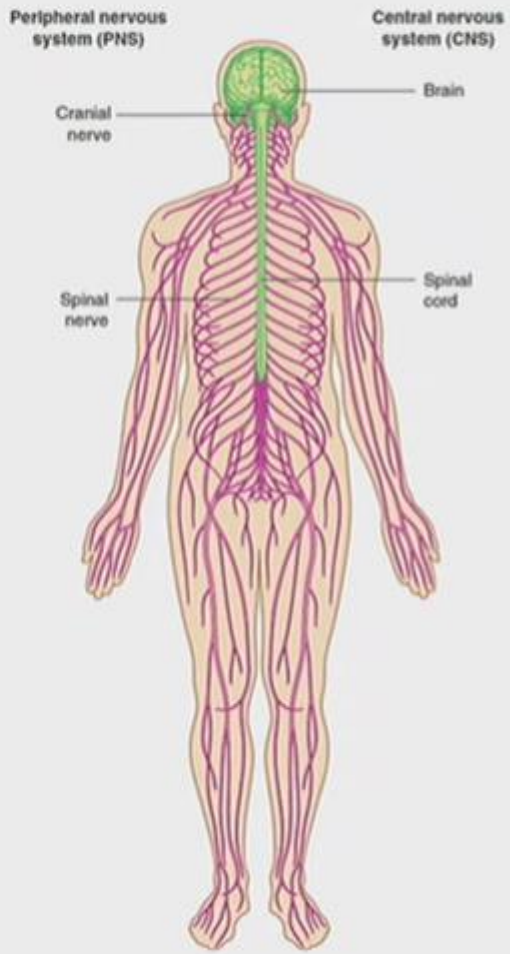
Nerves of the head and neck, Lymphatic drainage overview

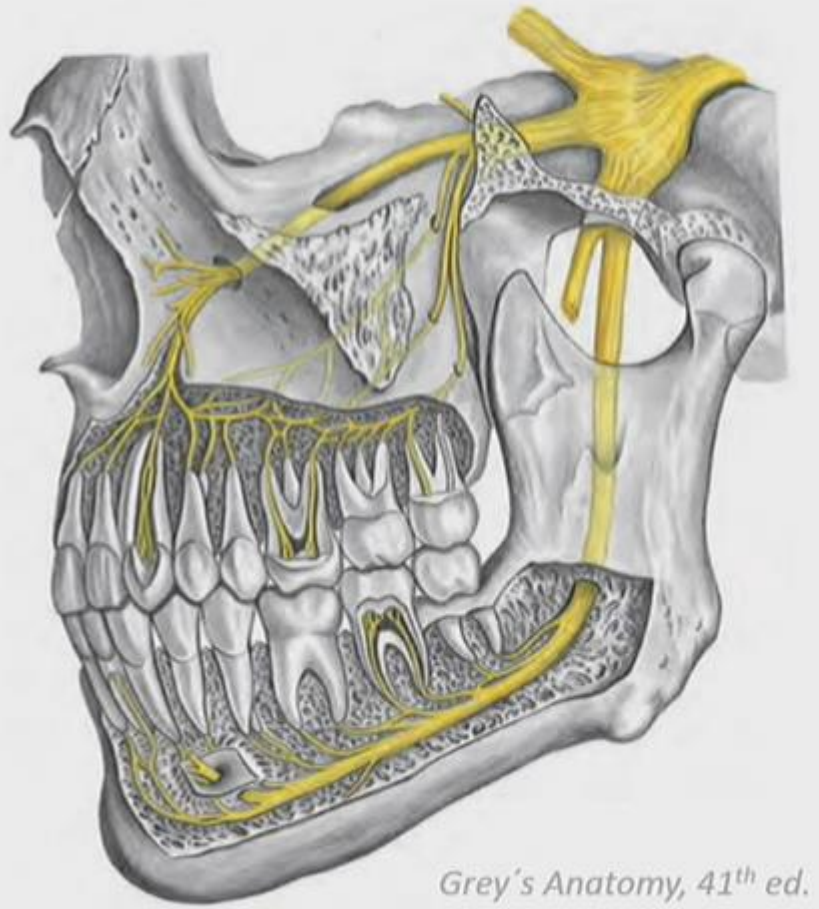
Omid Moztarzadeh

Nerves of head and neck

- **CNS**
- Cerebrum
- Medulla spinalis

- **PNS**
- Nervi craniales
- Nervi spinales





Grey´s Anatomy, 41th ed.

nervi craniales – cranial nerves – hlavové nervy

0. nervus terminalis – terminal nerve – koncový nerv

I. nervus olfactorius – olfactory nerve – čichový nerv

II. nervus opticus – optic nerve – zrakový nerv

III. nervus oculomotorius – oculomotor nerve – okohybný nerv

IV. nervus trochlearis – trochlear nerve – kladkový nerv

V. nervus trigeminus – trigeminal nerve – trojklanný nerv

VI. nervus abducens – abducent nerve – odtahovací nerv

VII. nervus facialis – facial nerve – lícní nerv

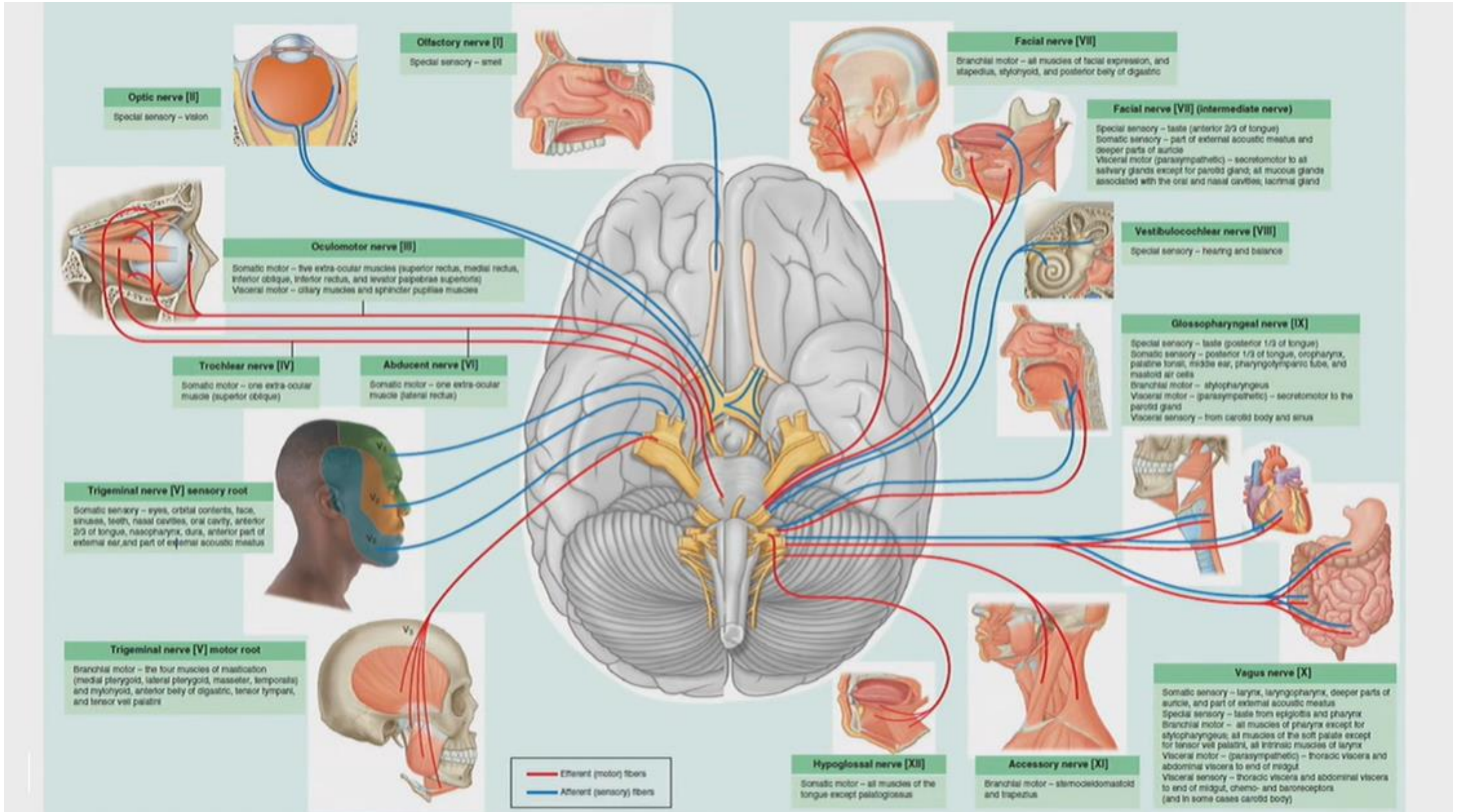
VIII. nervus vestibulocochlearis – vestibulocochlear nerve – rovnovážný a sluchový nerv

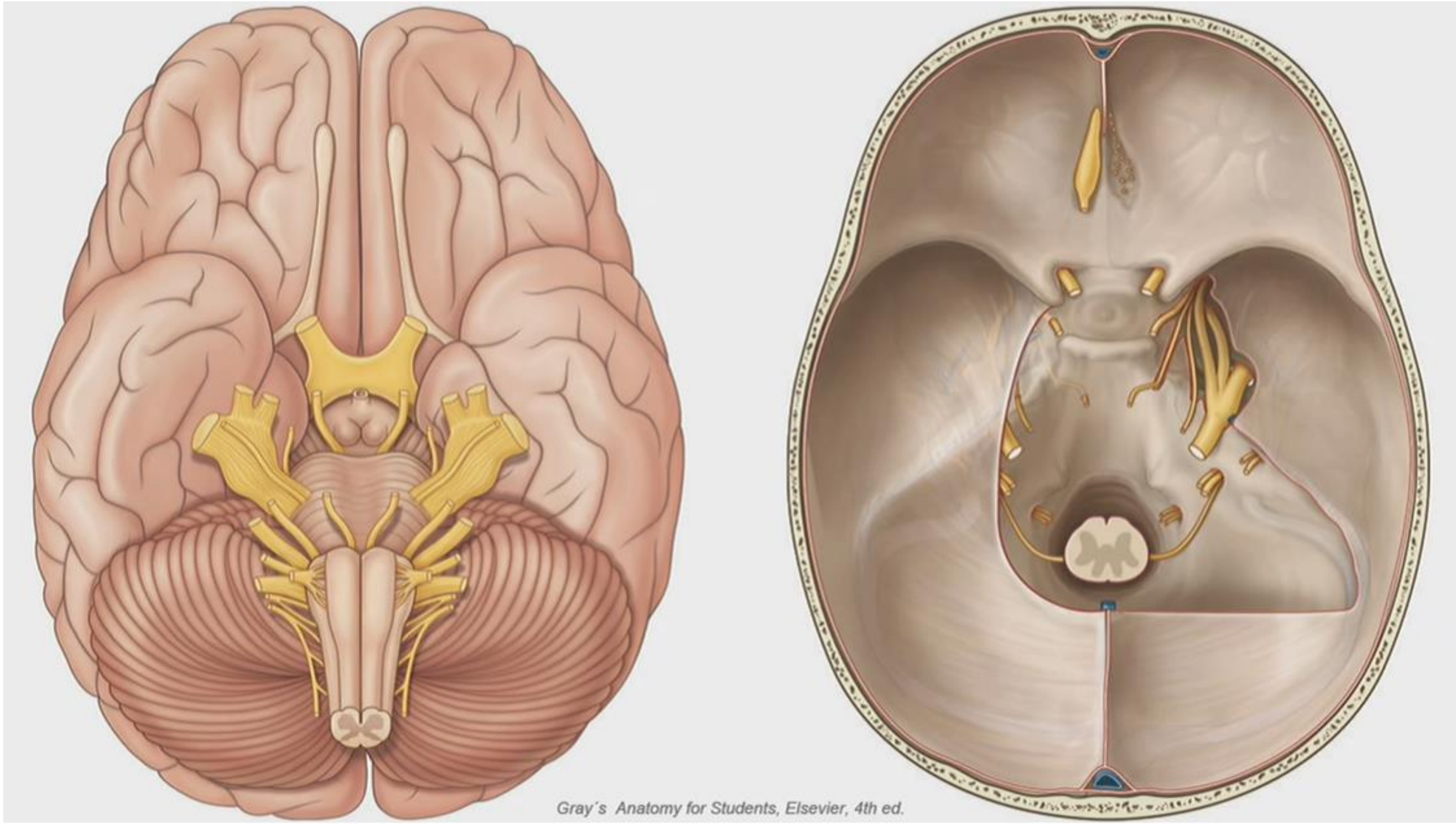
IX. nervus glosshopharyngeus – glossopharyngeal nerve – jazykohltanový nerv

X. nervus vagus – vagal nerve – bloudivý nerv

XI. nervus accesorius – accesory nerve – přídatný nerv

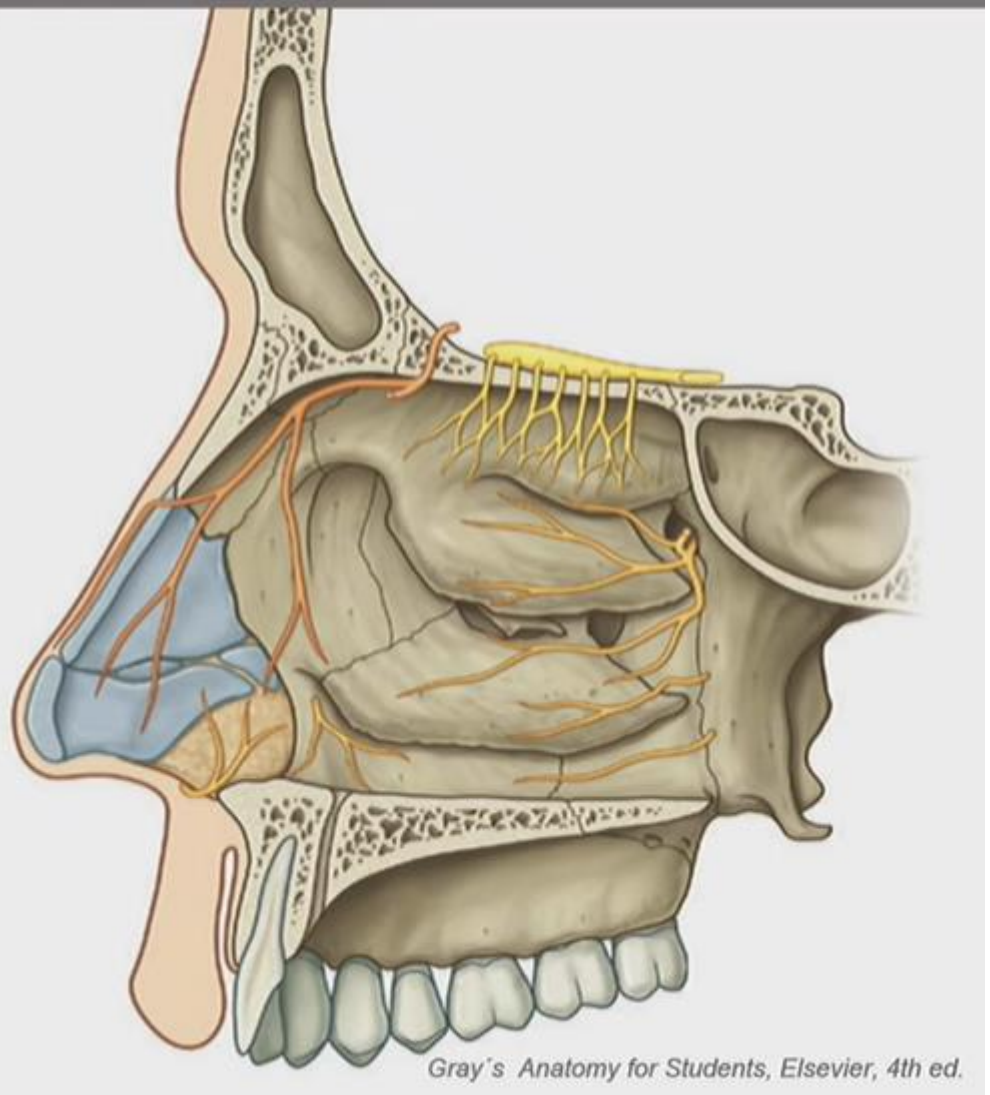
XII. nervus hypoglossus – hypoglossal nerve – podjazykový nerv


Optic nerve [II]
Special sensory – vision
Olfactory nerve [I]
Special sensory – smell
Facial nerve [VII]
Branchial motor – all muscles of facial expression, and stapedius, stylohyoid, and posterior belly of digastric
Facial nerve [VII] (intermediate nerve)
Special sensory – taste (anterior 2/3 of tongue)
Somatic sensory – part of external acoustic meatus and deeper parts of auricle
Visceral motor (parasympathetic) – secretomotor to all salivary glands except for parotid gland; all mucous glands associated with the oral and nasal cavities; lacrimal gland
Oculomotor nerve [III]
Somatic motor – five extra-ocular muscles (superior rectus, medial rectus, inferior oblique, inferior rectus, and levator palpebrae superioris)
Visceral motor – ciliary muscles and sphincter pupillae muscles
Vestibulocochlear nerve [VIII]
Special sensory – hearing and balance
Trochlear nerve [IV]
Somatic motor – one extra-ocular muscle (superior oblique)
Abducent nerve [VI]
Somatic motor – one extra-ocular muscle (lateral rectus)
Glossopharyngeal nerve [IX]
Special sensory – taste (posterior 1/3 of tongue)
Somatic sensory – posterior 1/3 of tongue, oropharynx, palatine tonsil, middle ear, pharyngotympanic tube, and mastoid air cells
Branchial motor – stylopharyngeus
Visceral motor – (parasympathetic) – secretomotor to the parotid gland
Visceral sensory – from carotid body and sinus
Trigeminal nerve [V] sensory root
Somatic sensory – eyes, orbital contents, face, sinuses, teeth, nasal cavities, oral cavity, anterior 2/3 of tongue, nasopharynx, dura, anterior part of external ear,and part of external acoustic meatus
Trigeminal nerve [V] motor root
Branchial motor – the four muscles of mastication (medial pterygoid, lateral pterygoid, masseter, temporalis) and mylohyoid, anterior belly of digastric, tensor tympani, and tensor veli palatini
Vagus nerve [X]
Somatic sensory – larynx, laryngopharynx, deeper parts of auricle, and part of external acoustic meatus
Special sensory – taste from epiglottis and pharynx
Branchial motor – all muscles of pharynx except for stylopharyngeus; all muscles of the soft palate except for tensor veli palatini, all intrinsic muscles of larynx
Visceral motor – (parasympathetic) – thoracic viscera and abdominal viscera to end of midgut
Visceral sensory – thoracic viscera and abdominal viscera to end of midgut, chemo- and baroreceptors (and in some cases carotid body)
Hypoglossal nerve [XII]
Somatic motor – all muscles of the tongue except palatoglossus
Accessory nerve [XI]
Branchial motor – sternocleidomastoid and trapezius
Efferent (motor) fibers
Afferent (sensory) fibers



Gray´s Anatomy for Students, Elsevier, 4th ed.

I. Nervus olfactorius



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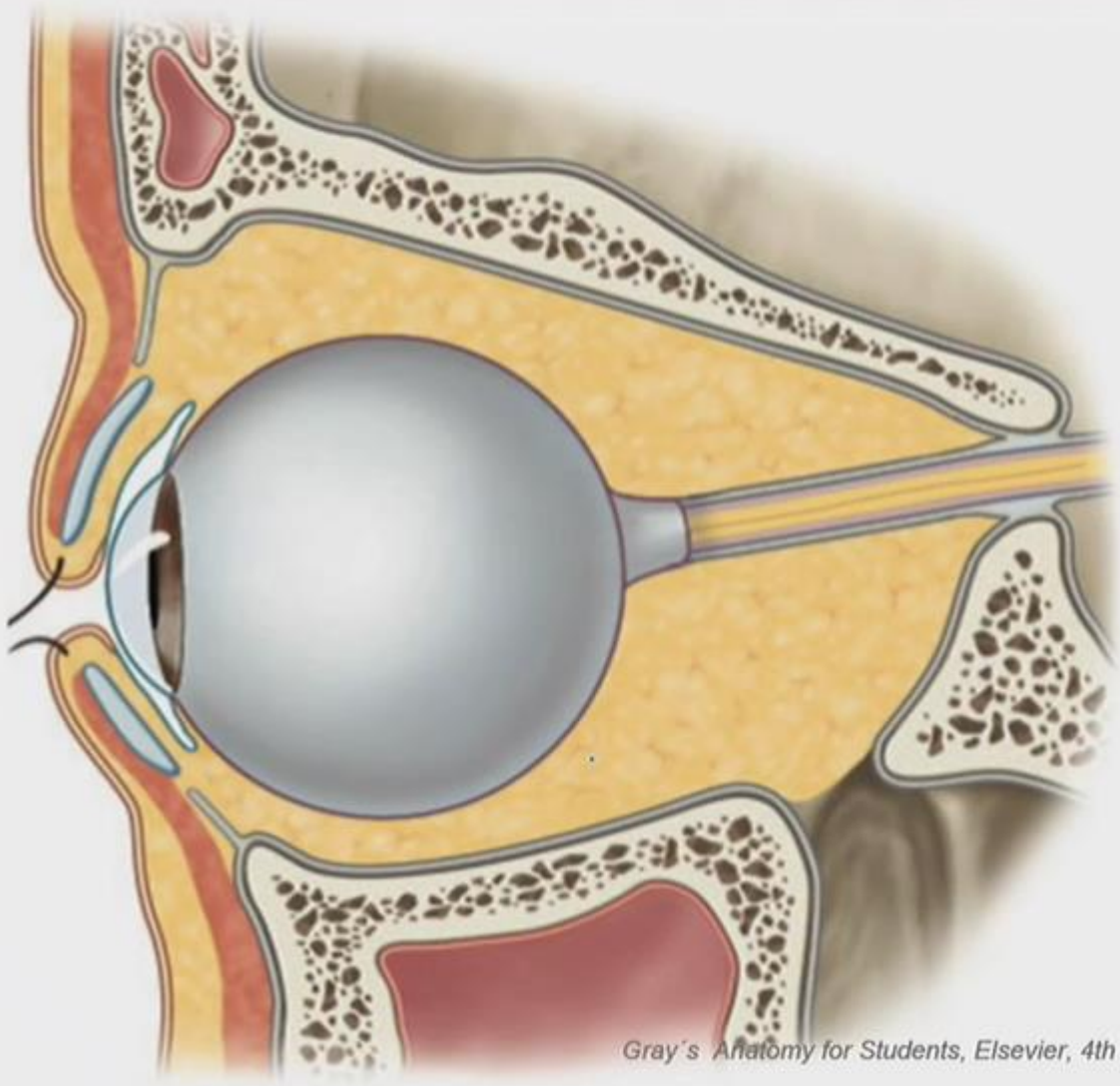
II. Nervus opticus



