Temporal and Infratemporal fossae

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Muscles of Mastication

Temporalis muscle

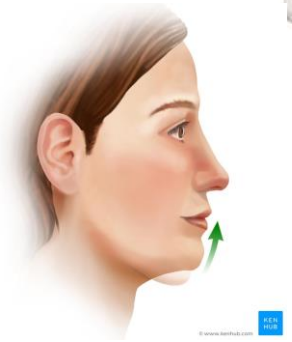
Origin: from the bony surfaces of the temporal fossa

Insertion: coronoid process
And anterior border of the ramus of the mandible

Action: Temporalis is a powerful elevator of the mandible, **closing jaws**
Retraction of the mandible

Temporalis is innervated by deep temporal nerves from the mandibular nerve [V3]

Note: The temporalis muscle is a large fan-shaped muscle that fills much of the temporal fossa



Elevation

Retraction

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Muscles of Mastication

Masseter muscle

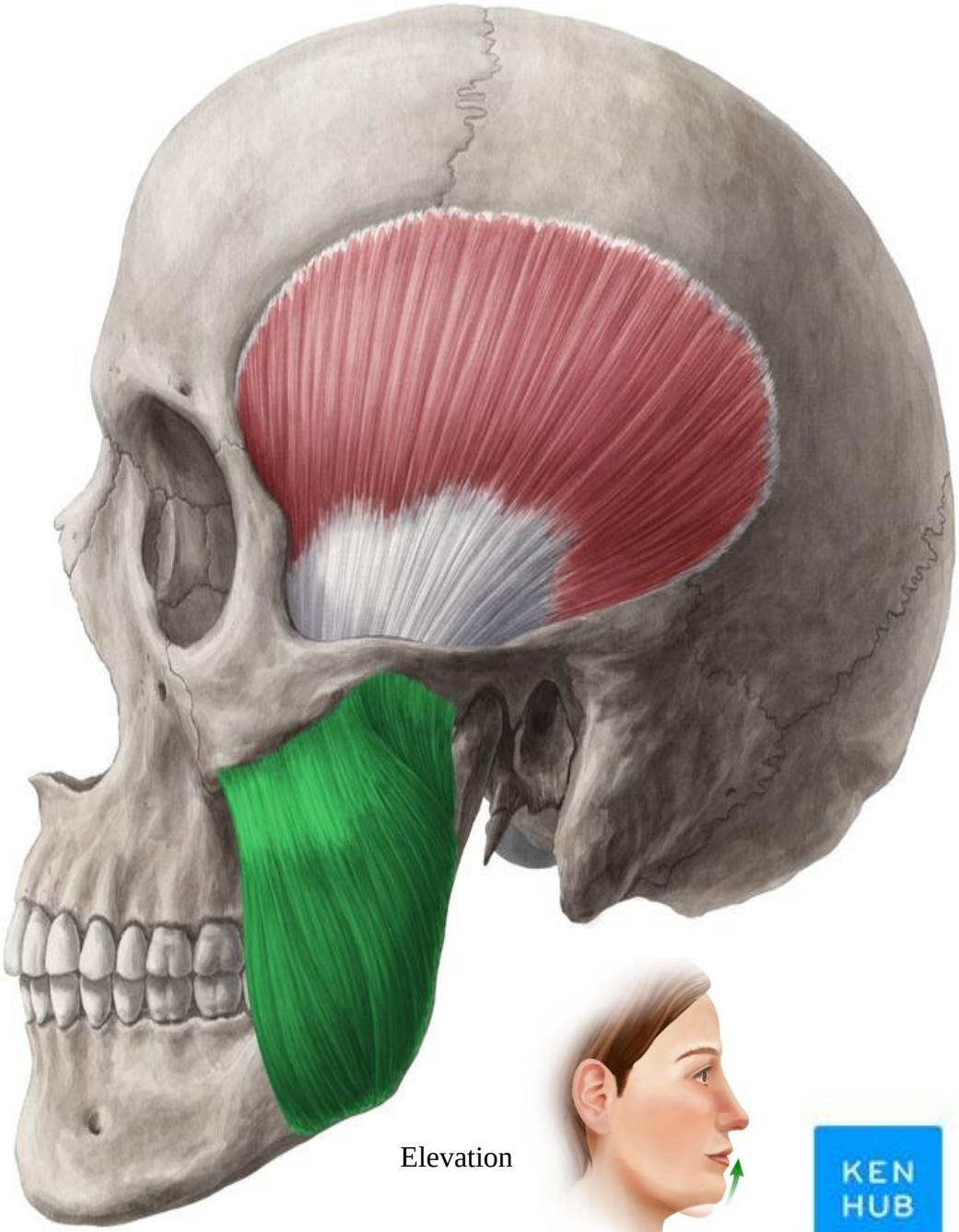
Origin: the zygomatic arch, maxillary process of zygomatic bone.
Insertion: into the lateral surface of the ramus of the mandible

Action: elevation of the mandible, **closing jaws**

The masseter is innervated by the masseteric nerve from the mandibular nerve [V3]

The masseter muscle is quadrangular in shape

Note: The masseter overlies the lateral surface of the ramus of the mandible



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Muscles of Mastication

Medial pterygoid

Origin: medial surface of the lateral pterygoid plate

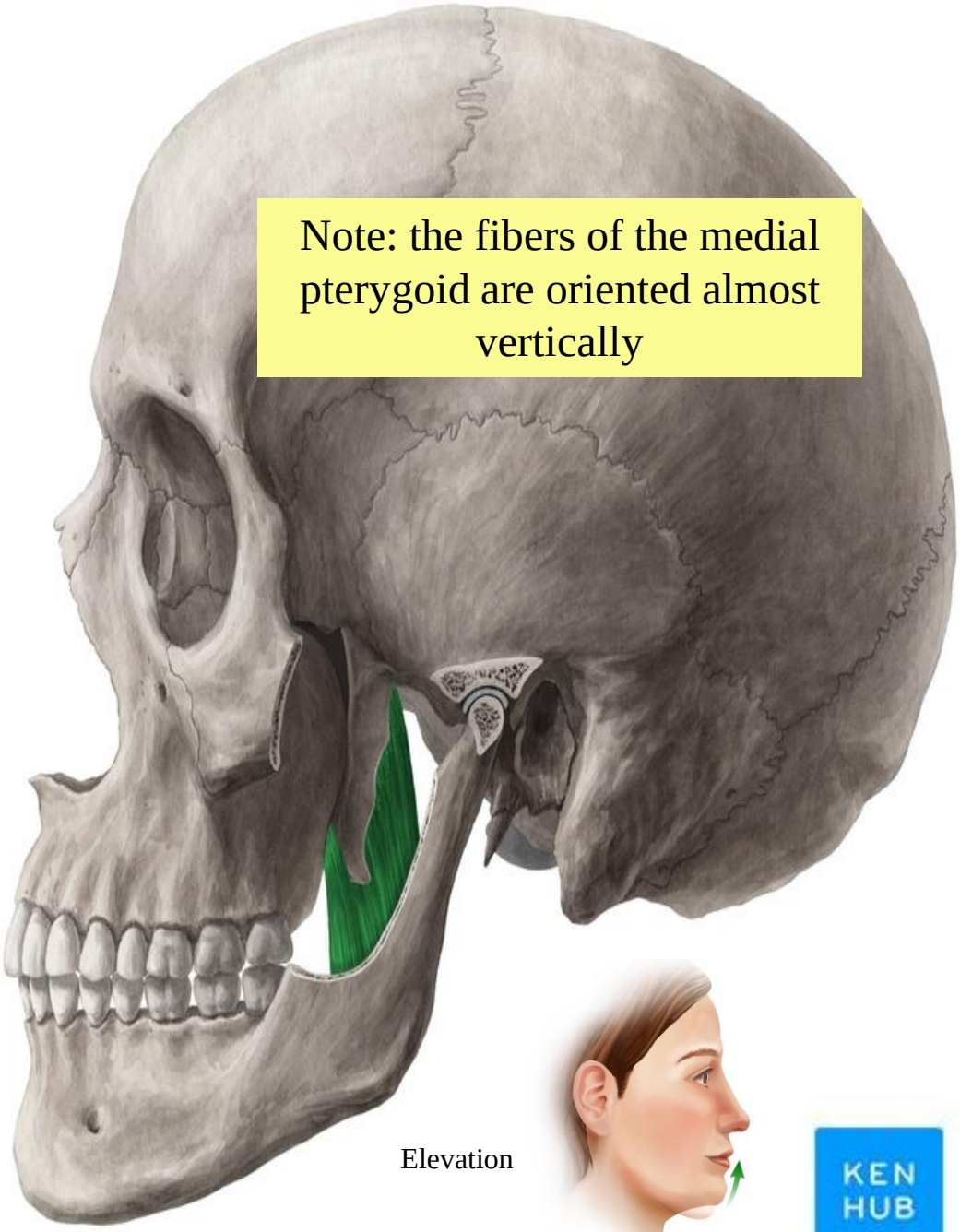
Insertion: medial surface of the ramus of mandible near the angle

Action: The medial pterygoid mainly elevates the mandible, **closing jaws**

The medial pterygoid is innervated by the nerve to medial pterygoid from the mandibular nerve [V3].

The medial pterygoid muscle is quadrangular in shape and has deep and superficial heads

Note: the fibers of the medial pterygoid are oriented almost vertically



Elevation

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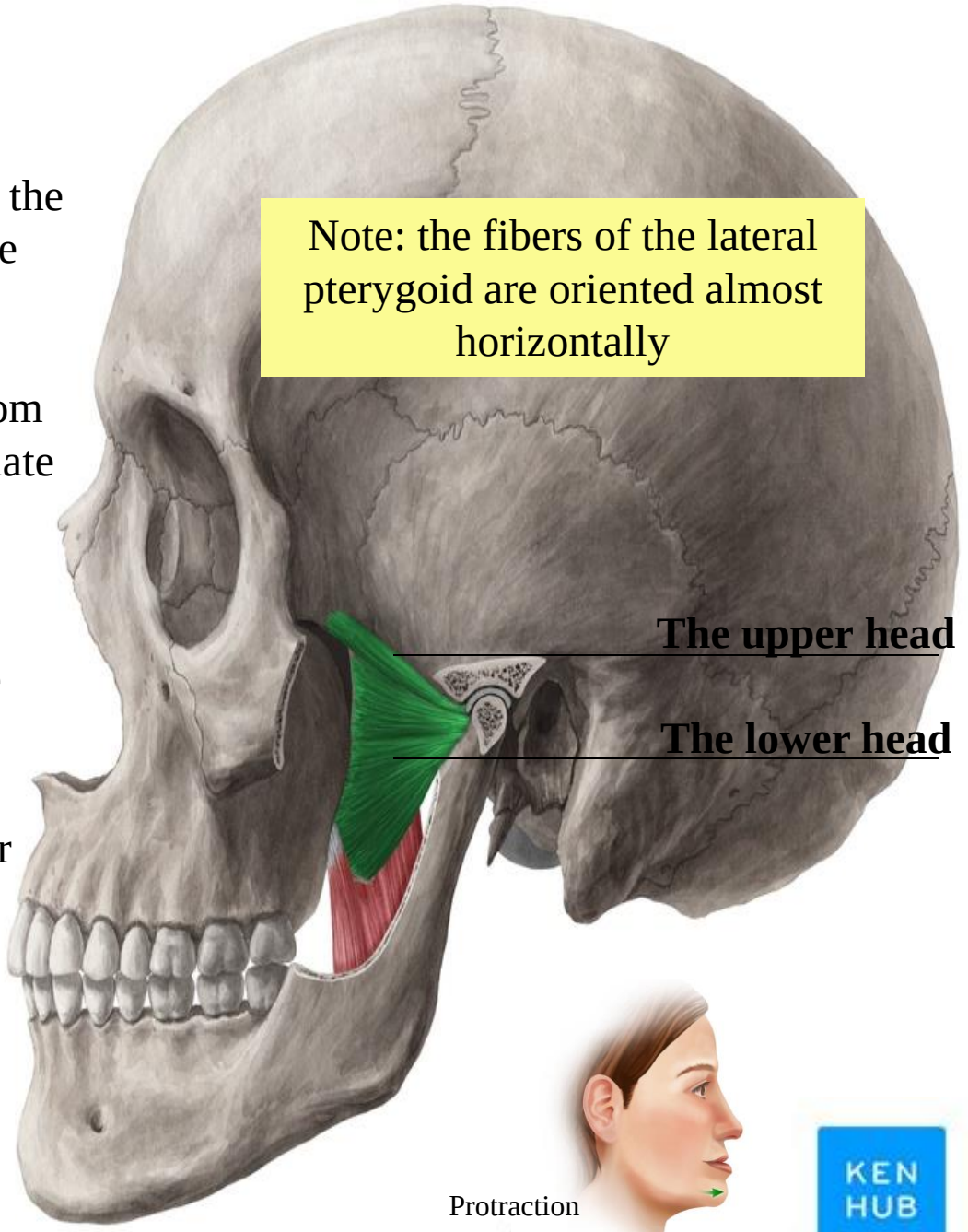
Muscles of Mastication

Lateral pterygoid

The upper head originates from the roof of the infratemporal fossa (inferior surface of the greater wing of the sphenoid and the infratemporal crest)

The lower head is larger and originates from the lateral surface of the lateral pterygoid plate

Note: the fibers of the lateral pterygoid are oriented almost horizontally



Insertion: into the neck of mandible (pterygoid fovea), into the capsule of the Temporomandibular joint (TMJ)

Action: The lateral pterygoid is the major protruder of the lower jaw

The lateral pterygoid is innervated by the nerve to lateral pterygoid from the mandibular nerve [V3].

The lateral pterygoid is a thick triangular muscle and has two heads

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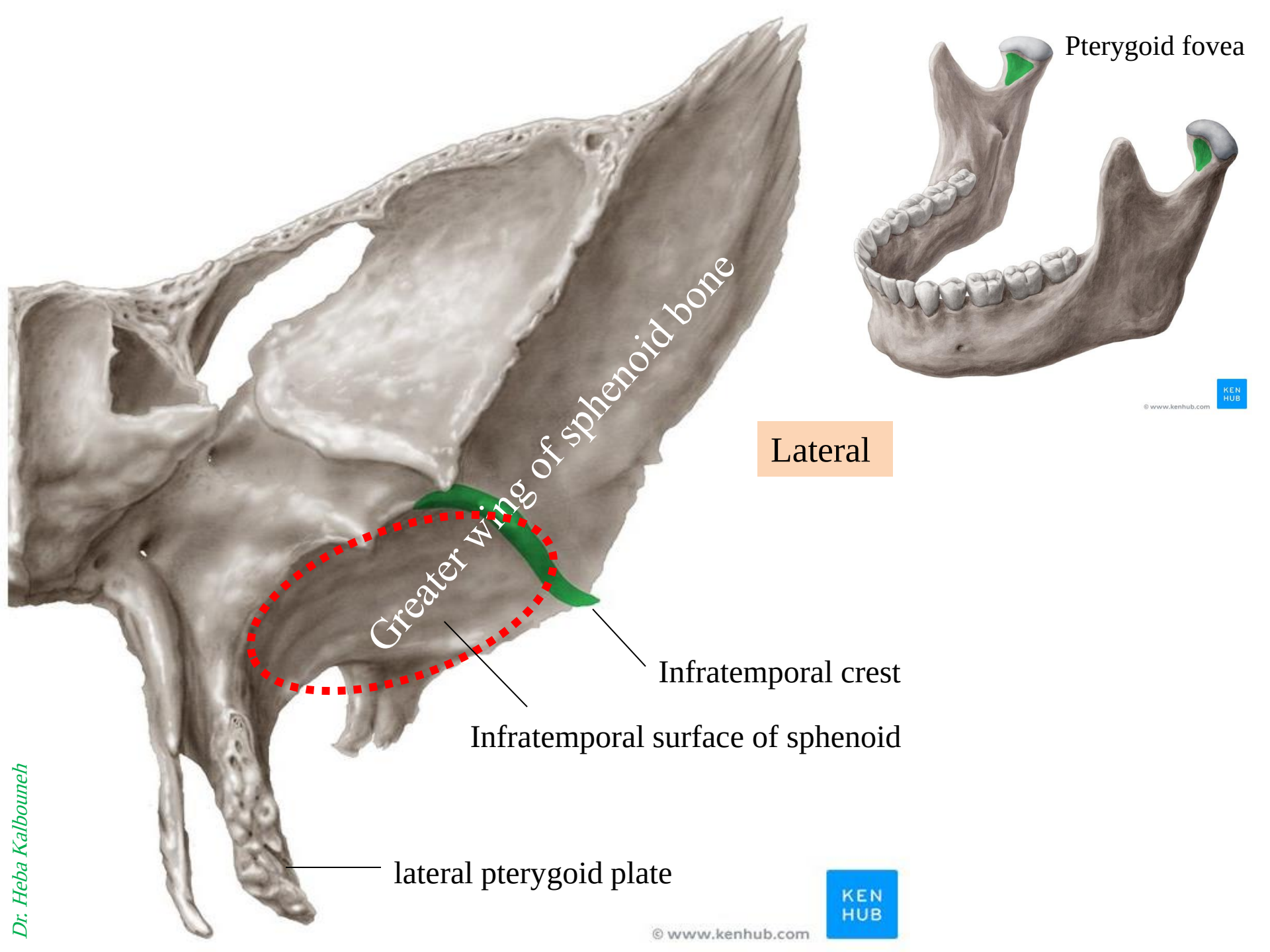

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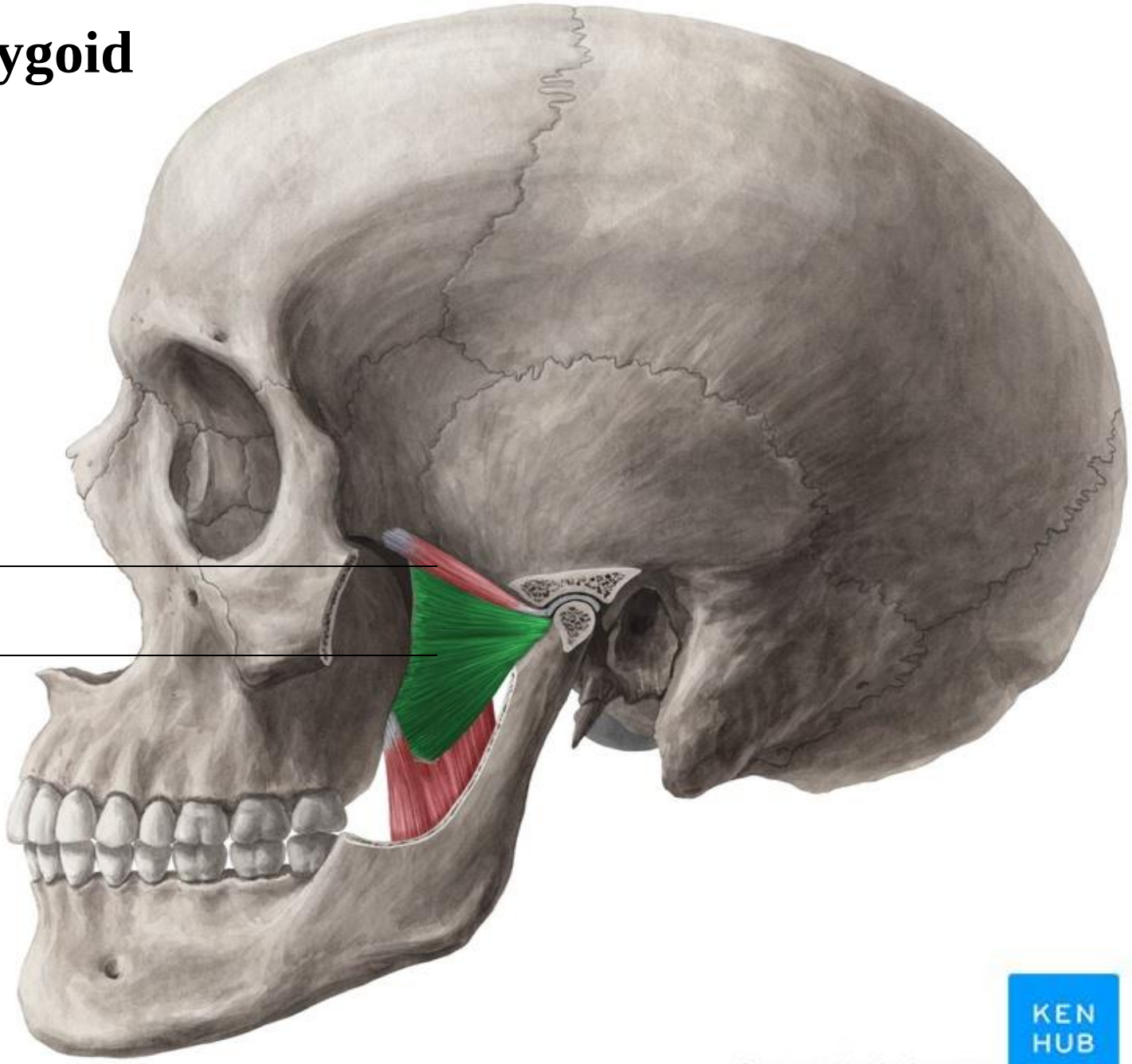
Lateral pterygoid



The upper head _____

The lower head _____

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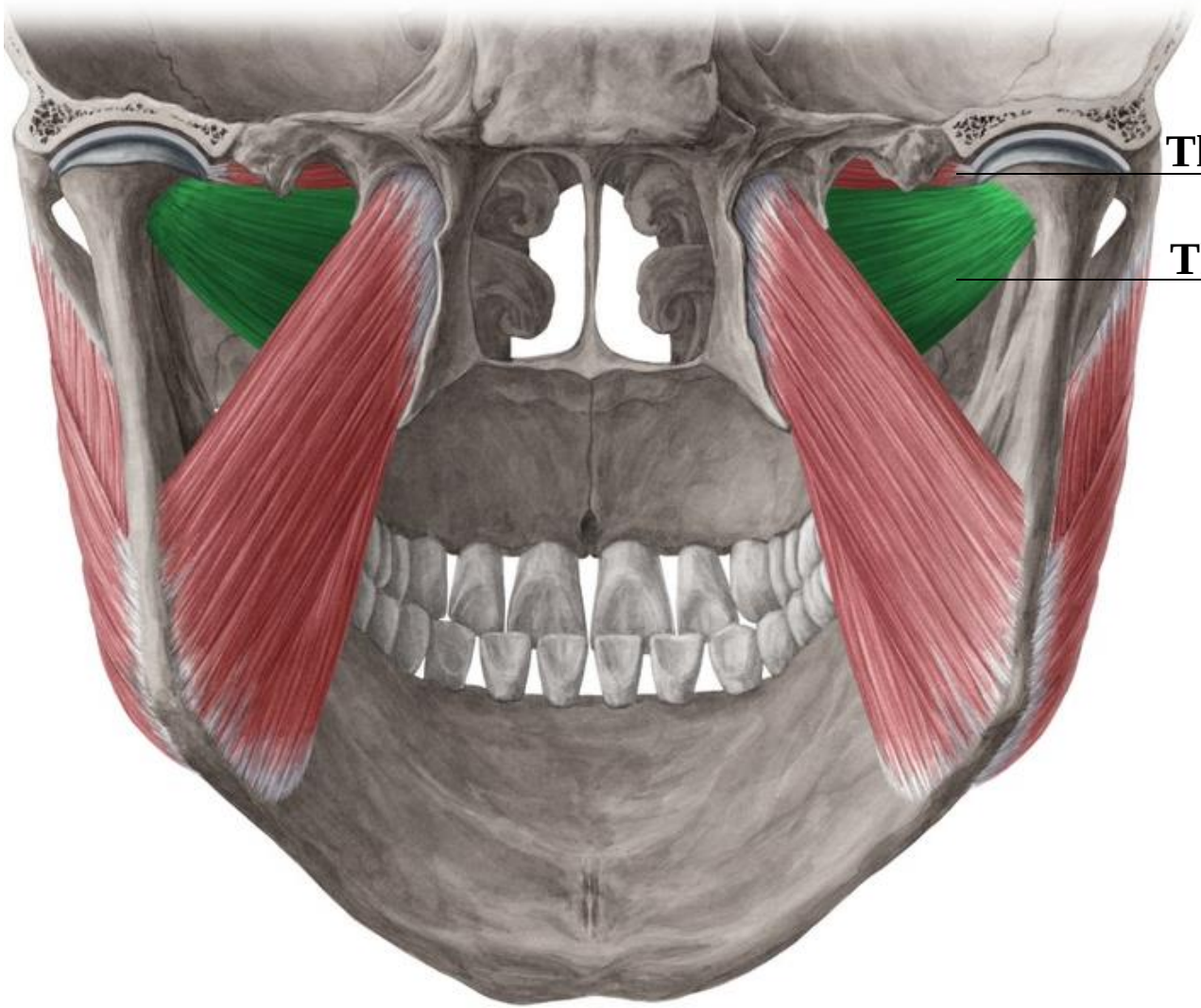
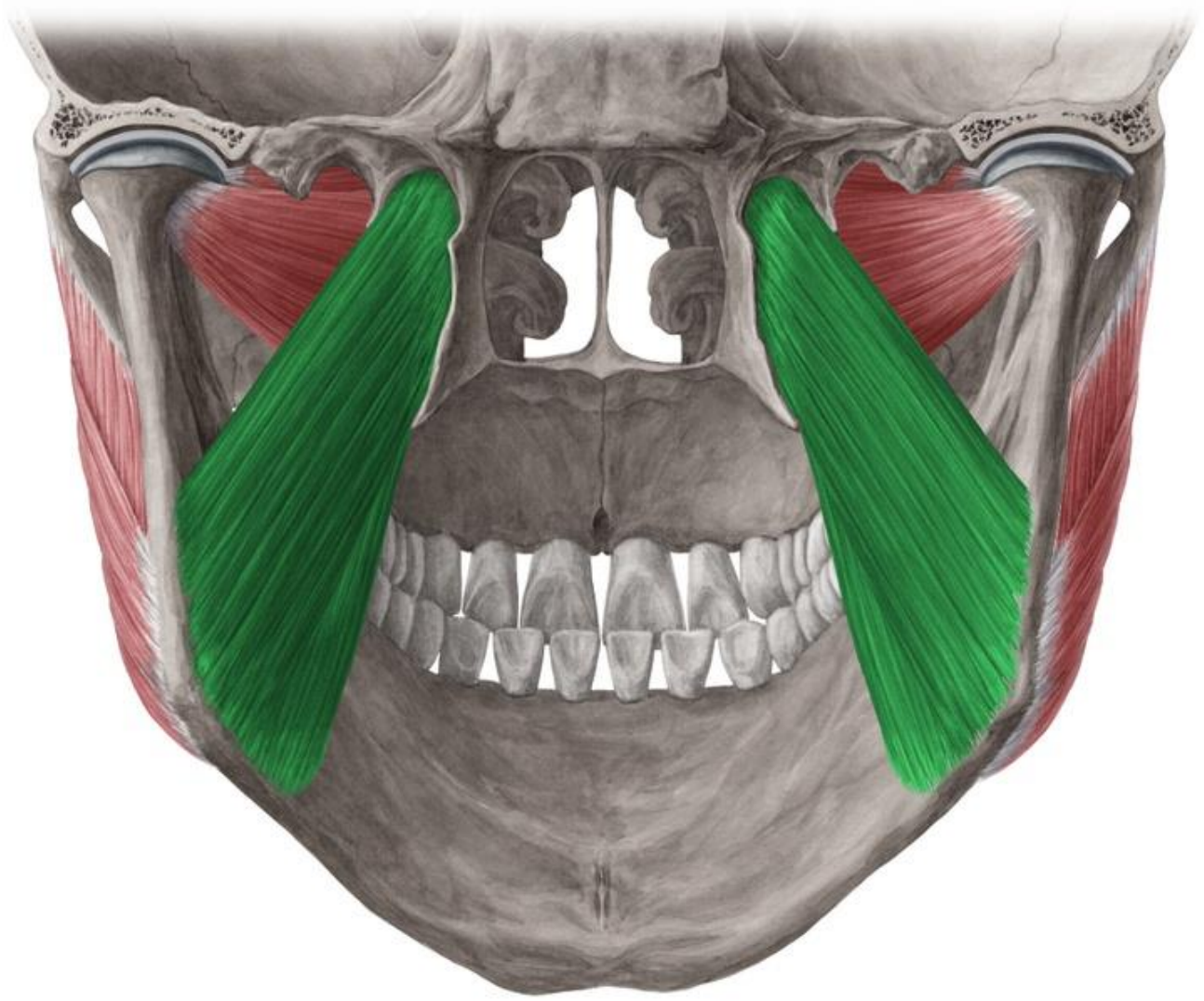
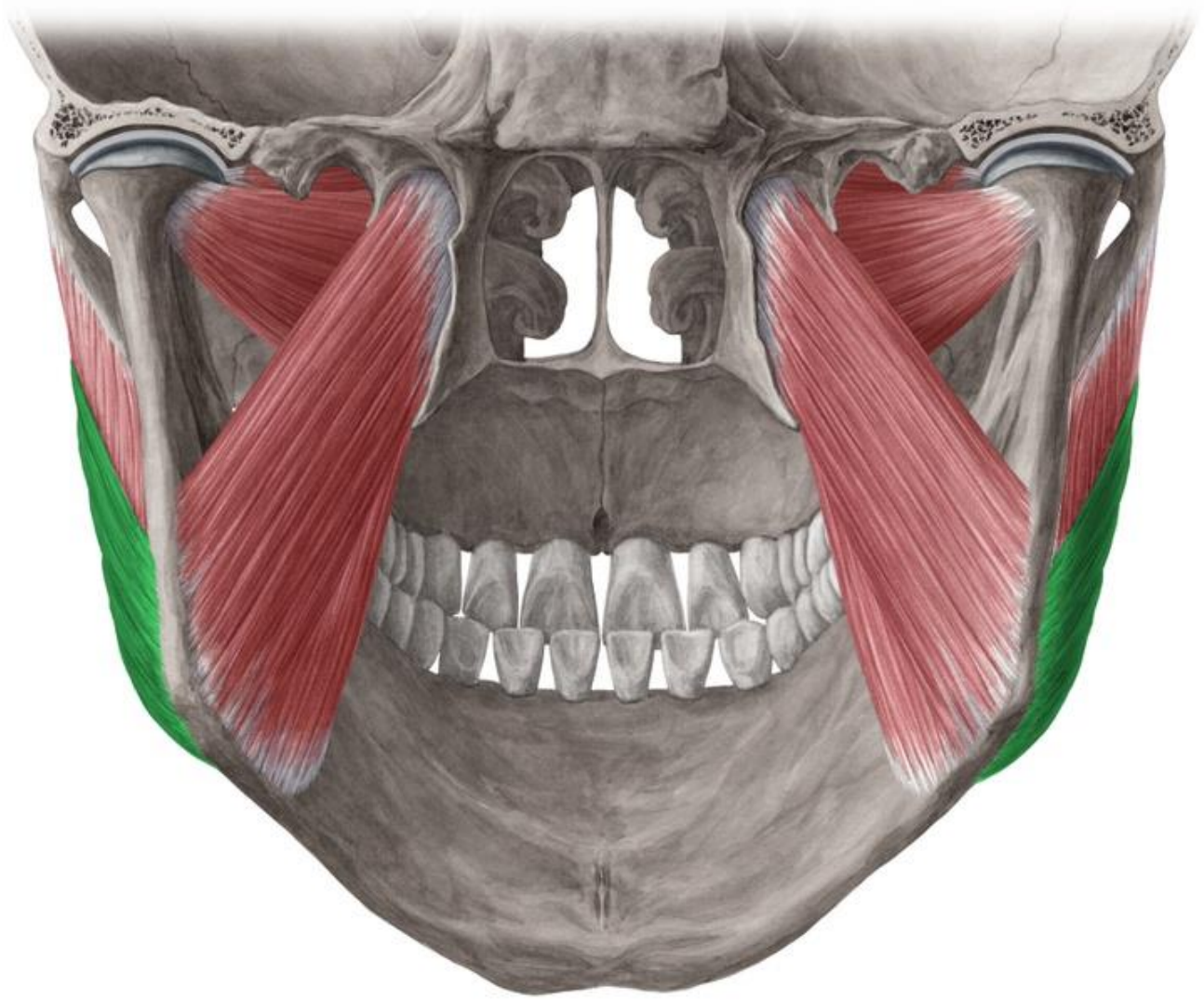
Lateral pterygoid



