PERIPHERAL NERVOUS SYSTEM

TRIGEMINAL NERVE (V1 & V2)

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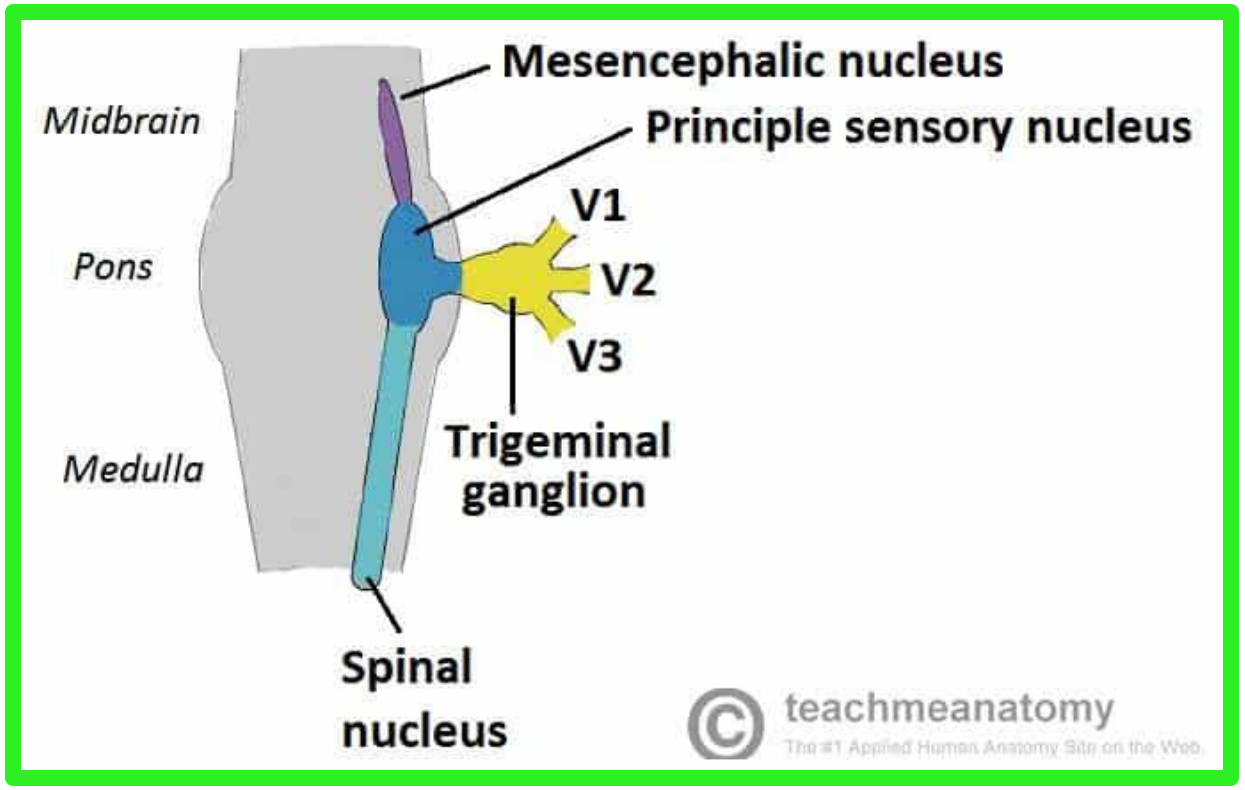
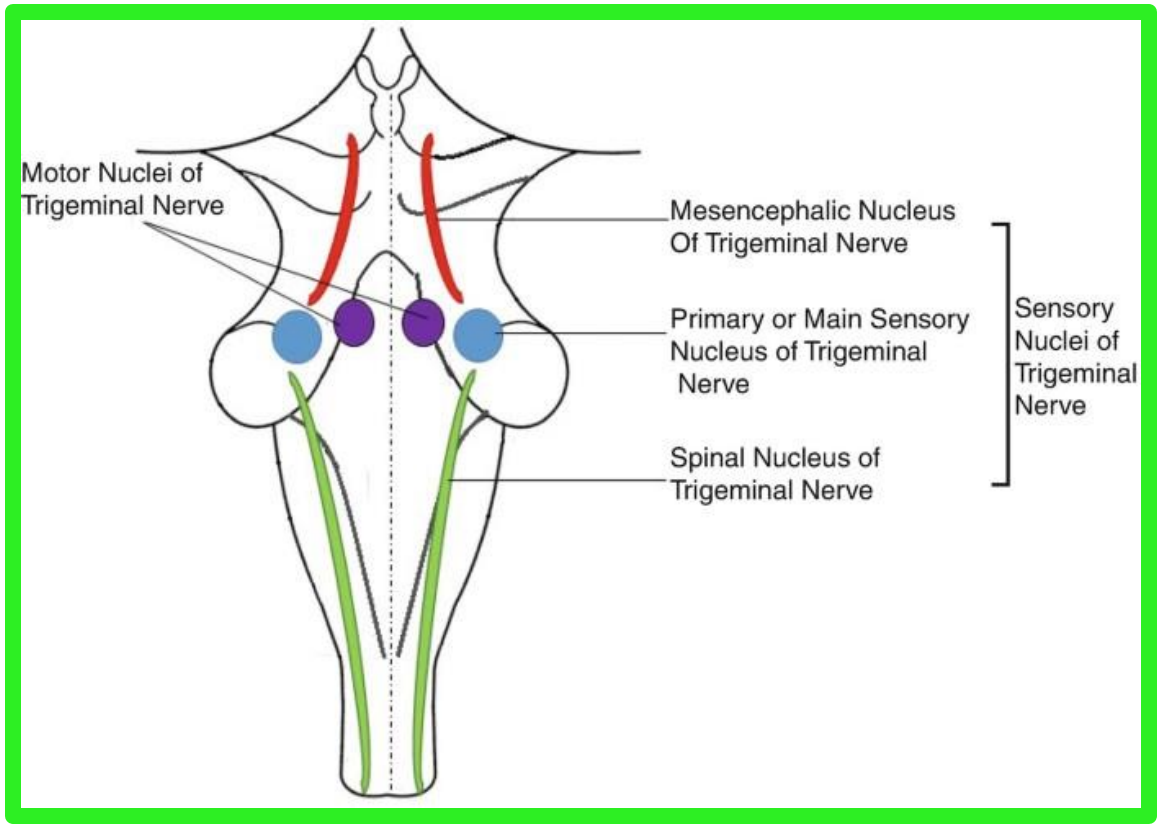
Sunday 25 February 2024

Trigeminal Nerve

Functions: Somatic (general) sensory and somatic (branchial) motor to derivatives of the 1st pharyngeal arch.

Nuclei: There are four trigeminal nuclei one motor (motor nucleus of trigeminal nerve) and three sensory (mesencephalic, principal sensory and spinal nuclei of trigeminal nerve).





Trigeminal Nerve

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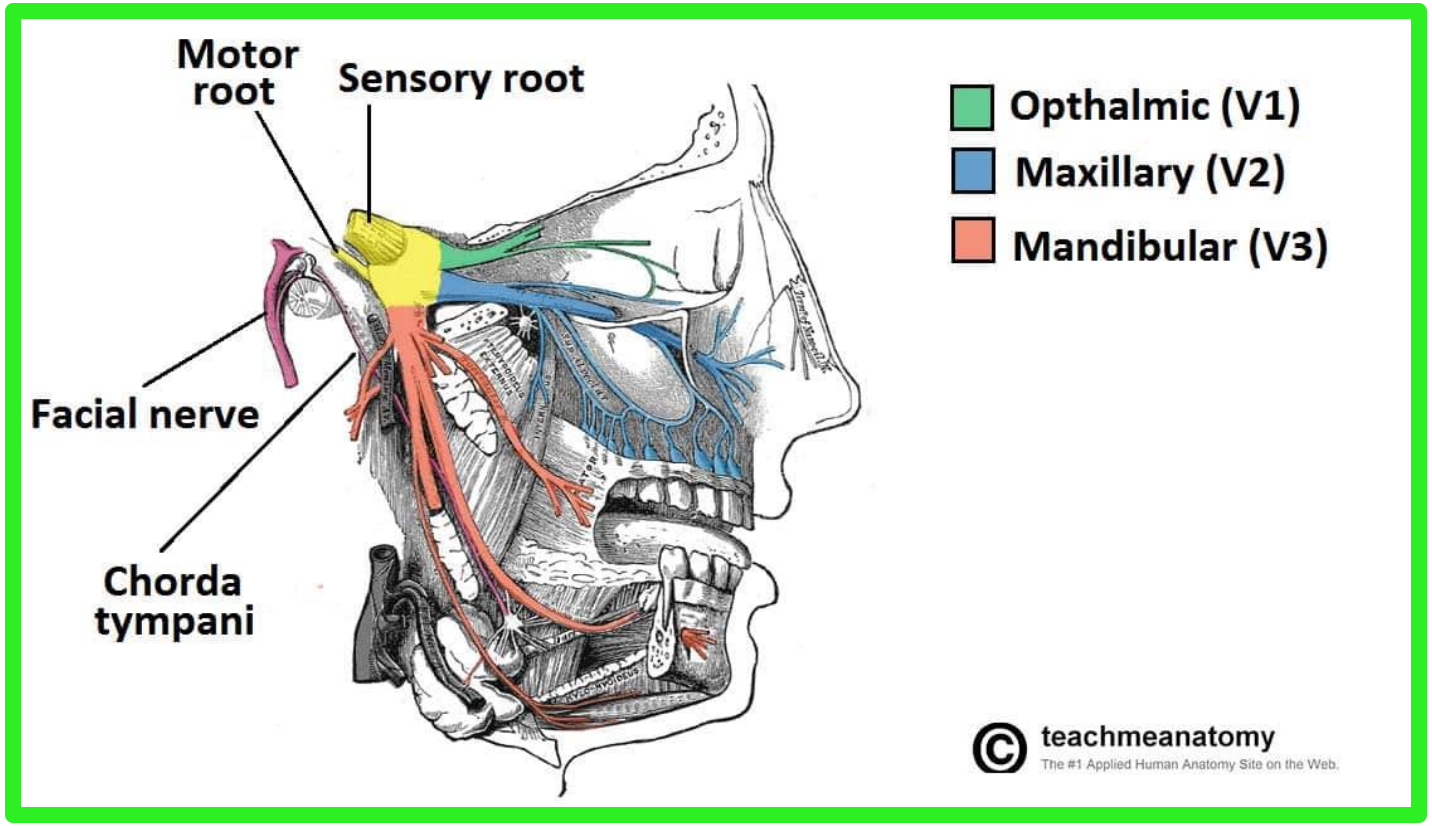
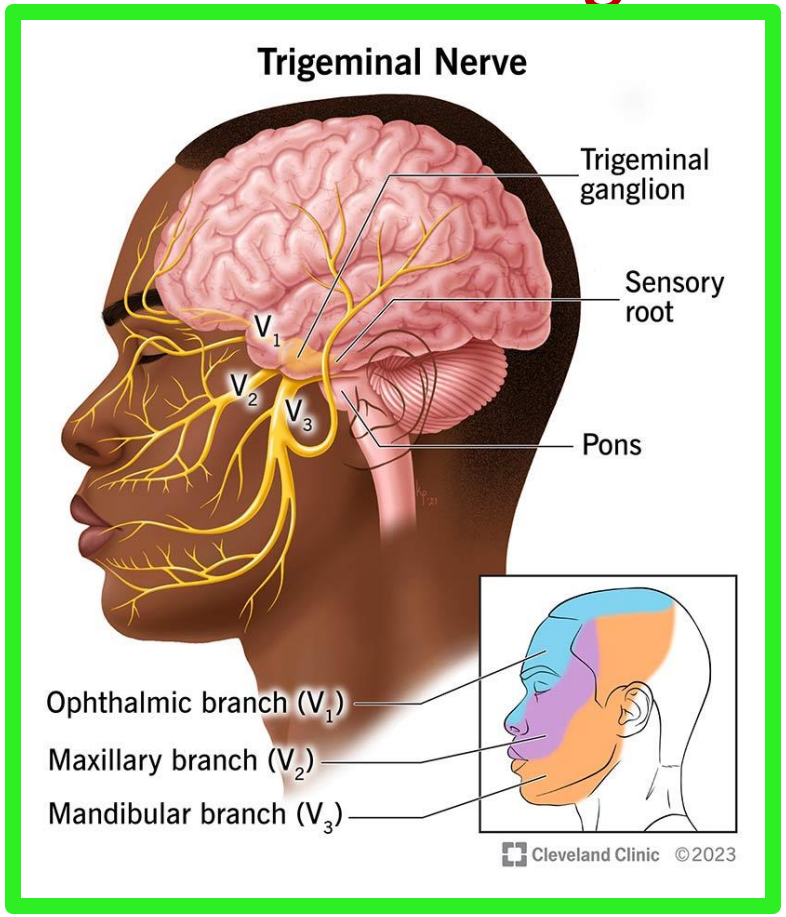
❖The trigeminal nerve is the largest cranial nerve.

❖It leaves the anterior aspect of the pons as a small motor root and a large sensory root.





❖ it passes forward, out of the posterior cranial fossa, to reach the apex of the petrous part of the temporal bone in the middle cranial fossa.