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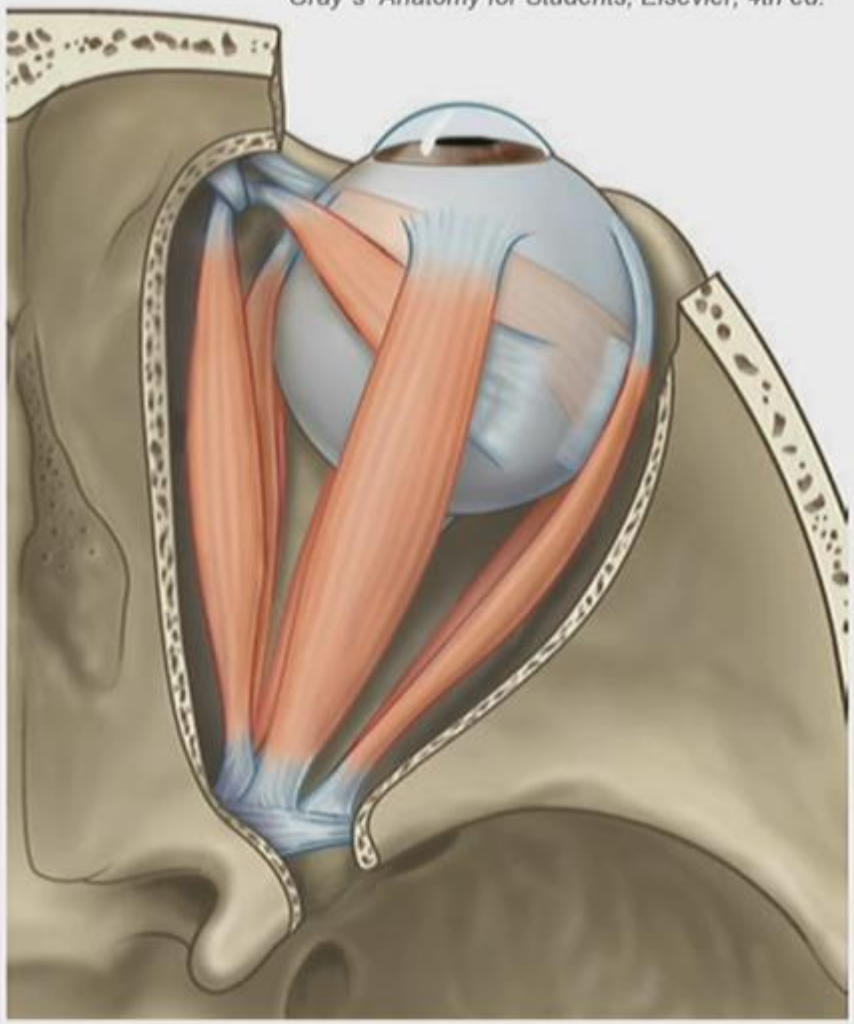
III. Nervus oculomotorius



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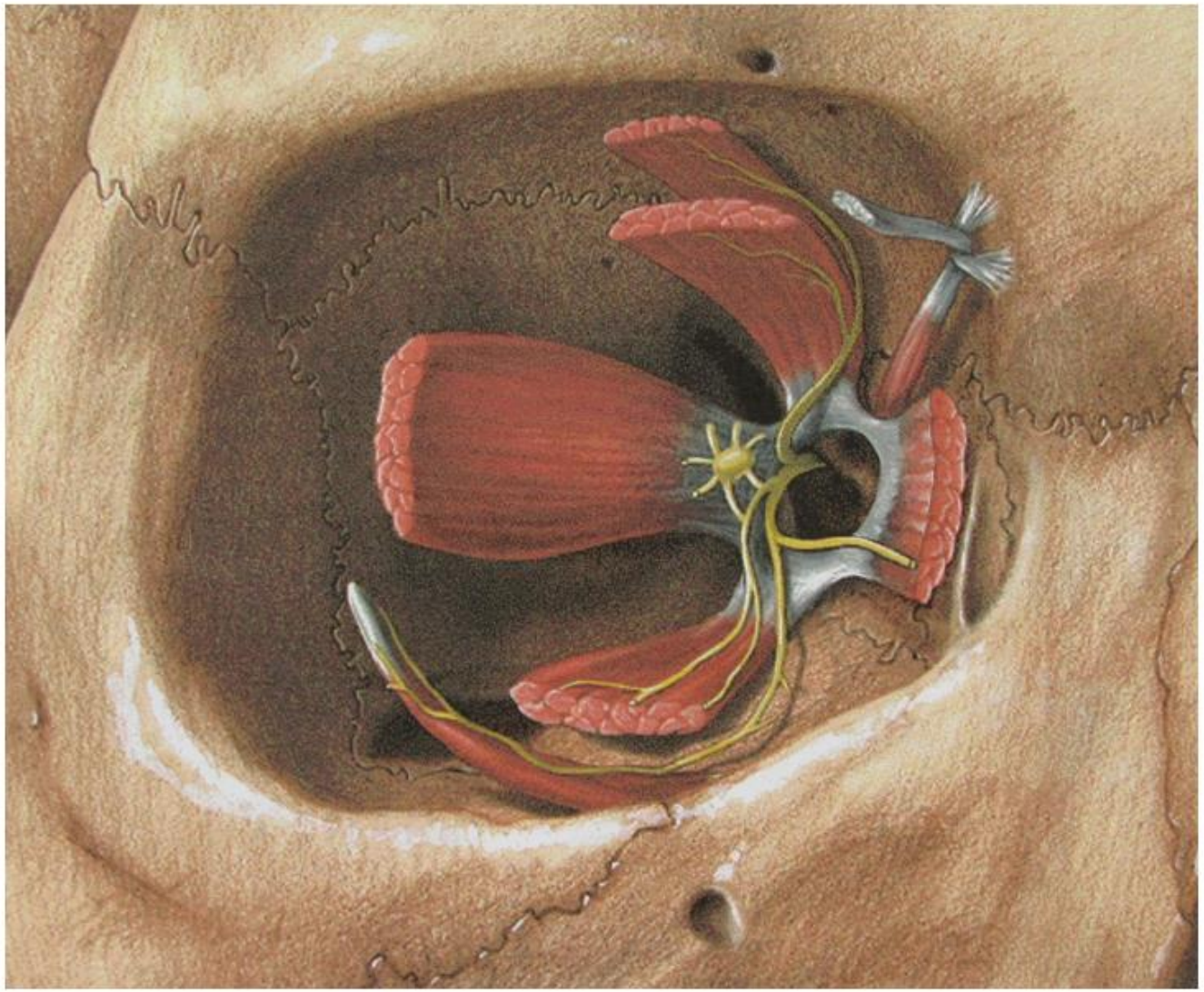
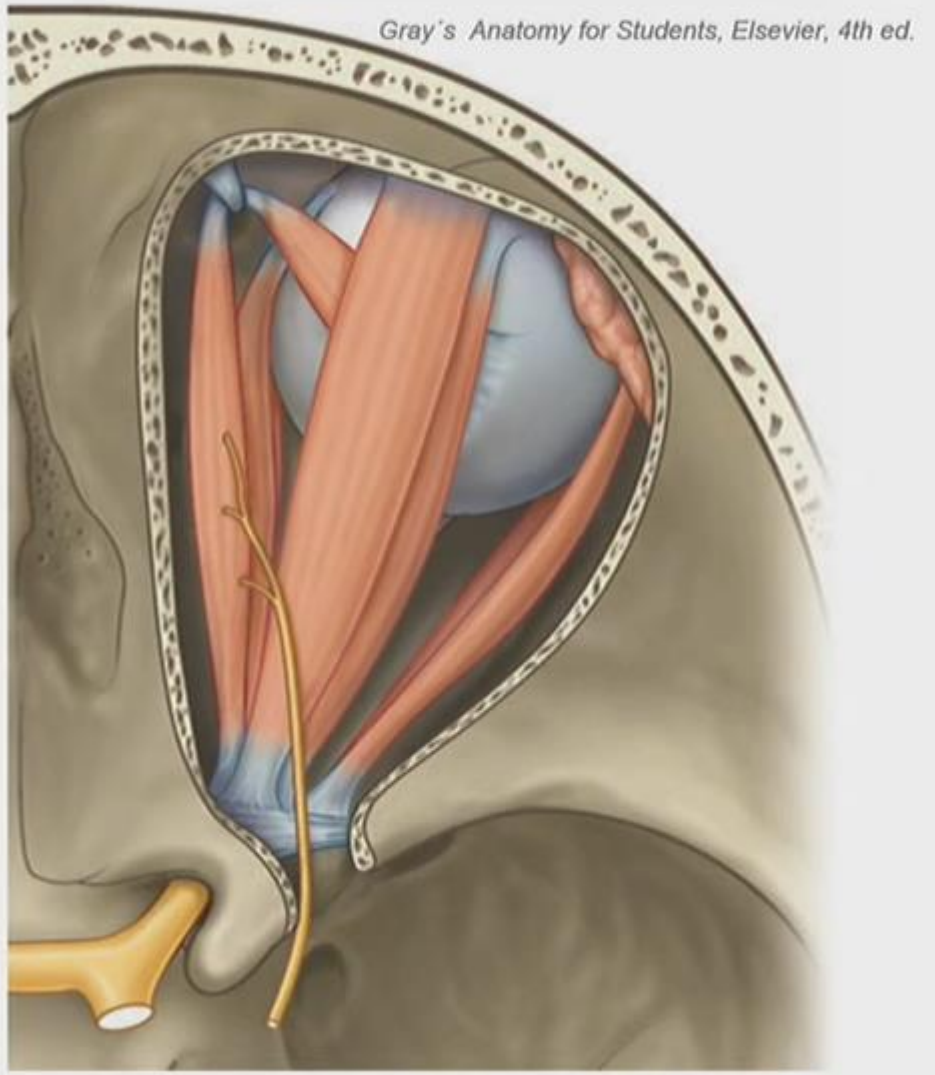
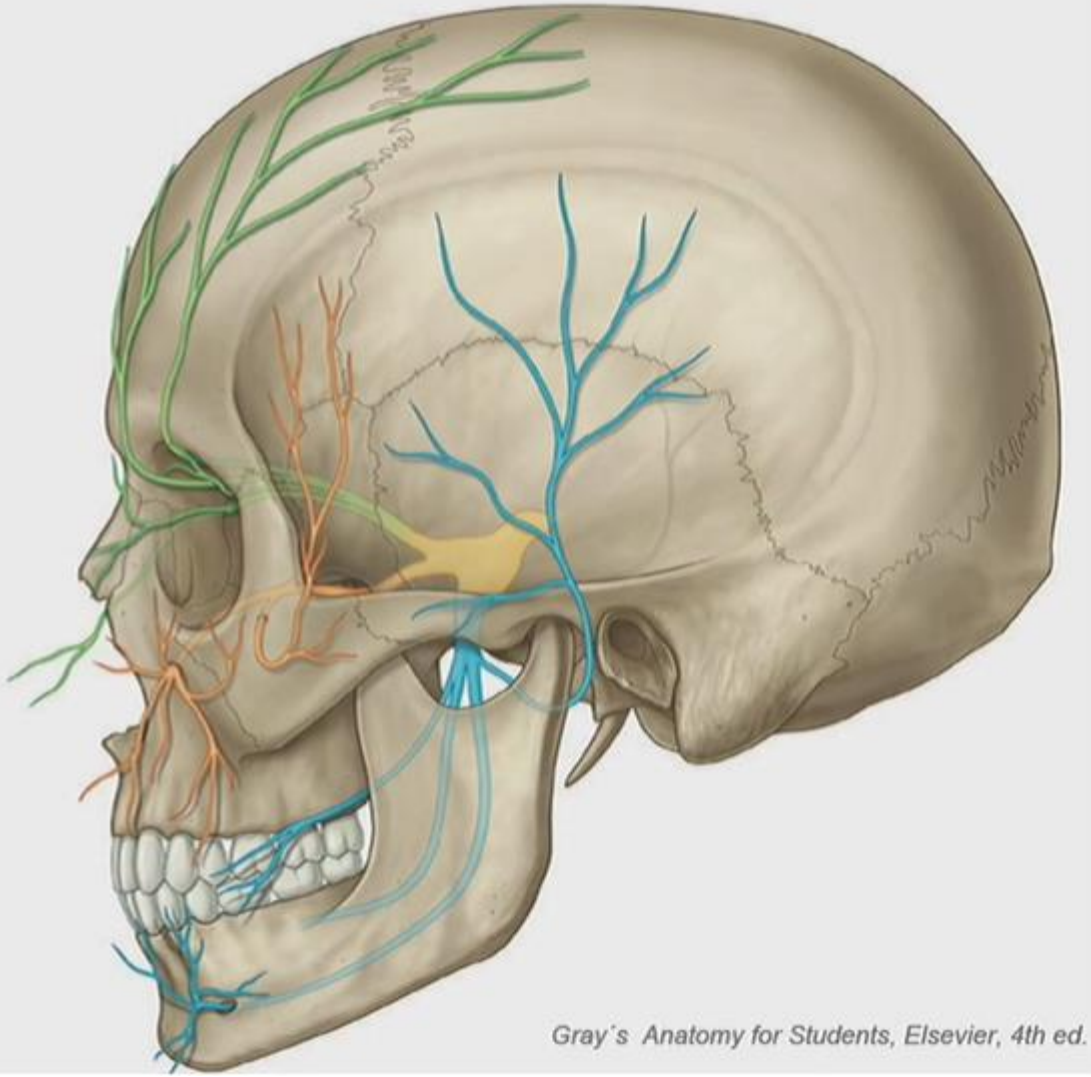
N. OCULOMOTORIUS



IV. Nervus trochlearis



V. Nervus trigeminus



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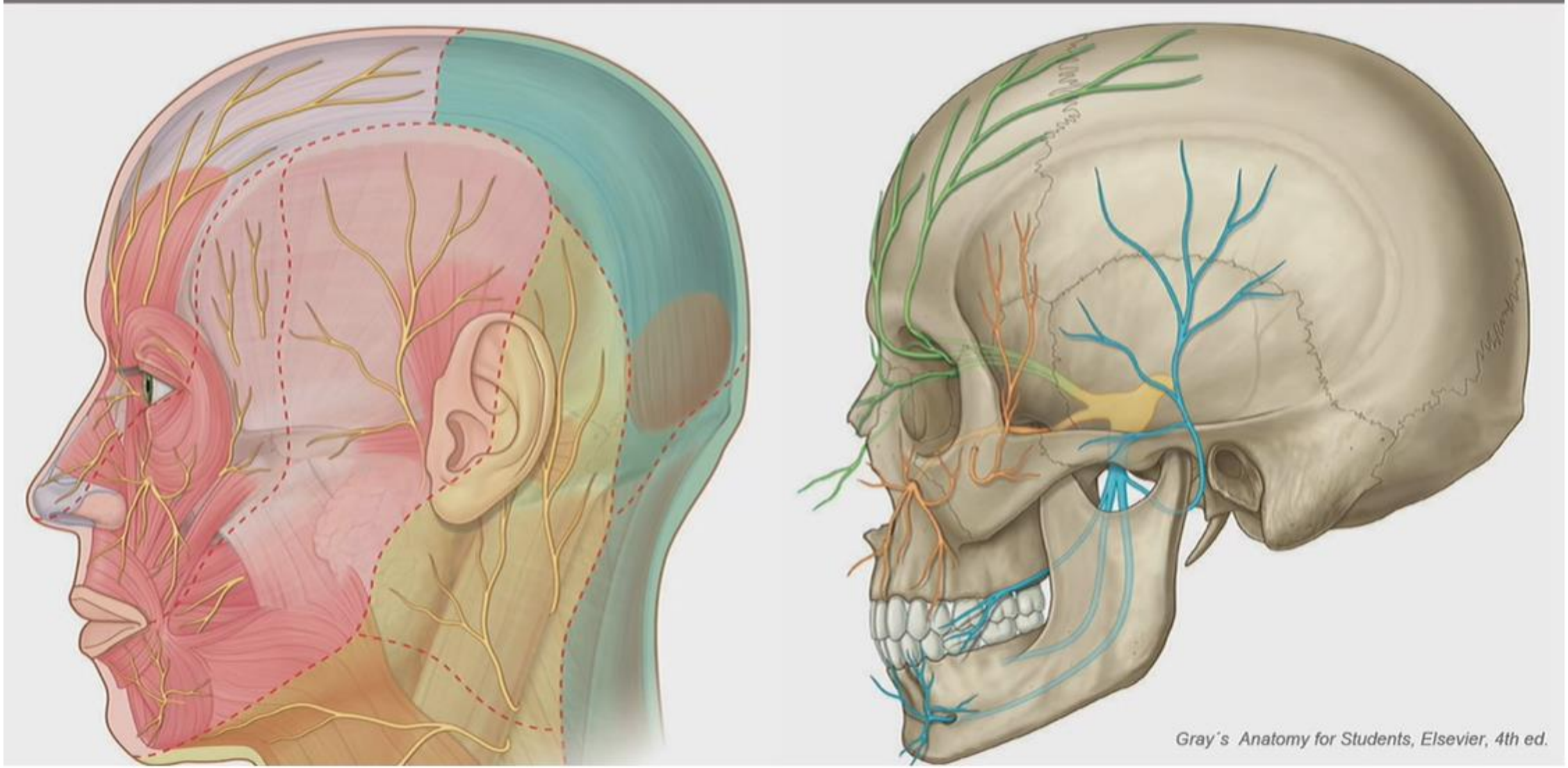
V. Nervus trigeminus



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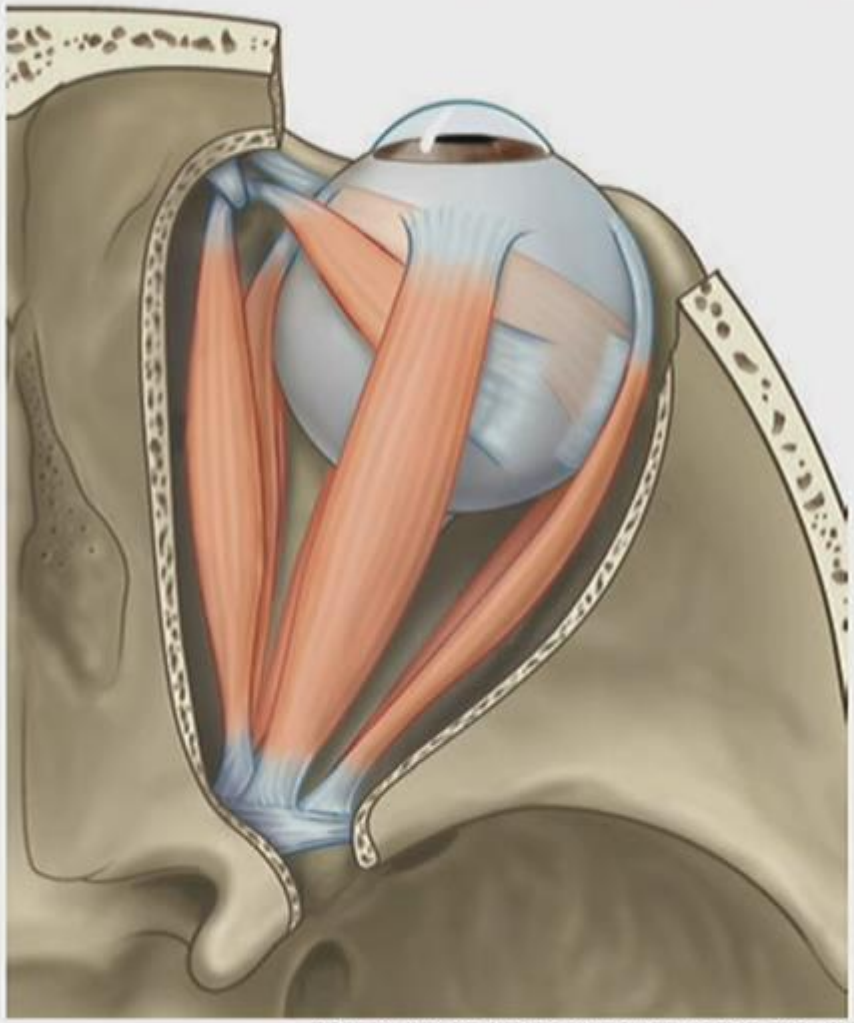
VI. Nervus abducens



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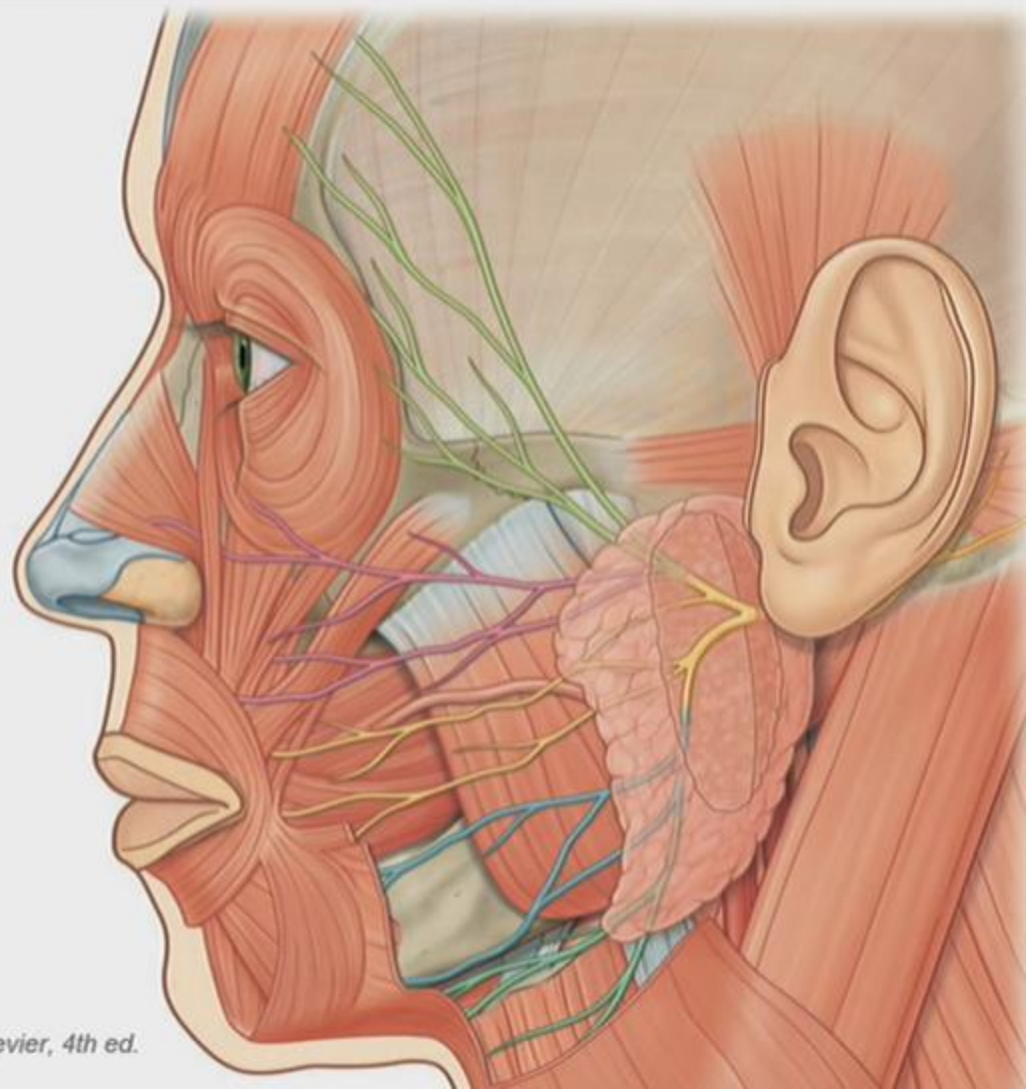
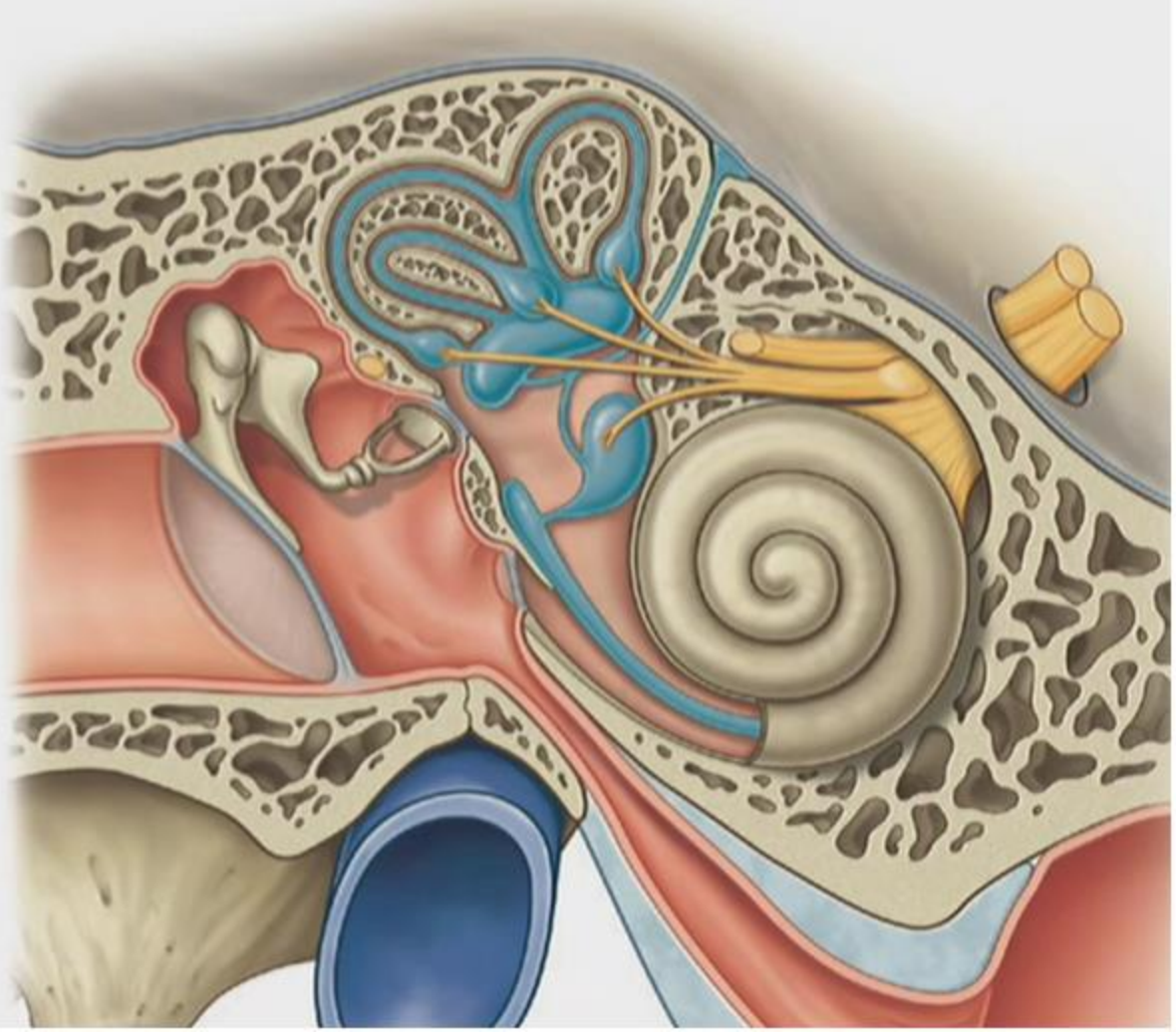
VII. Nervus facialis