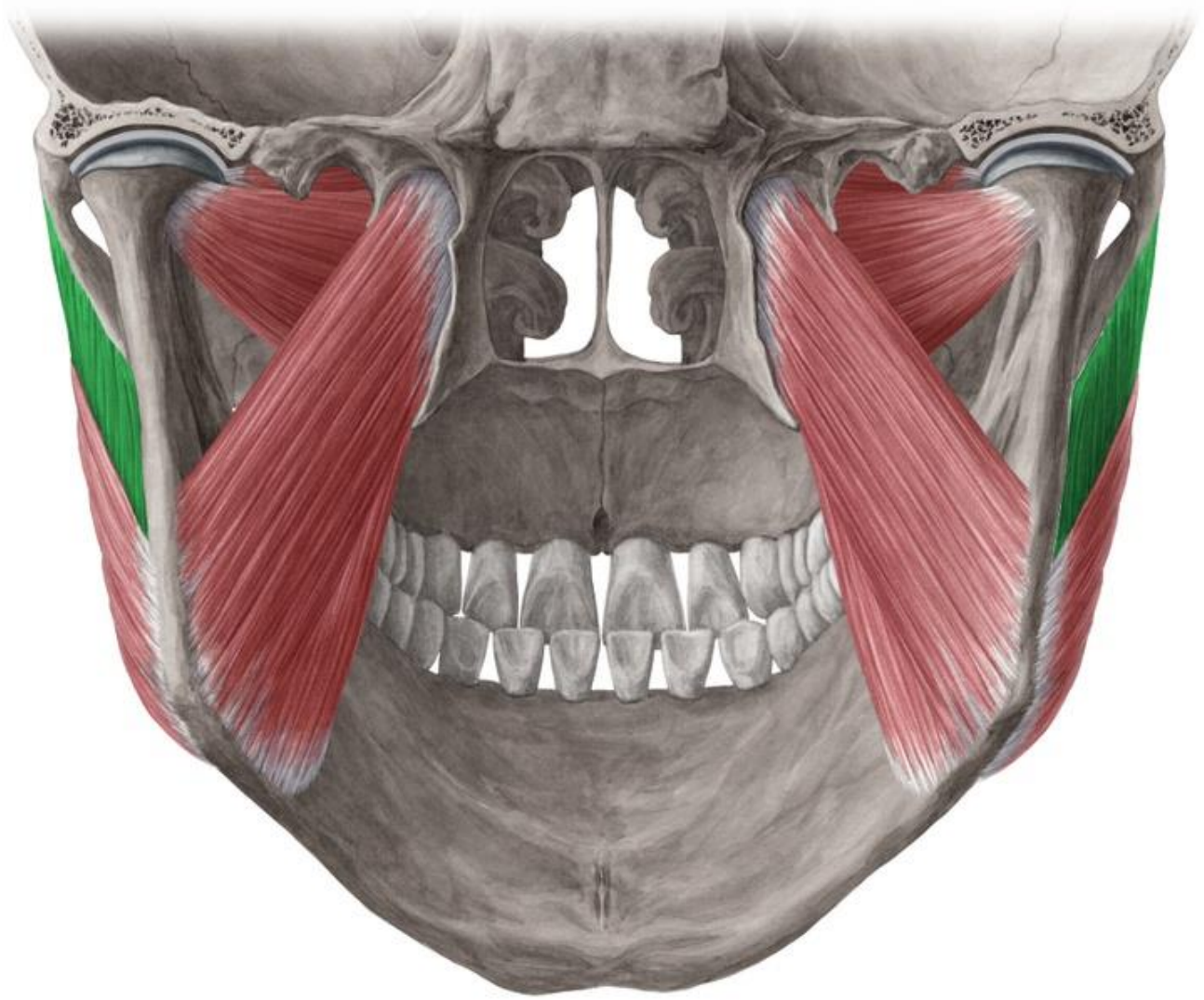
Medial pterygoid

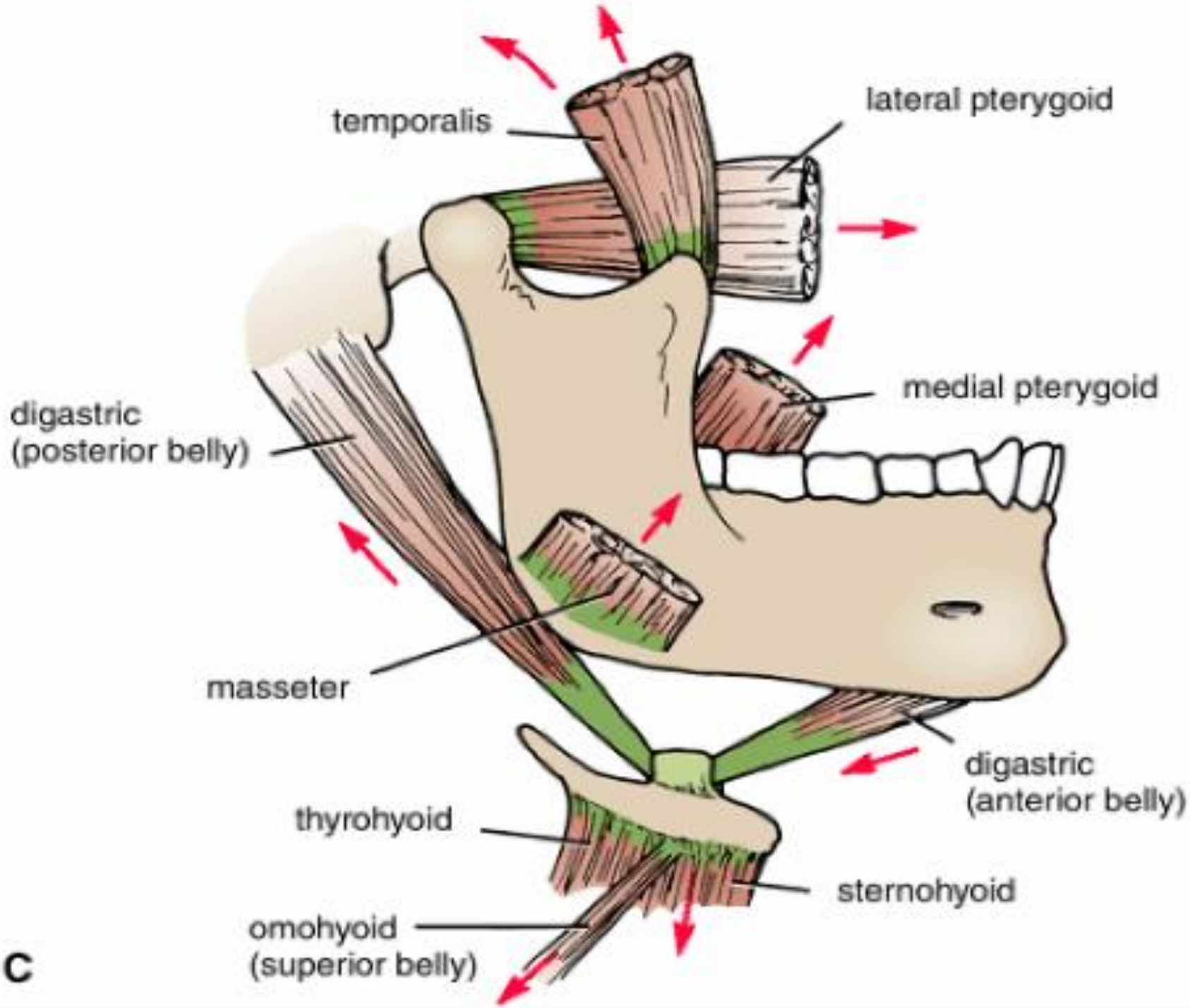


Masseter/ Superficial part



Masseter/ deep part




temporalis
lateral pterygoid
medial pterygoid
digastric
(posterior belly)
masseter
digastric
(anterior belly)
thyrohyoid
sternohyoid
omohyoid
(superior belly)
C

Temporal and infratemporal fossae are interconnected spaces on the lateral side of the head

Temporal fossa is superior to the infratemporal fossa above the zygomatic arch

Pterygo-palatine fossa
Lies below the apex of the orbit

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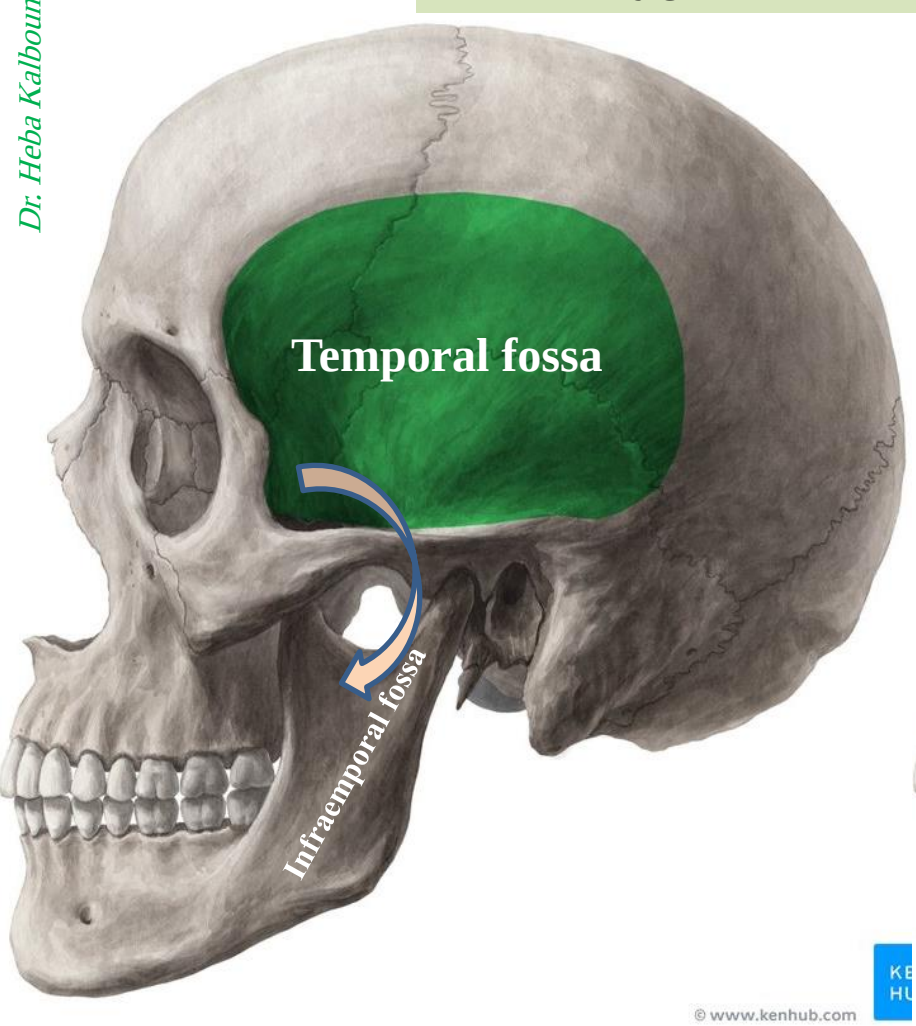

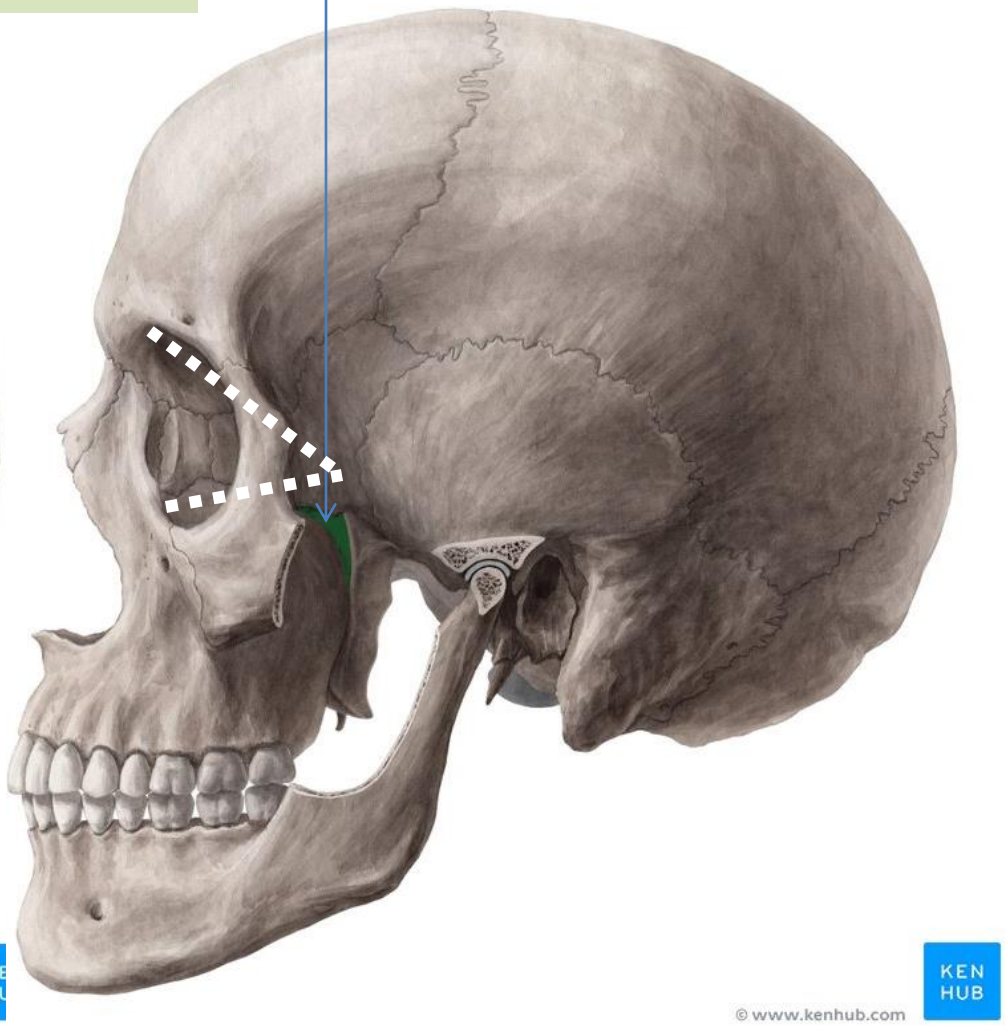

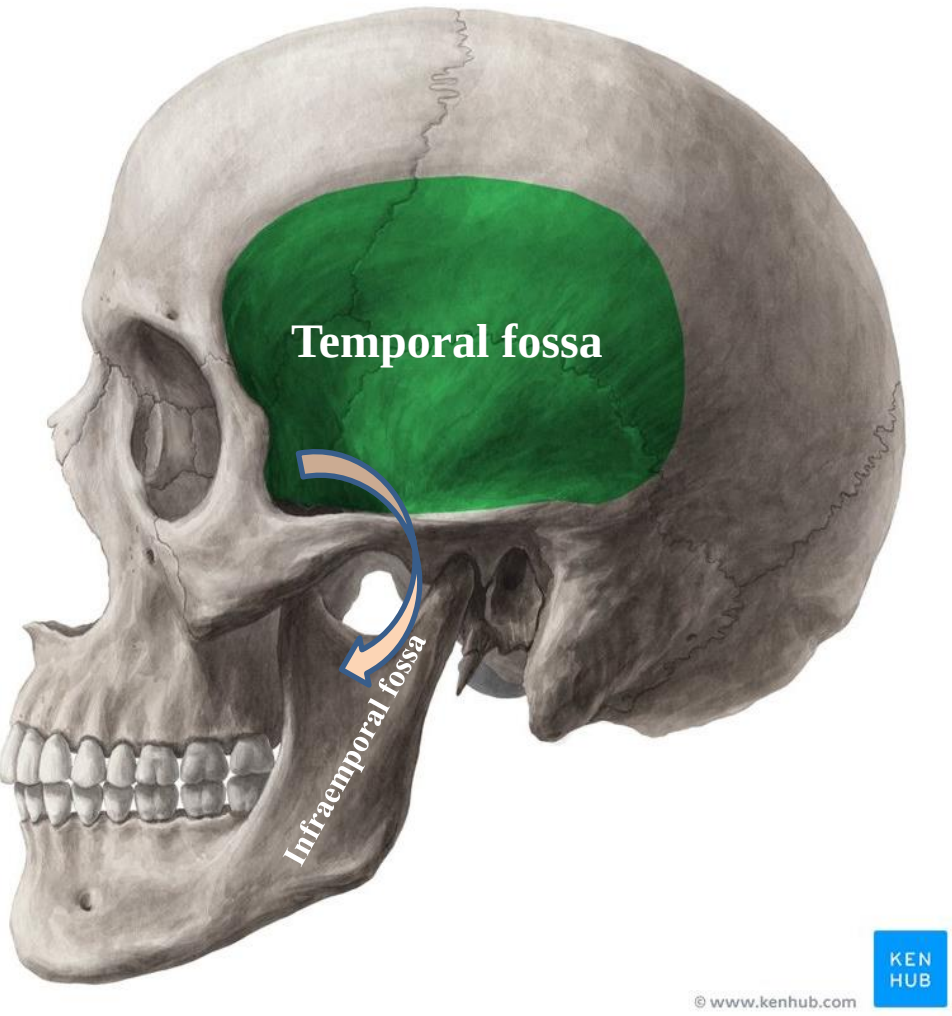

Of the four muscles of mastication (masseter, temporalis, medial pterygoid, and lateral pterygoid) that move the lower jaw at the TMJ

One (masseter) is lateral to the infratemporal fossa
Two (medial and lateral pterygoid) are in the infratemporal fossa
One fills the temporal fossa (temporalis)

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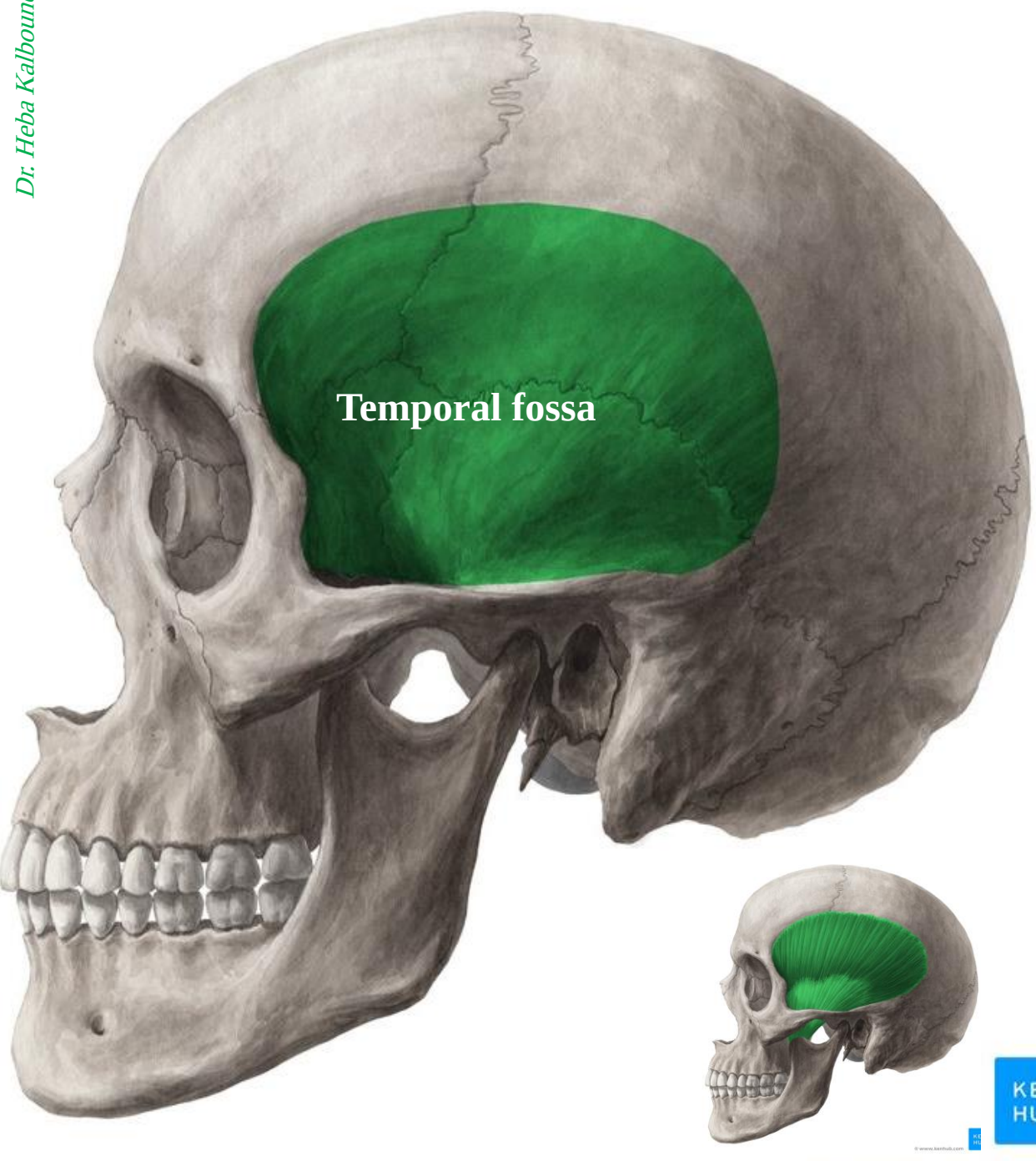


Temporal fossa is a narrow fan shaped space that covers the lateral surface of the skull

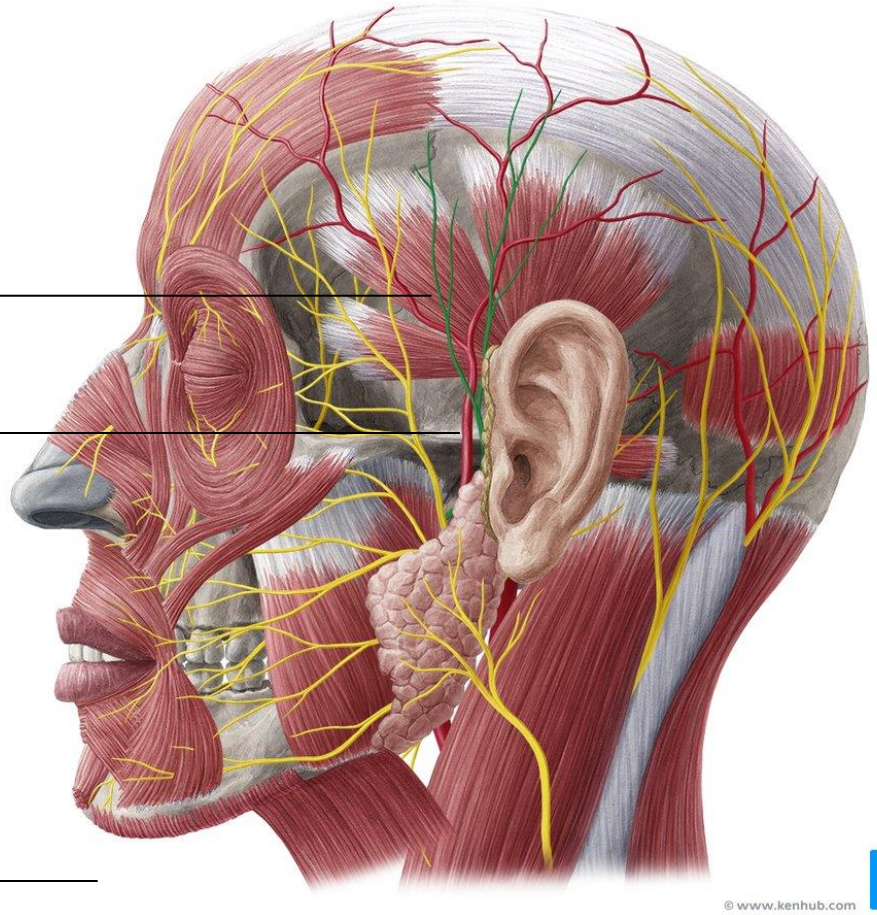
Floor is formed by 4 bones: frontal, parietal, temporal, and sphenoid

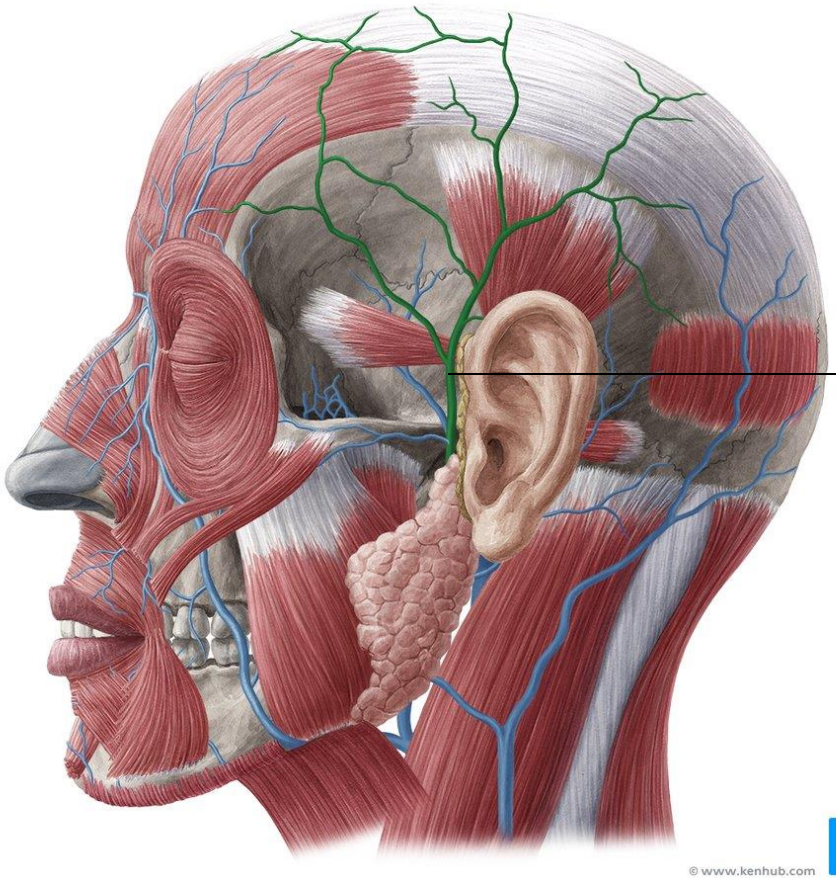
Contents

Temporalis muscle
Temporal fascia
Deep temporal arteries
Deep temporal nerves
Zygomaticotemporal nerve
Superficial temporal vessels
Auriculotemporal nerve
Temporal branch of facial nerve
Middle temporal artery