Trigeminal Nerve

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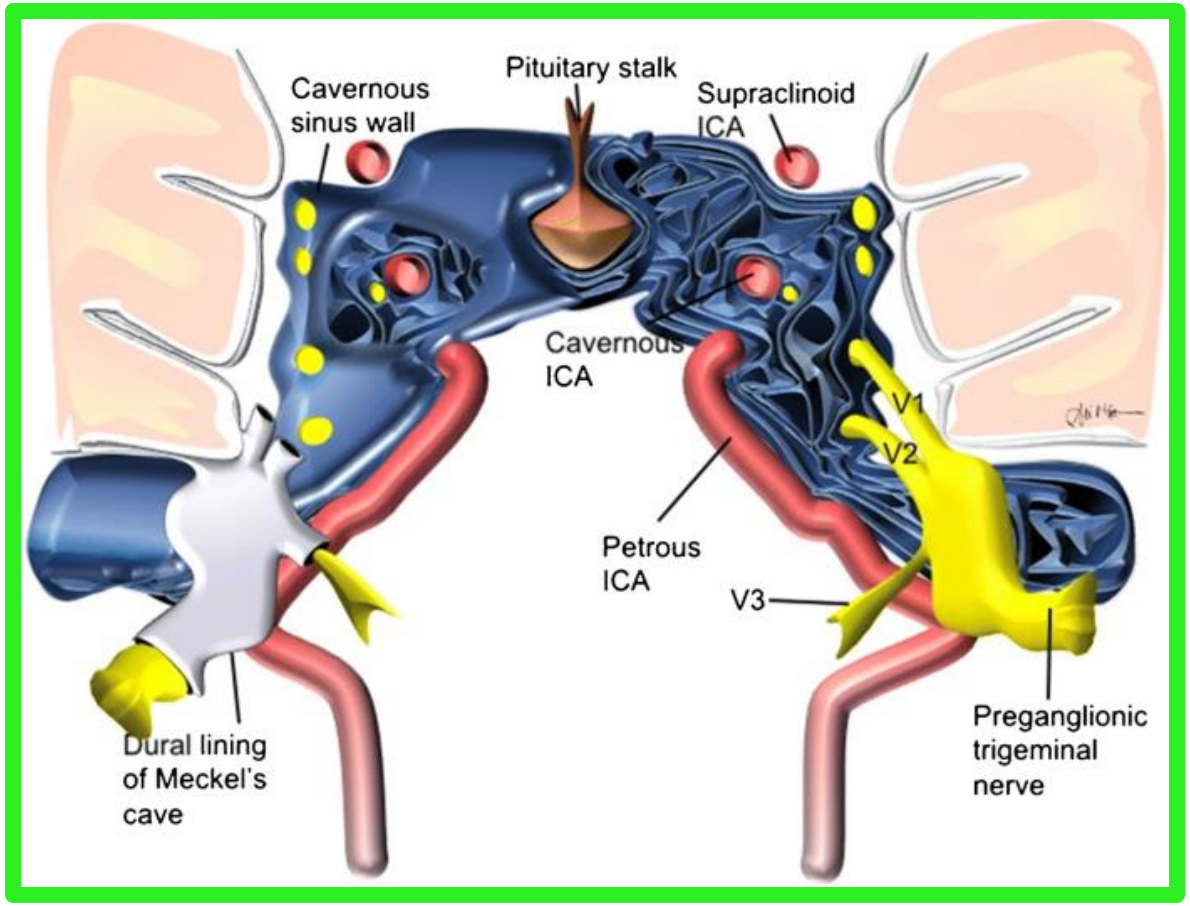
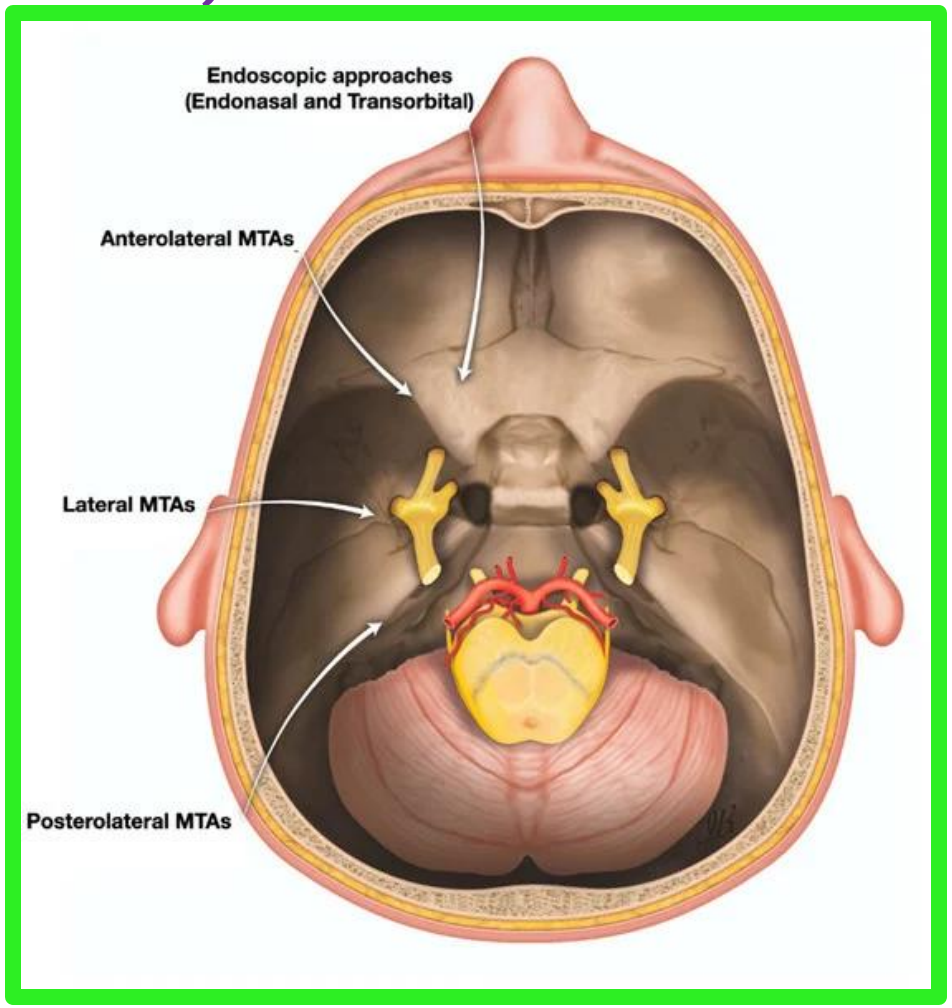
❖Here, the large sensory root expands to form the trigeminal ganglion

The trigeminal ganglion (flattened and crescent shaped) lies within a pouch of dura mater called the trigeminal cave. (Meckel cave) lateral to the cavernous sinus.

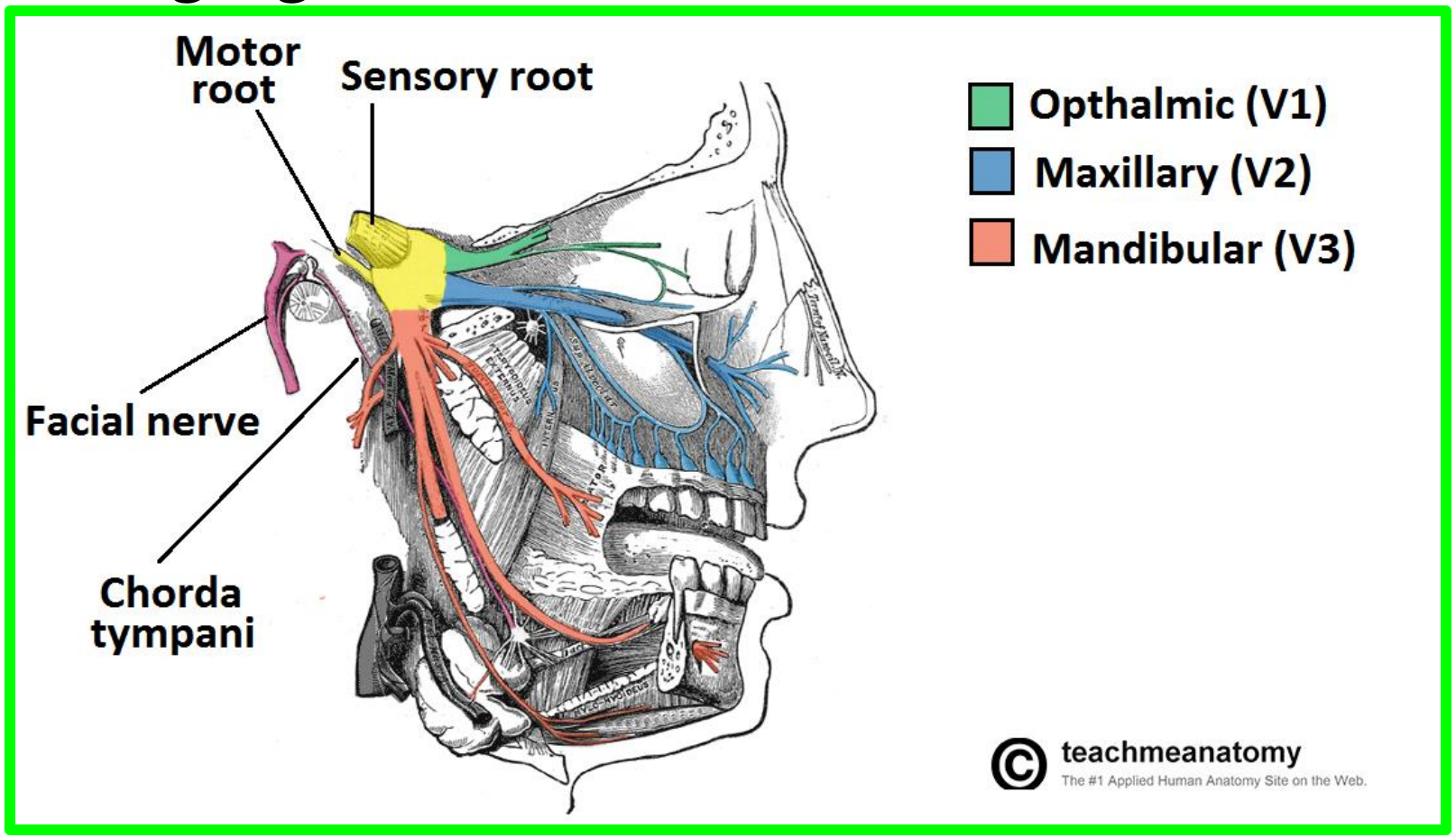




Trigeminal Nerve

❖The motor root of the trigeminal nerve is situated below the sensory ganglion and is completely separate from it.

❖ The ophthalmic (V1), maxillary (V2), and mandibular (V3) nerves arise from the anterior border of the ganglion.



Trigeminal Nerve

Ophthalmic Nerve (V1)

✓Is purely sensory.

✓ It runs forward in the lateral wall of the cavernous sinus in the middle cranial fossa

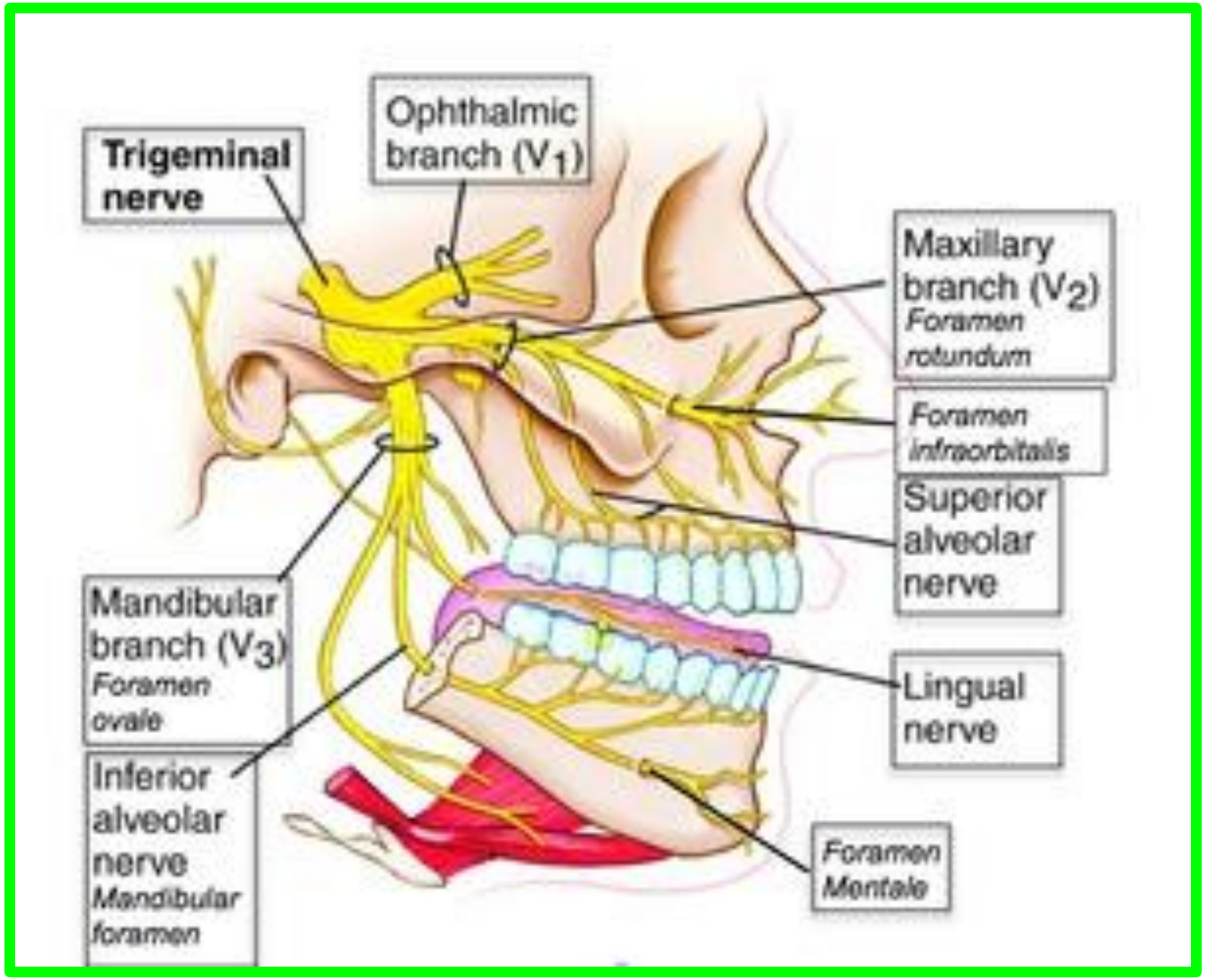
✓ Enter the orbital cavity through the superior orbital fissure

✓ divided into three branches:

❖The Lacrimal nerve

❖ Frontal nerve

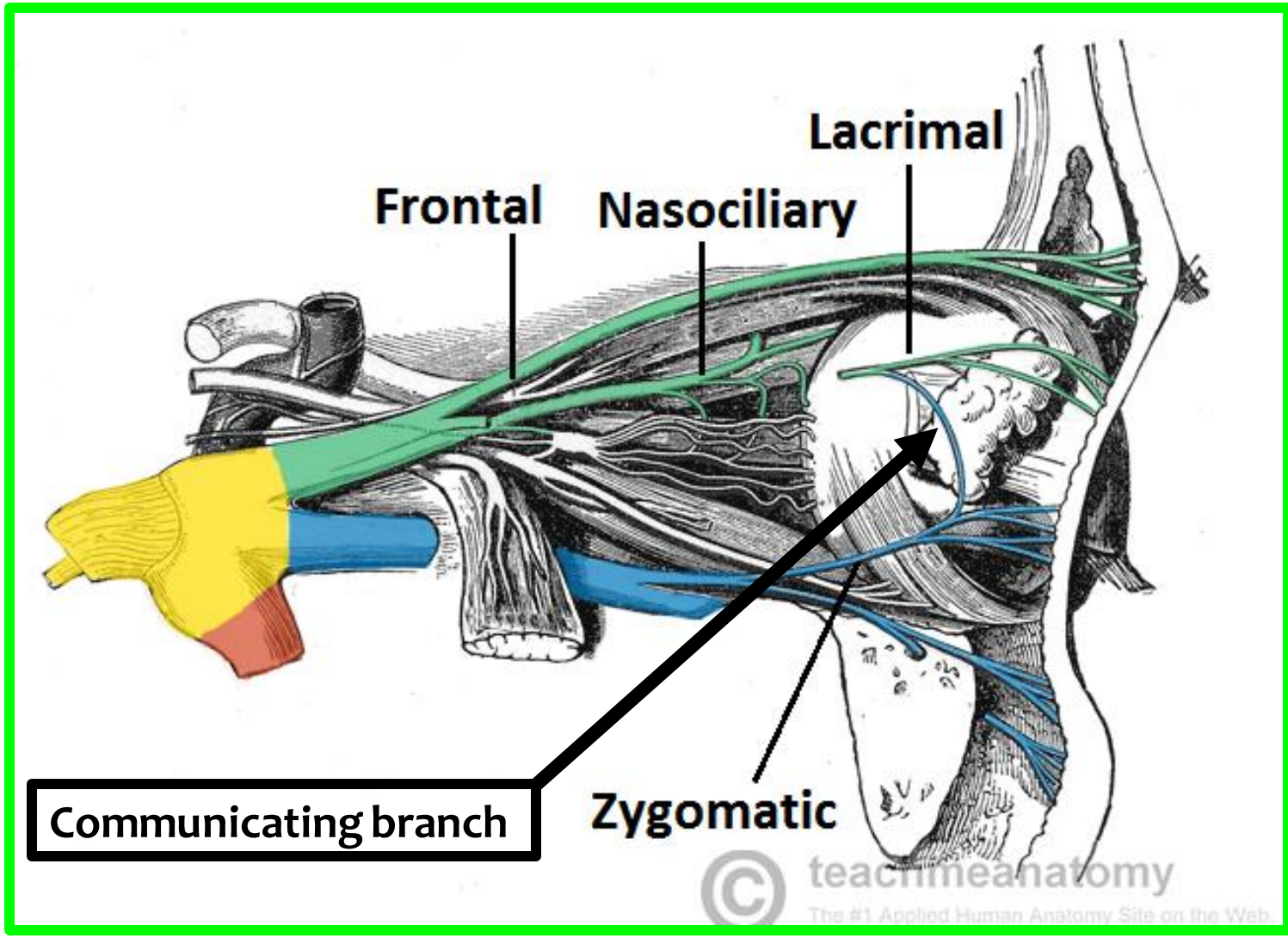
❖ Nasociliary nerve.



