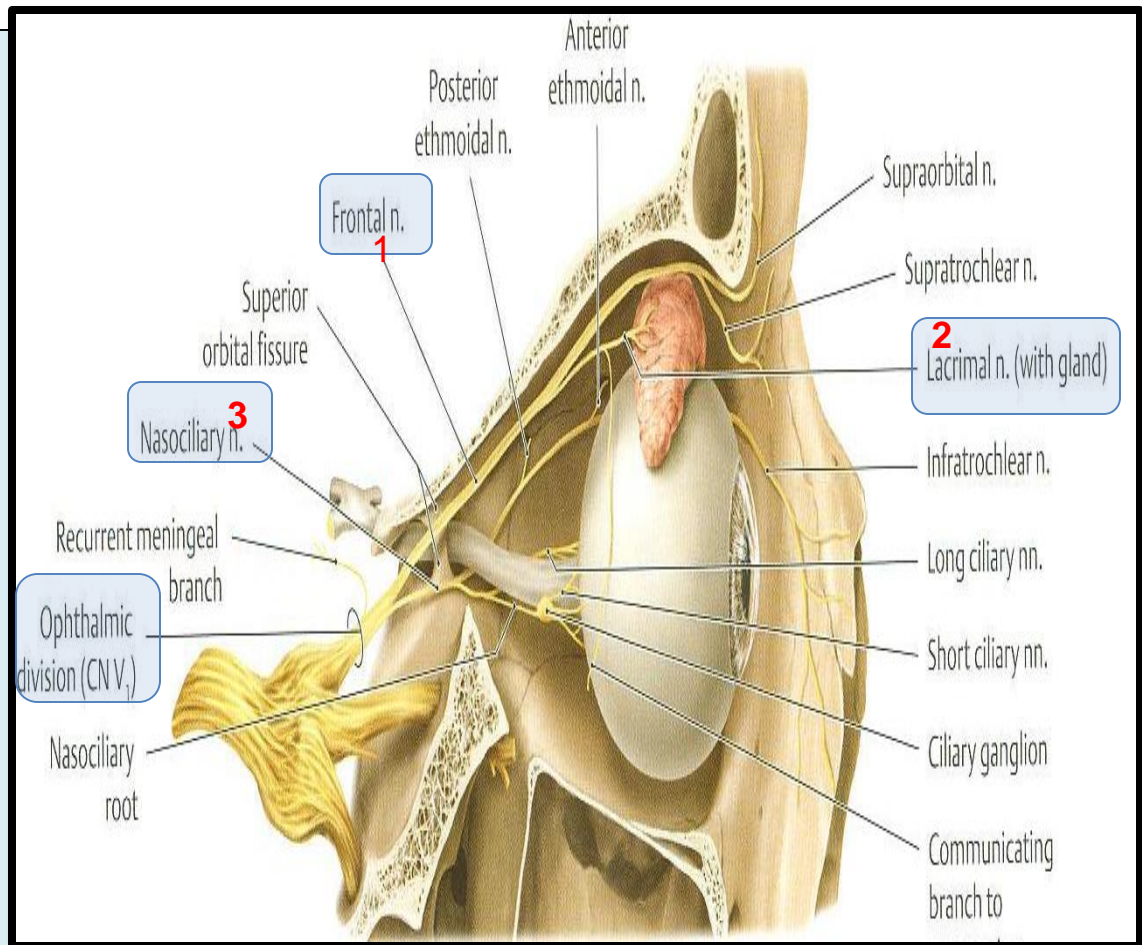
F. J. Netter M.D.



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.



