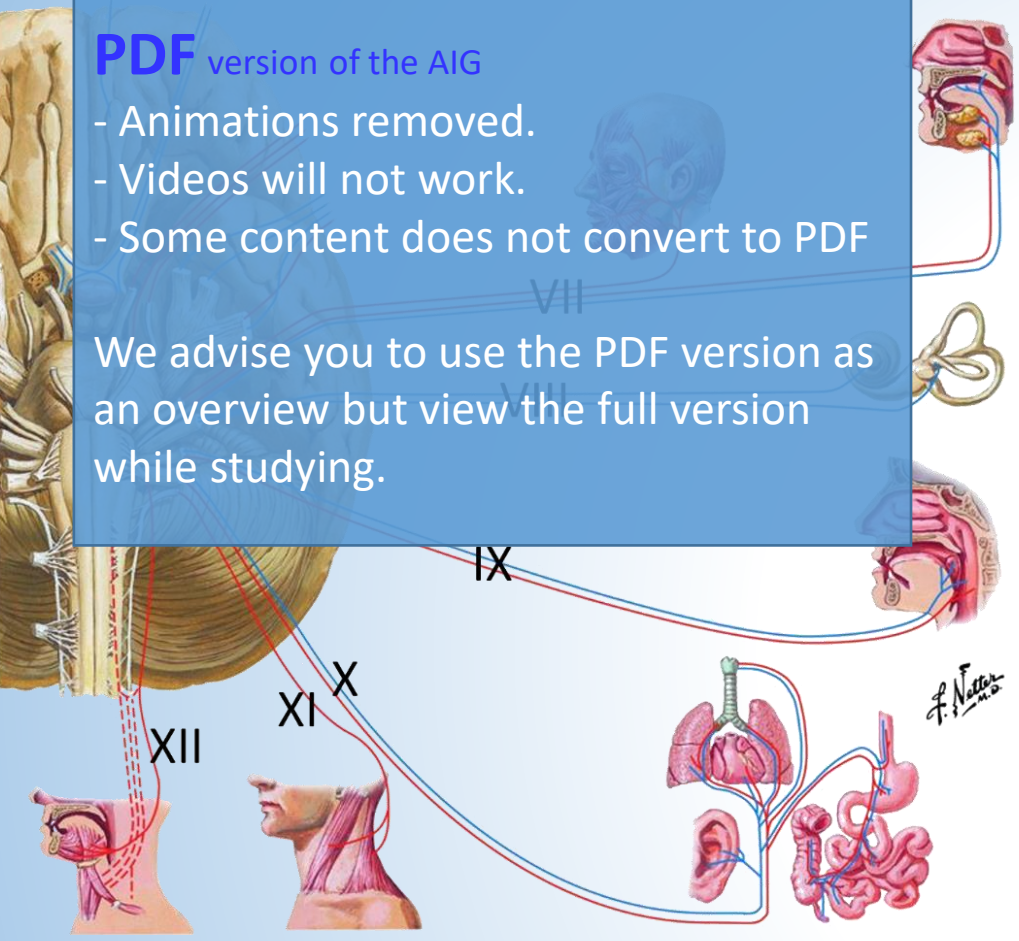
PDF version of the AIG
- Animations removed.
- Videos will not work.
- Some content does not convert to PDF

We advise you to use the PDF version as an overview but view the full version while studying.



Cranial Nerves VII-XII

Anatomy Interactive Guide

Darren Mehay and Dave Rasicci, PhD Candidates

Evan Goldman, PhD

Run this in presentation mode!

Quick links:

Overview & dissection instructions
CN VII: Facial
CN VIII: Vestibulocochlear
CN IX: Glossopharyngeal
CN X: Vagus
CN XI: Spinal accessory
CN XII: Hypoglossal

PennState College of Medicine

Continue

Learning Objectives

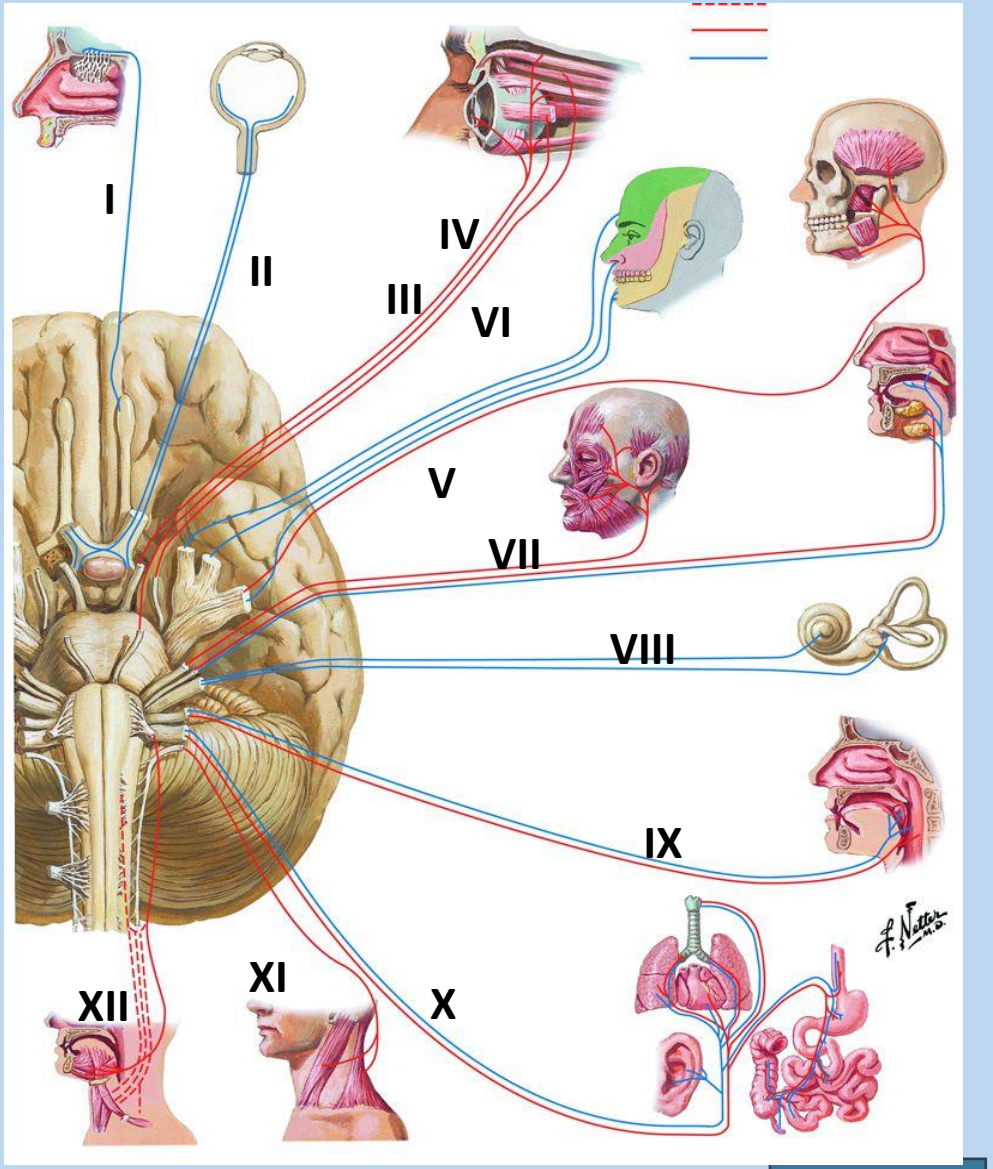
By the end of the AIG and associated labs, students should be able to:

- Explain the organization of cranial nerves with respect to their nuclei within the brain, their course through and exit from the brain, and their functional roles
- Interpret the manifestations of deficits and lesions of cranial nerves
- Explain the presentation of a hypoglossal nerve lesion

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OVERVIEW

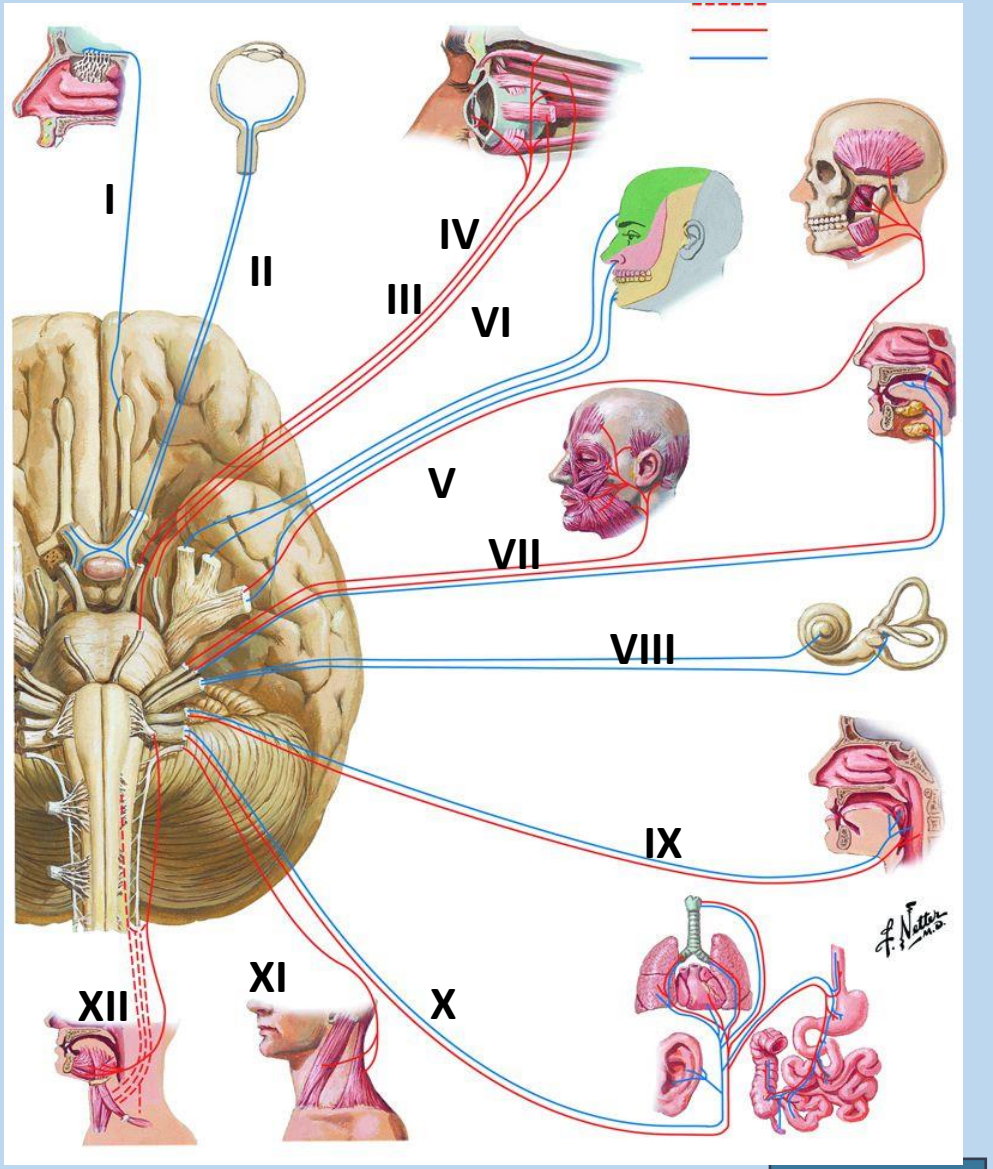
- There are 12 pairs of cranial nerves arising from the brain and brainstem. They are named using Roman numerals (I-XII). Each of these nerves is part of the peripheral nervous system. They leave the skull through foramina to innervate their target organs.
- Some of the cranial nerves are considered “motor”, some are “sensory”, and some are mixed. Some include parasympathetic fibers. There are plenty of mnemonics to keep these straight! Eventually, you’ll just know it!!!
- The cranial nerves are covered in two AIGs (I-VI; VII-XII). You will discover that thankfully, there is a lot of reiteration of the information in this block. Don’t feel you need to know every detail of every cranial nerve on the first pass through these two AIGs. Each AIG will highlight cranial nerves relevant to its content.



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OVERVIEW

- Learning Objectives for each cranial nerve… expect to know:
  - it's number (e.g. CN VII) and name (e.g. Facial nerve).
  - where it arises in the brainstem and more importantly, its target(s).
  - the foramina through which it passes.
  - be able to identify each nerve on the brain, and if the brain has been removed, in the skull.
  - how/where to find the nerve as it makes its way to its target.
  - the nerve's major branches.
  - and of course, what each nerve does!



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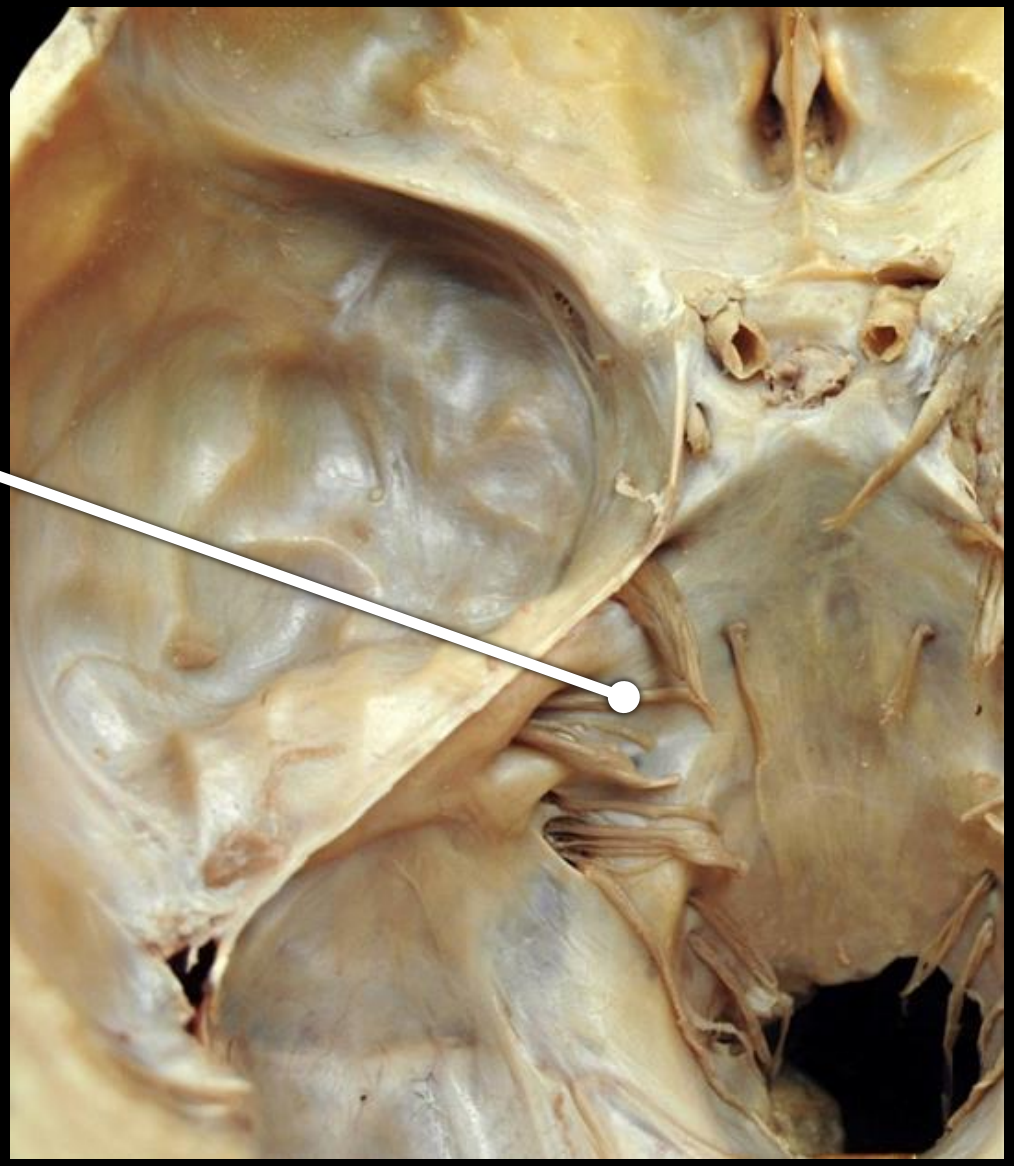


CN VII: Facial Nerve

Mixed nerve with
Fxn'l Components:

GVE SVE SVA GVA GSA

Relationship to Brain:
Exits Lateral Aspect of Inferior Pontine Sulcus with CN VIII



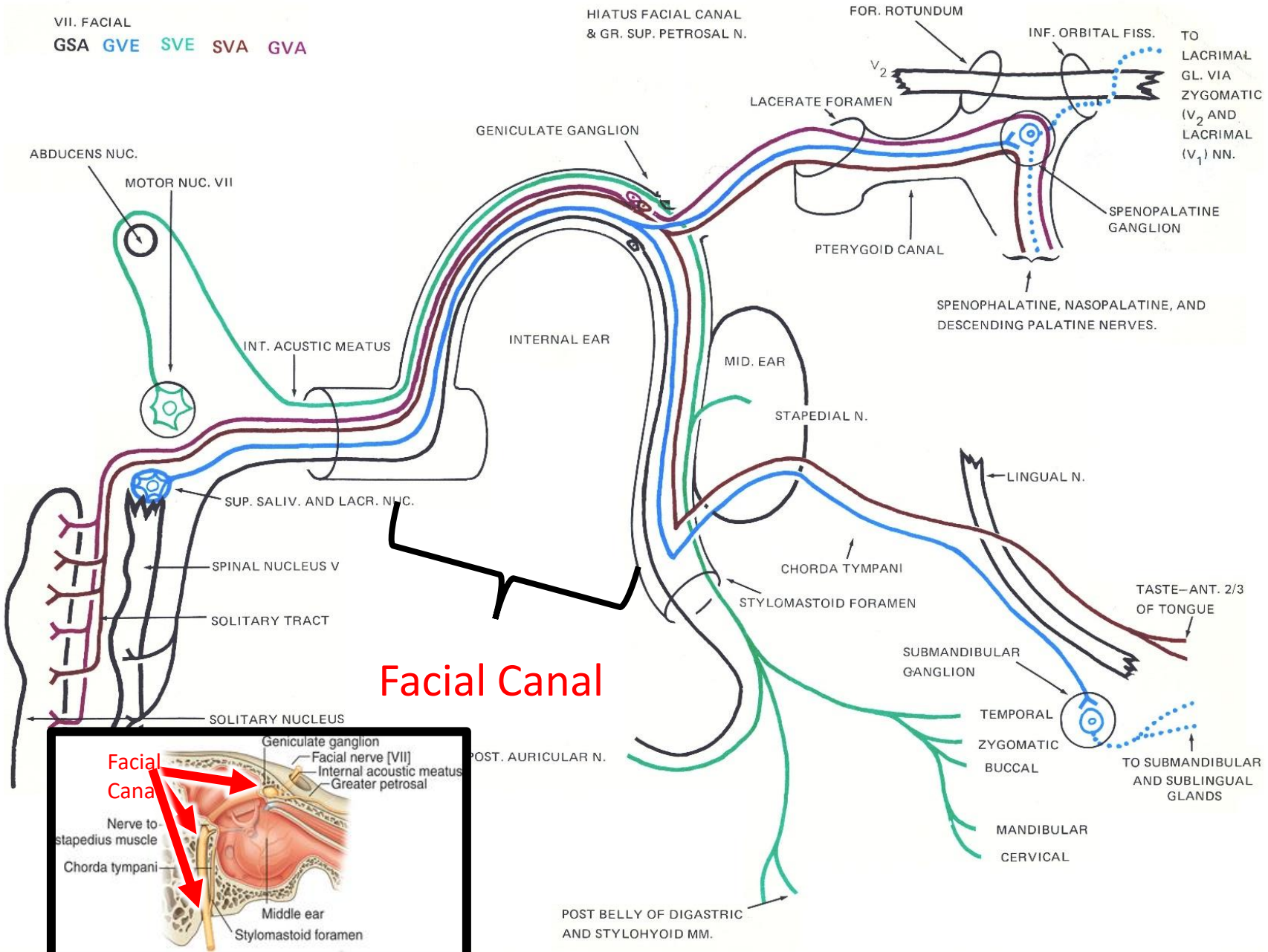
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CN VII: Facial Nerve, Schema



The facial nerve (CN VII) runs a complex course from the brainstem through the ***facial canal*** of the temporal bone of the skull

CN VII has 5 separate functions:

Efferent:

1. muscles of facial expression
2. parasympathetics to submandibular and sublingual salivary glands, lacrimal gland, and glands of the nasal and oral mucosa

Afferent:

3. taste from anterior 2/3 of tongue
4. sensation: mucosa of soft palate
5. sensation: ear canal, part of auricle

The next few slides will present the branches of CN VII responsible for: facial expression, glandular secretion, and taste.

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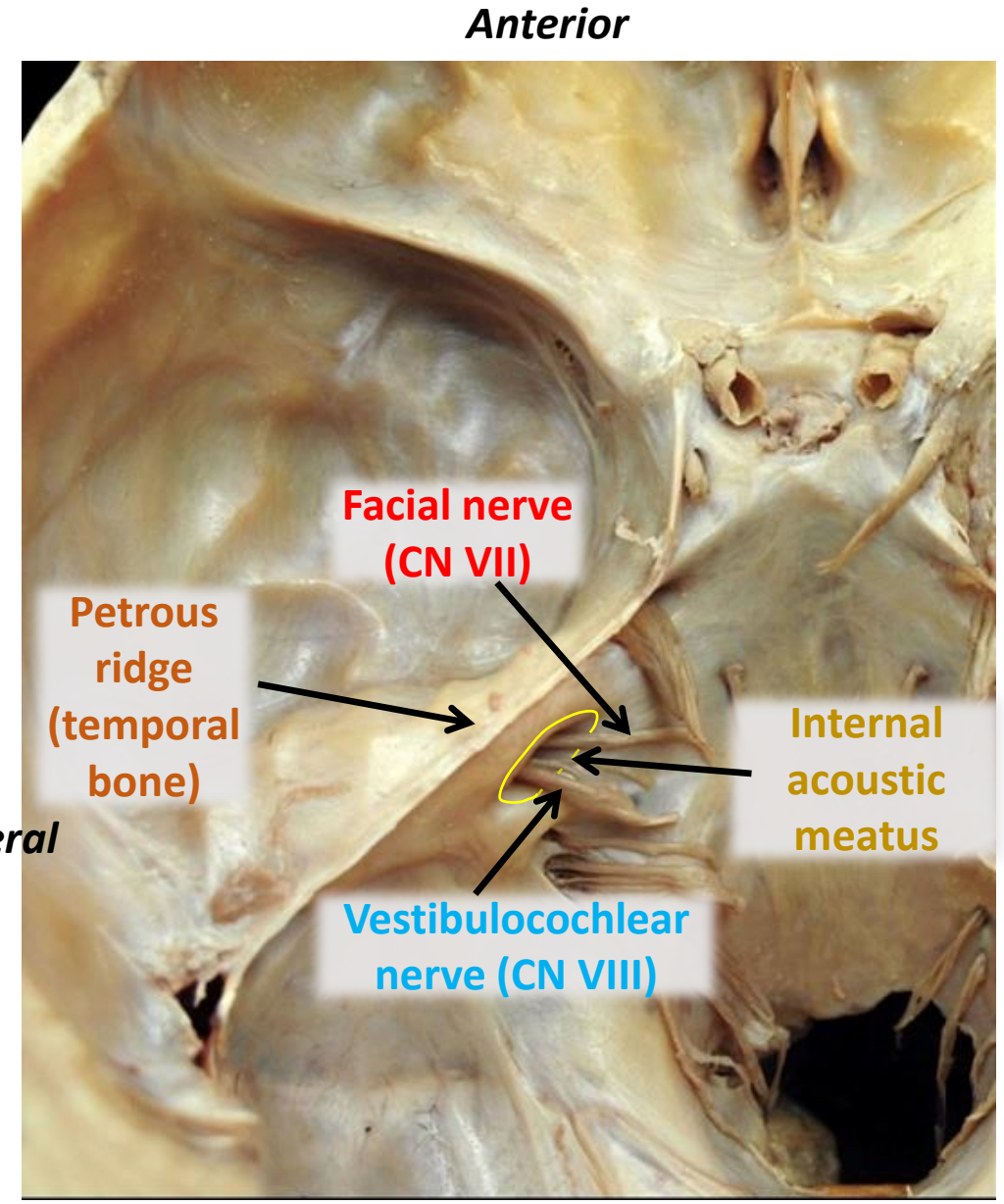
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CN VII: Facial Nerve,
Facial Canal

- After exiting the brainstem, the **facial nerve** initially travels with **CN VIII (vestibulocochlear nerve)**.
- The nerves enter the **internal acoustic meatus** as a group, then shortly thereafter, the facial nerve continues along its own path in the facial canal.

In the lab: The facial canal is fully embedded in bone and is quite difficult to dissect. Special instruments would be required.

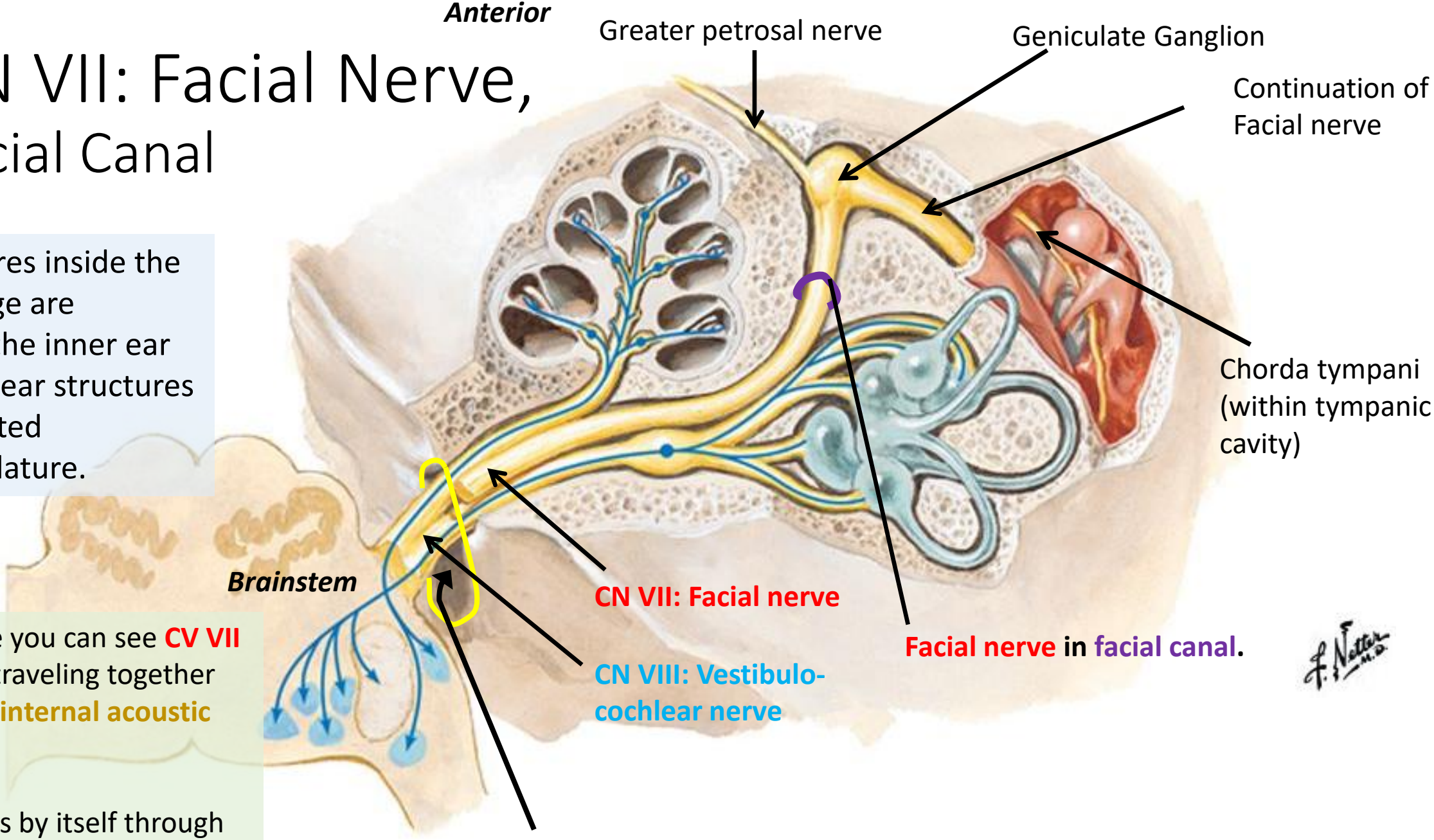
You are welcome to try to isolate the facial nerve within the **[petrous ridge of the] temporal bone**, but it is not required!



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CN VII: Facial Nerve, Facial Canal

The structures inside the petrous ridge are essentially the inner ear and middle ear structures and associated neurovasculature.