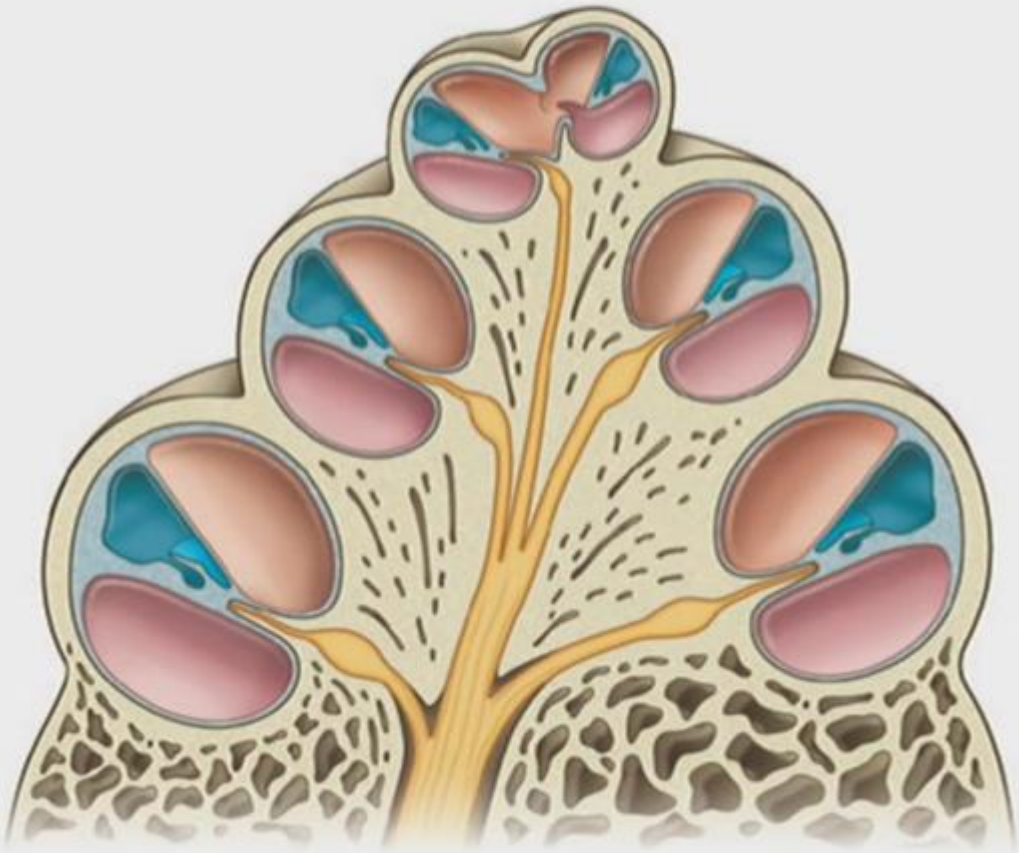
tudents, Elsevier, 4th ed.


Temporal
Zygomatic
Buccal
Marginal mandibular
Cervical

Nervus vestibularis



N. cochlearis



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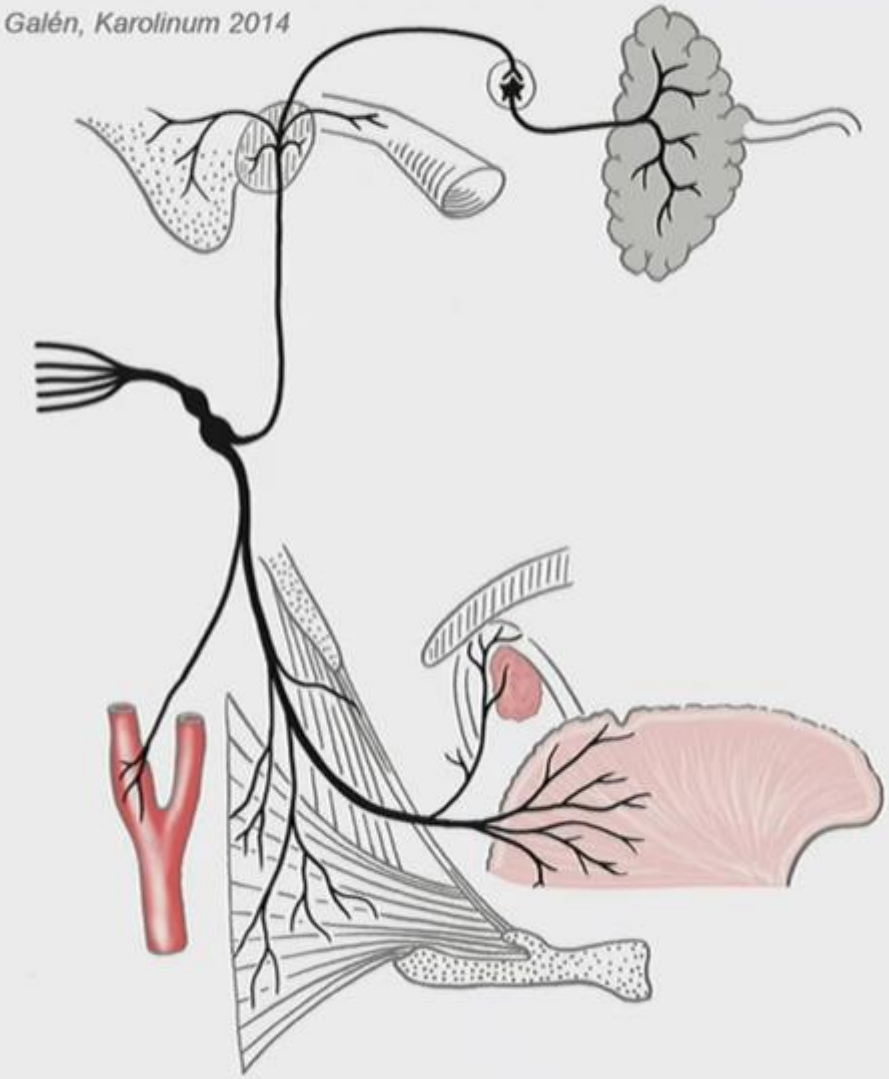
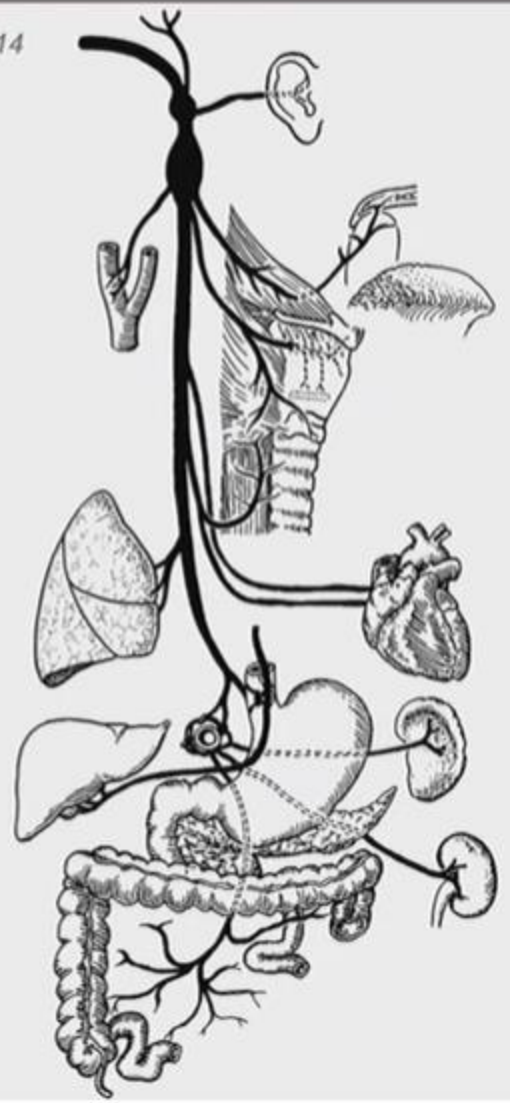
IX. Nervus glossopharyngeus

Grim M, Druga R, et al. Základy anatomie, Galén, Karolinum 2014

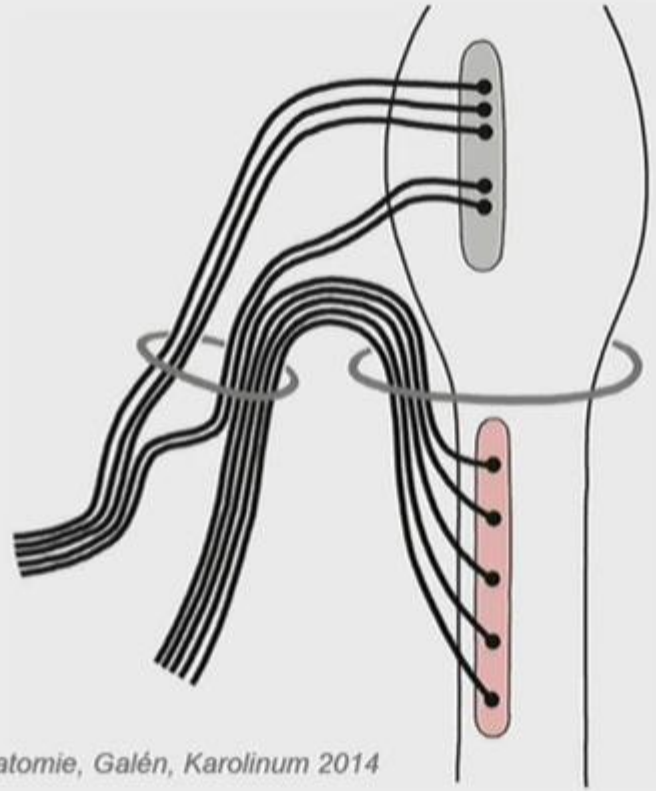


X. Nervus vagus

Grim M, Druga R, et al. Základy anatomie, Galén, Karolinum 2014



XI. Nervus accesorius

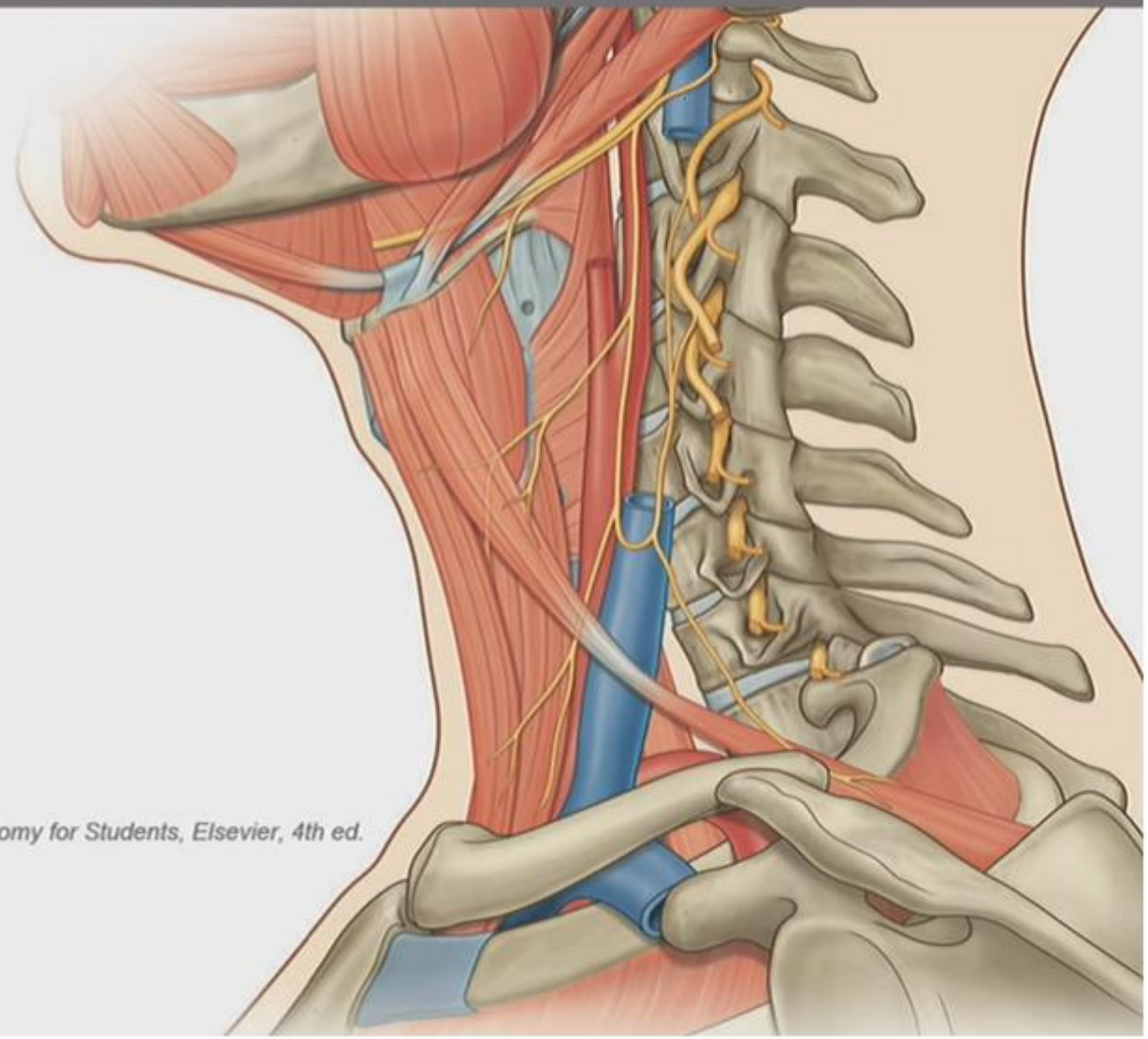


Grim M, Druga R, et al. Základy anatomie, Galén, Karolinum 2014

XII. Nervus hypoglossus

Grim M, Druga R, et al. Základy anatomie, Galén, Karolinum 2014

XII. Nervus hypoglossus

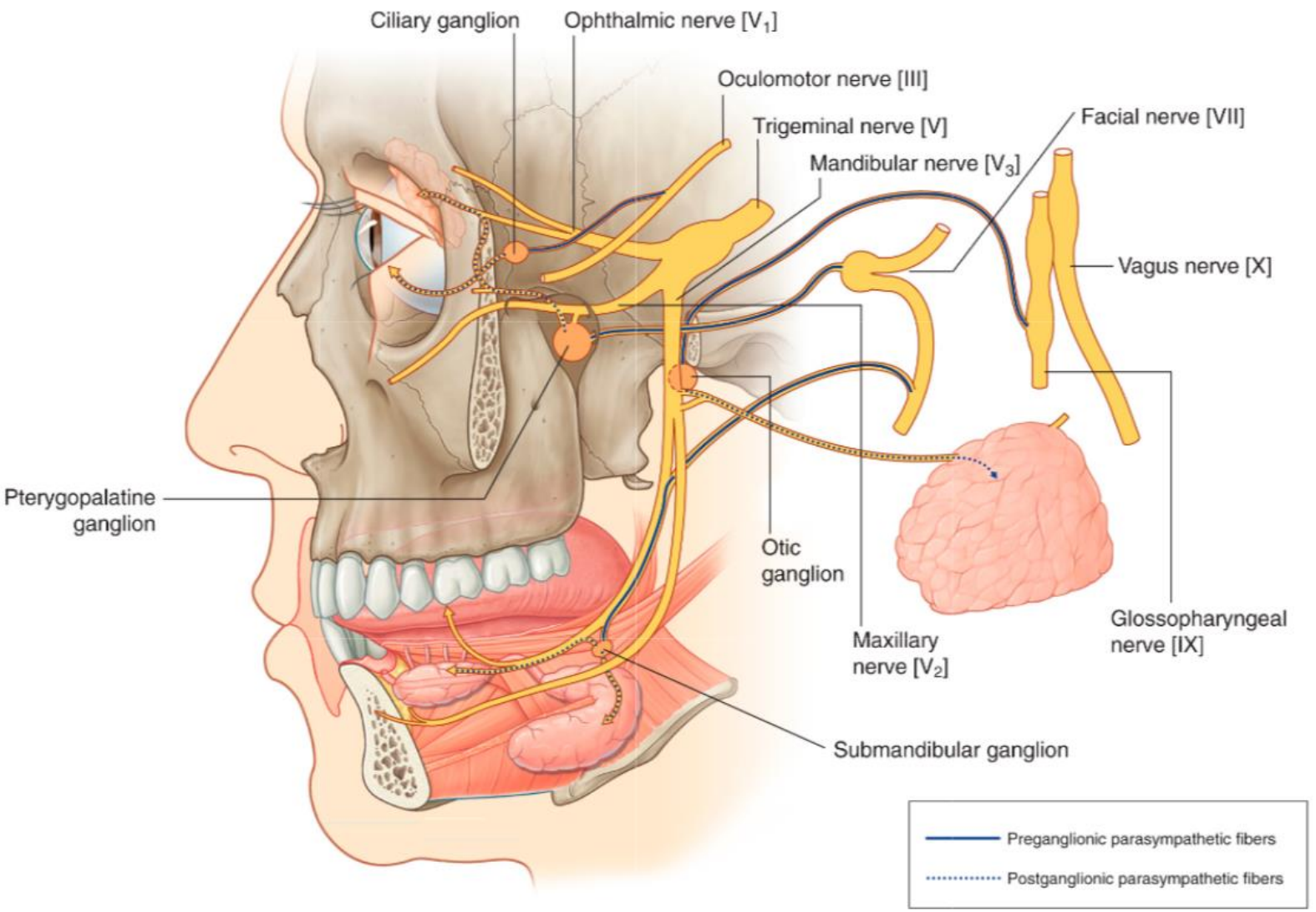


Gray's Anatomy for Students, Elsevier, 4th ed.

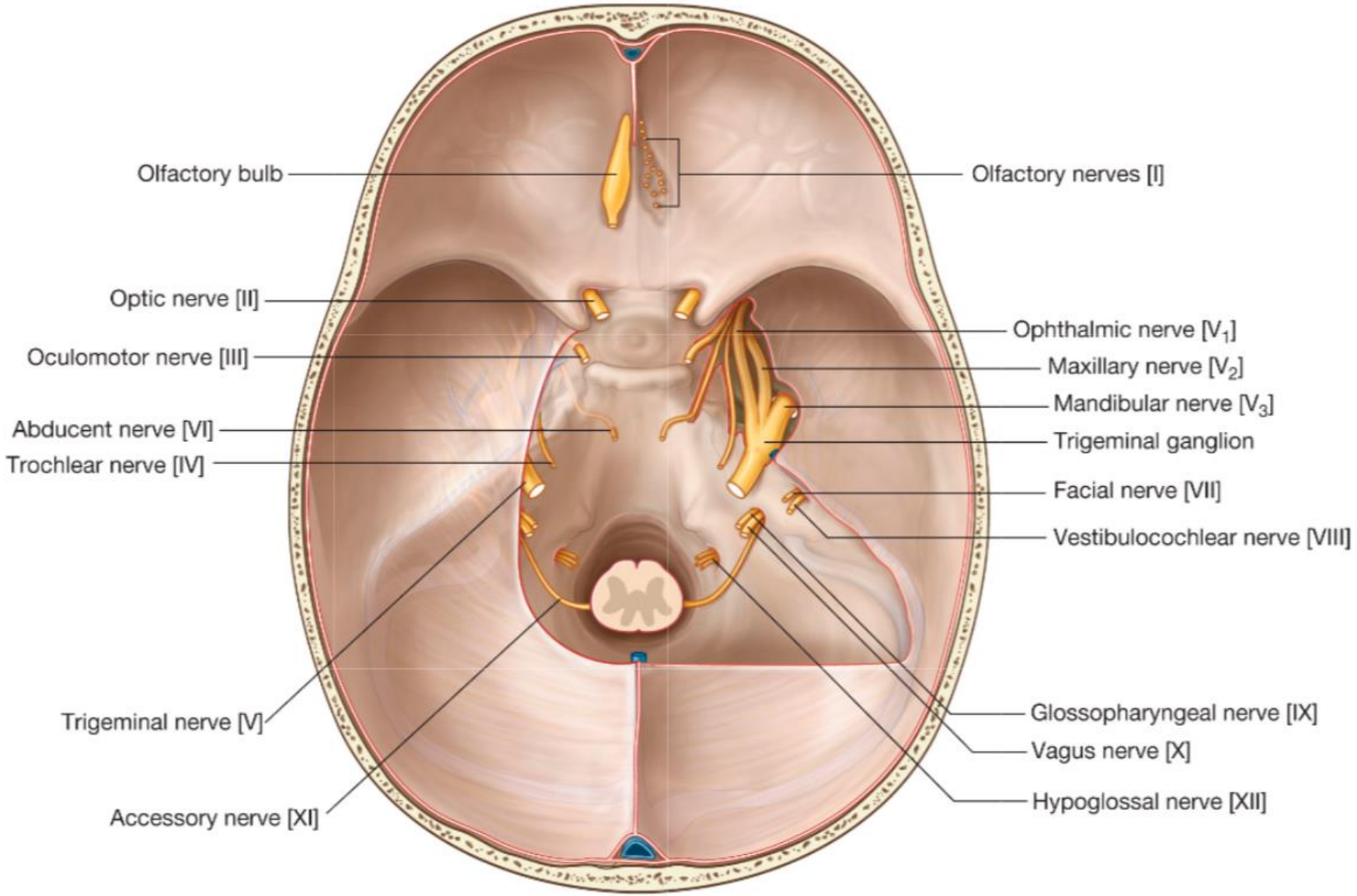
Cranial nerves

- There are twelve pairs of cranial nerves that exit the cranial cavity through foramina or fissures.
- All nerves except one, **the accessory nerve [XI]**, originate from the brain.
- All cranial nerves innervate structures in the head or neck. In addition, the **vagus nerve [X]** descends through the neck and into the thorax and abdomen where it innervates viscera.
- Parasympathetic fibers in the head are carried out of the brain as part of four cranial nerves—the **oculomotor nerve [III], the facial nerve [VII], the glossopharyngeal nerve [IX], and the vagus nerve [X].**
- Parasympathetic fibers in the **oculomotor nerve [III], the facial nerve [VII], and the glossopharyngeal nerve [IX]** destined for target tissues in the head leave these nerves, and are distributed with branches of the **trigeminal nerve [V].**
- The **vagus nerve [X]** leaves the head and neck to deliver parasympathetic fibers to the thoracic and abdominal viscera.