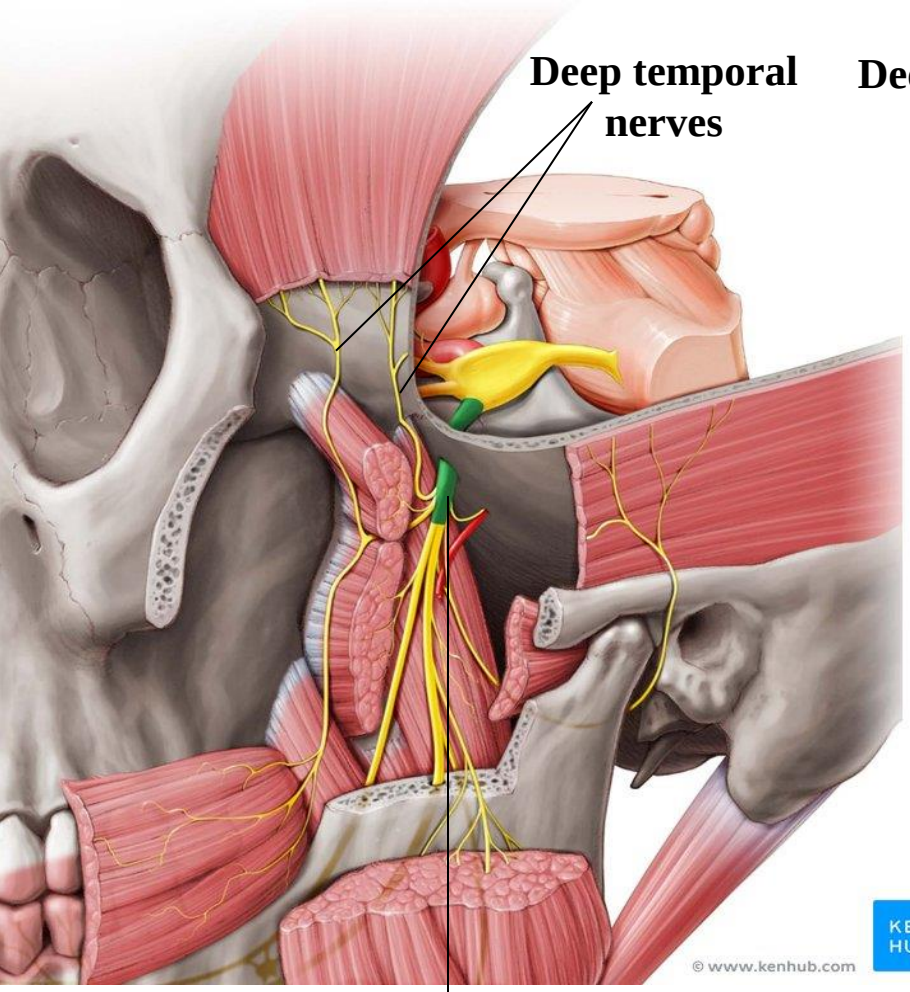
Auriculotemporal nerve

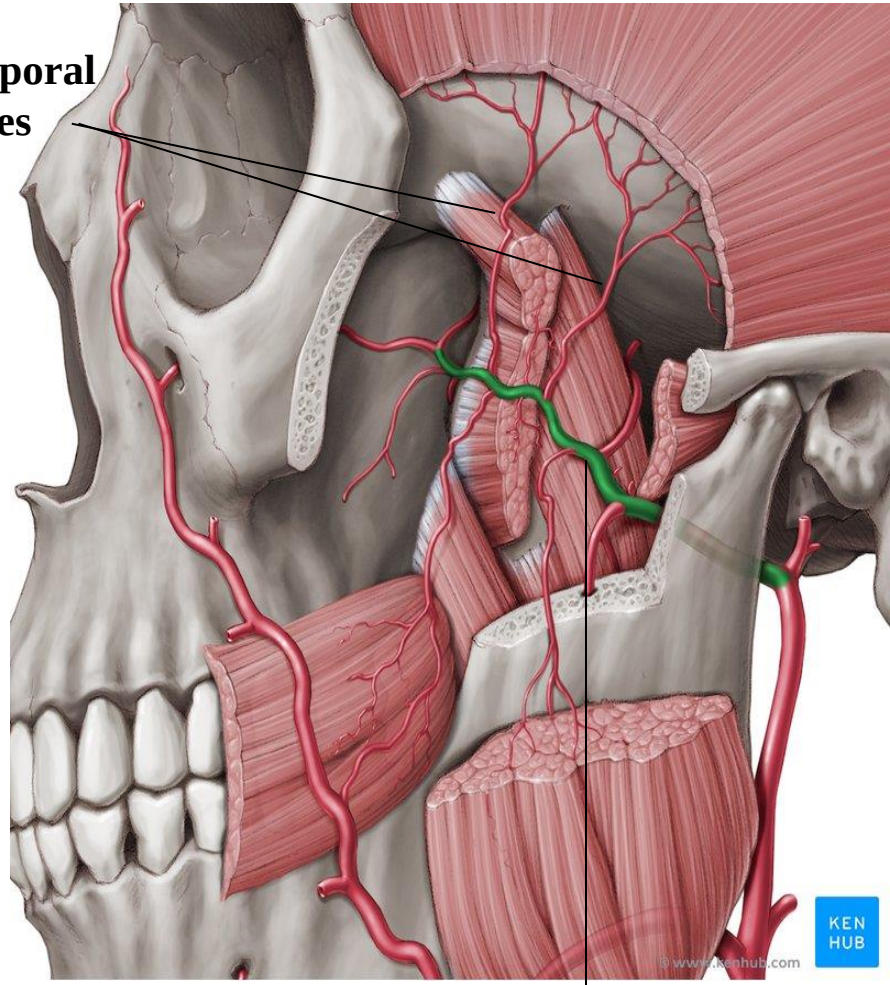
Superficial temporal artery





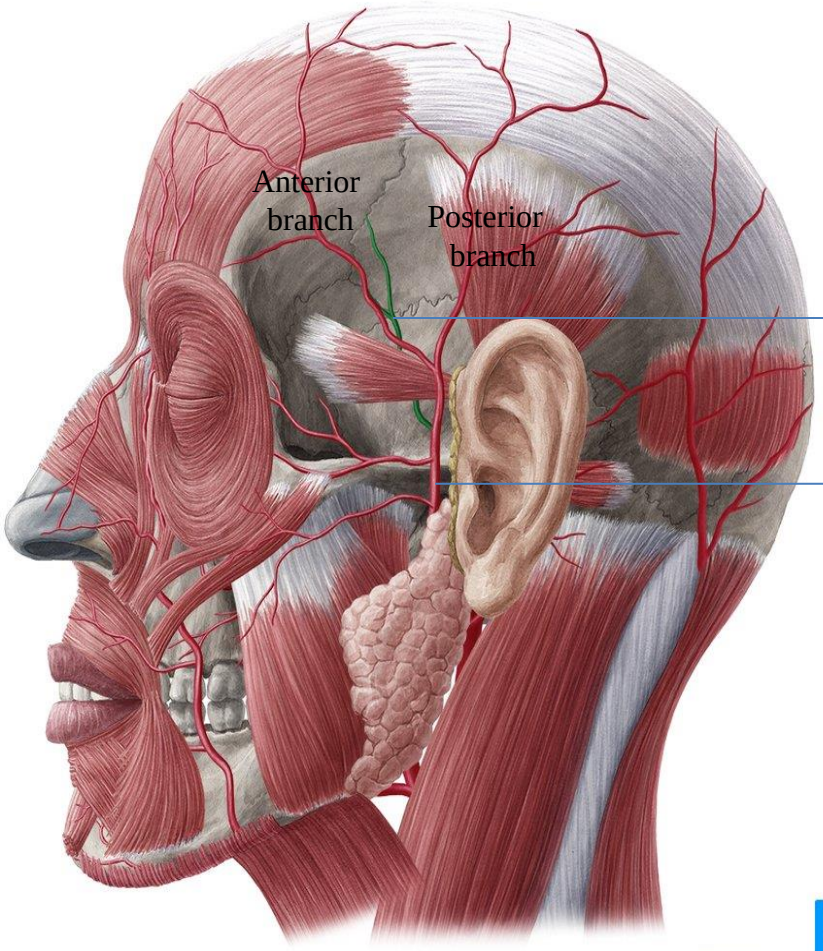
Superficial temporal vein





Mandibular nerve

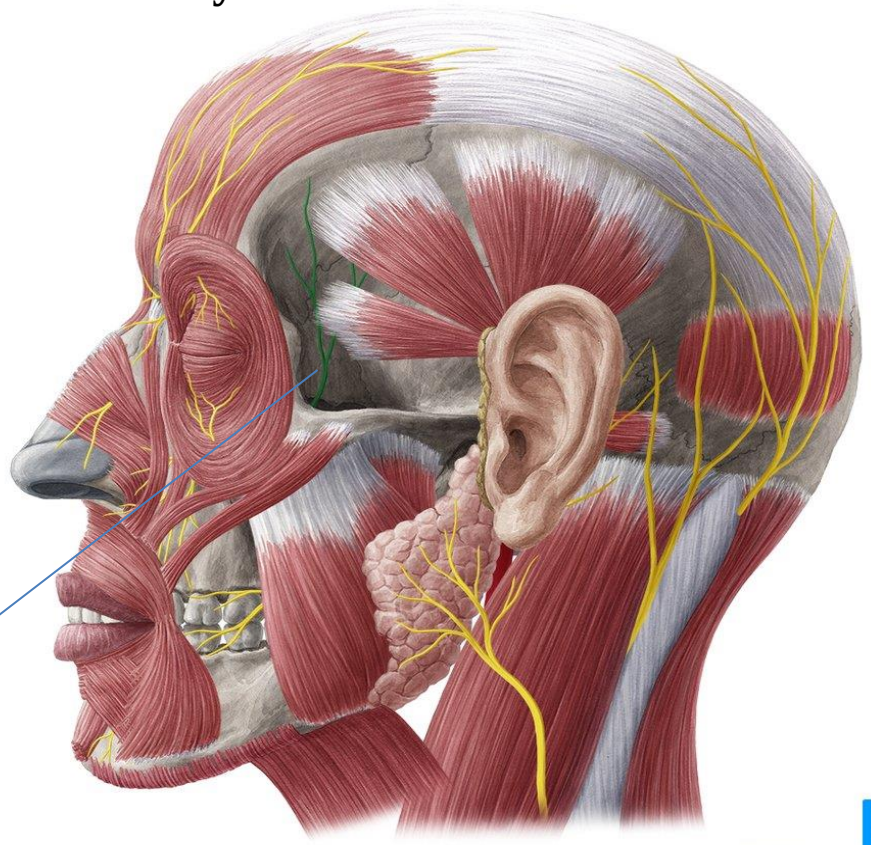
Maxillary artery



Middle temporal artery

Superficial temporal artery

Zygomaticotemporal nerve

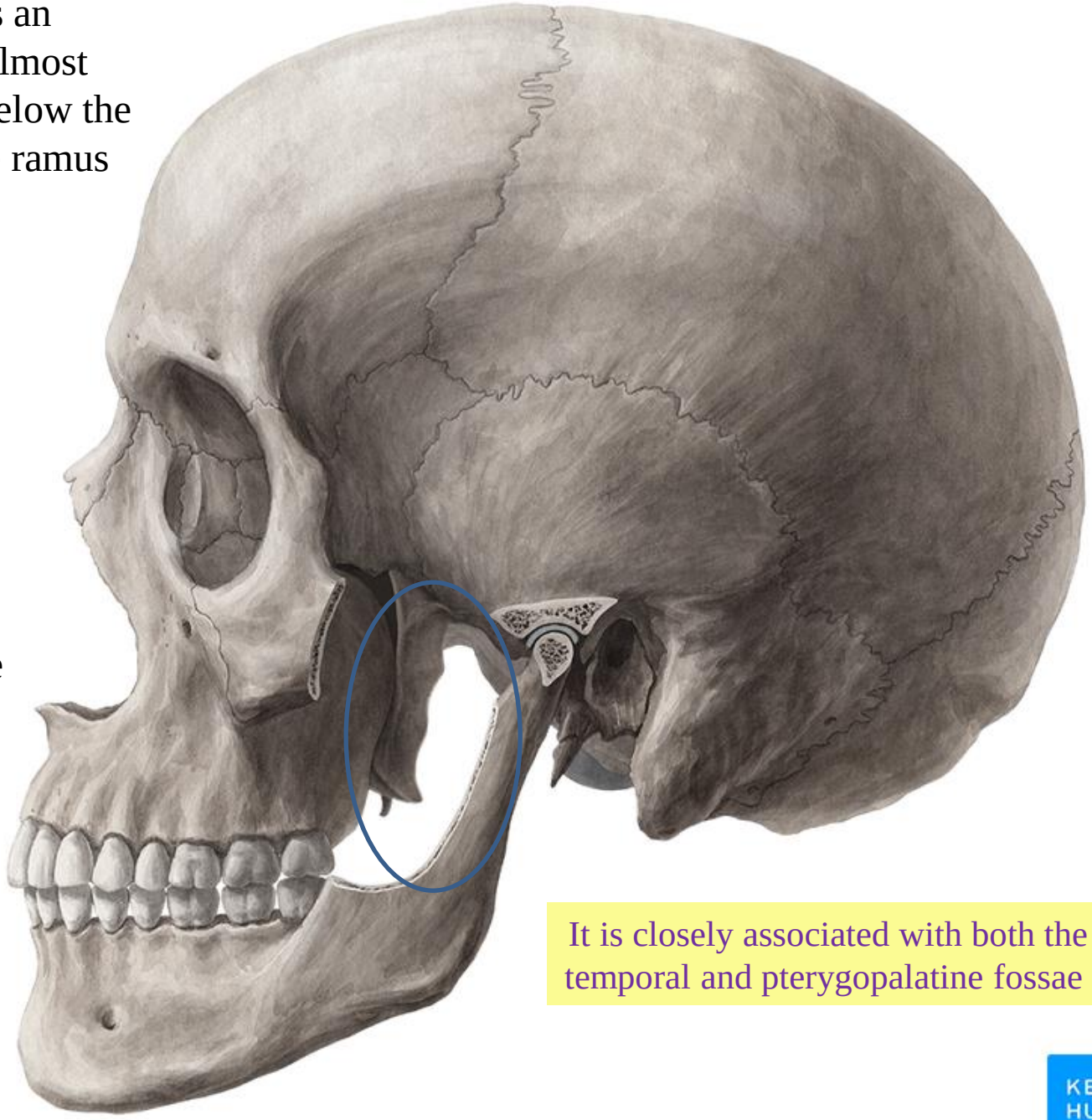


The **infratemporal fossa** is an irregularly shaped cavity (almost wedge in shape), situated below the zygomatic arch, deep to the ramus of the mandible

The infratemporal fossa acts as a pathway for neurovascular structures passing to and from the cranial cavity, pterygopalatine fossa and temporal fossa.

It also contains some of the muscles of mastication

The **medial** and **lateral pterygoids** are located within the fossa itself, whilst the masseter and temporalis muscles insert and originate into the borders of the fossa.



It is closely associated with both the temporal and pterygopalatine fossae

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Infra temporal fossa

Anterior wall: back of the maxilla

Medial wall: lateral pterygoid plate

Roof: greater wing of sphenoid bone

Lateral wall: ramus of mandible

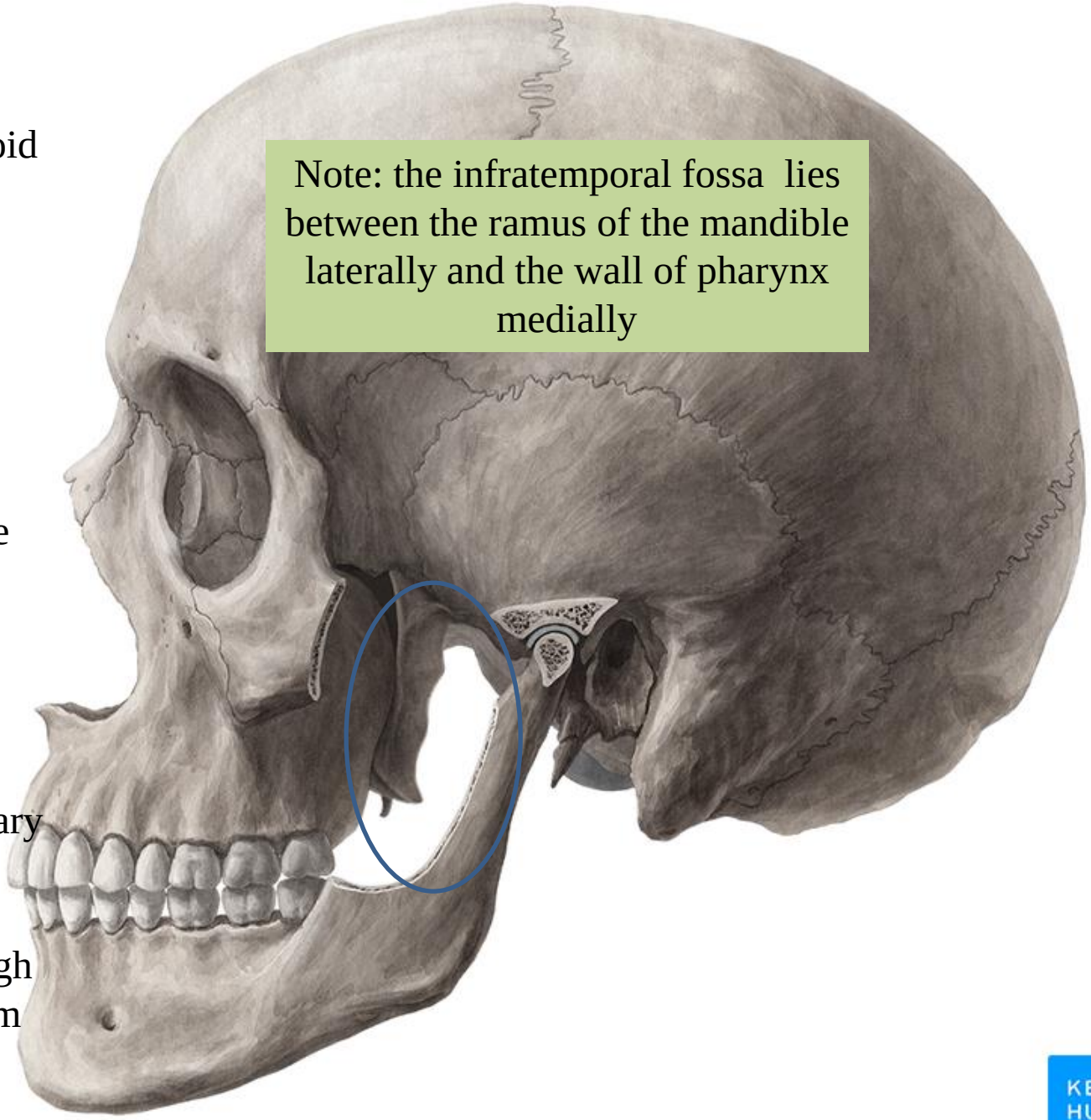
Communications

Temporal fossa: through the gap deep to the zygomatic arch

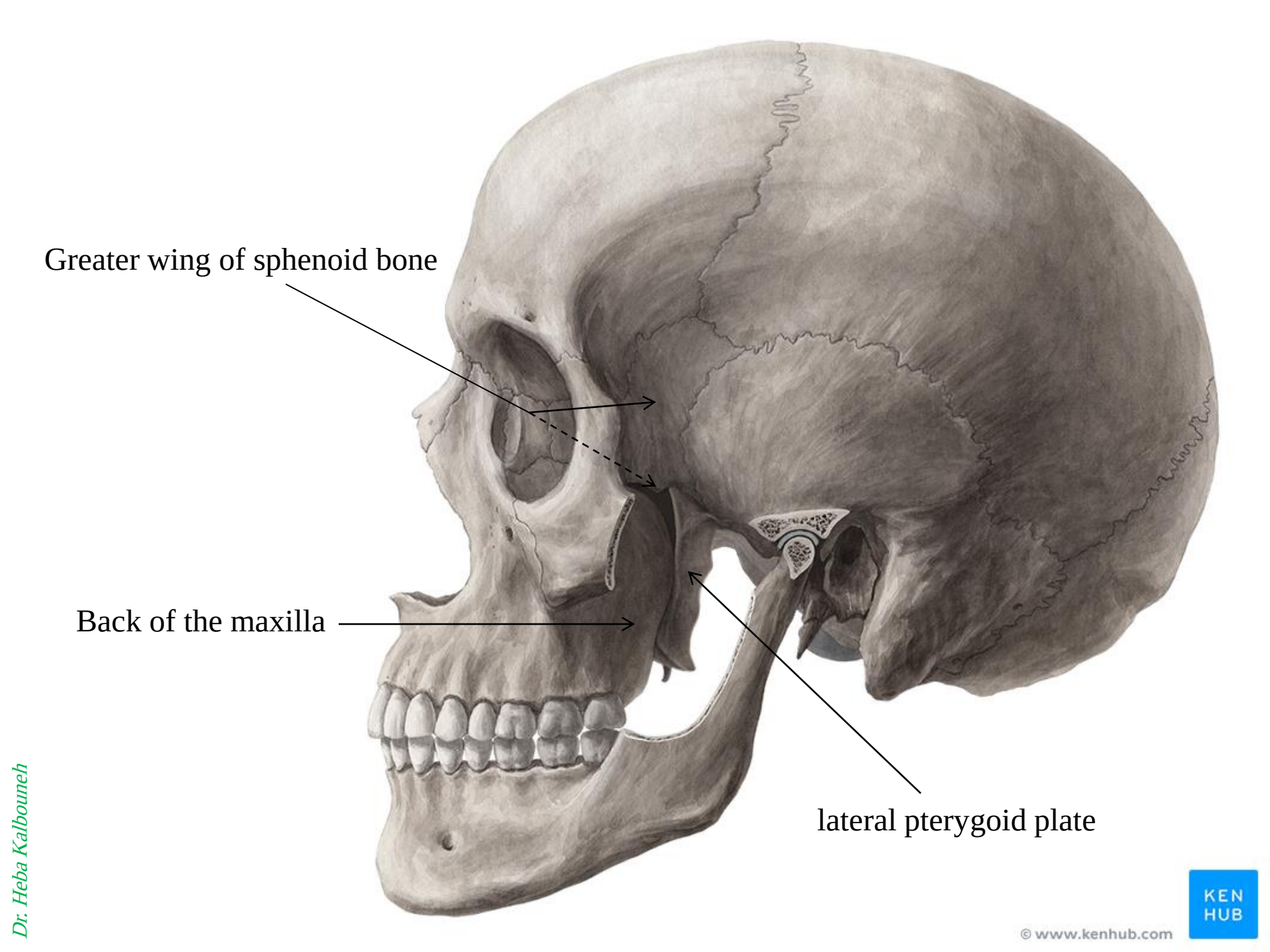
Orbit: through the inferior orbital fissure

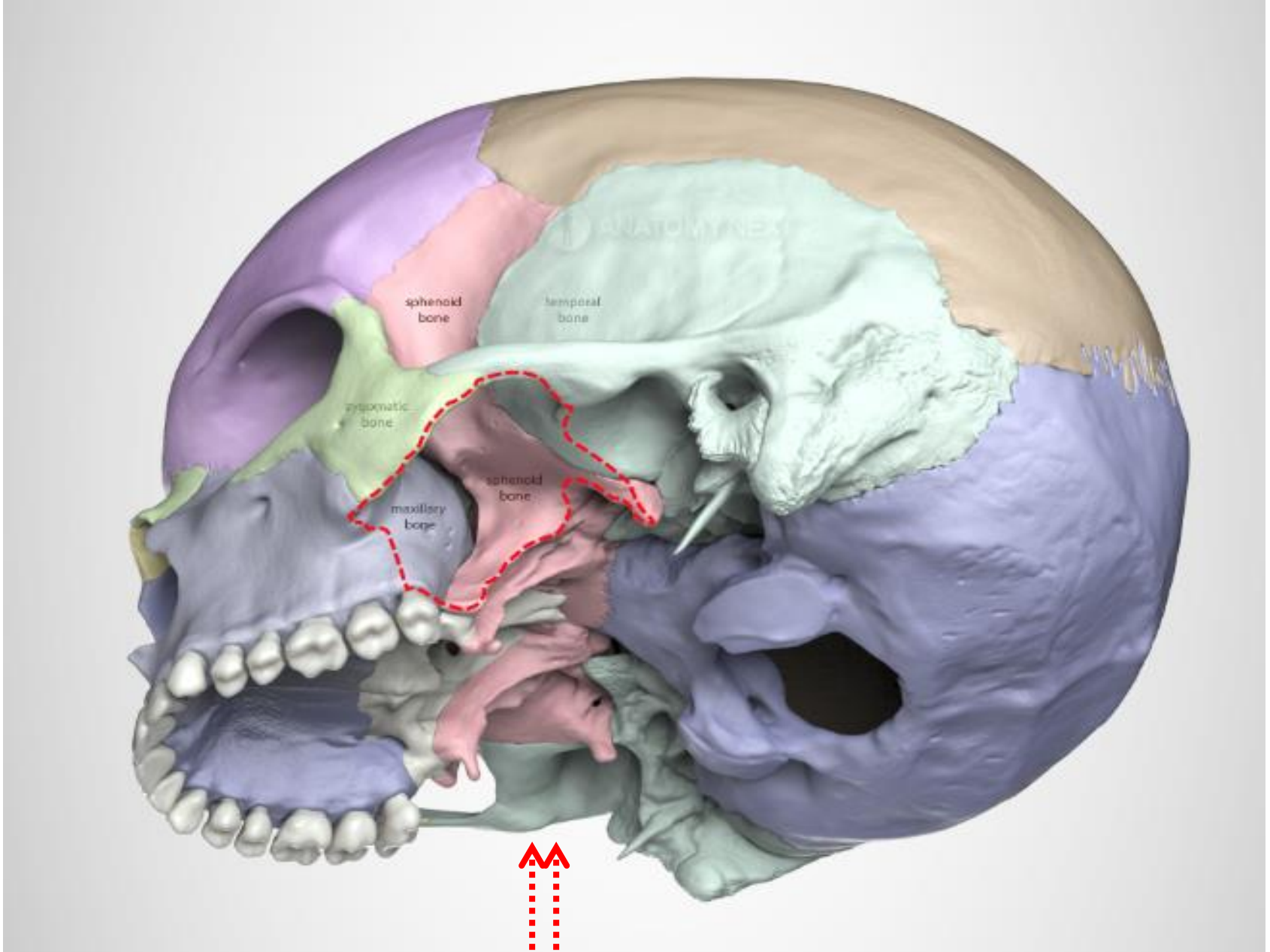
Pterygo-palatine fossa: through the pterygo-maxillary fissure

Middle cranial fossa: through foramen ovale and spinosum



Note: the infratemporal fossa lies between the ramus of the mandible laterally and the wall of pharynx medially

