



Anatomy Team
MED 439

Revised & Approved



MED439
KING SAUD UNIVERSITY

The Cranial Nerves 9 & 10

CNS Block

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Don't forget to check the [Editing File](#)

Color index:

Content
Male slides
Female slides
Important
Doctors notes

Extra information, explanation

Objectives

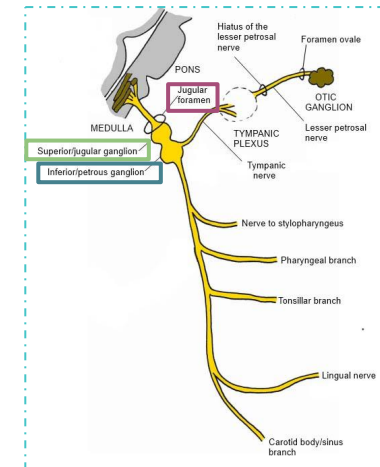
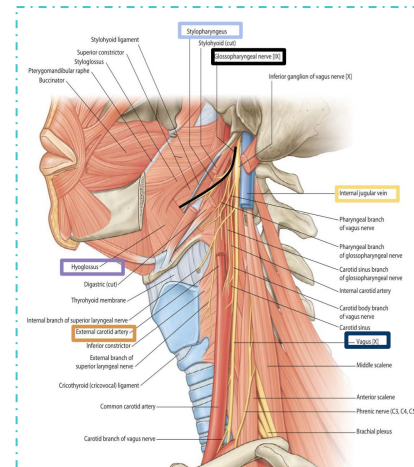
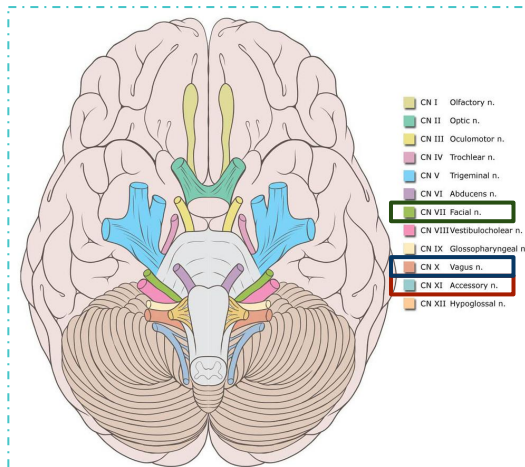
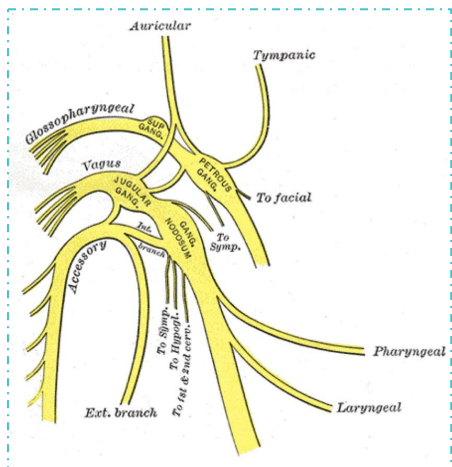
At the end of the lecture, students should be able to:

- Define the deep origin of both Glossopharyngeal and Vagus Nerves.
- Locate the exit of each nerve from the brain stem.
- Describe the course and distribution of each nerve .
- List the branches of both nerves.

Glossopharyngeal (IX) Cranial nerve

- It is principally a Sensory nerve with preganglionic parasympathetic and few motor fibers.
- It has no real nucleus to itself. Instead it shares nuclei with VII (facial) and X (vagus)

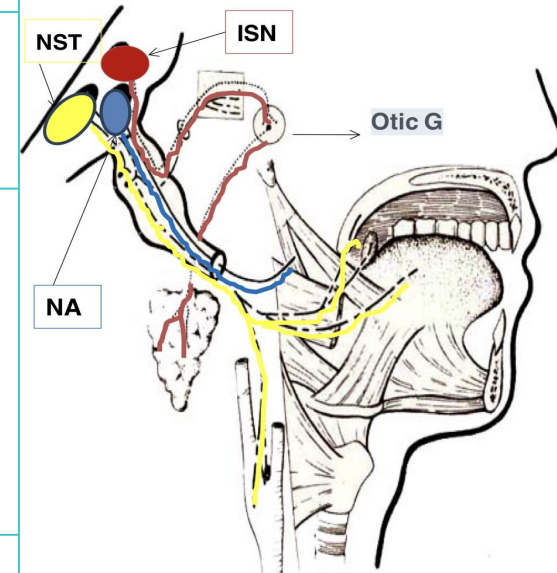
Superficial attachment	Course	Ganglia & communications
<p>- It arises from the ventral aspect of the medulla by a linear series of small rootlets, in groove between olive and inferior cerebellar peduncle.</p> <p>- It leaves the cranial cavity by passing through the jugular foramen in company with the Vagus, and the Accessory nerves and the Internal jugular vein.</p>	<p>- It Passes forwards between Internal jugular vein and External carotid artery.</p> <p>- Lies Deep to Styloid process.</p> <p>- Passes between external and internal carotid arteries at the posterior border of Stylopharyngeus then lateral to it.</p> <p>- It reaches the pharynx by passing between middle and inferior constrictors,</p> <p>- Deep to Hyoglossus, where it breaks into terminal branches.</p>	<p>It has two ganglia:</p> <p>Superior ganglion:</p> <ul style="list-style-type: none"> - Small, with no branches. - It is connected to the Superior Cervical sympathetic ganglion. <p>Inferior ganglion:</p> <ul style="list-style-type: none"> - Large and carries general sensations from pharynx, soft palate and tonsil. - It is connected to Auricular Branch of Vagus. - The Trunk of the nerve is connected to the Facial nerve at the stylomastoid foramen.