Cranial nerves and parasympathetic innervation



Cranial nerves exiting the cranial cavity



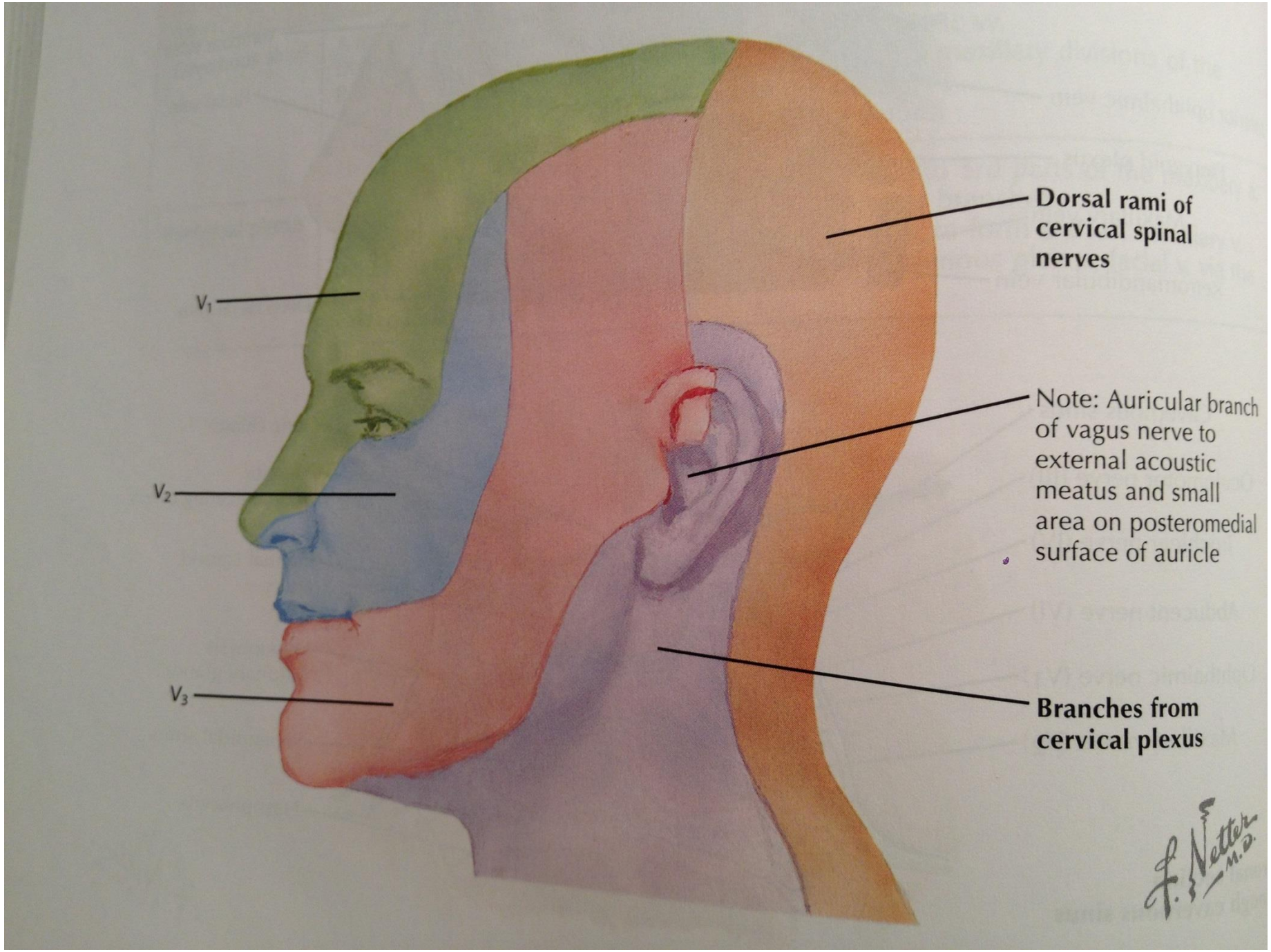
Cranial nerve functional components

Functional component	Abbreviation	General function	Cranial nerves containing component
General somatic afferent	GSA	Perception of touch, pain, temperature	Trigeminal nerve [V]; facial nerve [VII]; glossopharyngeal nerve [IX]; vagus nerve [X]
General visceral afferent	GVA	Sensory input from viscera	Glossopharyngeal nerve [IX]; vagus nerve [X]
Special afferent*	SA	Smell, taste, vision, hearing, and balance	Olfactory nerve [I]; optic nerve [II]; facial nerve [VII]; vestibulocochlear nerve [VIII]; glossopharyngeal nerve [IX]; vagus nerve [X]
General somatic efferent	GSE	Motor innervation to skeletal (voluntary) muscles	Oculomotor nerve [III]; trochlear nerve [IV]; abducent nerve [VI]; hypoglossal nerve [XII]
General visceral efferent	GVE	Motor innervation to smooth muscle, heart muscle, and glands	Oculomotor nerve [III]; facial nerve [VII]; glossopharyngeal nerve [IX]; vagus nerve [X]
Branchial efferent**	BE	Motor innervation to skeletal muscles derived from pharyngeal arch mesoderm	Trigeminal nerve [V]; facial nerve [VII]; glossopharyngeal nerve [IX]; vagus nerve [X]; accessory nerve [XI] (see Diogo R et al. *Nature* 2015;520:466–473)

Nerve	Component		Exit from skull	Function
	Afferent	Efferent		
Olfactory nerve [I]	SA		Cribriform plate of ethmoid bone	Smell
Optic nerve [II]	SA		Optic canal	Vision

Nerve	Component		Exit from skull	Function
	Afferent	Efferent		
Oculomotor nerve [III]		GSE, GVE	Superior orbital fissure	**GSE—**innervates levator palpebrae superioris, superior rectus, inferior rectus, medial rectus, and inferior oblique muscles **GVE—**innervates sphincter pupillae for pupillary constriction; ciliary muscles for accommodation of the lens for near vision
Trochlear nerve [IV]		GSE	Superior orbital fissure	Innervates superior oblique muscle
Abducent nerve [VI]		GSE	Superior orbital fissure	Innervates lateral rectus muscle

Nerve	Component		Exit from skull	Function
	Aff.	Eff.		
Trigeminal nerve [V]	GSA	BE	Superior orbital fissure—ophthalmic division [V_1] Foramen rotundum—maxillary nerve [V_2] Foramen ovale—mandibular division [V_3]	**GSA—**sensory from: **ophthalmic division [V_1]—** eyes, conjunctiva, orbital contents, nasal cavity, frontal sinus, ethmoidal cells, upper eyelid, dorsum of nose, anterior part of scalp, dura in anterior cranial fossa, superior part of tentorium cerebelli; **maxillary nerve [V_2]—**dura in middle cranial fossa, nasopharynx, palate, nasal cavity, upper teeth, maxillary sinus, skin covering the side of the nose, lower eyelid, cheek, upper lip; **mandibular division [V_3]—**skin of lower face, cheek, lower lip, anterior part of external ear, part of external acoustic meatus, temporal fossa, anterior two-thirds of tongue, lower teeth, mastoid air cells, mucous membranes of cheek, mandible, dura in middle cranial fossa **BE—**innervates temporalis, masseter, medial and lateral pterygoids, tensor tympani, tensor veli palatini, anterior belly of digastric, and mylohyoid muscles


V_1
V_2
V_3
Dorsal rami of cervical spinal nerves
Note: Auricular branch of vagus nerve to external acoustic meatus and small area on posteromedial surface of auricle
Branches from cervical plexus
F. Netter M.D.

Nerve	Component Aff.	Component Eff.	Exit from skull	Function
Facial nerve [VII]	GSA, SA	GVE, BE	Stylomastoid foramen (nerve leaves cranial cavity through internal acoustic meatus and gives rise to branches in the facial canal of the temporal bone prior to exiting through the stylomastoid foramen; these branches leave the skull through other fissures and canals.)	**GSA—**sensory from part of external acoustic meatus and deeper parts of auricle **SA—**taste from anterior two-thirds of tongue **GVE—**innervates lacrimal gland, submandibular and sublingual salivary glands, and mucous membranes of nasal cavity, hard and soft palates **BE—**innervates muscles of face (muscles of facial expression) and scalp derived from the second pharyngeal arch, and stapedius, posterior belly of digastric, stylohyoid muscles

Nerve	Component Aff.	Component Eff.	Exit from skull	Function
Vestibulocochlear nerve [VIII]	SA		(Nerve leaves cranial cavity through internal acoustic meatus)	Vestibular division—balance Cochlear division—hearing
Glossopharyngeal nerve [IX]	GVA, SA, GSA	GVE, BE	Jugular foramen	**GVA—**sensory from carotid body and sinus **GSA—**posterior one-third of tongue, palatine tonsils, oropharynx, and mucosa of middle ear, pharyngotympanic tube, and mastoid air cells **SA—**taste from posterior one-third of tongue **GVE—**innervates parotid salivary gland **BE—**innervates stylopharyngeus muscle

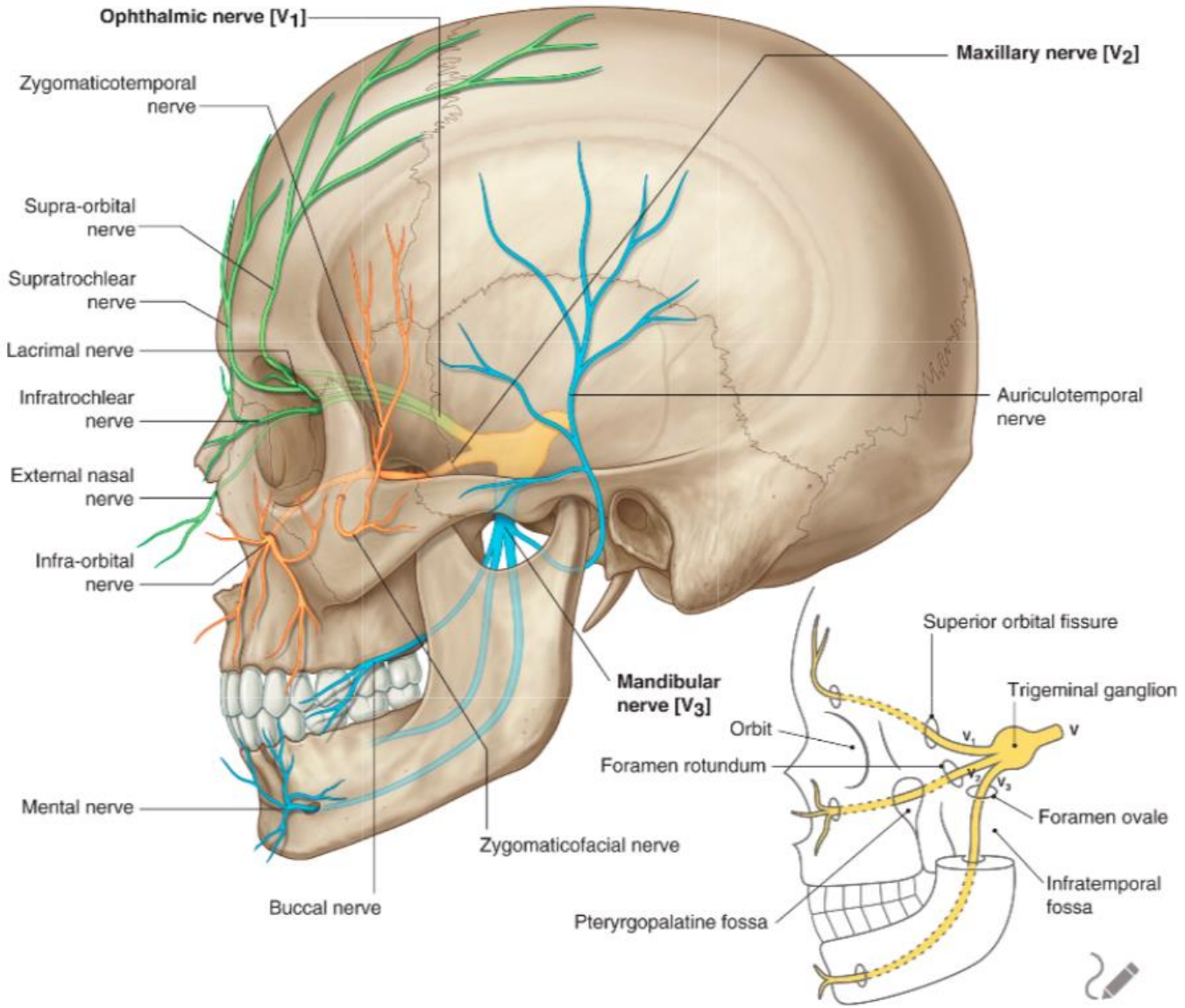
Nerve	Component		Exit from skull	Function
	Aff.	Eff.		
Vagus nerve [X]	GSA, GVA, SA	GVE, BE	Jugular foramen	**GSA—**sensory from larynx, laryngopharynx, deeper parts of auricle, part of external acoustic meatus, and dura in posterior cranial fossa **GVA—**sensory from aortic body chemoreceptors and aortic arch baroreceptors, esophagus, bronchi, lungs, heart, and abdominal viscera of the foregut and midgut **SA—**taste from the epiglottis and pharynx **GVE—**innervates smooth muscle and glands in the pharynx, larynx, thoracic viscera, and abdominal viscera of the foregut and midgut **BE—**innervates one tongue muscle (palatoglossus), muscles of soft palate (except tensor veli palatini), pharynx (except stylopharyngeus), and larynx
Accessory nerve [XI]		BE	Jugular foramen	Innervates sternocleidomastoid and trapezius muscles [for classification as BE see Diogo R et al. *Nature* 2015;520:466–473.]
Hypoglossal nerve [XII]		GSE	Hypoglossal canal	Innervates hyoglossus, genioglossus, and styloglossus muscles and all intrinsic muscles of the tongue

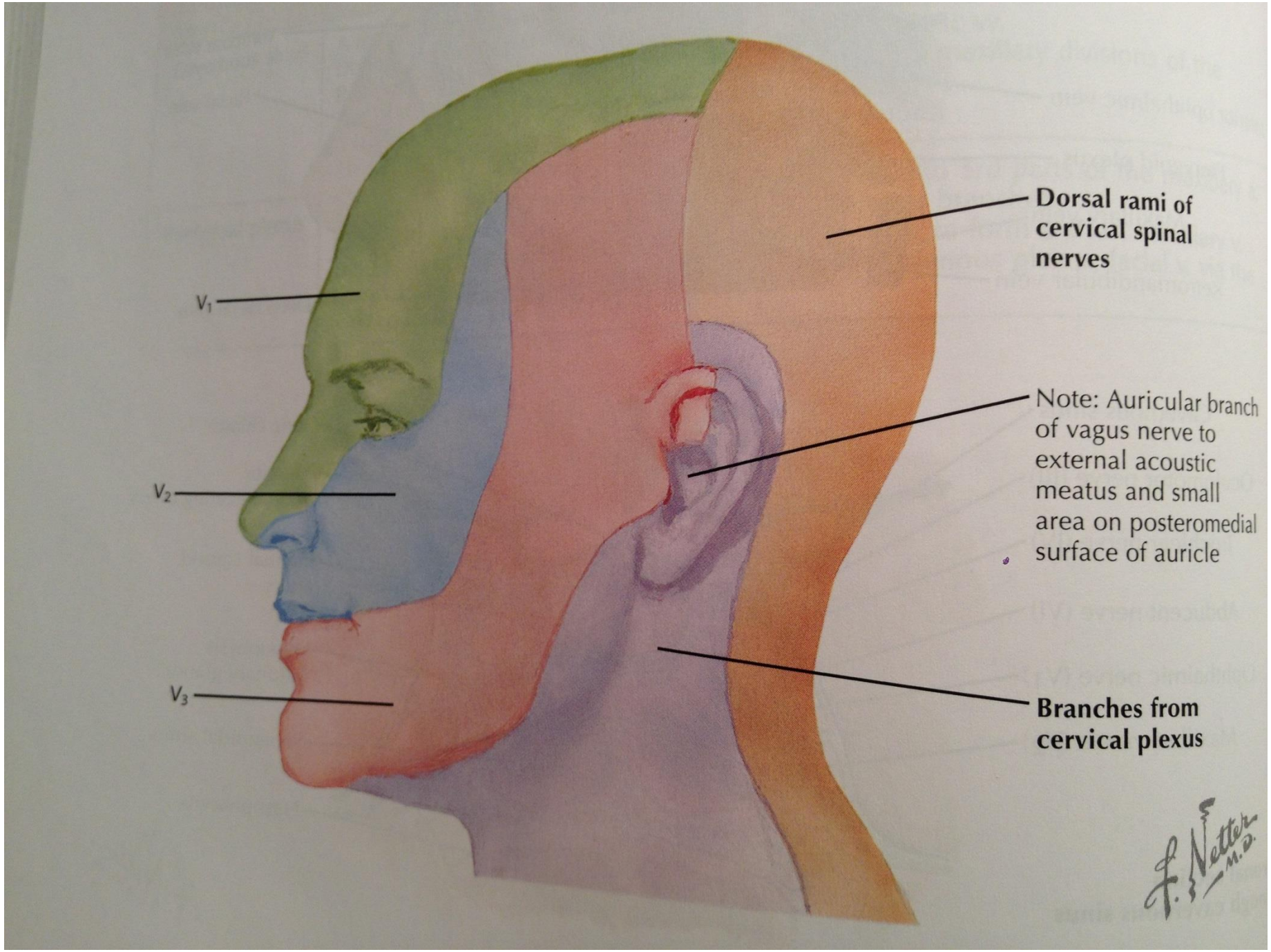
Cranial nerves

During development a cranial nerve becomes associated with each of the pharyngeal arches. Because the face is primarily derived from the first and second pharyngeal arches, innervation of neighboring facial structures is as follows:

- **The trigeminal nerve [V]** innervates facial structures derived from the **first arch.**
- **The facial nerve [VII]** innervates facial structures derived from the **second arch.**

The **trigeminal nerve [V]** divides into three major **divisions—the ophthalmic [V_1], maxillary [V_2], and mandibular [V_3]**—before leaving the middle cranial fossa. Each of these divisions passes out of the cranial cavity to innervate a part of the face, so most of the skin covering the face is innervated solely by branches of the trigeminal nerve [V]. The exception is a small area covering the angle and lower border of the ramus of the mandible and parts of the ear, where **the facial [VII], vagus [X], and cervical nerves** contribute to the innervation.

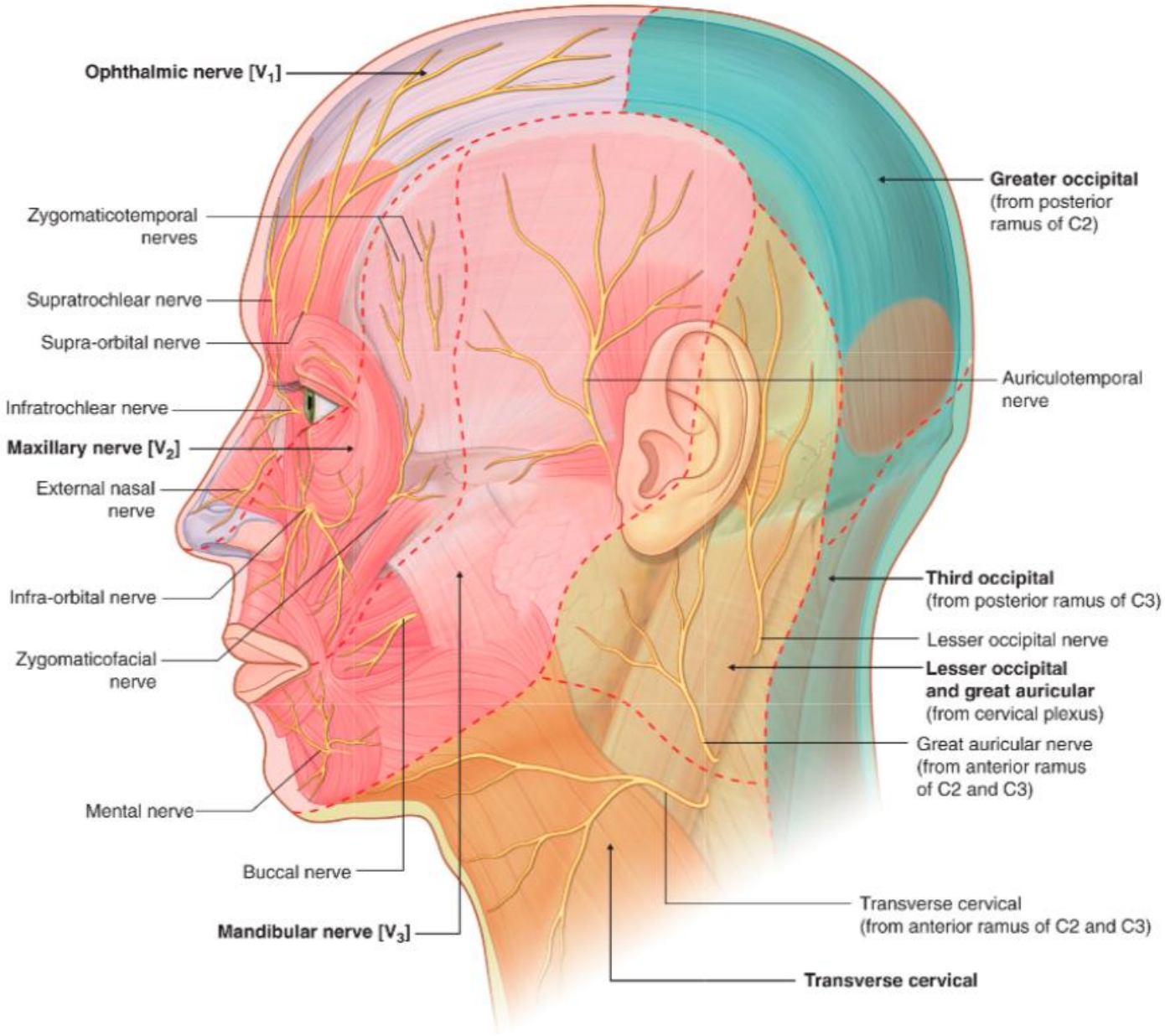


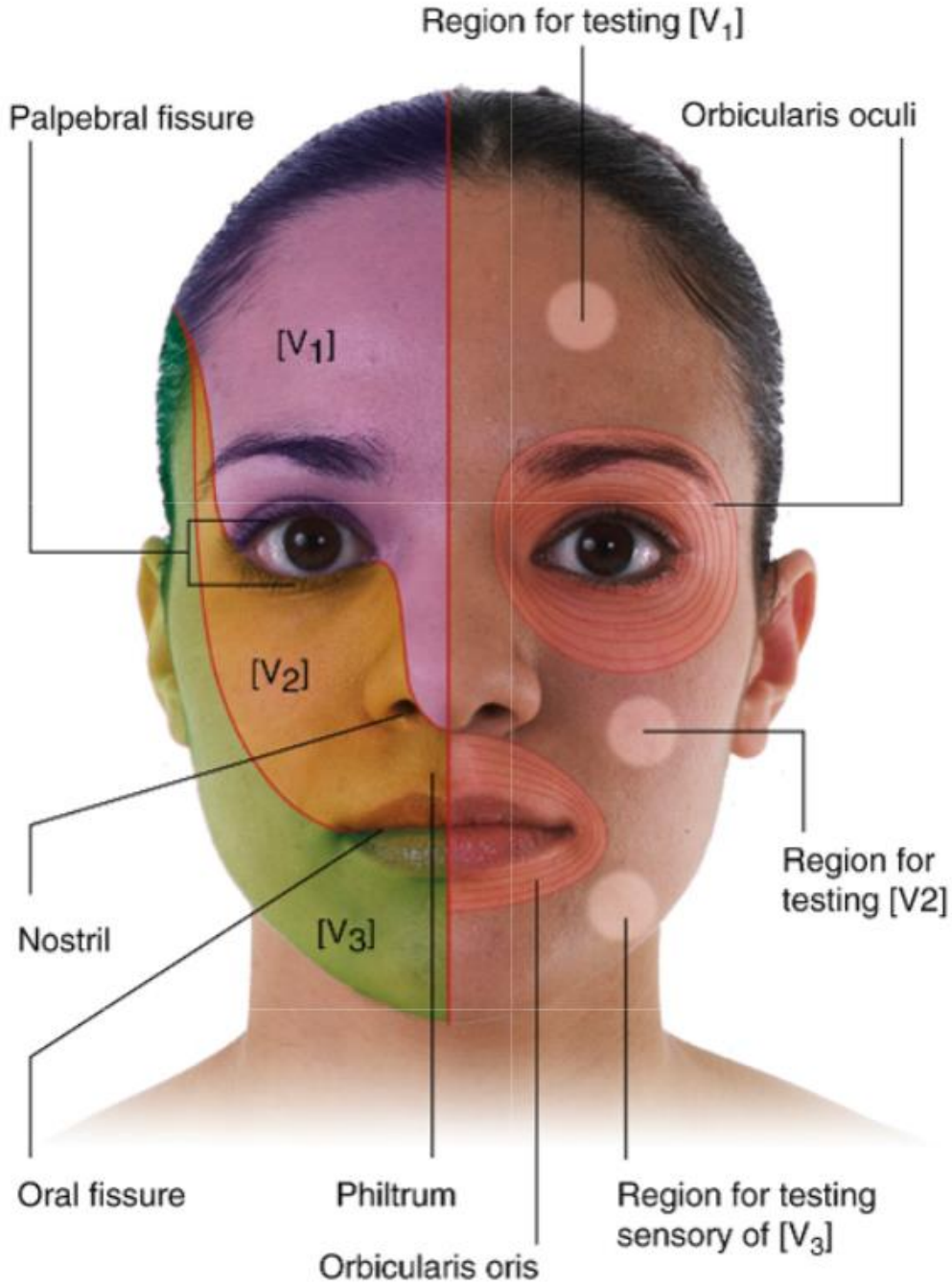

V_1
V_2
V_3
Dorsal rami of cervical spinal nerves
Note: Auricular branch of vagus nerve to external acoustic meatus and small area on posteromedial surface of auricle
Branches from cervical plexus
F. Netter M.D.

