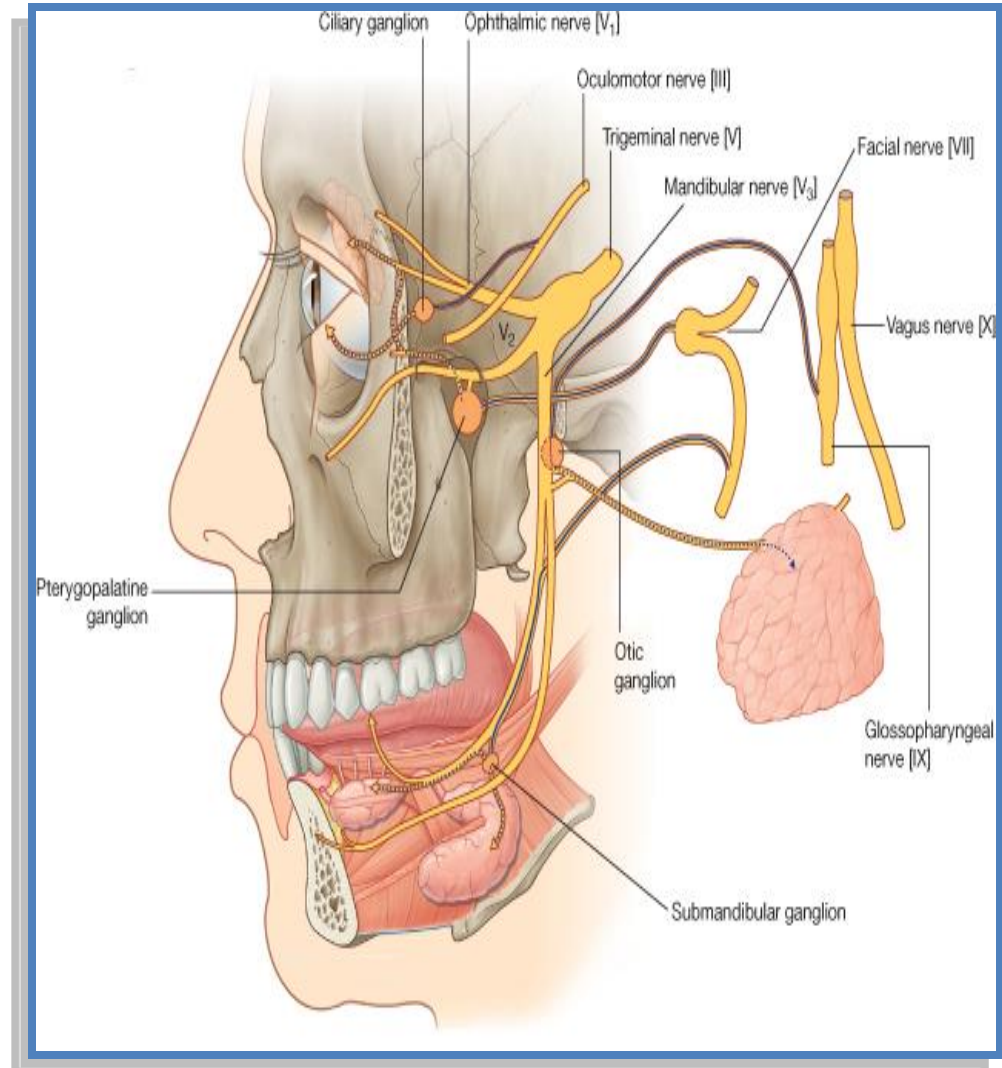


NERVES OF THE FACE

5TH & 7TH CRANIAL NERVES



Prof. Saeed Abuel Makarem

OBJECTIVES

By the end of the lecture, you should be able to:

- List the nuclei of 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 points in the course and distribution of trigeminal and facial nerves.
- Describe the main motor & sensory manifestation in case of lesion of the trigeminal & facial nerves.

TRIGEMINAL NERVE

➤ Type:

Mixed:

(Sensory & Motor).

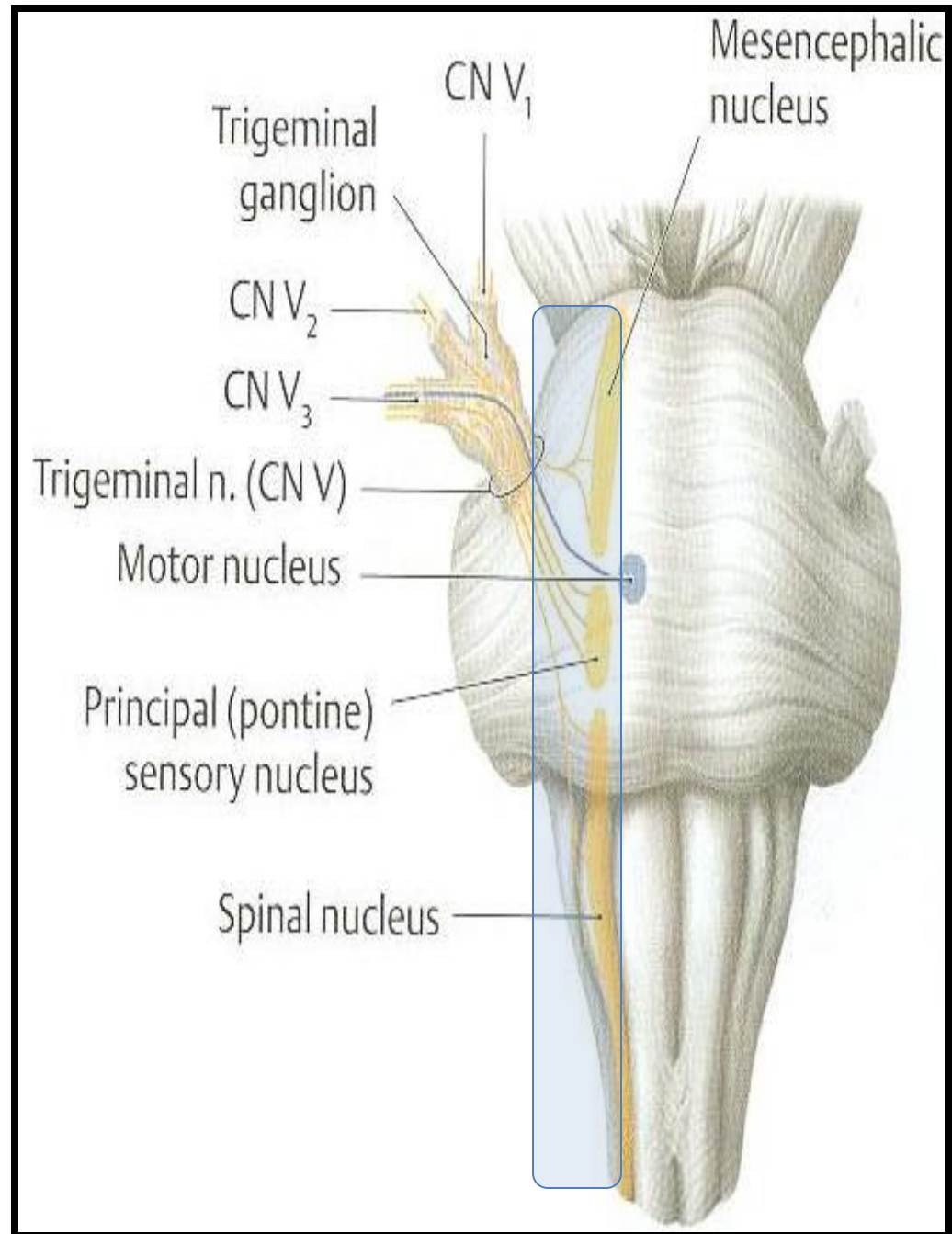
➤ Fibers:

1. **General Somatic Afferent:**

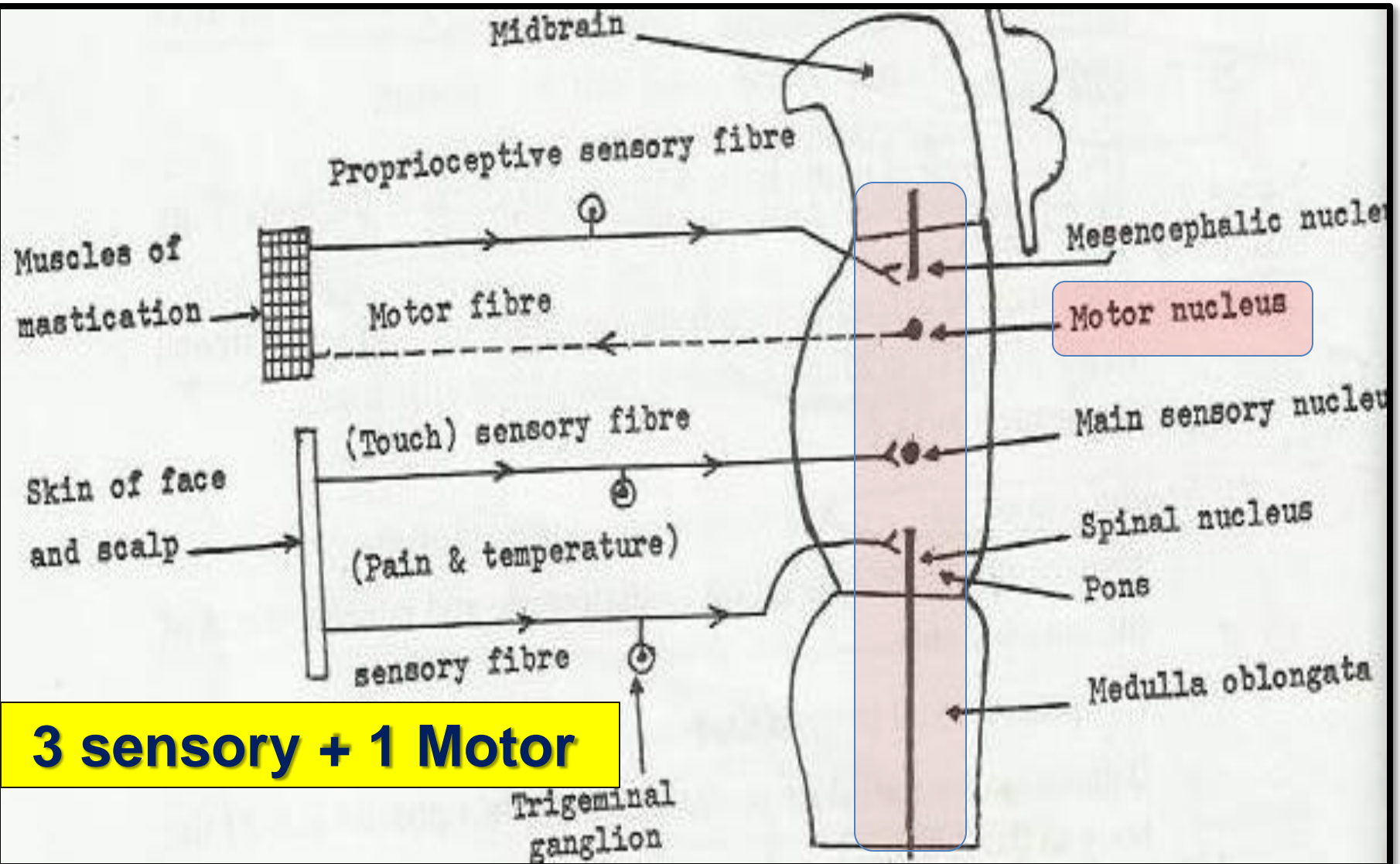
Carrying general sensations from the face, and anterior part of the scalp.

2. **Special Visceral Efferent:**

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



TRIGEMINAL NERVE NUCLEI, (Deep origin)



TRIGEMINAL NERVE NUCLEI

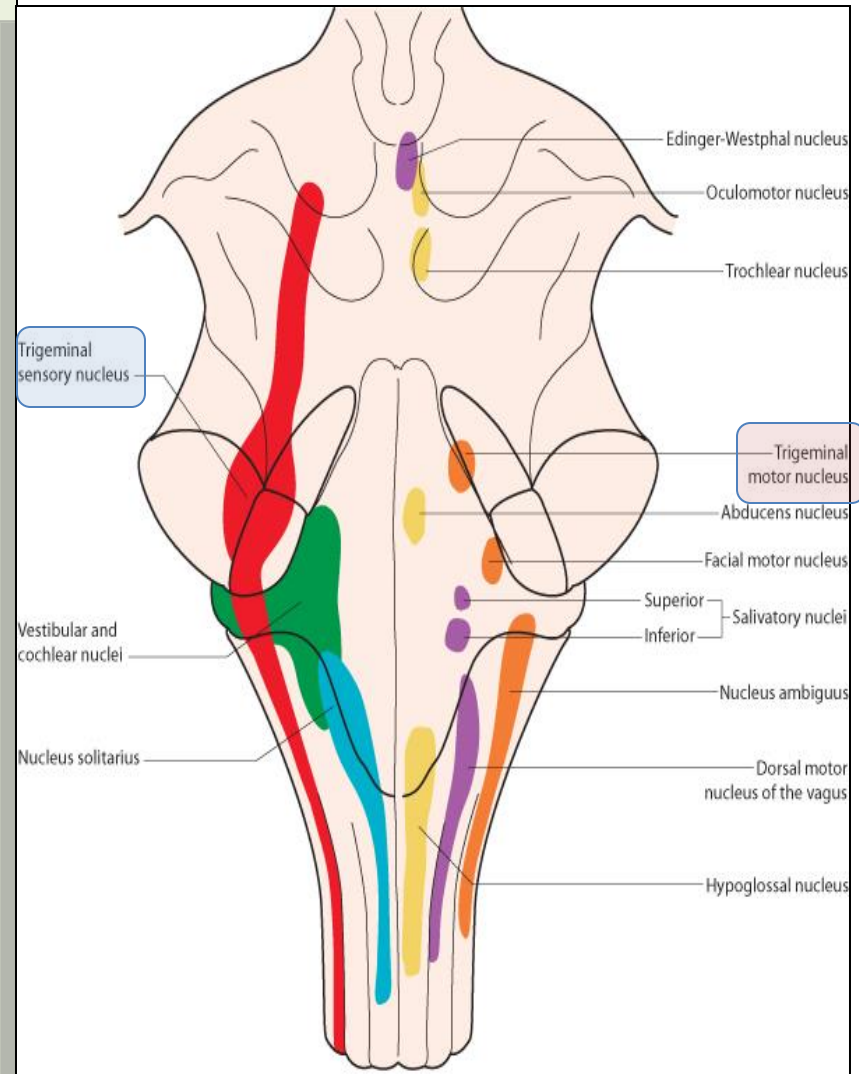
➤ **Four nuclei: (3 sensory + 1 Motor).**