Glossopharyngeal (IX) Cranial nerve

Components of the fibers & deep origin

Type of fibers	Nuclei	Structure innervated
SVE fibers Special visceral efferent	Nucleus ambiguus (NA)	Supply stylopharyngeus muscle
GVE fibers: General Efferent Visceral	Inferior salivatory nucleus (ISN).	Relay in otic ganglion. the postganglionic fibers supply parotid gland.
SVA fibers Special Visceral afferent	Nucleus of solitary tract (NST).	Originate from the cells of inferior ganglion, their 1- Central processes terminate in (NST). 2- Peripheral processes carry sensation from the taste buds on posterior third of tongue.
GVA fibers: General Visceral Afferent		Carry visceral sensation from mucosa of posterior third of tongue, pharynx, auditory tube ,tympanic cavity and carotid sinus.



Glossopharyngeal (IX) Cranial nerve

Branches

1

Tympanic:

relays in the otic ganglion and gives secretomotor to the **parotid gland**

2

Nerve to **Stylopharyngeus** muscle.

3

Pharyngeal:

To the mucosa of pharynx .

4

Tonsillar

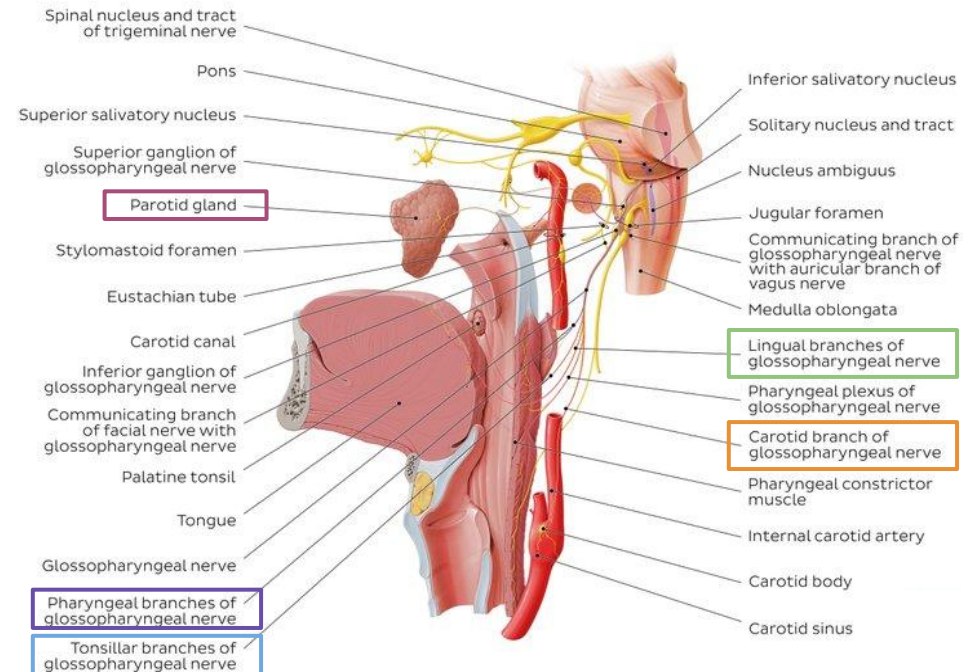
5

Lingual

Carries sensory branches, general and special (taste) from the posterior third of the tongue.

6

Sensory branches from the **carotid sinus and body** (pressoreceptors and chemoreceptors).