In this image you can see **CV VII** and **CN VIII** traveling together through the **internal acoustic meatus.**

CN VII travels by itself through the **facial canal.**

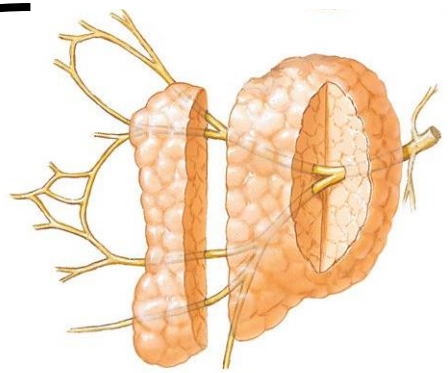
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CN VII, Facial Nerve:

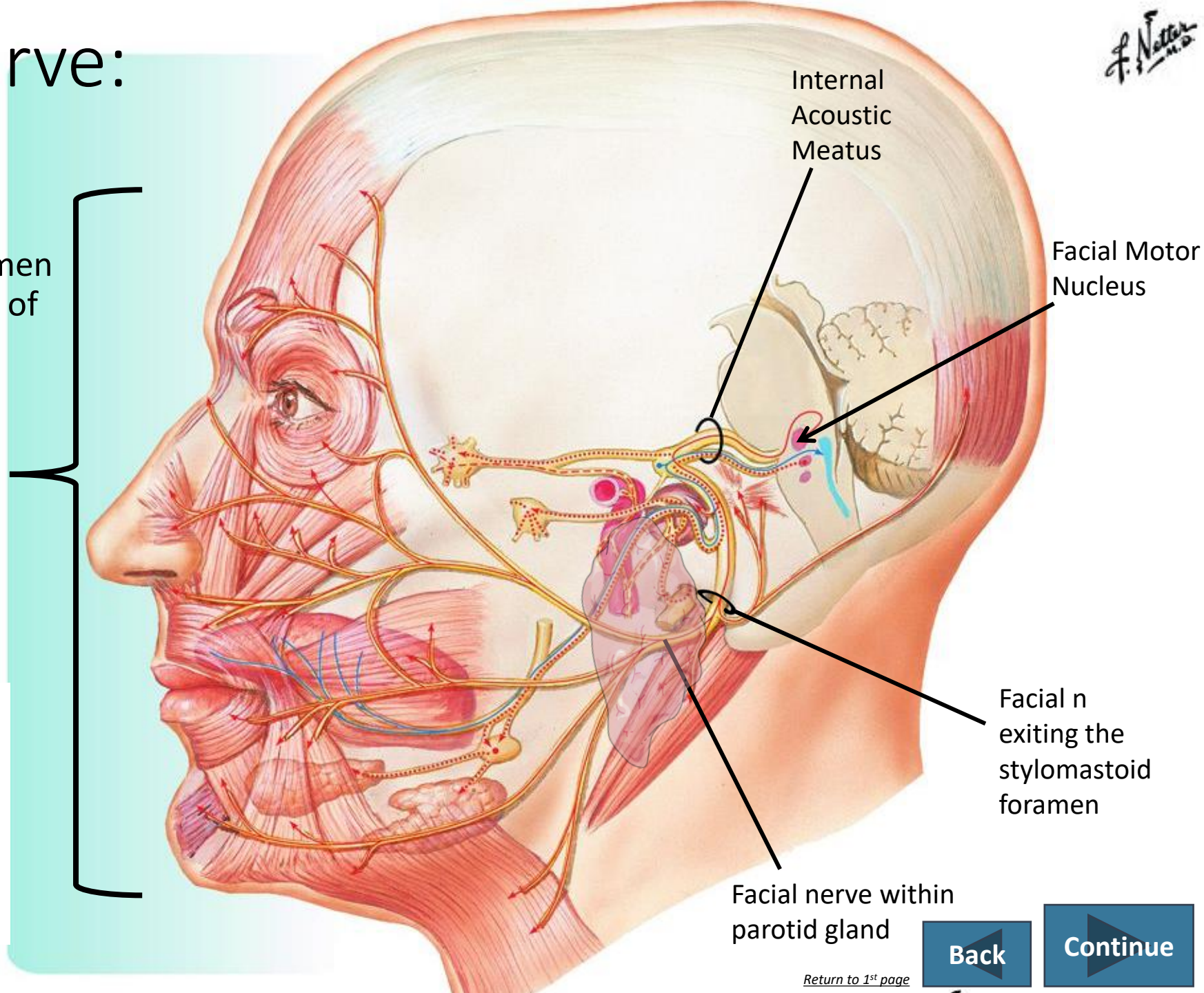
The terminal branches of the facial nerve supplies the muscles of facial expression. These branches exit the skull through the stylomastoid foramen as a single nerve then form a plexus of branches within the parotid gland.

Though it enters the parotid gland, the facial nerve does ***NOT*** provide autonomic innervation to the gland

Branches of Facial Nerve

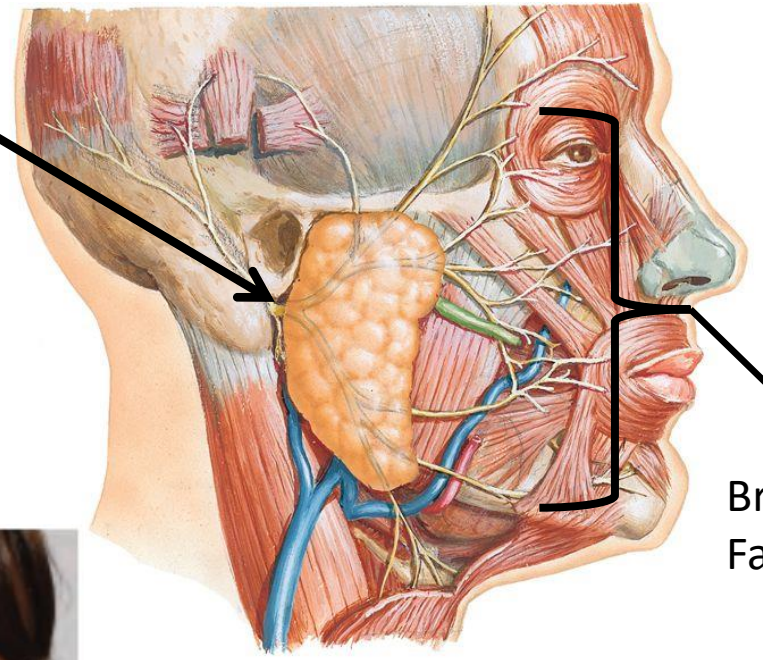


Branches of Facial Nerve



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CN VII, Facial Nerve:
Netter Schema



A popular mnemonic used to remember the motor branches of the facial nerve:

Name of Branch(es)	Mnemonic
Temporal	Two
Zygomatic	Zombies
Buccal	Bit
Marginal Mandibular	My
Cervical	Cat's
Posterior Auricular	Paw



(Moore's Clinical Anatomy)

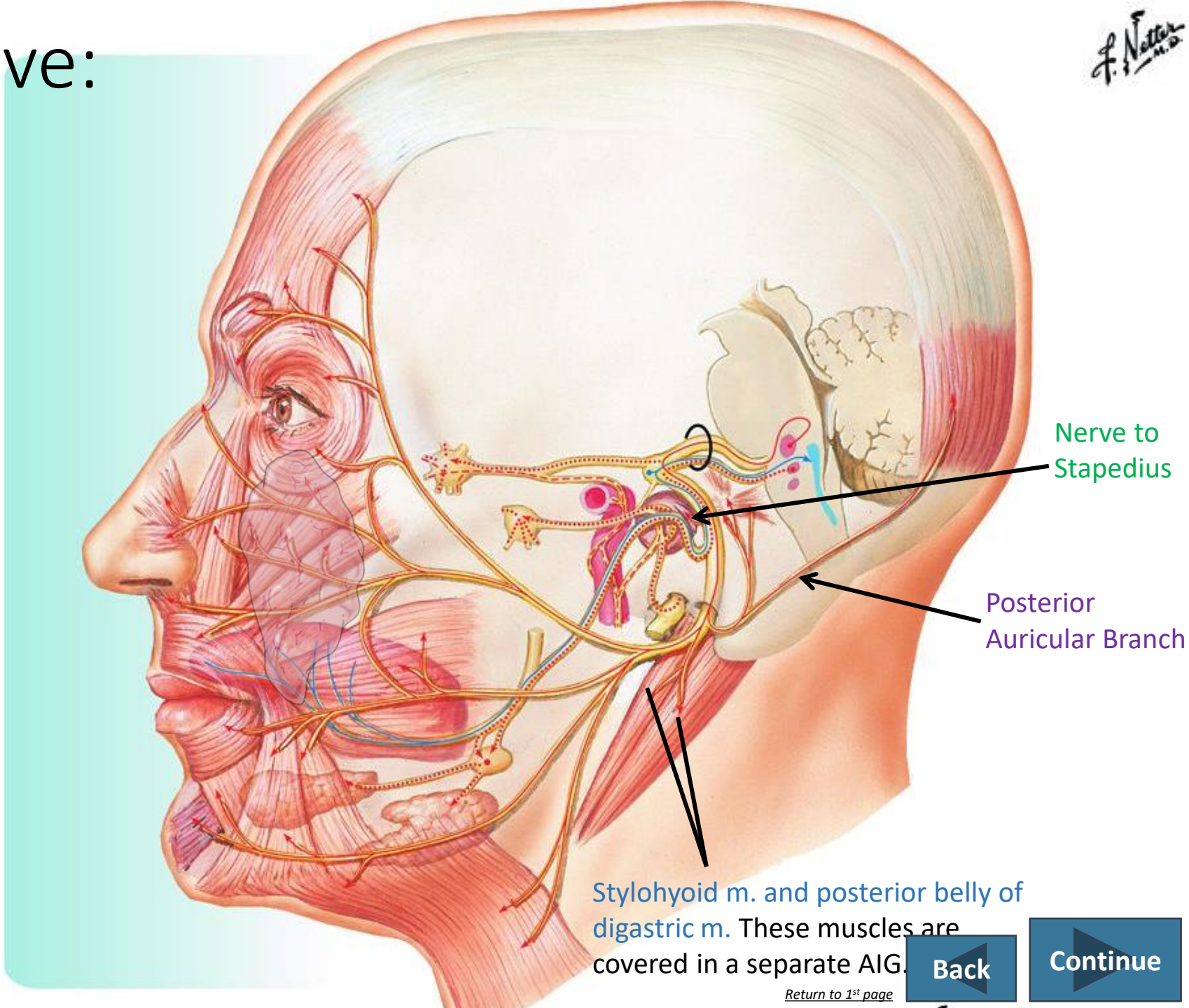
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CN VII, Facial Nerve:

The facial nerve also gives off:

- posterior auricular branch. This nerve innervates the posterior belly of the occipitofrontalis muscle.
- Branches that innerve the stylohyoid m. and posterior belly of the digastric. Both muscles are associated with swallowing.
- Nerve to stapedius. This nerve branches early from the facial nerve while the nerve is still in the facial canal.

  The ***Stapedius*** muscle is particularly important clinically due to its role in ***dampening loud sounds***.



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CN VII, Facial Nerve:

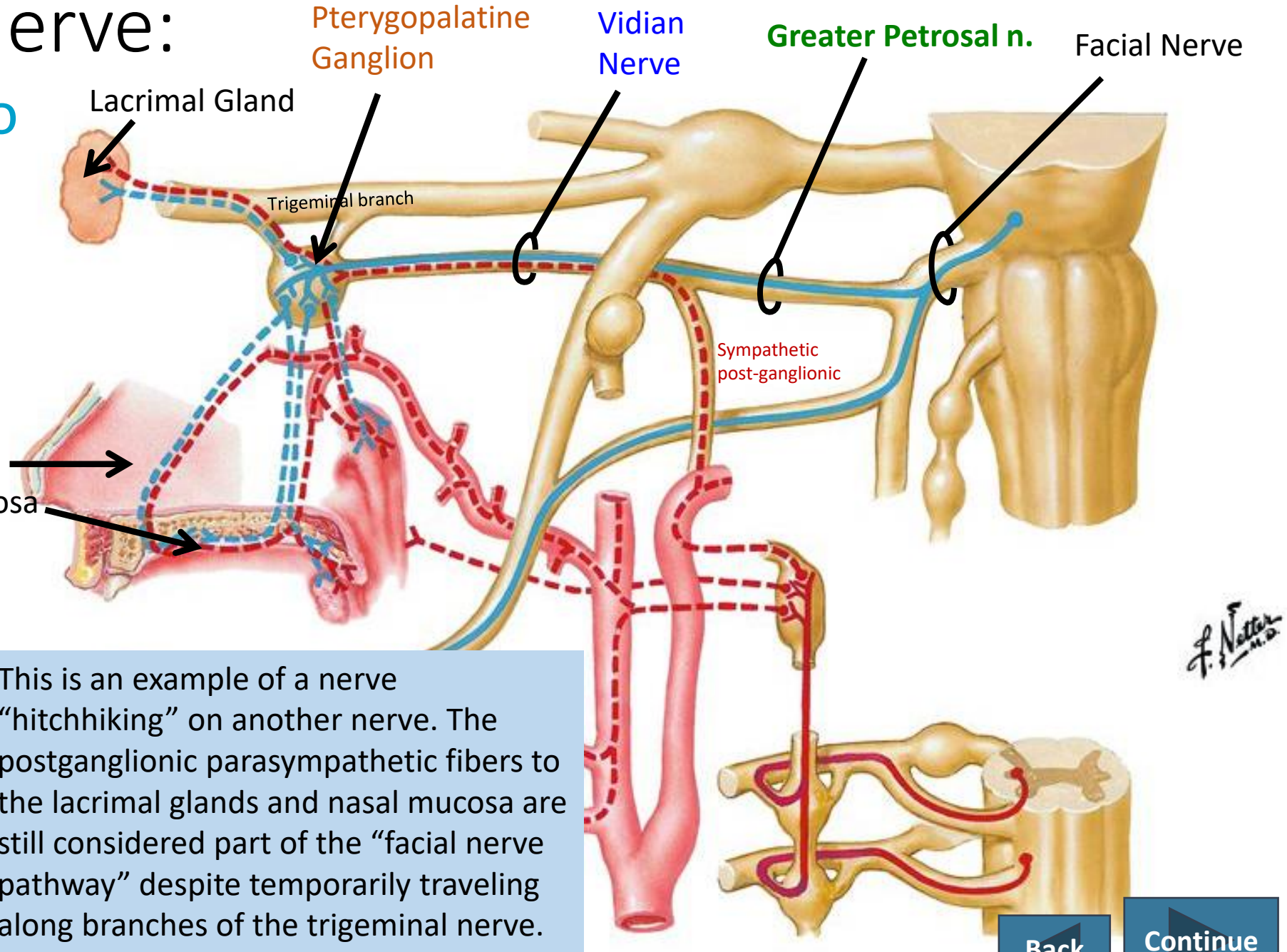
Parasympathetics to lacrimal gland and nasal/oral mucosa

Let's trace the pathway of tear production (lacrimation) and mucous secretion from the nasal and oral cavities

The **greater petrosal n.** conveys pre-ganglionic parasympathetics

It then merges with sympathetics to form the Vidian nerve

The pre-ganglionic parasympathetics synapse at the ***pterygopalatine ganglion***, after which post-ganglionic parasympathetic neurons follow ***trigeminal*** (click here for more information) pathways to get to their target organ



This is an example of a nerve "hitchhiking" on another nerve. The postganglionic parasympathetic fibers to the lacrimal glands and nasal mucosa are still considered part of the "facial nerve pathway" despite temporarily traveling along branches of the trigeminal nerve.

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CN VII, Facial Nerve:

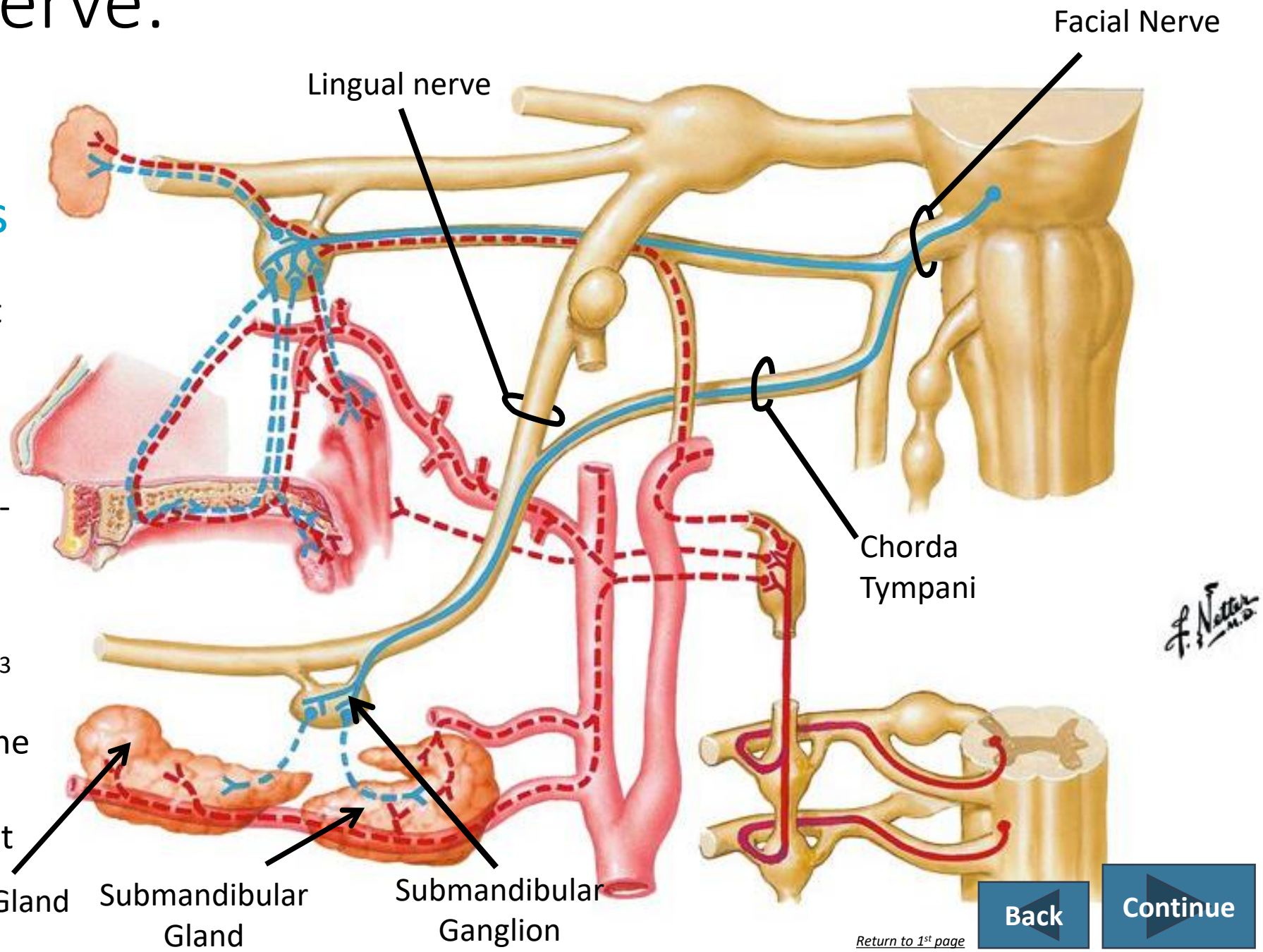
Parasympathetics to sublingual and submandibular glands

Now let's trace the pathway that leads to salivation from the sublingual and submandibular glands

The chorda tympani conveys pre-ganglionic parasympathetics

Chorda tympani "hitches a ride" with the lingual n., a branch of V_3

The pre-ganglionics synapse at the ***submandibular ganglion***, from where post-ganglionic neurons follow trigeminal pathways to get to their target organ



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CN VII, Facial Nerve:

Taste

Follow the THIN BLUE LINE. The facial nerve carries taste from the **anterior 2/3 of the tongue**

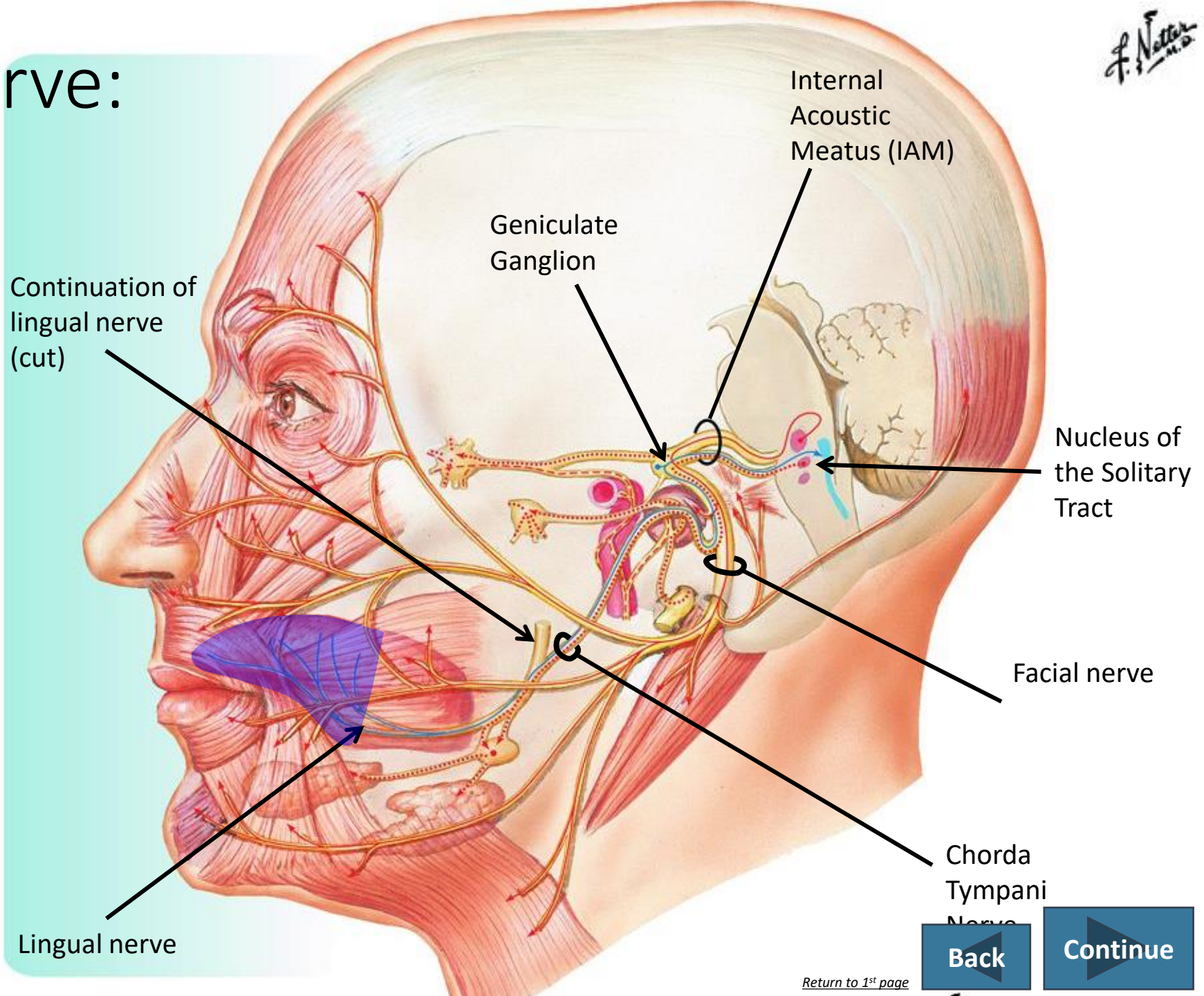
The taste fibers leave the tongue by traveling along the lingual nerve (a branch of V_3)

This information then jumps onto the chorda tympani which enters skull via the petrotympanic fissure (not shown)

The chorda tympani joins the facial nerve inside the facial canal.

The cell bodies of the taste neurons are in the geniculate ganglion (also located within the bone along the facial canal)

These neurons continue through the IAM (internal acoustic meatus) and into the brainstem



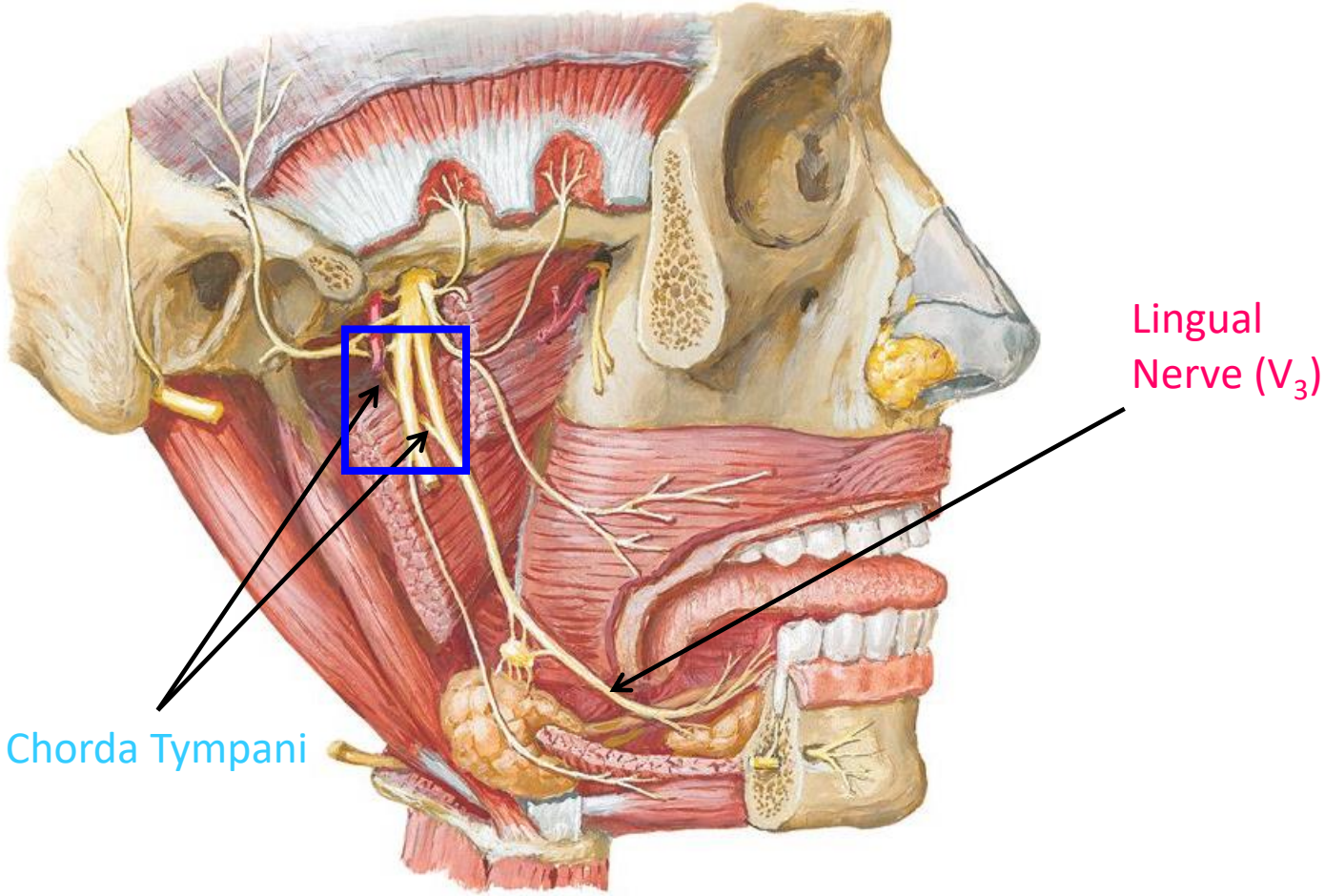
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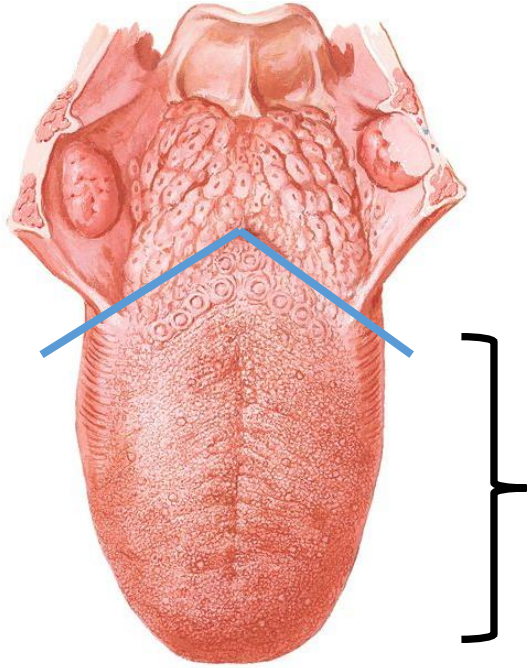
CN VII, Facial Nerve:
Netter Schema

Taste

This image demonstrates the communication between lingual nerve (V_3) and the chorda tympani to convey taste from the ***anterior 2/3 of the tongue***.

This is where you'll see chorda tympani in the lab!