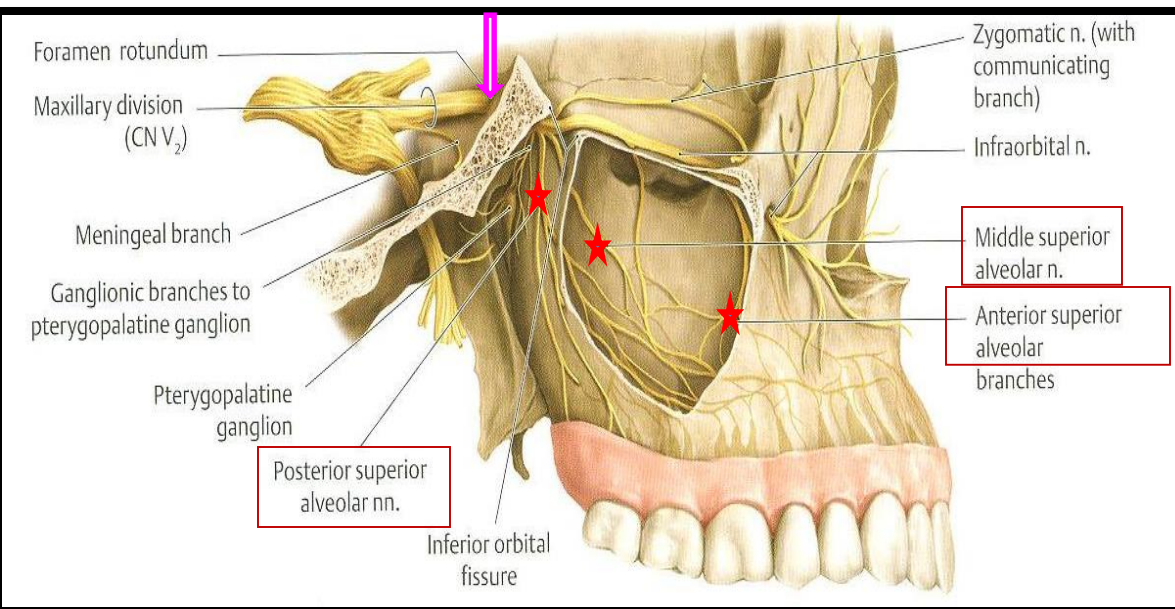
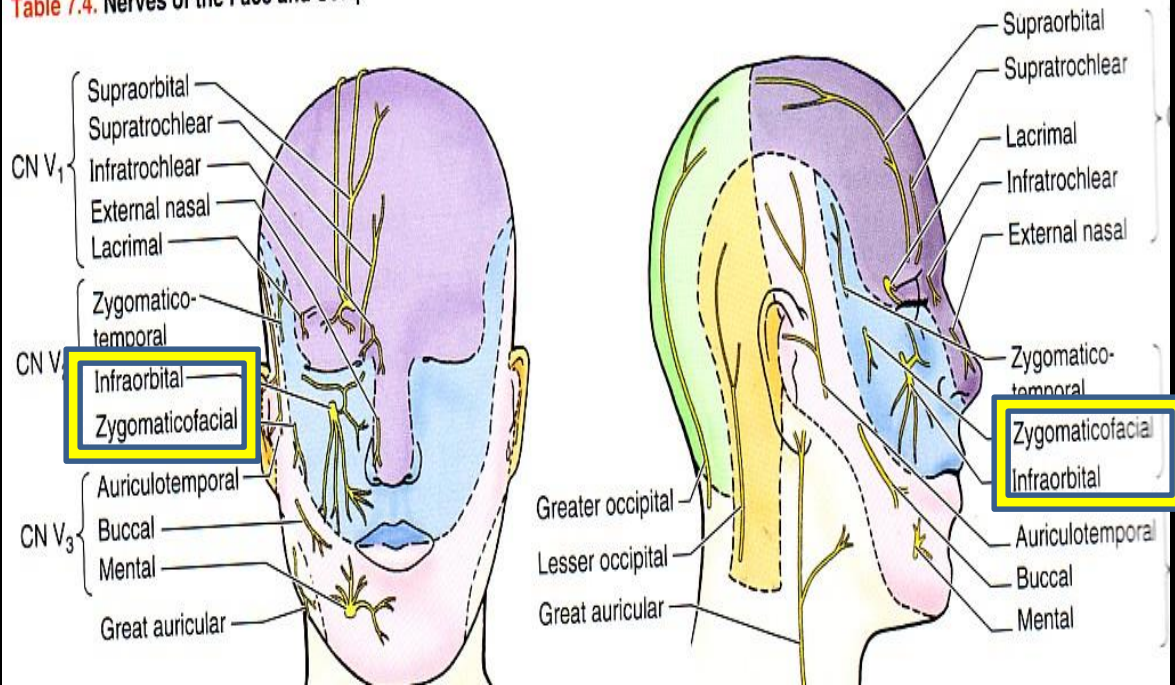
MAXILLARY (PURE SENSORY)

➤ Supplies:

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

1. Face: (zygomaticofacial & infraorbital nerves).

Table 7.4. Nerves of the Face and Scalp



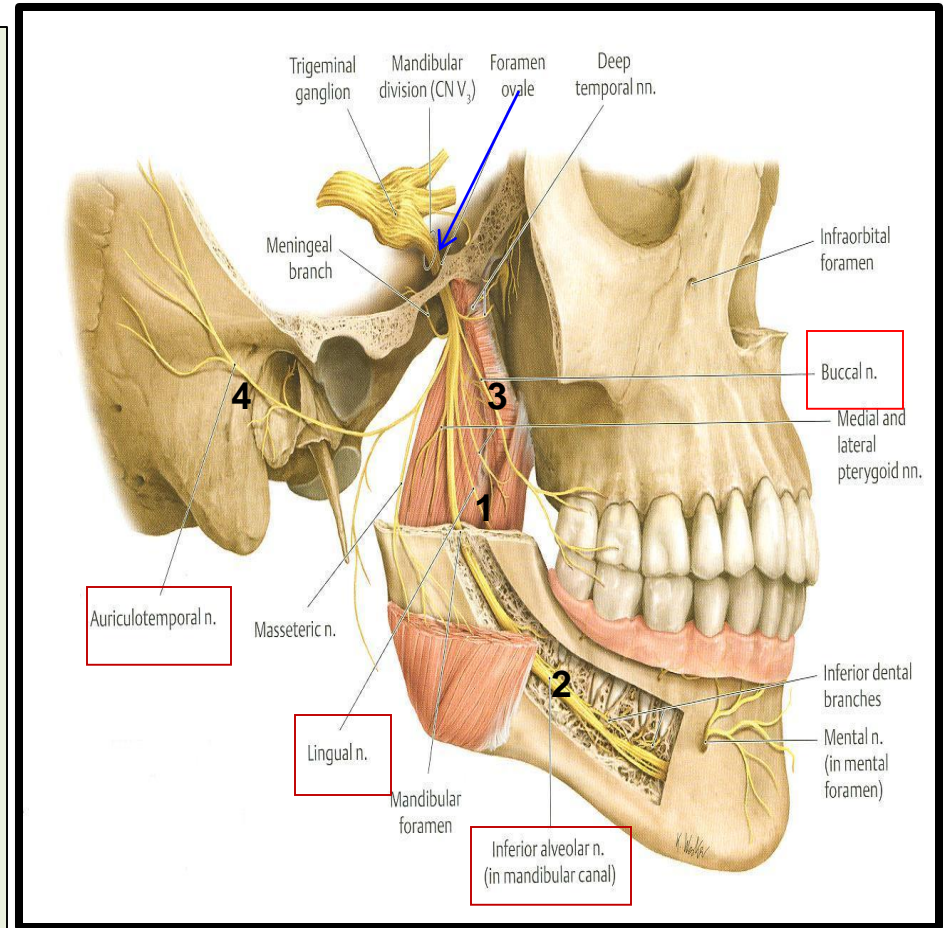
MANDIBULAR (MIXED)

➤ SENSORY BRANCHES:

- 1. Lingual:** receives
General sensations from anterior 2/3 the of tongue.
- 2. Inferior alveolar:** supplies
Lower teeth, gums & face.
- 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, most often in the face)
- This condition is characterized by **recurring episodes of intense stabbing excruciating 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.