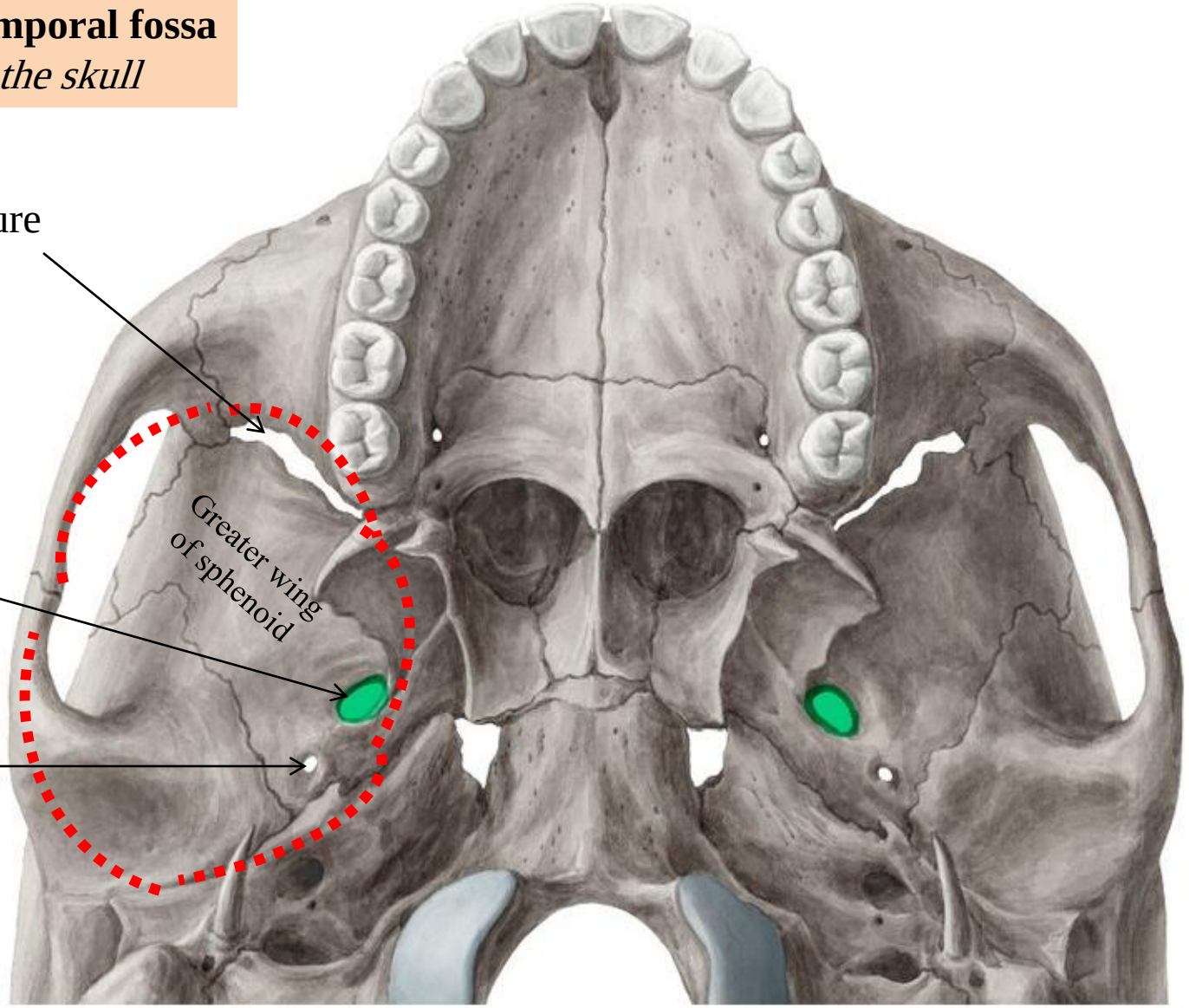




Infratemporal fossa

The roof of Infratemporal fossa

Inferior view of the skull



Note:
The foramen ovale and foramen spinosum open on its roof

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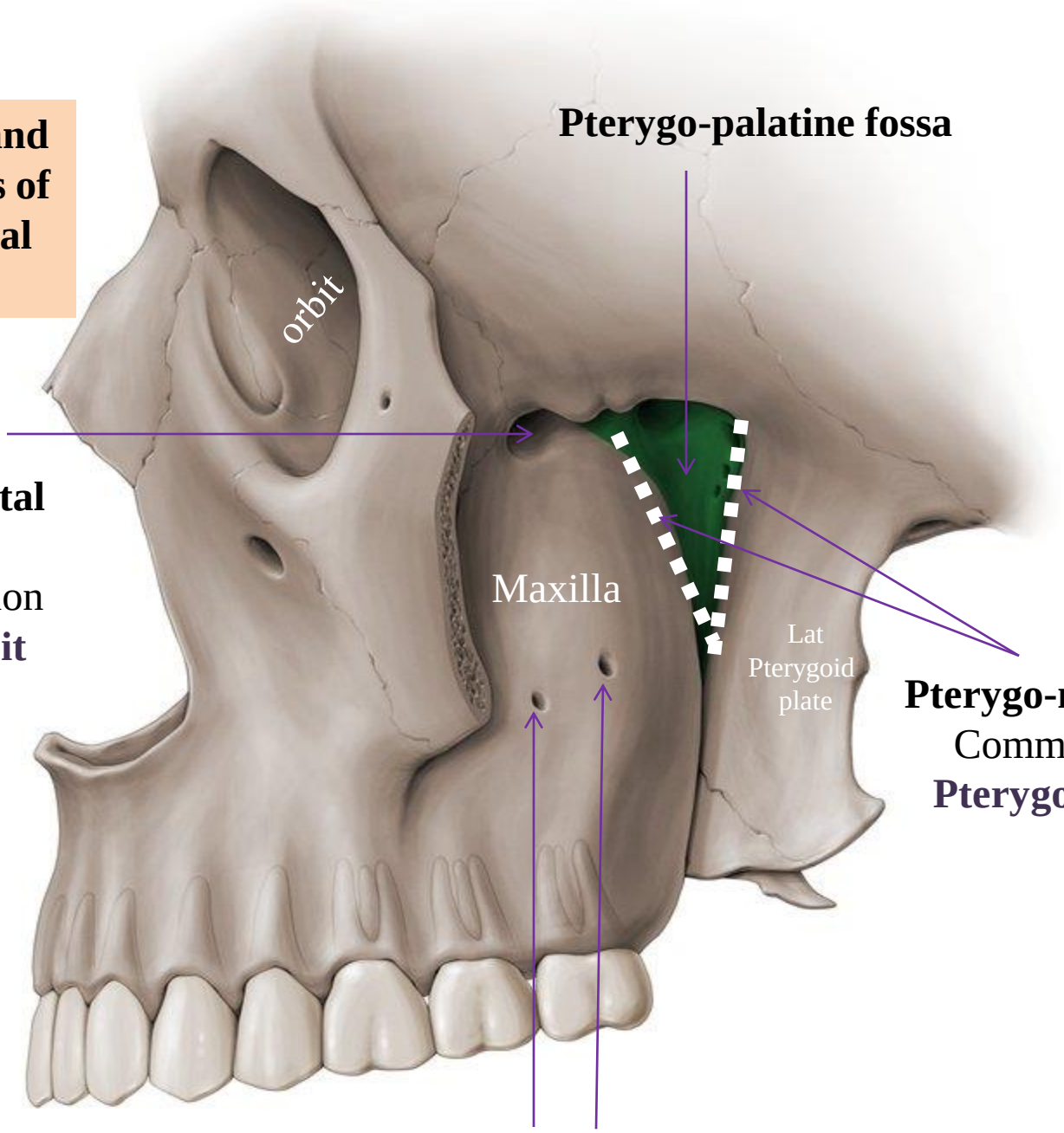
The medial and anterior walls of Infratemporal fossa



Pterygo-palatine fossa

Inferior orbital fissure
Communication with the **orbit**

Pterygo-maxillary fissure
Communication with **Pterygo-palatine fossa**

Alveolar foramina (leading to alveolar canals)

Lateral wall is formed by the medial surface of the ramus of mandible
Which contains the **mandibular foramen**

The lateral wall of Infratemporal fossa

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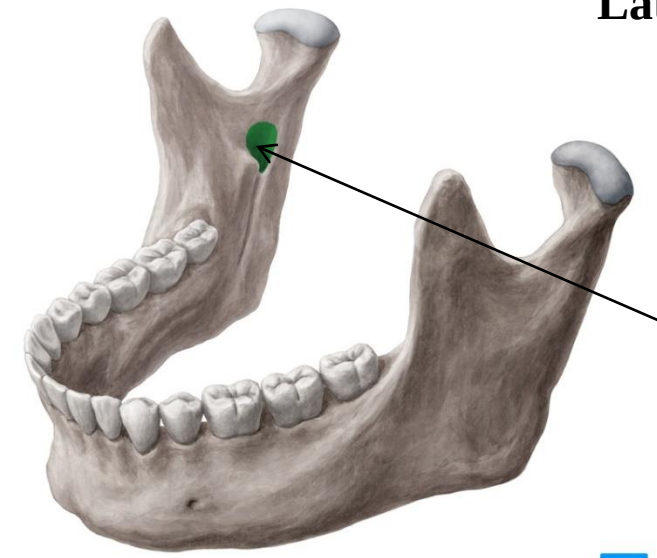
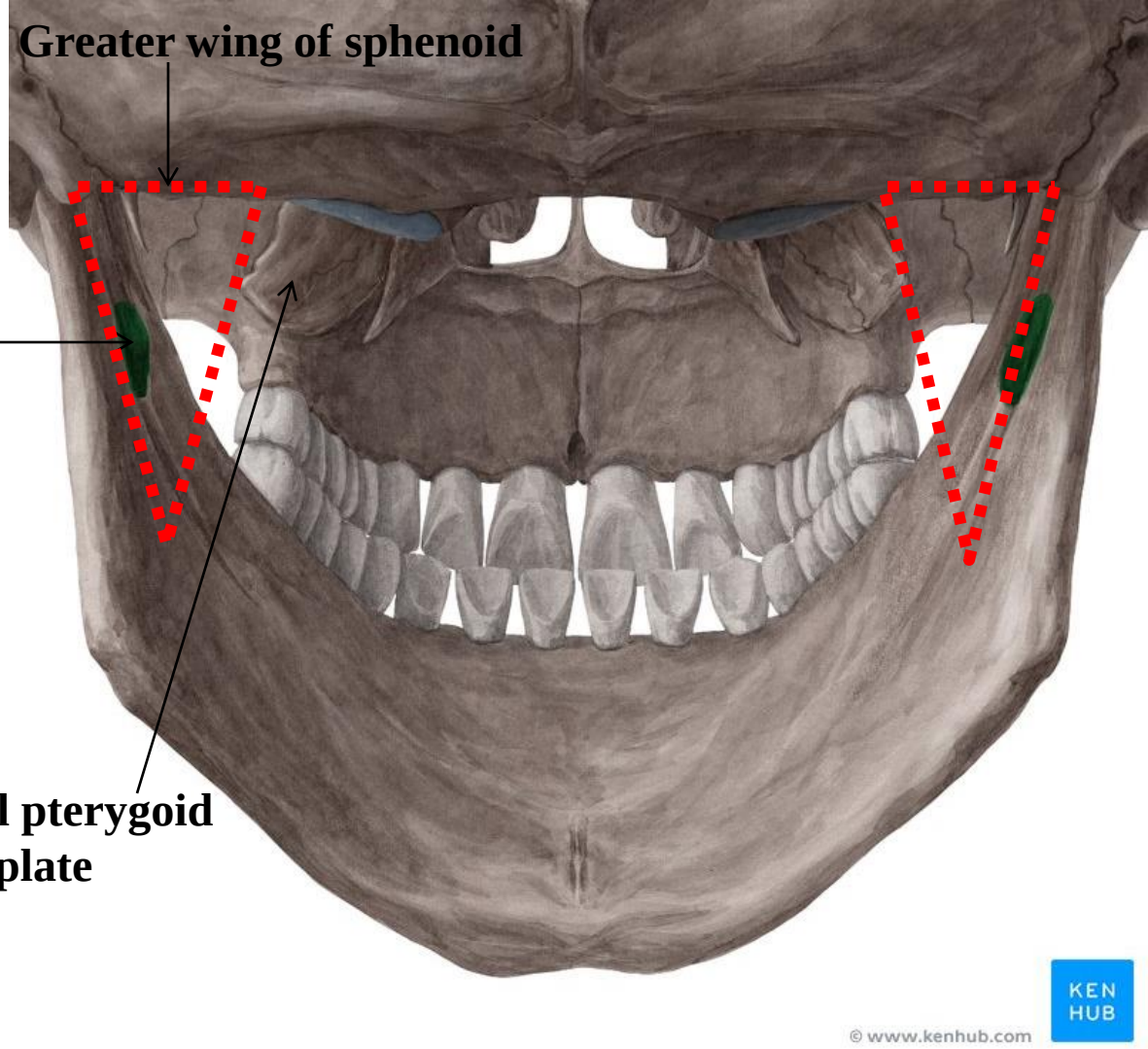
The infratemporal fossa can be said to have a **wedge** shape

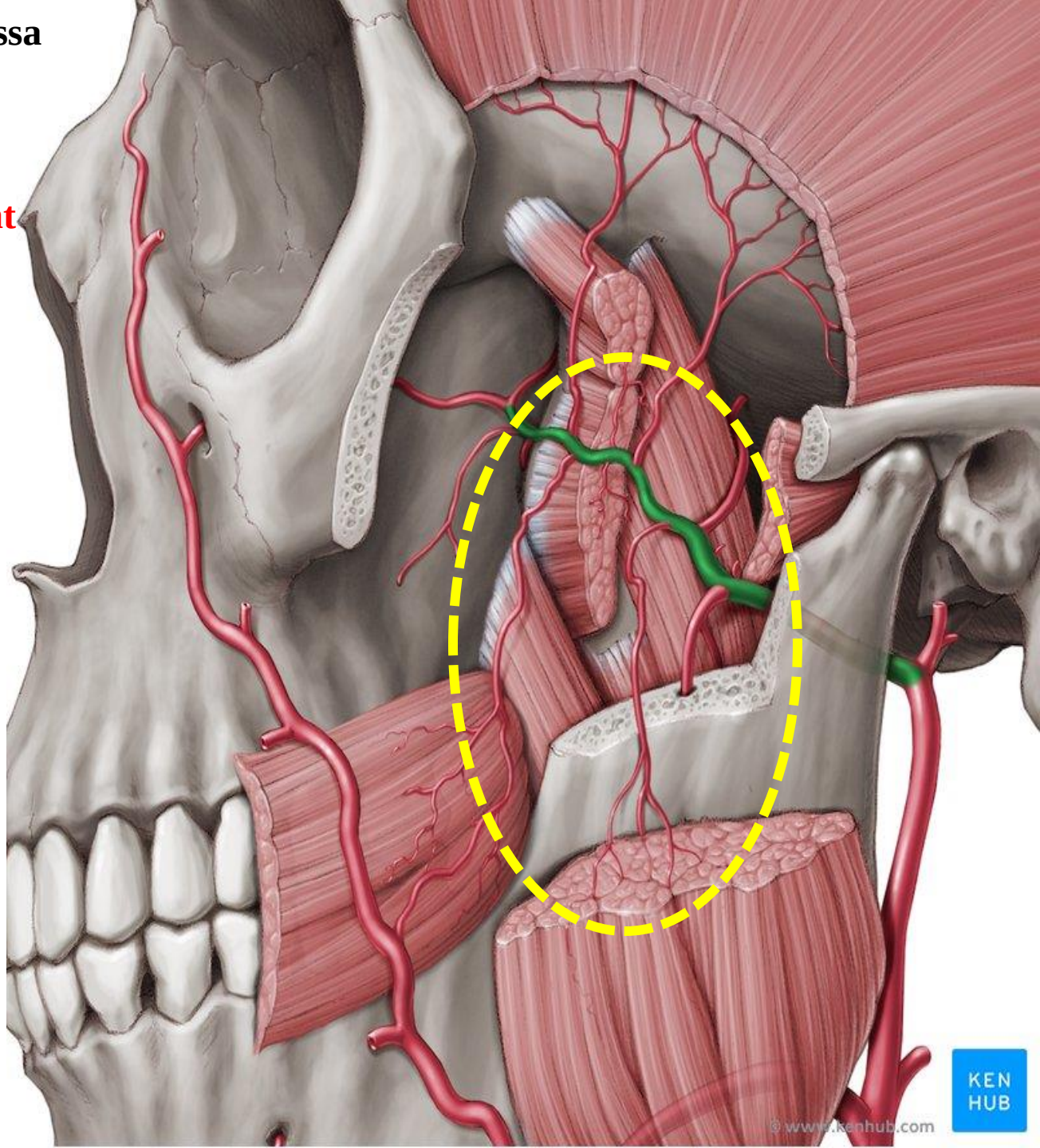




Mandibular foramen: an opening to the mandibular canal
Transmits inferior alveolar nerve (a branch from mandibular nerve) and blood vessels

Contents of infratemporal fossa

Lateral pterygoid muscle
Medial pterygoid muscle
Sphenomandibular ligament
Maxillary artery (and its branches:
☺ *Middle meningeal artery*
Deep temporal arteries
Buccal artery
Inferior alveolar artery
Pterygoid branches
Mandibular nerve (and its branches:
Auriculotemporal nerve
Buccal nerve
Lingual nerve
Inferior alveolar nerve
Chorda tympani
Pterygoid venous plexus
Maxillary vein
Middle meningeal vein
Otic ganglion



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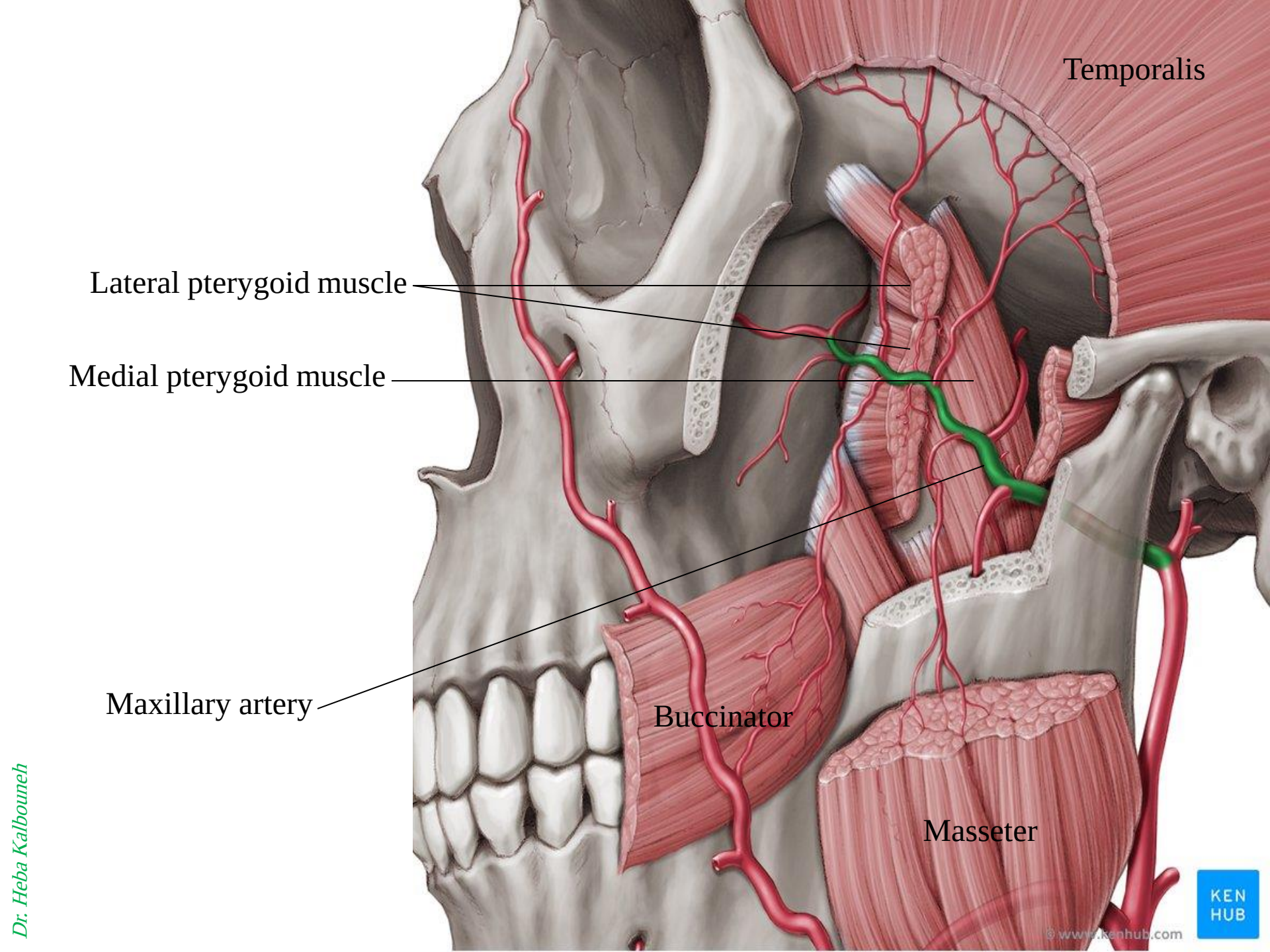
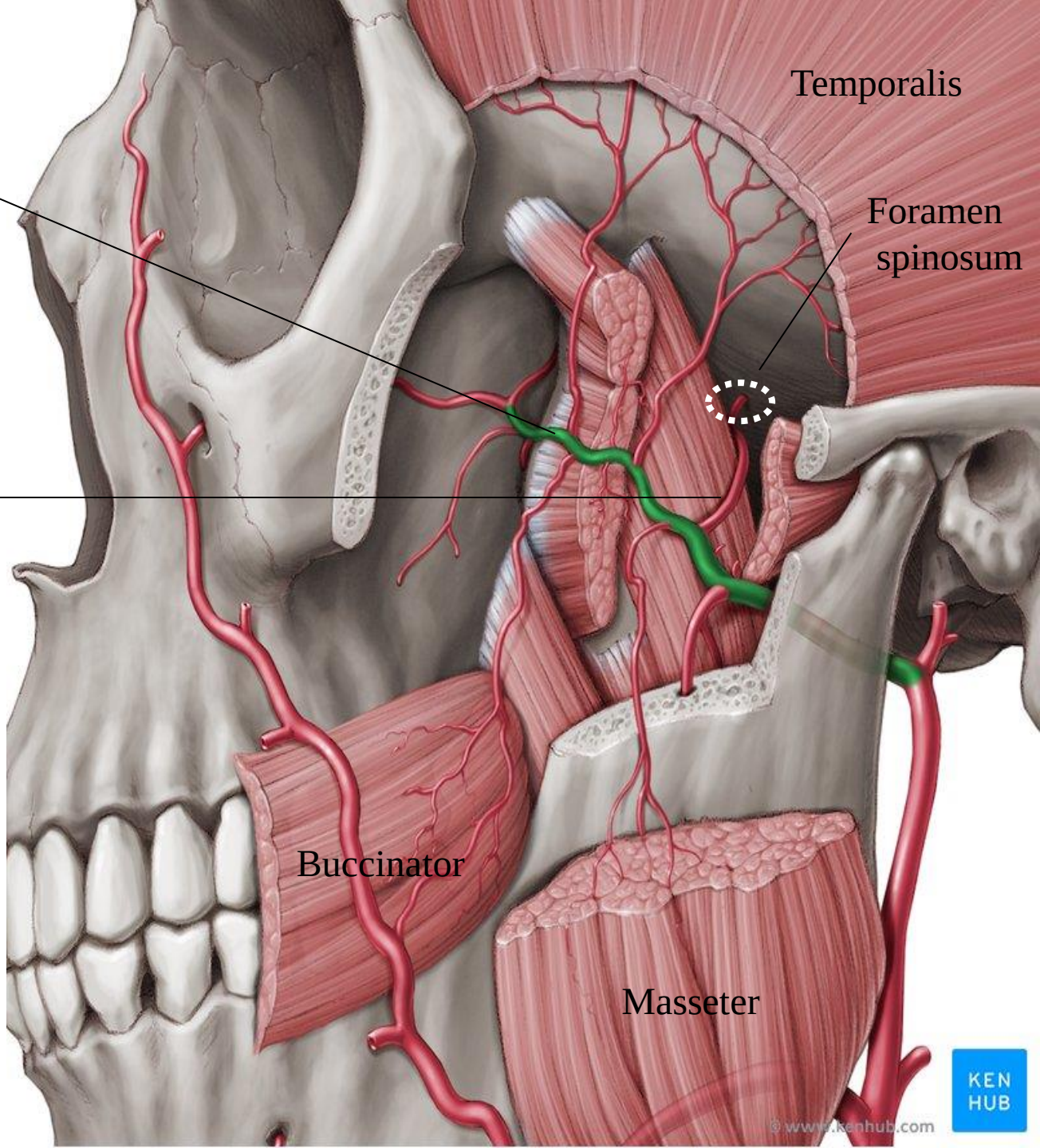


Maxillary artery the terminal branch of the external carotid artery. It travels through the infratemporal fossa.

Within the fossa, it gives rise to the **middle meningeal artery,** which passes through the foramen spinosum.



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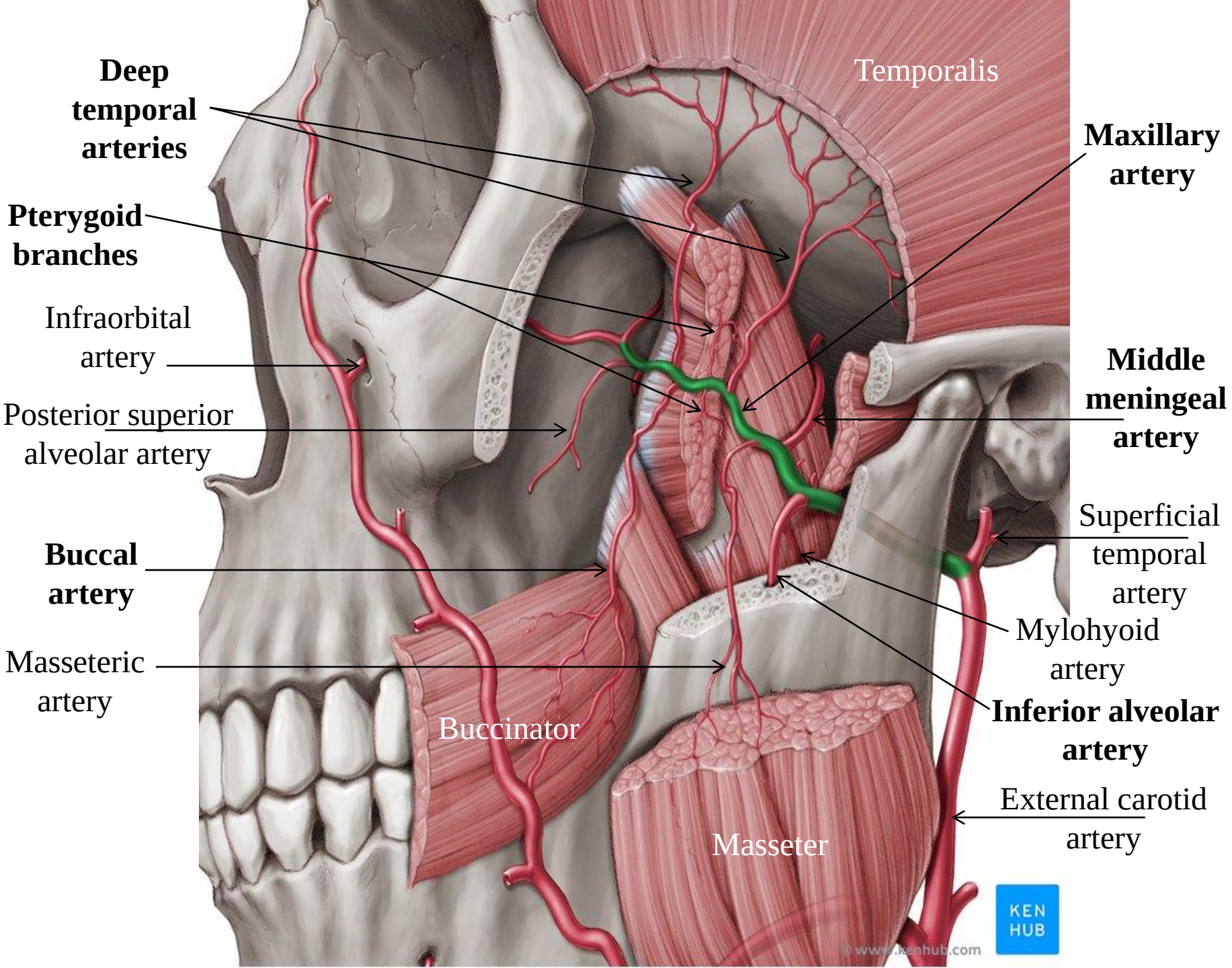
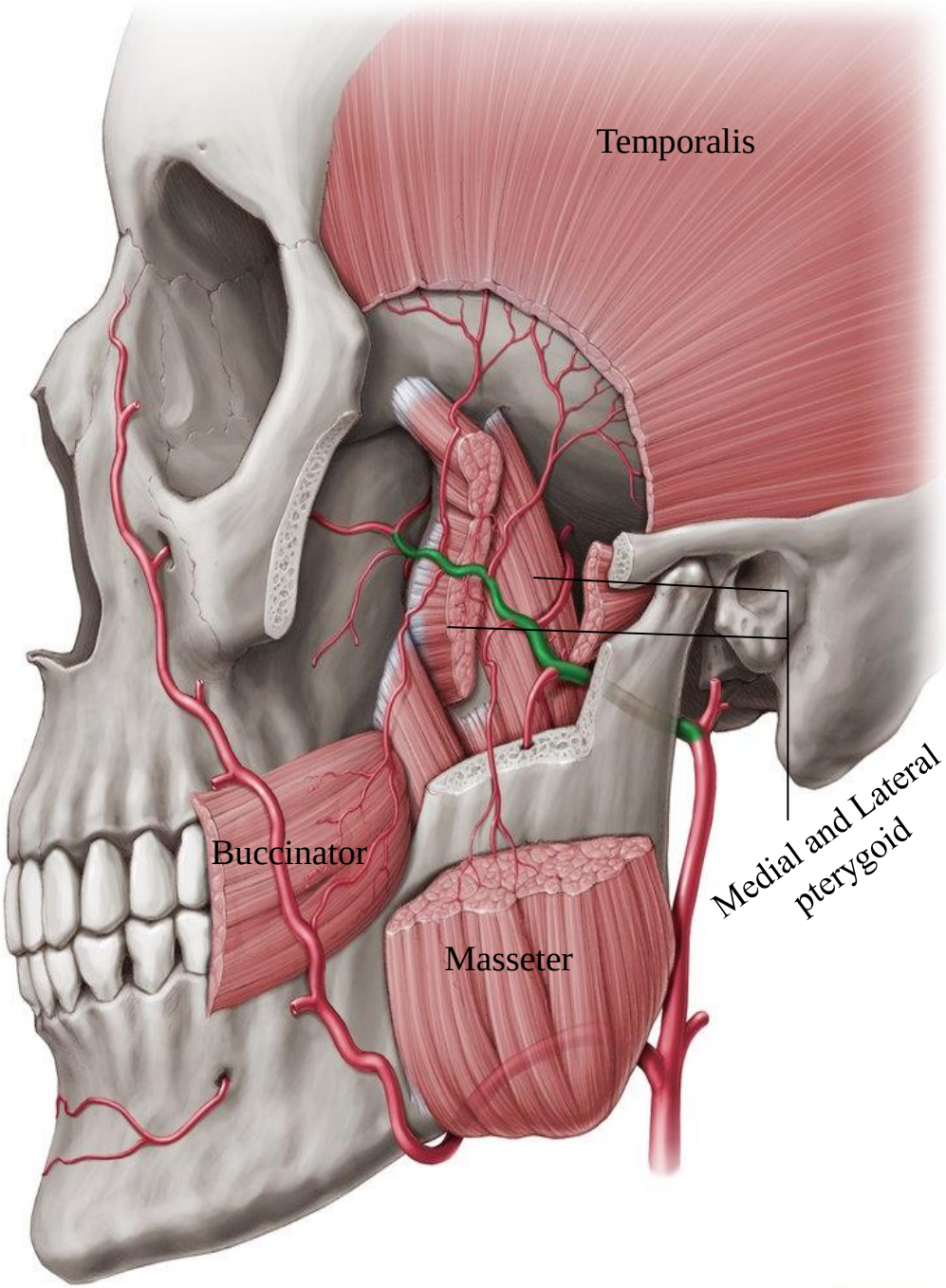
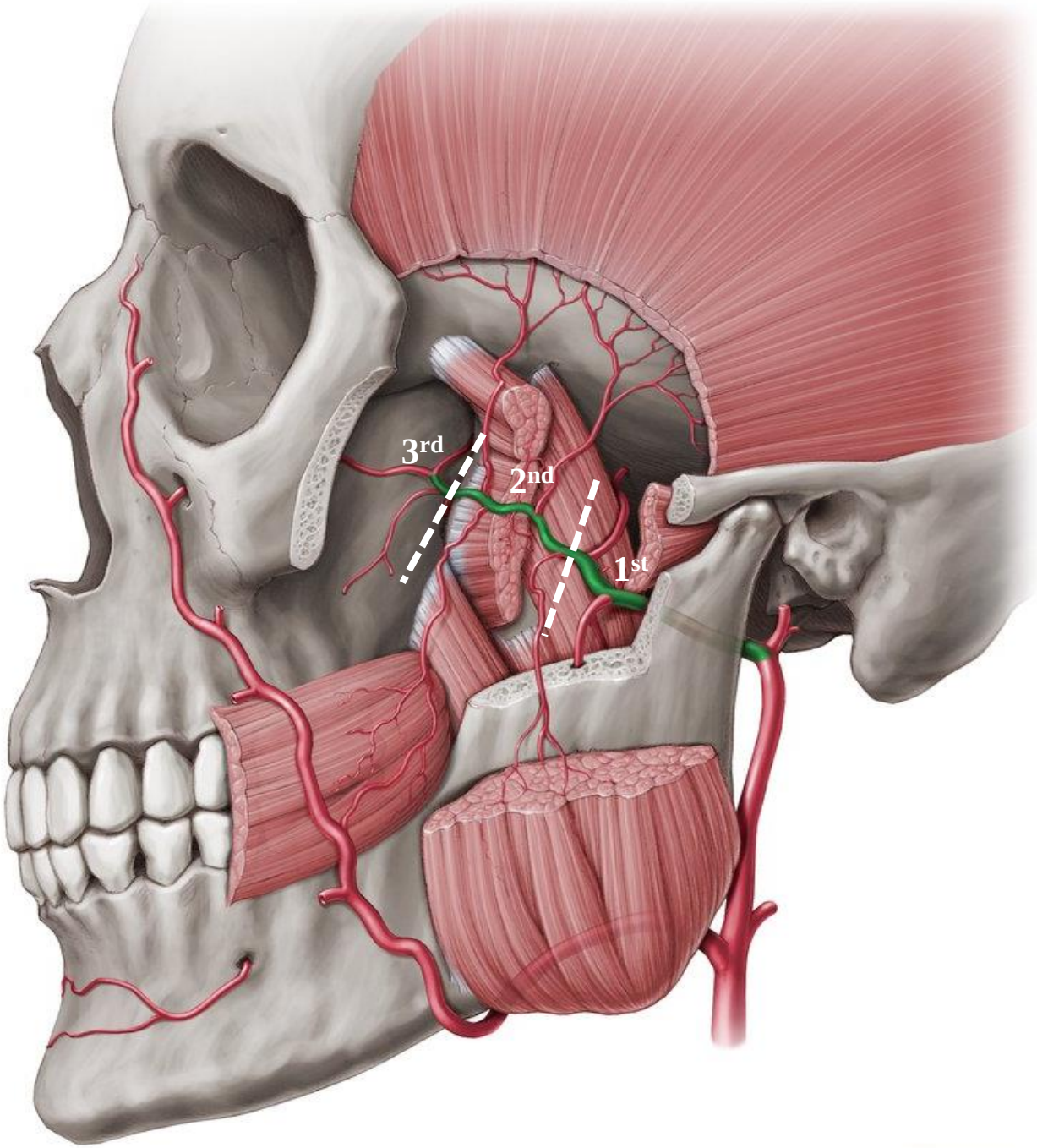