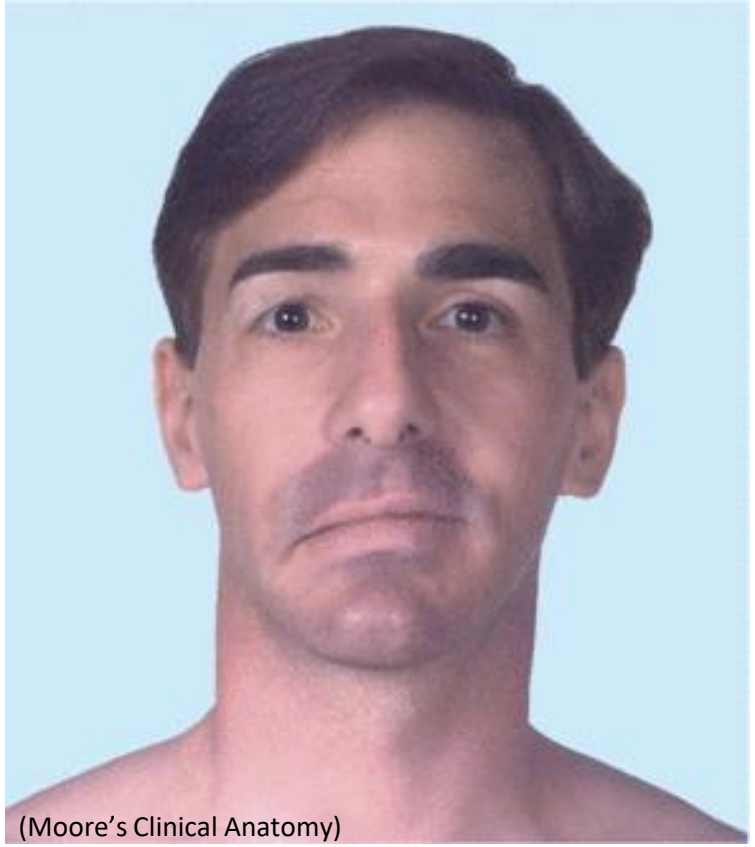
Anterior 2/3 of Tongue:

General sensation: Lingual n. from V3 (trigeminal)
Taste: Facial n. (via chorda tympani)

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CN VII, Facial Nerve:
Deficits and Clinical Considerations

Bell's Palsy, Facial Nerve Paralysis


(Moore's Clinical Anatomy)

A patient reports to the clinic with the resting facial expression seen here. ***CLICK*** which side of his face is affected:

Right Side Yes! Notice the drooping and facial distortion on his right side.

Left Side No, the patient's left side seems to be intact here.

Can you think of a mechanism of injury?

Many answers here! Let's go with laceration of parotid gland.

In addition to facial distortion, ***CLICK*** other functions affected by laceration of the parotid gland…

Blinking (and thus spread of lacrimal fluid) ✓

Food accumulation in oral vestibule ✓

Sensation of face ✗ → Recall that sensation of the face is mediated by CN V, trigeminal

Closing oral sphincter, food and saliva dribbling out of mouth ✓

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CN VII, Facial Nerve:
Deficits and Clinical Considerations

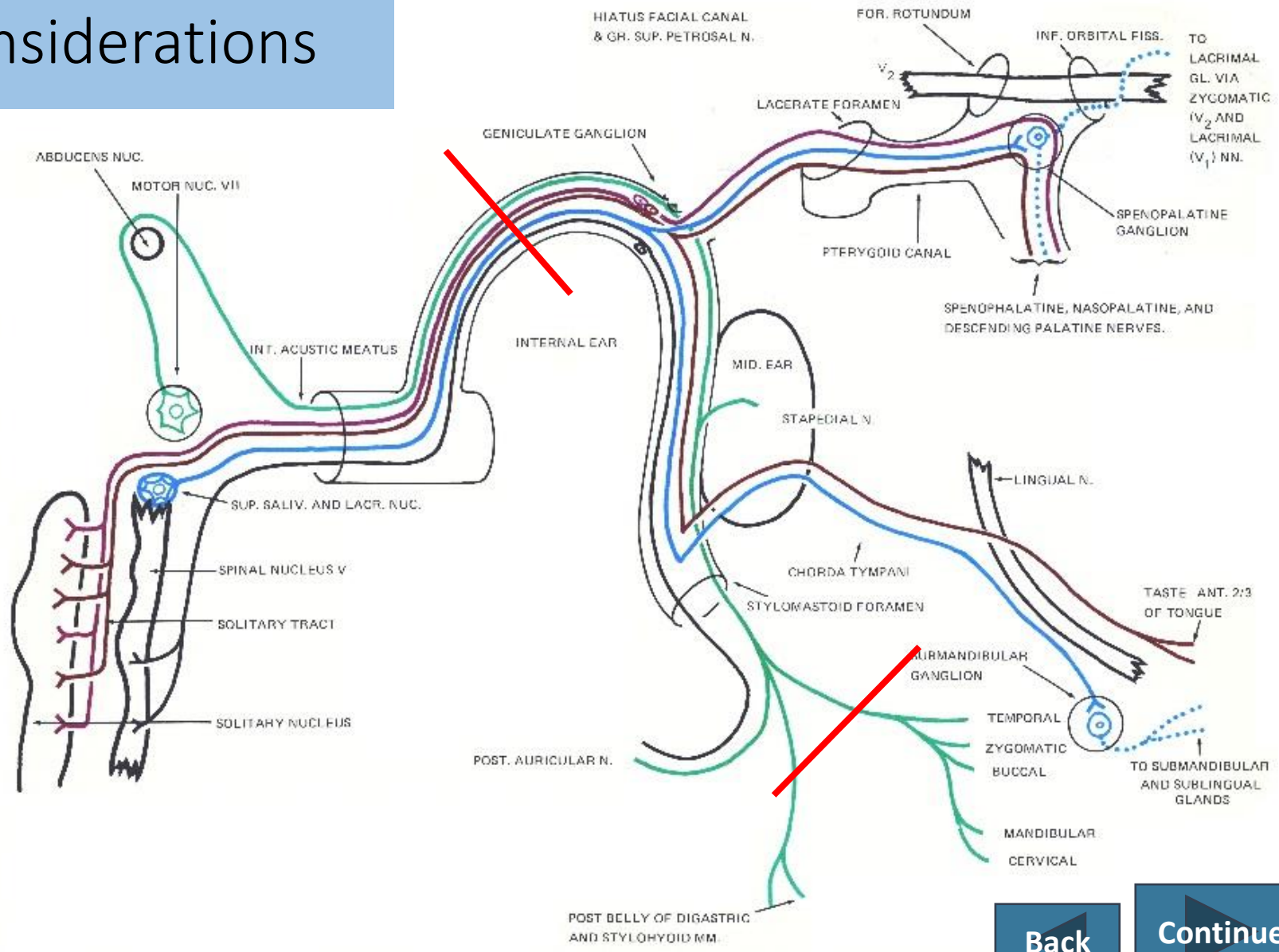
In the previous example, the patient appeared to have an external lesion of CN VII

Let's imagine a fracture of the temporal bone.

What additional symptoms would you expect if the lesion were here?

What about here?

We will review these deficits during your cranial nerve workshop later in the block



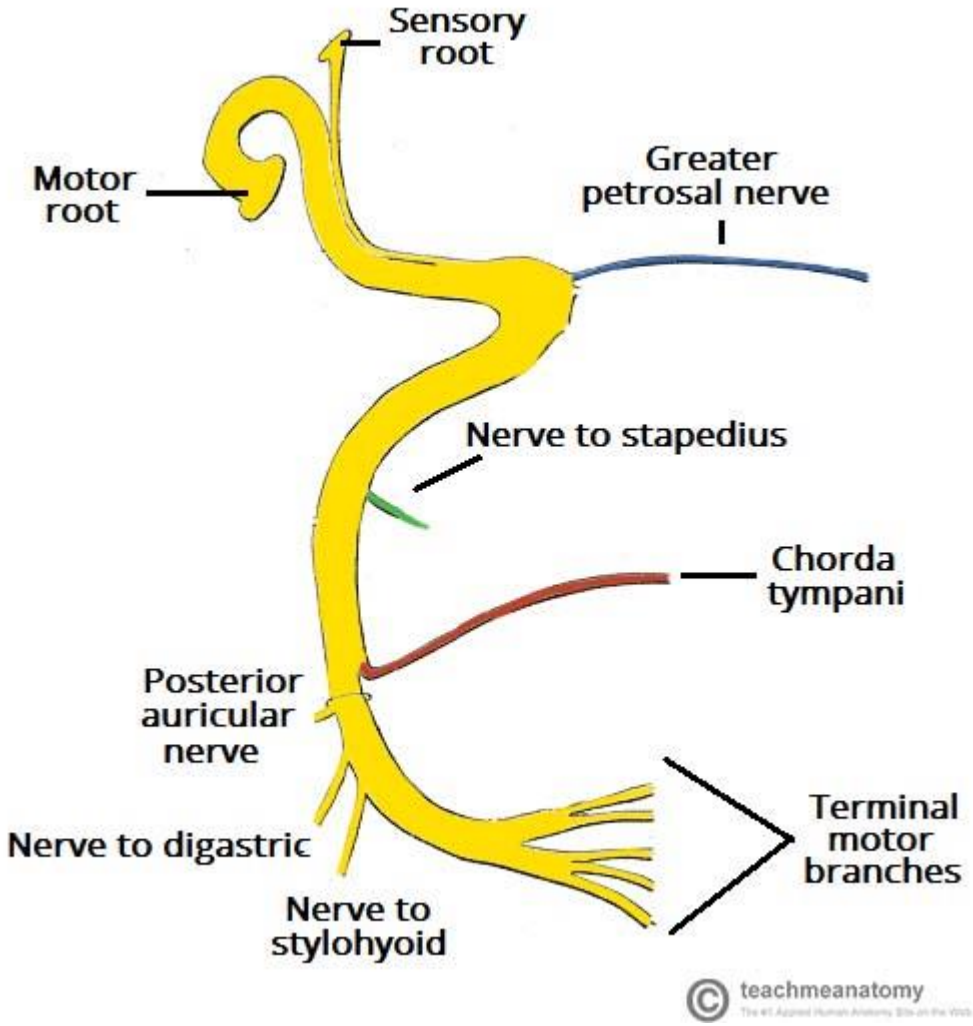
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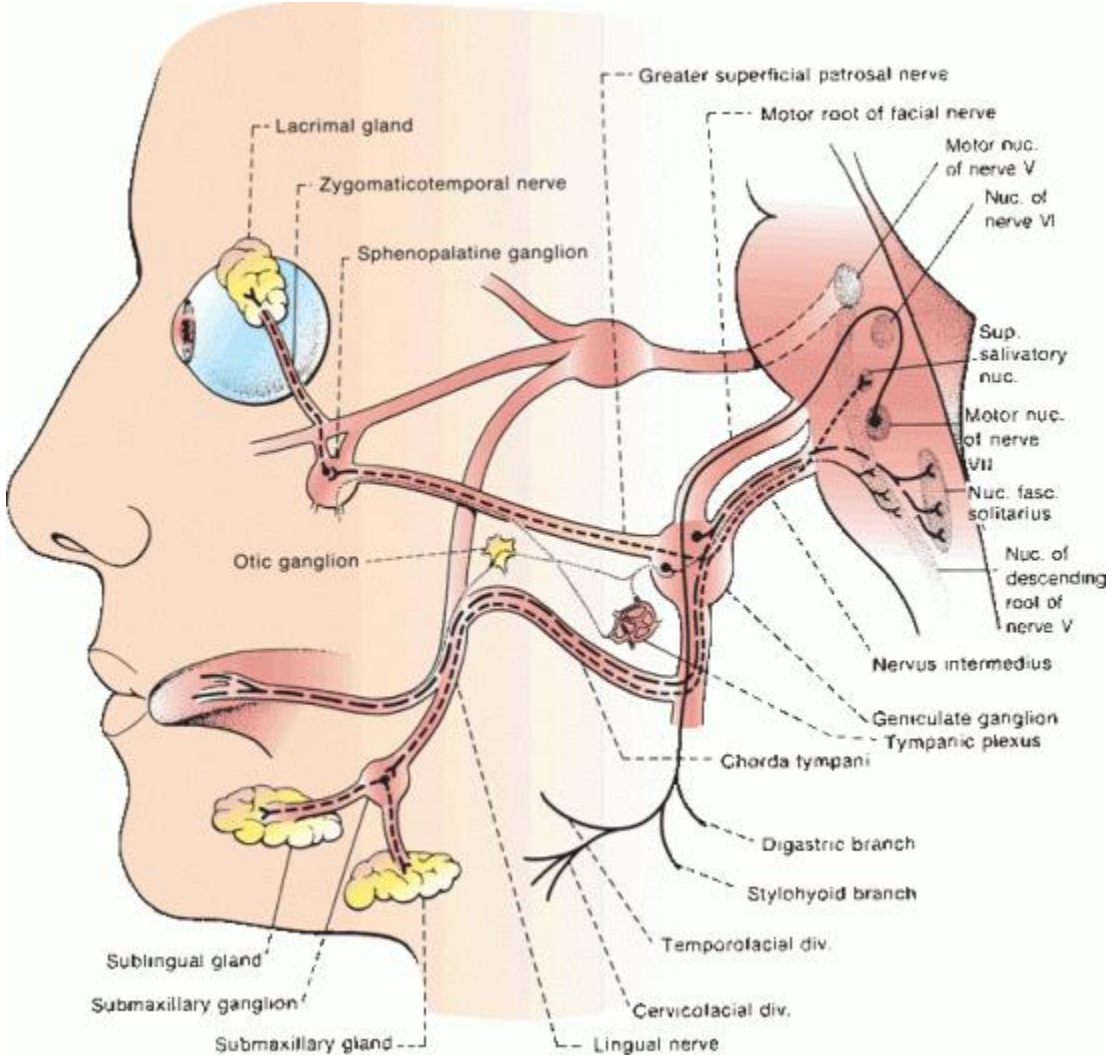
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CN VII: Facial Nerve, Schema

Here are two additional images you may find helpful while studying!





https://myneurosurg.com/cranial-anatomy/cranial-nerve-7-facial-nerve-and-its-pathology/

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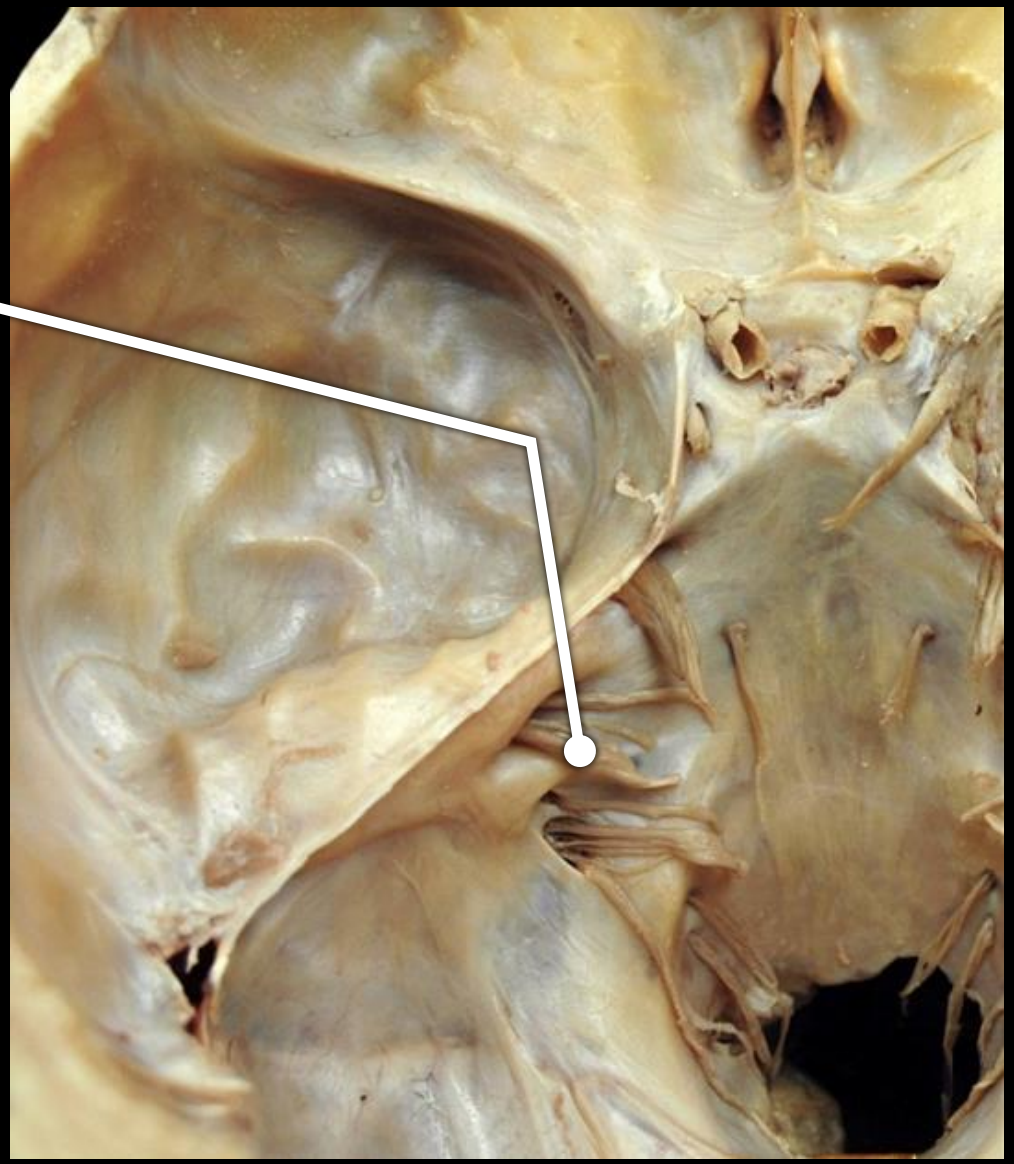
Haines, Neuroanatomy in Clinical Context, 9th ed.

CN VIII: Vestibulocochlear Nerve

Sensory Nerve
Fxn'l Component:

SSA

Relationship to Brain:
Exits Lateral Aspect of Inferior Pontine Sulcus with CN VII



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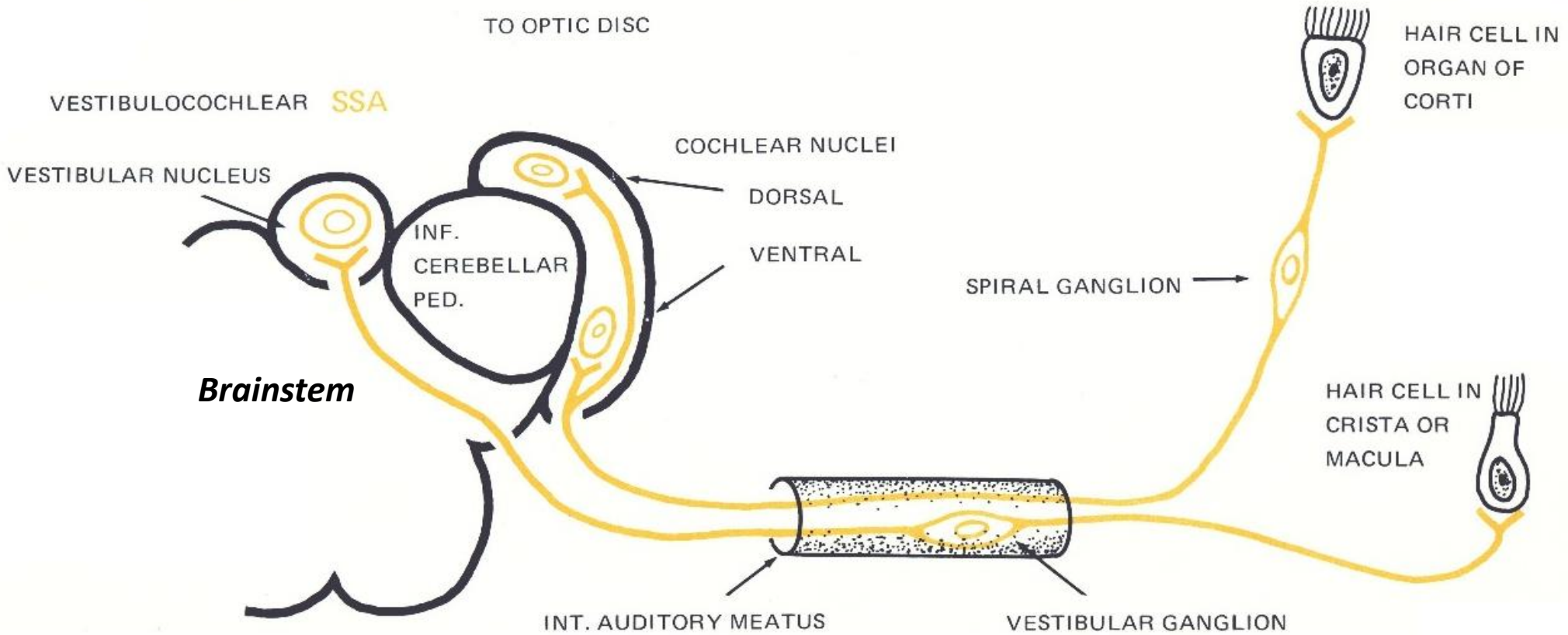
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CN VIII, Vestibulocochlear Nerve:

CN VIII is relatively straightforward. The “vestibulocochlear nerve” convey **special senses** information from the vestibular apparatus and the cochlea (balance and hearing, respectively) from the inner ear to the brainstem.

Posterior



Brainstem

~ Cochlea

~ Vestibular Apparatus

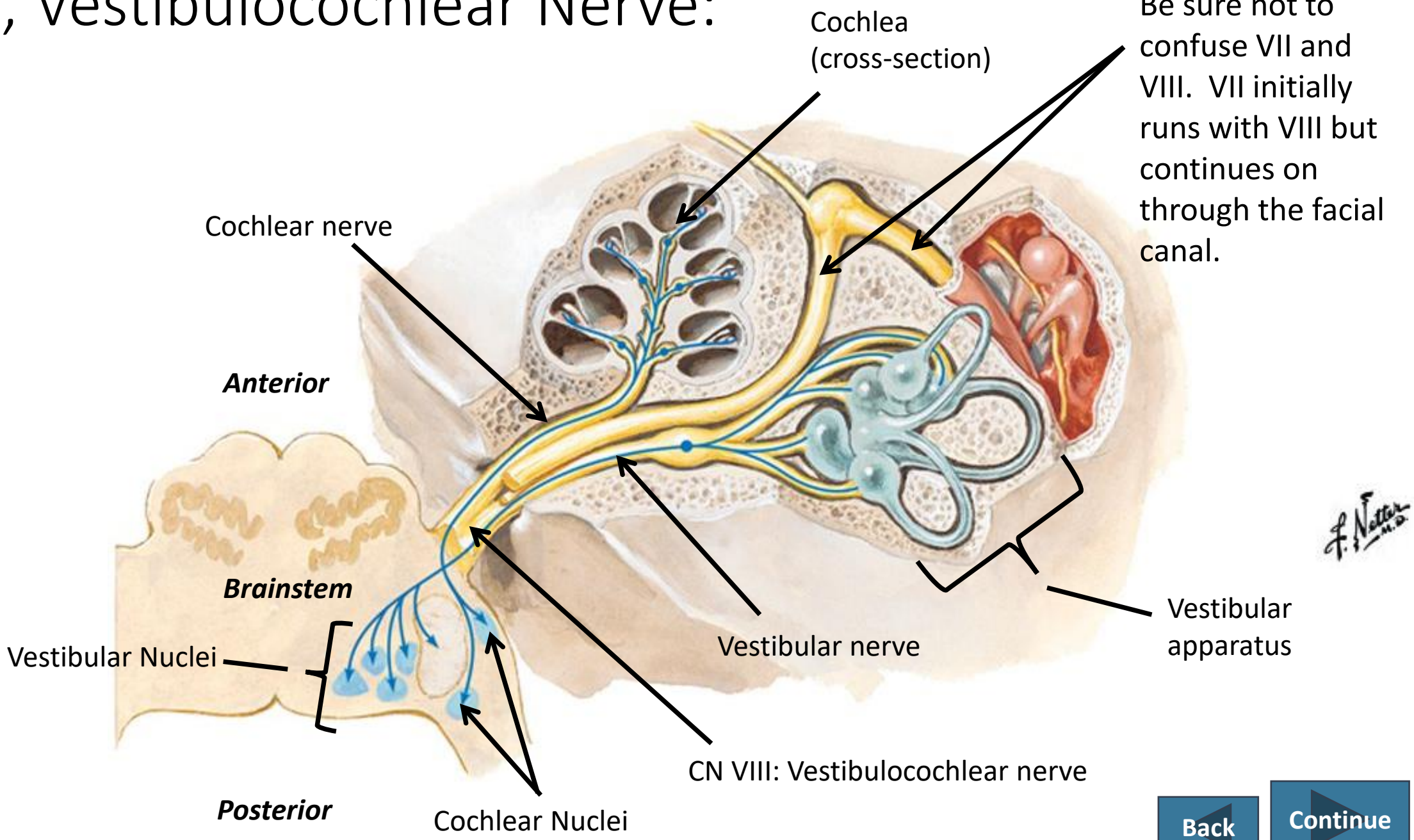
Anterior

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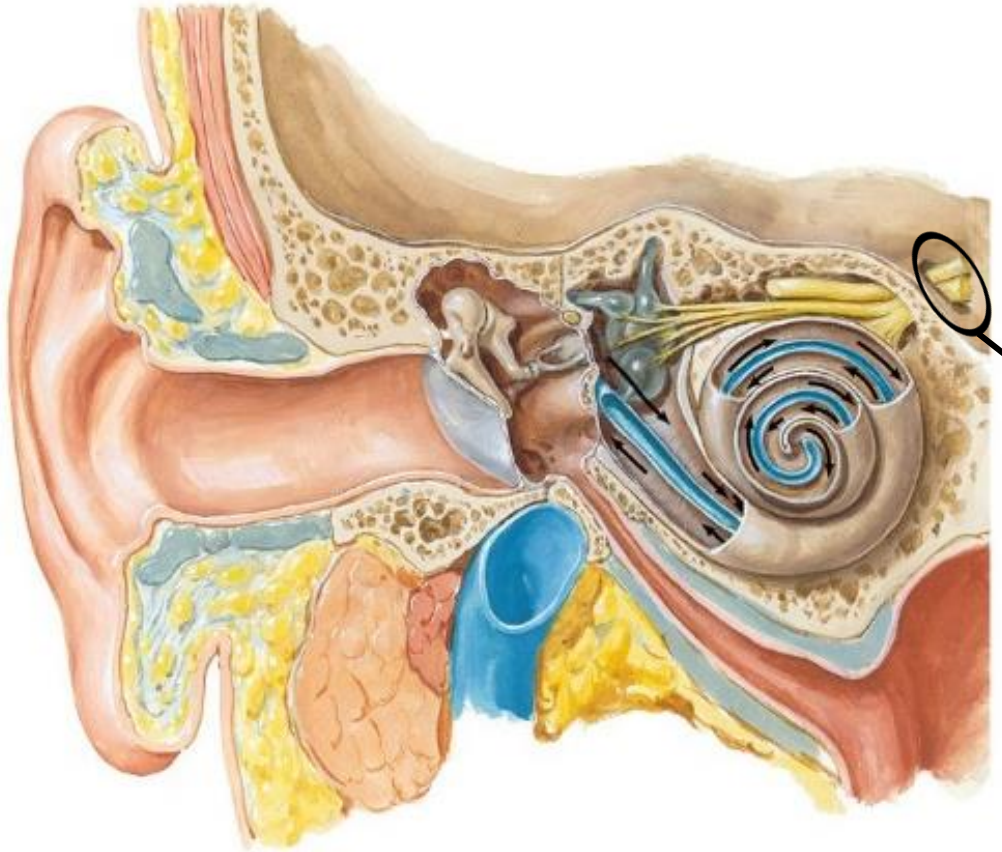
CN VIII, Vestibulocochlear Nerve:

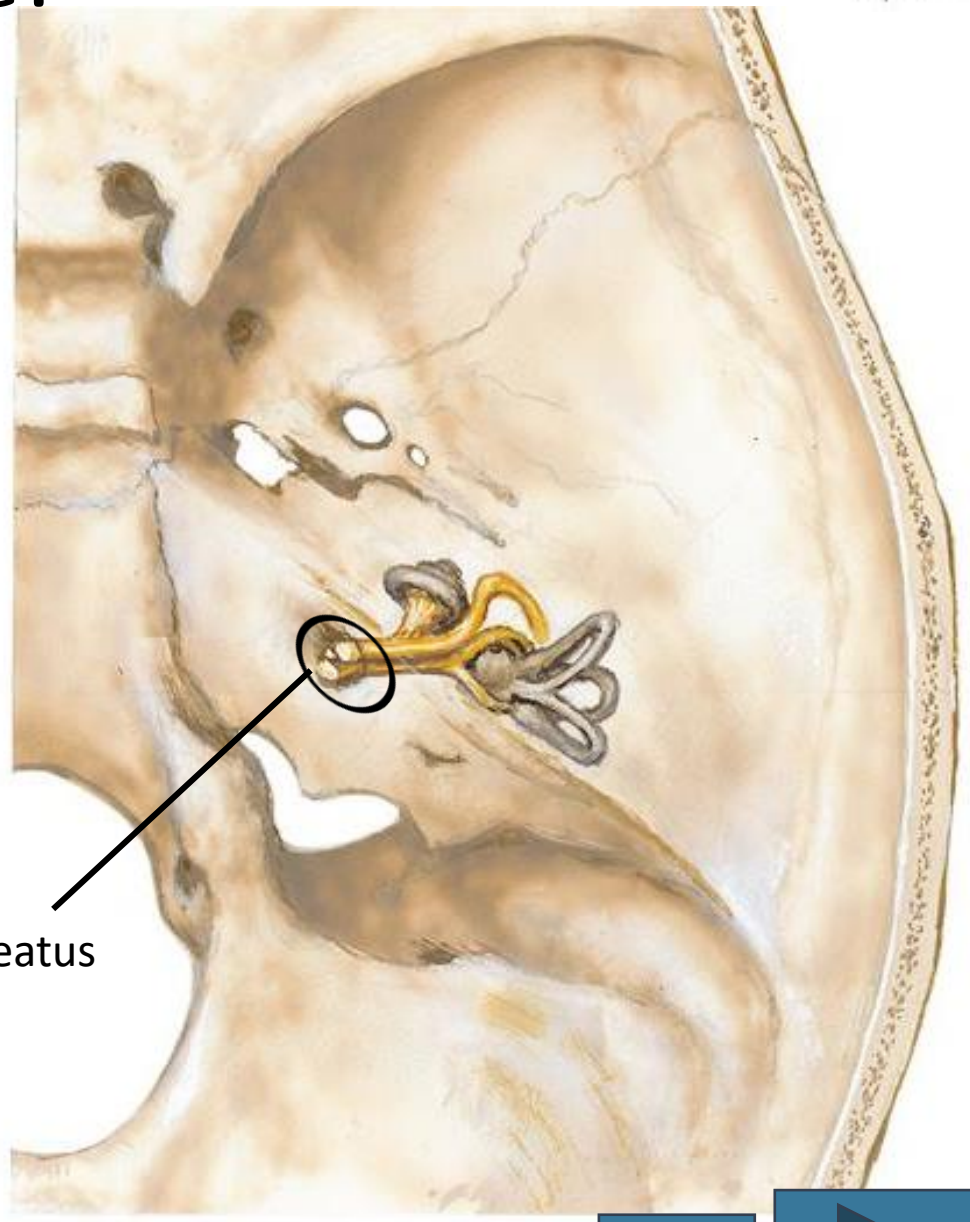


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CN VIII, Vestibulocochlear Nerve:

Importantly, CN VIII communicates with the brainstem via the IAM. It does ***NOT*** exit the temporal bone via any other routes!