Ophthalmic nerve [V_1]:

The ophthalmic nerve [V_1] exits the skull through the **superior orbital fissure** and enters the orbit. Its branches that innervate the face include:

- the **supraorbital and supratrochlear nerves,** which leave the orbit superiorly and innervate the **upper eyelid, forehead, and scalp;**
- the **infratrochlear nerve,** which exits the orbit in the medial angle to innervate the **medial half of the upper eyelid, the skin in the area of the medial angle of eye, and the side of the nose**;
- the **lacrimal nerve,** which exits the orbit in the lateral angle to innervate the **lateral half of the upper eyelid and the skin in the area of the lateral angle of eye**; and
- the **external nasal nerve,** which supplies the **anterior part of the nose**




Region for testing [V1]
Palpebral fissure
Orbicularis oculi
[V1]
[V2]
Region for testing [V2]
Nostril
[V3]
Oral fissure
Philtrum
Region for testing sensory of [V3]
Orbicularis oris

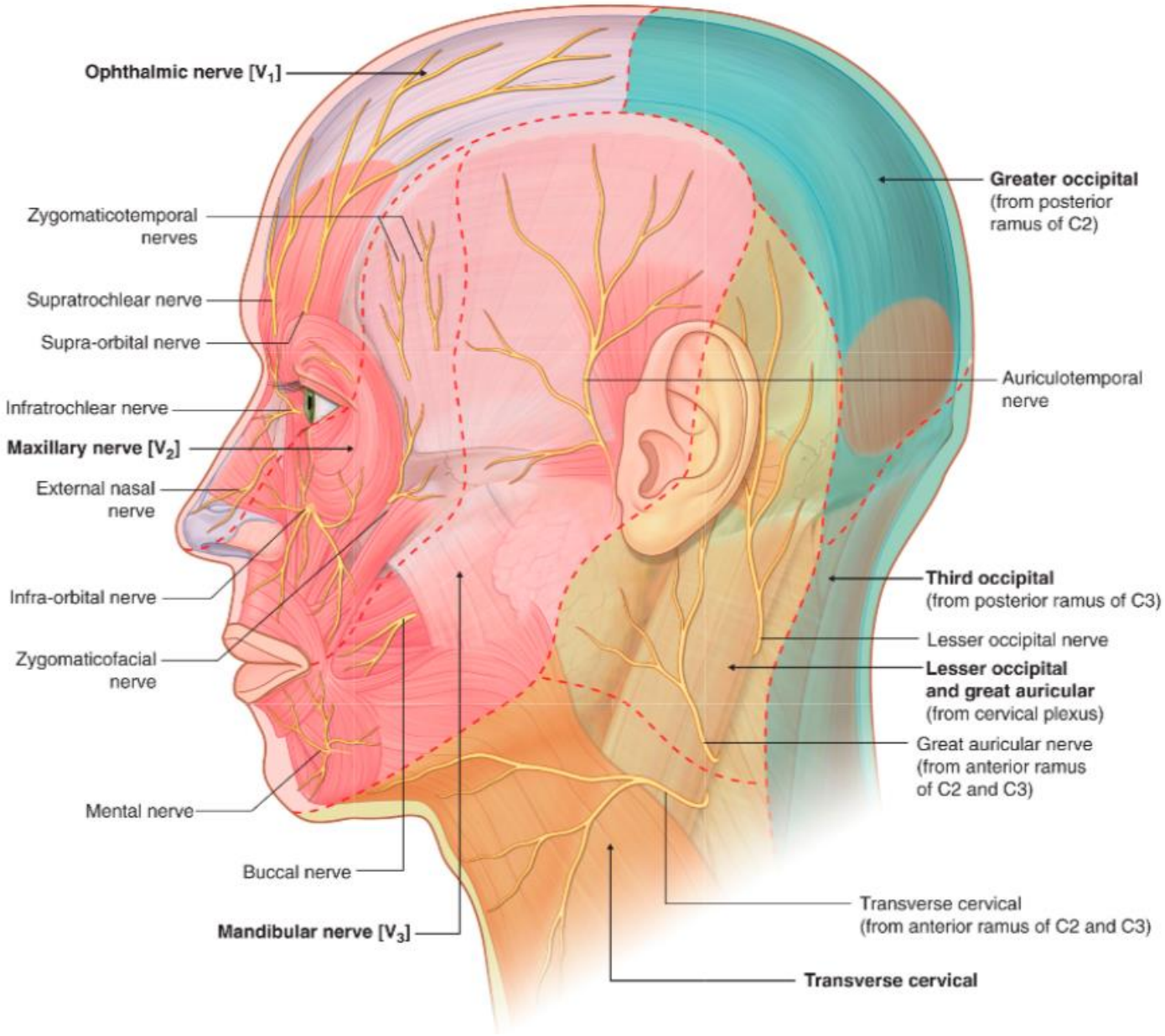
Maxillary nerve [V2]:

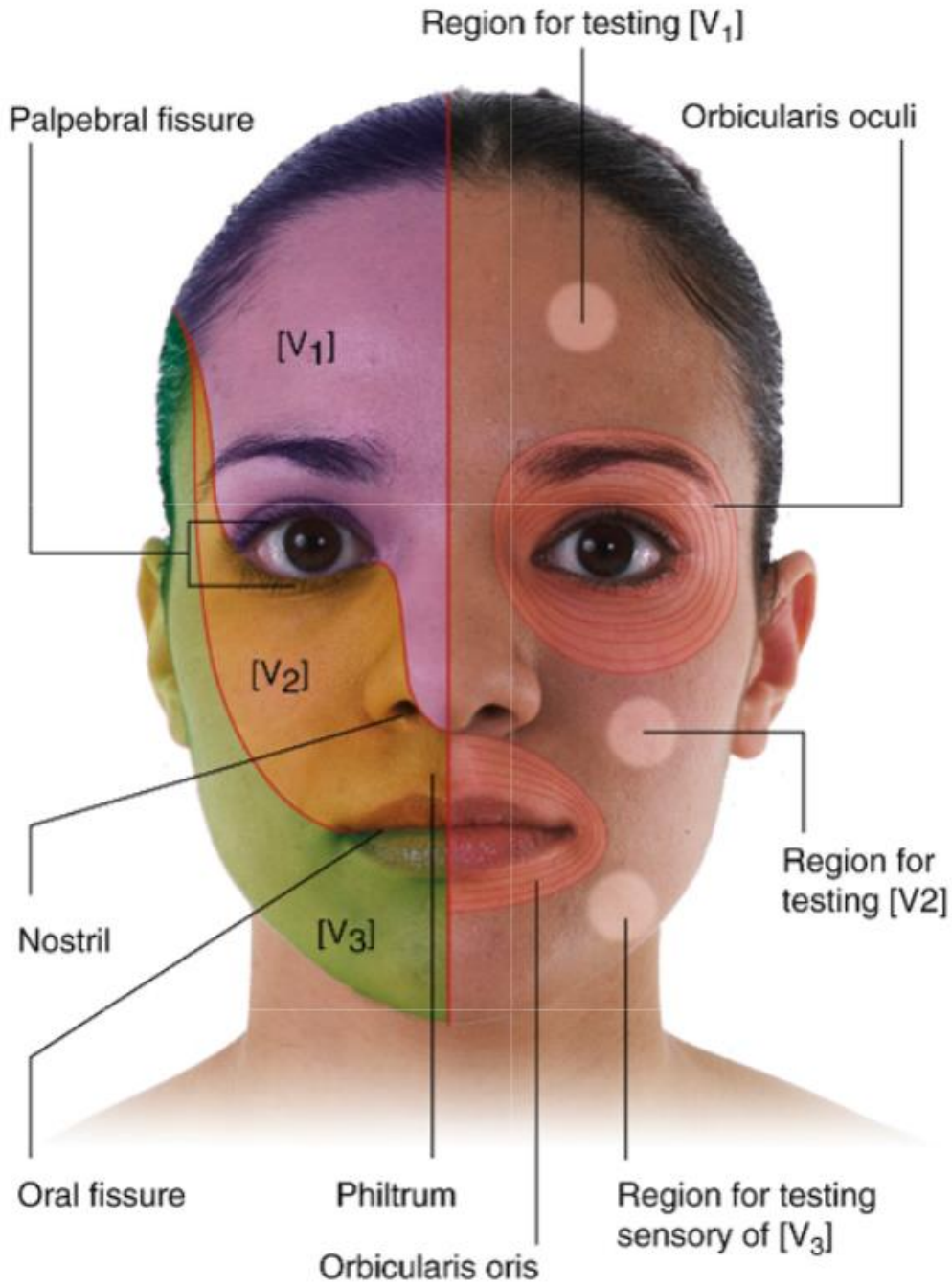
Exits the skull through the **foramen rotundum**. Branches that innervate the face include:

a small **zygomaticotemporal branch**, which exits the zygomatic bone and supplies a small area of the **anterior temple above the zygomatic arch;**

a small **zygomaticofacial branch**, which exits the zygomatic bone and supplies a small area of **skin over the zygomatic bone;** and

the large **infraorbital nerve**, which exits the maxilla through the infraorbital foramen and immediately divides into multiple branches to supply **the lower eyelid, cheek, side of the nose, and upper lip - pes anserinus minor**




Region for testing [V1]
Palpebral fissure
Orbicularis oculi
[V1]
[V2]
Region for testing [V2]
Nostril
[V3]
Oral fissure
Philtrum
Region for testing sensory of [V3]
Orbicularis oris

Mandibular nerve [V3]

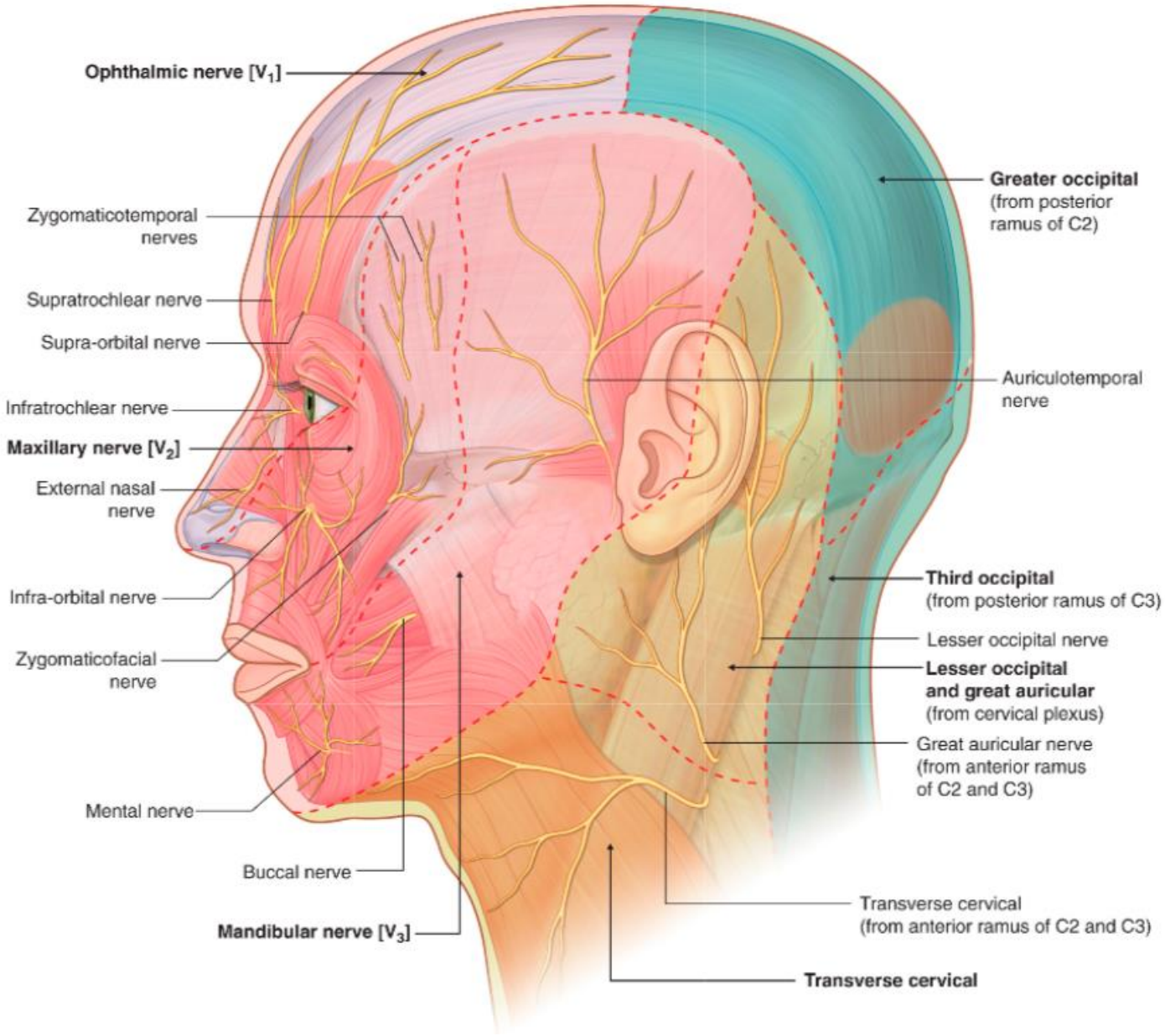
Exits the skull through the **foramen ovale**. Branches

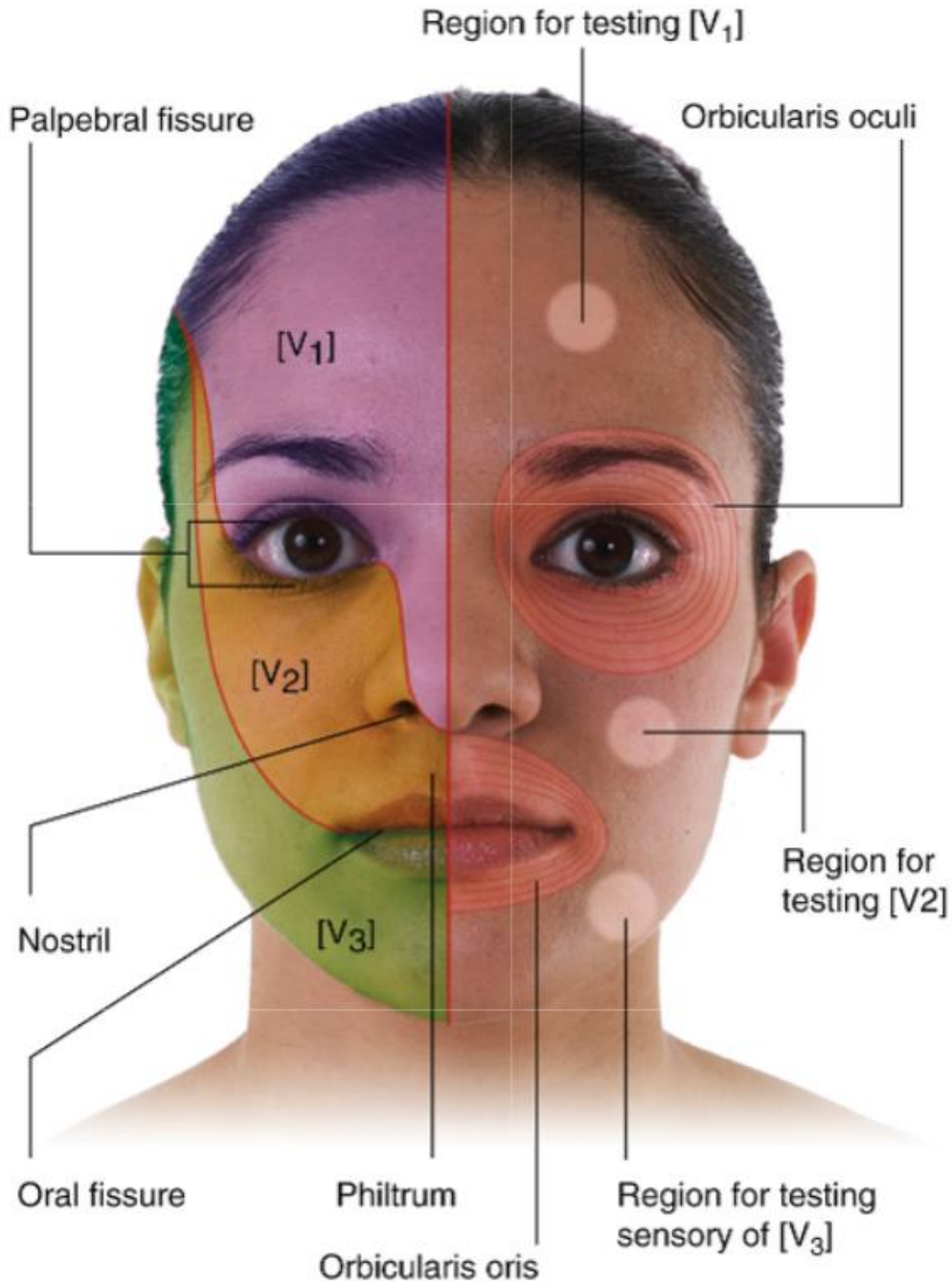
innervating the face include:

the **auriculotemporal nerve**, which enters the face just posterior to the temporomandibular joint, passes through the parotid gland, and ascends just anterior to the ear to supply **the external acoustic meatus, the surface of the tympanic membrane (eardrum), and a large area of the temple;**

the **buccal nerve**, which is on the surface of the buccinator muscle supplying the **cheek**; and

the **mental nerve**, which exits the mandible through the mental foramen and immediately divides into multiple branches to supply the **skin and mucous membrane of the lower lip and skin of the chin**




Region for testing [V1]
Palpebral fissure
Orbicularis oculi
[V1]
[V2]
Region for testing [V2]
Nostril
[V3]
Oral fissure
Philtrum
Region for testing sensory of [V3]
Orbicularis oris

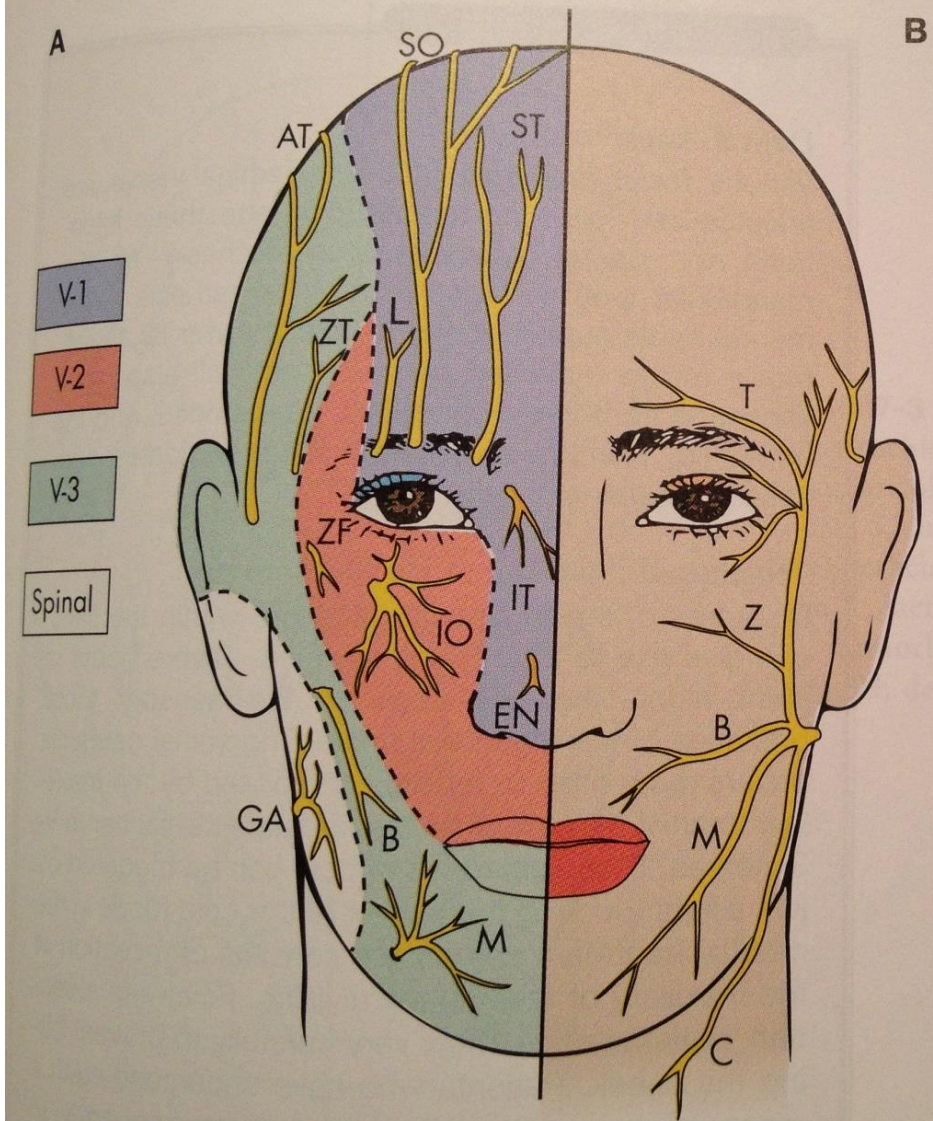


Figure 7-2 **A,** Cutaneous nerves of face. *V-1 (ophthalmic nerve): SO,* Supraorbital nerve; *ST,* supratrochlear nerve; *L,* lacrimal nerve; *IT,* infratrochlear nerve; *EN,* external nasal nerve. *V-2 (maxillary nerve): IO,* Infraorbital nerve. *V-3 (mandibular nerve): AT,* Auriculotemporal nerve; *B,* buccal nerve; *M,* mental nerve. *Spinal nerve: GA,* Great auricular nerve. **B,** Motor nerves to muscles of facial expression. *Facial branches of CN VII: T,* Temporal branches; *Z,* zygomatic branches; *B,* buccal branches; *M,* mandibular branches; *C,* cervical branches.