Ophthalmic Nerve (V1)

1...The Lacrimal nerve

✓It is joined by the zygomaticotemporal branch of the maxillary nerve, which contains the parasympathetic secretomotor fibers to the lacrimal gland



✓The lacrimal nerve then enters the lacrimal gland and gives branches to the conjunctiva and the skin of the upper eyelid.

Ophthalmic Nerve (V1)

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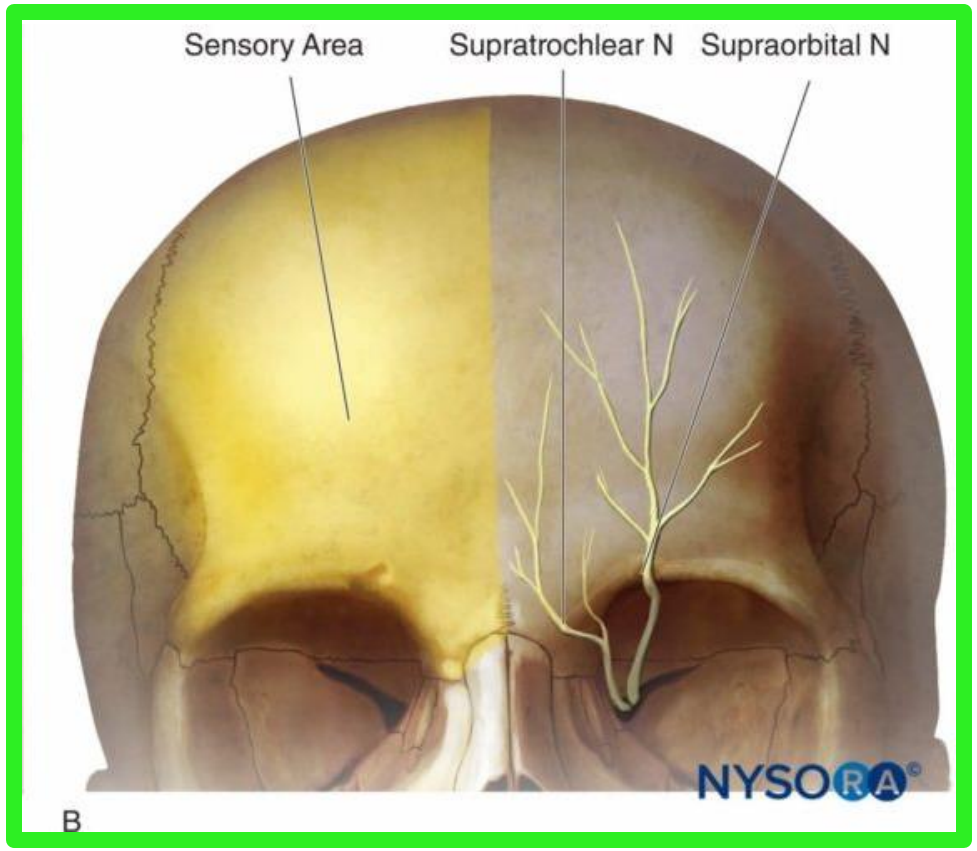
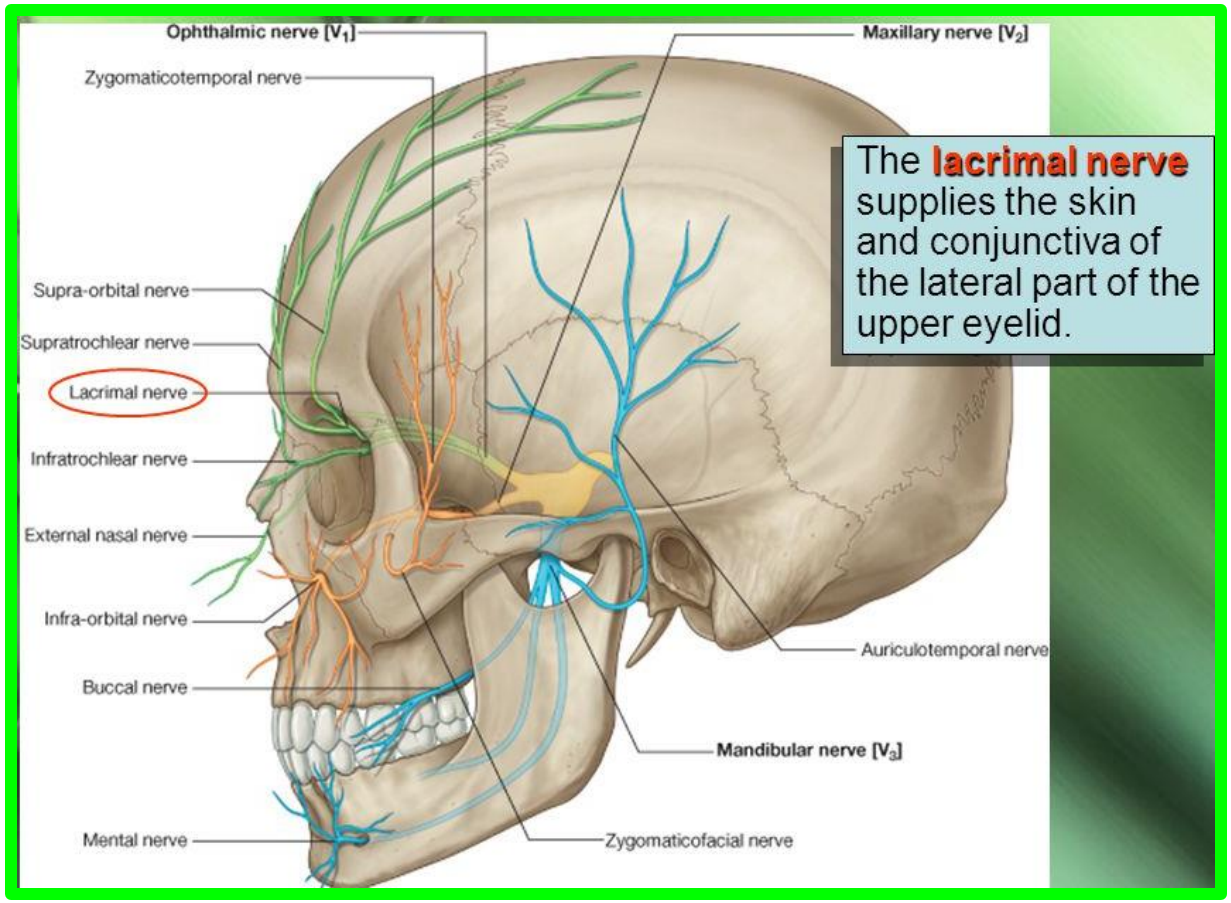
2...The frontal nerve

✓Runs forward on the upper surface of the levator palpebrae superioris muscle and divides into the supraorbital and supratrochlear nerves

✓These nerves leave the orbital cavity and supply the frontal air sinus and the skin of the forehead and the scalp.

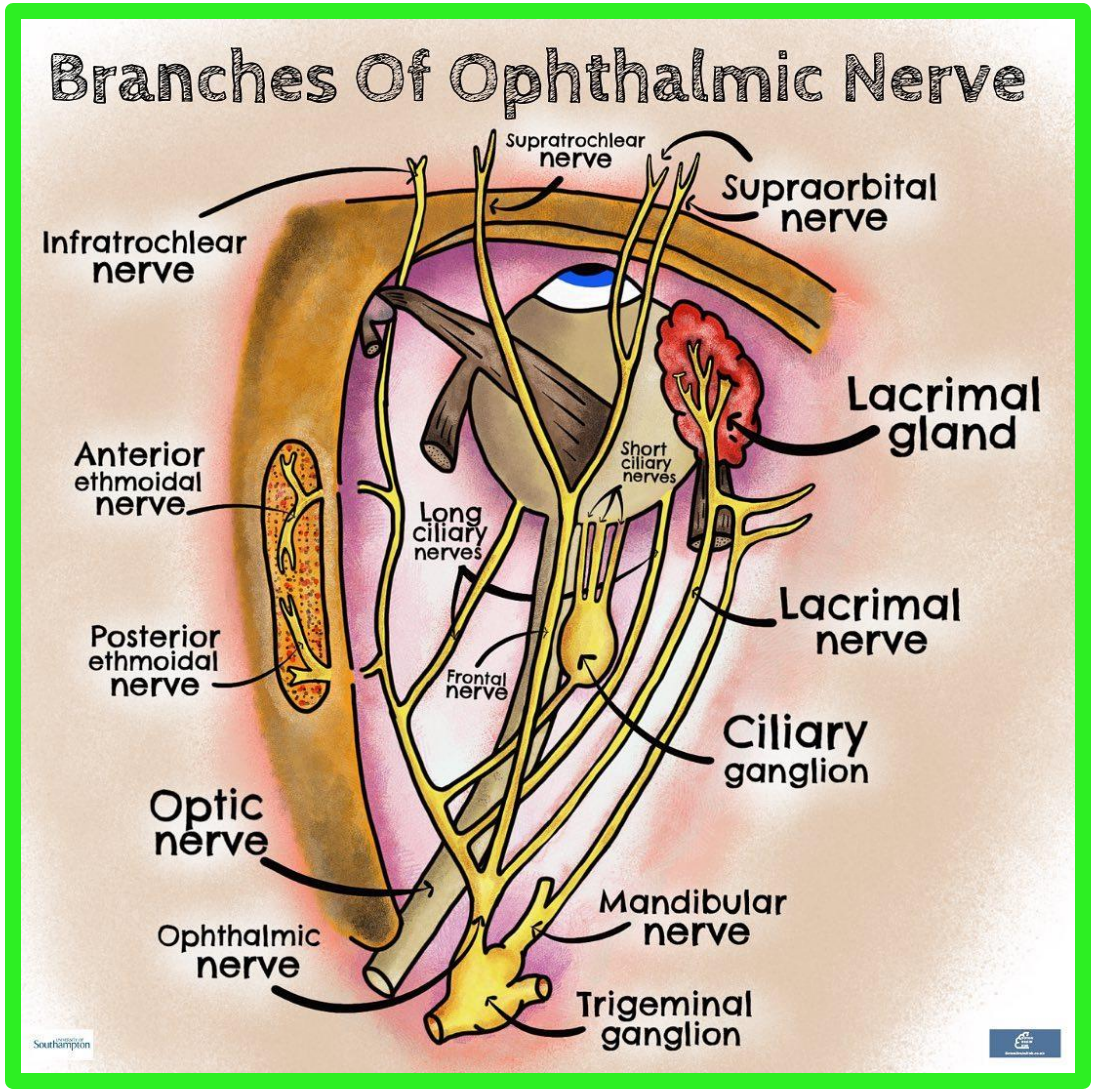




Ophthalmic Nerve (V1)

3...The nasociliary nerve

- ✓Crosses the optic nerve
- ✓Runs forward on the upper border of the medial rectus m.
- ✓Continues as the anterior ethmoid nerve
- ✓It then descends at the side of the crista galli to enter the nasal cavity.

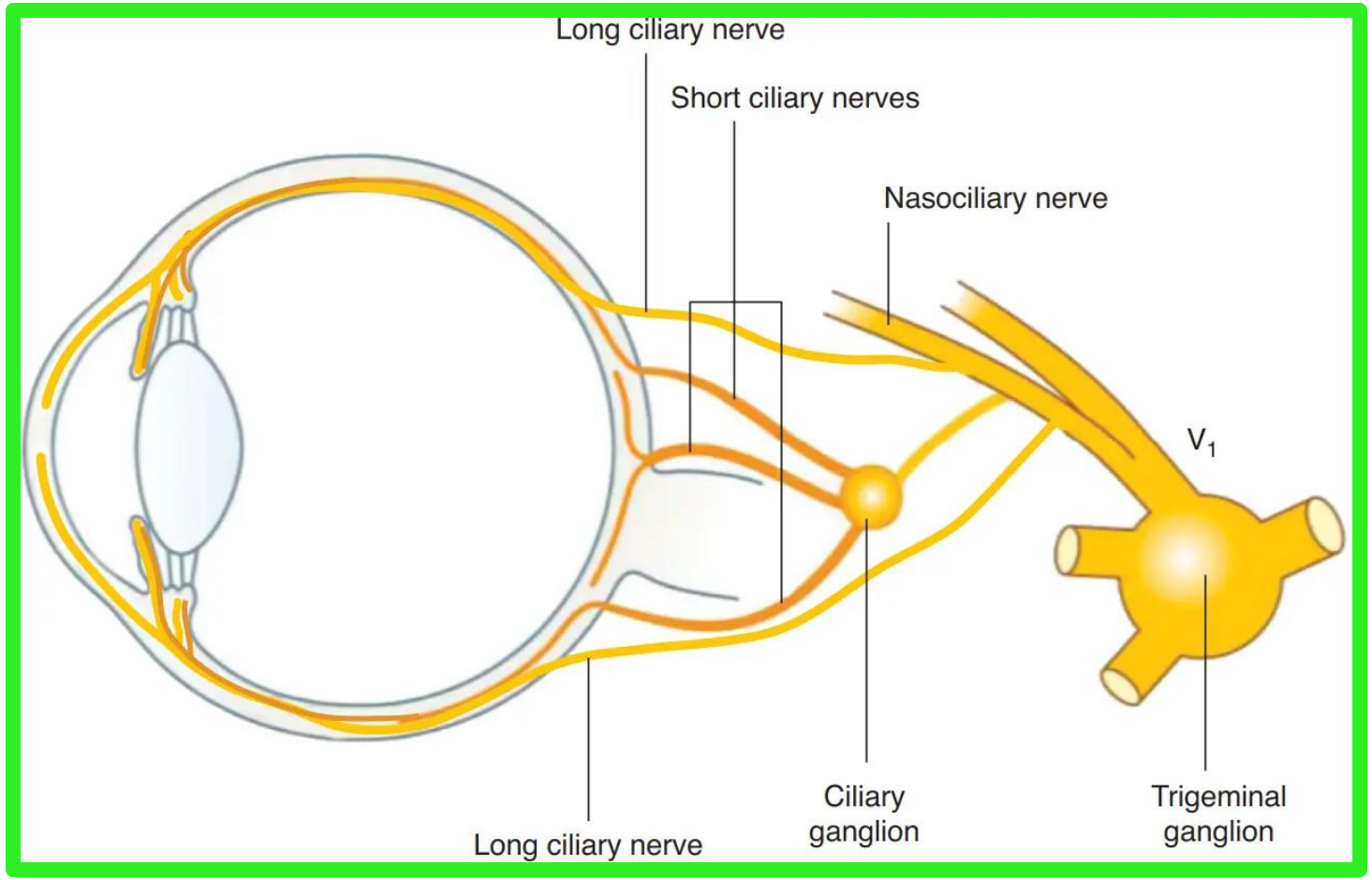


- ✓It gives off two internal nasal branches and it then supplies the skin of the tip of the nose with the external nasal nerve.