Internal Acoustic Meatus (IAM)

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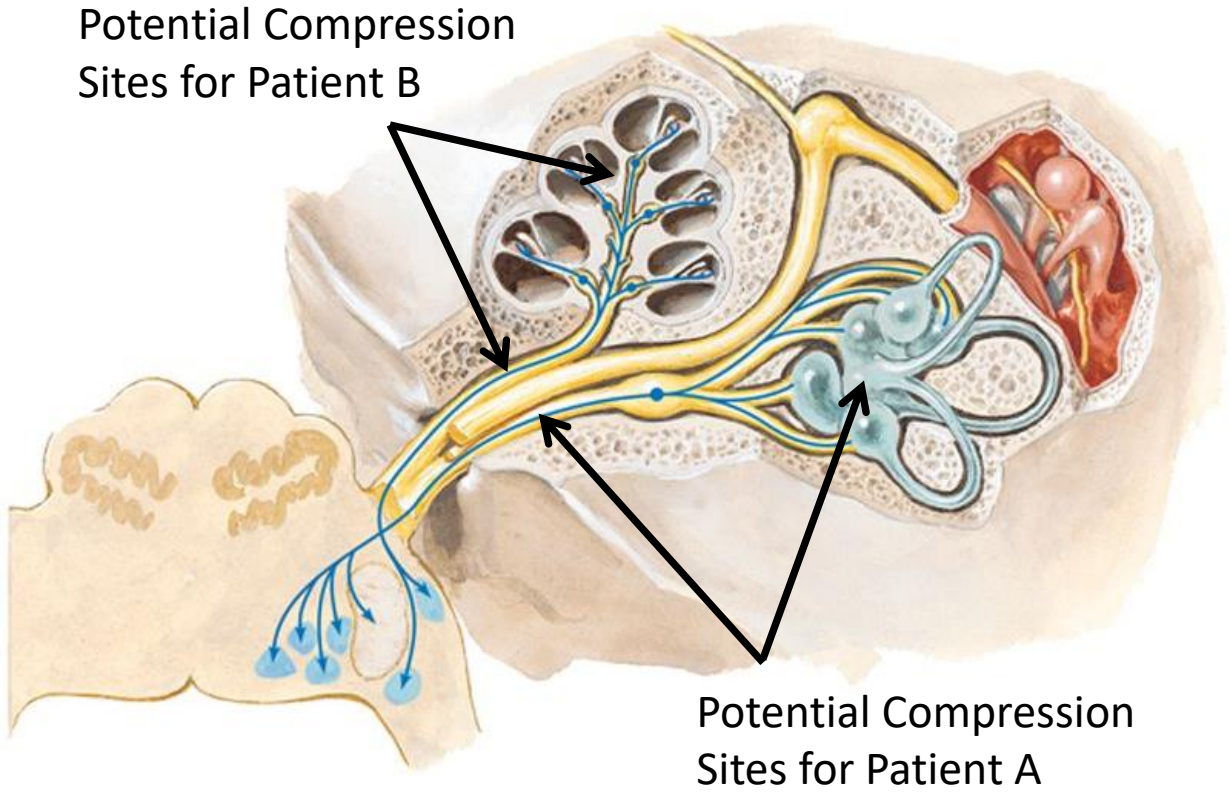
CN VII, Facial Nerve:
Deficits and Clinical Considerations

As an ENT specialist, you are treating two patients, each with a tumor of the temporal bone, yet each have vastly different symptoms.

Patient A presents with disequilibrium, vertigo, and nystagmus, whereas patient B presents with unilateral hearing loss and tinnitus.

Based on the anatomy of CN VIII, how can you account for the differences between these two patients?

In patient A, the tumor is affecting the vestibular apparatus or the vestibular nerve, whereas in patient B, the tumor is compressing the cochlea or the cochlear nerve.



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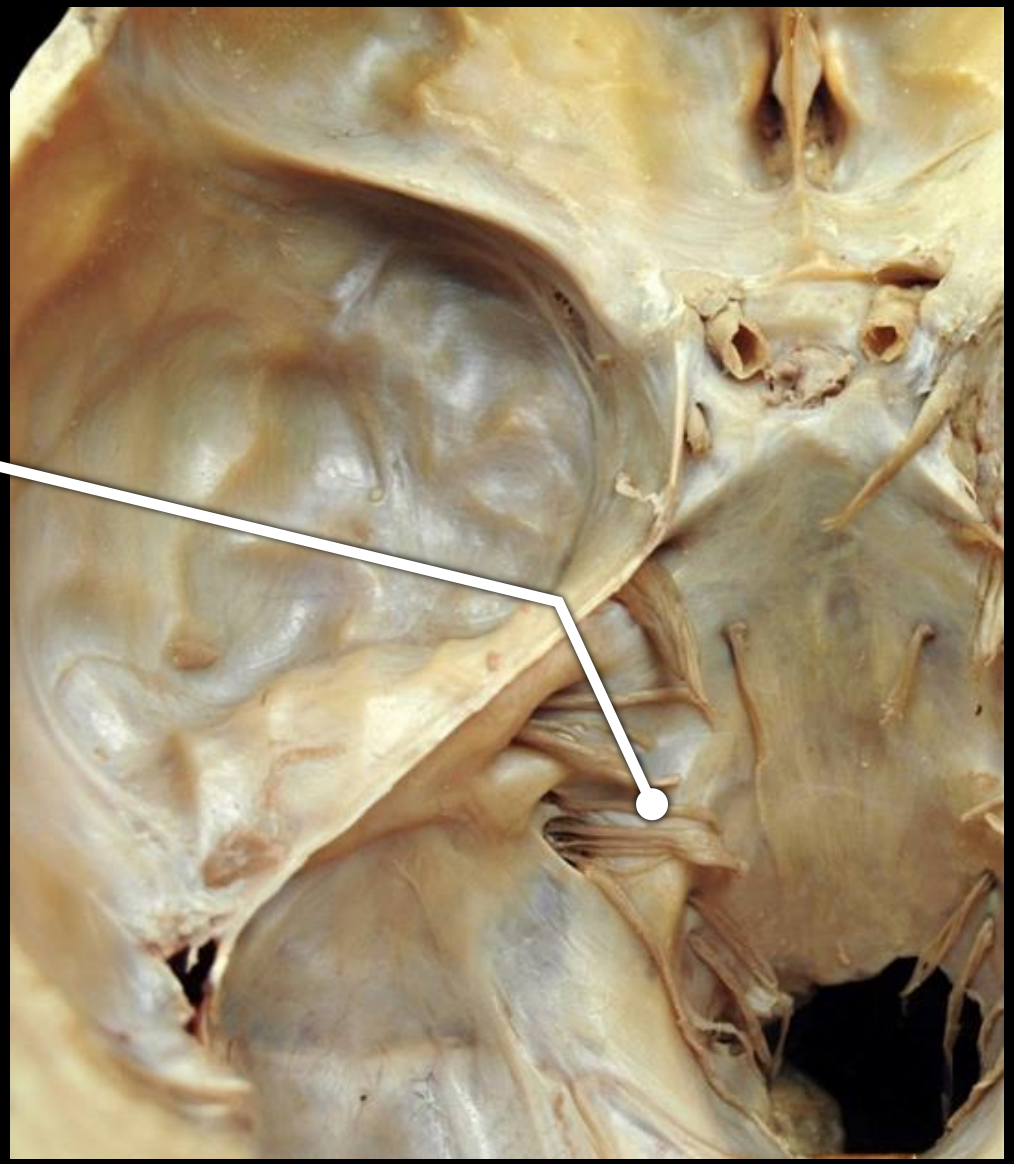
Haines, Neuroanatomy in Clinical Context, 9th ed.

CN IX: Glossopharyngeal Nerve

Mixed Nerve with Fxn'l Components:

GVE SVE SVA GVA GSA

Relationship to Brain:
Exits Lateral Aspect of Medulla
with CN X and XI



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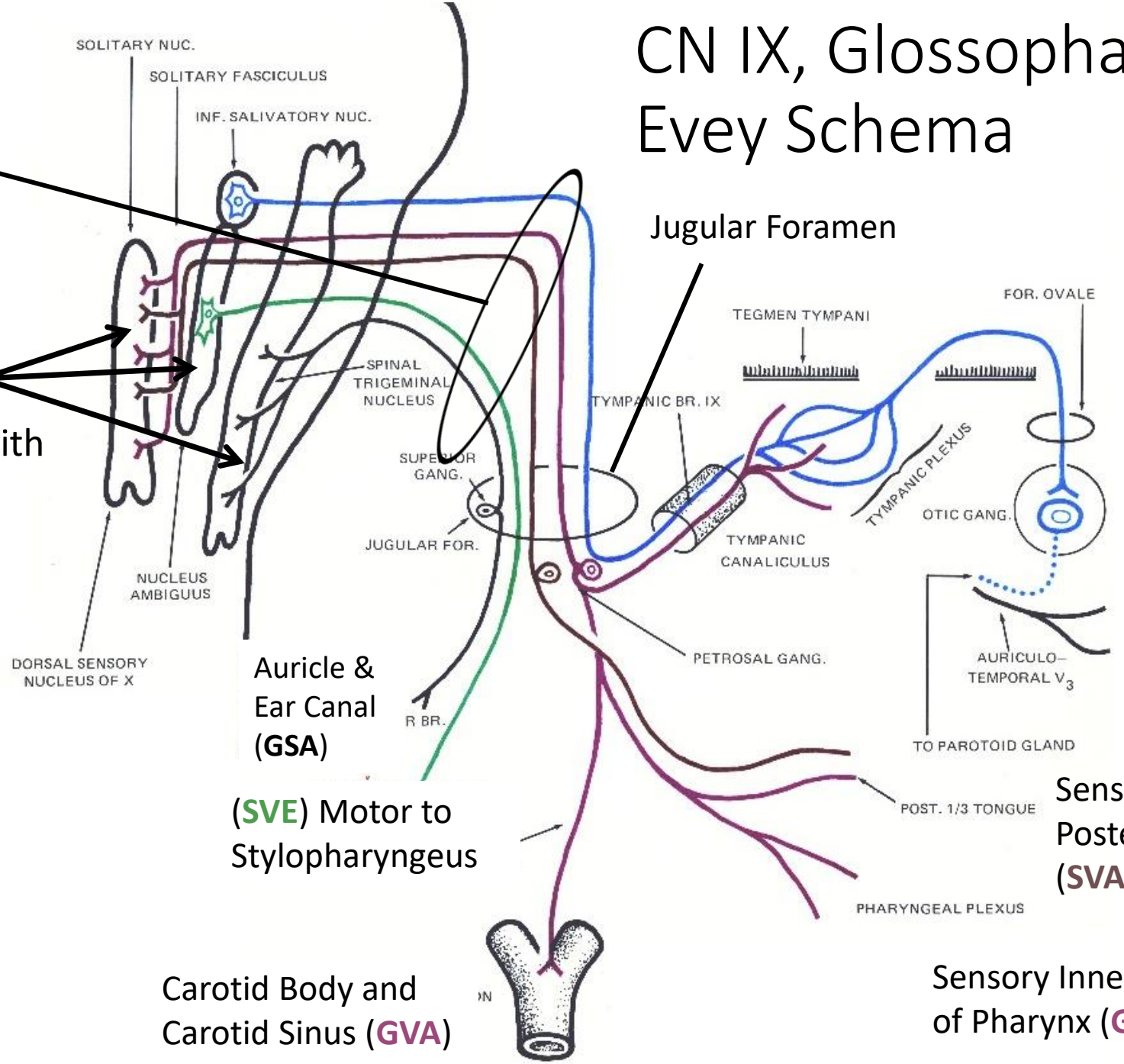
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CN IX, Glossopharyngeal Nerve: Evey Schema

CN IX: Glossopharyngeal Nerve

Various Brainstem Nuclei associated with CN IX (Sensory and Motor)



Jugular Foramen

Parotid Gland (GVE)

Auricle & Ear Canal (**GSA**)

(SVE) Motor to Stylopharyngeus

Sensory Innervation of Posterior 1/3 of Tongue (SVA and GVA)

Carotid Body and Carotid Sinus (GVA)

Sensory Innervation of Pharynx (GVA)

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CN IX, Glossopharyngeal Nerve:

The word “glossopharyngeal” implies function at the tongue and pharynx (or throat)

The glossopharyngeal nerve passes from the brainstem through the ***jugular foramen*** along with cranial nerves X and XI

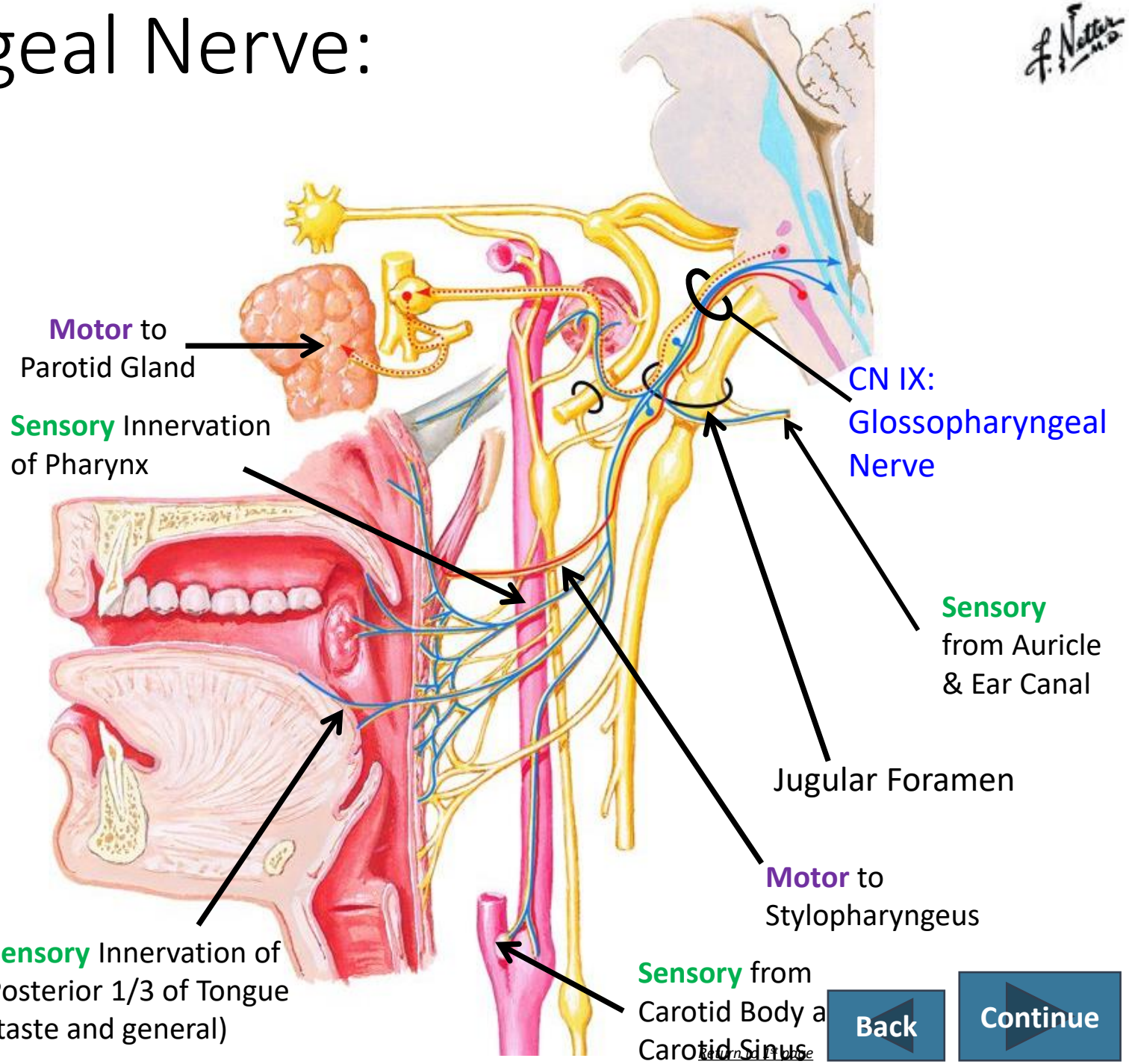
The glossopharyngeal has the following components:

Efferent:

1. Innervation to Stylopharyngeus muscle
2. Innervation to Parotid Gland (parasympathetic)

Afferent:

1. Taste from posterior 1/3 of tongue
2. General Sensory from:
    1. Posterior 1/3 of tongue
    2. Carotid body and Carotid Sinus
    3. Pharynx (pharyngeal plexus)
    4. Part of auricle



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CN IX: Glossopharyngeal Nerve

The next few slides cover relevant information about each of the glossopharyngeal branches and/or structures innervated by the branches.

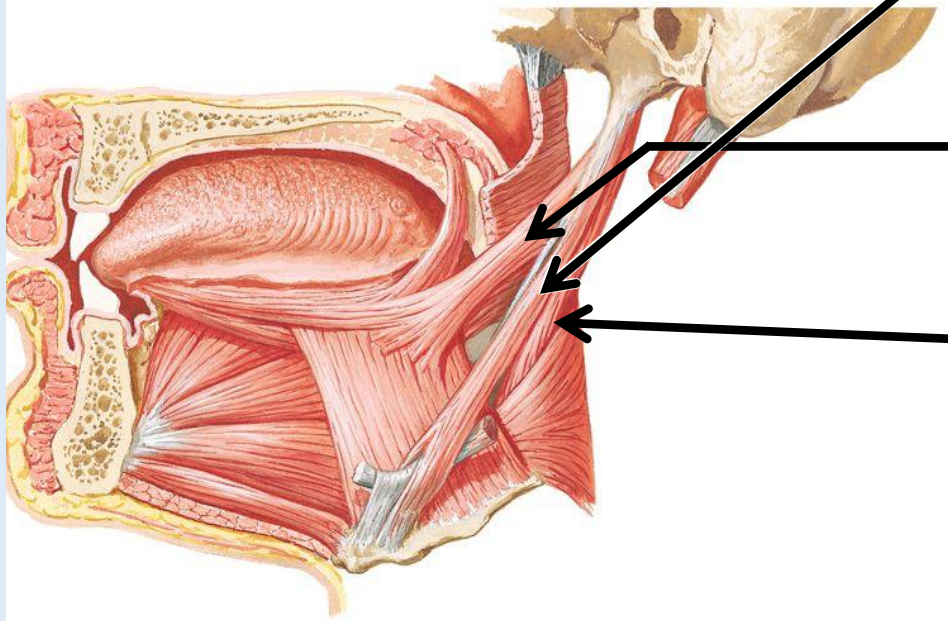
The stylopharyngeus m. runs from the styloid process to the pharynx.

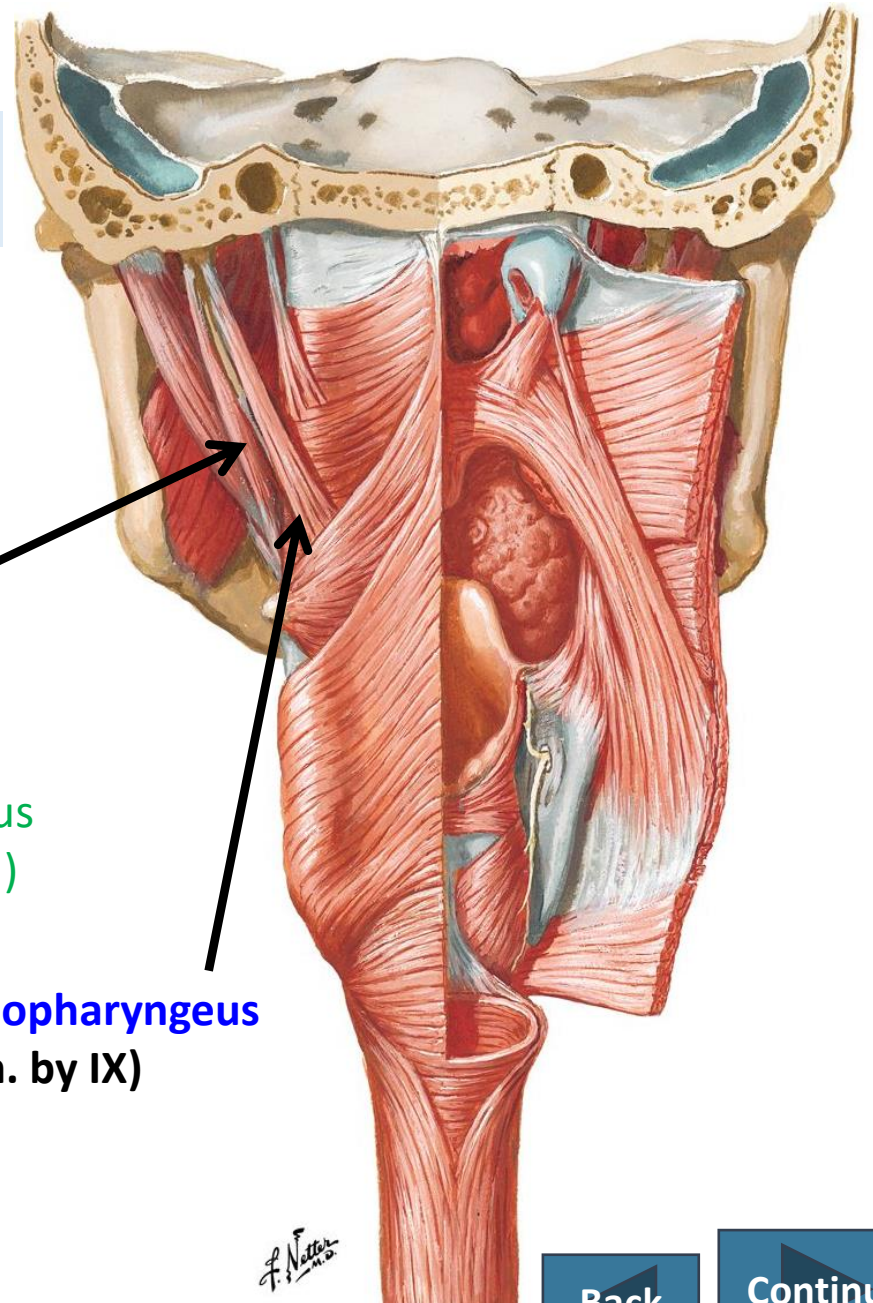
In the lab. *This muscle will be found only with a very deep, very invasive dissection. The nerve to stylopharyngeus will be very small and will be difficult to find*

Don't confuse the stylopharyngeus with other muscles originating from the styloid process!

- Stylohyoid (innervated by CN VII)
- Styloglossus (innervated by XII)

Numerous cranial nerves (VII, IX, X, and XII) supply the muscles of the pharynx and tongue. Meaning, cranial nerves VII, IX, X, and XII are all involved in eating/swallowing. Eating also involves chewing (CN V3), and sensation and production of mucous/saliva (CN V, VII, and X)!