Motor innervation

The muscles of the face, as well as those associated with the ear and the scalp, are derived from the **second pharyngeal arch.** The cranial nerve associated with this arch is the **facial nerve [VII]** and therefore branches of the facial nerve [VII] innervate all these muscles.

The facial nerve [VII] passes the posterior cranial fossa through the internal acoustic meatus. It passes through the temporal bone, giving off several branches, and emerges from the base of the skull through the stylomastoid foramen .

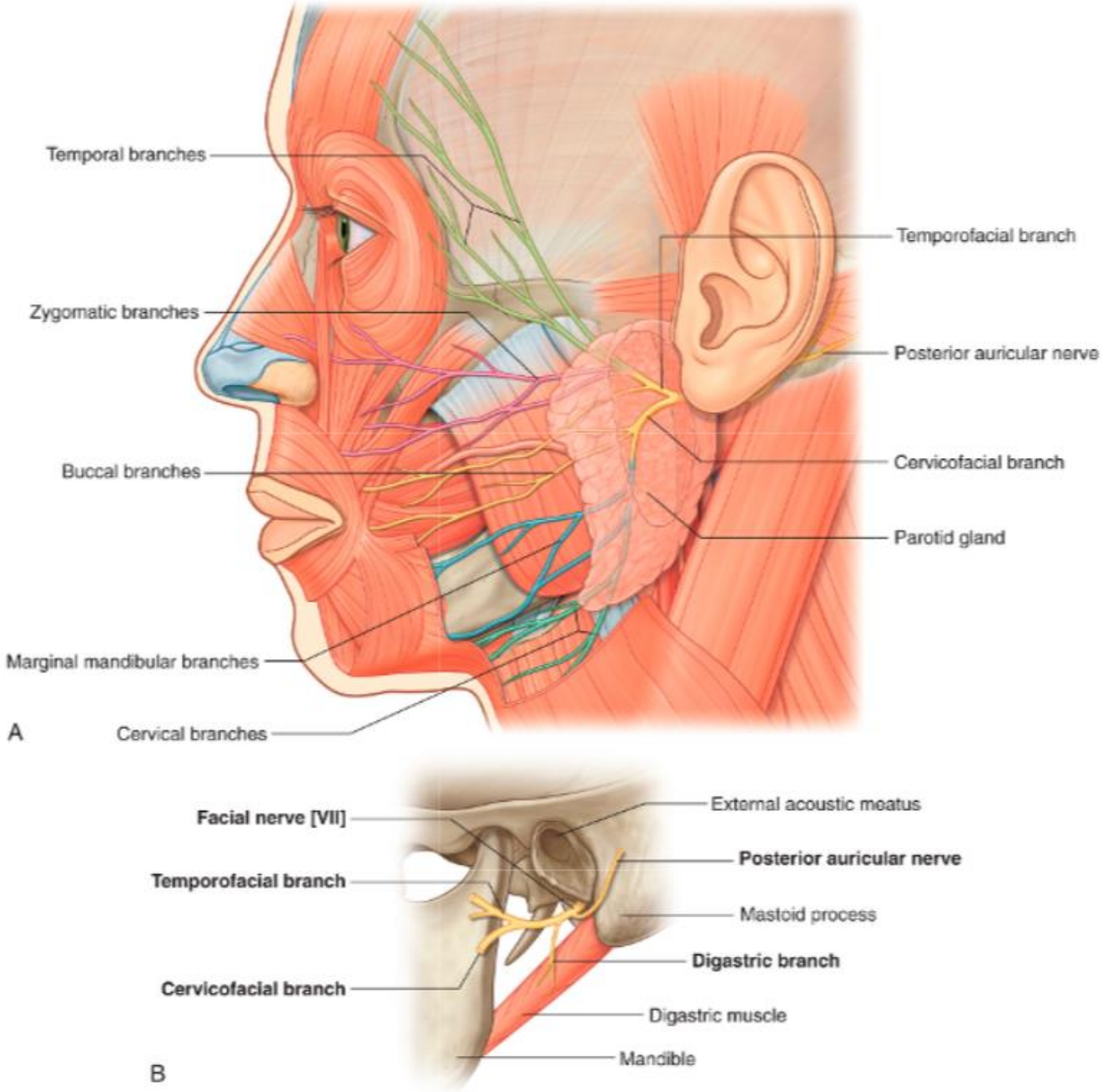
At this point it gives off the **posterior auricular nerve**. This branch passes upward, behind the ear, to supply the **occipital belly** of the occipitofrontalis muscle of the scalp and the **posterior auricular muscle** of the ear.

The main stem of the facial nerve [VII] then gives off another branch, which innervates the **posterior belly of the digastric muscle** and the **stylohyoid muscle**.

At this point, the facial nerve [VII] enters the deep surface of the parotid gland and forms the **parotid plexus.**

Five terminal groups of branches of the facial nerve [VII]-

the temporal, zygomatic, buccal, marginal mandibular, and cervical branches-emerge from the parotid gland



Facial nerve [VII]

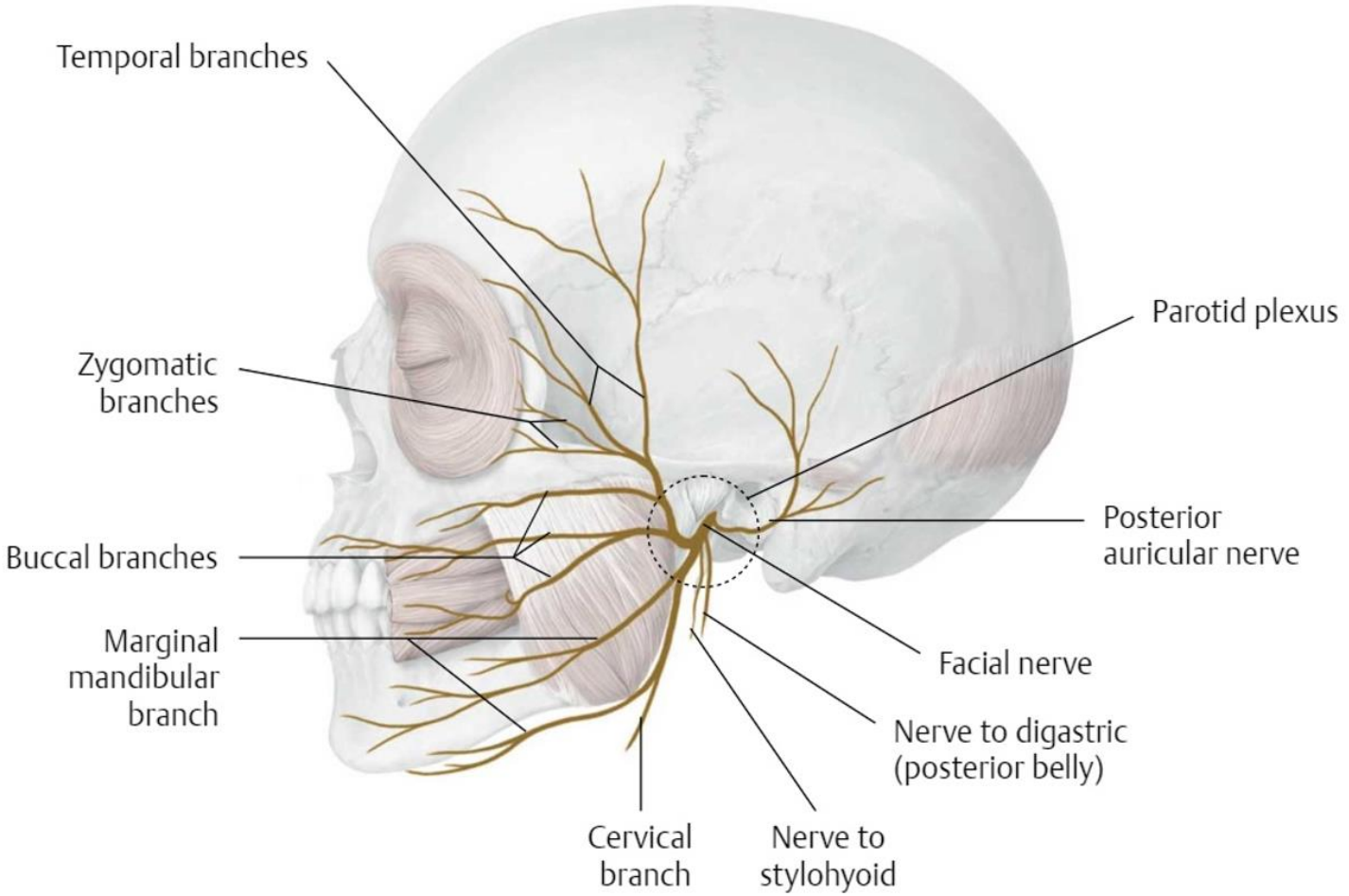
Temporal branches exit from the superior border of the parotid gland to supply muscles in the area of the **temple, forehead, and supra-orbital area**;

Zygomatic branches emerge from the anterosuperior border of the parotid gland to supply **muscles in the infraorbital area, the lateral nasal area, and the upper lip;**

Buccal branches emerge from the anterior border of the parotid gland to supply muscles in the **cheek, the upper lip, and the corner of the mouth;**

Marginal mandibular branches emerge from the anteroinferior border of the parotid gland to supply **muscles of the lower lip and chin**;

Cervical branches emerge from the inferior border of the parotid gland to supply the **platysma**.



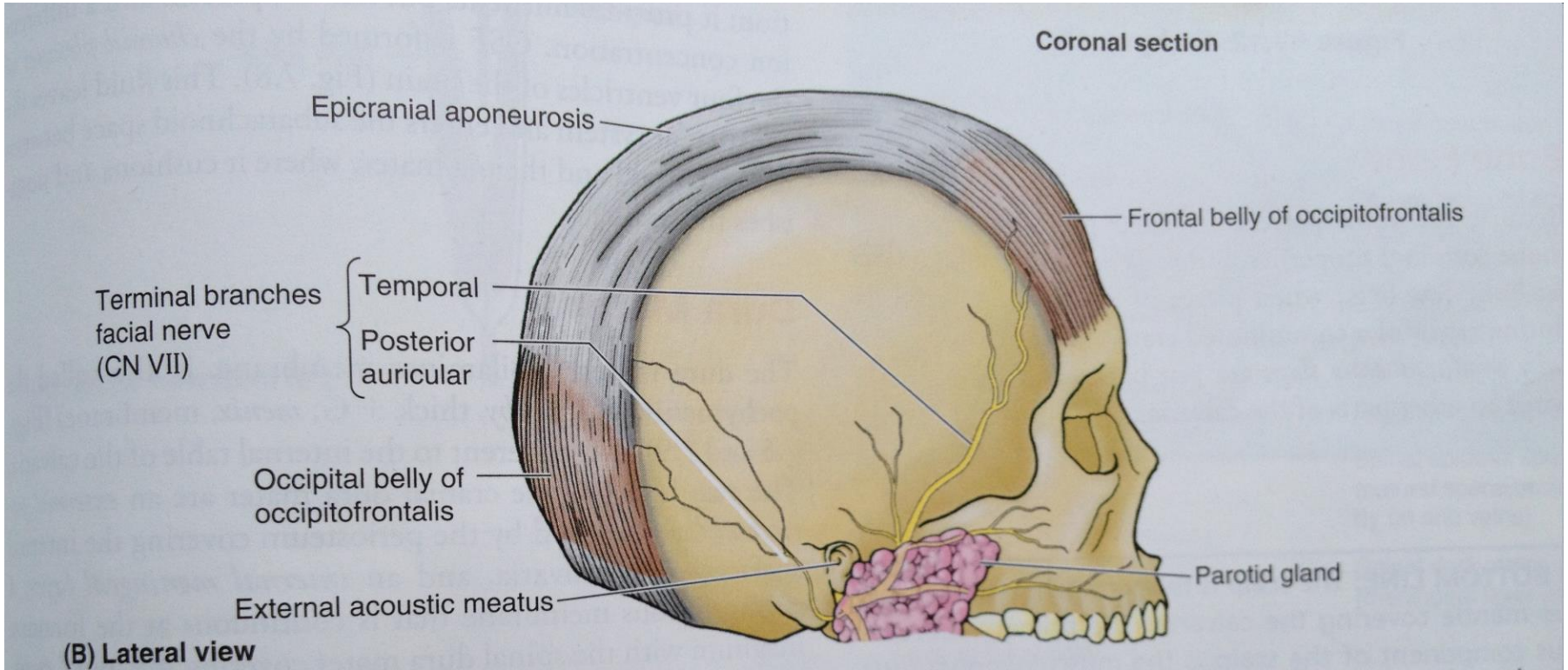
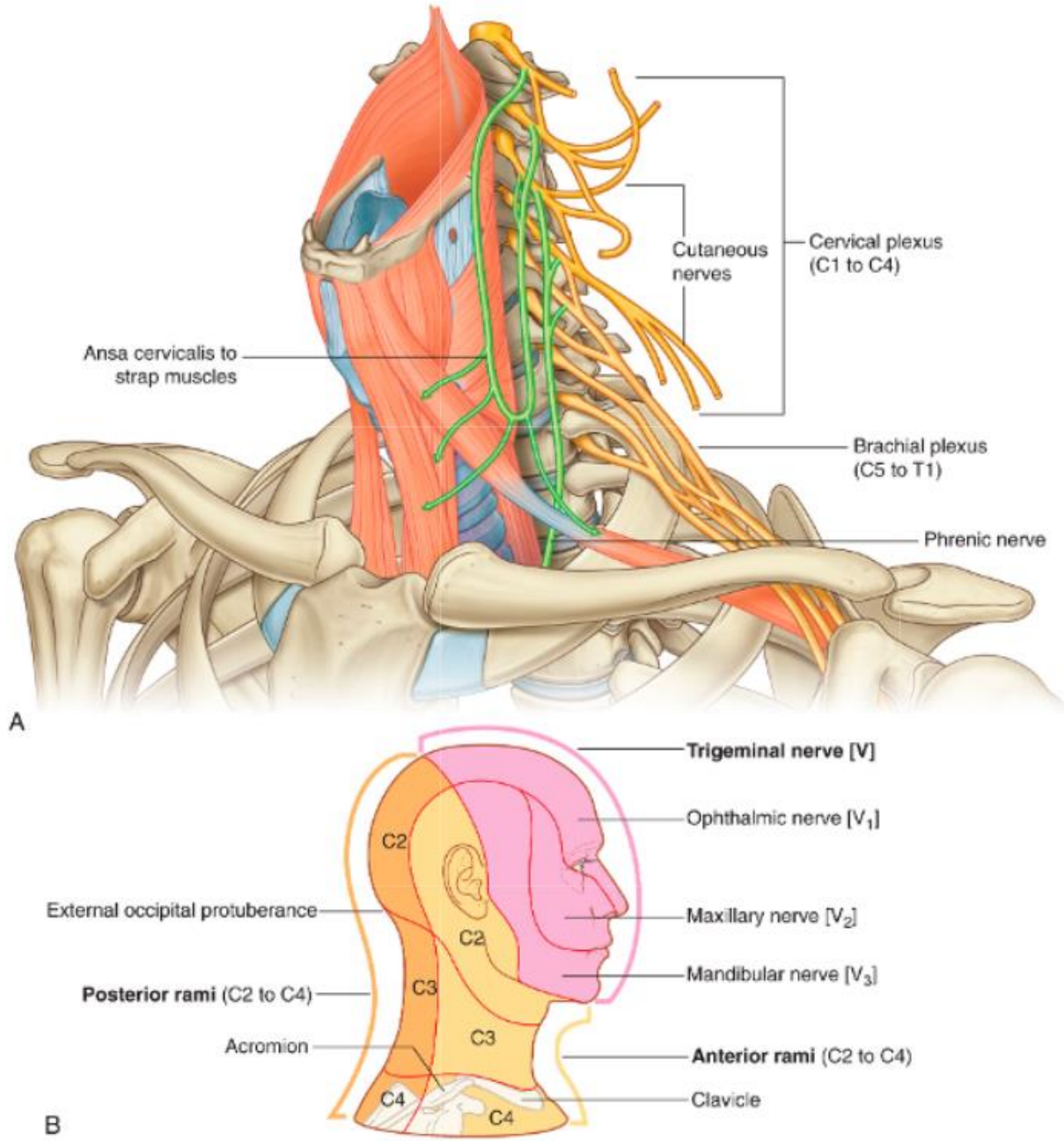


Figure 7.7. Layers of scalp, cranium, and meninges. A. The skin is bound tightly to the epicranial aponeurosis, v moves freely over the pericranium and cranium because of the intervening loose connective tissue. The aponeurosis is the fl termediate tendon of the occipitofrontalis muscle. The cranial meninges and the subarachnoid (leptomeningeal) space are sh *CSF*, cerebrospinal fluid. **B.** The occipitofrontalis muscle, including its occipital and frontal bellies, and the epicranial aponeu Innervation of the two bellies by the posterior auricular and temporal branches of the facial nerve is also demonstrated.


Cutaneous nerves
Cervical plexus (C1 to C4)
Ansa cervicalis to strap muscles
Brachial plexus (C5 to T1)
Phrenic nerve
A
Trigeminal nerve [V]
Ophthalmic nerve [V1]
C2
External occipital protuberance
Maxillary nerve [V2]
C2
C3
Posterior rami (C2 to C4)
Mandibular nerve [V3]
C3
Acromion
Anterior rami (C2 to C4)
C4
Clavicle
C4
B

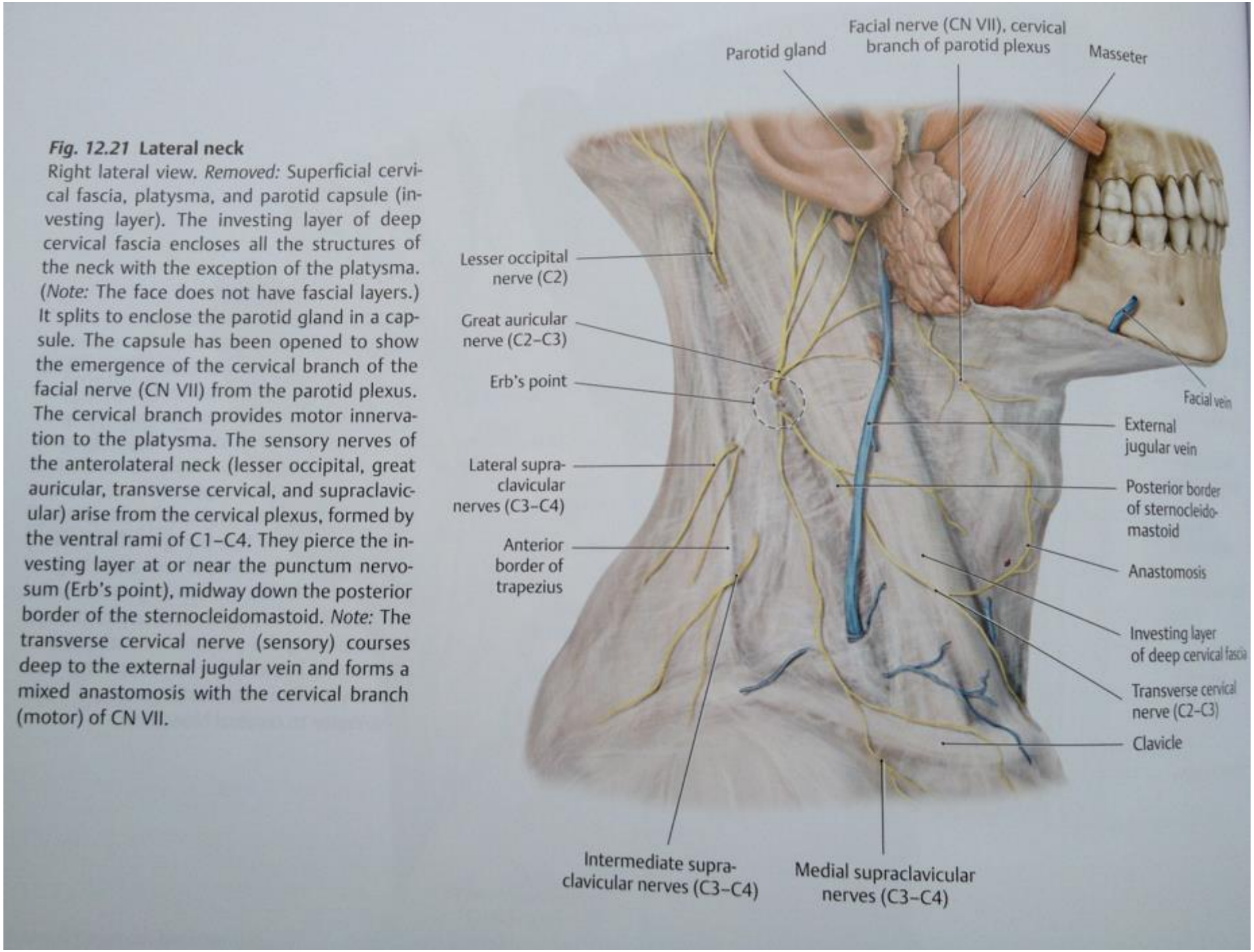
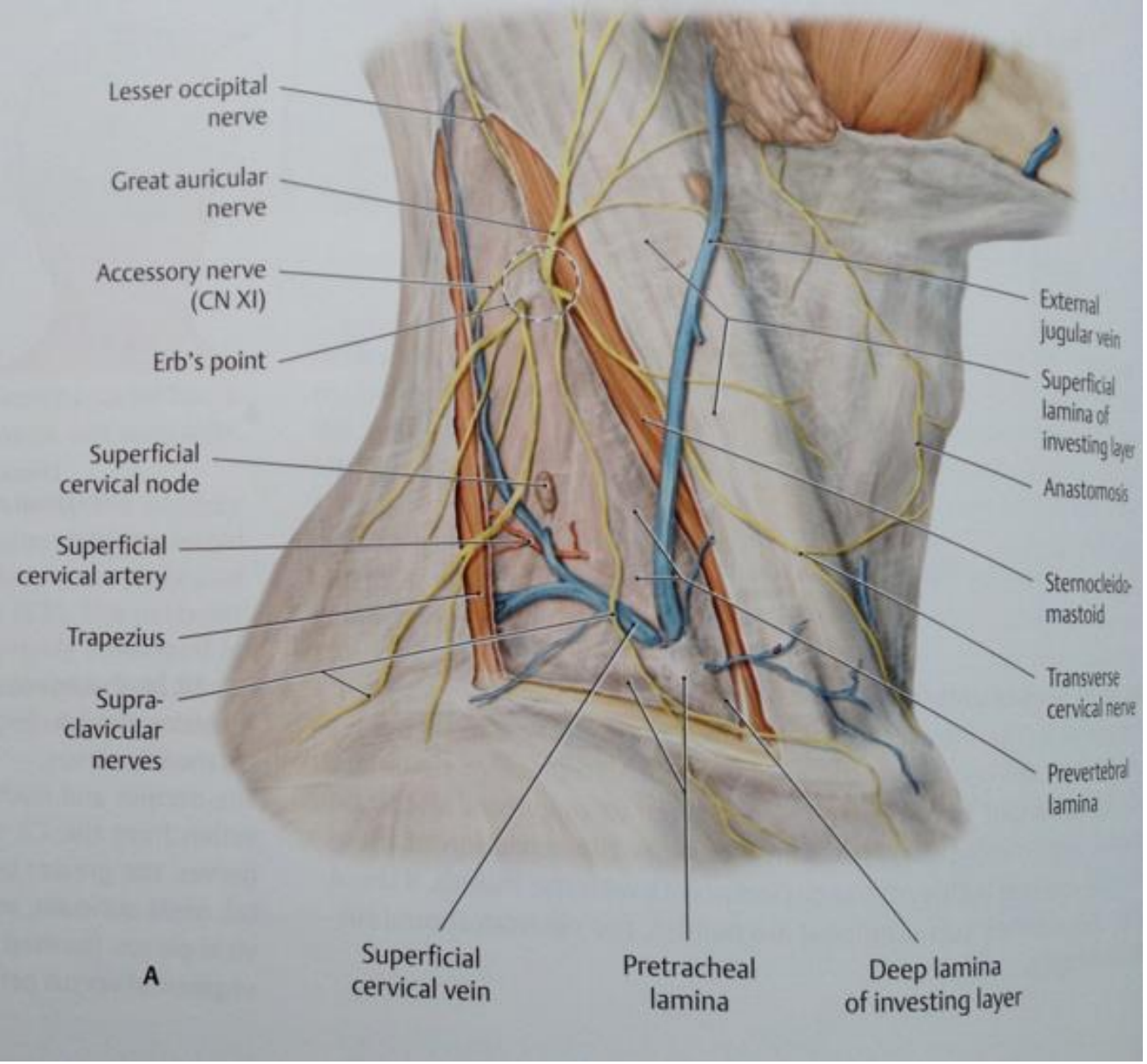