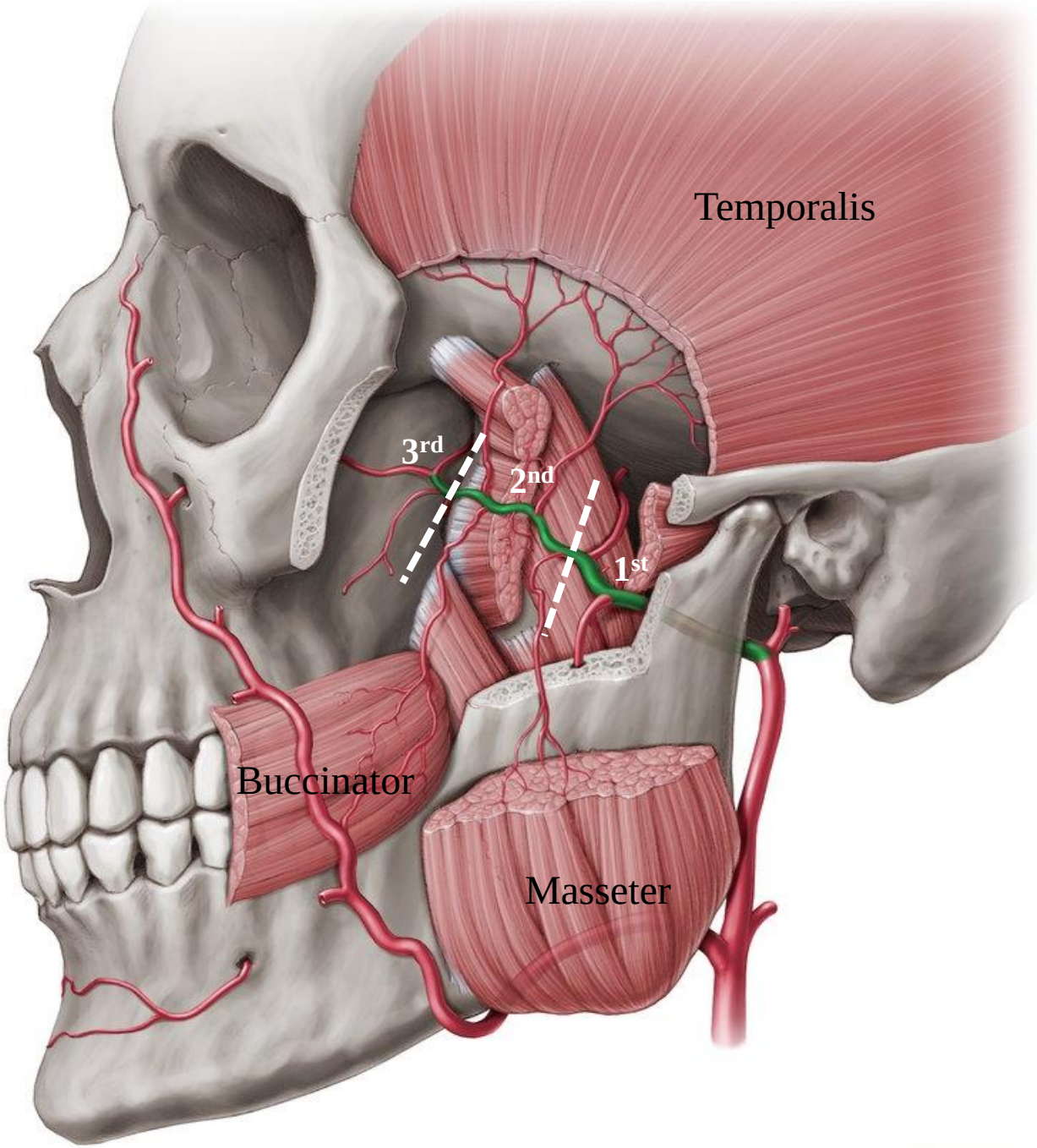
The maxillary artery

- ✓ The larger of the two terminal branches of the external carotid artery
- ✓ Originates in the substance of the parotid gland
- ✓ Passes forward between the neck of the mandible and the spheno-mandibular ligament into the infratemporal fossa
- ✓ Ascends obliquely in the infratemporal fossa to enter the pterygopalatine fossa by passing through the pterygomaxillary fissure
- ✓ Runs either superficial or deep to the lower head of lateral pterygoid muscle
- ✓ It supplies the deep structures of the face, maxilla, mandible, all teeth, nasal cavity and cerebral dura mater



The main trunk of the maxillary artery is divided into three parts, which are named according to related structures along the artery's course

Mandibular part (1st part)
Pterygoid part (2nd part)
Pterygopalatine part (3rd part)

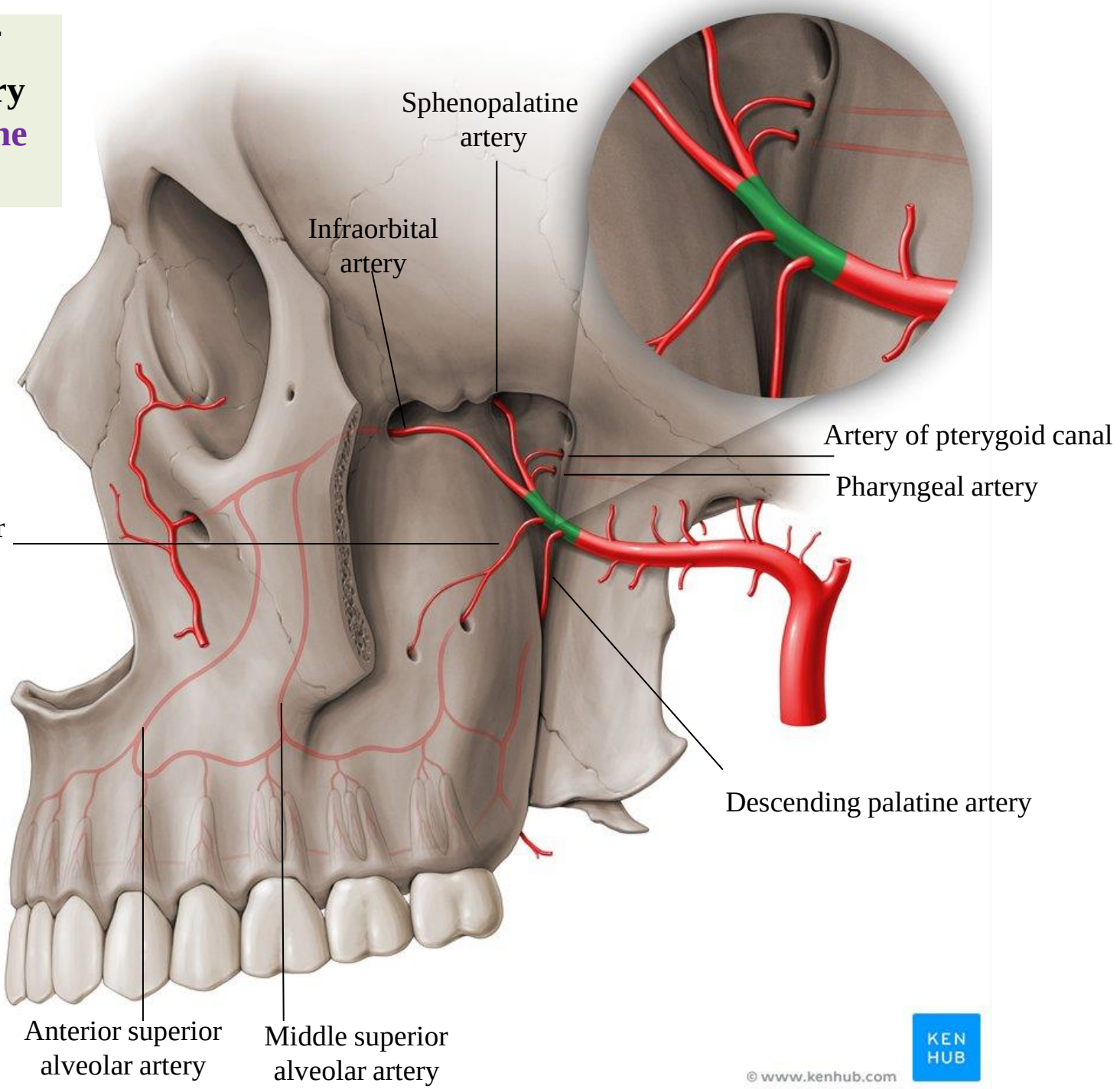


Mandibular part (1st part)
Middle meningeal artery
Inferior alveolar artery
Deep auricular artery
Anterior tympanic artery
Accessory meningeal artery

Pterygoid part (2nd part)
(its branches course with branches of mandibular nerve)
Deep temporal arteries
Masseteric artery
Buccal artery
Pterygoid branches

Pterygopalatine part (3rd part)
(its branches course with branches of maxillary nerve and pterygopalatine ganglion)
Sphenopalatine artery
Descending palatine artery
Infraorbital artery (gives off Middle and Anterior superior alveolar arteries)
Posterior superior alveolar artery
Pharyngeal artery
Artery of the pterygoid canal

Third part of maxillary artery (Pterygopalatine part)



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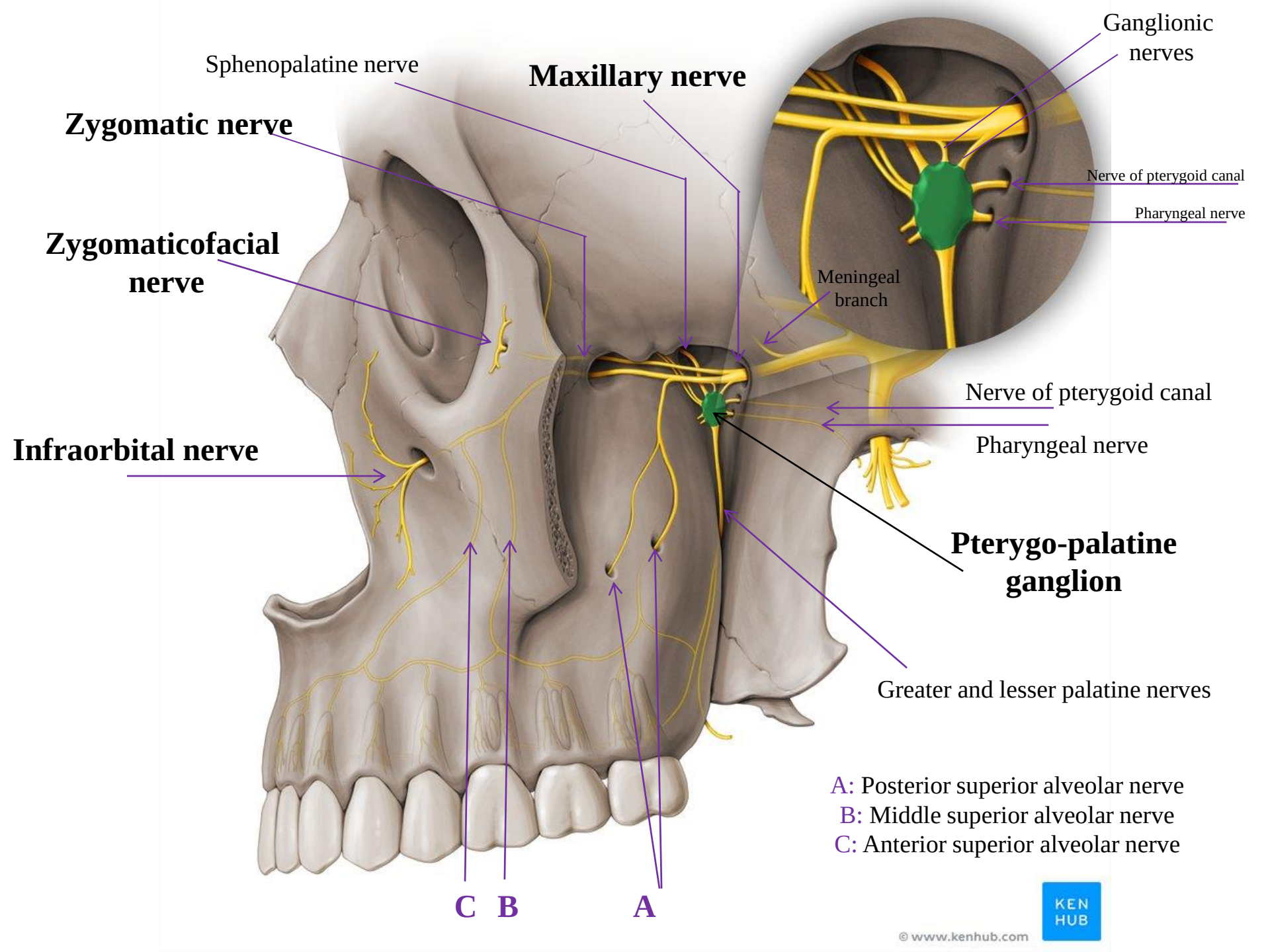
Sphenopalatine nerve
Maxillary nerve
Ganglionic nerves
Zygomatic nerve
Nerve of pterygoid canal
Pharyngeal nerve
Zygomaticofacial nerve
Meningeal branch
Nerve of pterygoid canal
Infraorbital nerve
Pharyngeal nerve
Pterygo-palatine ganglion
Greater and lesser palatine nerves
C
B
A
A: Posterior superior alveolar nerve
B: Middle superior alveolar nerve
C: Anterior superior alveolar nerve
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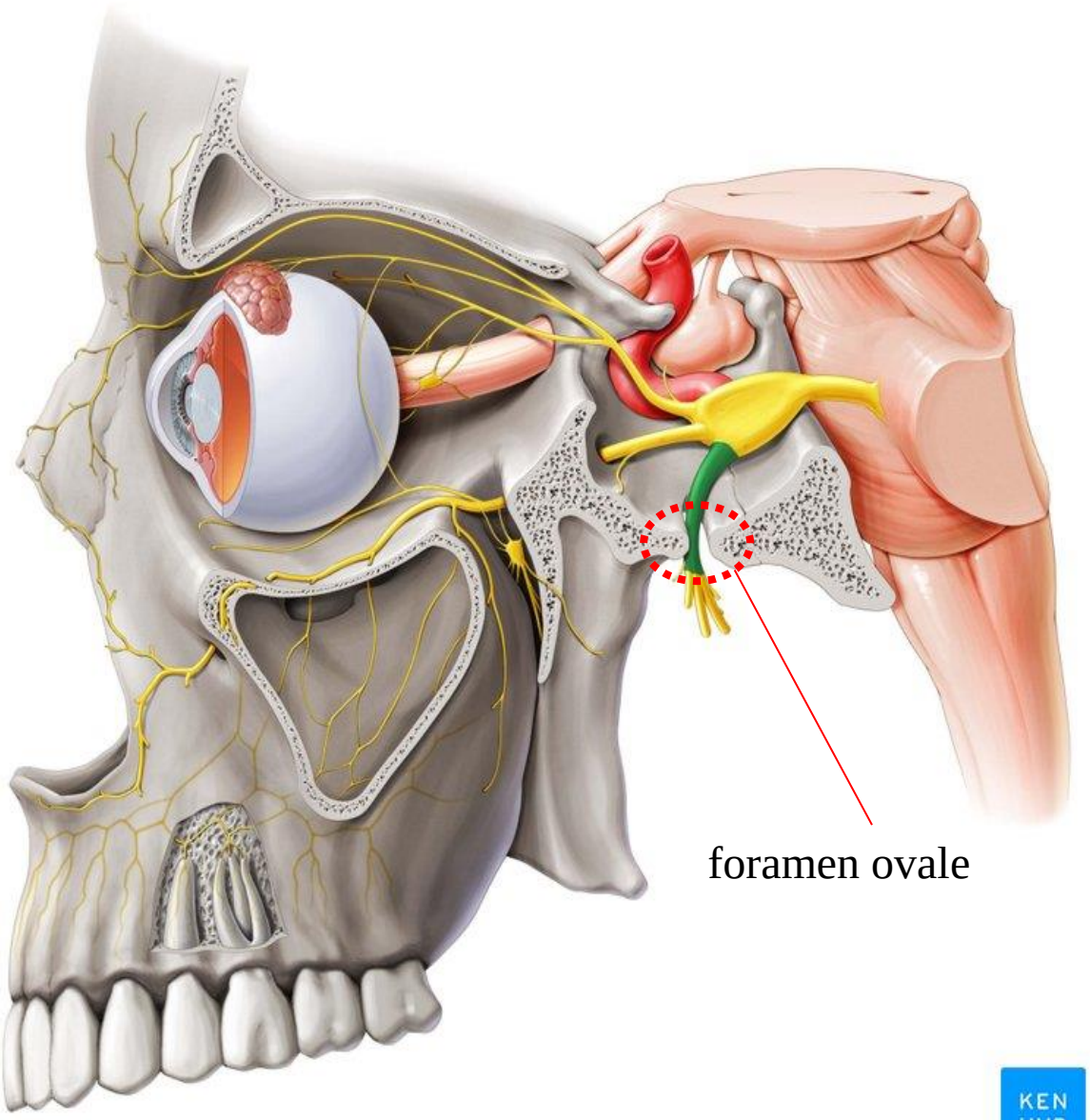
Mandibular Nerve (V3)

The mandibular nerve is both motor and sensory

The sensory root leaves the trigeminal ganglion and passes out of the skull through the foramen ovale to enter the infratemporal fossa.

The motor root of the trigeminal nerve also leaves the skull through the foramen ovale and joins the sensory root to form the trunk of the mandibular nerve

Then divides into a small anterior and a large posterior division



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Branches From the Main Trunk of the Mandibular Nerve:

1- Meningeal branch
2- Nerve to the medial pterygoid muscle

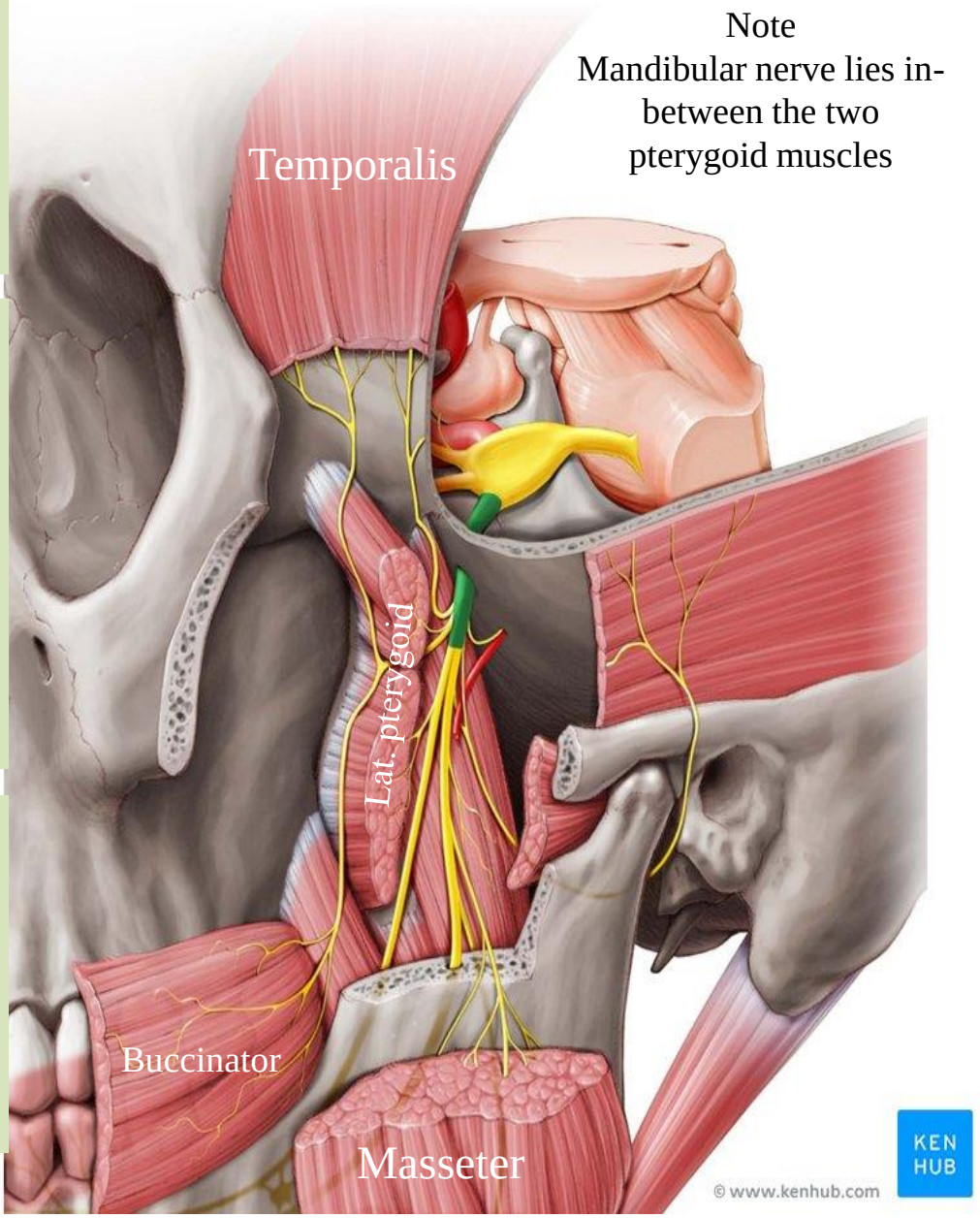
Branches From the Anterior Division of the Mandibular Nerve

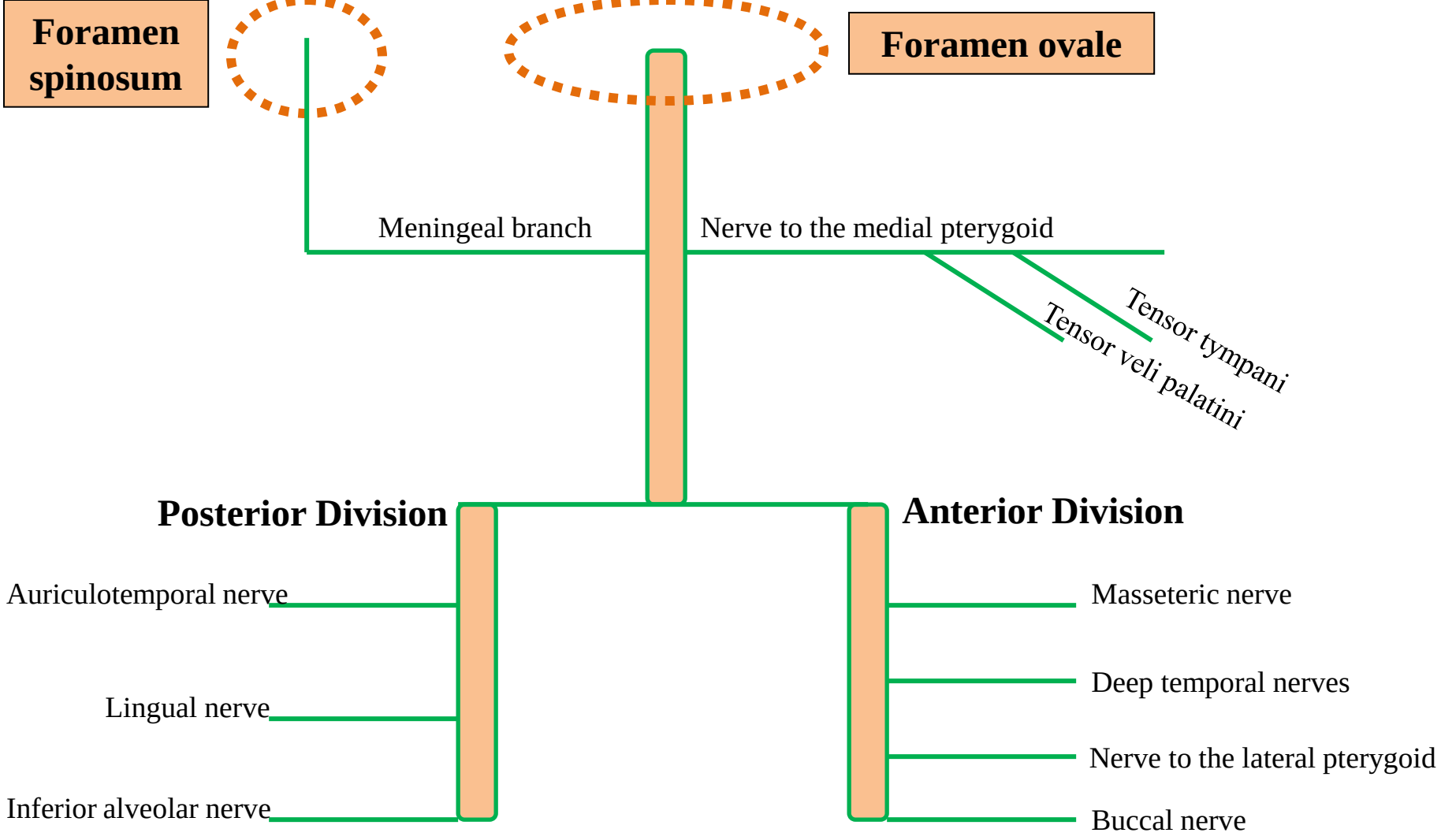
1- Masseteric nerve (to masseter muscle)
2- Deep temporal nerves (to temporalis muscle)
3- Nerve to the lateral pterygoid muscle
4- Buccal nerve