➤ **General Somatic Afferent:**

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

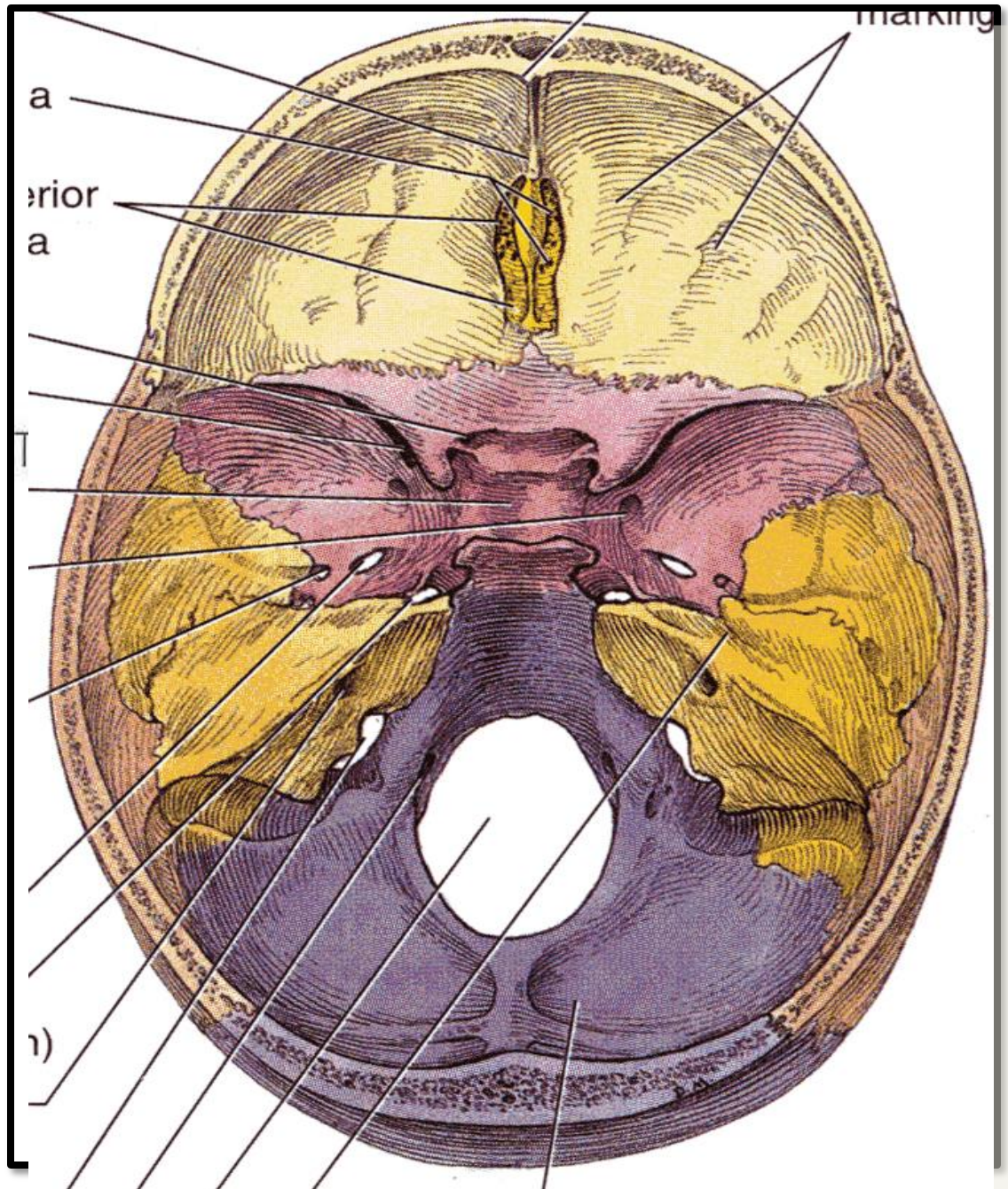
➤ **Special Visceral Efferent:**

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, (trigeminal impression).
- **Importance:** Contains cell bodies:
 1. Whose **dendrites** carry sensations from face & scalp.
 2. Whose **axons** form the sensory root of trigeminal nerve.



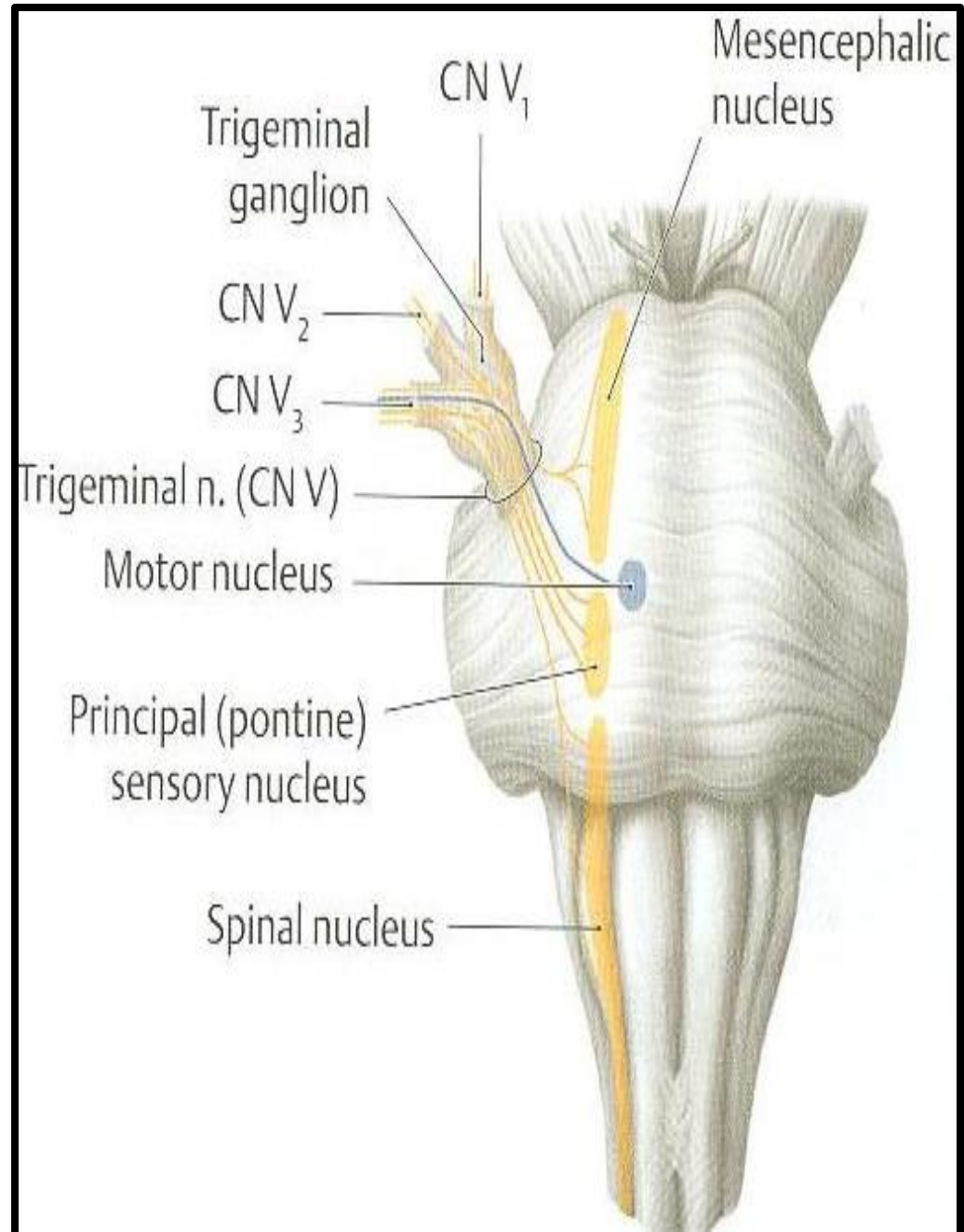
TRIGEMINAL NERVE

➤ **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, CV1**
2. **Maxillary, CV2**
3. **Mandibular, CV3**

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



Trigeminal nerve (V)

Ophthalmic nerve (V₁)

Maxillary nerve (V₂)

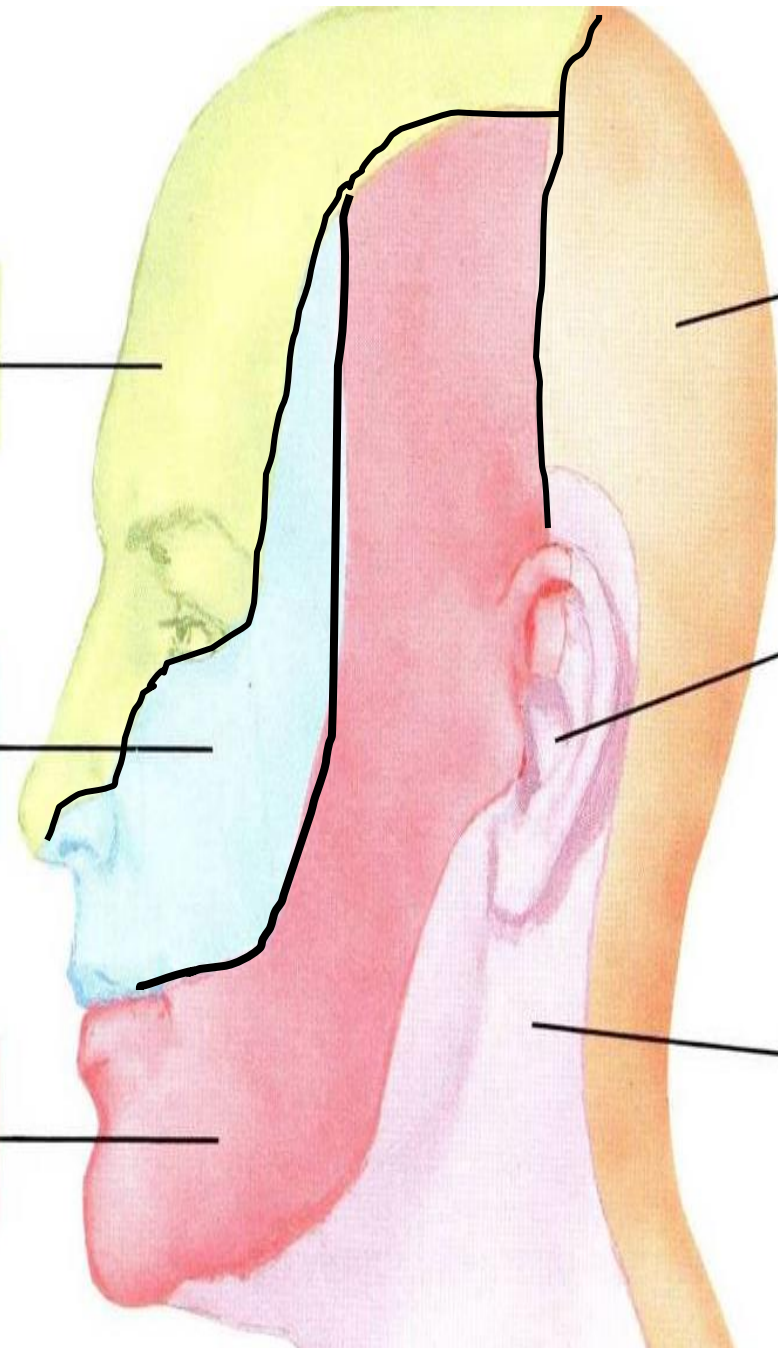
Mandibular nerve (V₃)

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. Netter M.D.