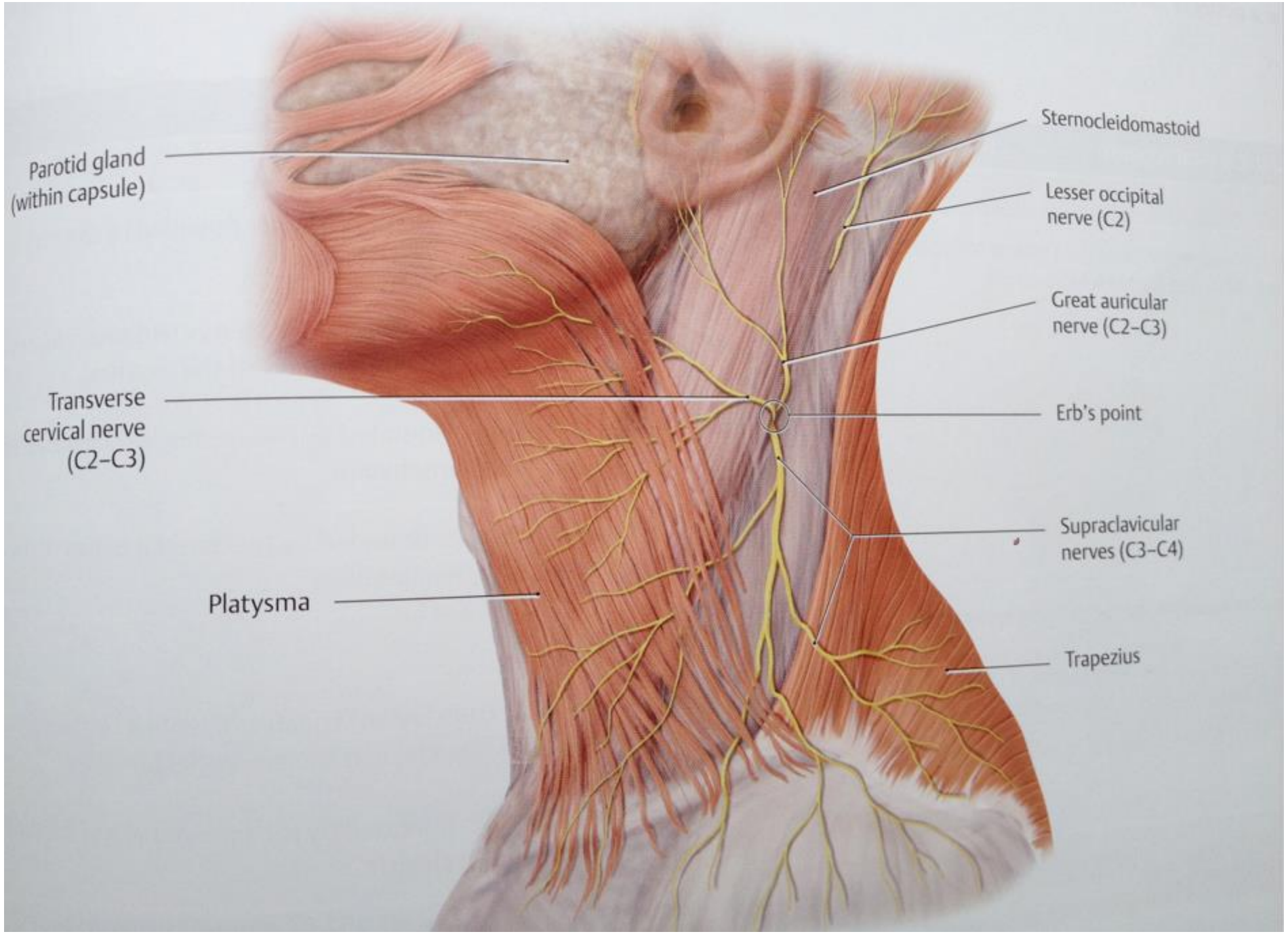
Fig. 12.21 **Lateral neck**

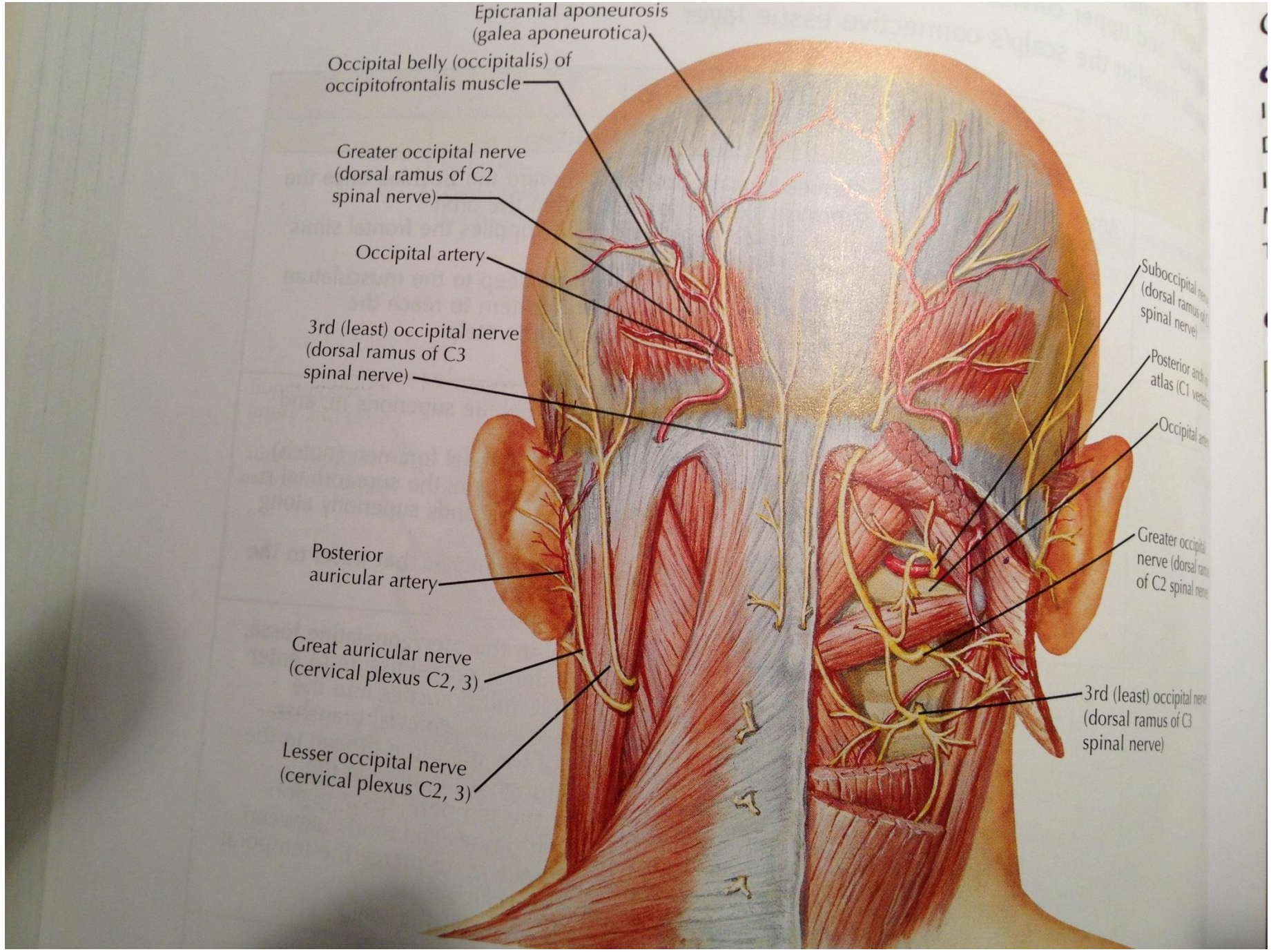
Right lateral view. *Removed:* Superficial cervical fascia, platysma, and parotid capsule (investing layer). The investing layer of deep cervical fascia encloses all the structures of the neck with the exception of the platysma. (*Note:* The face does not have fascial layers.) It splits to enclose the parotid gland in a capsule. The capsule has been opened to show the emergence of the cervical branch of the facial nerve (CN VII) from the parotid plexus. The cervical branch provides motor innervation to the platysma. The sensory nerves of the anterolateral neck (lesser occipital, great auricular, transverse cervical, and supraclavicular) arise from the cervical plexus, formed by the ventral rami of C1–C4. They pierce the investing layer at or near the punctum nervosum (Erb's point), midway down the posterior border of the sternocleidomastoid. *Note:* The transverse cervical nerve (sensory) courses deep to the external jugular vein and forms a mixed anastomosis with the cervical branch (motor) of CN VII.

***Fig. 12.22* Posterior cervical triangle**
Right lateral view. **A** Investing fascia removed. **B** Pretracheal fascia removed. **C** Prevertebral fascia removed.

The investing layer of deep cervical fascia splits into a superficial and a deep lamina to enclose the sternocleidomastoid and trapezius, both of which are innervated by the accessory nerve (CN XI). (*Note:* The accessory nerve may be injured during lymph node biopsy.) Removing the investing layer between the sternocleidomastoid and trapezius reveals the posterior cervical triangle (bounded inferiorly by the clavicle). This exposes the prevertebral fascia, which encloses the intrinsic and deep muscles of the neck. The prevertebral fascia is fused to the pretracheal fascia, which envelops the omohyoid (**B**). Removing the prevertebral fascia exposes the phrenic nerve (**C**), which arises from the cervical plexus and descends to innervate the diaphragm. The brachial plexus (**C**) is also visible at its point of emergence between the anterior and middle scalenes.




Parotid gland
(within capsule)
Transverse
cervical nerve
(C2–C3)
Platysma
Sternocleidomastoid
Lesser occipital
nerve (C2)
Great auricular
nerve (C2–C3)
Erb's point
Supraclavicular
nerves (C3–C4)
Trapezius


Epicranial aponeurosis (galea aponeurotica)
Occipital belly (occipitalis) of occipitofrontalis muscle
Greater occipital nerve (dorsal ramus of C2 spinal nerve)
Occipital artery
3rd (least) occipital nerve (dorsal ramus of C3 spinal nerve)
Posterior auricular artery
Great auricular nerve (cervical plexus C2, 3)
Lesser occipital nerve (cervical plexus C2, 3)
Suboccipital
(dorsal ramus
spinal nerve)
Posterior
atlas (C1
Occipital
Greater occipital
nerve (dorsal
of C2 spinal
3rd (least) occipital
(dorsal ramus of C3
spinal nerve)

Cervical spinal nerves

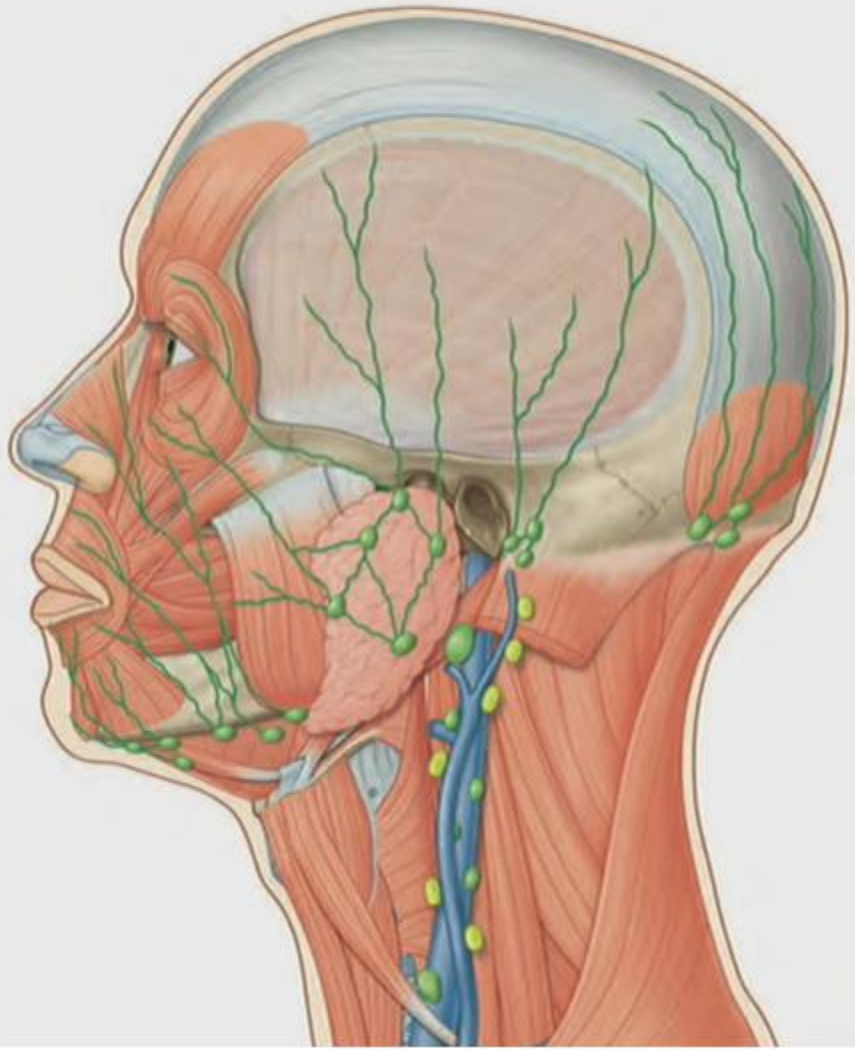
- There are eight cervical nerves **(C1 to C8):**
- C1 to C7 emerge from the vertebral canal **above** their respective vertebrae.
- **C8 emerges between vertebrae CVII and TI**
- The anterior rami of C1 to C4 form the **cervical plexus**. The major branches from this plexus supply the strap muscles, the diaphragm (phrenic nerve), skin on the anterior and lateral parts of the neck, skin on the upper anterior thoracic wall, and **skin on the inferior parts of the head**.
- The anterior rami of C5 to C8, together with a large component of the anterior ramus of T1, form the **brachial plexus**, which innervates the **upper limb.**

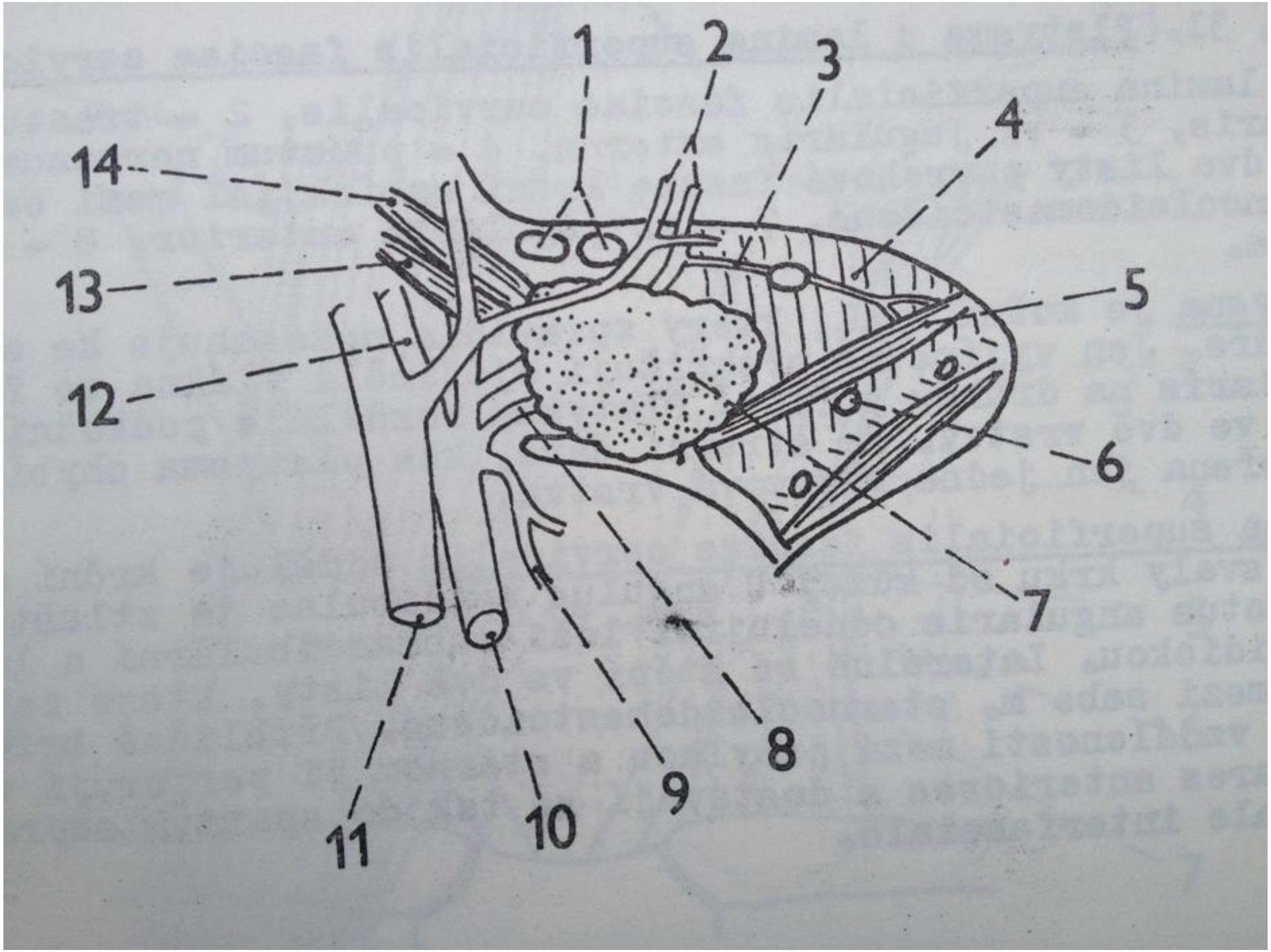
Nodi lymphatici

- Occipitales
- Retroauriculares
- Parotidei

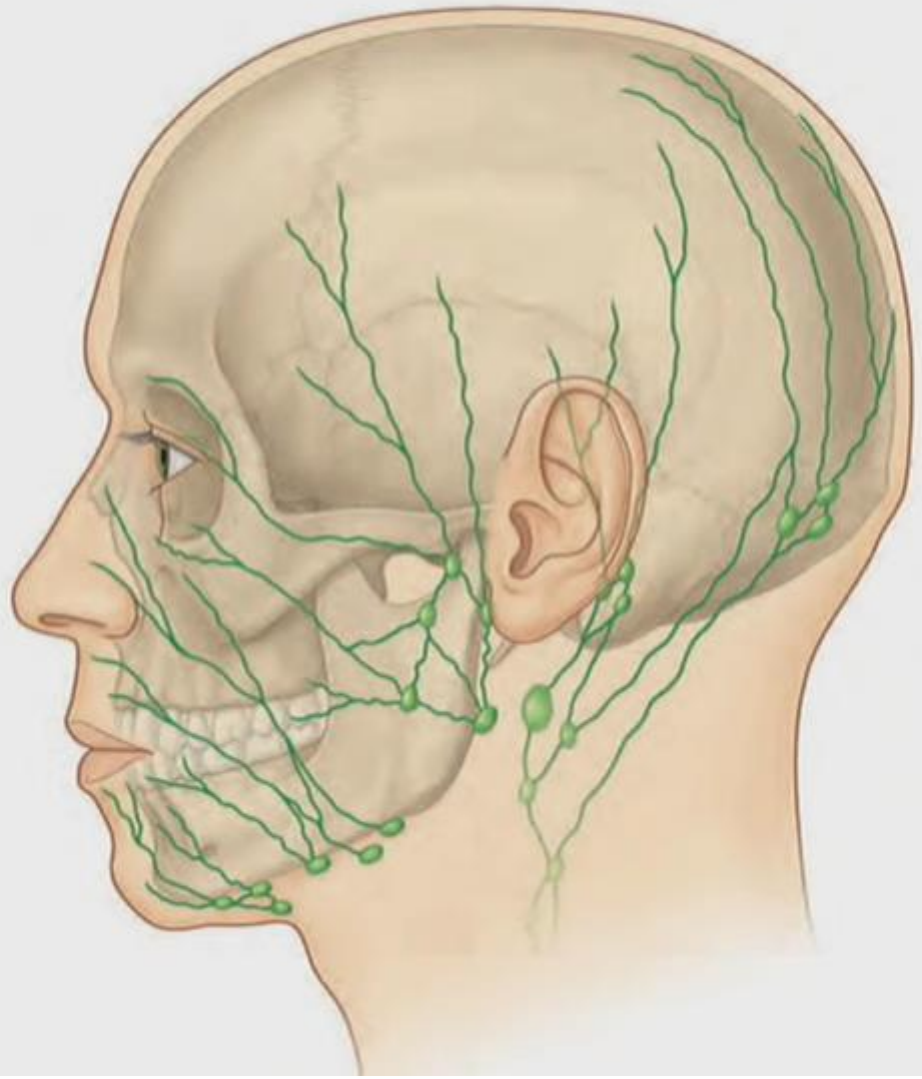
- Submentales
- Submandibulares
- Jugulares