Branches From the Posterior Division of the Mandibular Nerve

1- Auriculotemporal nerve
2- Lingual nerve
3- Inferior alveolar nerve

Note
Mandibular nerve lies in-between the two pterygoid muscles

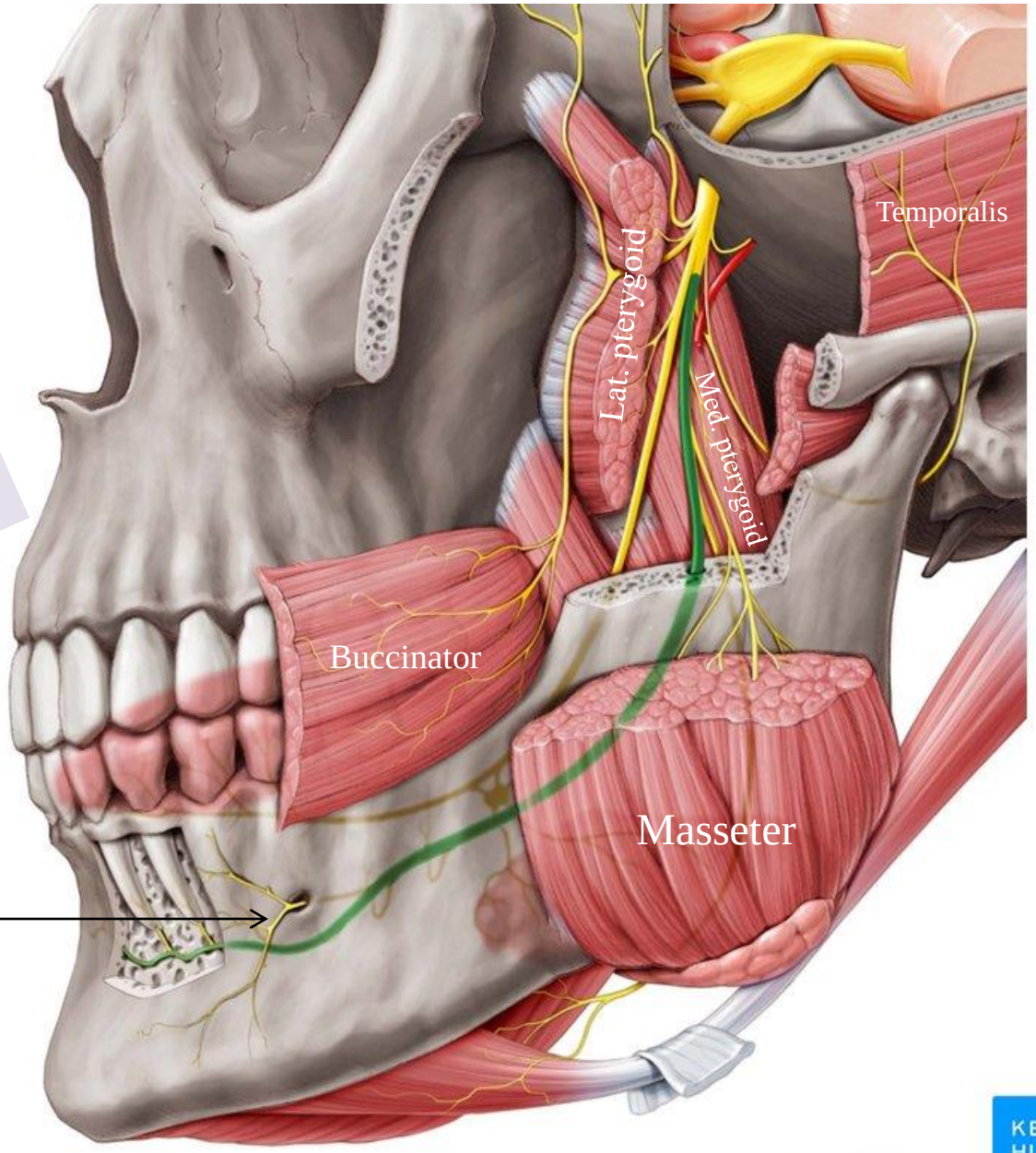



Foramen spinosum
Foramen ovale
Meningeal branch
Nerve to the medial pterygoid
Tensor tympani
Tensor veli palatini
Posterior Division
Anterior Division
Auriculotemporal nerve
Lingual nerve
Inferior alveolar nerve
Masseteric nerve
Deep temporal nerves
Nerve to the lateral pterygoid
Buccal nerve

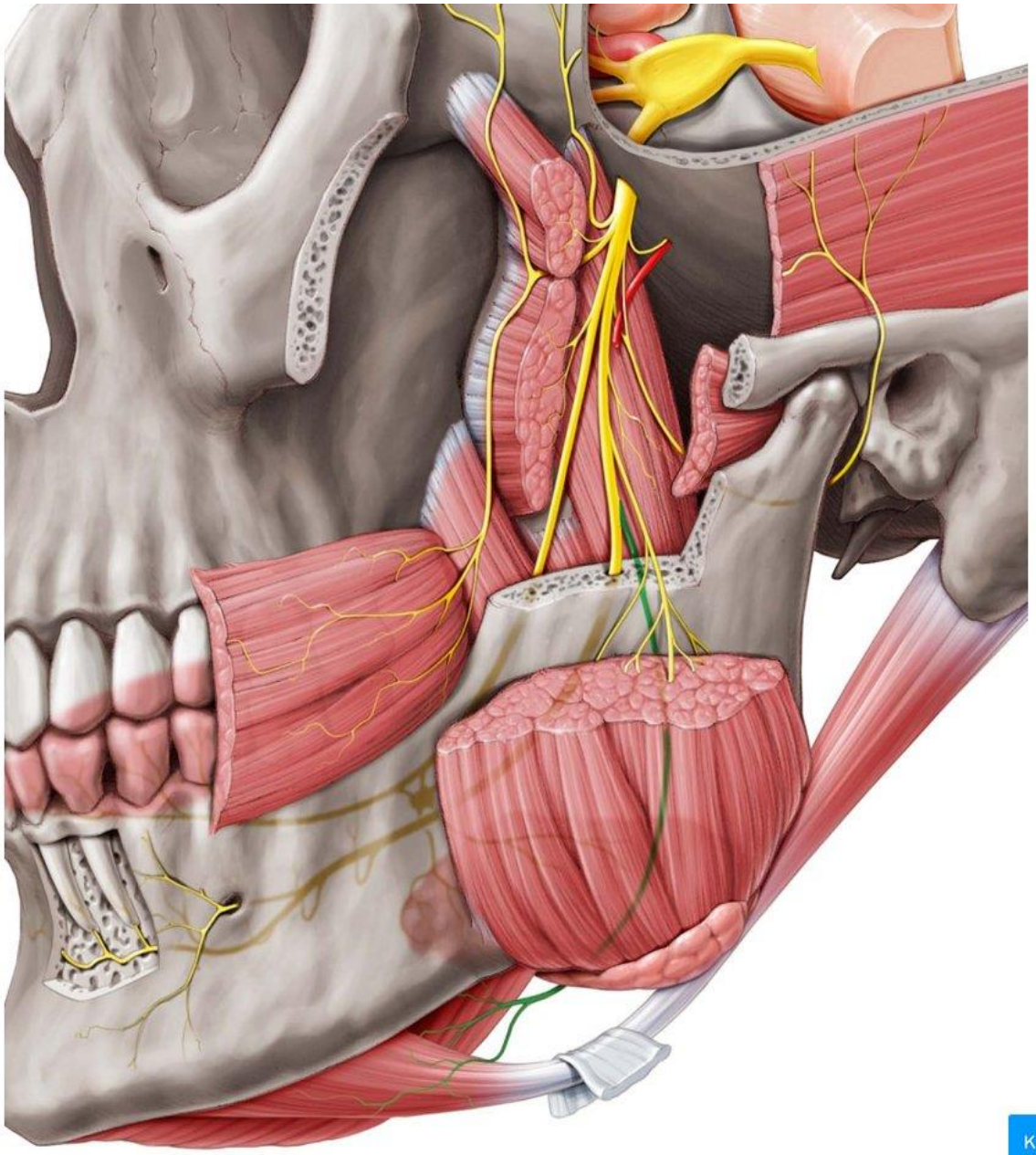
The **inferior alveolar nerve (inferior dental nerve)** is a branch of the mandibular nerve

It supplies sensation to the lower teeth, lower lip and chin

Before entering the canal, it gives off **nerve to mylohyoid,** which supplies the mylohyoid muscle and the anterior belly of the digastric muscle

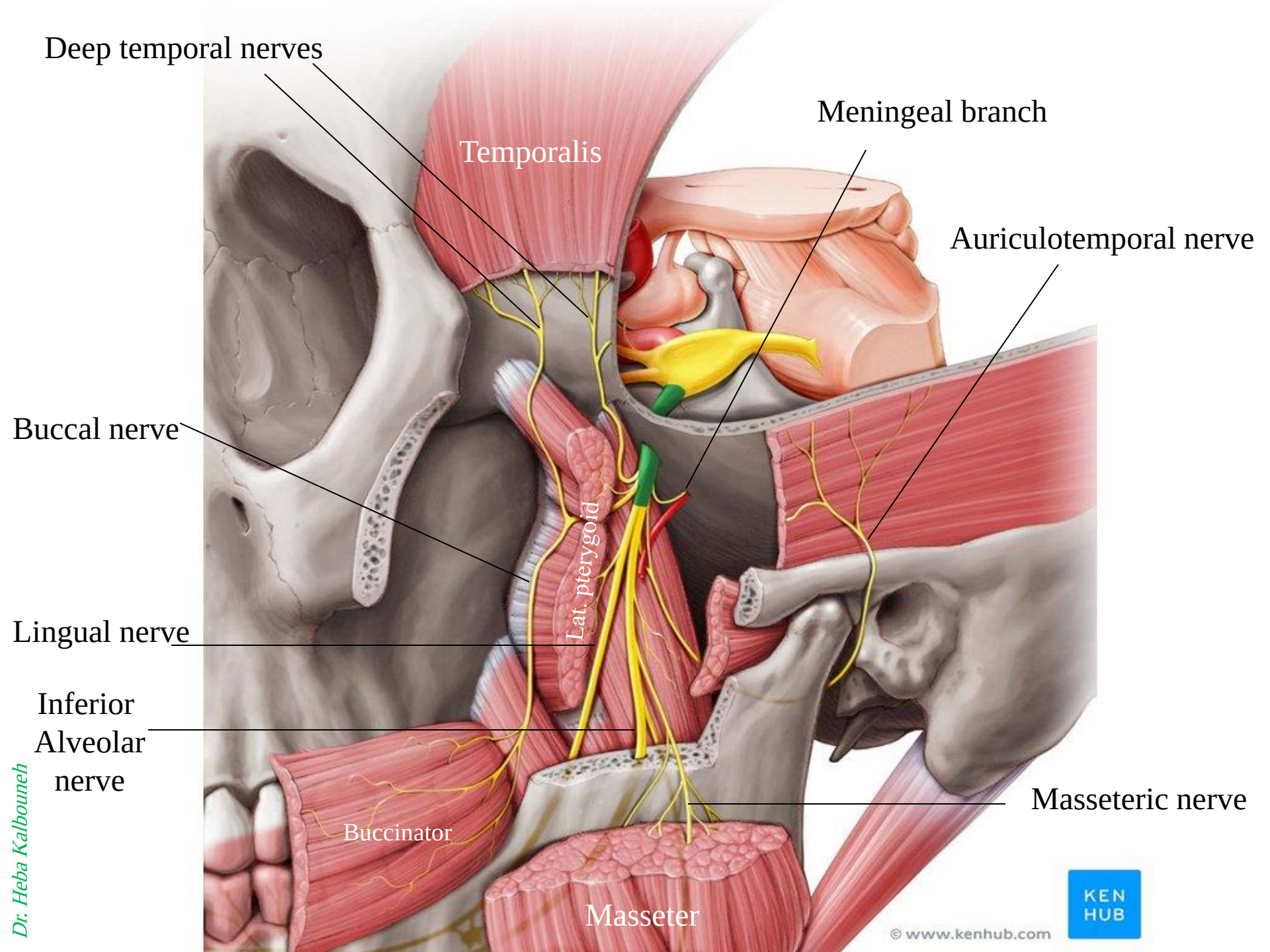


Mental nerve is a branch of inferior alveolar nerve to supply the skin and mucous membrane of the lower lip and chin
(Passes through mental foramen)



Note

As the inferior alveolar nerve enters the mandibular foramen, it gives off nerve to *mylohyoid* which runs in the mylohyoid groove (along with mylohyoid blood vessels), and supplies the mylohyoid muscle and the anterior belly of the digastric muscle



Review Notes

Nerve to medial pterygoid supplies:
1- The medial pterygoid muscle
2- The tensor veli palatini muscle
3- The tensor tympani muscle

Lingual nerve

✓It supplies the mucous membrane of the anterior two thirds of the tongue and the floor of the mouth **(general sensations)**

✓ It is joined by the chorda tympani nerve

✓ It gives off preganglionic parasympathetic secretomotor fibers to the submandibular ganglion, (*the chorda tympani !!)*

✓It carries taste sensations from the anterior two thirds of the tongue (*the chorda tympani !!*)

Buccal nerve is the only sensory branch of the anterior division of mandibular nerve.

Buccal nerve of mandibular is SENSORY and does not supply the buccinator muscle (which is supplied by buccal nerve of facial MOTOR)

Buccal nerve supplies the skin and the mucous membrane of the cheek

Auriculotemporal nerve conveys postganglionic parasympathetic secretomotor fibers from the otic ganglion to the parotid salivary gland.

Remember: Auriculotemporal nerve brings sensations from the skin of the auricle, the external auditory meatus, outer surface of tympanic membrane, the temporomandibular joint, parotid gland and the scalp

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Sphenomandibular ligament is an extra-capsular ligament of TMJ

.

It runs between the spine of sphenoid and the lingula of the mandible

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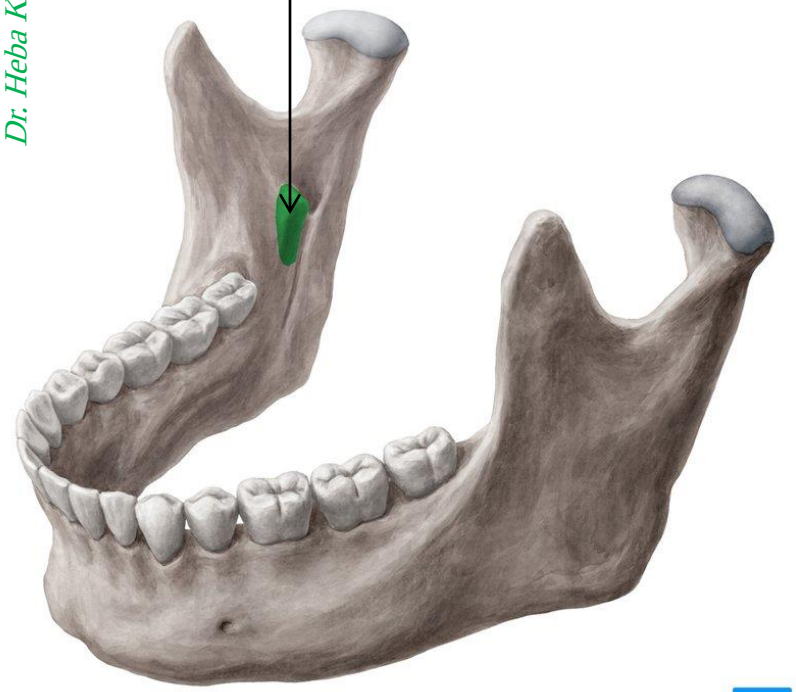
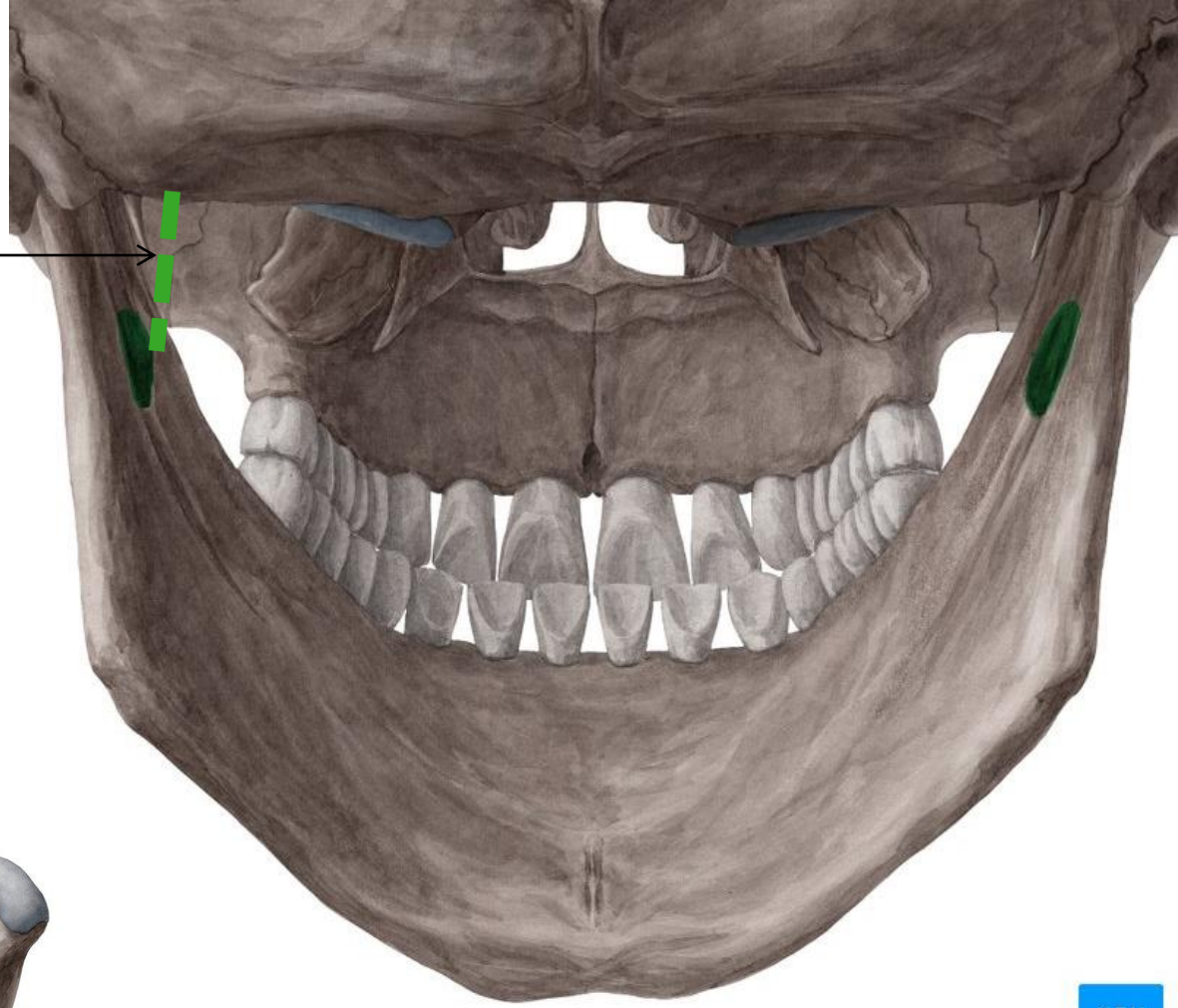
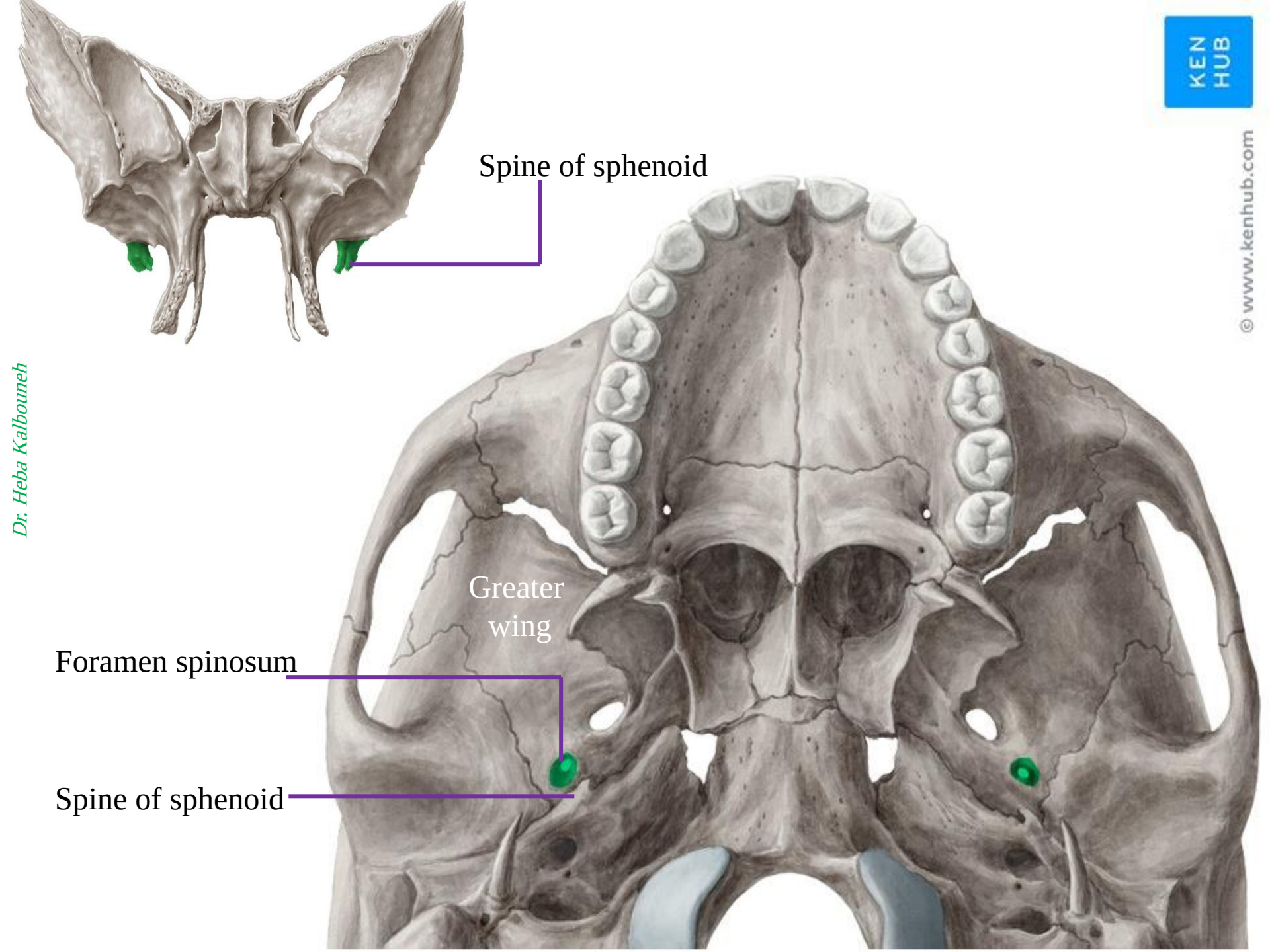
Lingula






Spine of sphenoid
Greater wing
Foramen spinosum
Spine of sphenoid
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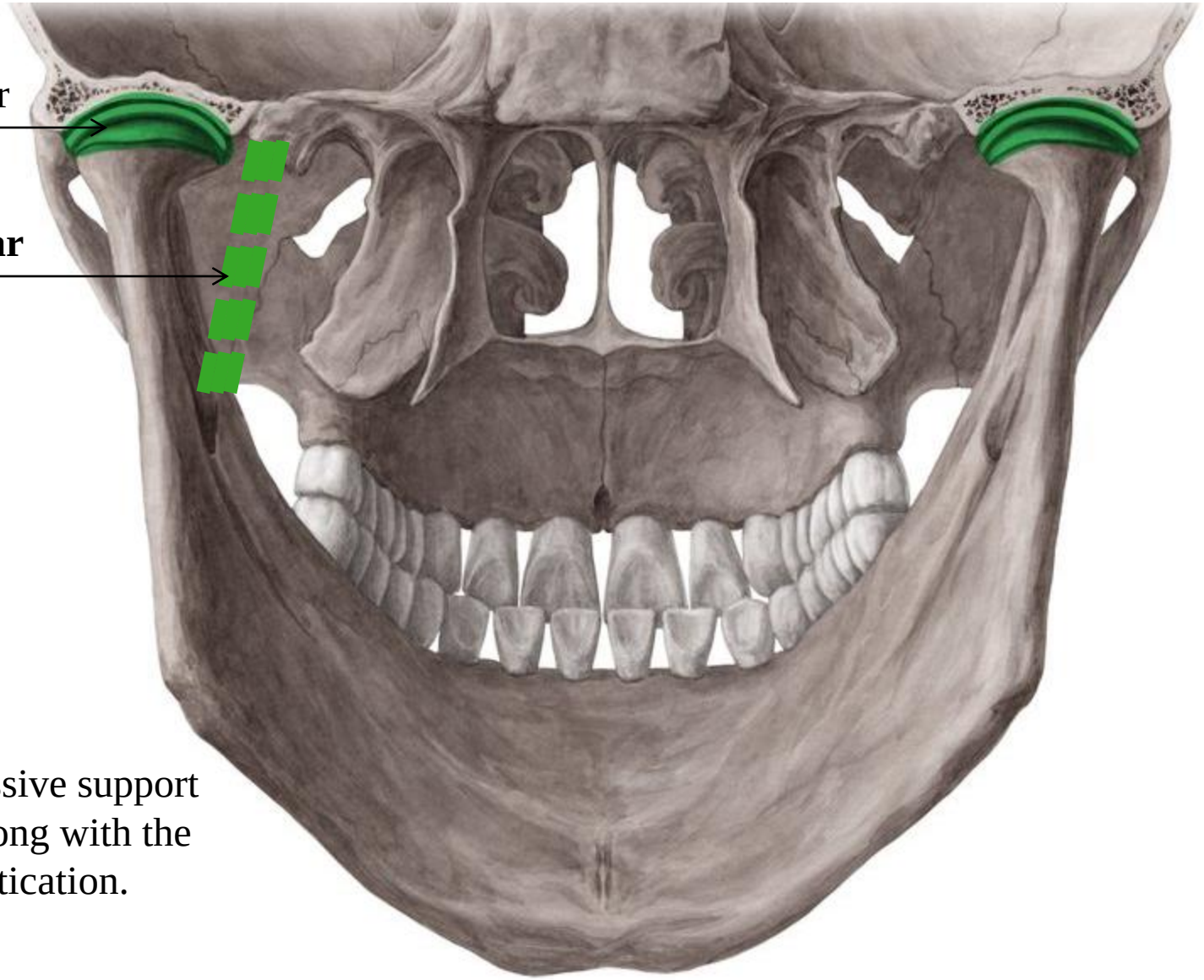
Temporomandibular joint

Sphenomandibular ligament



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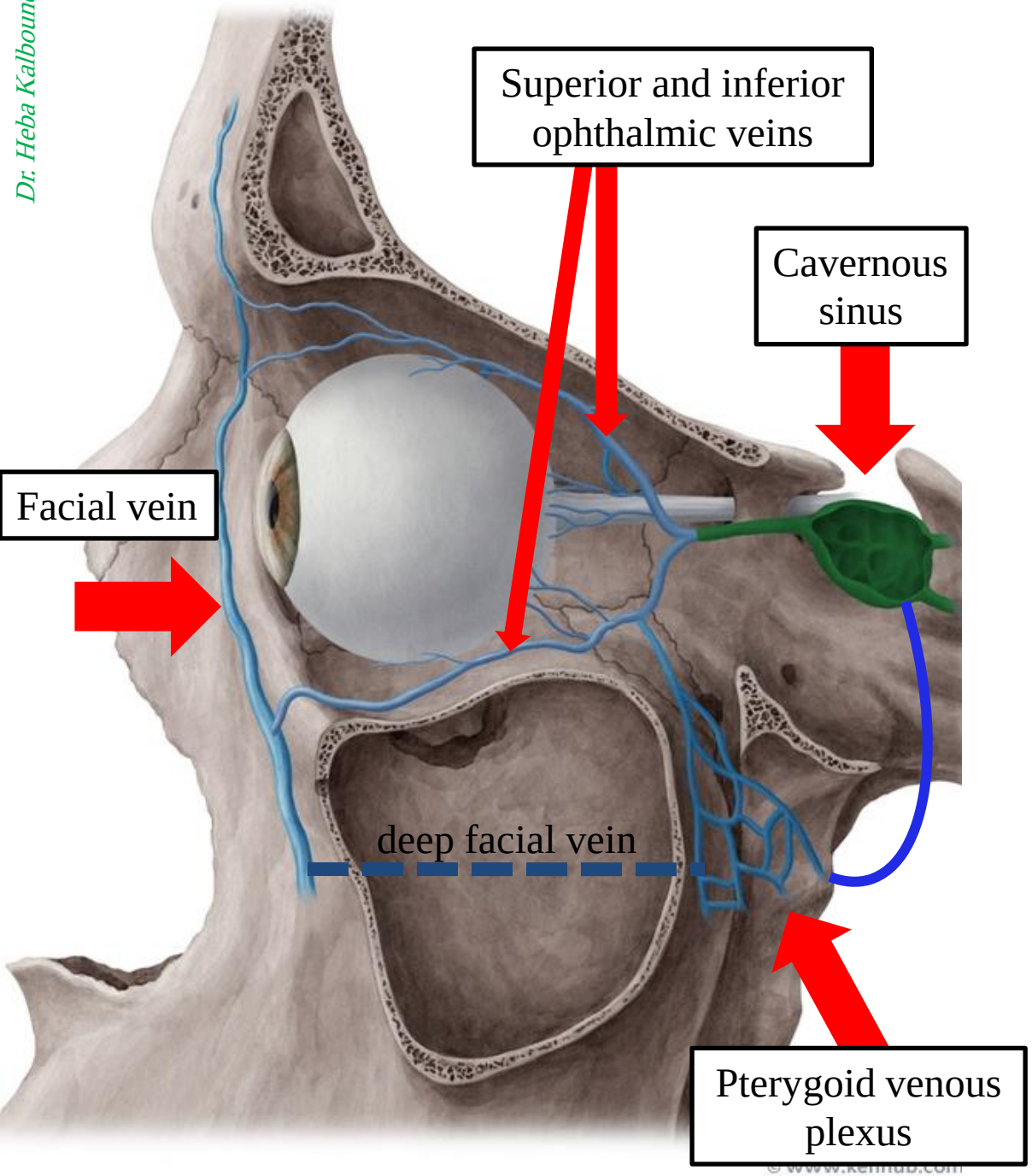
It is the primary passive support of the mandible, along with the muscles of mastication.