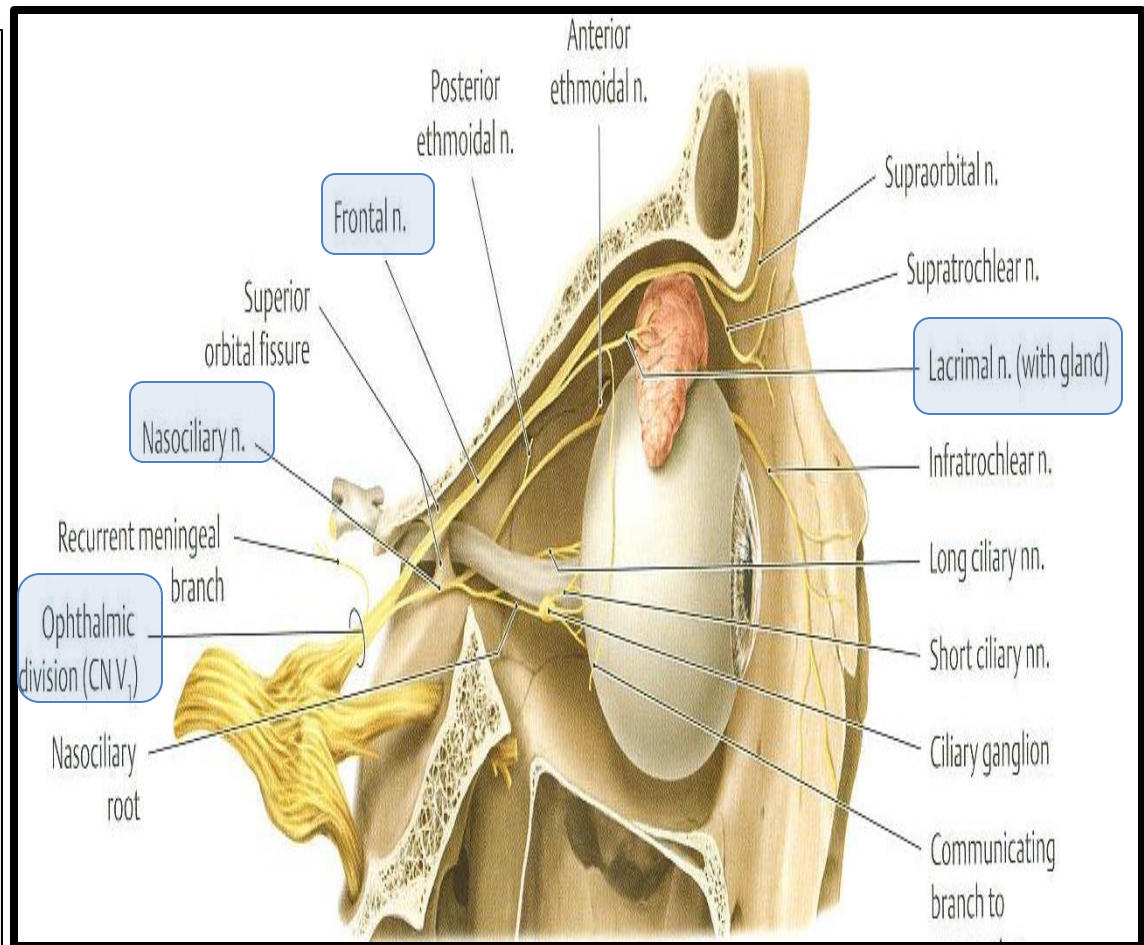


OPHTHALMIC (PURE SENSORY)

➤ **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 and gum & maxillary air sinus:

(anterior superior alveolar.

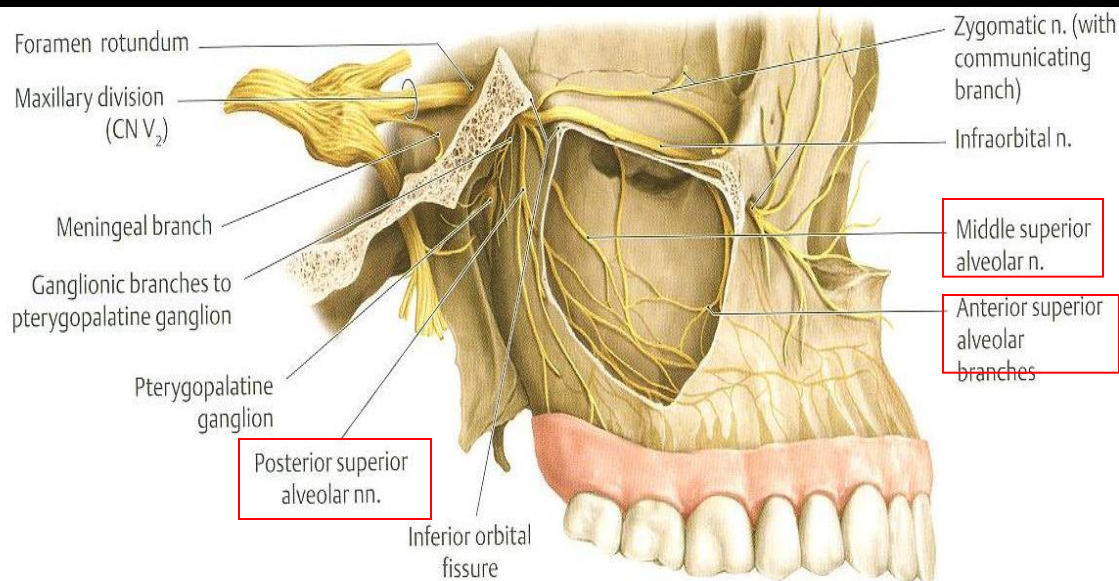
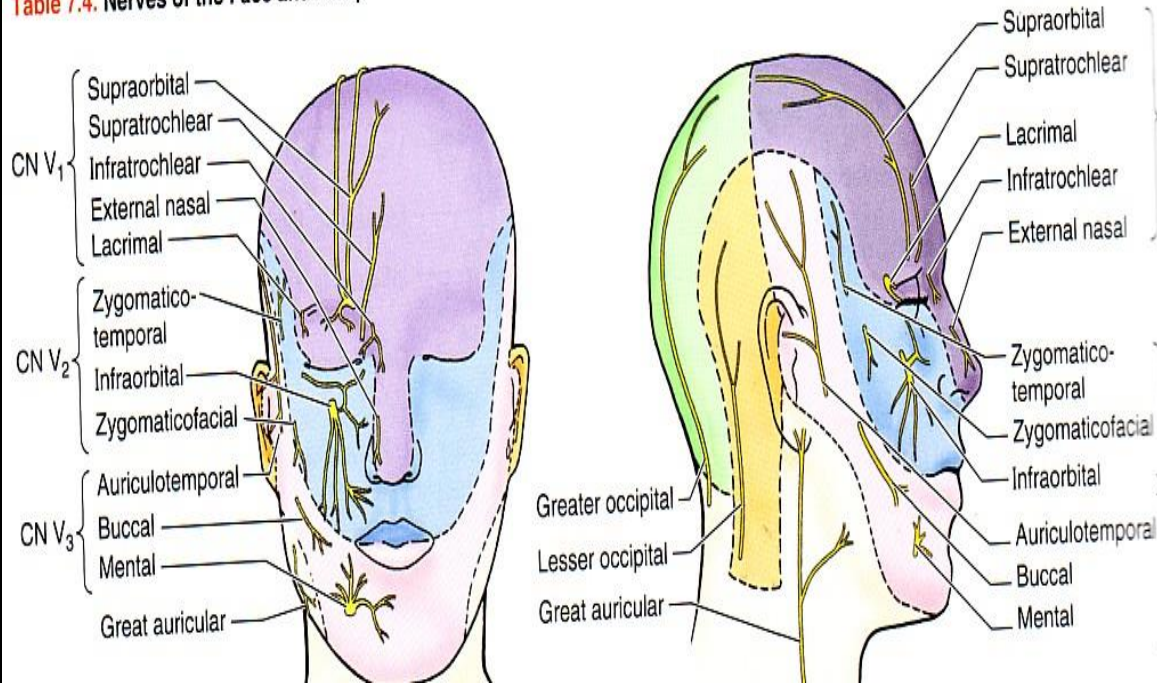
middle superior alveolar &

posterior superior alveolar nerves).