Ophthalmic Nerve (V1)

3...The nasociliary nerve: Its branches include the following:

- ■ Sensory fibers to the ciliary ganglion
- ■Long ciliary nerves that contain sympathetic fibers to the dilator pupillae muscle and sensory fibers to the cornea.



Ophthalmic Nerve (V1)

3...The nasociliary nerve:

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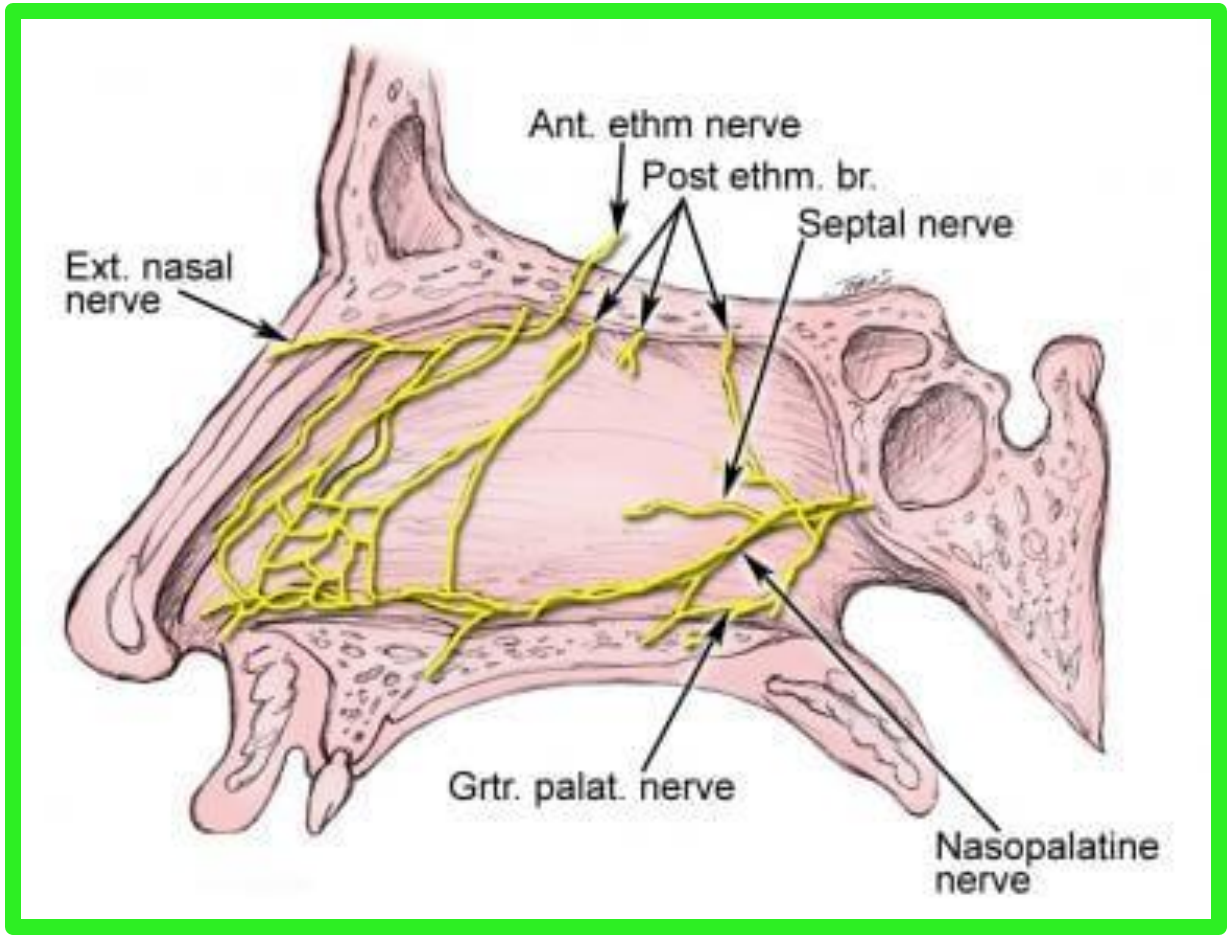
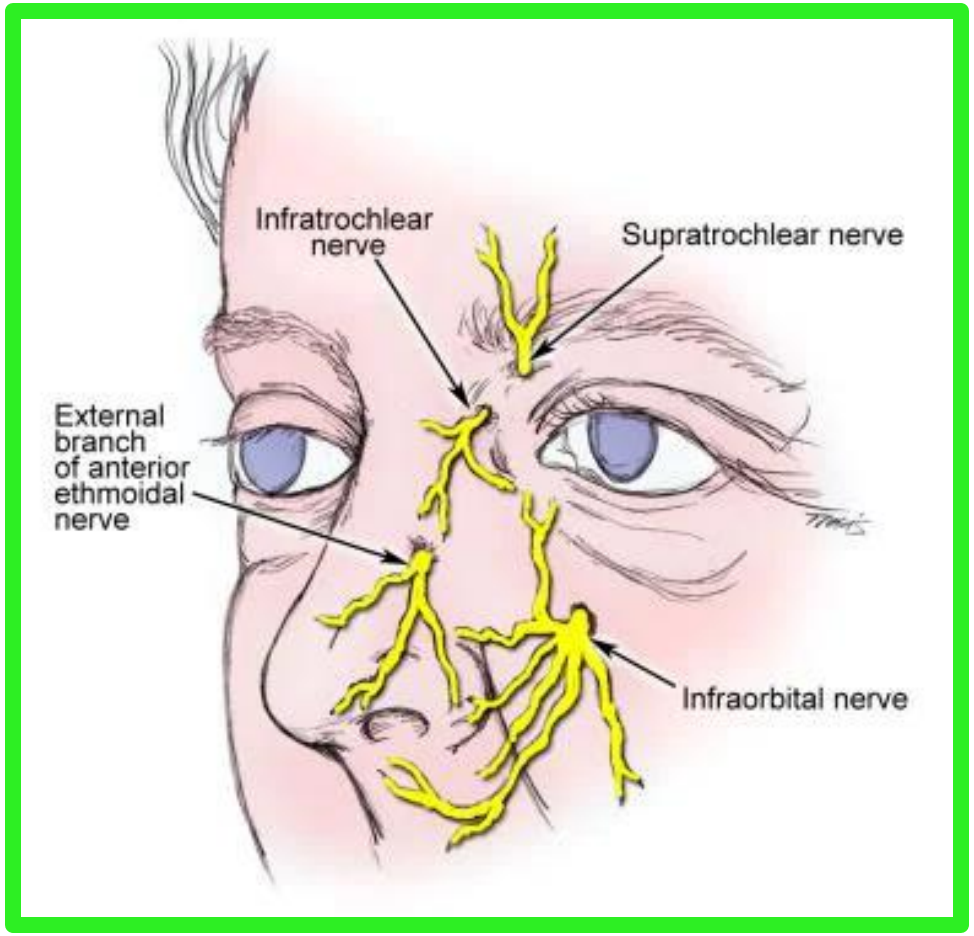
- ■**Infratrochlear nerve** that supplies the skin of the eyelids
- ■ **External nasal nerve** supply the skin of the dorsum till the tip of the nose
- ■**Anterior and posterior ethmoidal nerve** that is sensory to the ethmoid and sphenoid sinuses





Ophthalmic Nerve (V1)

The integrity of this division is tested by checking the corneal reflex—touching the cornea, which is also supplied by CN V1, with a wisp of cotton will evoke a reflexive blink if the nerve is functional.

Maxillary Nerve (V2)

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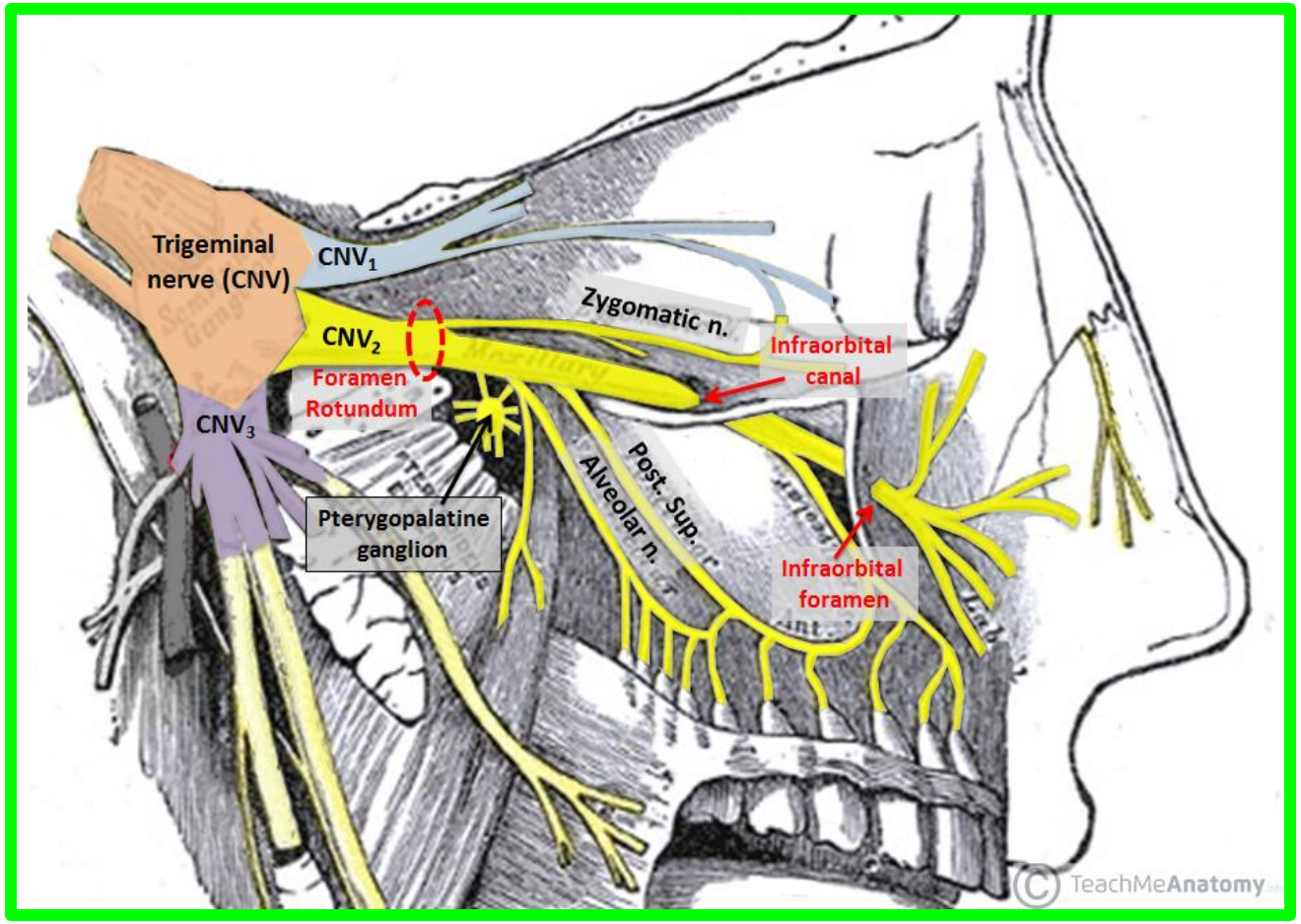
✓The maxillary nerve arises from the trigeminal ganglion in the middle cranial fossa.

✓Purely sensory nerve.