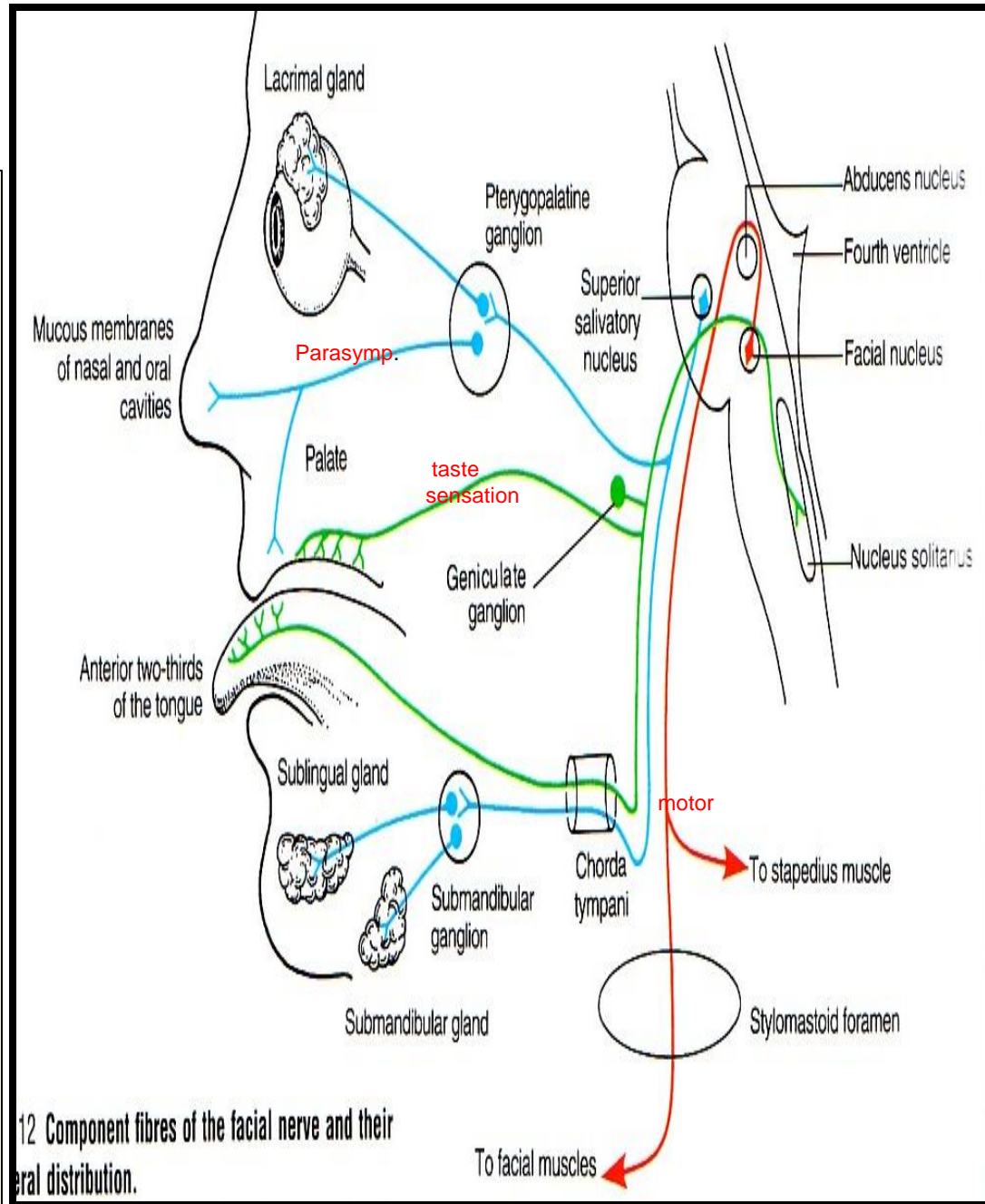


FACIAL NERVE

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

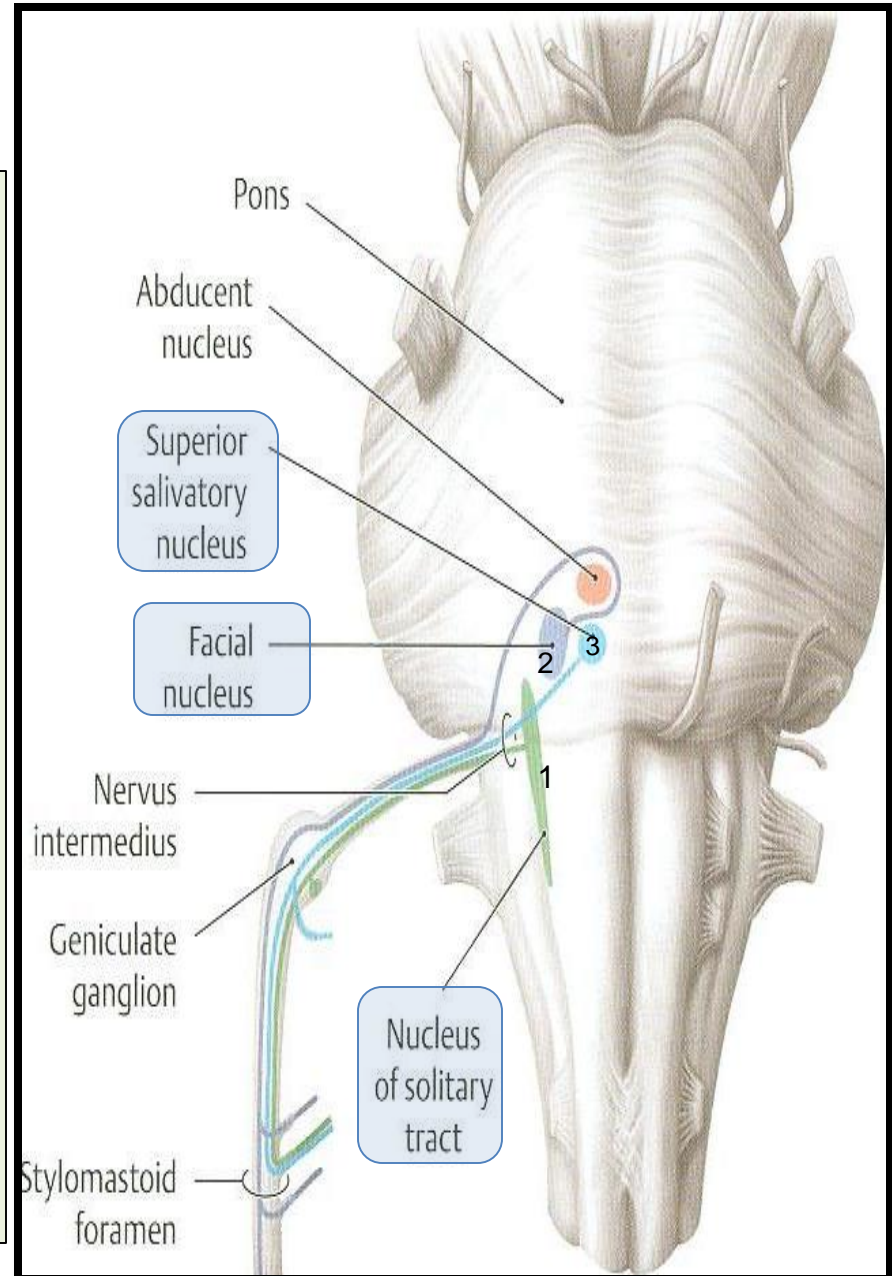
➤ **Fibers:**

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.



FACIAL NERVE NUCLEI

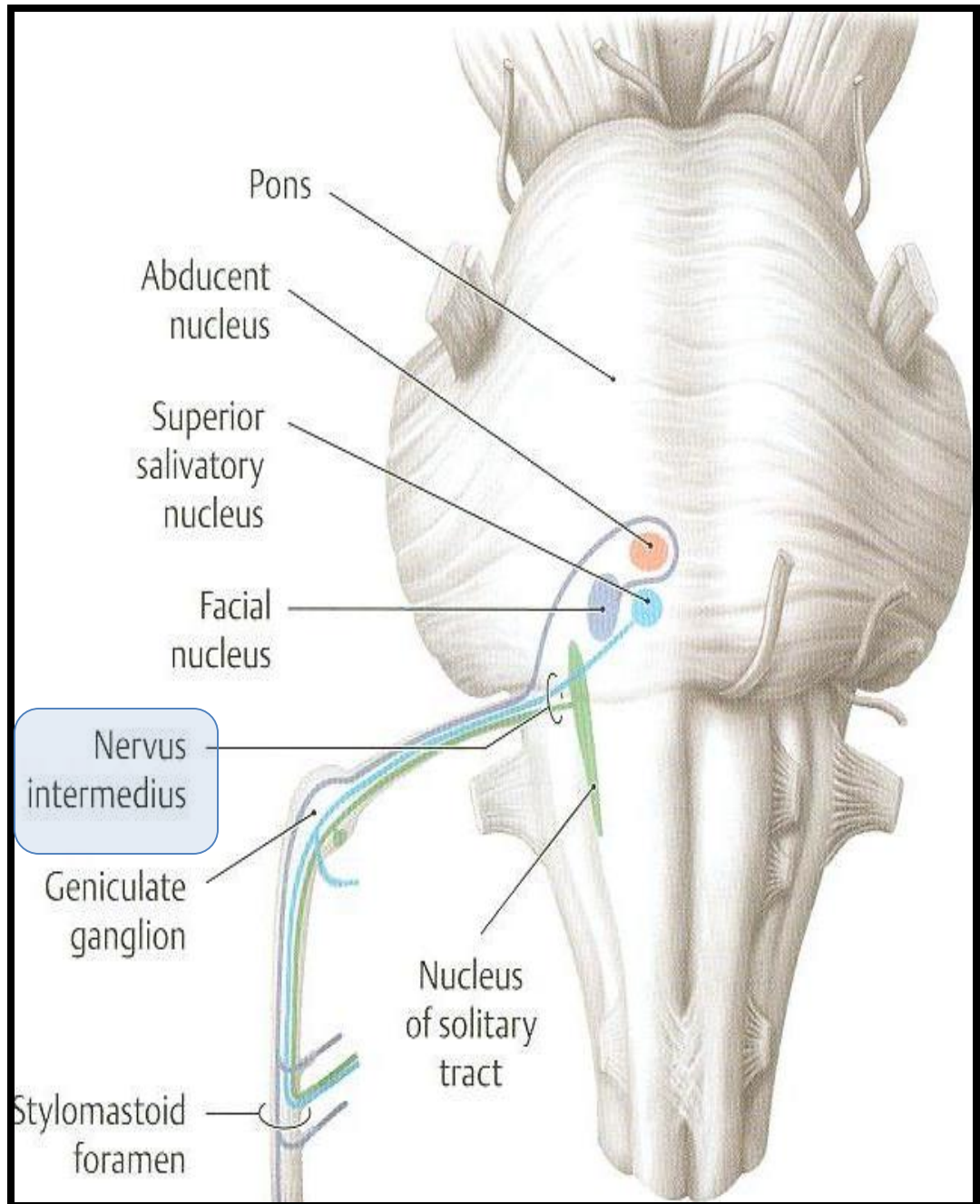
- 3 Nuclei :
- **Special visceral afferent: (nucleus solitarius):** receives taste from the anterior 2/3 of tongue.
- **Special visceral efferent: motor nucleus of facial nerve:** supplies: muscles of face, posterior belly of digastric, stylohyoid, platysma, stapedius, and occipitofrontalis.
- **General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