2. Face:

(zygomaticofacial & infraorbital nerves).

Table 7.4. Nerves of the Face and Scalp



MANDIBULAR (MIXED)

➤ SENSORY BRANCHES:

1. **Lingual:**

General sensations from anterior 2/3 the of tongue.

2. **Inferior alveolar:**

Lower teeth, gum & face.

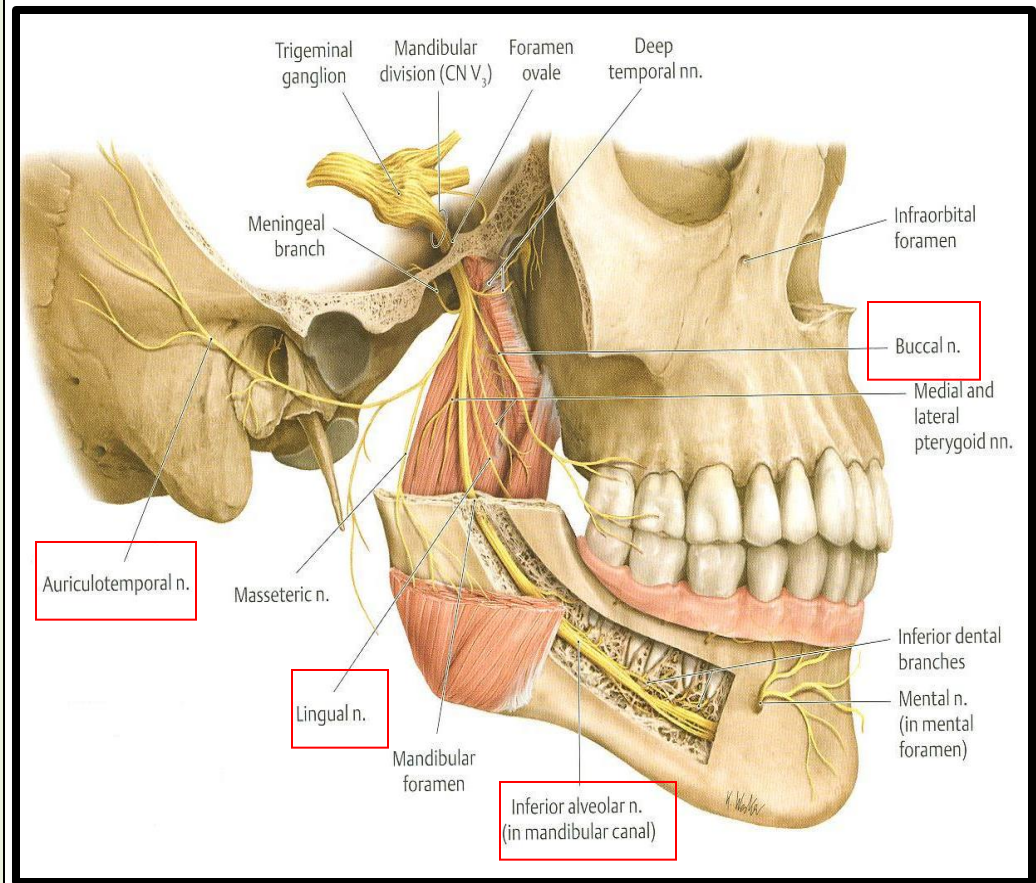
3. **Buccal:** Face, (cheek on upper jaw)

4. **Auriculotemporal:**

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**.
- This condition is characterized by recurring episodes of intense stabbing , sever, **excoriating 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.

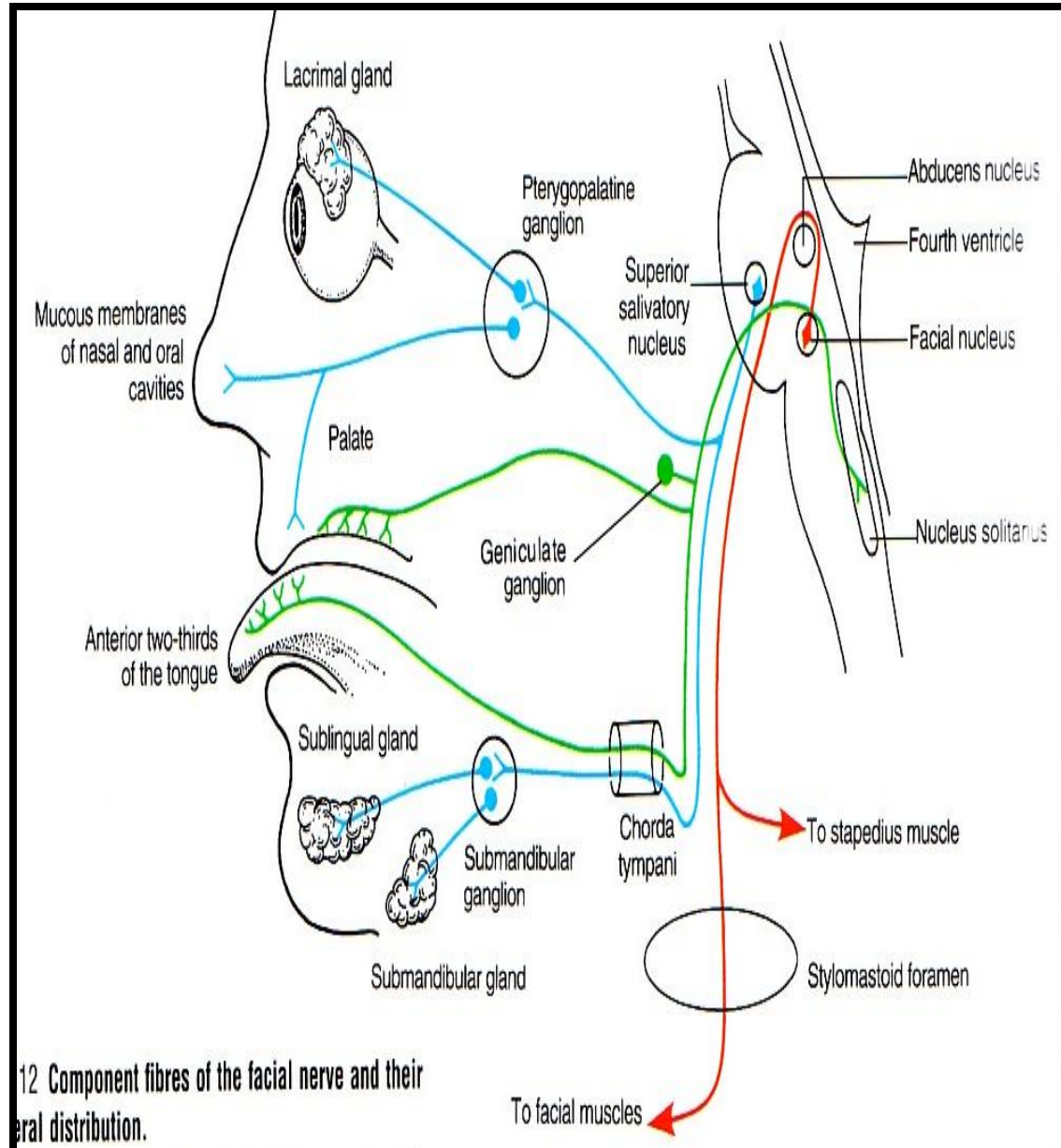


- **Type:** Mixed:
Special sensory,
Motor,
Parasympathetic.

➤ **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**:
parasympathetic
secretory fibers to
submandibular,
sublingual, **lacrimal,**
nasal & palatine glands.