✓It passes forward in the lateral wall of the cavernous sinus and leaves the skull through the foramen rotundum

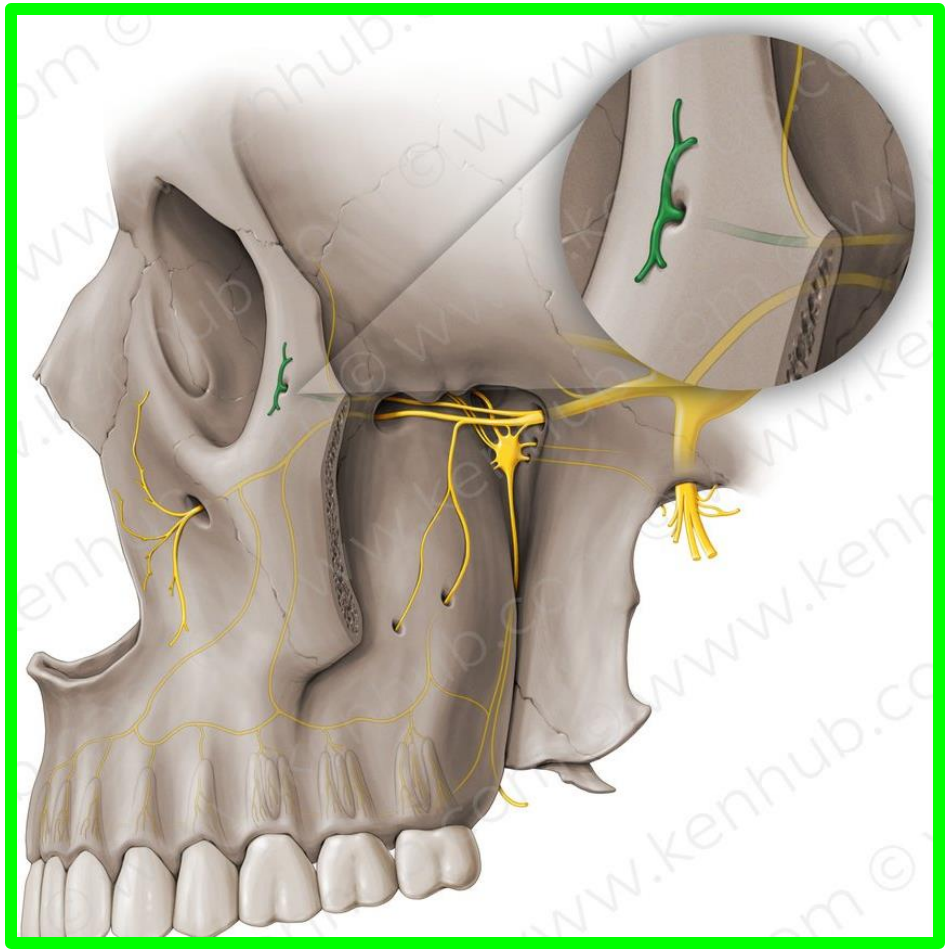


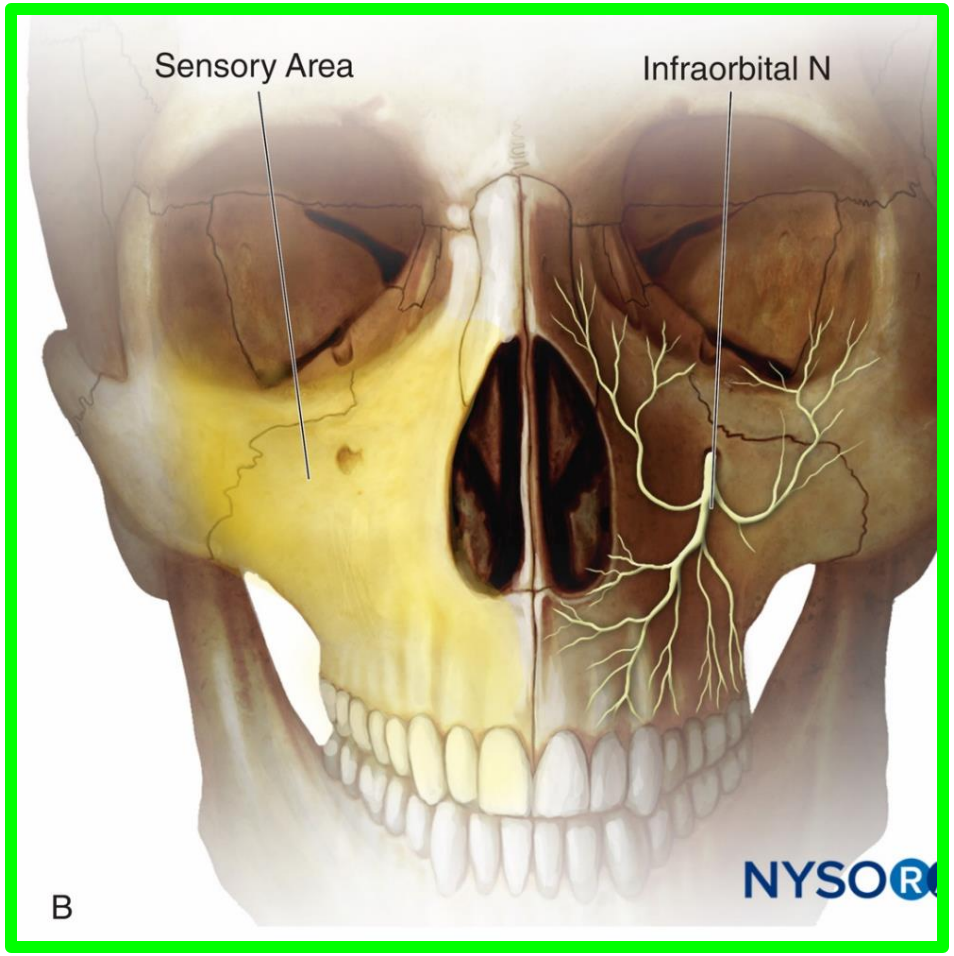
✓It crosses the pterygopalatine fossa to enter the orbit through the inferior orbital fissure.

Maxillary Nerve (V2)

✓It then continues as the infraorbital nerve in the infraorbital groove, and it emerges on the face through the infraorbital foramen.

✓It gives sensory fibers to the skin of the face and the side of the nose.





Maxillary Nerve (V2)

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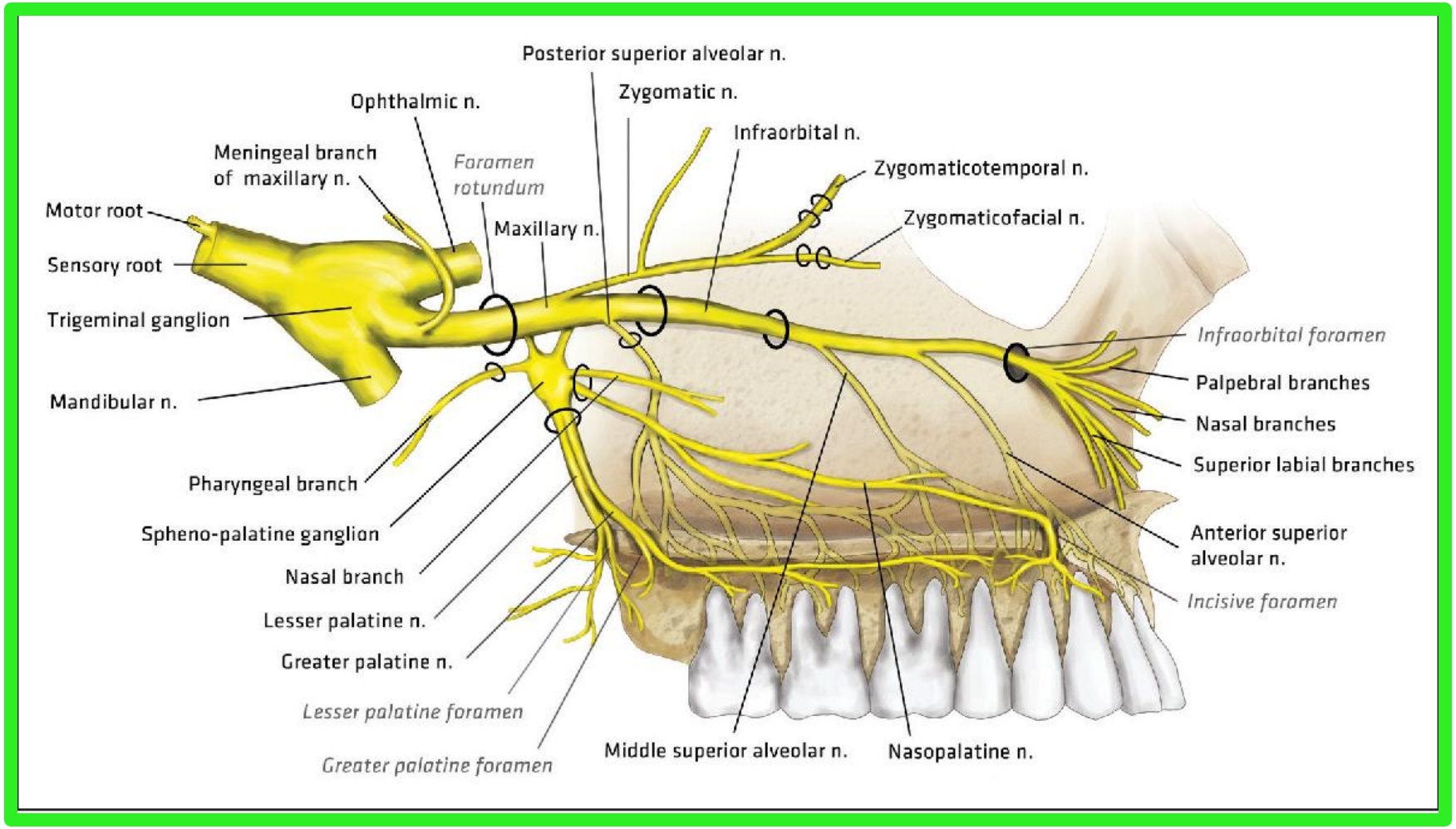
Branches

■■ Meningeal branches: Supplies dura mater of anterior part of middle cranial fossa;

The meningeal branch accompanies the course of middle meningeal vessels and enter the cranium through the foramina spinosum.



Maxillary Nerve (V2)

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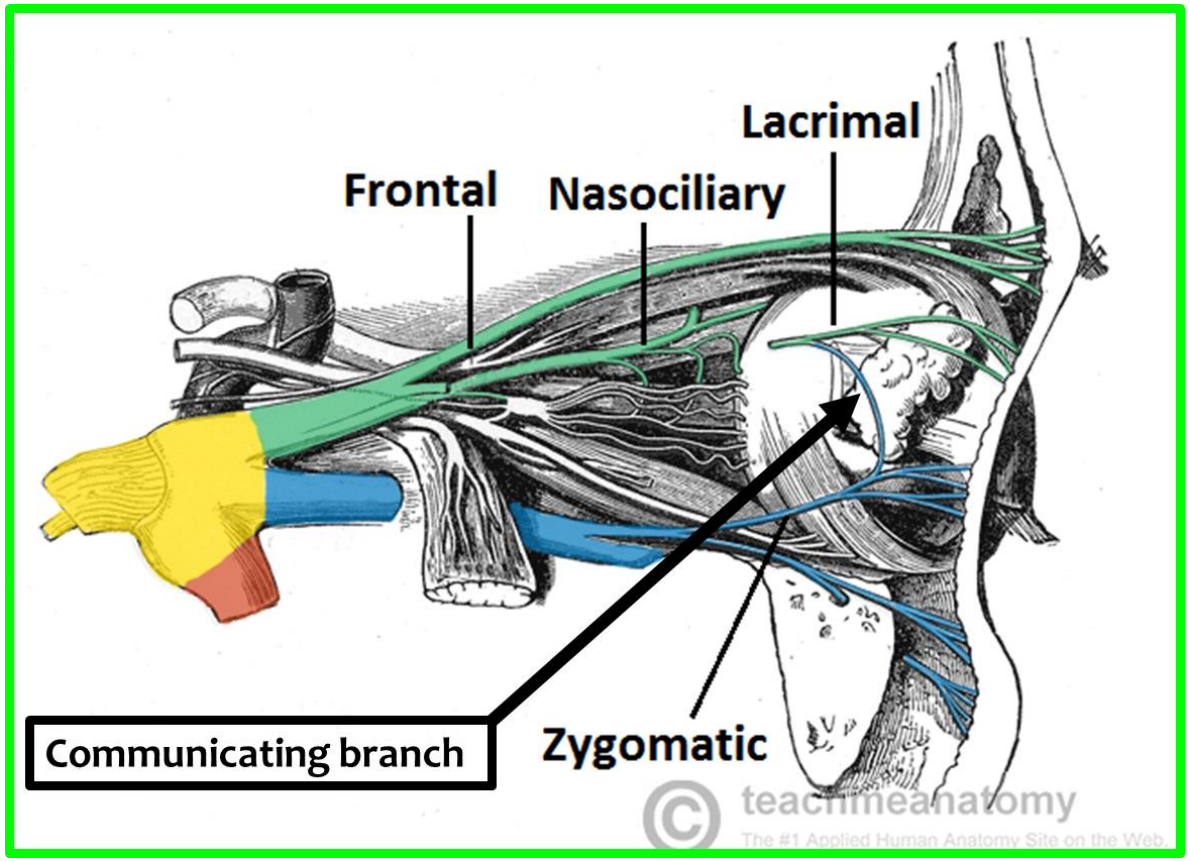
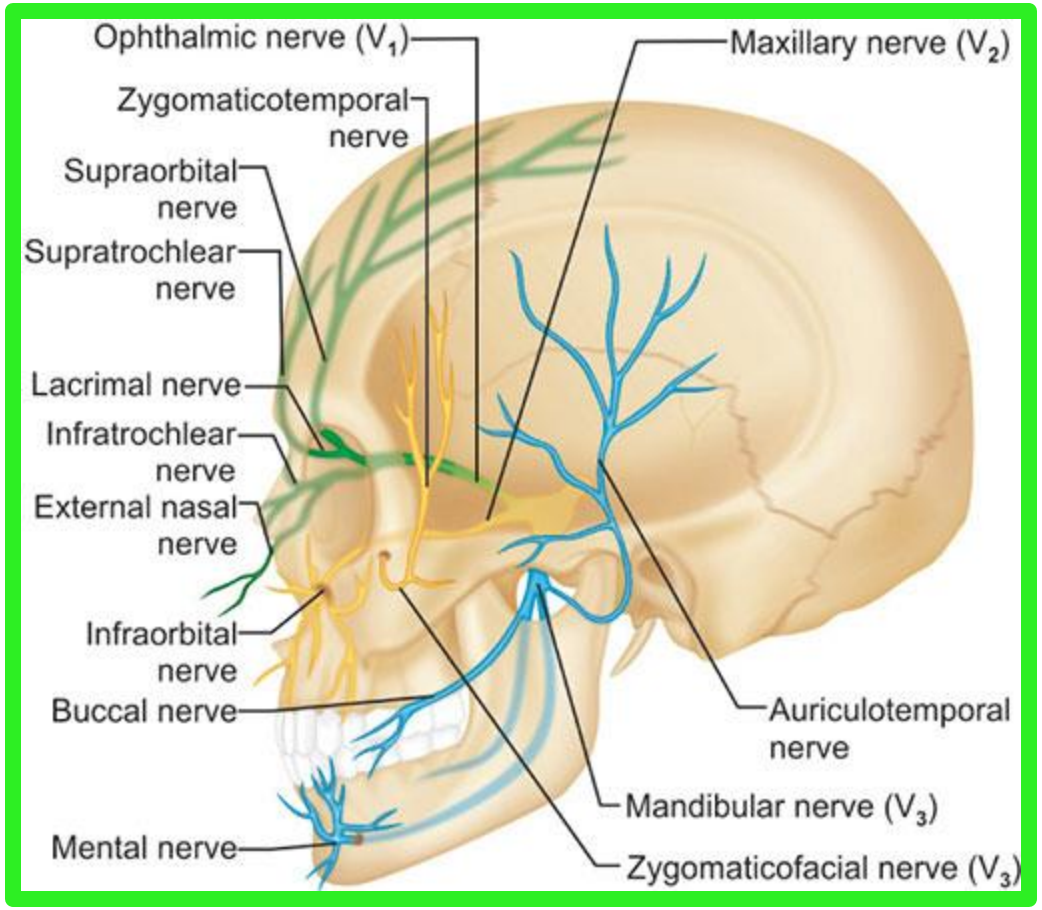
■■ Zygomatic branch which divides into the zygomaticotemporal and the zygomaticofacial nerves that supply the skin of the face