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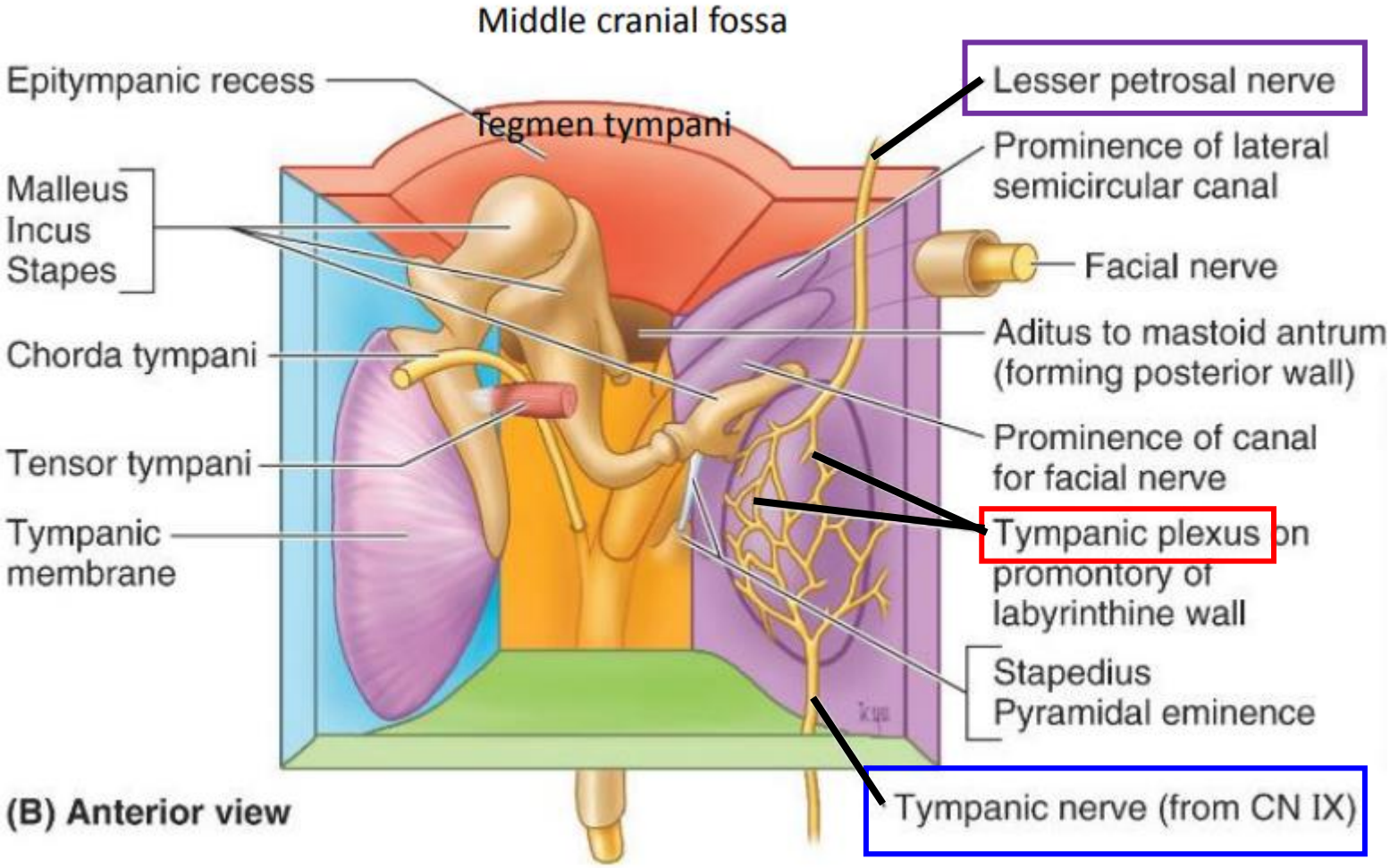
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CN IX, Glossopharyngeal Nerve:

Parotid gland (parasympathetic)

The Facial Nerve passes through the parotid gland – but does not innervate it! Salivation control for the parotid gland is via **CN IX**

The branch of CN IX that supplies the parotid gland passes through the middle ear quite close to the facial nerve. The relevant components of the path are the tympanic nerve, tympanic plexus, lesser petrosal nerve, and the otic ganglion (not shown)



Moore and Daley, Clinically Oriented Anatomy

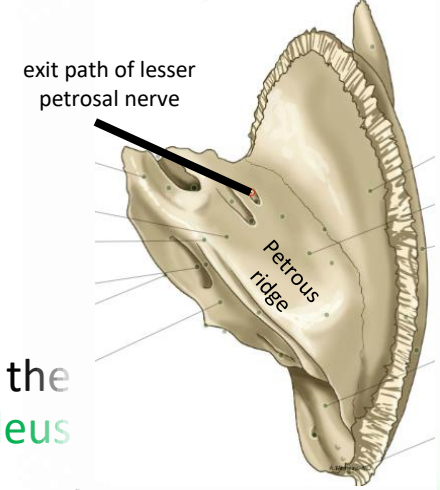
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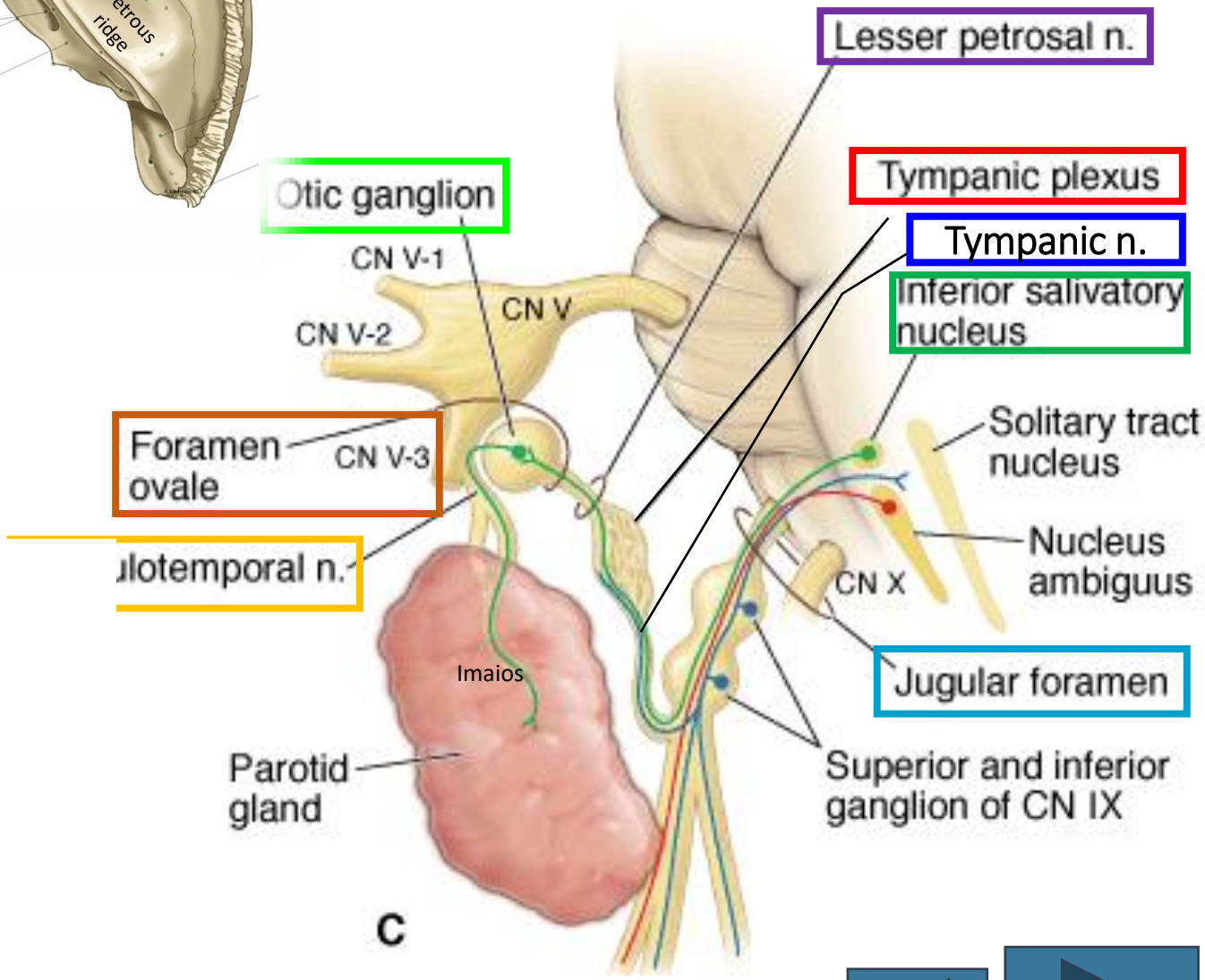
CN IX

Parotid gland (parasympathetic)

Putting it all together…

1. CN IX pre-ganglionic parasympathetic fibers to the parotid originate on the inferior salivatory nucleus
2. The fibers are initially part of the glossopharyngeal nerve. Within the jugular foramen they form a small branch, the tympanic nerve, which passes into the petrous part of the temporal bone.
3. tympanic nerve-->tympanic plexus-->lesser petrosal nerve in the middle ear (tympanic cavity)
4. The lesser petrosal n. exits the tympanic cavity, then passes though the anterior wall of the petrous ridge to the middle cranial fossa
5. The lesser petrosal nerve passes through the foramen ovale with V3.
6. Medial to the mandible, the nerve synapses on the Otic Ganglion.
7. The postganglionic parasympathetic neurons follow the auriculotemporal nerve (V_3) to the parotid gland





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CN IX

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"Oh my, this seems complicated. What do I need to know for the test?!?"

Summary:

- The glossopharyngeal nerve supplies parasympathetic innervation to the parotid gland.
- The preganglionic fibers pass through the middle ear and exit as the lesser petrosal nerve.
- The lesser petrosal nerve synapses on the Otic Ganglion (medial to body of mandible) in the infratemporal fossa.
- Postganglionic parasympathetic neurons travel along the auriculotemporal nerve to the parotid gland.

- the management (Dr. G)

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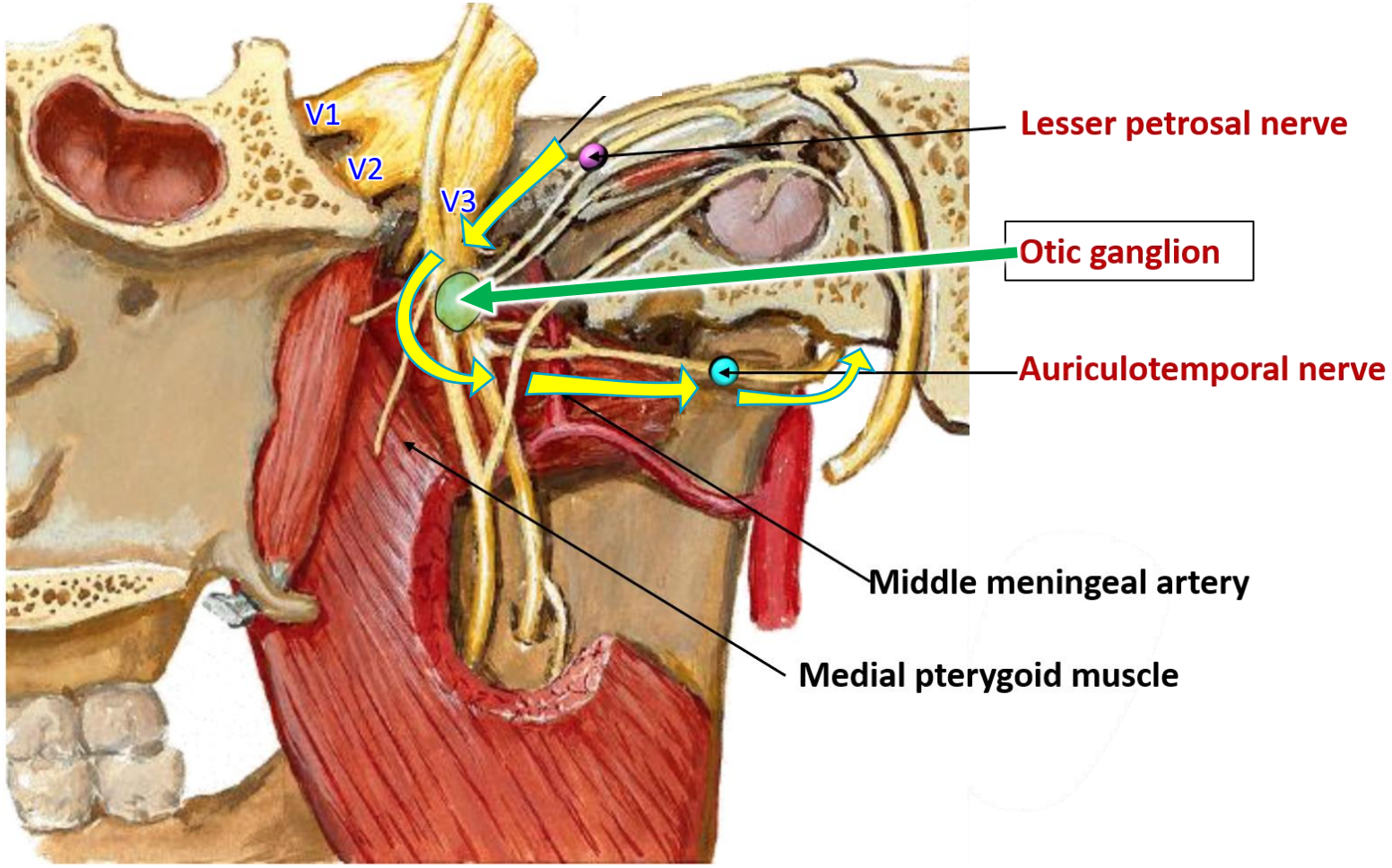
CN IX, Glossopharyngeal Nerve:

Parotid gland (parasympathetic)

This is the location of the Otic ganglion.

It is very small and is located medial to the ramus of the mandible in the infratemporal fossa

Fibers to the parotid gland travel along the lesser petrosal nerve, synapse on the otic ganglion, then postganglionic fibers continue along the auriculotemporal nerve (branch of V3) to reach the parotid gland



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CN IX, Glossopharyngeal Nerve

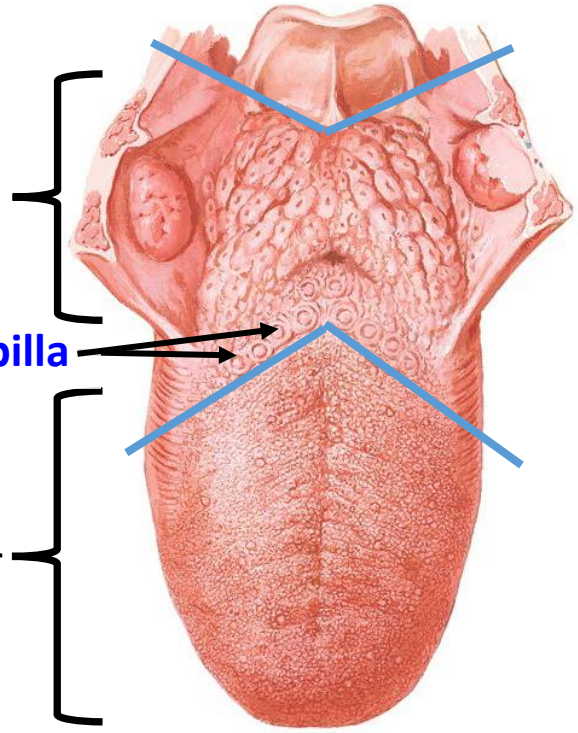
The ***posterior 1/3 of the tongue*** is entirely supplied by the glossopharyngeal nerve

- General sense (touch, **GVA**)
- Special sense (taste, **SVA**)
  - the circumvallate papilla (v-shaped row of taste-buds at back of tongue) are also innerved by CN IX

Additionally, CN IX also carries sensory information from the carotid body (chemosensory), carotid sinus (mechanosensory), and the pharyngeal plexus

Posterior 1/3 of Tongue

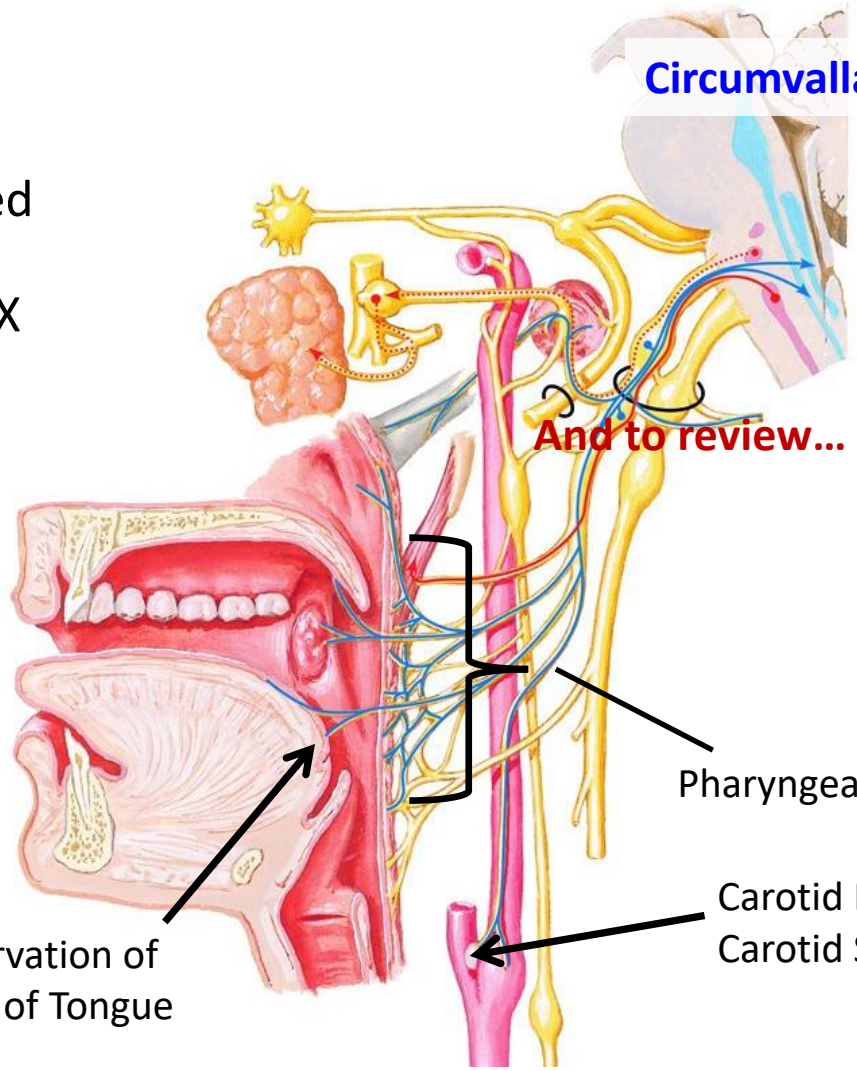
Glossopharyngeal n. (IX): general sense (touch) & taste



Anterior 2/3 of Tongue

touch: Lingual n. V3

taste: Facial n. (via chorda tympani)



F. Netter M.D.

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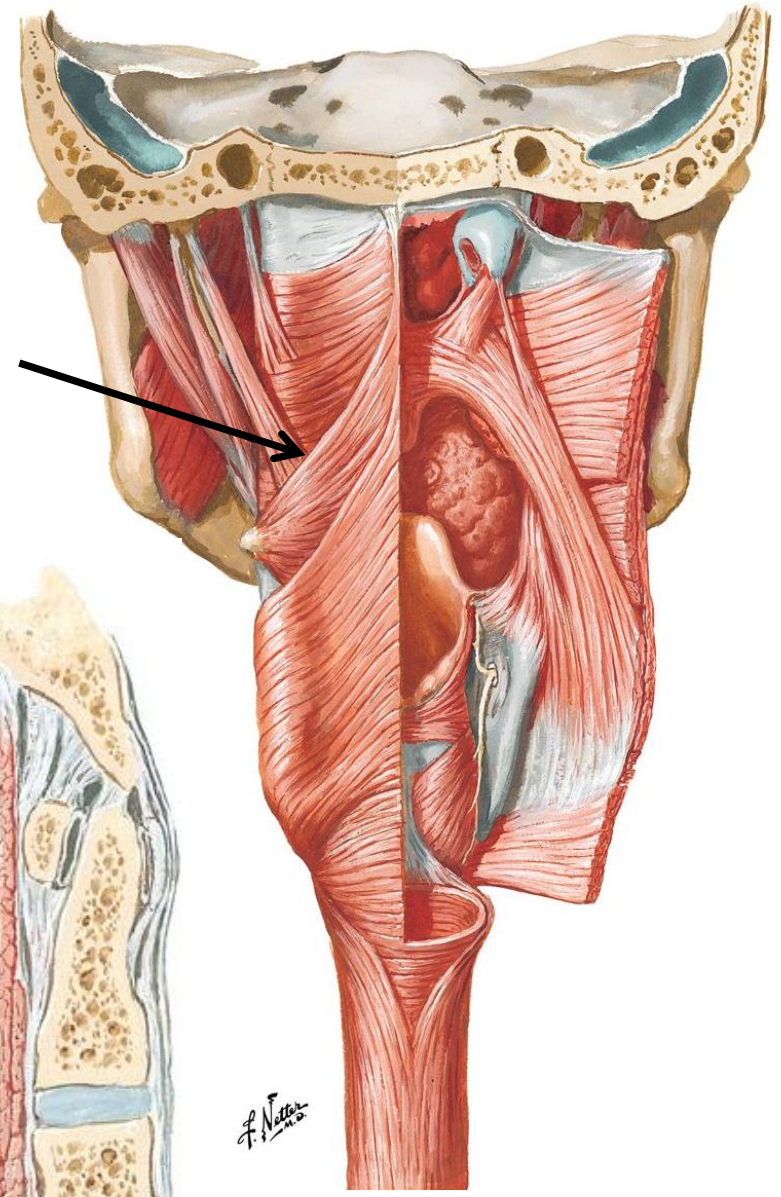
CN IX, Glossopharyngeal Nerve: In the Cadaver Lab

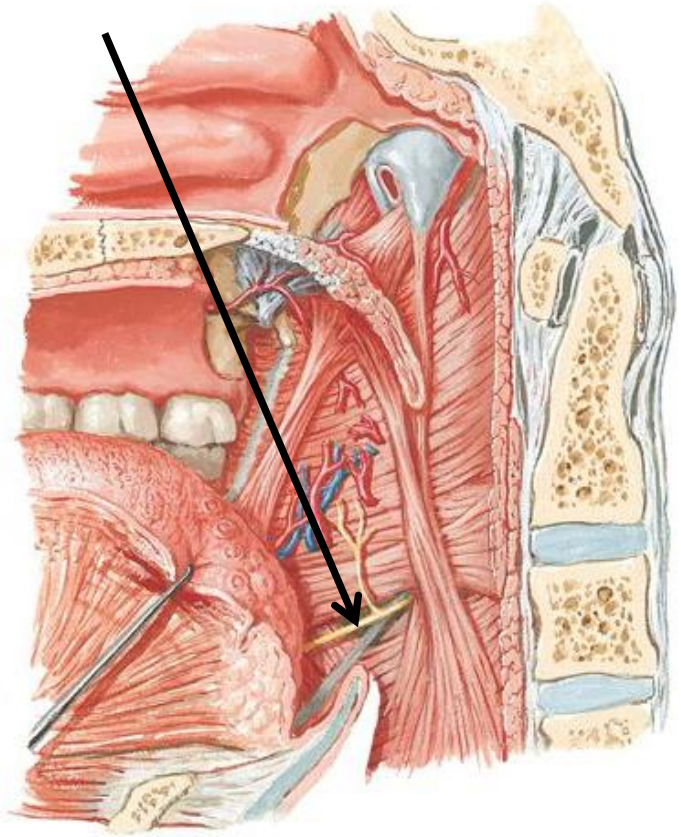
Aside from its location in the cranial vault, CN IX may best be viewed peripherally either:

1) coursing ***between*** the superior and middle constrictor muscles (along with stylopharyngeus m.)

2) ***between*** the palatoglossus and palatopharyngeus muscles of the oral cavity

Note: finding this nerve will require scraping away oral mucosa.





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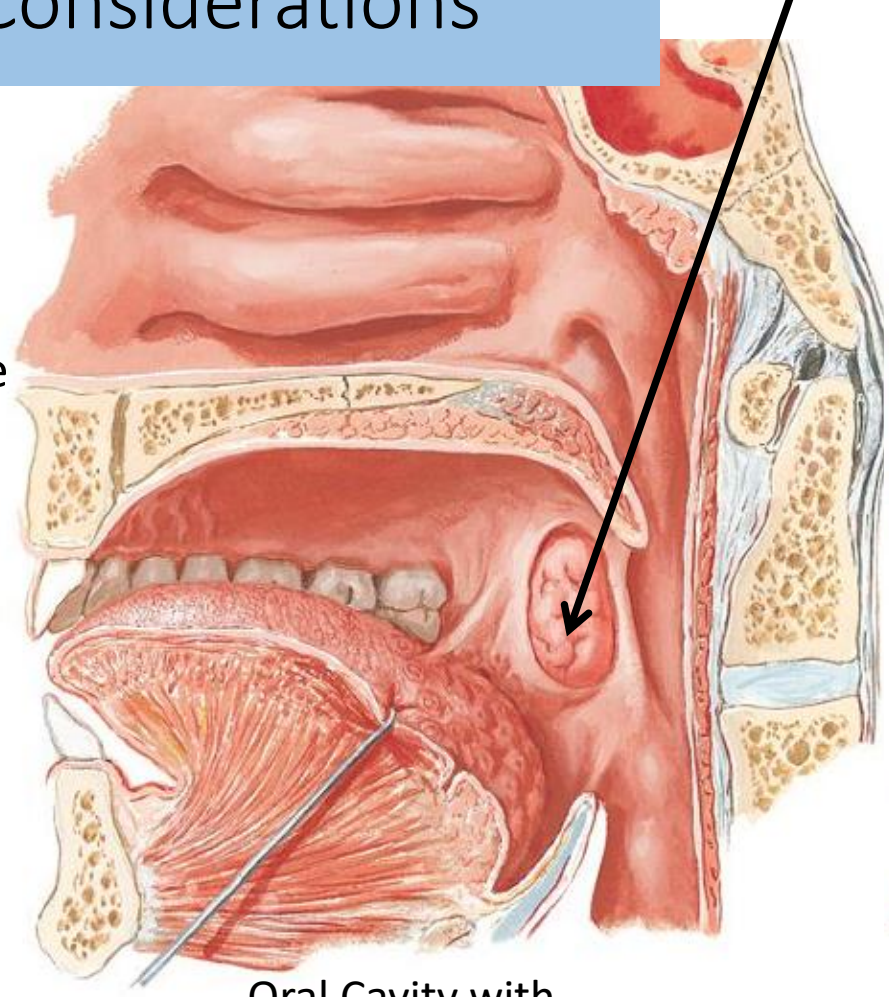
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CN IX, Glossopharyngeal Nerve:
Deficits and Clinical Considerations

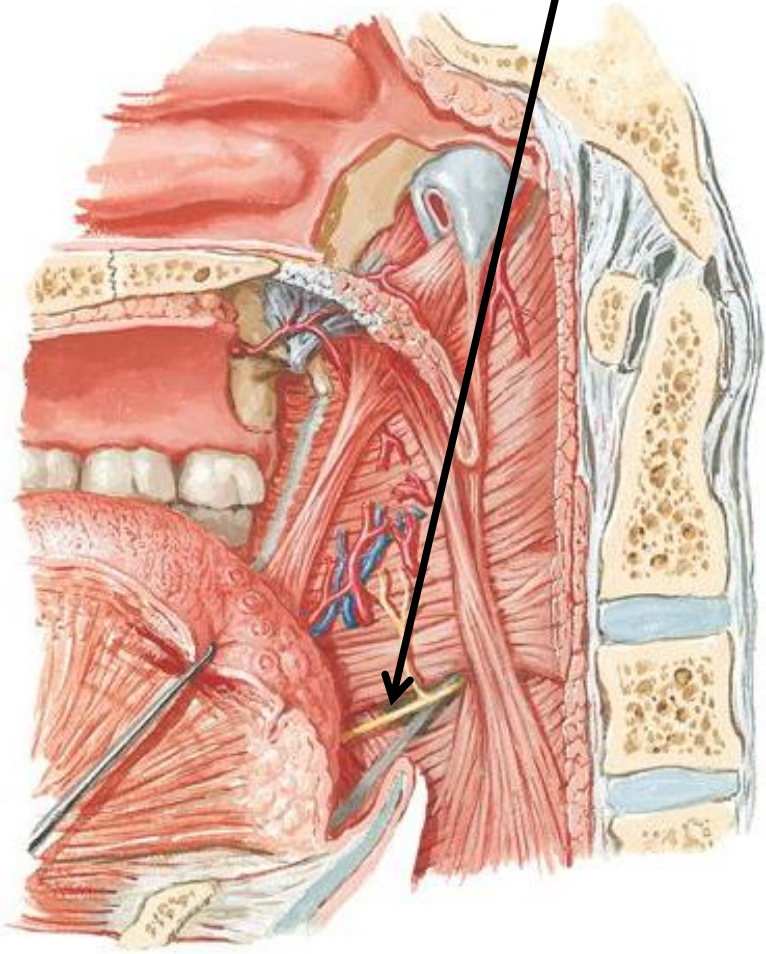
Following a tonsillectomy, a young female patient notices an absence of sensation on the posterior 1/3 of the tongue, slight dysphagia, and an absence of the gag reflex, all on her right side.

How do you interpret these findings?

This is likely an iatrogenic injury, in which the physician caused trauma to her right CN IX between the palatal arches. Each of the symptoms can be accounted for by the ***functional components*** of CN IX.