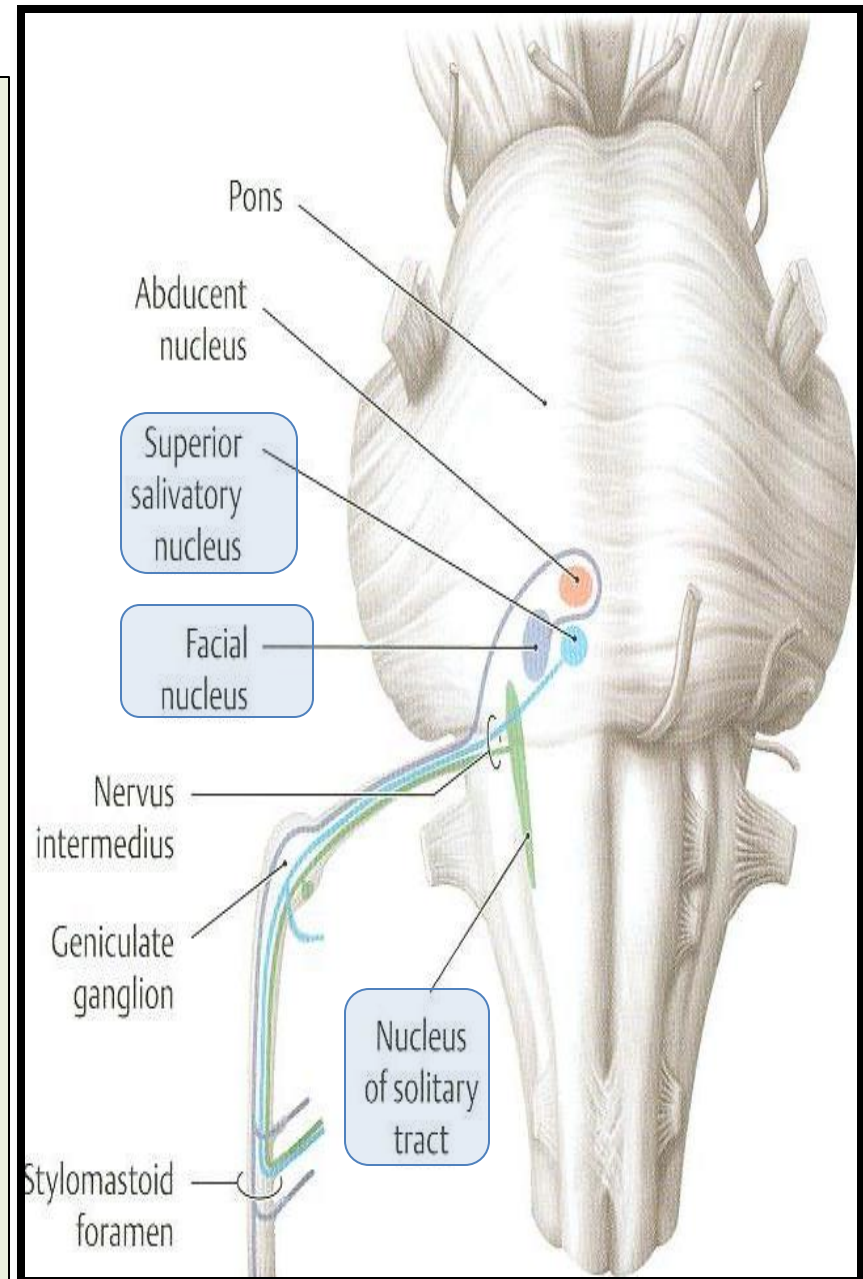
FACIAL NERVE



12 Component fibres of the facial nerve and their distribution.

FACIAL NERVE NUCLEI

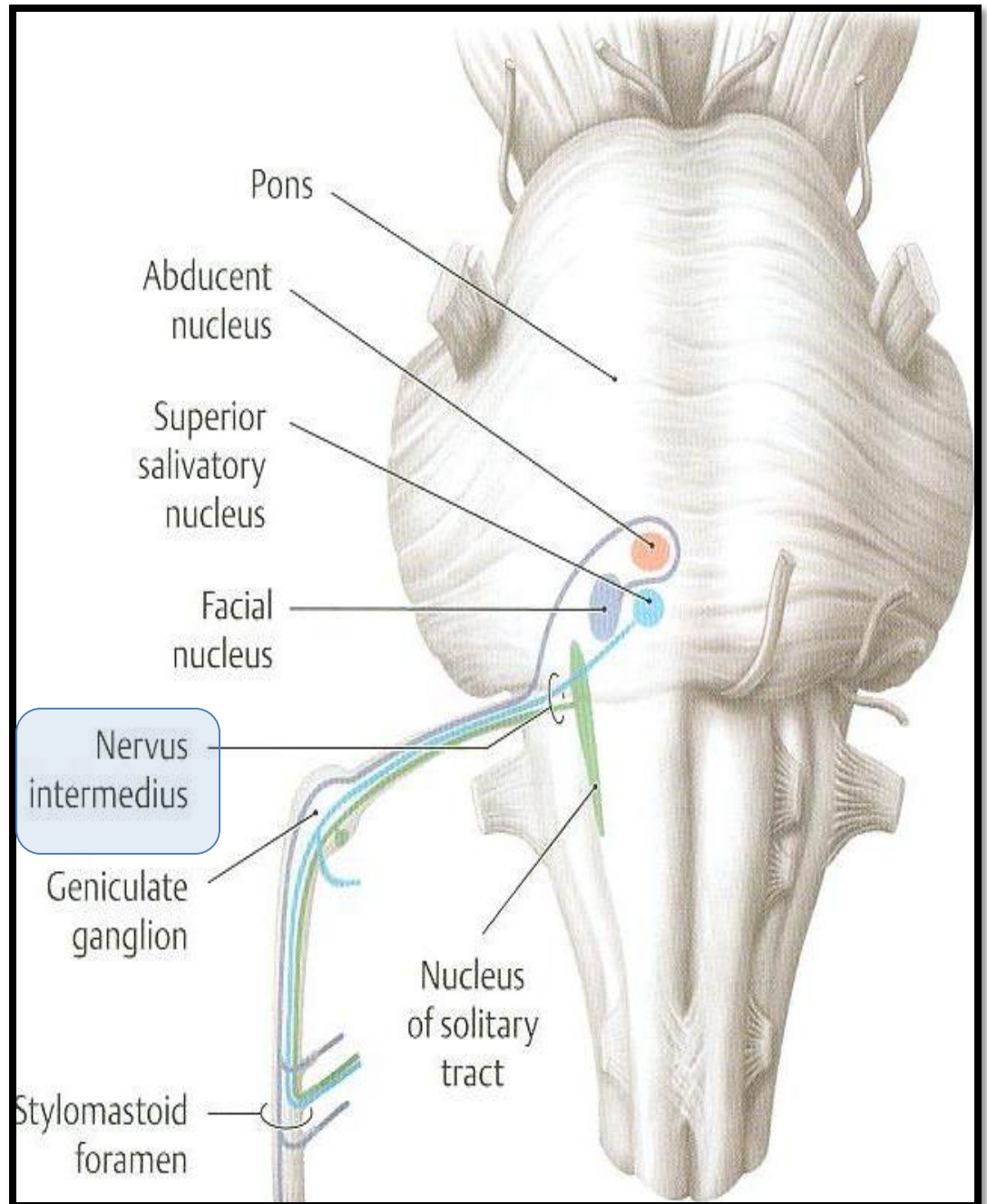
- 3 Nuclei :
- **Special Visceral Afferent: (nucleus solitarius):** receives taste from the anterior 2/3 of tongue.
- **Special Visceral Efferent: motor nucleus of facial nerve:** supplies:
 - Muscles of the face,
 - Muscles of scalp, (Occipitofrontalis).
 - Muscles of the auricle.
 - Posterior belly of digastric,
 - Platysma,
 - Stylohyoid,
 - Stapedius, and
- **General Visceral Efferent:**
 - Superior salivatory nucleus:** sends preganglionic **parasympathetic secretory fibers** to:
 - Sublingual, Submandibular,
 - Lacrimal, Nasal & Palatine glands.