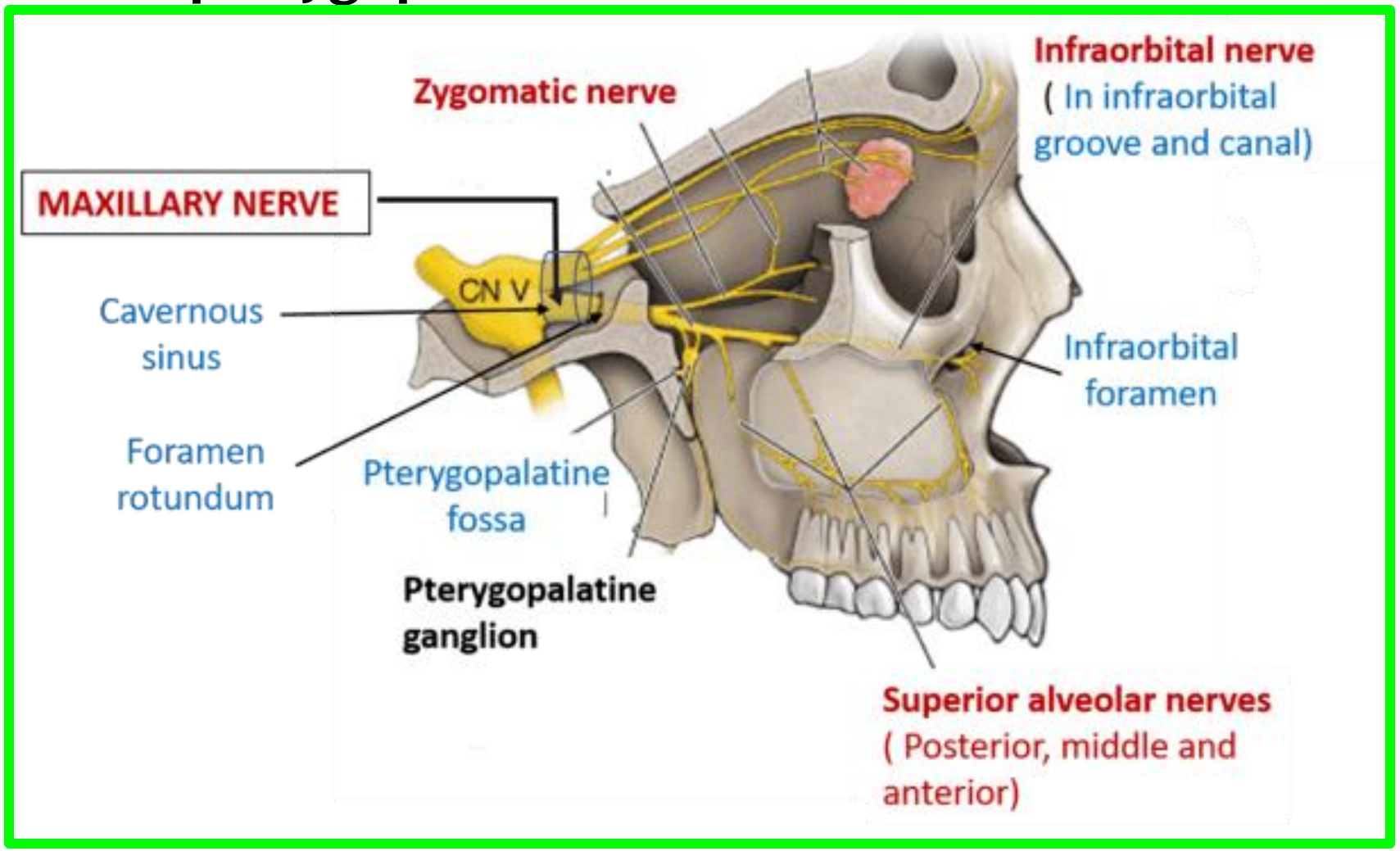
❖ The zygomaticotemporal branch gives parasympathetic secretomotor fibers to the lacrimal gland via the lacrimal nerve.





Maxillary Nerve (V2)

■■ Ganglionic branches, which are two short nerves that suspend the pterygopalatine ganglion in the pterygopalatine fossa.



Maxillary Nerve (V2)

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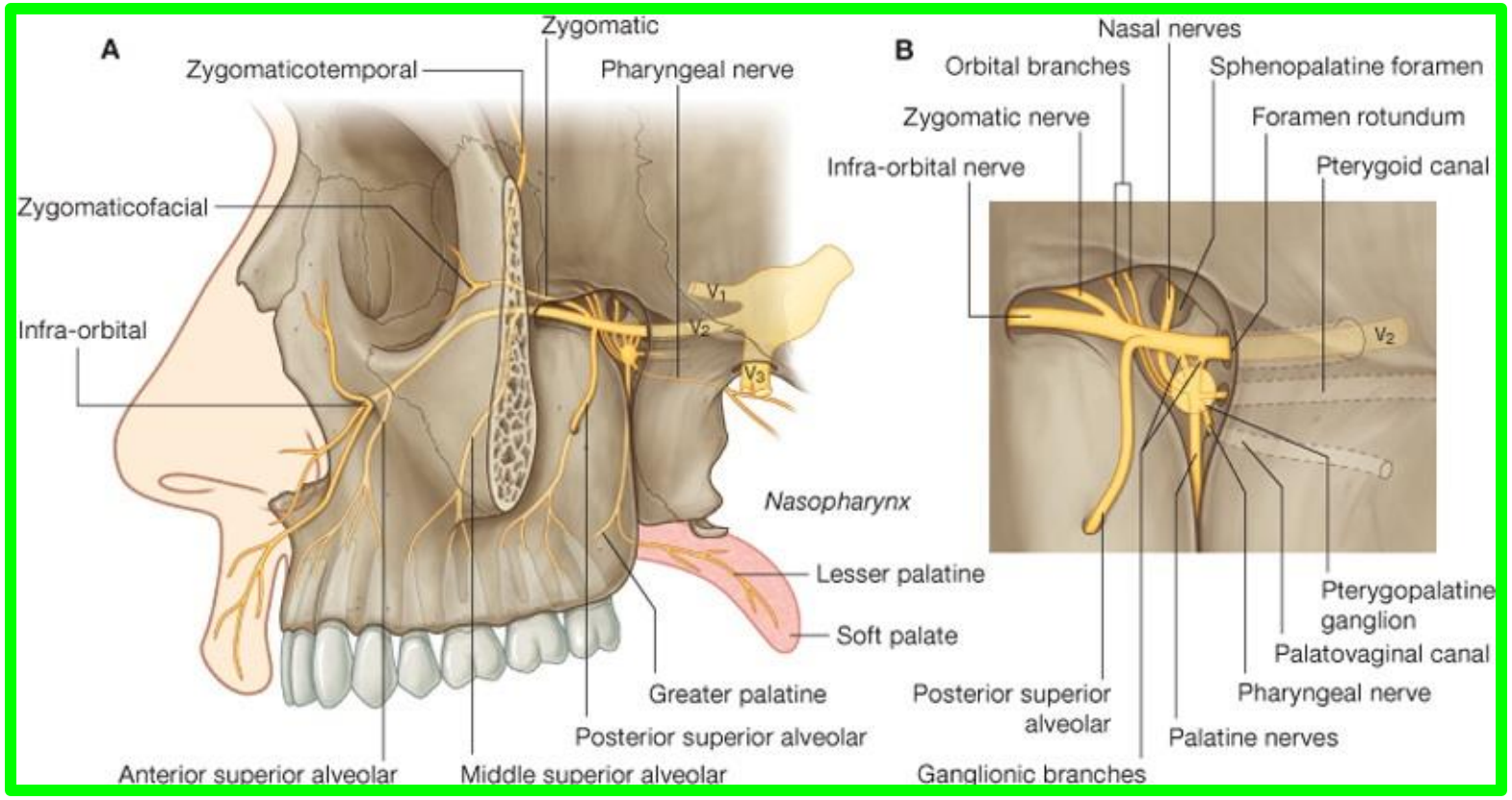
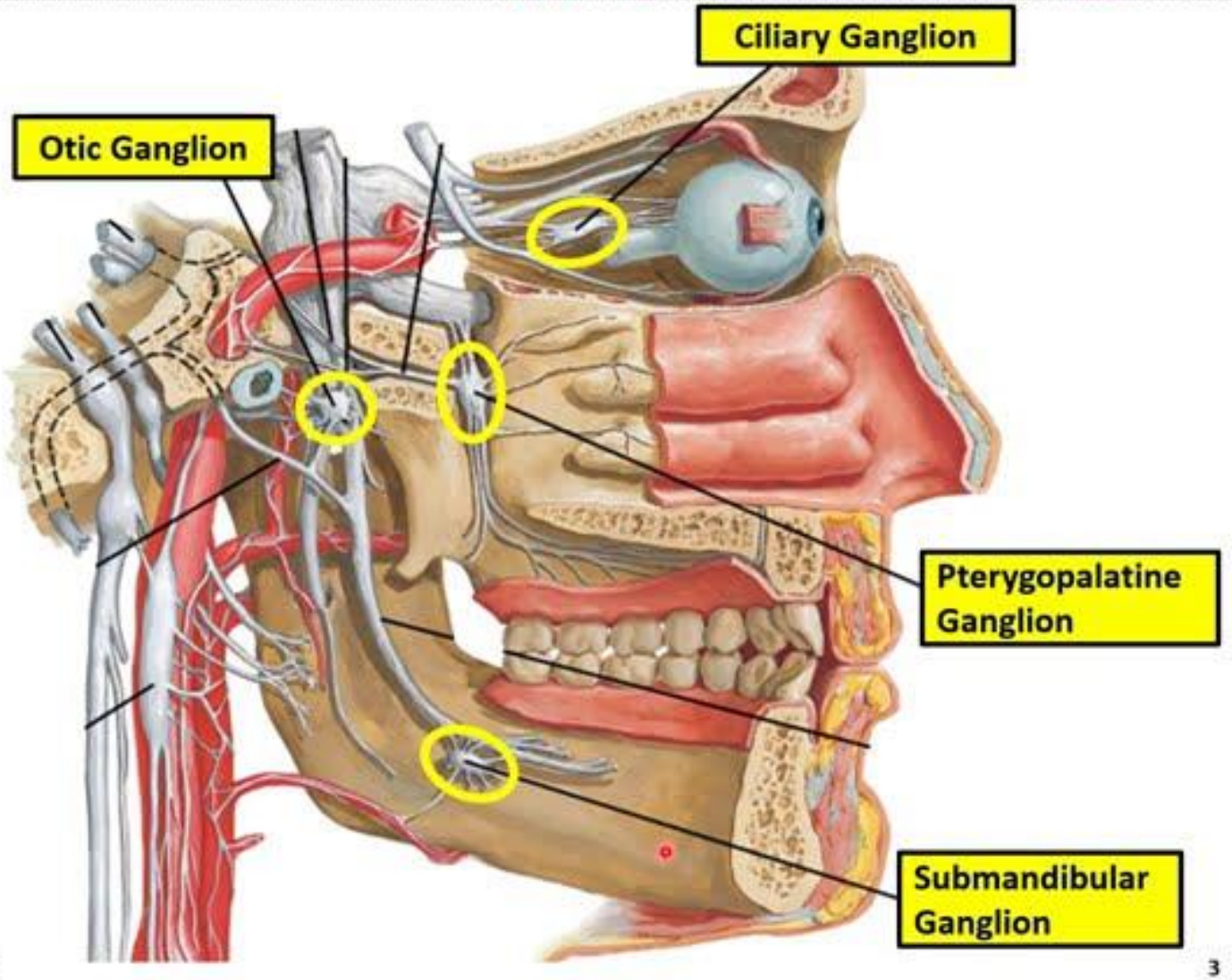
■■ Posterior superior alveolar nerve which supplies the maxillary sinus as well as the upper molar teeth and adjoining parts of the gum and the cheek

■■ Middle superior alveolar nerve which supplies the maxillary sinus as well as the upper premolar teeth, the gums, and the cheek



■■ Anterior superior alveolar nerve, which supplies the maxillary sinus as well as the upper canine and the incisor teeth

Locations of Parasympathetic Ganglia



Pterygopalatine Ganglion

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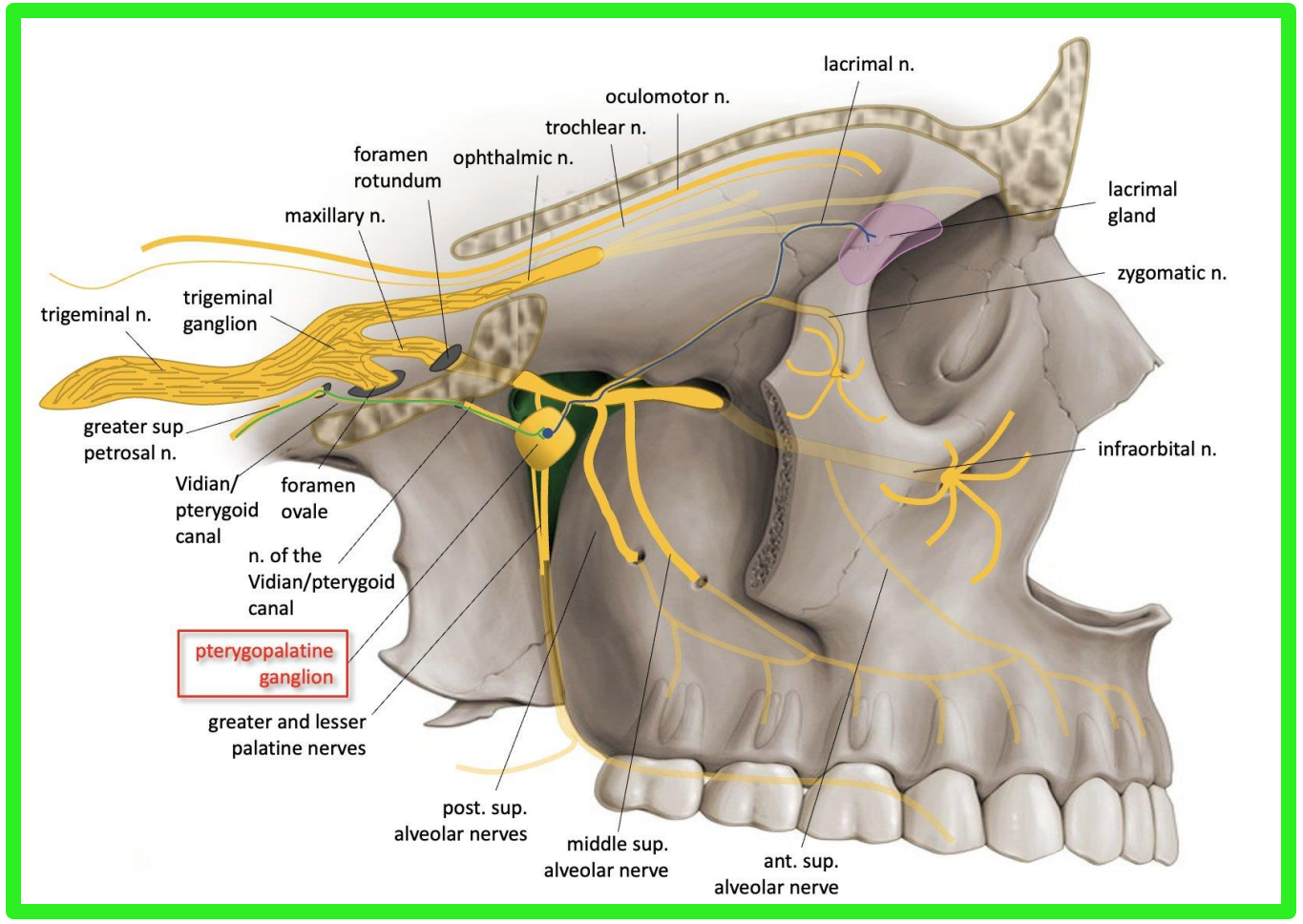
- is a parasympathetic ganglion, which is suspended from the maxillary nerve in the pterygopalatine fossa.
- It is secretomotor to the lacrimal and nasal glands

- They contain sensory fibers that have passed through the ganglion from the nose, the palate, and the pharynx.