- Nodus digastricus

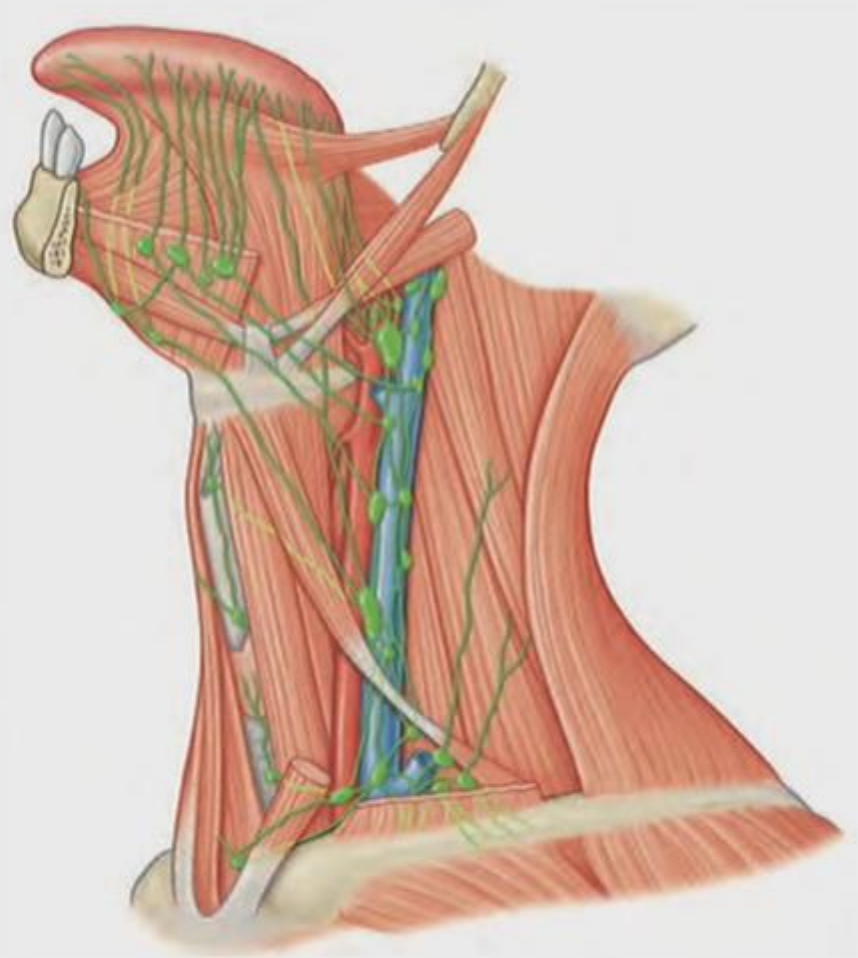



1
2
3
4
5
6
7
8
9
10
11
12
13
14

Ring



String



Lymphatic drainage

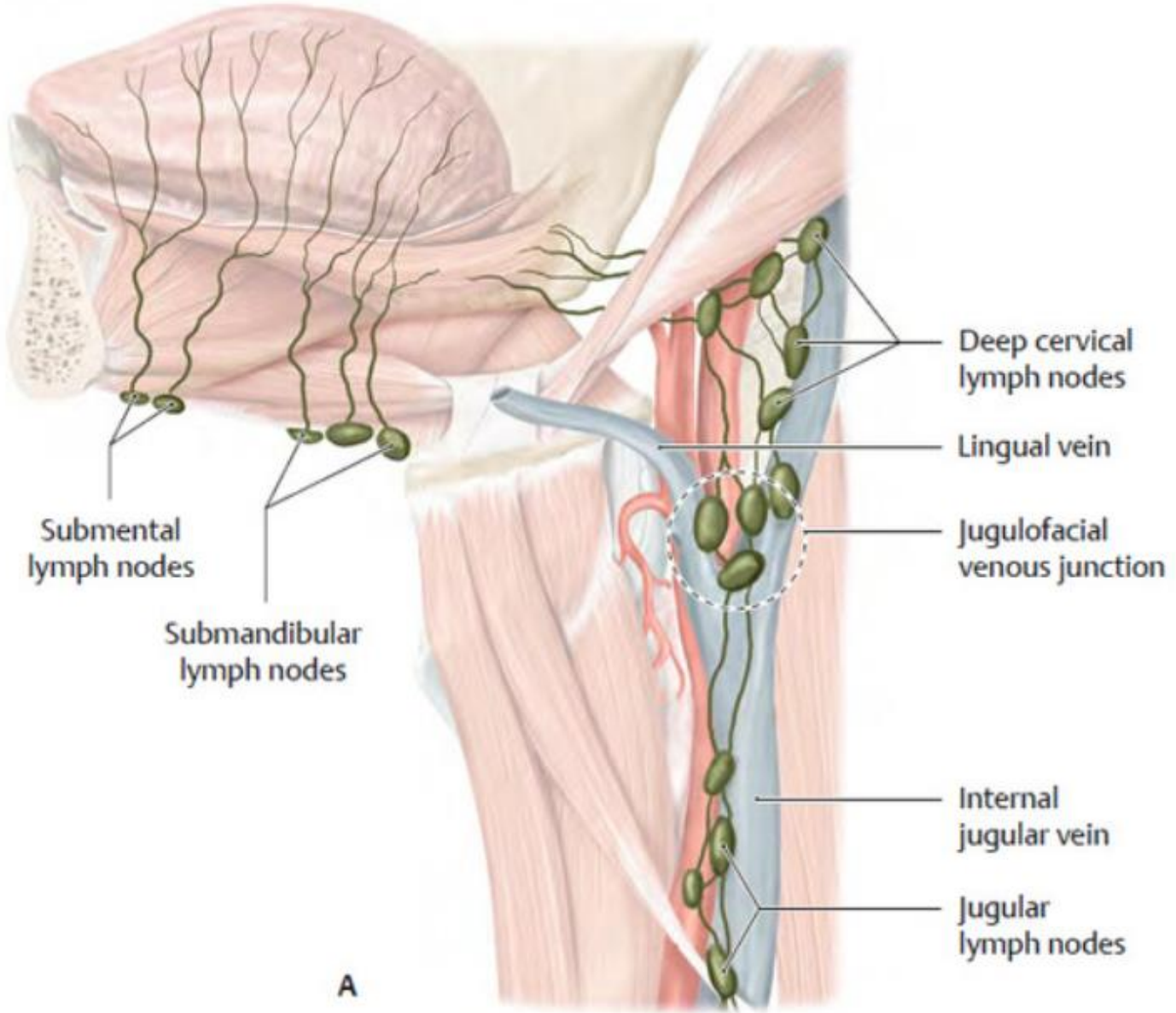
All lymphatic vessels from the tongue ultimately drain into the **deep cervical chain** of nodes **along the internal jugular vein:**

- **The pharyngeal part** of the tongue drains through the pharyngeal wall directly into mainly the **jugulodigastric node of the deep cervical chain.**

- **The oral part** of the tongue drains both **directly into the deep cervical nodes,** and **indirectly into** these nodes by passing first through the mylohyoid muscle and into **submental and submandibular nodes.**

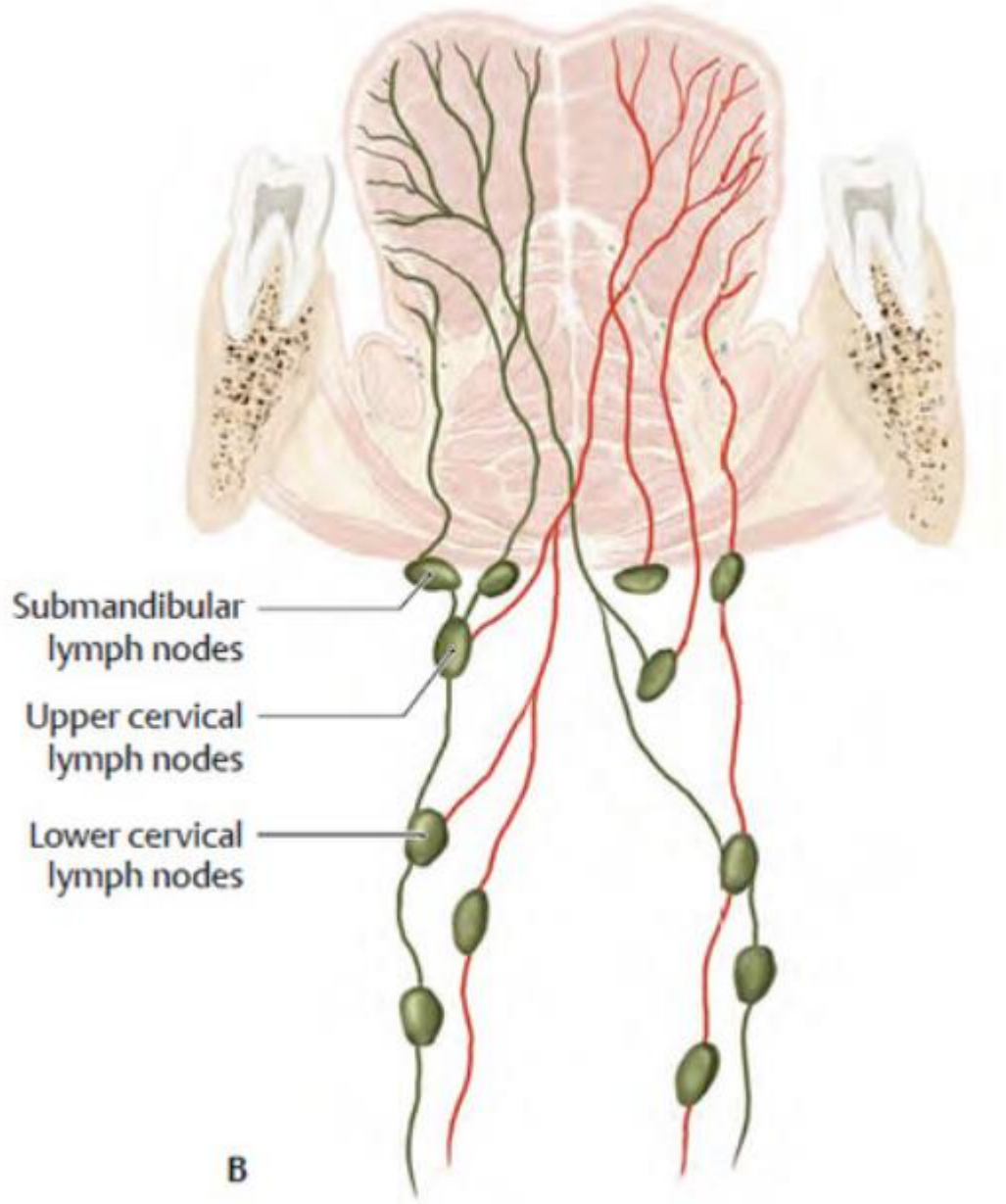
The submental nodes are inferior to the mylohyoid muscles and between the digastric muscles, while **the submandibular nodes** are below the floor of the oral cavity along the inner aspect of the inferior margins of the mandible.

The tip of the tongue drains through the mylohyoid muscle into the **submental nodes** and then into mainly **the jugulo-omohyoid node of the deep cervical chain.**



Lymphatic drainage

Because the lymph nodes receive drainage from both the **ipsilateral and contralateral sides**, tumor cells may become widely disseminated in this region (e.g., metastatic squamous cell carcinoma, especially on the lateral border of the tongue, frequently metastasizes to the opposite side).



Lymphatic drainage

The deep lymph nodes in the neck consist mainly of collecting nodes. They have major clinical importance as potential sites of metastasis from head and neck tumors. Affected deep cervical lymph nodes may be surgically removed (neck dissection) or may be treated by regional irradiation. For this purpose, the American Academy of Otolaryngology—Head and Neck Surgery has grouped the deep cervical lymph nodes into six levels (Robbins 1991):

I Submental and submandibular lymph nodes

II–IV Deep cervical lymph nodes along the internal jugular vein (lateral jugular lymph nodes):

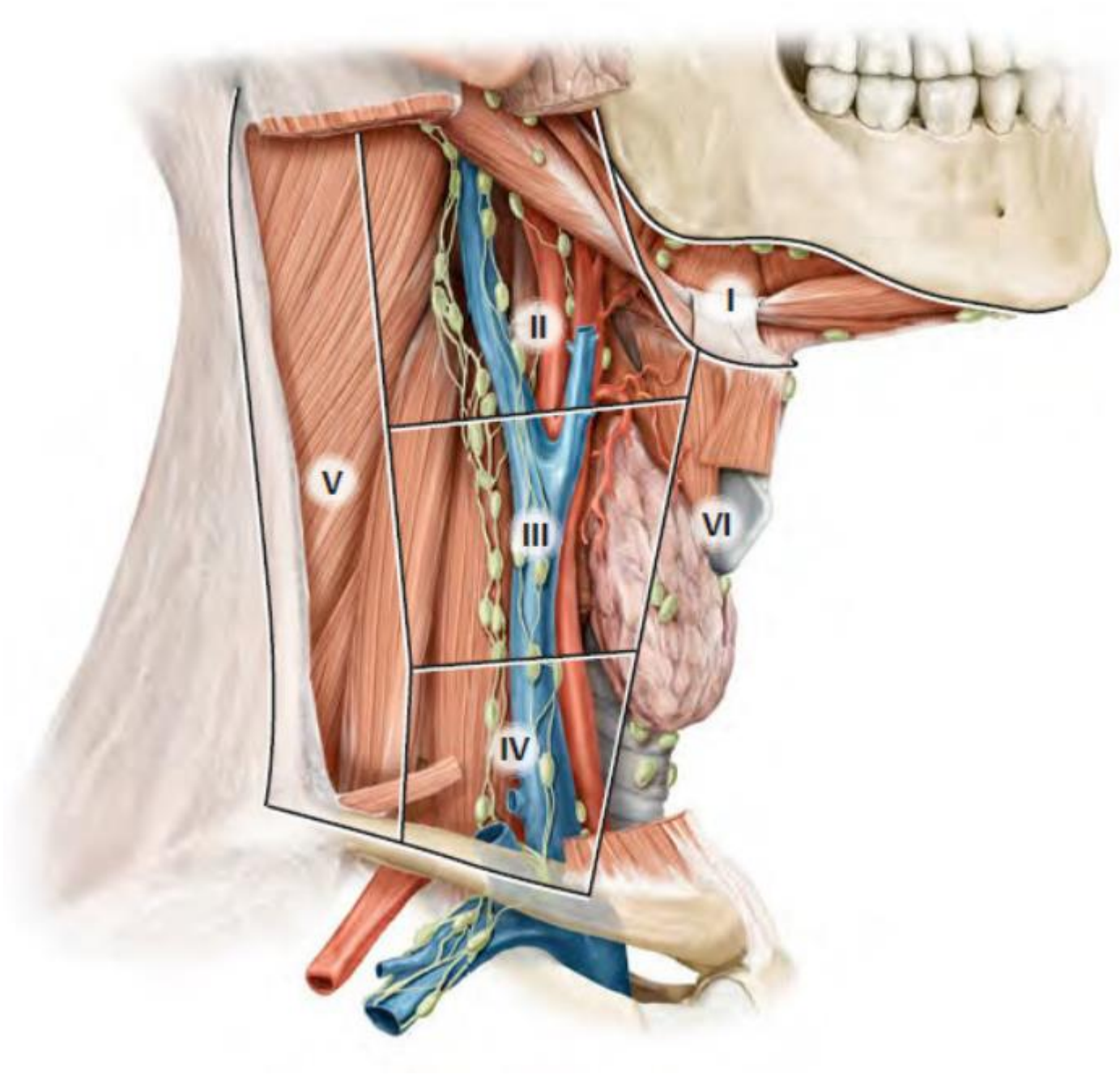
– II Deep cervical lymph nodes (upper lateral group)

– III Deep cervical lymph nodes (middle lateral group)

– IV Deep cervical lymph nodes (lower lateral group)

V Lymph nodes in the posterior cervical triangle

VI Anterior cervical lymph nodes



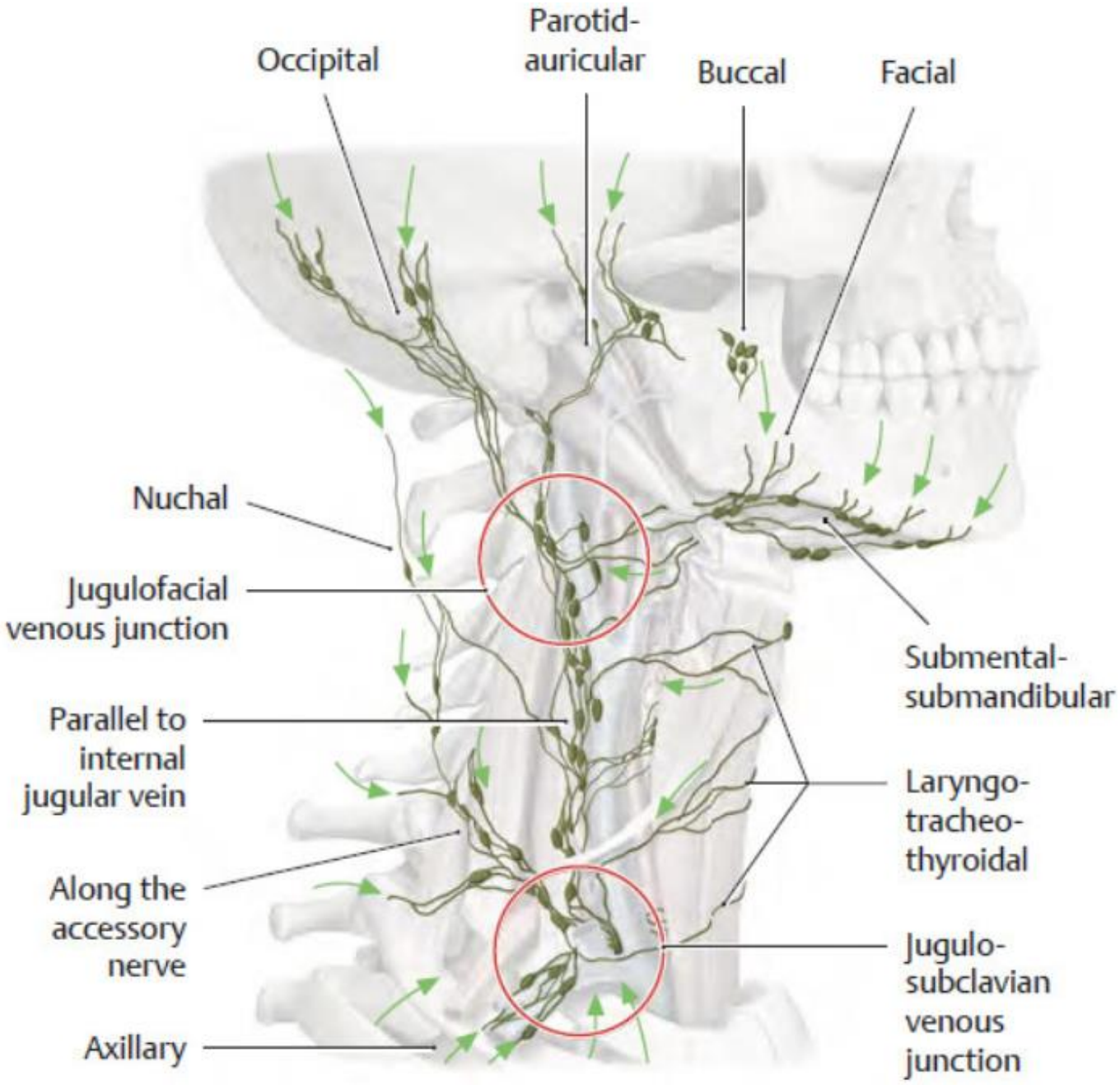
Directions of lymphatic drainage in the neck

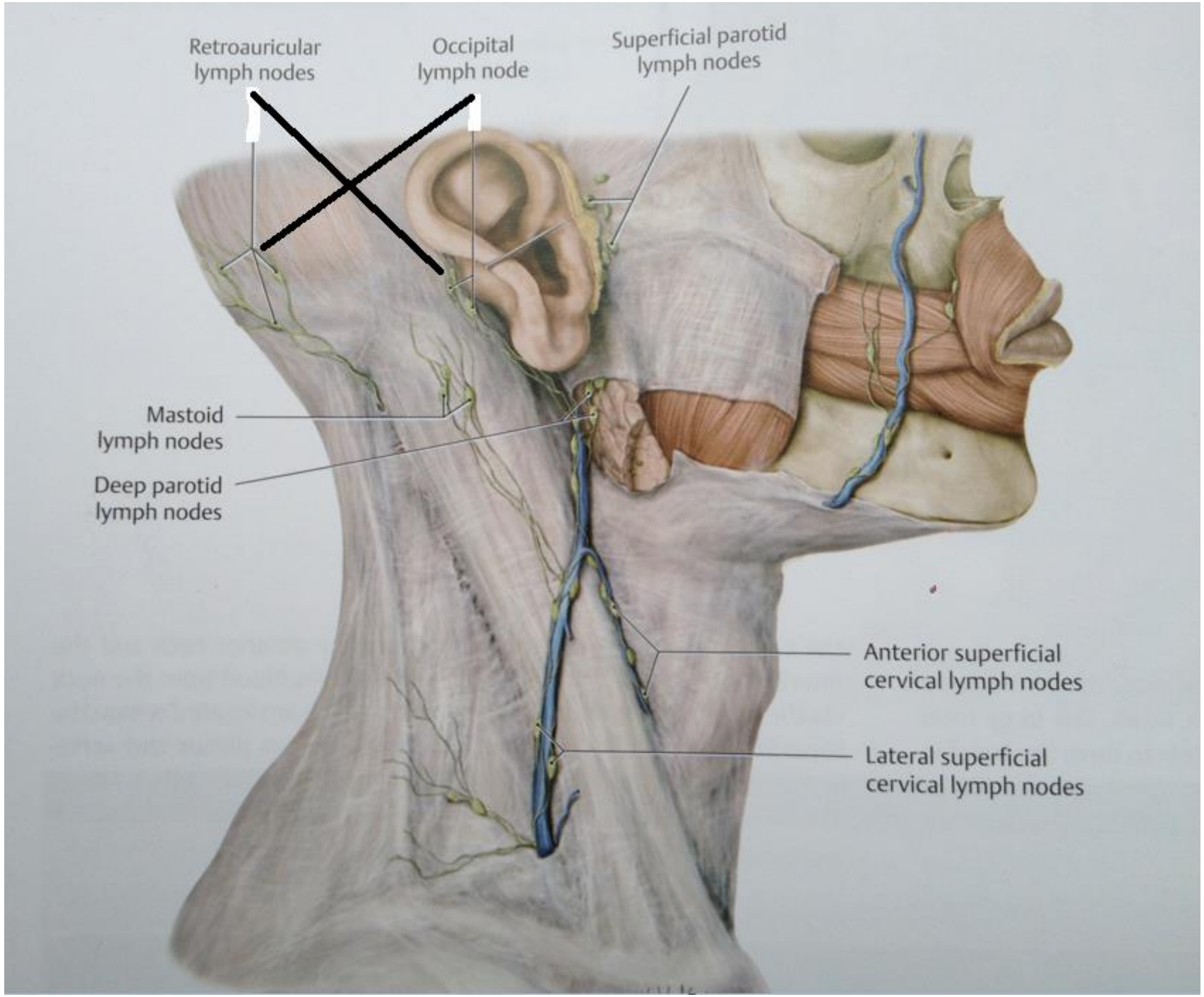
Understanding this pattern of lymphatic flow is critical to identifying the location of a potential cause of enlarged cervical lymph nodes.There are two main sites in the neck where the lymphatic pathways intersect:

Jugulofacial venous junction: Lymphatics from the head pass obliquely downward to this site, where the lymph is redirected vertically downward in the neck.

Jugulosubclavian venous junction: The main lymphatic trunk, the thoracic duct, terminates at this central location, where lymph collected from the left side of the head and neck region is combined with lymph draining from the rest of the body.

If only peripheral nodal groups are affected, this suggests a localized disease process. If the central groups (e.g., those at the venous junctions) are affected, this usually signifies an extensive disease process. Central lymph nodes can be obtained for diagnostic evaluation by prescalene biopsy.




Retroauricular lymph nodes
Occipital lymph node
Superficial parotid lymph nodes
Mastoid lymph nodes
Deep parotid lymph nodes
Anterior superficial cervical lymph nodes
Lateral superficial cervical lymph nodes

Systematic palpation of the cervical lymph nodes

The cervical lymph nodes are systematically palpated during the physical examination to ensure the detection of any enlarged nodes.

Panel **A** shows the sequence in which the various nodal groups are successively palpated. The examiner usually palpates the **submental-submandibular group first (B), including the mandibular angle (C), then proceeds along the anterior border of the sternocleidomastoid muscle (D). The supraclavicular lymph nodes are palpated next (E), followed by the lymph nodes along the accessory nerve and the nuchal group of nodes (F).**

If lymph nodes are palpable, the following characteristics should be noted and described: **size (<1 cm in diameter is normal), pain/tenderness (suggestive of inflammation), consistency (soft nodes suggest inflammation; firm, rubbery nodes suggest lymphoma; stony-hard nodes may be a sign of cancer),** location of lymphadenopathy, and whether it is localized or generalized as this may help aid diagnosis.