COURSE OF FACIAL NERVE

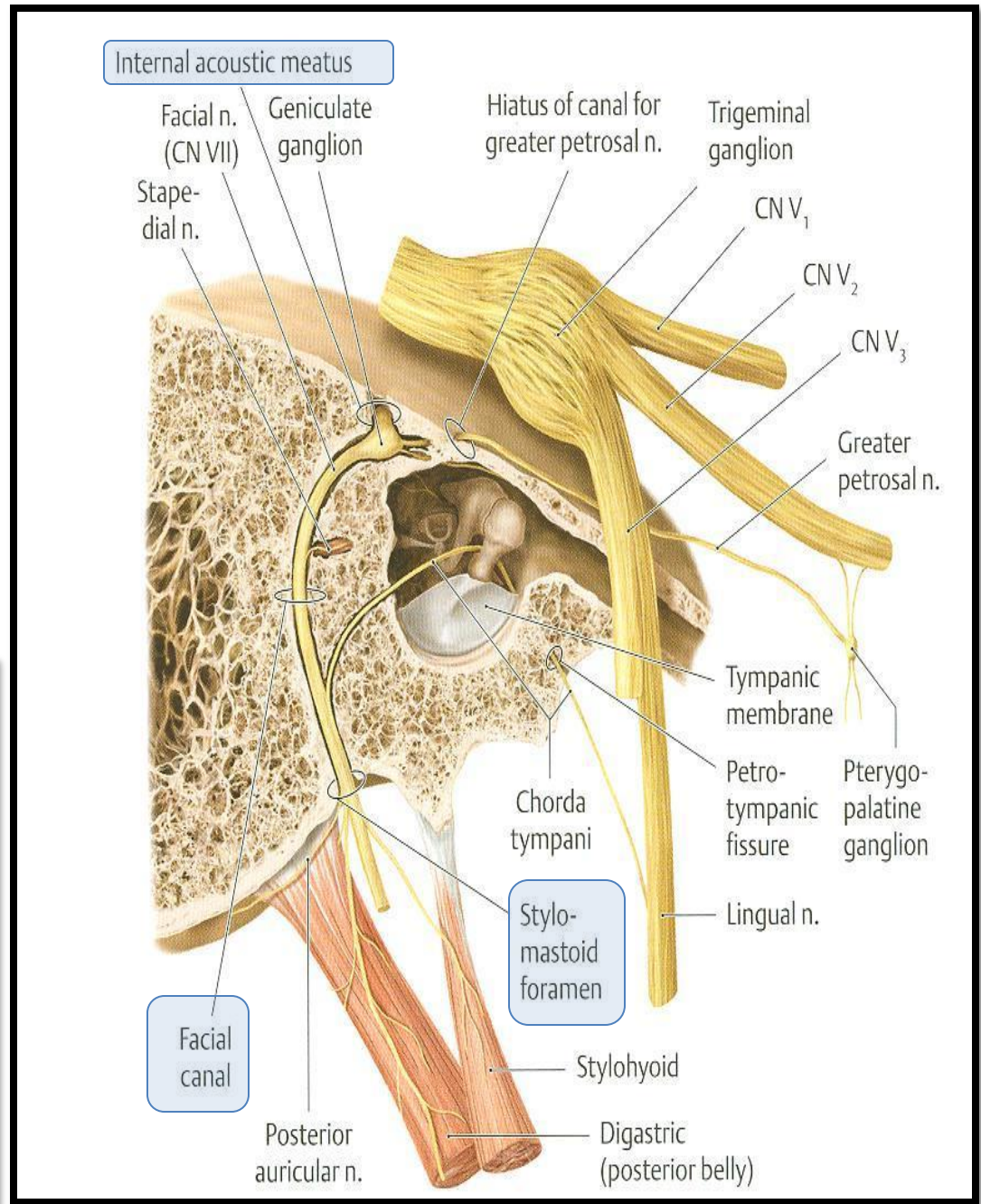
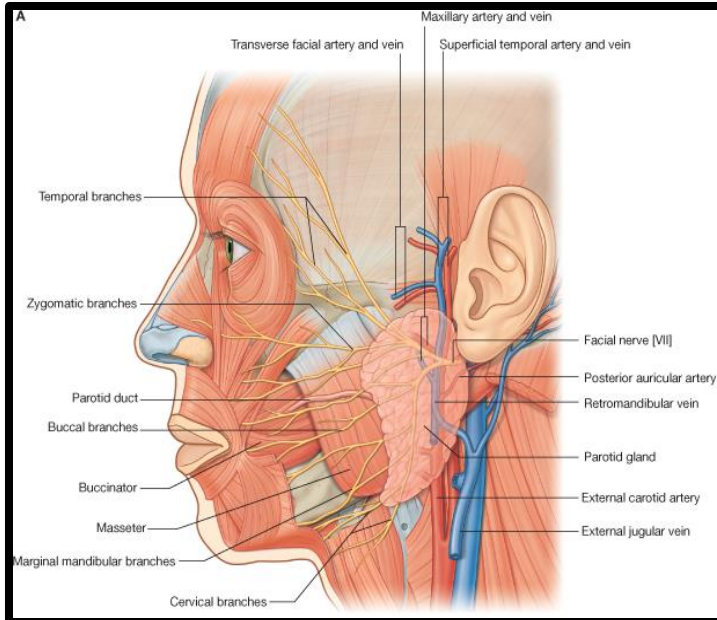
➤ Emerges from the cerebellopontine angle by 2 roots:

- 1. Medial Motor root:** contains motor fibers.
- 2. Lateral root (nervous intermedius):** contains Parasympathetic & Taste fibers.



COURSE OF FACIAL NERVE

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



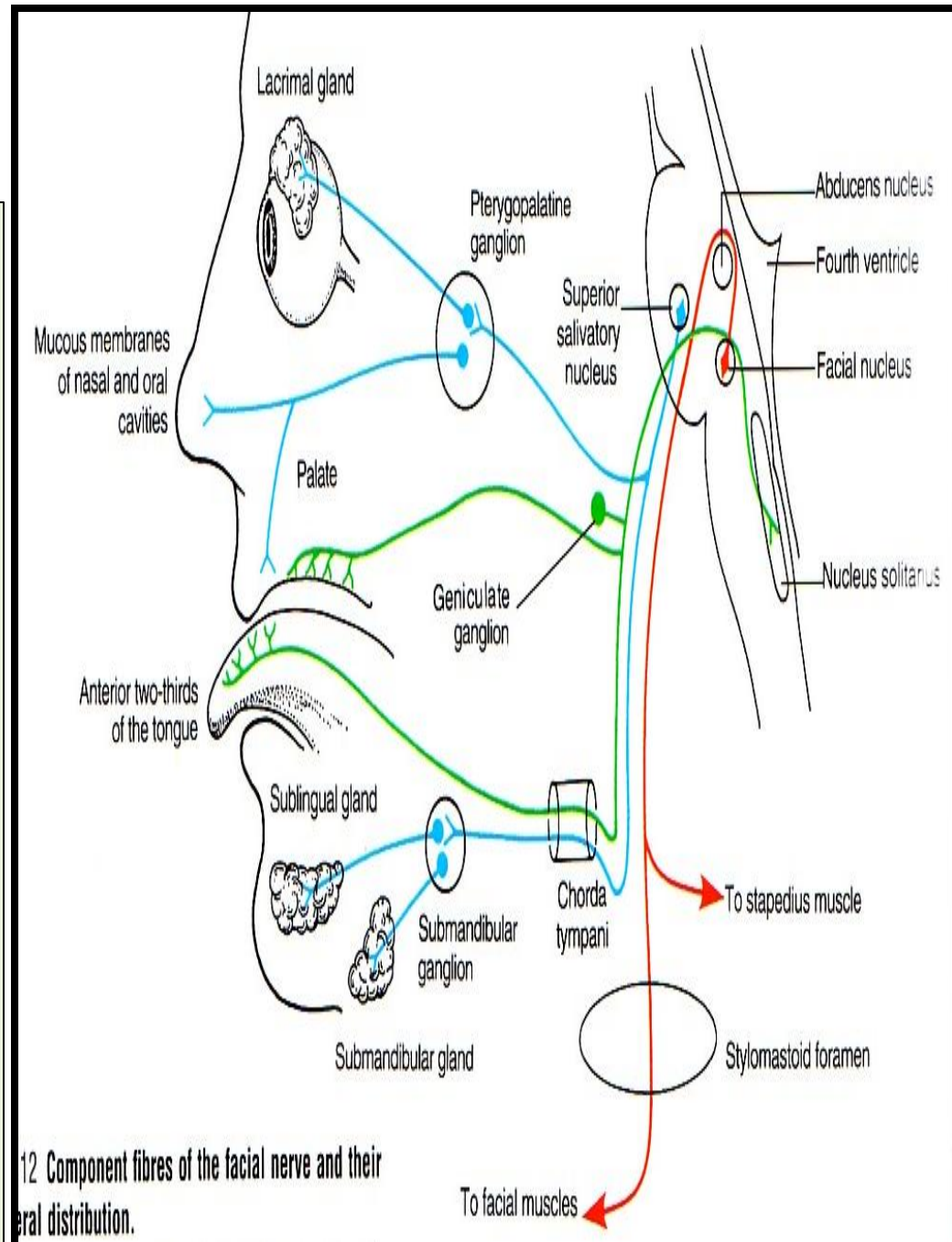
BRANCHES OF FACIAL NERVE

➤ In facial canal:

1. Greater petrosal nerve: carries preganglionic parasympathetic fibers to **pterygopalatine** ganglion then postganglionic fibers to lacrimal, nasal & palatine glands.
2. **Chorda tympani**: carries:
 - a) Preganglionic parasympathetic fibers to **submandibular ganglion** then postganglionic fibers to submandibular & sublingual glands.
 - b) Taste fibers from anterior 2/3 of tongue.