- They also contain postganglionic parasympathetic fibers that are going to the lacrimal gland



Pterygopalatine Ganglion

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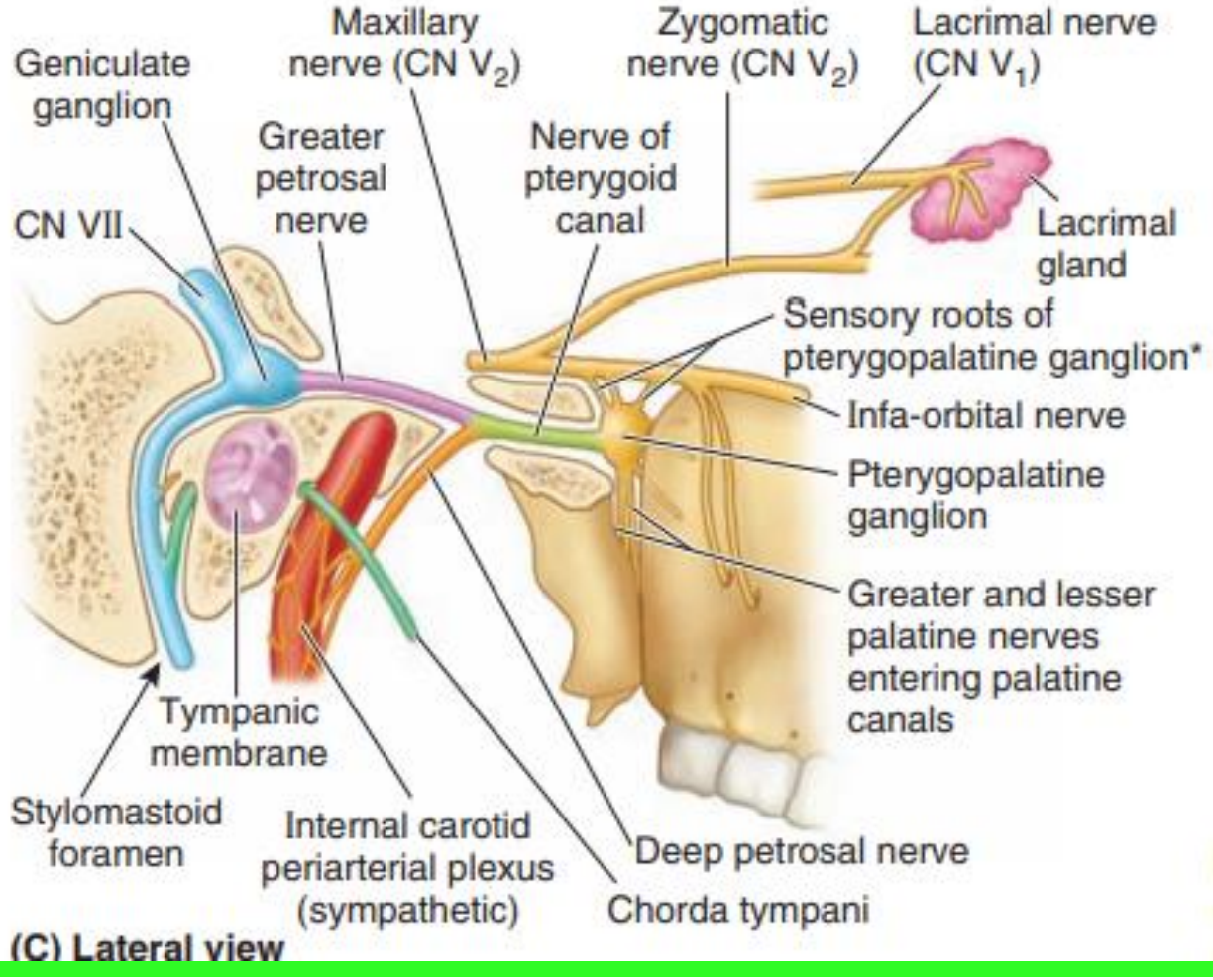
❖The parasympathetic fibers to the pterygopalatine ganglion come from the facial nerve by way of its first branch, the greater petrosal nerve.

❖This nerve joins the deep petrosal nerve as it passes through the foramen lacerum to form the nerve of the pterygoid canal, (Vidian nerve) which passes anteriorly through this canal to the pterygopalatine fossa.

❖The parasympathetic fibers of the greater petrosal nerve synapse in the pterygopalatine ganglion



Pterygopalatine Ganglion

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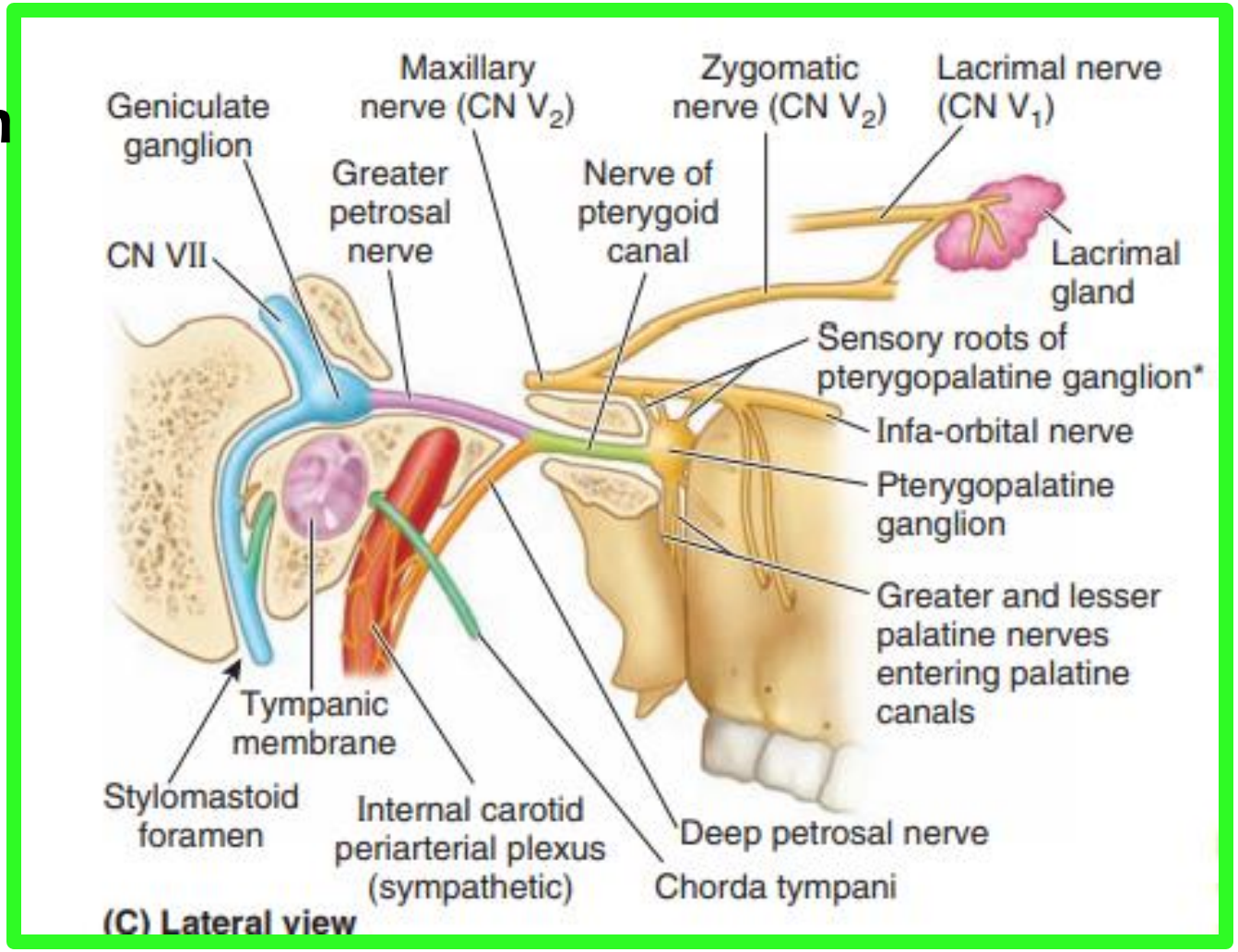
❑The deep petrosal nerve is a sympathetic nerve arising from the internal carotid plexus as the artery exits the carotid canal.

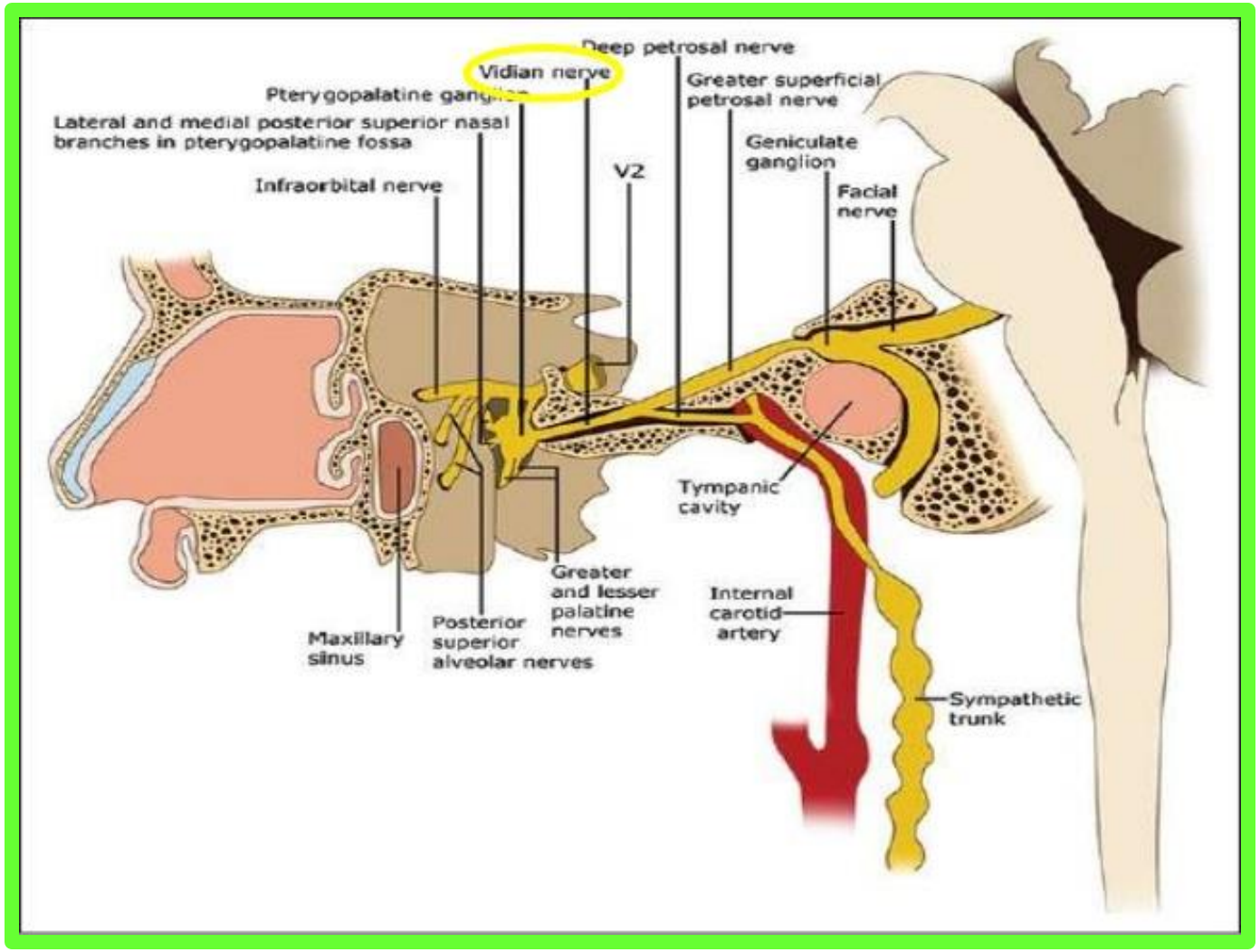
❑ It conveys postsynaptic fibers from nerve cell bodies in the superior cervical sympathetic ganglion to the pterygopalatine ganglion by joining the nerve to the pterygoid canal.



Pterygopalatine Ganglion

- The fibers do not synapse in the ganglion but pass directly through it into the branches (of CN V_2) arising from it.