Glossopharyngeal (IX) nerve lesions

Difficulty of swallowing

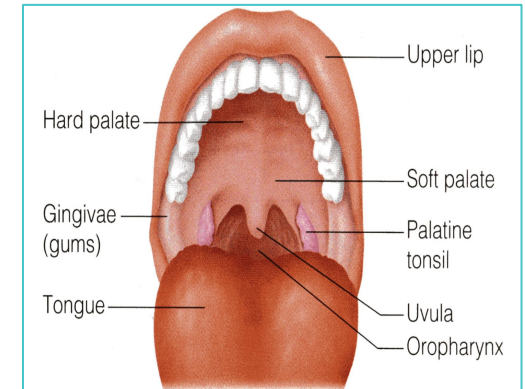
Impairment of taste sensation over the posterior one-third of the tongue, palate and pharynx.

Absent gag reflex
(vomiting)

Dysfunction of the parotid gland.

How to test for Glossopharyngeal (IX) nerve lesion?

- Have the patient open the mouth and inspect the palatal arch on each side for asymmetry.
- Use a tongue blade to depress the base of the tongue gently if necessary.
- Ask the patient to say " ahhh" as long as possible.
- Observe the palatal arches as they contract and the soft palate as it swings up and back in order to close off the nasopharynx from the oropharynx.
- Normal palatal arches will constrict and elevate, and the uvula will remain in the midline as it is elevated.
- With paralysis there is no elevation or constriction of the affected side.
- Warn the patient that you are going to test the gag reflex. Gently touch first one and then the other palatal arch with a tongue blade, waiting each time for gagging.



Note:

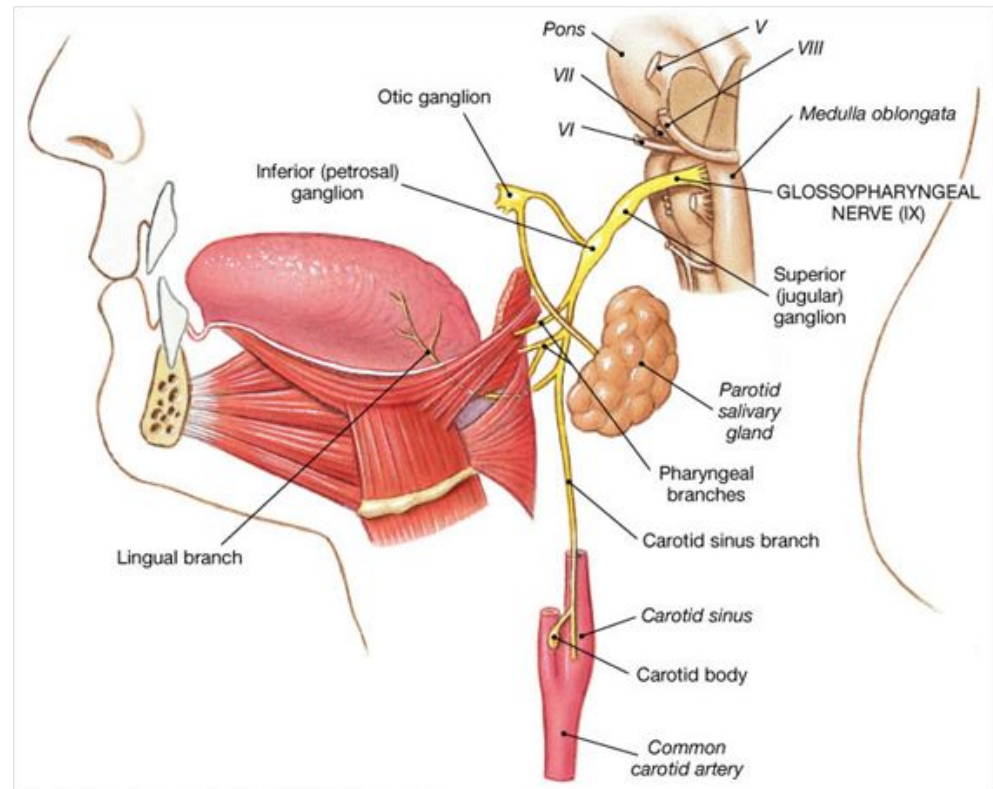
When the glossopharyngeal gets damaged. There is a high chance that the other nearby nerves (such as the accessory and vagus) are also damaged.

Why?

Because they're so close to each other. So the probability of a single nerve lesion of those nerves is pretty low.

Glossopharyngeal nerve & branches summary

- It is a mixed nerve.
- Carries motor fibers to pharyngeal muscles from swallowing & parasympathetic motor fibers to salivary glands.
- Sensory fibers carry messages from the pharynx, tonsils, posterior to tongue (taste).
- Glossopharyngeal fibers also carry afferent messages from the carotid sinus baroreceptors.