COURSE OF FACIAL NERVE

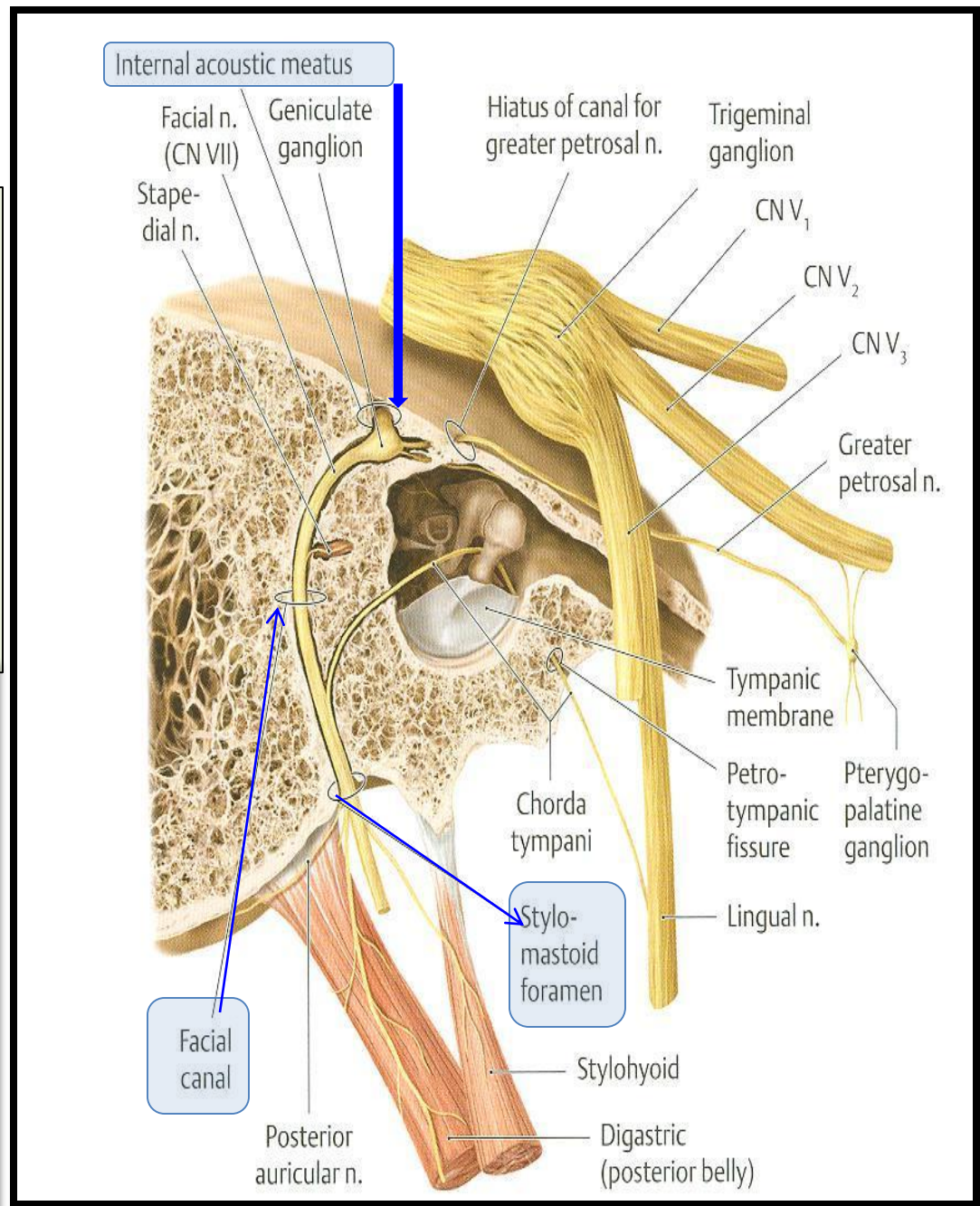
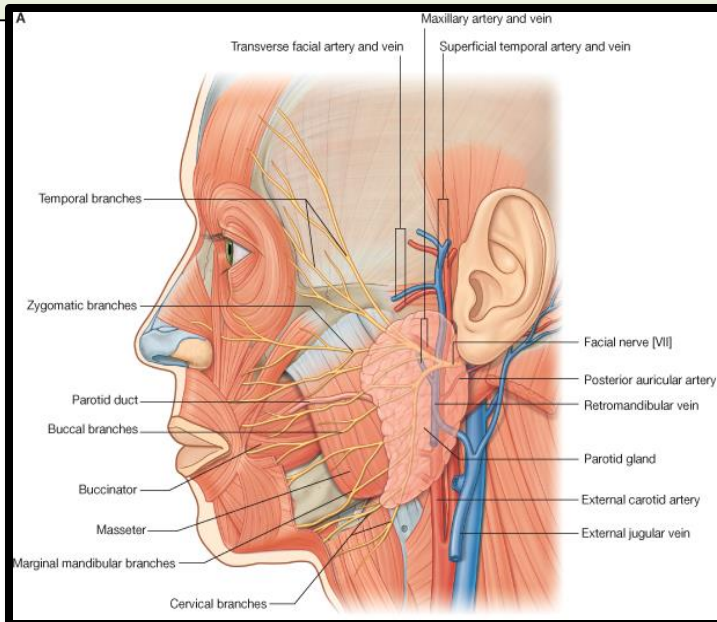
➤ Emerges from the cerebellopontine angle by 2 roots:

- 1. Medial motor root:** contains motor fibers.
- 2. Lateral root (nervus 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

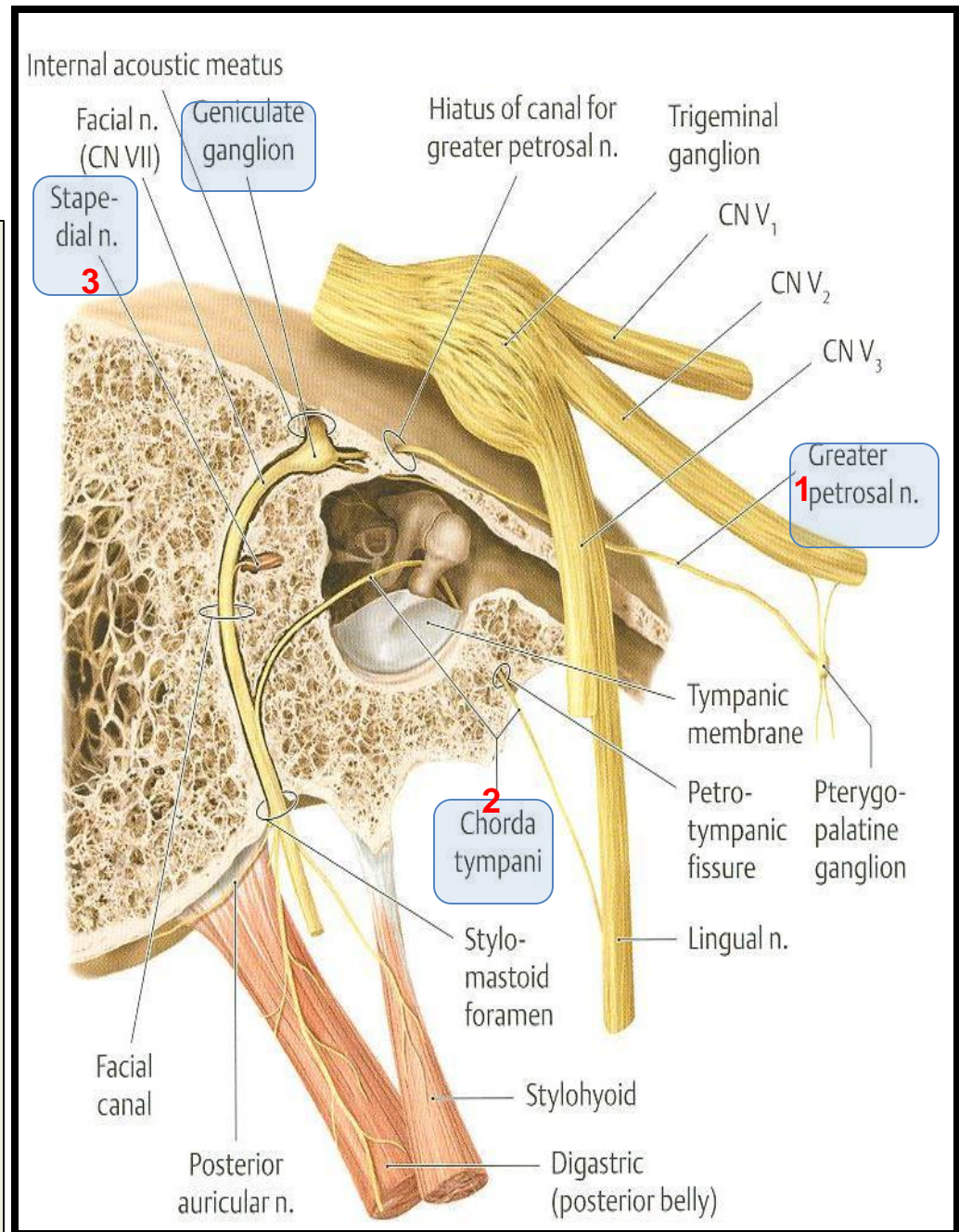
In facial canal:

- Greater petrosal nerve:** carries preganglionic parasympathetic fibers to lacrimal, nasal & palatine glands.
- Chorda tympani:** carries:
 - preganglionic parasympathetic fibers to submandibular & sublingual glands.
 - taste fibers from anterior 2/3 of tongue.

- 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 **neurons** ; its fibres carrying taste sensations from anterior 2/3 of tongue; ending in solitary nucleus in M.O .

Lies in internal acoustic meatus.