- The postsynaptic parasympathetic and the sympathetic fibers pass to:
  - ✓ the lacrimal gland,
  - ✓ the palatine glands, and
  - ✓ the mucosal glands of the nasal cavity and superior pharynx



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Pterygopalatine Ganglion

Branches

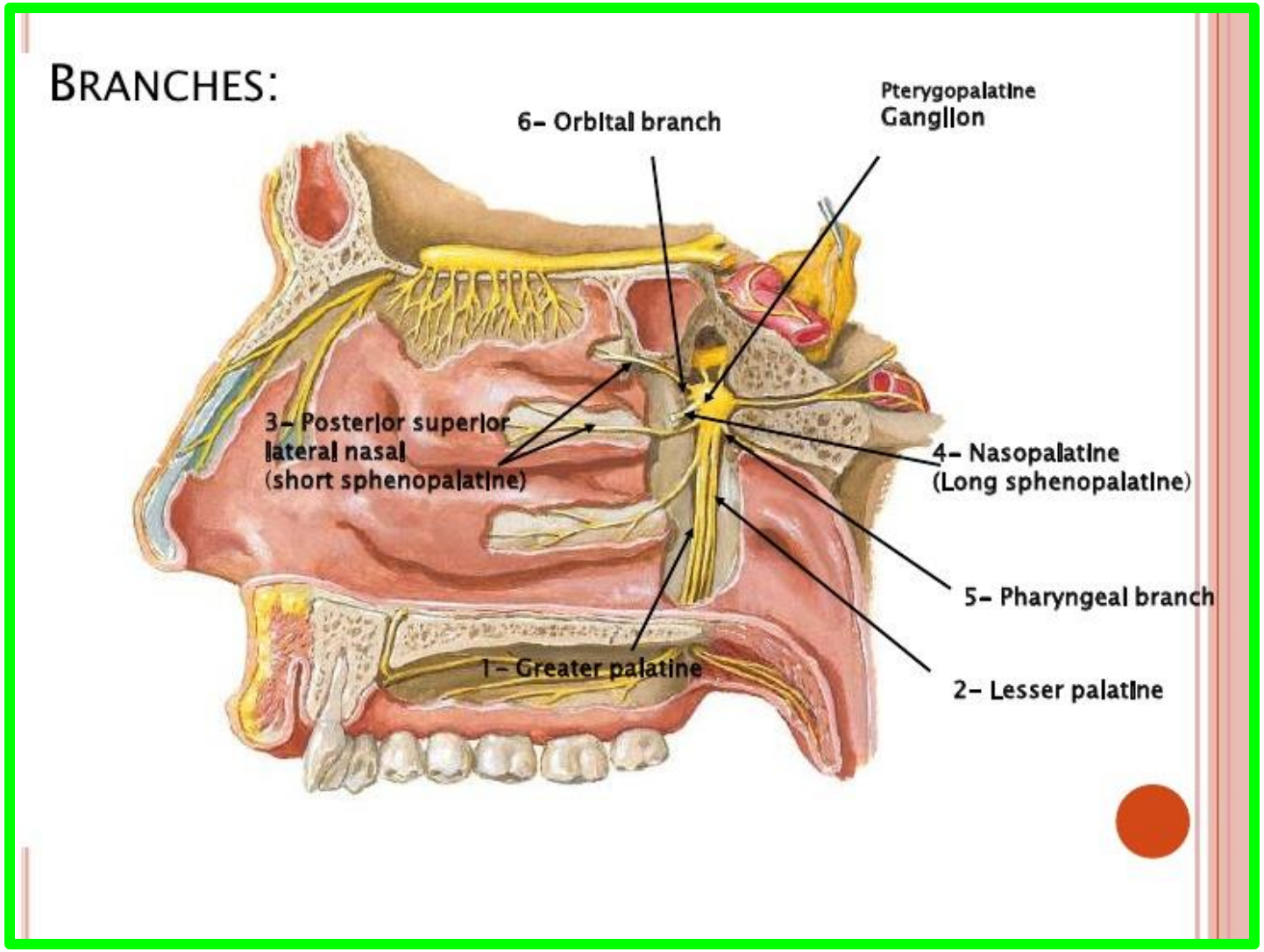
■■ **Orbital branches**, which enter the orbit through the inferior orbital fissure

■■ **Greater and lesser palatine nerves** which supply the palate, the tonsil, and the nasal cavity

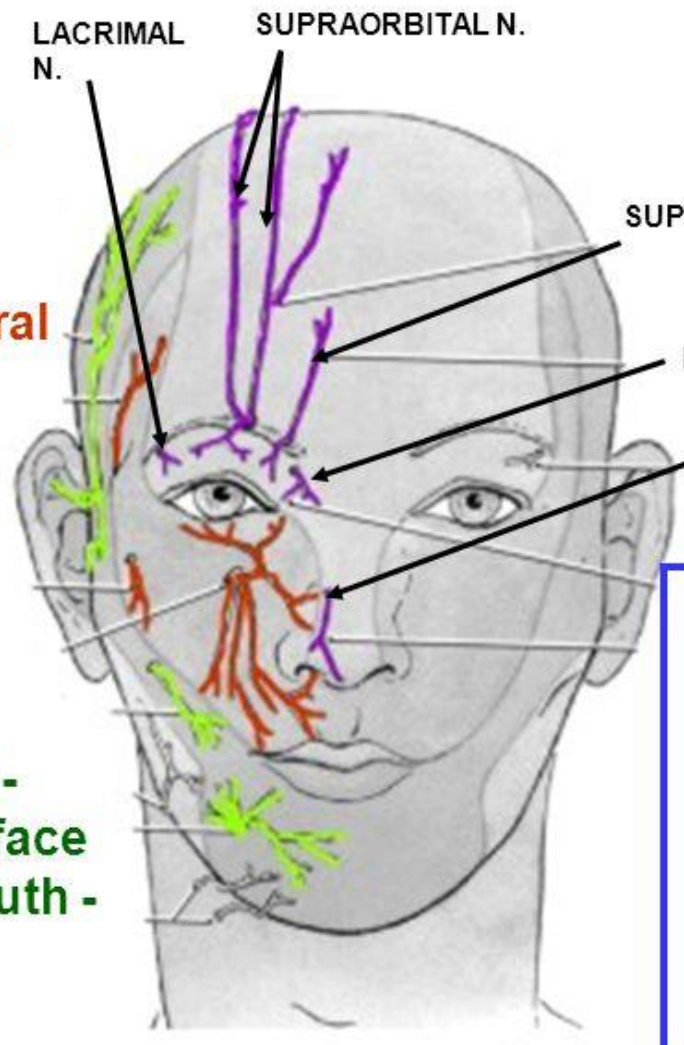
■■ **Pharyngeal branch,** which supplies the roof of the nasopharynx

■■**The posterior (superior & inferior) lateral nasal nerves.**

■■ **The nasopalatine nerve**



TRIGEMINAL – SENSORY BRANCHES TO FACE

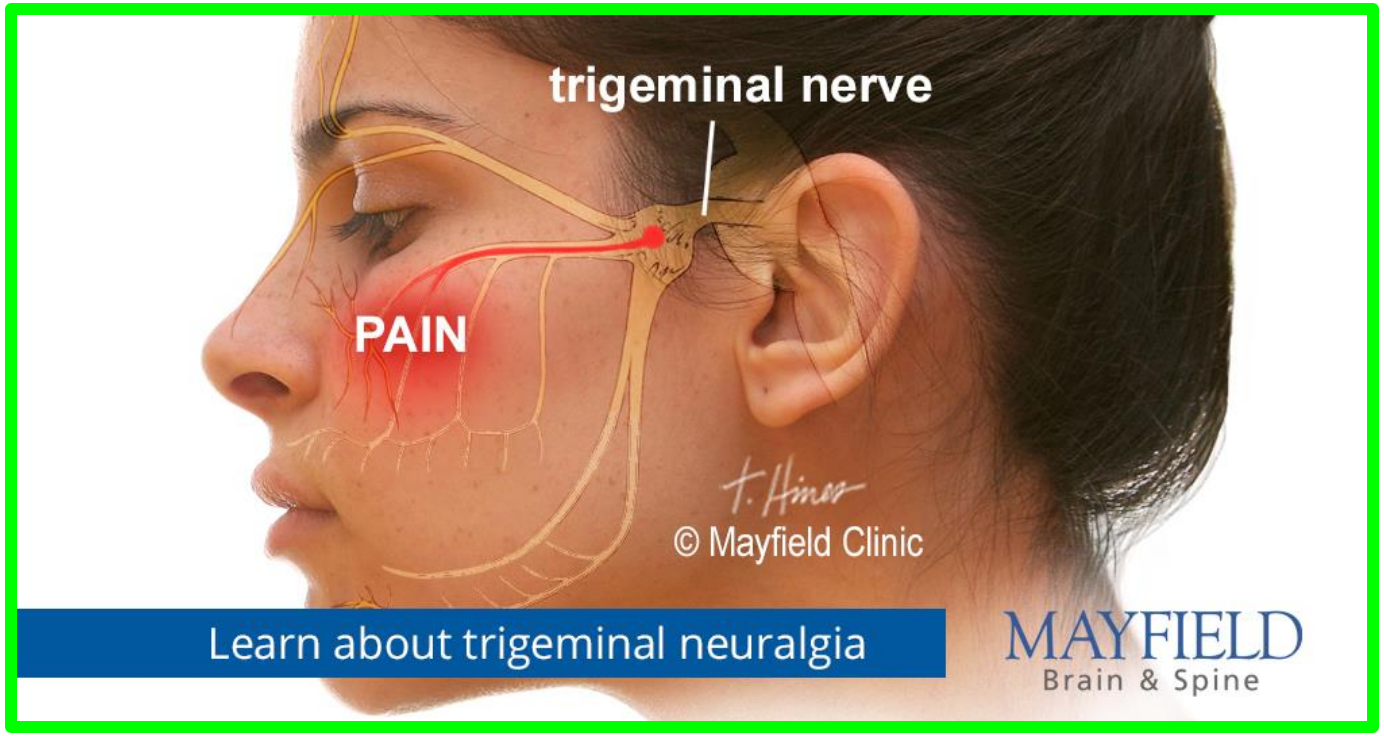


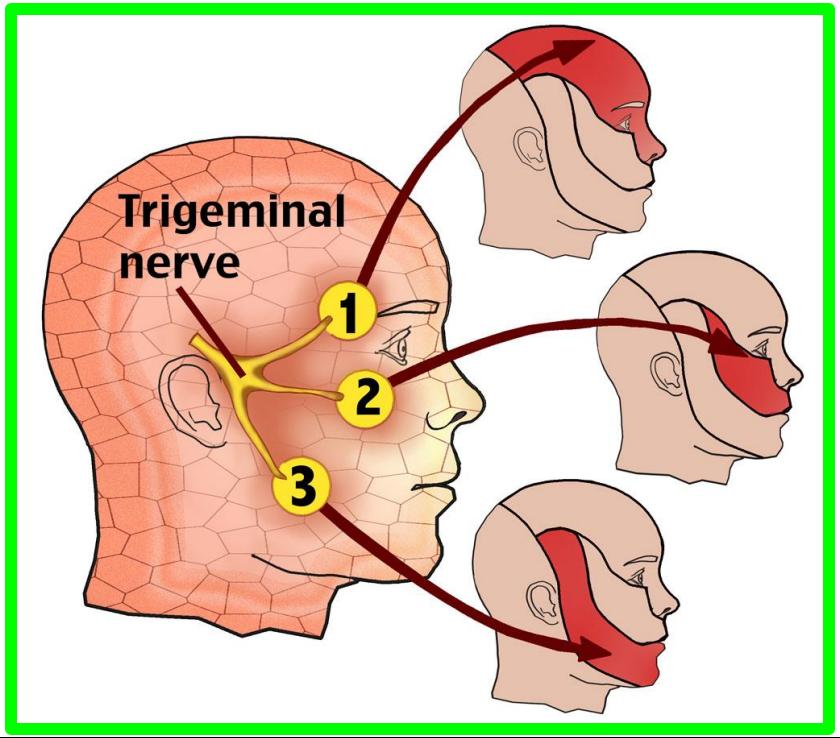
V2 – MAXILLARY -
to skin of cheek below orbit -
Zygomaticotemporal
Zygomaticofacial
Infraorbital

V3- MANDIBULAR -
to skin of jaw and face below angle of mouth -
Auriculotemporal
Buccal
Mental

V1 – OPHTHALMIC -
to skin above orbit -
a. Lacrimal
b. Supraorbital
c. Supratrochlear
d. Infratrochlear
e. External Nasal Nerve
(branch of Ant. Ethmoidal N.)

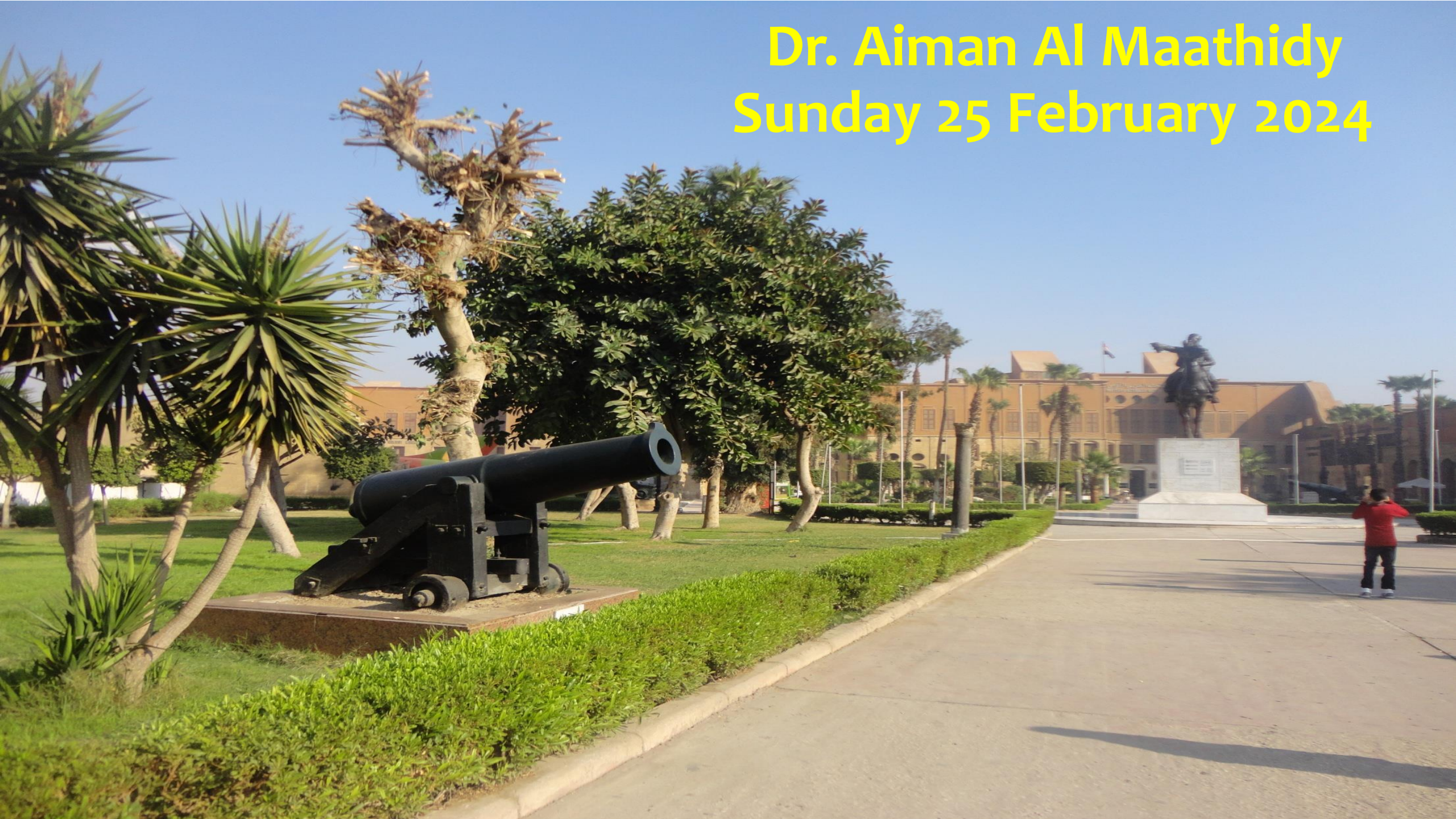
Trigeminal neuralgia: is a relatively common condition in which the patient experiences excruciating pain in the distribution of the mandibular or maxillary division, with the ophthalmic division usually escaping.





Usually is caused by pressure on the trigeminal nerve close to where it enters the brain stem(by an artery or vein).

Microvascular decompression (MVD) surgery is regarded as the most long-lasting treatment for trigeminal neuralgia caused by blood vessel compression,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