3. Nerve to stapedius.

N.B.: **Geniculate ganglion**: contains cell bodies of **neurons** carrying taste sensations from anterior 2/3 of tongue.



BRANCHES OF FACIAL NERVE

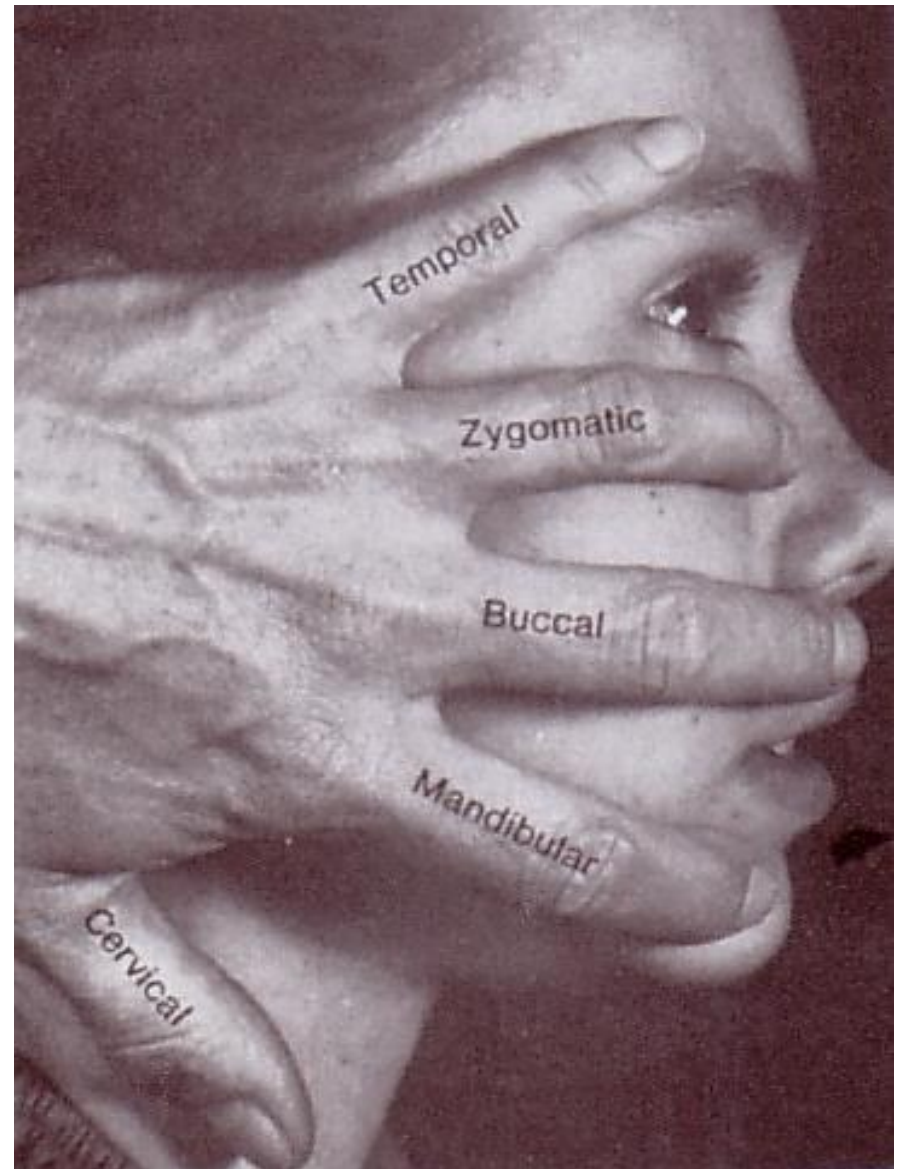
➤ Just as it emerges from the stylomastoid foramen it gives:

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

➤ **Inside parotid gland:**

Gives 5 terminal motor branches:

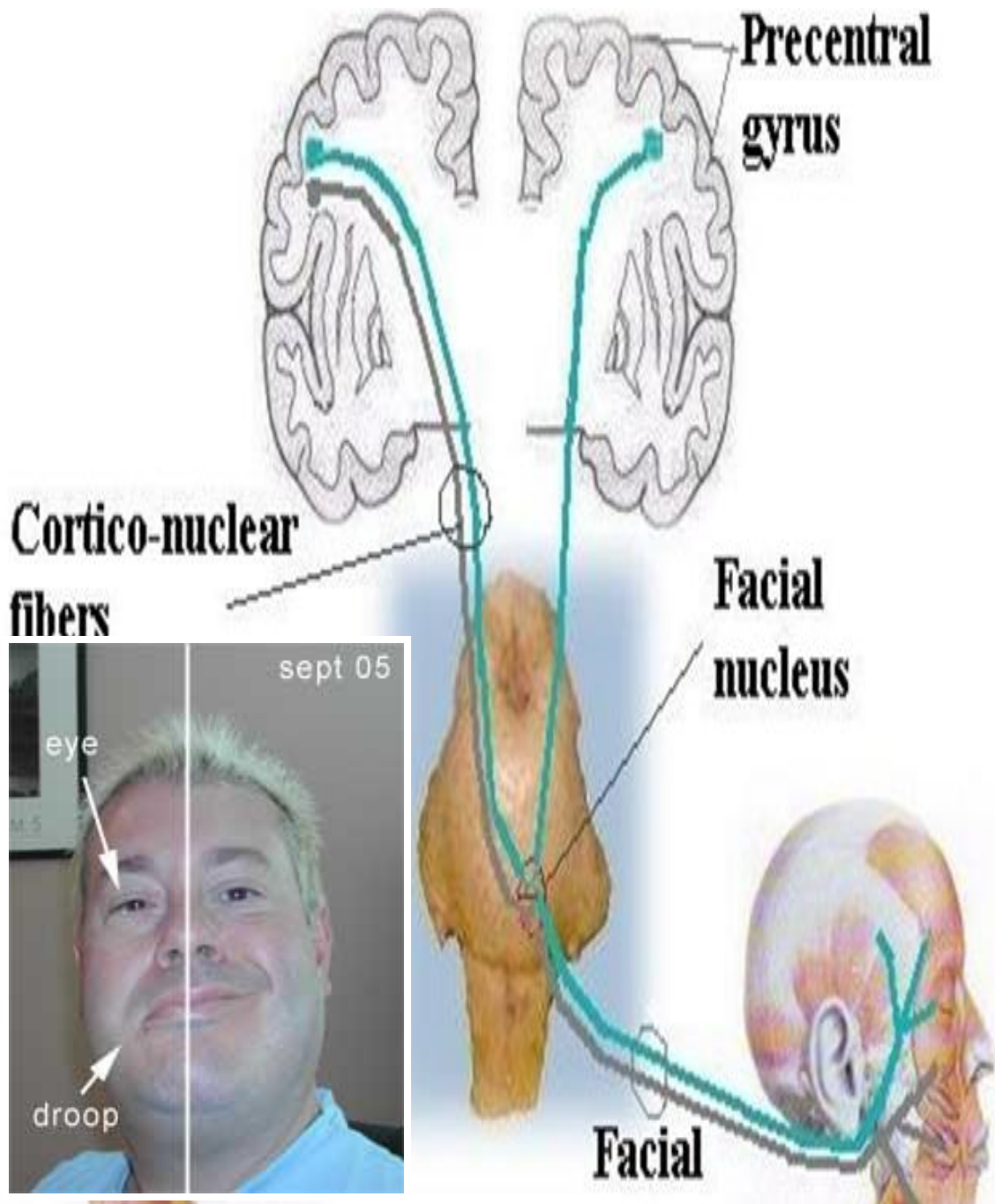
1. *Temporal,*
2. *Zygomatic,*
3. *Buccal,*
4. *Mandibular &*
5. *Cervical.... To the muscles of the face.*



Bell's Palsy

- Damage of the facial nerve results in **paralysis of muscles of facial expressions** : (Bell's) palsy; **lower motor neuron lesion** (*whole face affected*)
- **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 suckling,
 - Unable to show teeth or close the eye **on that side**.

NB. In upper motor neuron lesion (upper face is intact).



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).
- **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**, 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.

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.

THANK YOU & BEST LUCK