Pterygoid venous plexus

It is a valveless venous plexus of considerable size, and is situated on the lateral aspect of medial pterygoid within the infratemporal fossa

It drains the eye and is directly connected to the cavernous sinus. It provides a potential route by which infections of the face can spread intracranially.

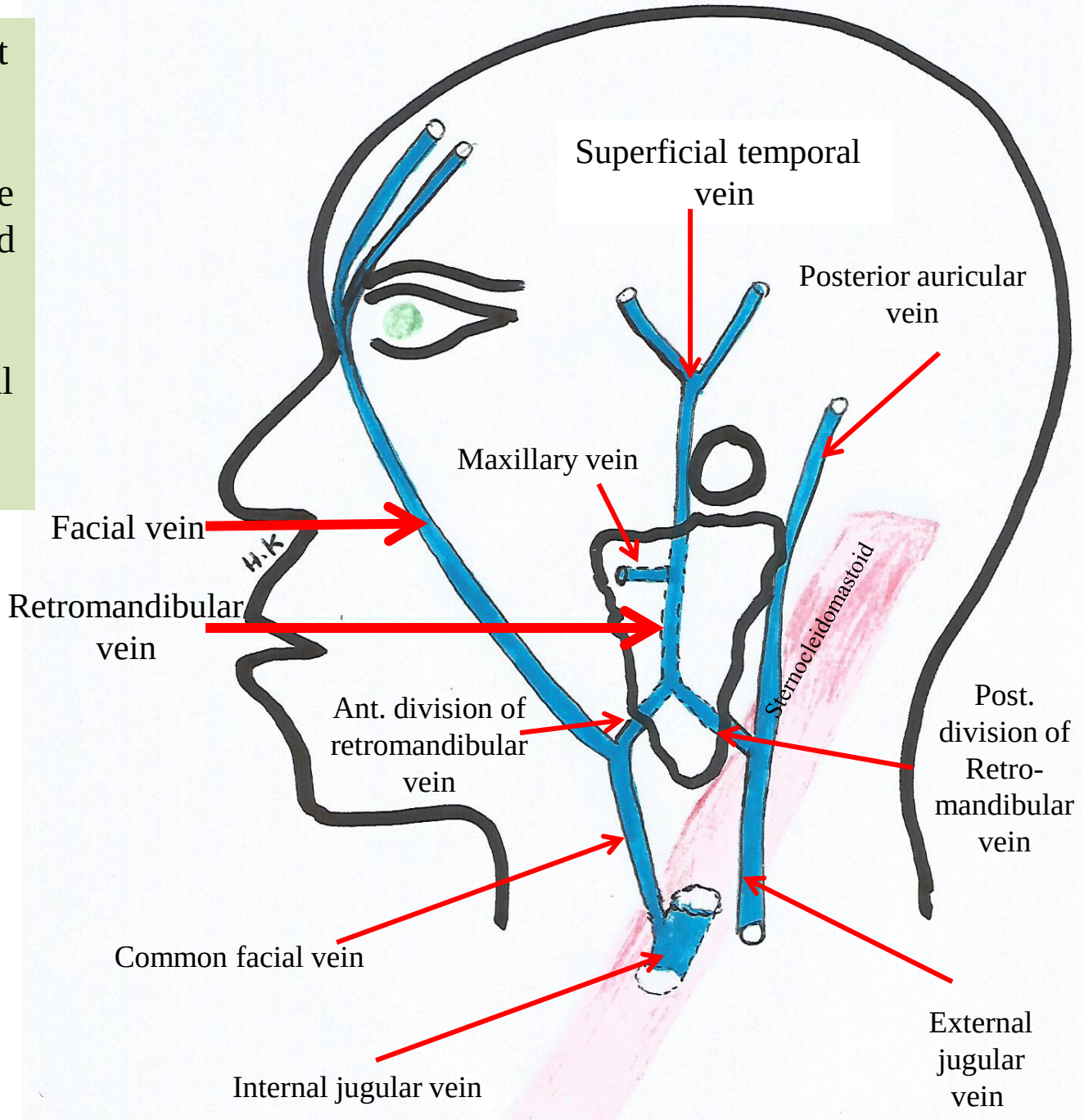
It receives tributaries corresponding with the branches of the maxillary artery

It forms the maxillary vein

The **maxillary vein** consist of a short trunk

It is formed by a confluence of the veins of the pterygoid plexus

It unites with the superficial temporal vein to form the retromandibular vein



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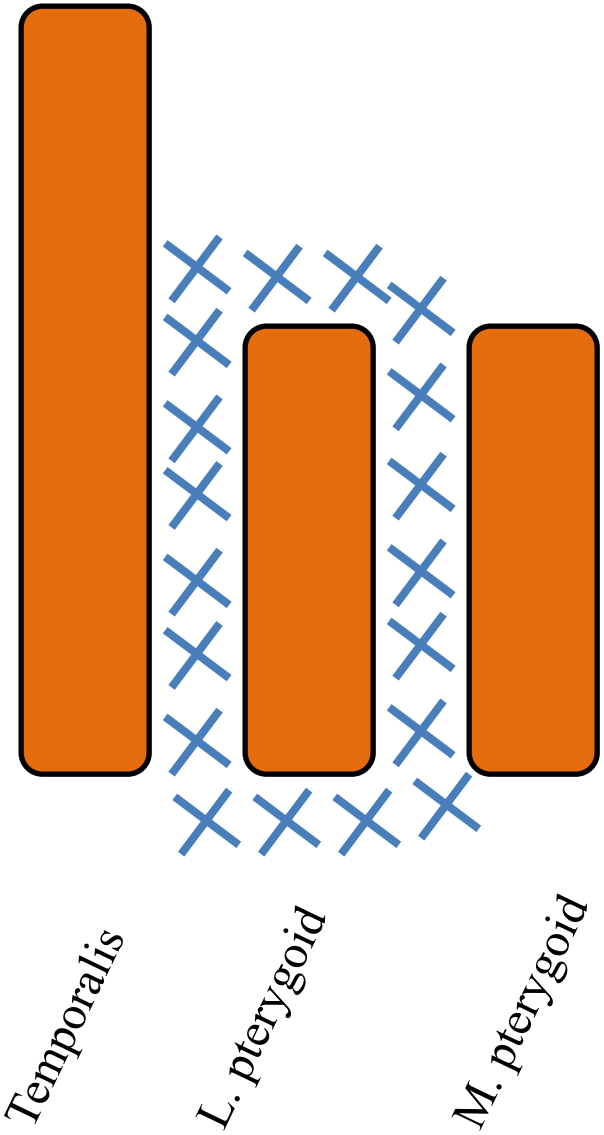
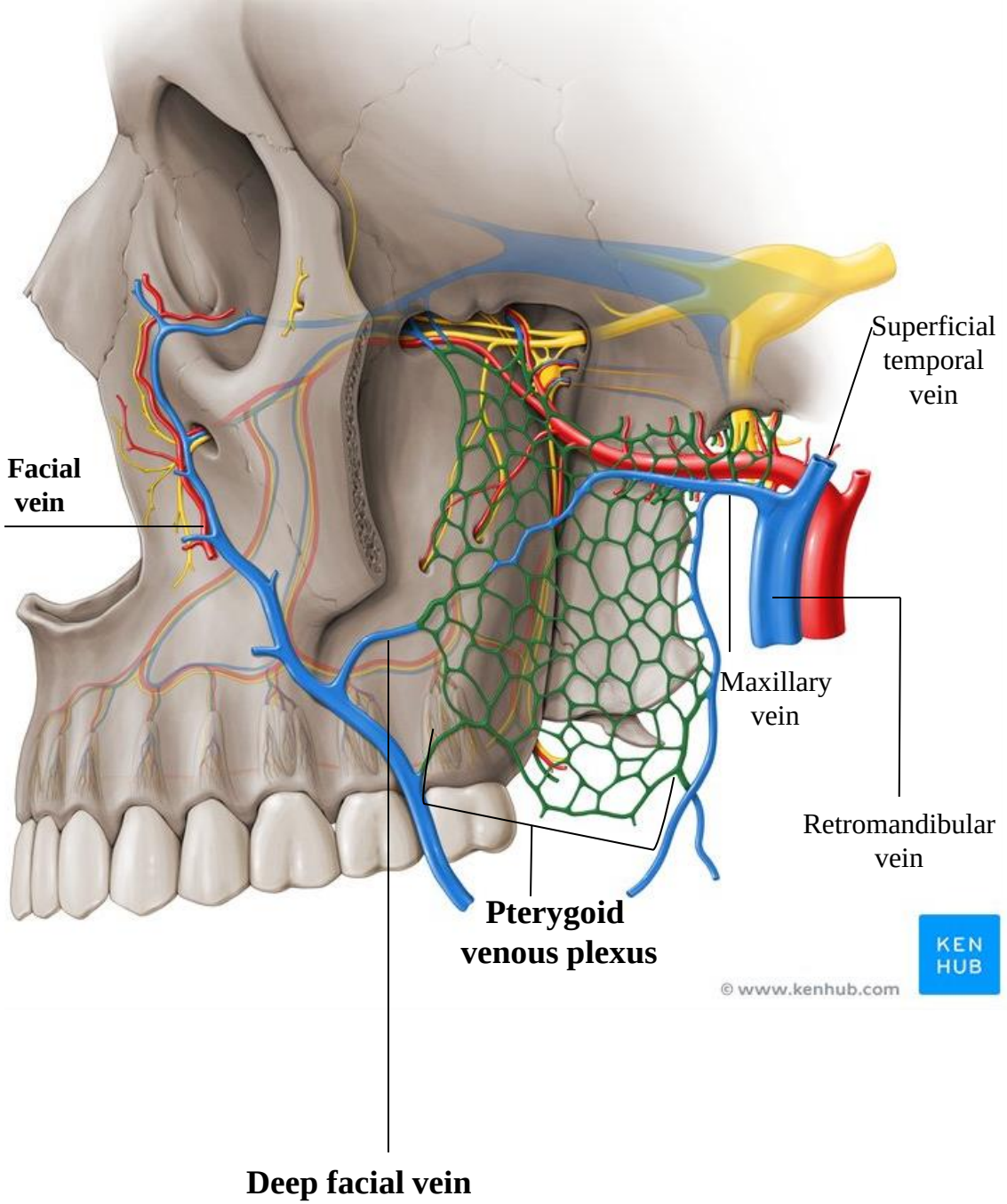
Note:
Pterygoid venous plexus lies around lateral pterygoid muscle





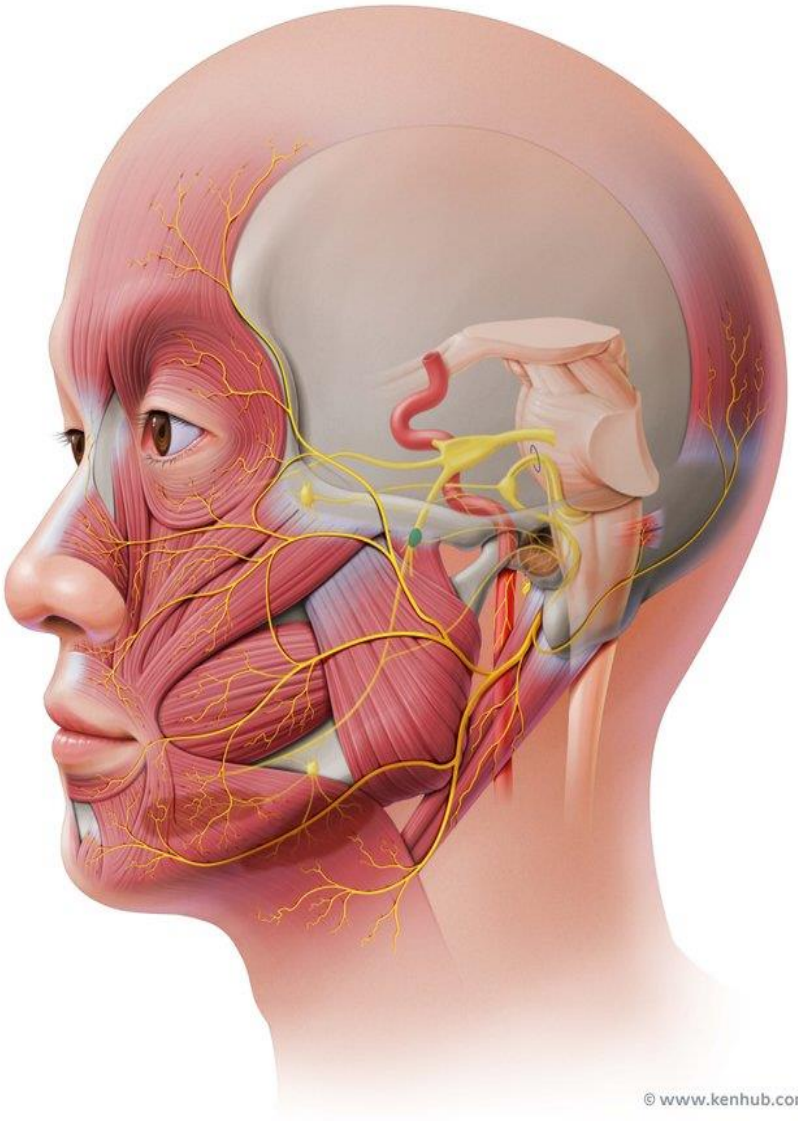
The **otic ganglion** is a small parasympathetic ganglion located immediately below the foramen ovale in the infratemporal fossa and on the medial surface of the mandibular nerve.

It is functionally associated with the glossopharyngeal nerve and innervates the parotid gland for salivation.

The preganglionic parasympathetic fibers originate in the glossopharyngeal nerve, and they reach the ganglion via the **lesser petrosal nerve**

The postganglionic parasympathetic (secretomotor) fibers reach the parotid salivary gland via the **auriculotemporal nerve.**

Nerve fibers leaving this ganglion 'hitchhike' along the auriculotemporal nerve to reach the parotid gland.



Tympanic Nerve

➢The tympanic nerve arises from the glossopharyngeal nerve, just below the jugular foramen

➢It passes through the floor of the middle ear and onto the promontory

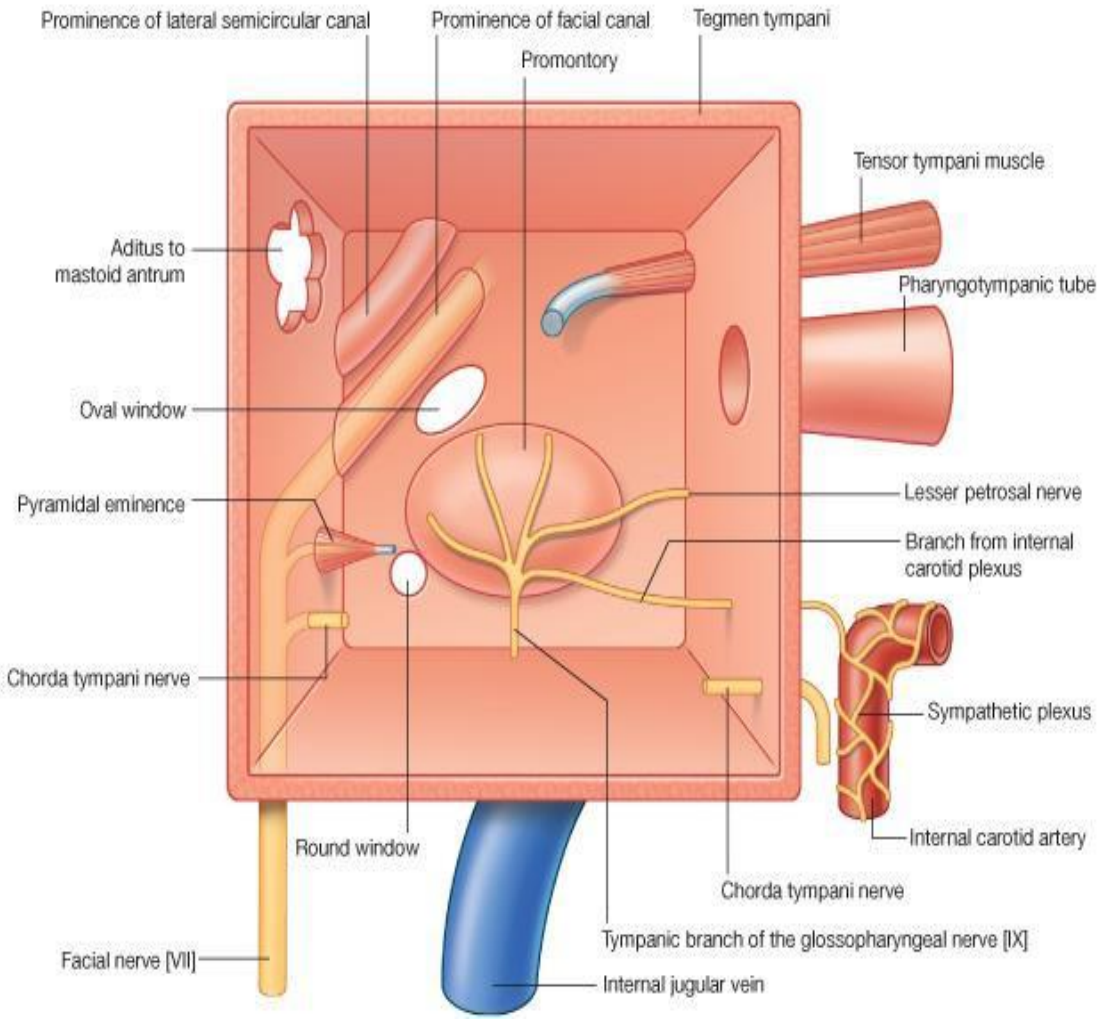
➢Here it splits into branches, which form the **tympanic plexus**.

➢The tympanic plexus supplies the lining of the middle ear and gives off:

Lesser petrosal nerve

It leaves the skull through the foramen ovale

Carries preganglionic parasympathetic fibers to the parotid gland via the otic ganglion



The **lesser petrosal nerve** is a branch from glossopharyngeal nerve (CN IX), carrying parasympathetic preganglionic fibers from the tympanic plexus to the parotid gland. It synapses in the otic ganglion, from where the postganglionic fibers emerge

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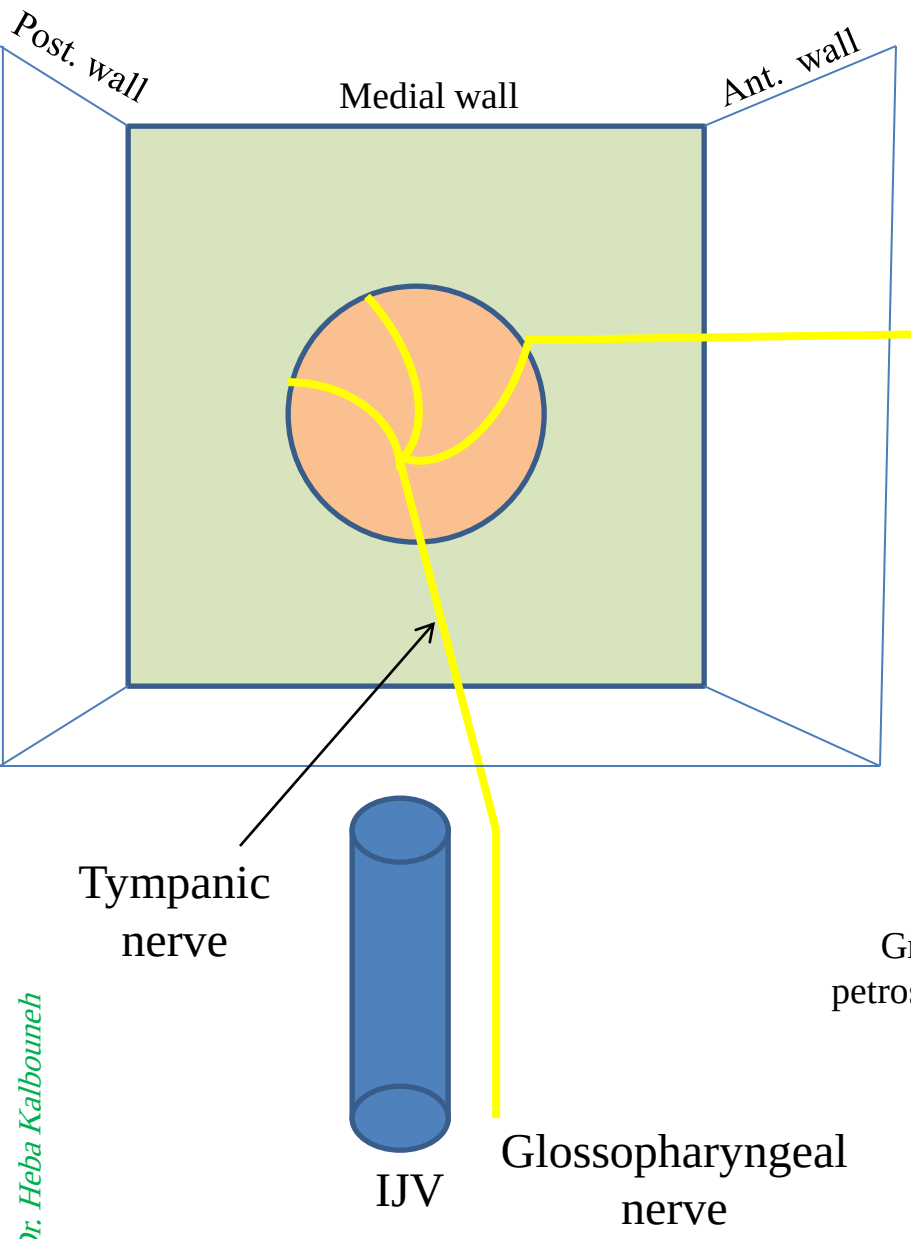
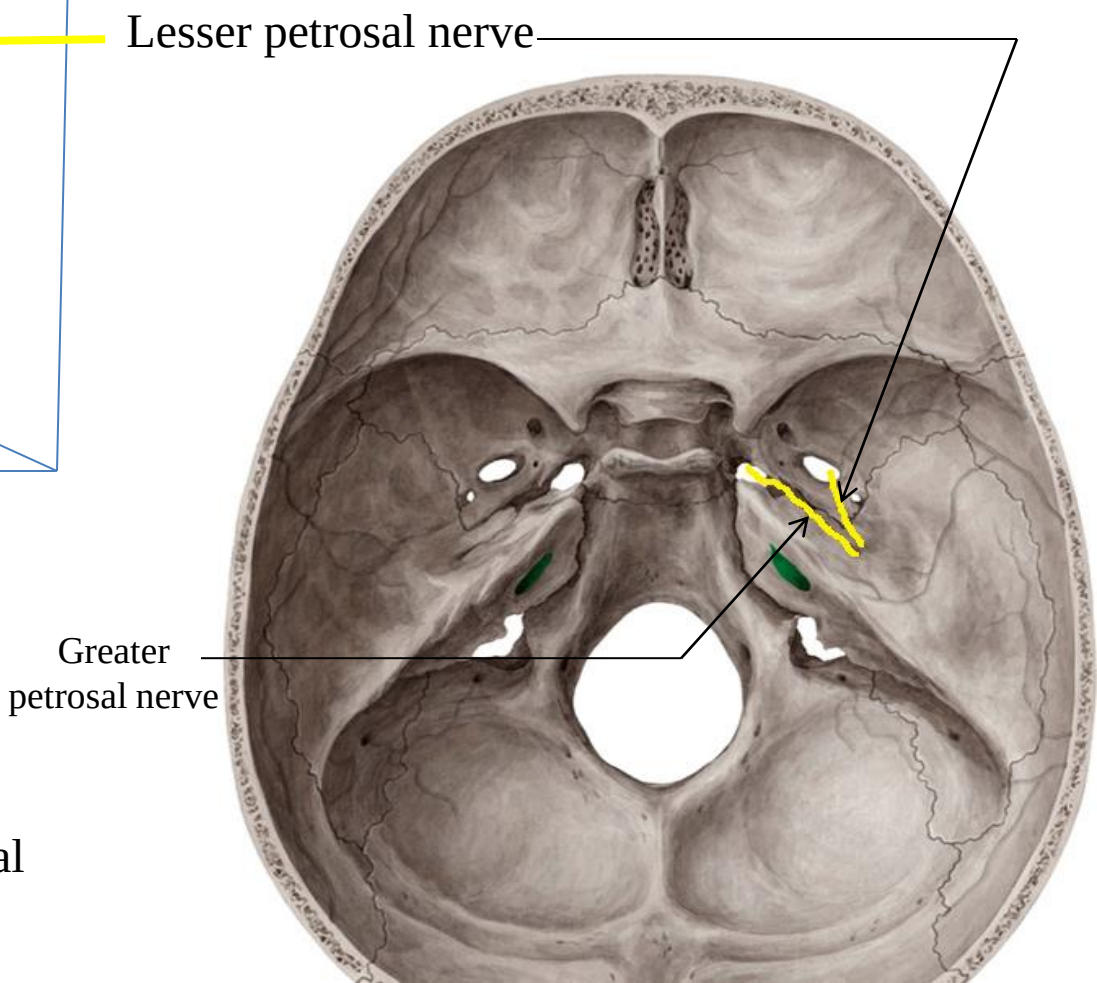
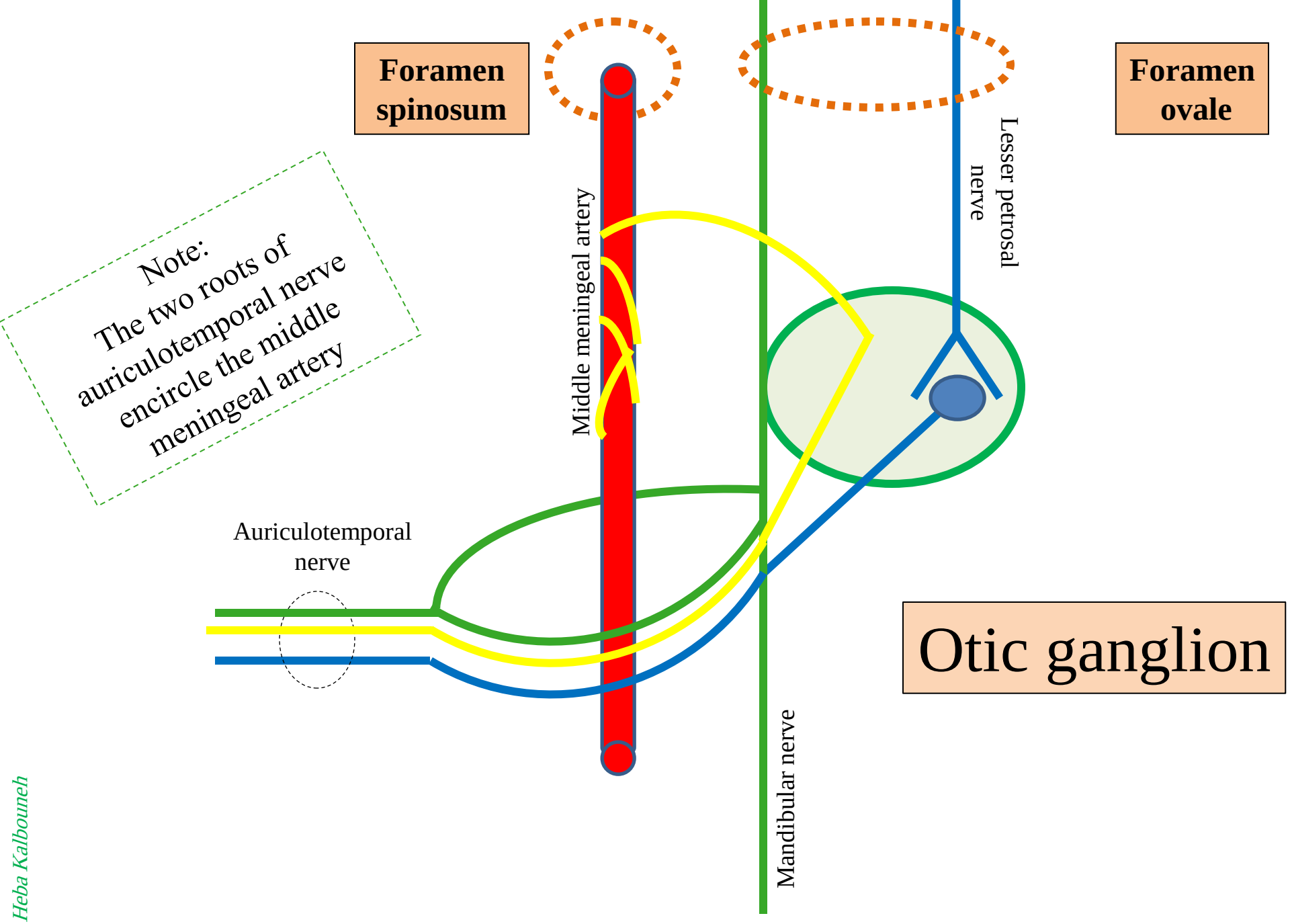
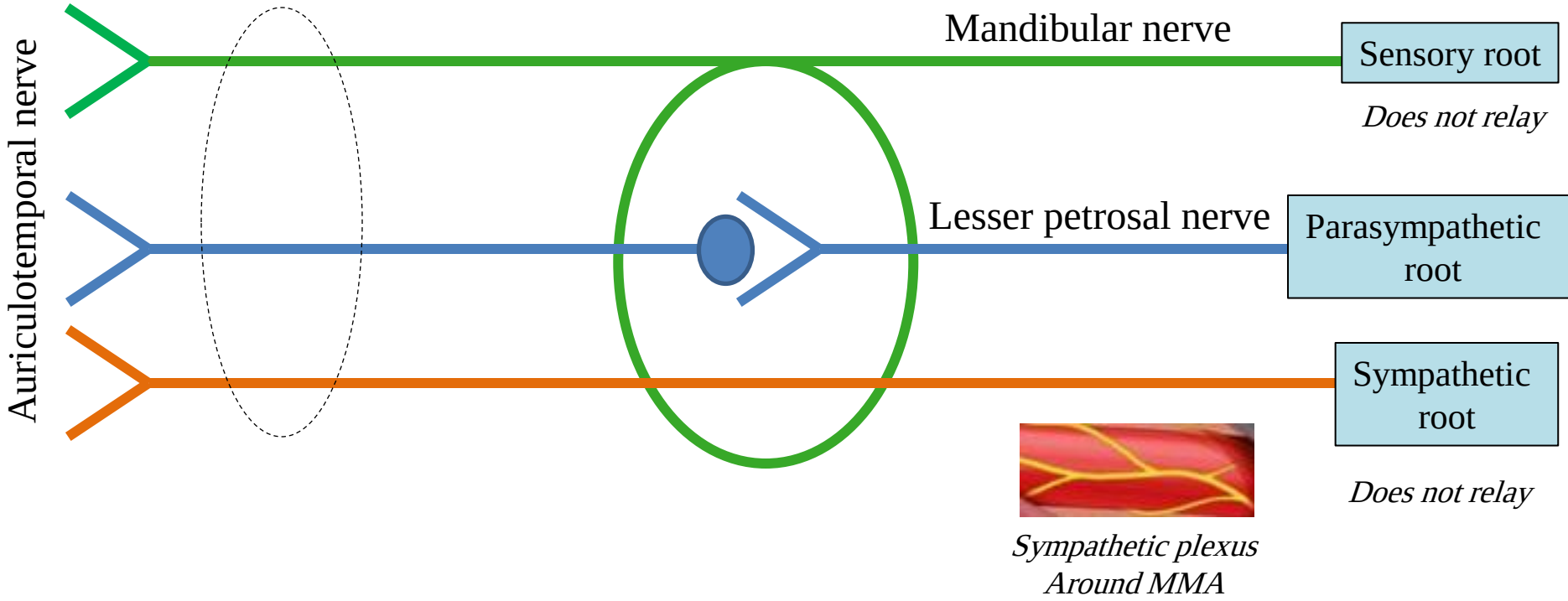