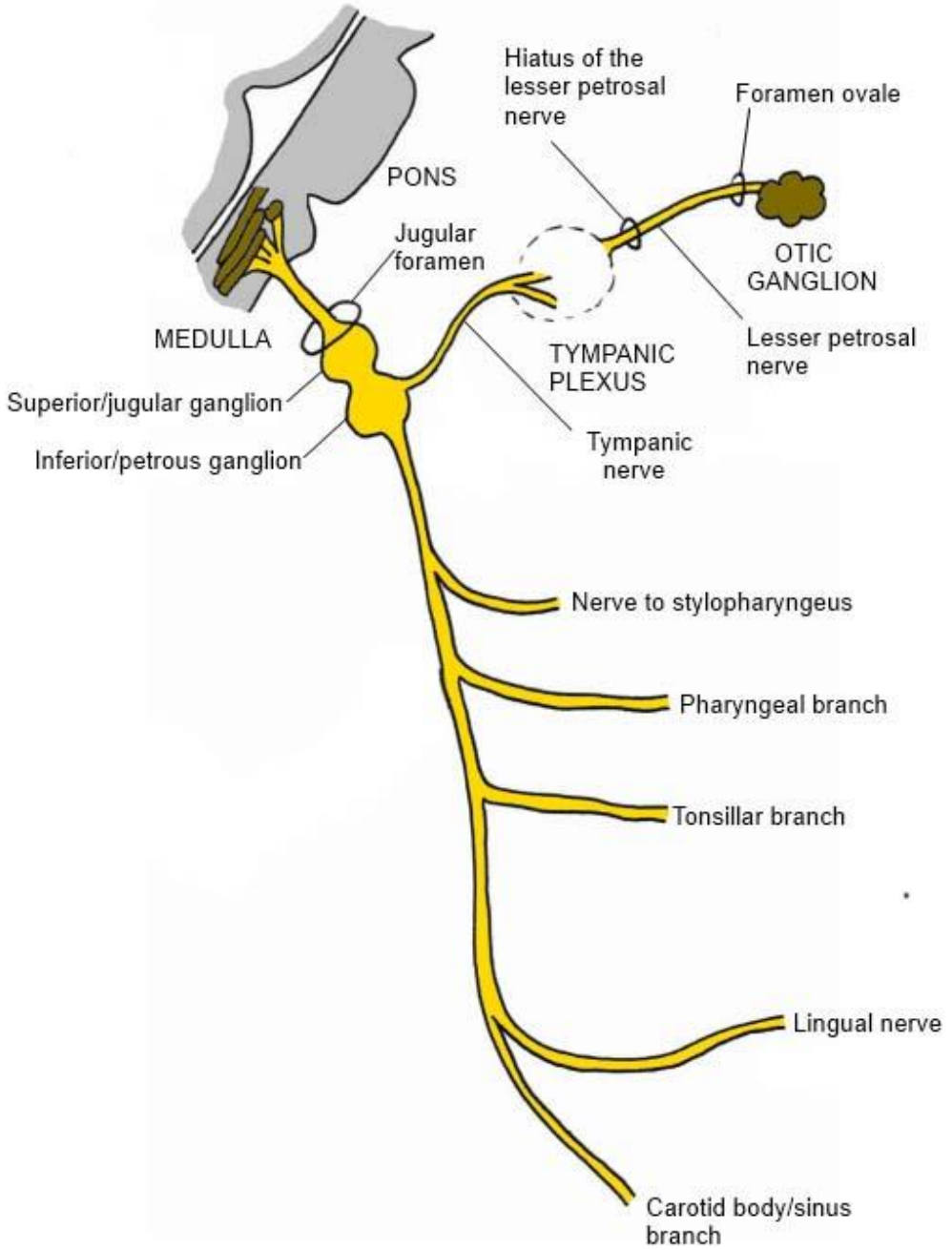
Oral Cavity with Mucosal Membrane



Oral Cavity without Mucosal Membrane

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Here is another image you may find helpful while studying!



https://teachmeanatomy.info/head/cranial-nerves/glossopharyngeal-nerve/

Image adapted, with permission, from anatomymcqs.com

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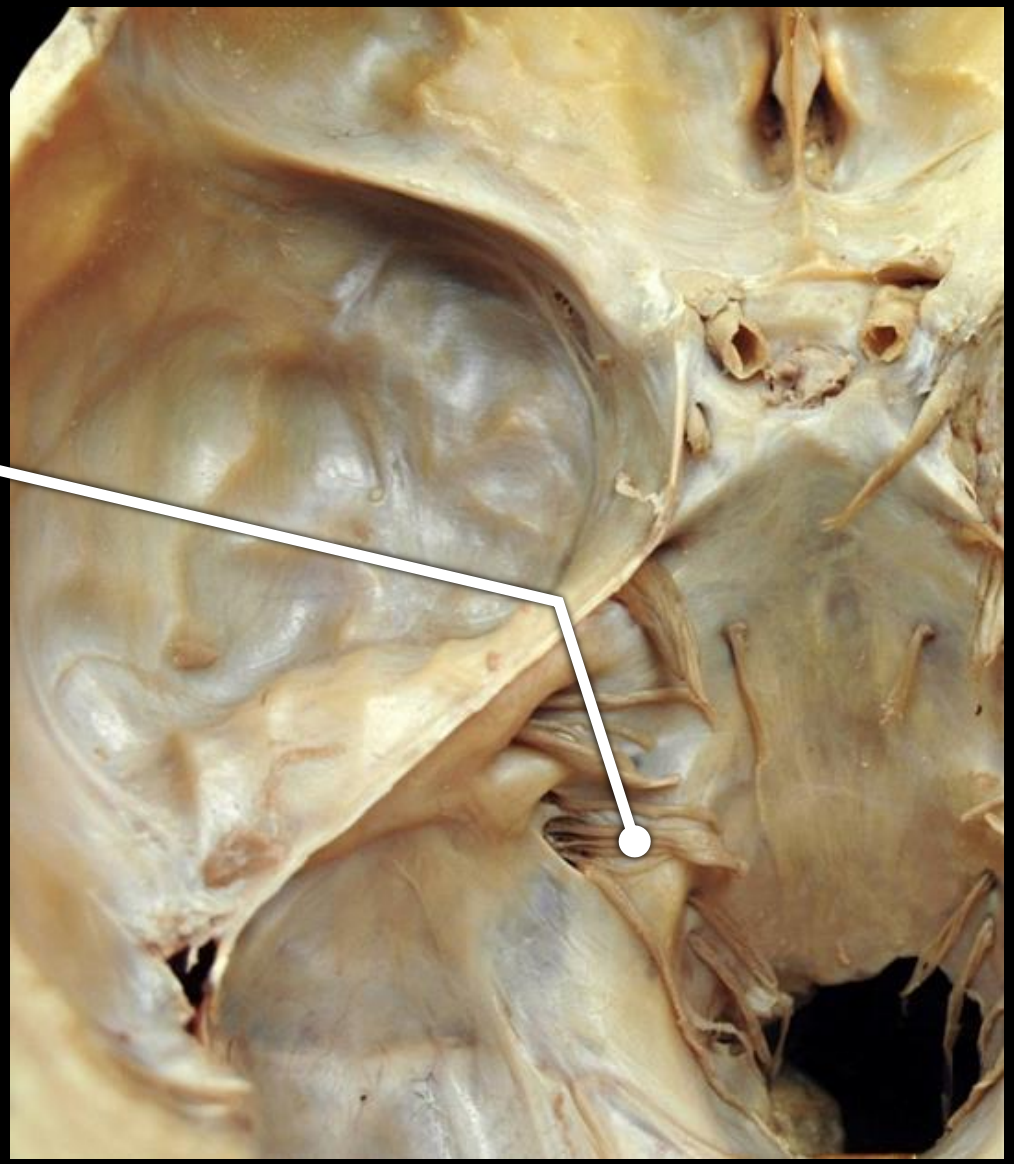
Haines, Neuroanatomy in Clinical Context, 9th ed.

CN X:
Vagus Nerve

Mixed Nerve with
Fxn'l Components:

GVE SVE SVA GVA GSA

Relationship to Brain:
Exits Lateral Aspect of
Medulla
with CN IX and XI



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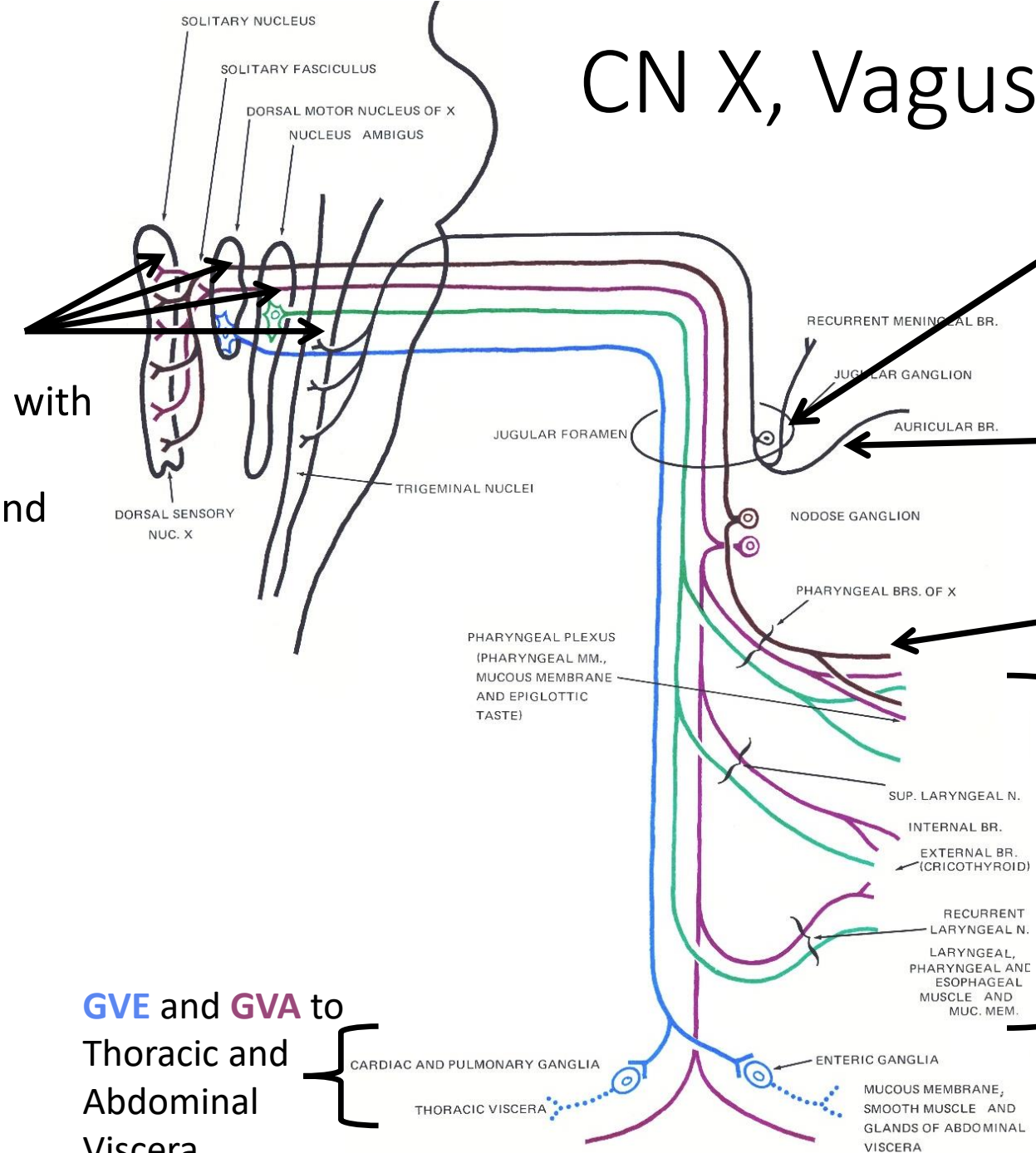
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Continue

CN X, Vagus Nerve: Evey Schema

Various Brainstem Nuclei associated with CN X (Sensory and Motor)



Jugular Foramen

GSA to external acoustic meatus and Auricle

SVA to Epiglottis

SVE to Pharyngeal and Laryngeal Muscles, **GVA** of Pharyngeal Plexus

GVE and **GVA** to Thoracic and Abdominal Viscera

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CN X, Vagus Nerve:

The word “vagus” means “wanderer”, referring to the pathway of the nerve. CN X passes through the jugular foramen with CN IX and XI.

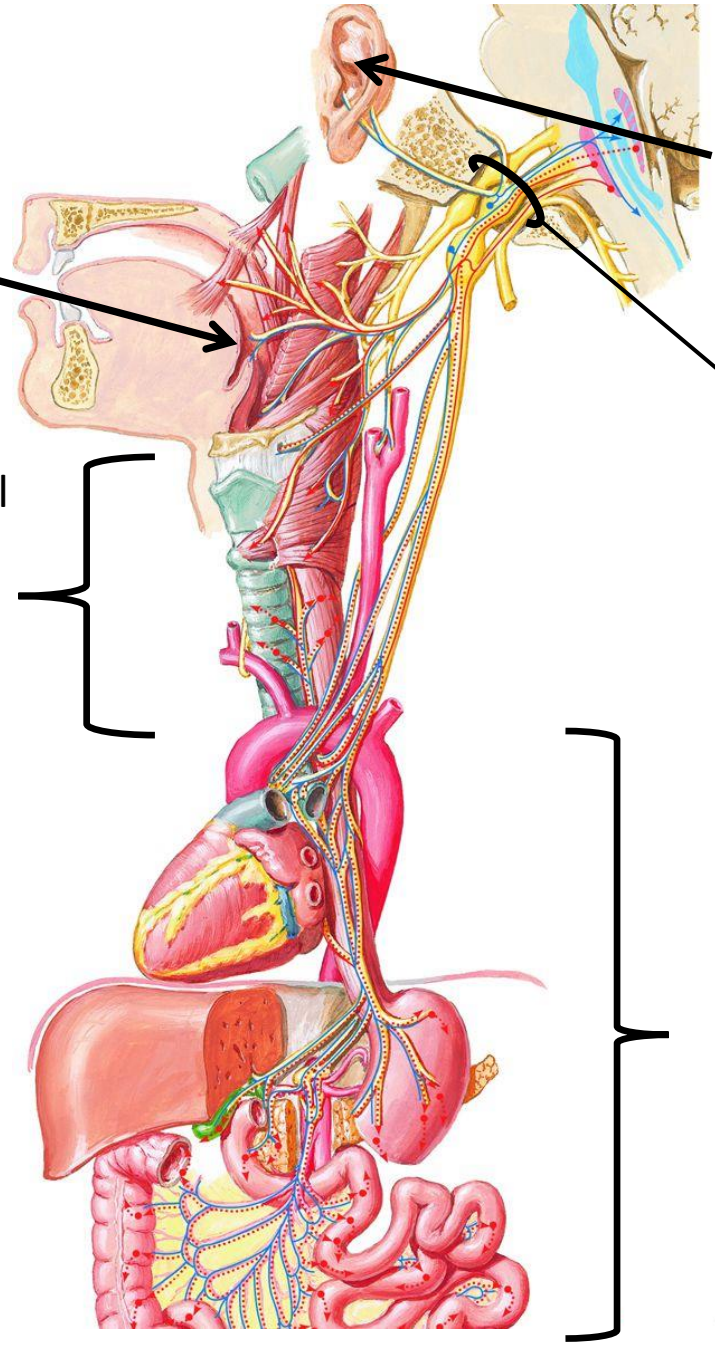
The Vagus nerve has the following components:

Efferent:

1. Parasympathetics to thoracic and abdominal viscera
2. Motor to Pharyngeal and laryngeal muscles

Afferent:

1. Pharyngeal plexus
2. Taste from epiglottis
3. General Sensory from:
   - ear canal and part of auricle
   - thoracic/abdominal viscera



Sensory from EAM and Auricle

Taste from Epiglottis

Jugular Foramen

Motor to Pharyngeal and Laryngeal Muscles.

Sensory from Pharyngeal Plexus

Parasympathetic stimulation to Thoracic and Abdominal Viscera

Sensory from thoracic/abdominal viscera

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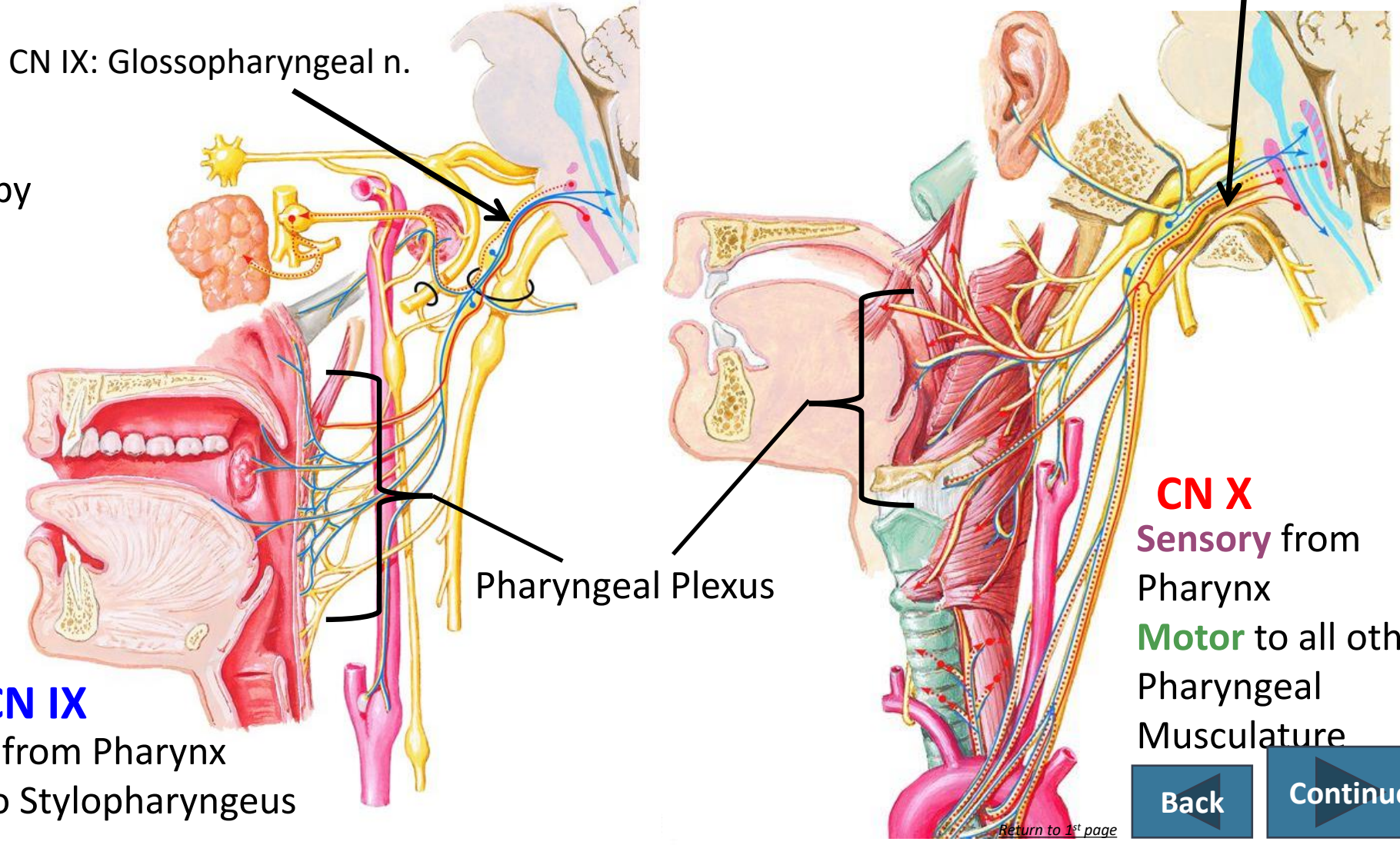
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The Pharyngeal Plexus (CNs IX + X)

The pharyngeal plexus is a mixed network of nerves (**motor** and **sensory**) formed by branches of **CN IX and CN X** that innervate the pharynx

The **vagus** is the main motor and sensory nerve supply to the muscles of the pharynx and soft palate and acts to coordinate swallowing and speech.



CN IX

Sensory from Pharynx

Motor to Stylopharyngeus

CN X

Sensory from Pharynx

Motor to all other Pharyngeal Musculature

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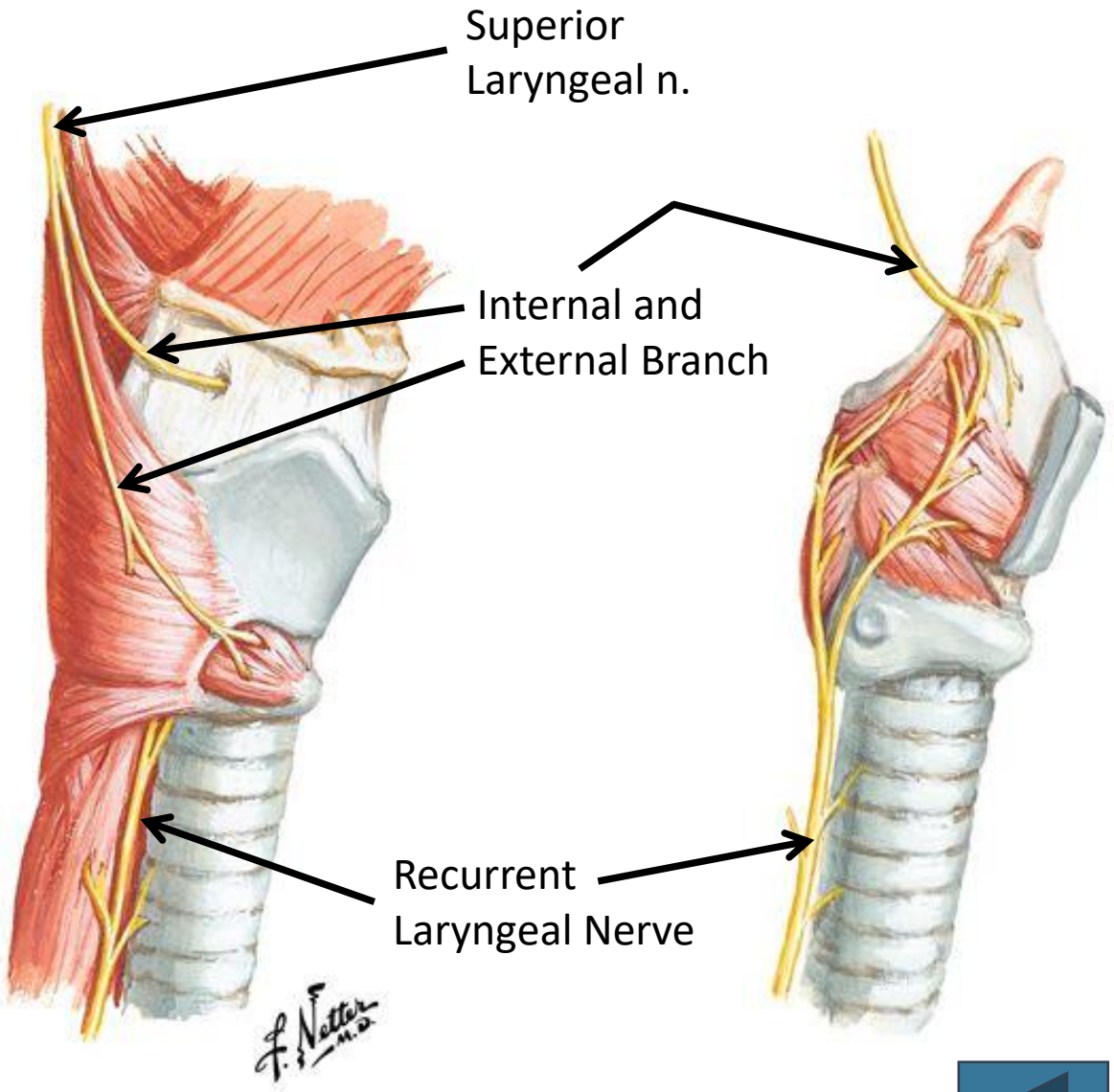
Continue

CN X, Vagus Nerve: Larynx

In addition to pharyngeal muscles, **Motor** fibers of the vagus nerve are responsible for laryngeal musculature

The larynx is supplied bilaterally via ***superior laryngeal nerves*** and the ***recurrent laryngeal nerves***, and their respective branches

Fortunately, will have an entire AIG on the pharynx and larynx ☺



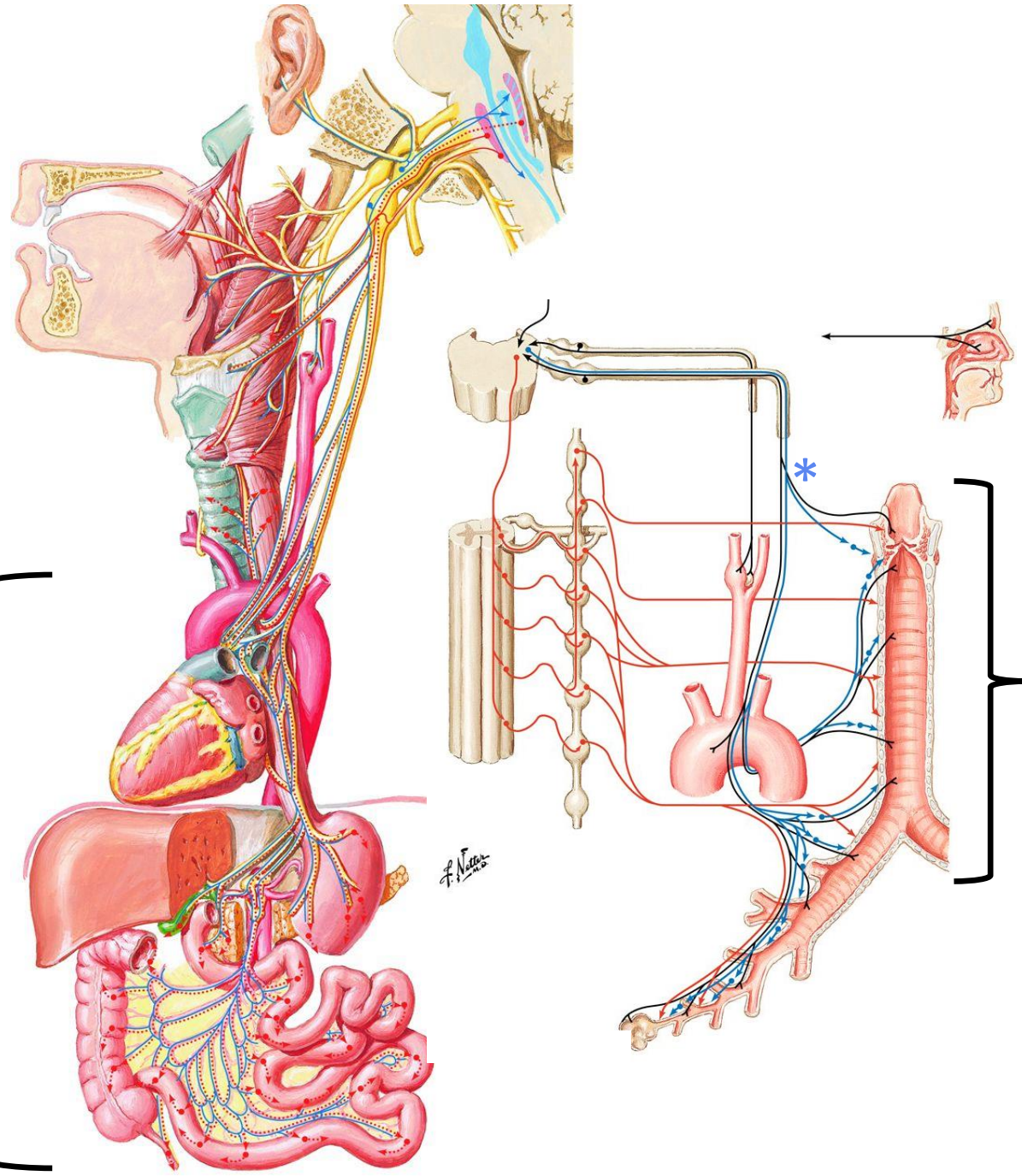
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CN X, Vagus Nerve:

Parasympathetic

Most of the **parasympathetic motor (GVE)** functions of the vagus nerve have been covered previously in the cardiorespiratory and GI blocks

Most pertinent to head and neck, the vagus nerve also provide **parasympathetic** innervation to glands and smooth muscle in the pharynx and larynx (e.g. smooth muscle of the trachea)



Thoracic and Abdominal Viscera Viscera

parasympathetic to smooth muscle of Trachea

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CN X, Vagus Nerve:

To complete our discussion on sensation of the tongue, we need to discuss the epiglottis

The vagus nerve supplies both ***general*** (touch) and ***special*** sense in the area near the epiglottis (via the superior laryngeal nerve)

Epiglottis

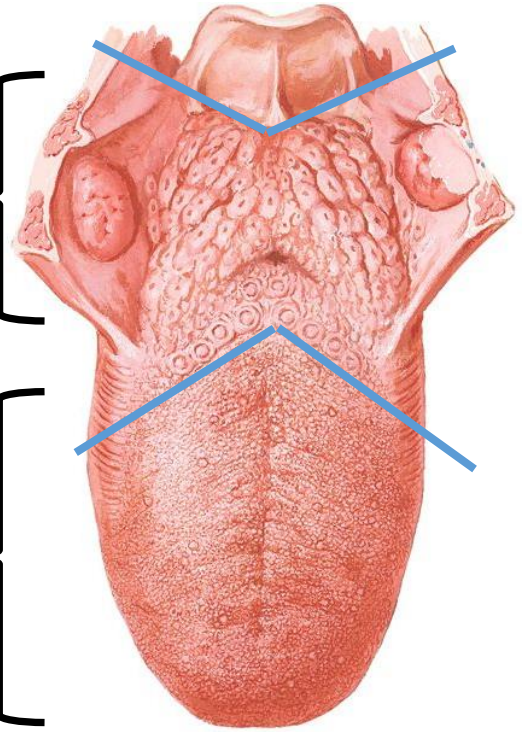
Touch: Vagus n. (X)

Taste: Vagus n. (X)

Posterior 1/3 of Tongue

Touch: Glossopharyngeal n. (IX)

Taste: Glossopharyngeal n. (IX)



Anterior 2/3 of Tongue

Touch: Lingual n. (V_3)

Taste: Facial n. (VII)
(via chorda tympani)

Note there are ***taste buds*** in other parts of the oral cavity, such as the palate and the oral epithelium. Most of this information is conveyed by CN VII.

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CN X, Vagus Nerve:
Deficits and Clinical Considerations

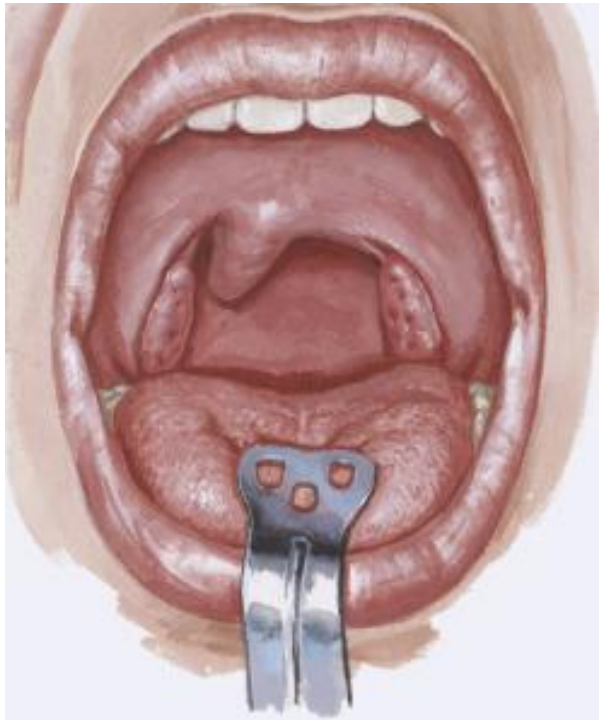
A patient reports to your clinic with hoarseness, dysphagia, and a deviated uvula to the right side. Your immediate suspicion is an injury to the _____ vagus nerve (CN X).