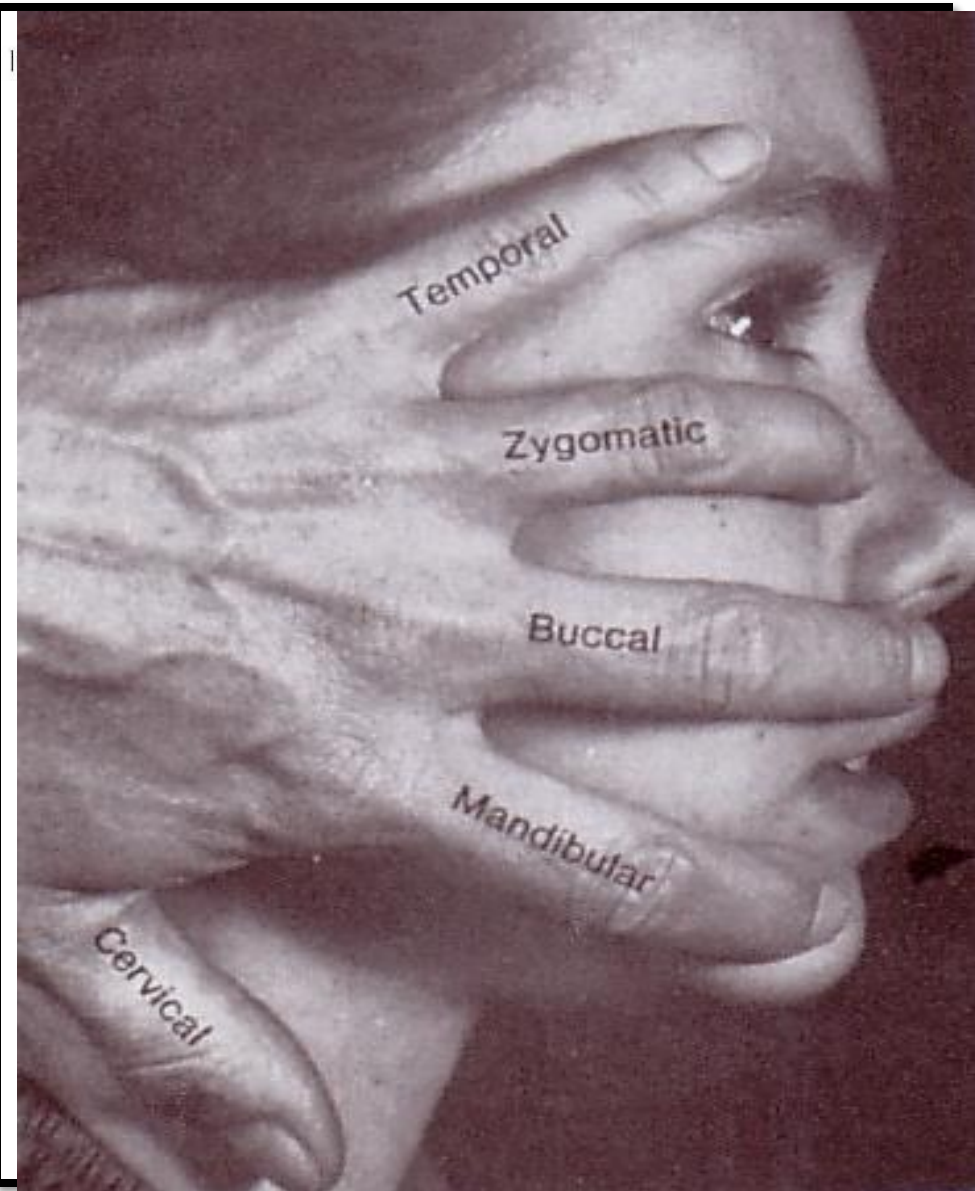
BRANCHES OF FACIAL NERVE

➤ 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.**

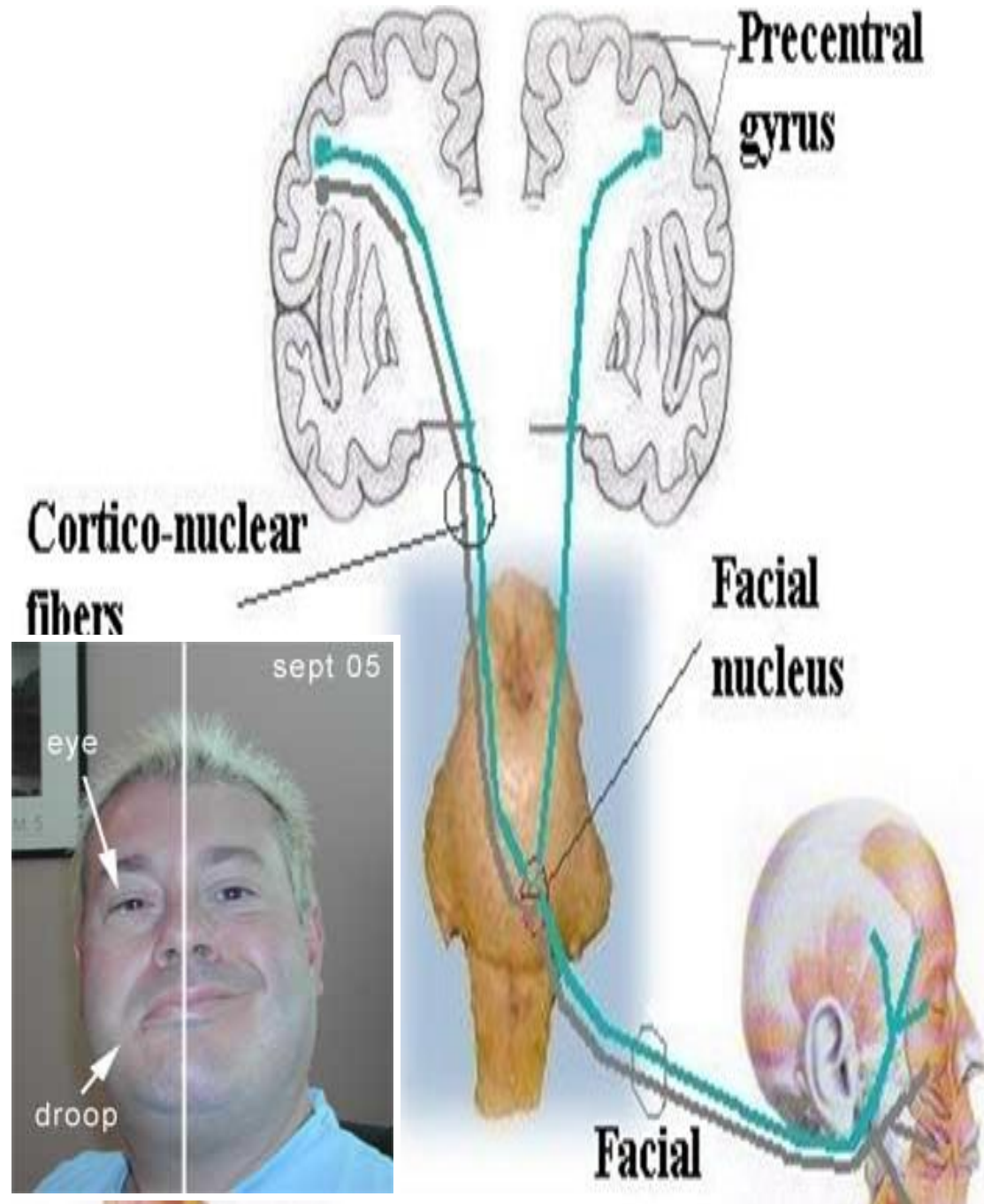
➤ **Inside parotid gland:** gives **5 terminal motor branches:**