Anatomically, its connected to mandibular nerve
Functionally, its associated with the glossopharyngeal nerve

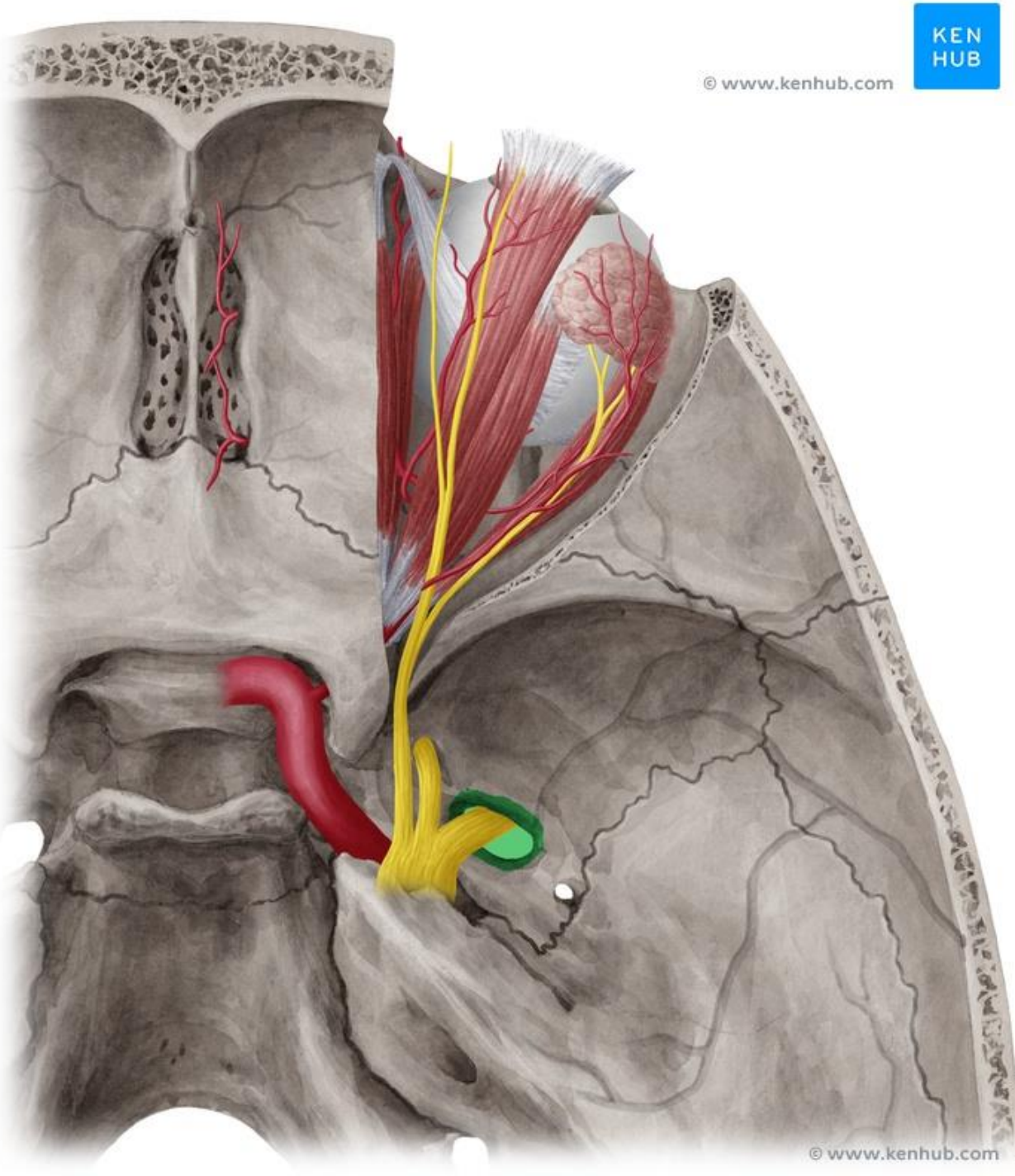


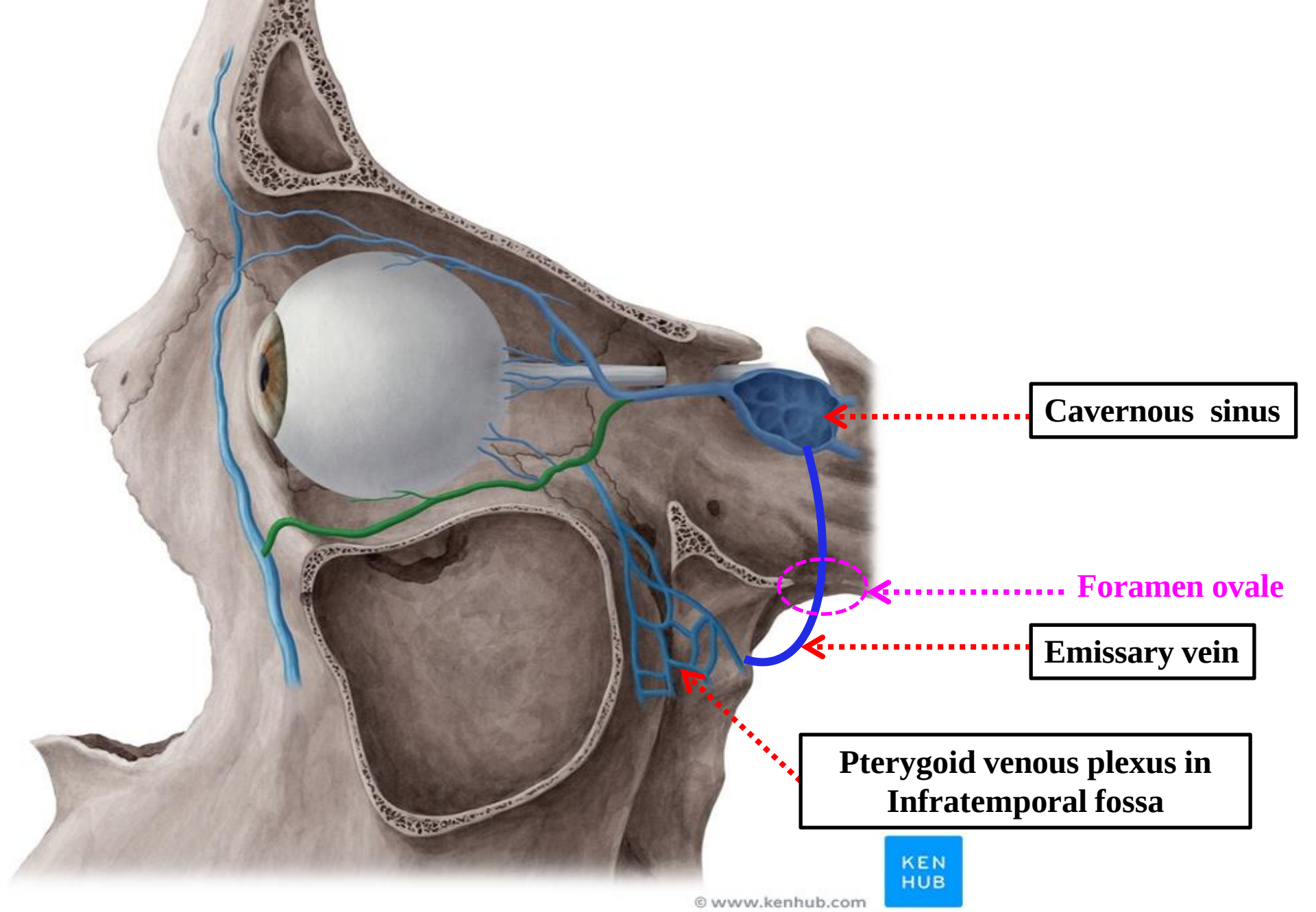
Otic ganglion

Foramen ovale transmits:

Mandibular nerve
Accessory meningeal artery
Lesser petrosal nerve
Emissary vein

MALE




Cavernous sinus
Foramen ovale
Emissary vein
Pterygoid venous plexus in Infratemporal fossa
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The chorda tympani

✓It arises from the facial nerve just above the stylomastoid foramen

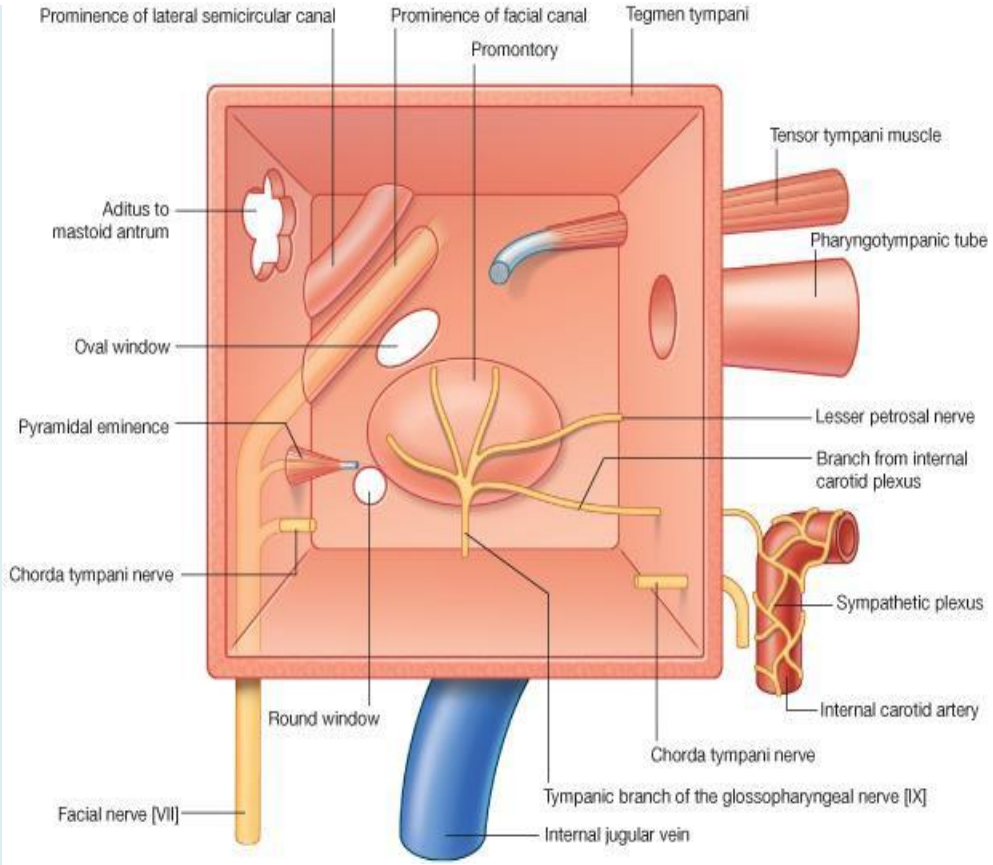
✓It enters the middle ear close to the posterior border of the tympanic membrane.

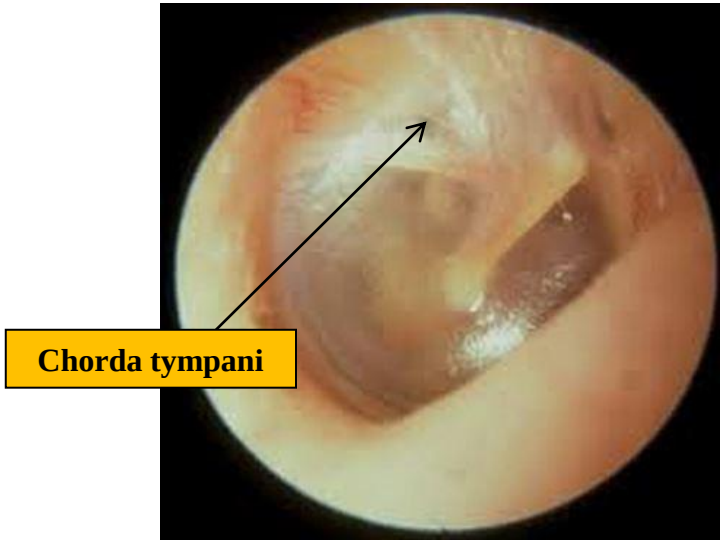
✓ It then runs forward over the tympanic membrane and crosses the root of the handle of the malleus

✓It leaves the middle ear through the petrotympanic fissure and enters the infratemporal fossa, where it joins the lingual nerve

The chorda tympani contains:

1. Taste fibers from the mucous membrane covering the anterior two thirds of the tongue and the floor of the mouth.
2. Carries preganglionic parasympathetic fibers to the submandibular and sublingual glands via the **submandibular ganglion**



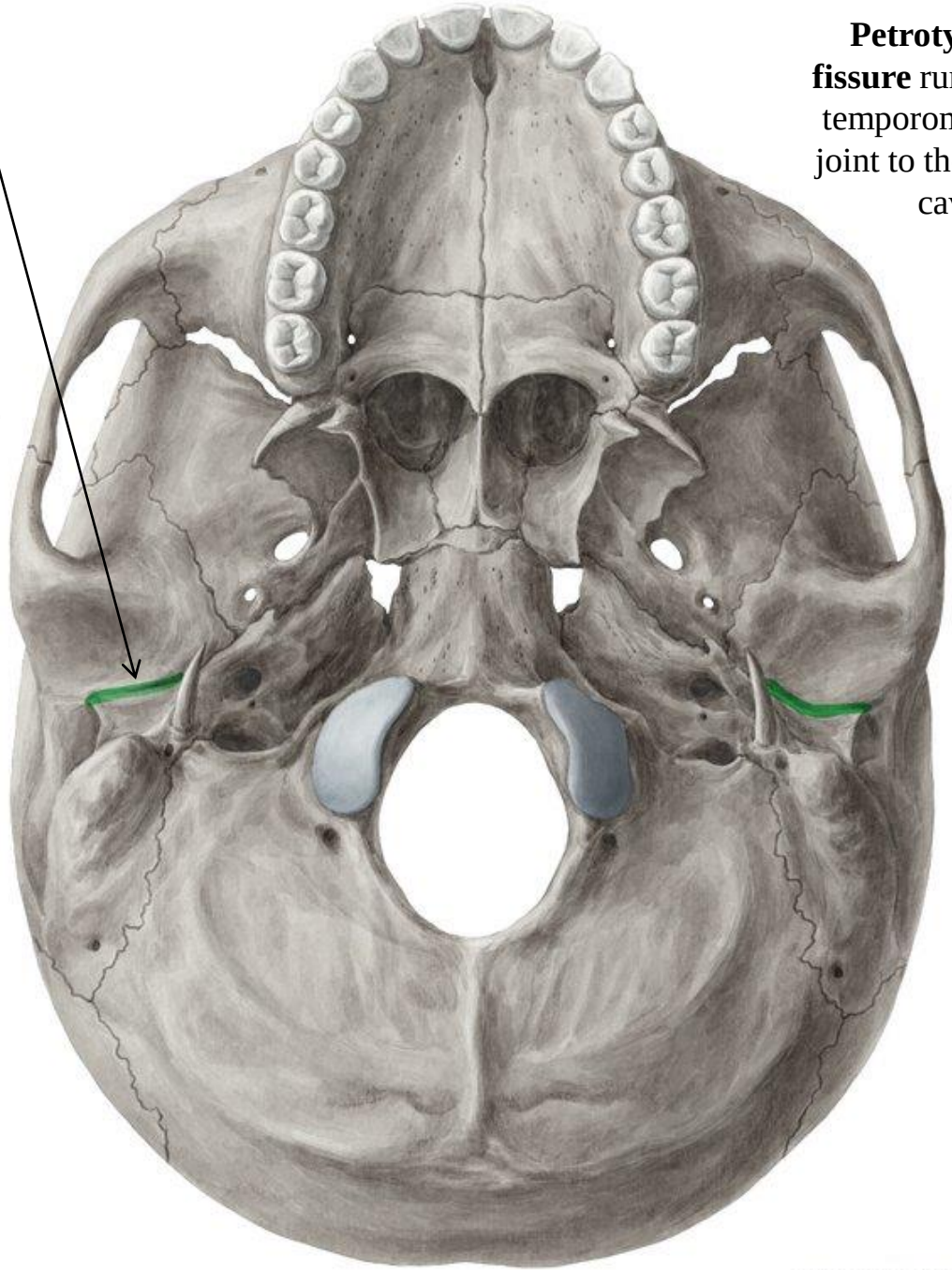


The **petrotympanic fissure** is a fissure in the temporal bone

The chorda tympani runs through the fissure to join with the lingual nerve in the infratemporal fossa
It provides taste innervation to the anterior 2/3 of the tongue.

The **chorda tympani** is a branch of the facial nerve

The **chorda tympani** passes medial to the tympanic membrane and the handle of the malleus, and again enters the temporal bone. It exits the skull through the petrotympanic fissure and descends in the infratemporal fossa.



Petrotympanic fissure runs from the temporomandibular joint to the tympanic cavity

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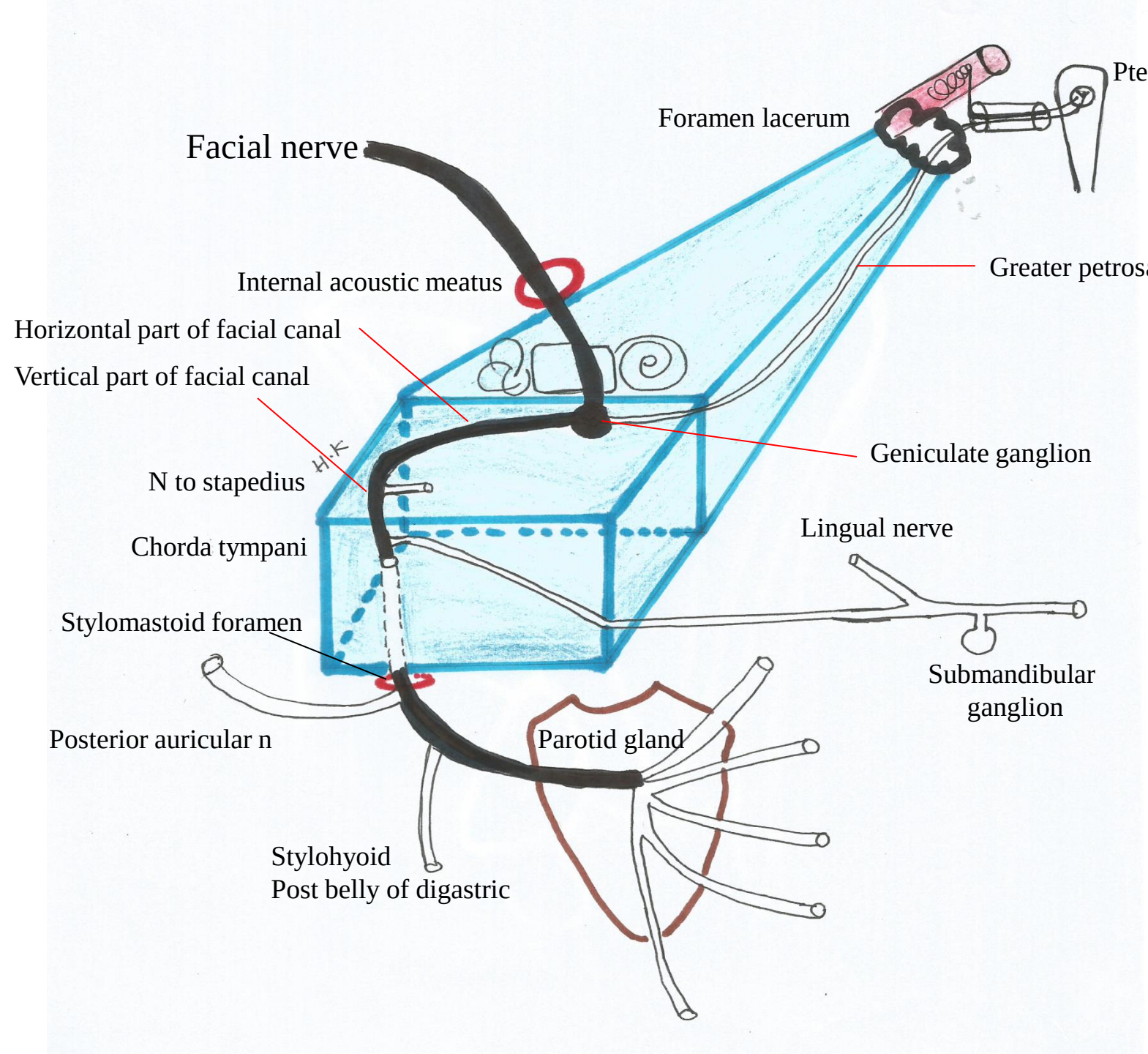
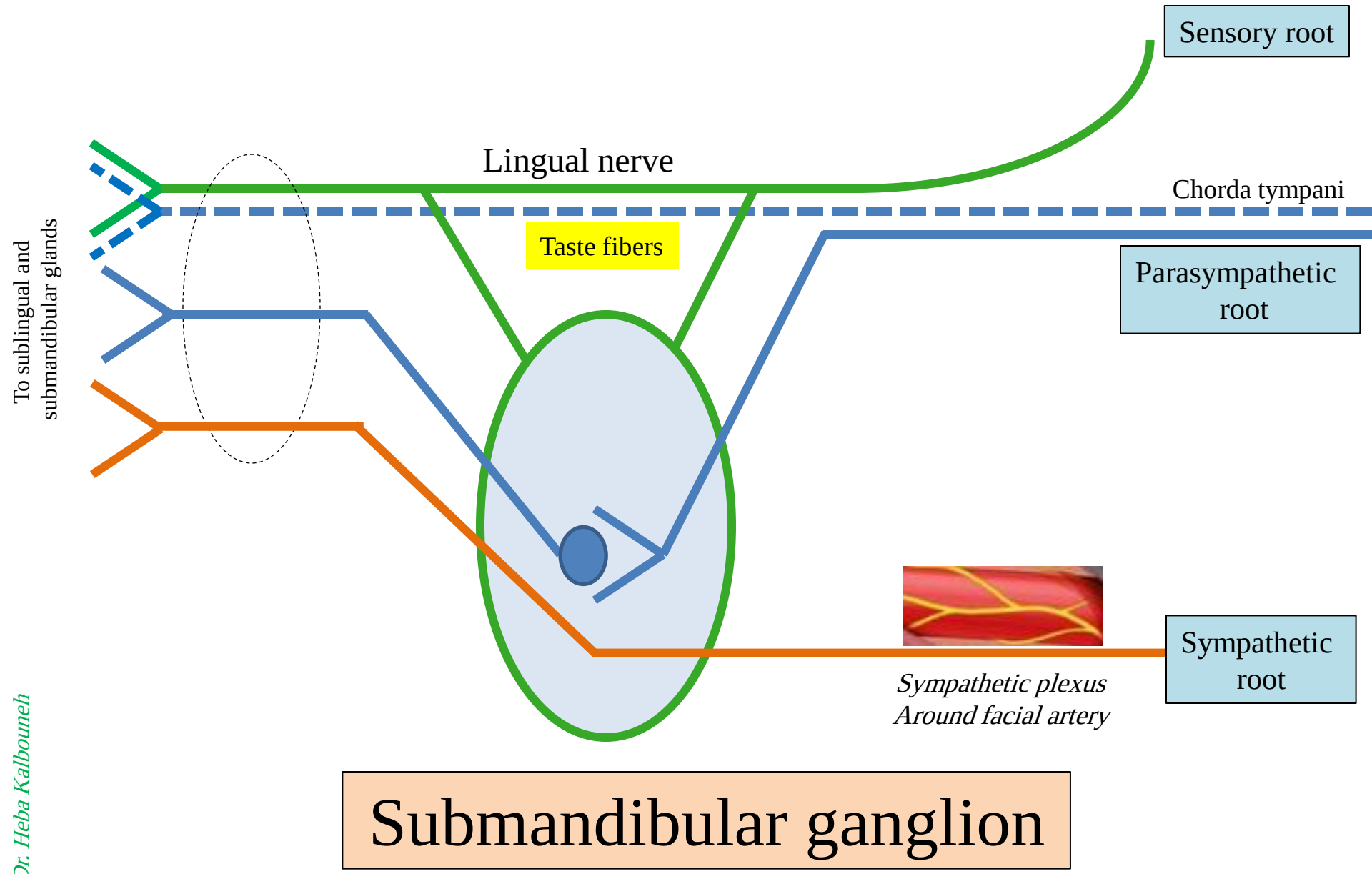


Anatomically, its connected to lingual nerve
Functionally, its associated with the facial nerve (chorda tympani)



Submandibular ganglion

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