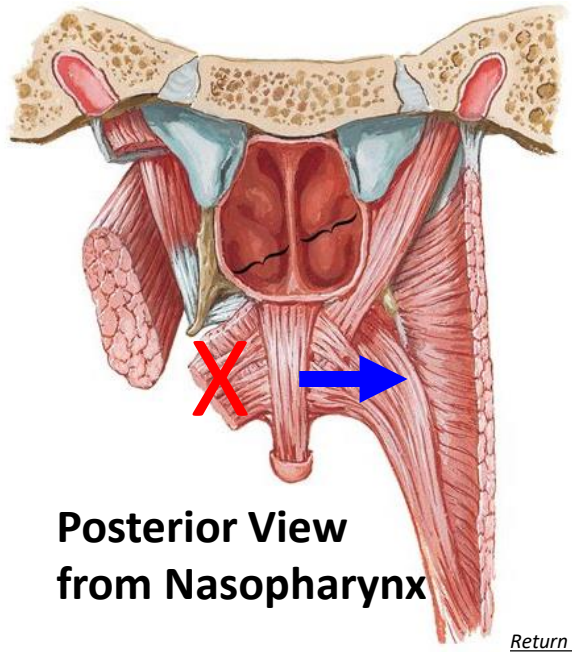
CLICK the correct side below:

Right Side ✘ Left Side ✓

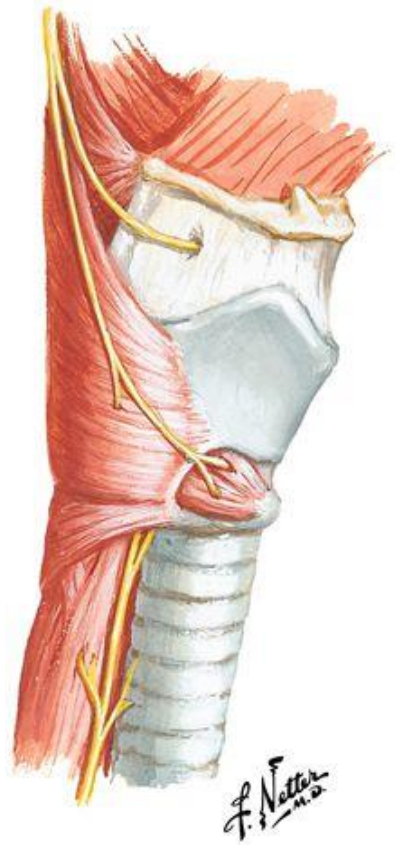
How does a lesion of the vagus nerve account for these symptoms?

- Hoarseness – paralysis of laryngeal musculature
- Dysphagia – paralysis of pharyngeal musculature
- Uvular deviation – paralysis of pharyngeal/soft palate musculature (--> deviation contralateral to lesion)





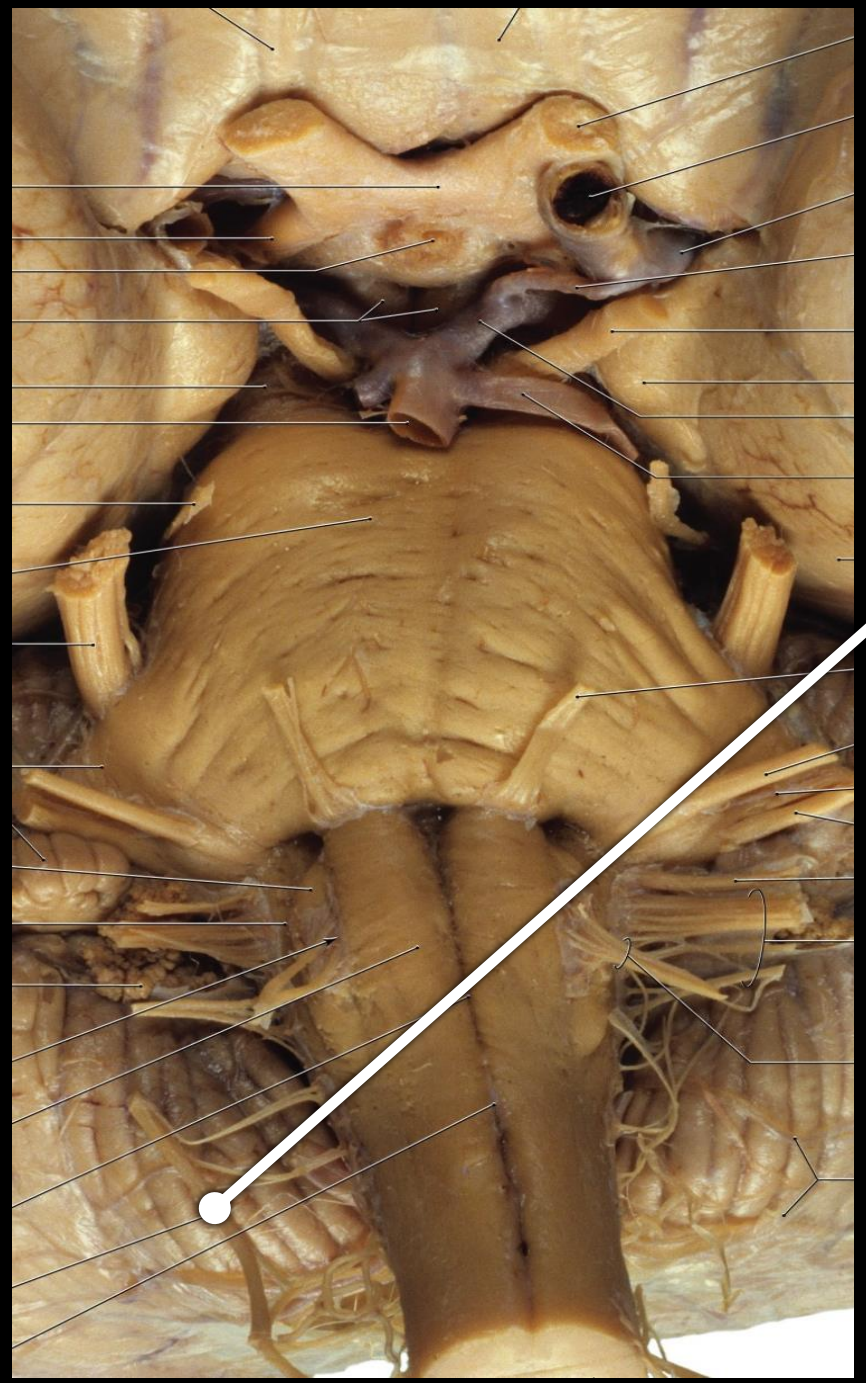
Posterior View from Nasopharynx



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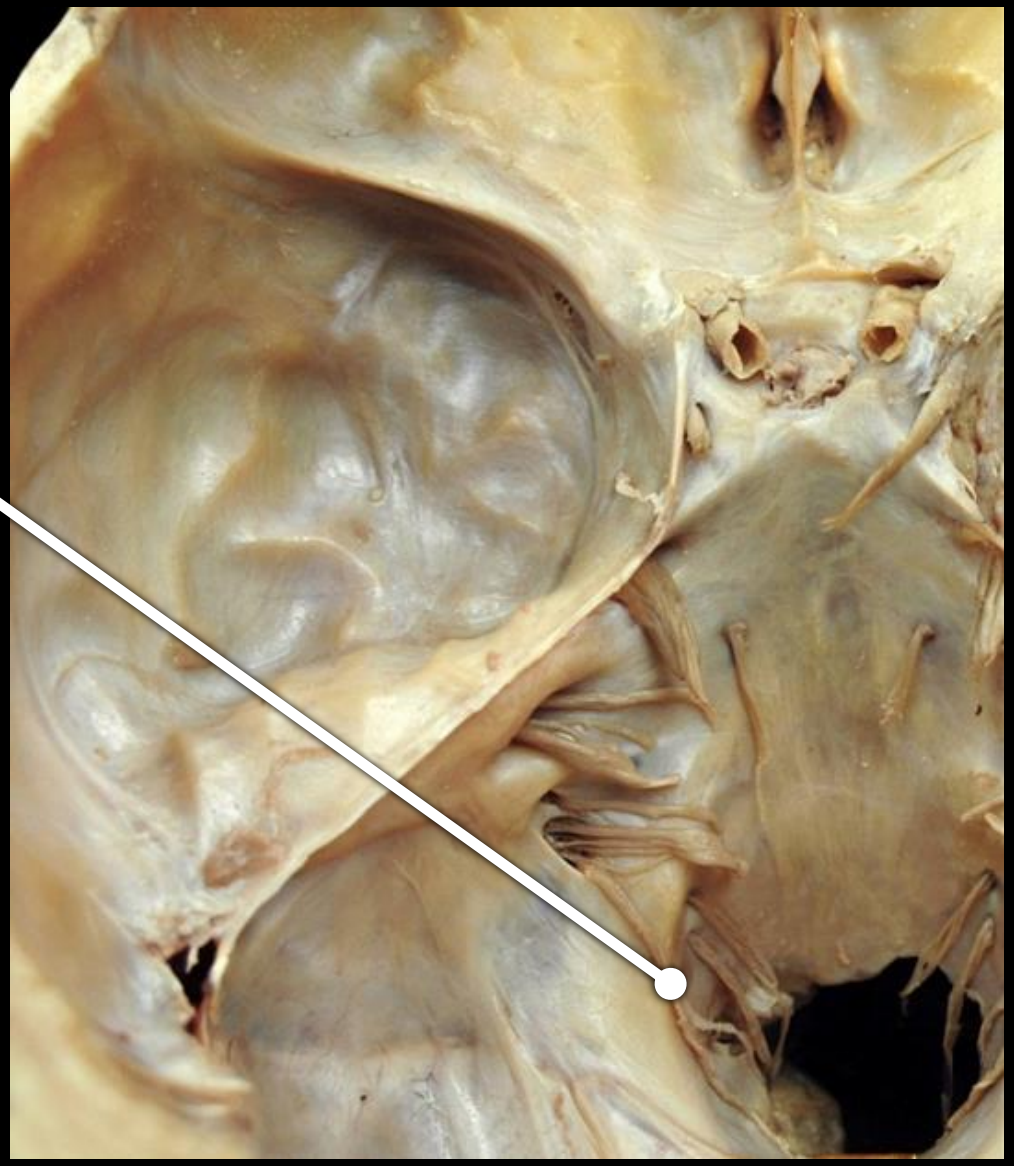
Haines, Neuroanatomy in Clinical Context, 9th ed.

CN XI
(Spinal) Accessory Nerve

Motor Nerve
Fxn'l Component:

SVE

Relationship to Brain:
Ascends Cervical Spinal Cord to exit Lateral Aspect of Medulla with CN IX and X



BlueLink

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CN XI, Accessory Nerve:

The accessory nerve (CN XI) is sometimes referred to as “spinal accessory nerve” due to its ascending path from cervical levels (C1-C5) of the spinal cord to the cranium.



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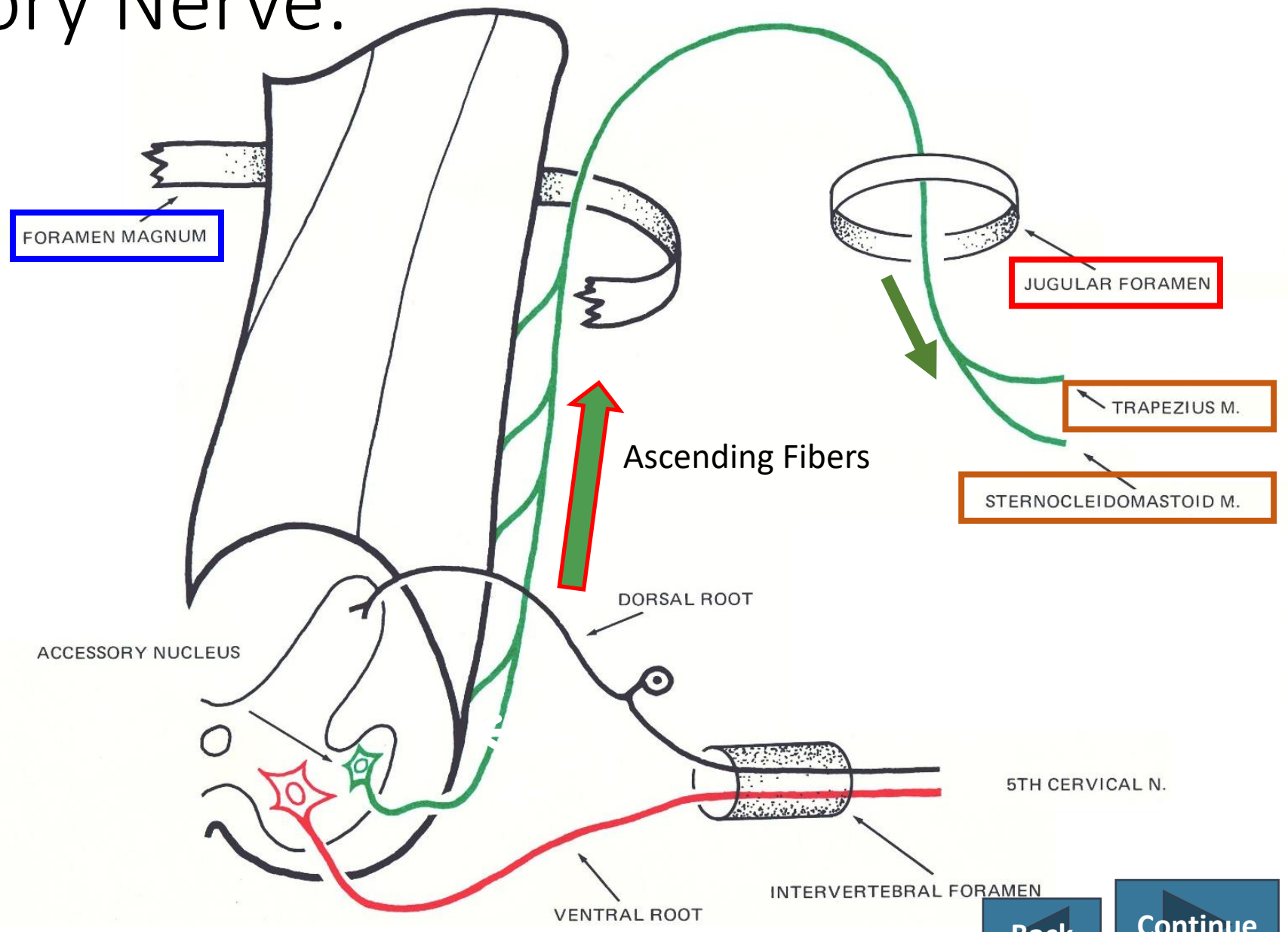
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CN XI, Accessory Nerve:

The accessory nerve (CN XI

- Ascends from the cervical levels and enters the cranial vault via the foramen magnum
- Exits via the jugular foramen
- Runs a posterior course to innervate trapezius and sternocleidomastoid mm.



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CN XI, Accessory Nerve Nerve:

Fibers arise from cervical levels C1-C5 and ascend

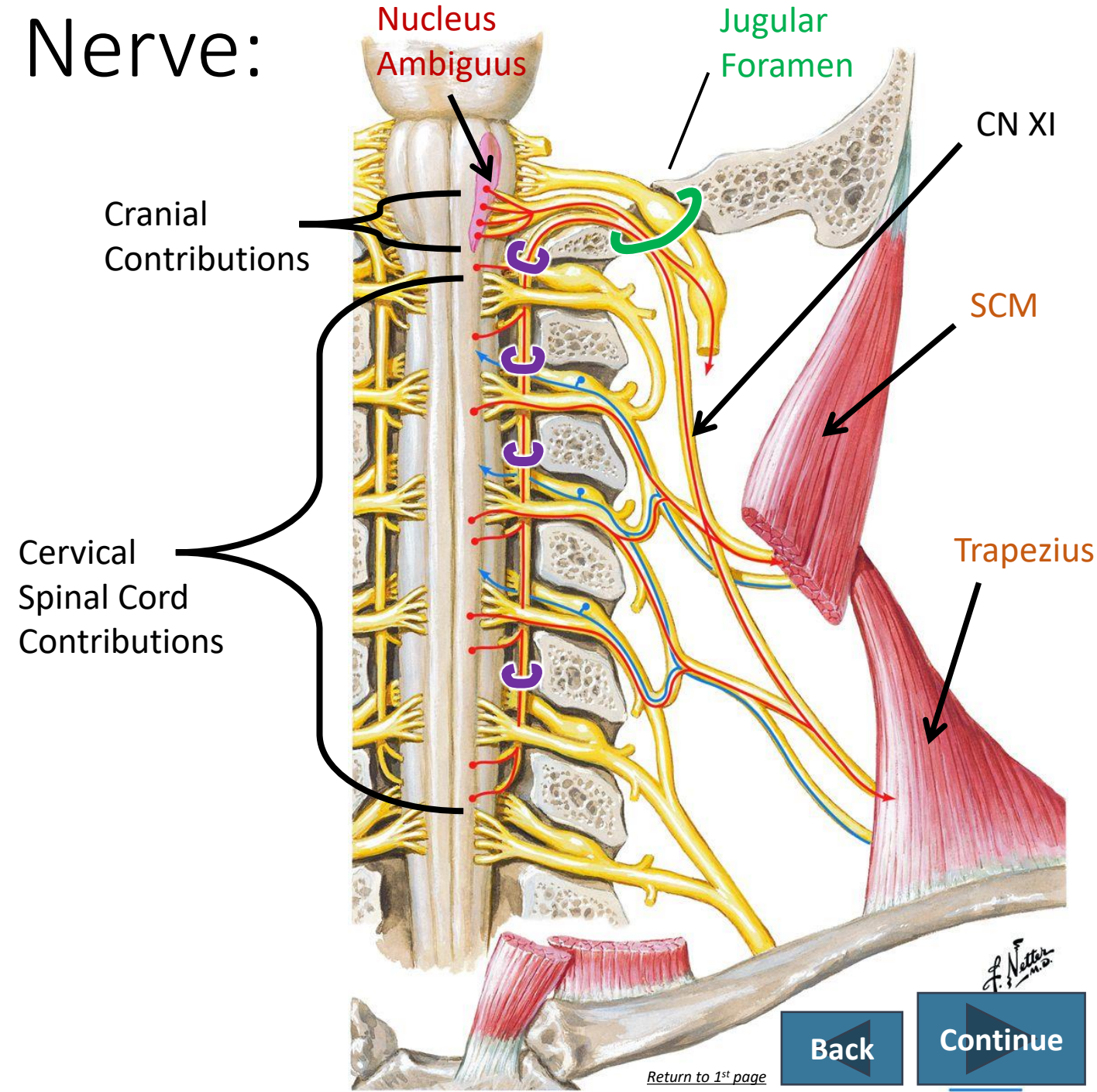
Cranial contributions from Nucleus Ambiguus

Fibers merge and exit jugular foramen

Descend in posterior triangle of neck

Receive sensory contributions from cervical plexus (in **blue** here)

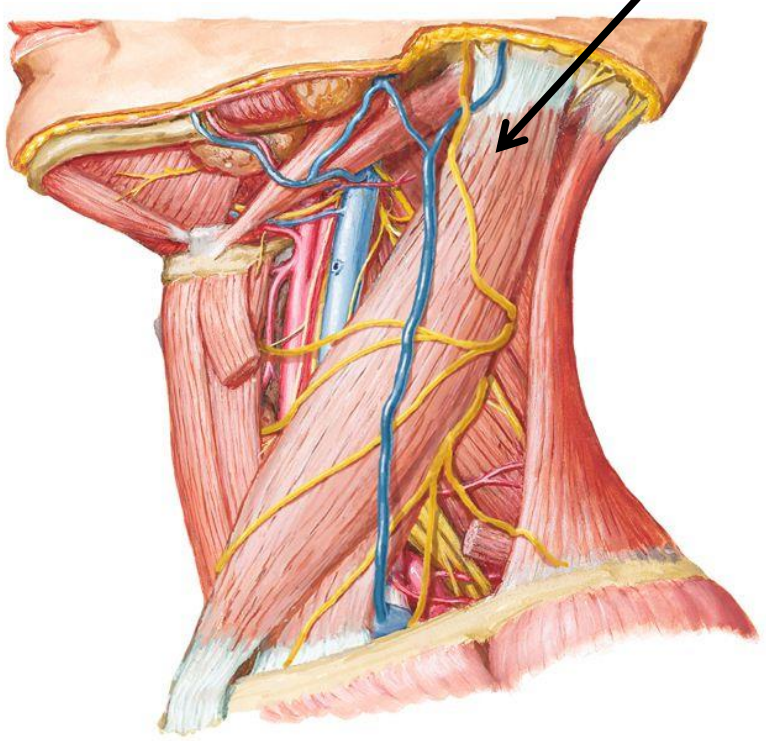
Provide motor innervation to Sternocleidomastoid (SCM) and Trapezius

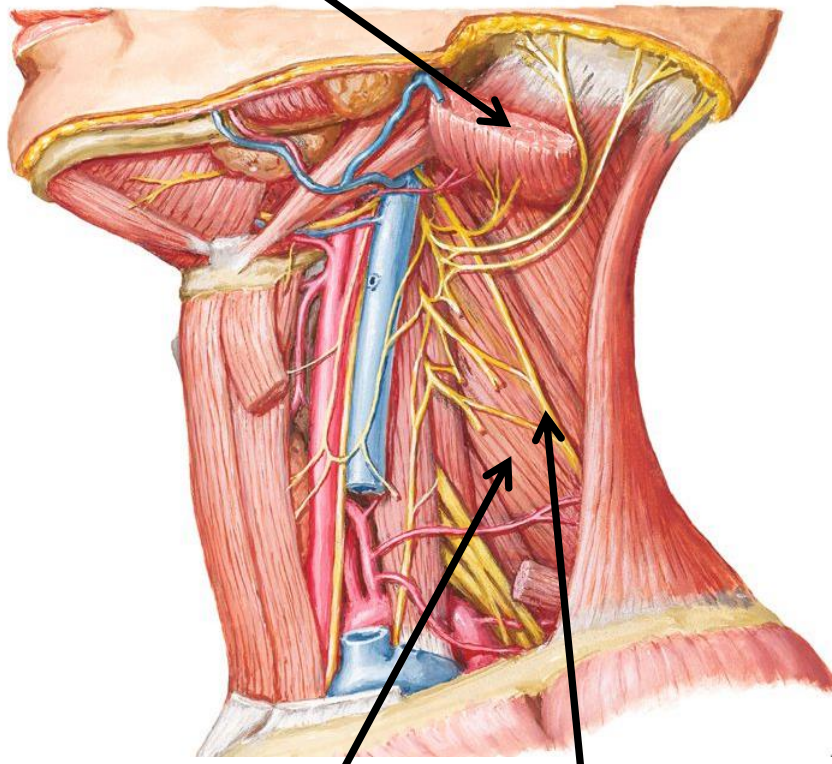


CN XI, Accessory Nerve: in the Cadaver Lab…

In the left image, we can see **SCM** running from the mastoid process to the sternum/medial clavicle.

With **SCM** reflected (right image), we can see the ***accessory nerve*** running on the surface of the **levator scapulae muscle** as it makes its way to the trapezius. Superiorly, you can see a branch innervating the SCM.





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CN XI, Accessory Nerve:
Deficits and Clinical Considerations

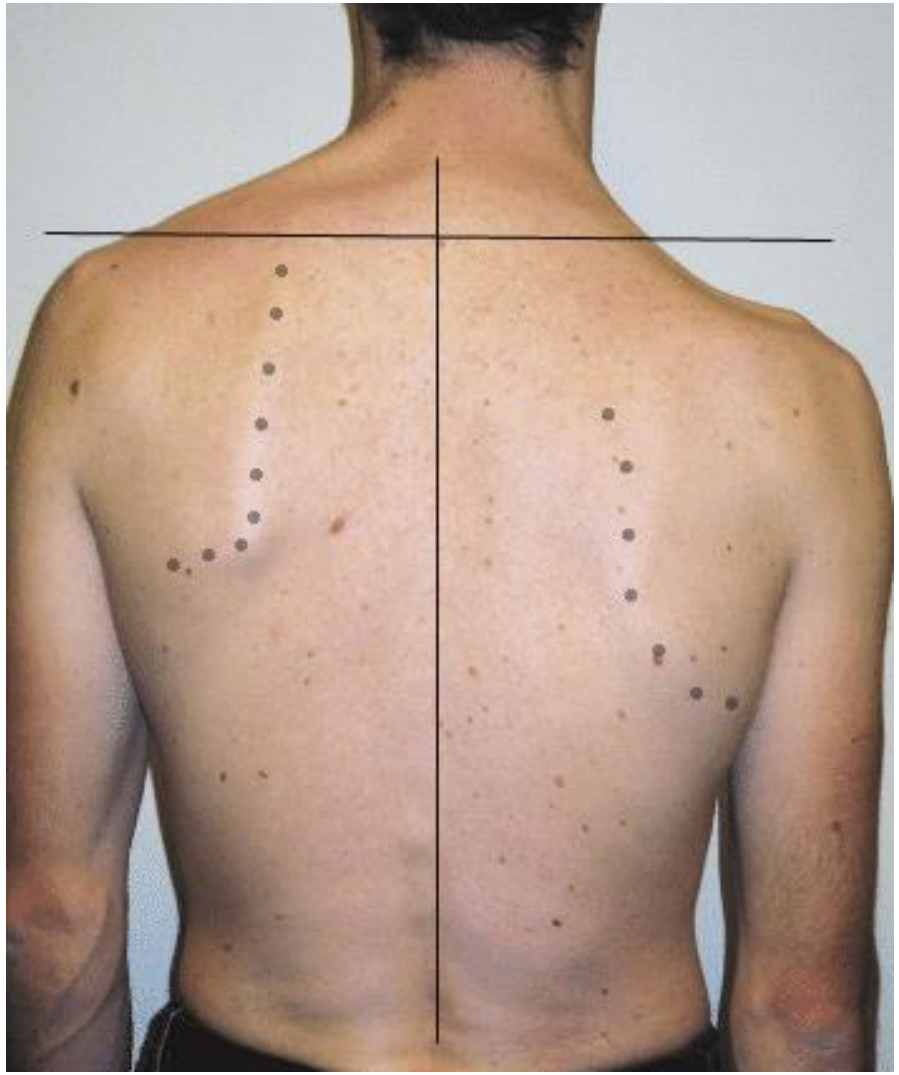
Three months after a lymph node biopsy in his right neck a patient reports to your clinic with drooping of his right shoulder and pronounced atrophy of the trapezius.

Account for the deformity on the right side.

- Iatrogenic injury of CN XI --> atrophy of trapezius

What movements of the shoulder might be affected?