- *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.

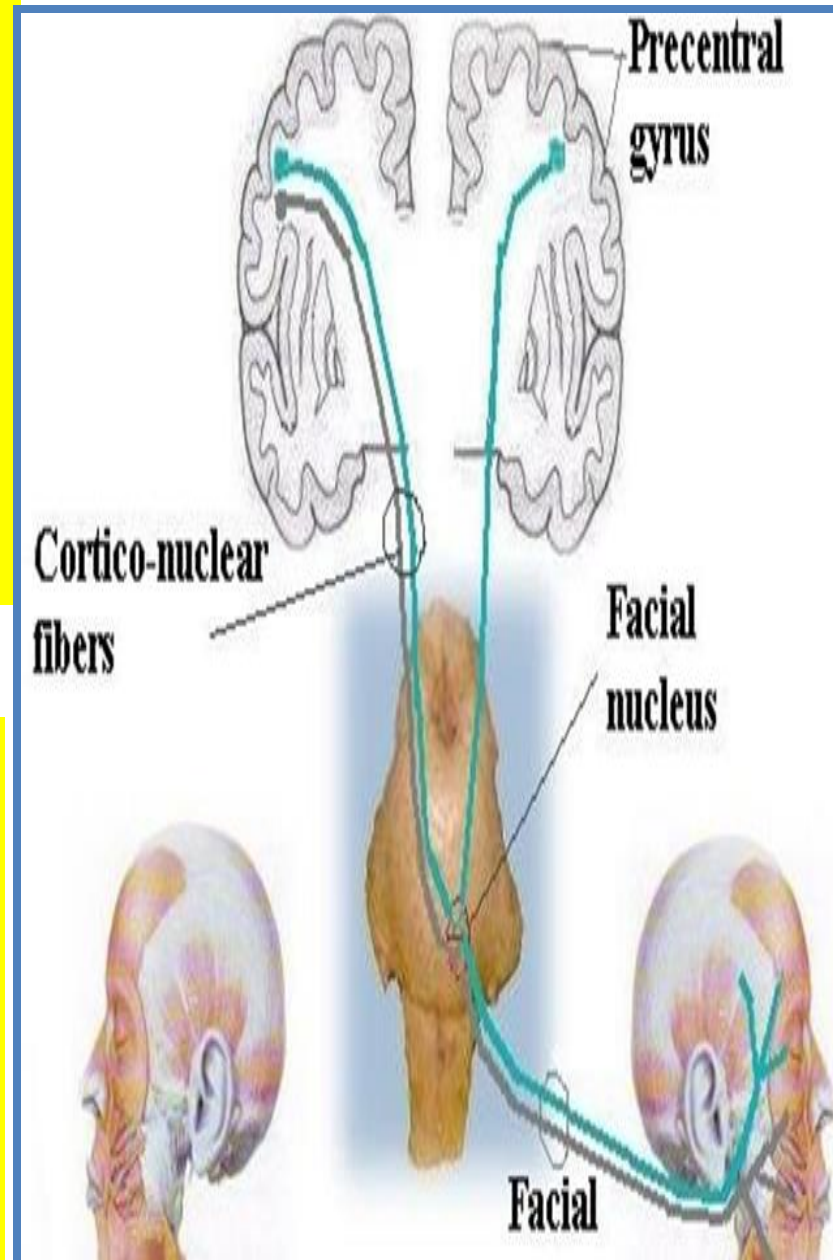
Lower Motor Neuron Lesion

- **Results from injury of facial nerve fibres** 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.
- **If lesion of facial nerve above the origin of chorda tympani and nerve to stapedius**, the paralysis of facial muscles will be associated with :
 - **Hyperacusis** : sounds are heard more acute due to paralysis of stapedius ms.
 - **Loss of taste sensation** from anterior 2/3 of tongue.

Upper Motor Neuron Lesion

- This occurs after **injury to the pyramidal tract (corticospinal) above facial nucleus...**
- Leads to **paralysis of facial muscles of lower 1/2 of face of opposite side** but the upper 1/2 of the face not affected **because** the **lower part of facial nucleus & Ms. of lower 1/2 of face** receive pyramidal fibres from opposite cerebral cortex only, **while Ms. of upper 1/2 of face** are normal because they receive pyramidal fibres from both cerebral hemispheres.

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.