- Inability to elevate and retract the shoulder
- Difficulty in elevating upper limb beyond horizontal level

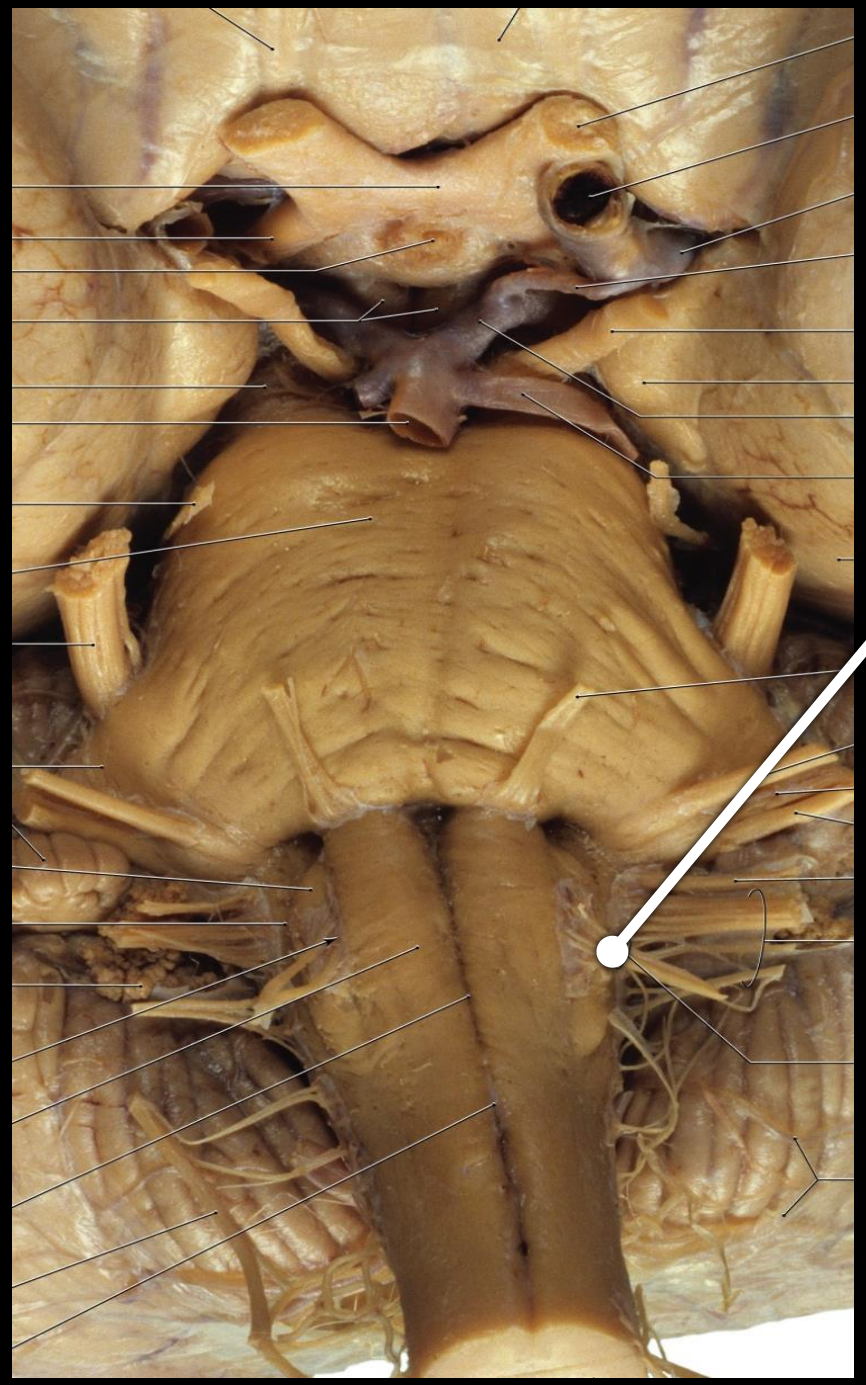


(Online Open Source)

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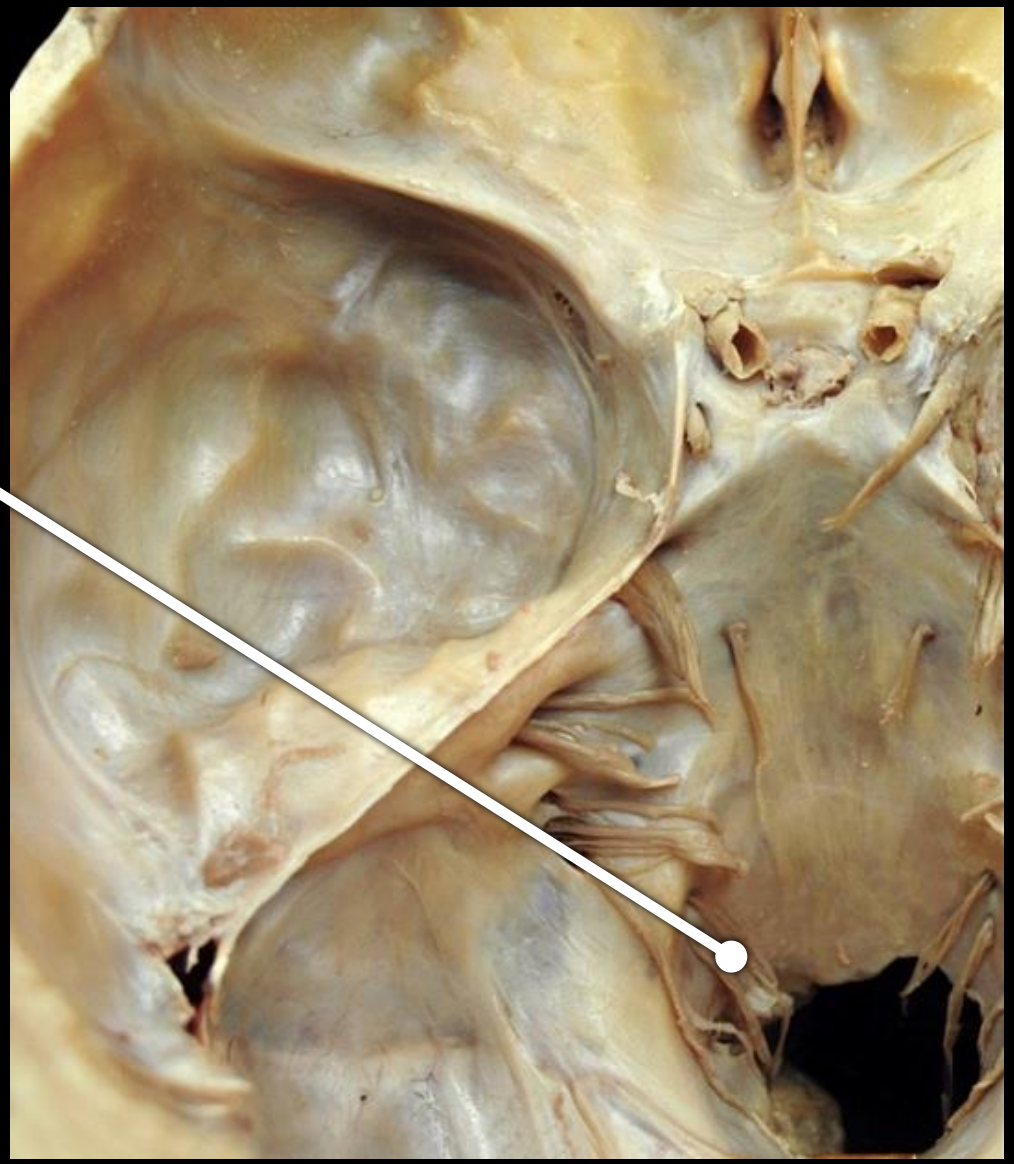


CN XII
Hypoglossal Nerve

Motor Nerve
Fxn'l Component:

GSE

Relationship to Brain:
Exits Anterior Medulla
between
Medullary Pyramids and
Olives



Haines, Neuroanatomy in Clinical Context, 9th ed.

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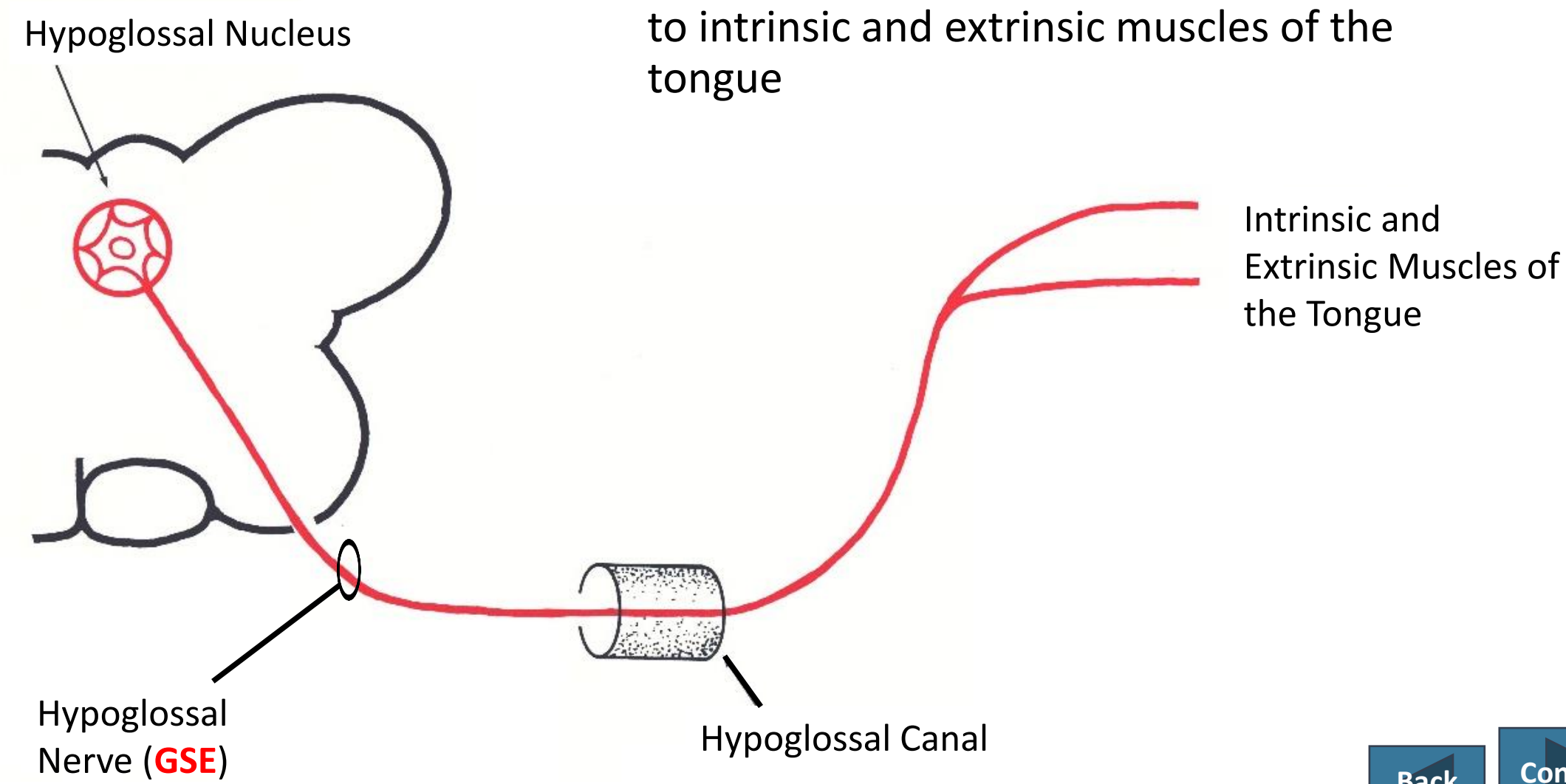
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CN XII, Hypoglossal Nerve: Evey Schema

The last cranial nerve! And fortunately, it's relatively straight-forward…

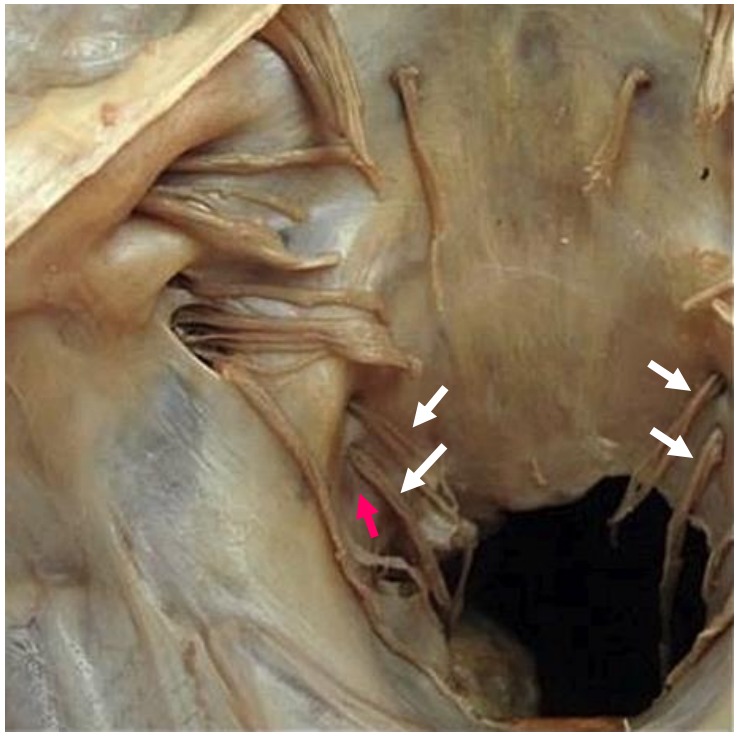
The hypoglossal nerve supplies **motor** fibers to intrinsic and extrinsic muscles of the tongue



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CN XII, Hypoglossal Nerve:

- The hypoglossal nerve passes through the hypoglossal canal to exit the cranial cavity.
- The canal is located just superior to the foramen magnum. To see this (and a few other structures!) – watch the video to the right.
- The canal appears quite large in the skull (see video), but *when you try to locate it in the lab, you won't see it* because the internal opening is covered by periosteal dura as seen on the image to the right. The hypoglossal nerve appears as small branches (white arrows) that pierce through the dura.





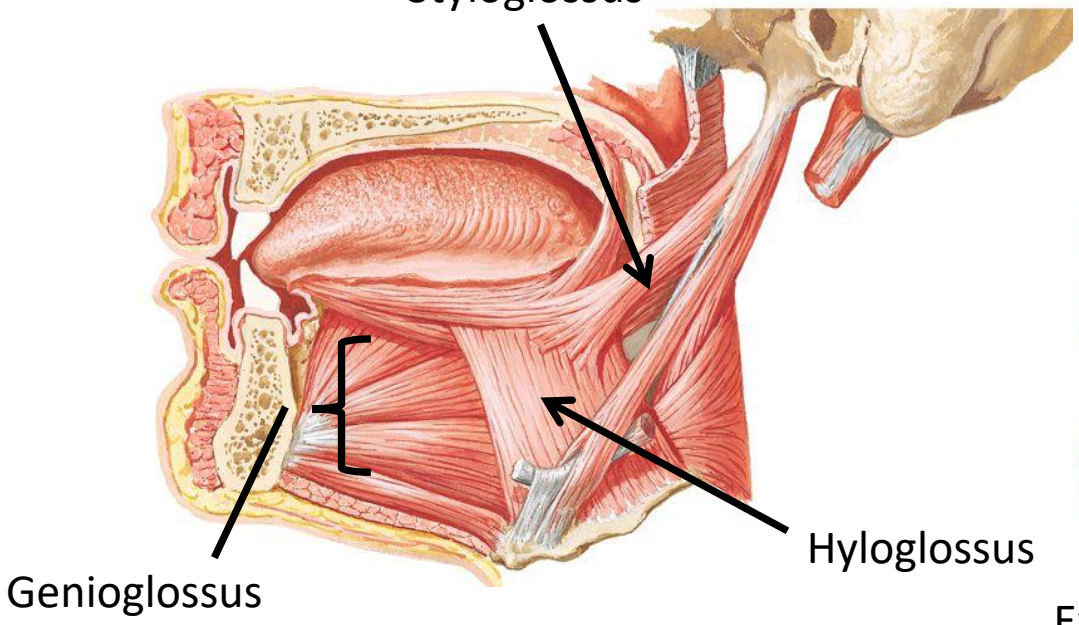
This video not available in PDF version

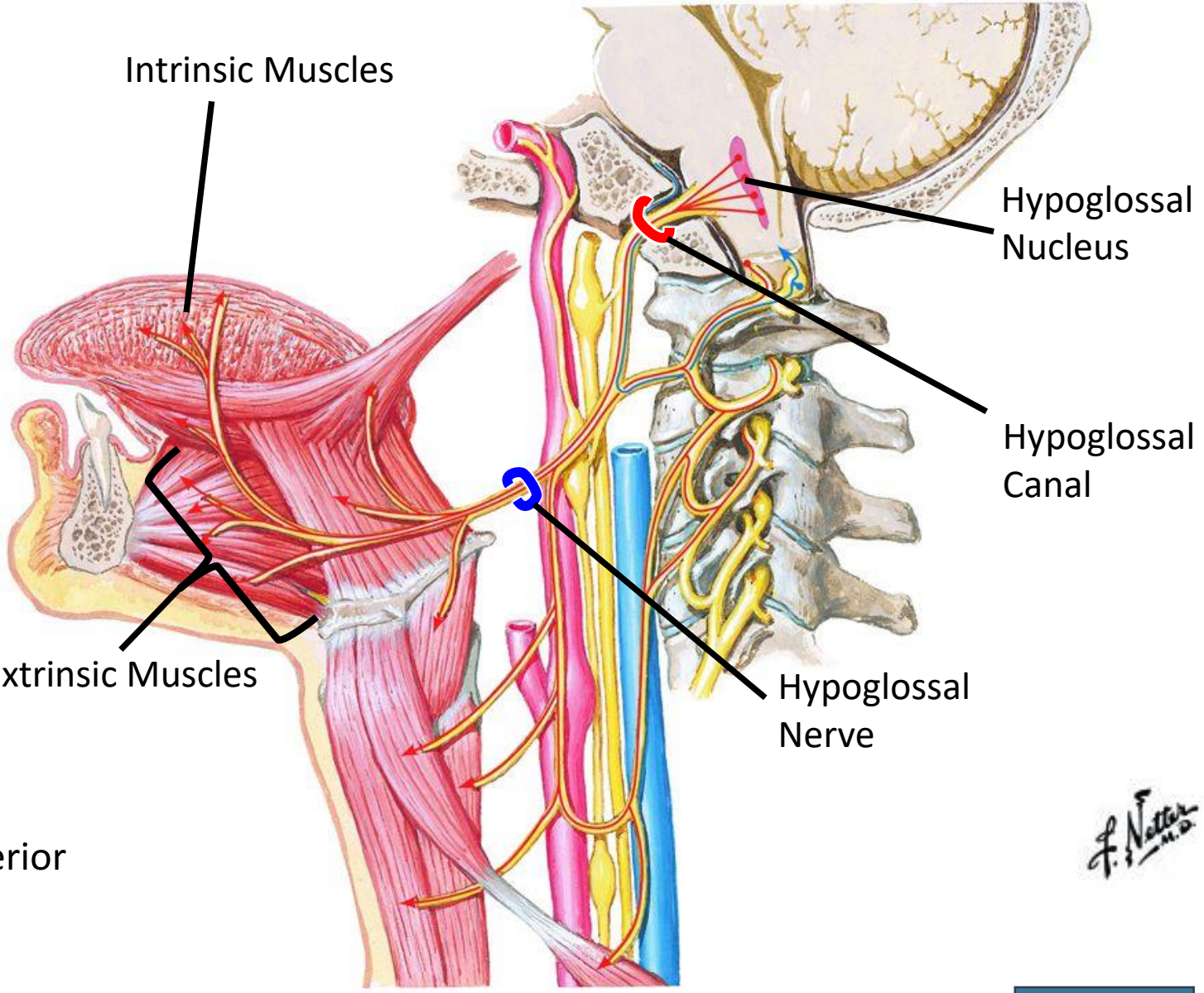
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CN XII, Hypoglossal Nerve:





- The hypoglossal nerve supplies **motor** fibers to intrinsic and extrinsic muscles of the tongue
  - Intrinsic muscles =superior longitudinal and inferior longitudinal, transverse, and vertical mm.
- And extrinsic muscles of the tongue
  - Extrinsic muscles = anything with "glossus" in the name
  - One exception = palatoglossus (not pictured) is innervated by vagus n. CN X

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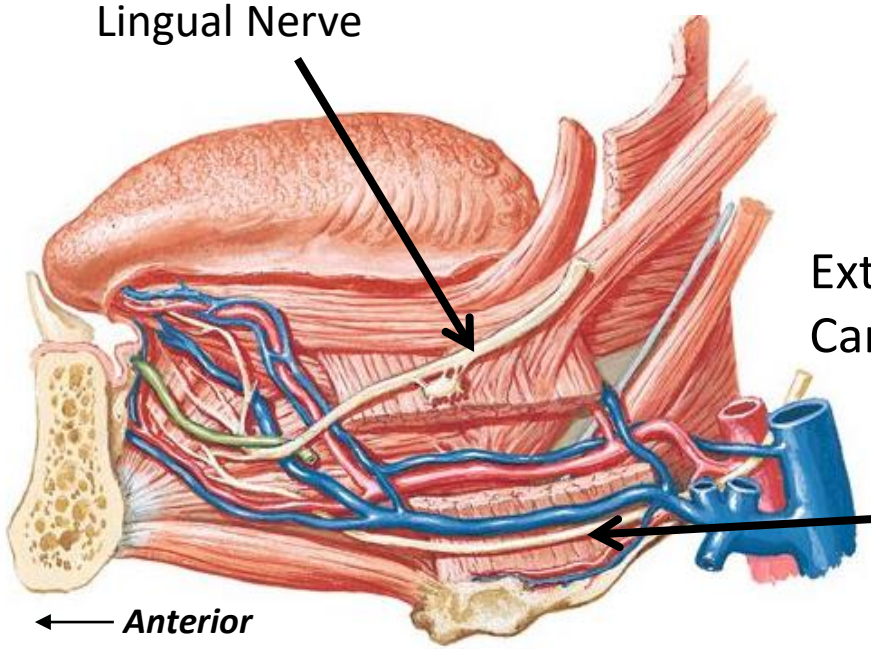
CN XII, Hypoglossal Nerve: in the Cadaver Lab…

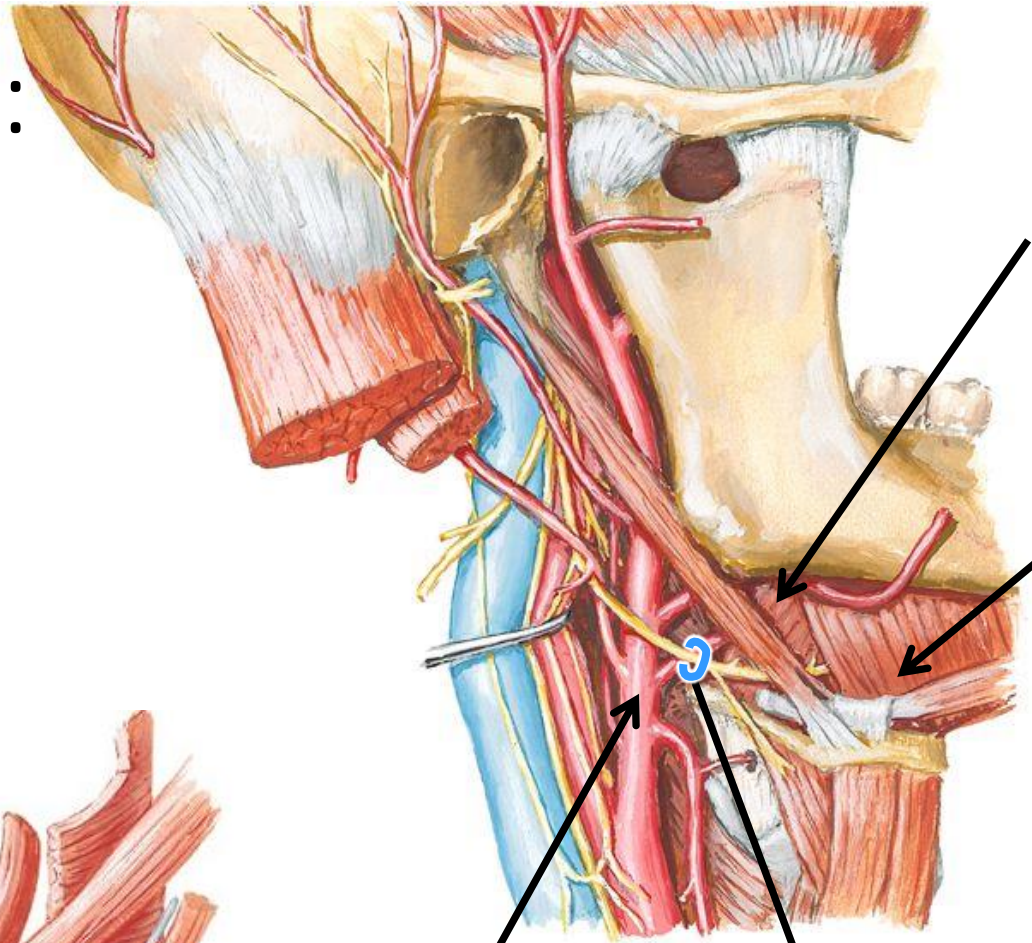
Note that CN XII passes lateral to branches of the ***external carotid artery*** and then runs sandwiched between the hyoglossus and mylohyoid muscles

Upon dissection, you should be able to find this nerve as it hooks ***inferiorly*** to the angle of the mandible

The hypoglossal nerve is also be visible within the floor of the oral cavity

Be sure not to confuse it with the lingual n. (V_3) which runs more superiorly (and you will likely need to remove part of the jaw to see the lingual nerve)

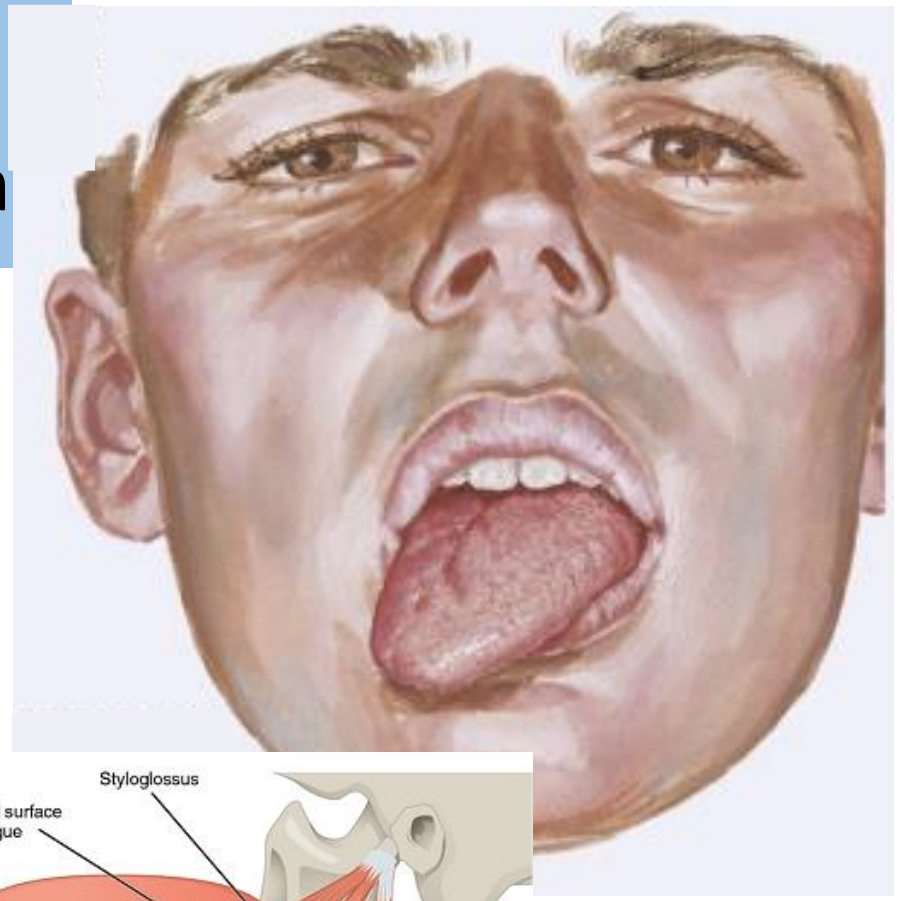




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https://study.com/academy/lesson/genioglossus-muscle-origin-action-insertion.html

CN XII, Hypoglossal Nerve:
Deficits and Clinical Consideration



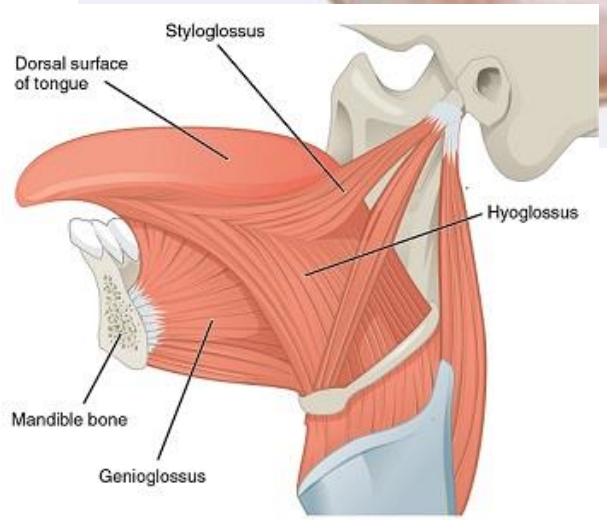
A patient reports to your clinic after developing dysarthria and unilateral atrophy of the tongue

You ask the patient to protrude their tongue, and it deviates to the right side (pictured here)

CLICK **which hypoglossal nerve is affected…**

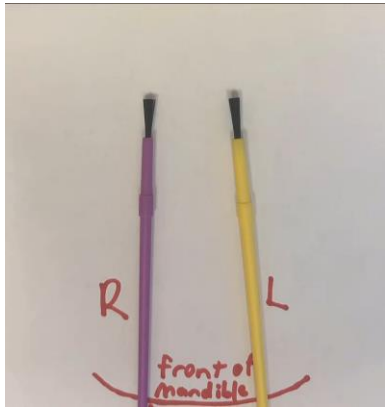
Right Side ✓ Left Side ✘

This may be counterintuitive. The genioglossus attaches anteriorly to the mandible and pulls the tongue forward and slightly to the contralateral side. A lesion of the right hypoglossal nerve will reduce the function of the right genioglossus muscle, allowing the left genioglossus to function unopposed, resulting in the tongue deviating to the right side (ipsilateral side of the nerve lesion). Click here for a mini demonstration.



(a) Extrinsic tongue muscles

This video not available in PDF version



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(Moore's Clinical Anatomy)

CN VII	Laceration or contusion in parotid region	Paralysis of facial muscles; eye remains open; angle of mouth droops; forehead does not wrinkle
	Fracture of temporal bone	As above, plus associated involvement of cochlear nerve and chorda tympani; dry cornea; loss of taste on anterior two thirds of tongue
	Intracranial hematoma ("stroke")	Forehead wrinkles because of bilateral innervation of frontalis muscle; otherwise paralysis of contralateral facial muscles
CN VIII	Tumor of nerve (acoustic neuroma)	Progressive unilateral hearing loss; tinnitus (noises in ear)
CN IX	Brainstem lesion or deep laceration of neck	Loss of taste on posterior third of tongue; loss of sensation on affected side of soft palate
CN X	Brainstem lesion or deep laceration of neck	Sagging of soft palate; deviation of uvula to normal side; hoarseness owing to paralysis of vocal fold
CN XI	Laceration of neck	Paralysis of sternocleidomastoid and descending fibers of trapezius; drooping of shoulder
CN XII	Neck laceration; fractures of cranial base	Protruded tongue deviates toward affected side; moderate dysarthria (disturbance of articulation)

Congrats! You made it!

We understand this is can be an overwhelming amount of information. Our hope is that you return to these two cranial nerve AIGs consistently throughout the unit to ***integrate*** head and neck anatomy.

For quick reference, here's the remainder of the summary table of cranial nerve lesions from Moore's

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Thank you for learning with us!



If you have any questions on this content, please don't hesitate to reach out!

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