Short and quick recap for the Glossopharyngeal nerve:

It is a mixed cranial

It provides:

Motor supply
Sensory supply
Parasympathetic supply

Its deep origin:

Nucleus ambiguus
(motor supply to **stylopharyngeus**)

Inferior salivatory nucleus
(Parasympathetic supply)

Solitary nucleus.
(sensory)

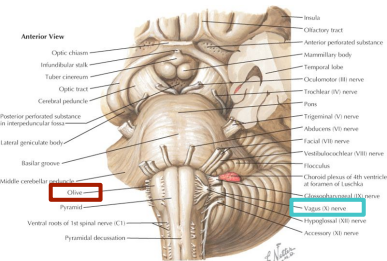
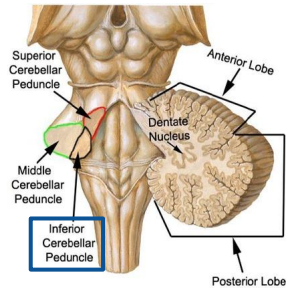
Vagus nerve (X) cranial nerve

- It is **mixed** nerve.
- It's name means **wandering** (it goes all the way to the abdomen)
- It is the longest and most Widely Distributed cranial nerve.
- The principal role of the Vegas is to provide parasympathetic supply to organs throughout the thorax and upper abdomen.
- it also gives sensory and motor supply to the pharynx and larynx.

Superficial attachment

It's rootlets exit from medulla between **Olive** and **Inferior cerebellar peduncle**.
Leaves the skull through jugular foramen.

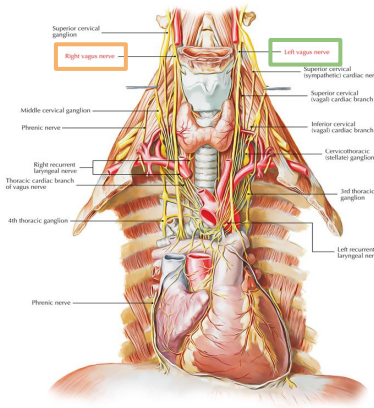
It occupies the posterior aspect of the carotid sheath between the internal jugular vein laterally, and the internal and common carotid arteries medially.



Course

The Vegas runs down the neck on the prevertebral muscles and fascia. The internal jugular vein lies behind it, the internal and common carotid arteries are in front of it, all the way down to the superior thoracic aperture.

- It lies on the prevertebral muscles and fascia.
- Enters thorax (in the superior mediastinum) through its inlet:
- **Right Vagus** descends in front of the subclavian artery.
- **Left Vagus** descends between the left common carotid and subclavian arteries.



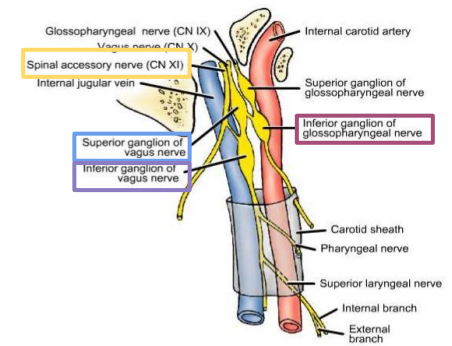
Communications

It has two ganglia:

- Superior ganglion in the jugular foramen.
- Inferior ganglion, just below the jugular foramen.

Superior ganglion with:
Inferior ganglion of glossopharyngeal nerve, superior cervical sympathetic ganglion & facial nerve.

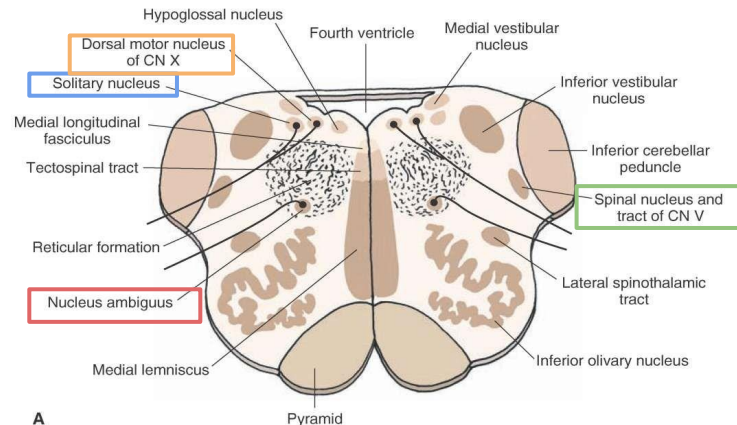
Inferior ganglion with:
Cranial part of **accessory nerve,** hypoglossal nerve, superior cervical sympathetic ganglion, 1st cervical nerve.



Vagus nerve (X) cranial nerve

Components of fibers & deep origin

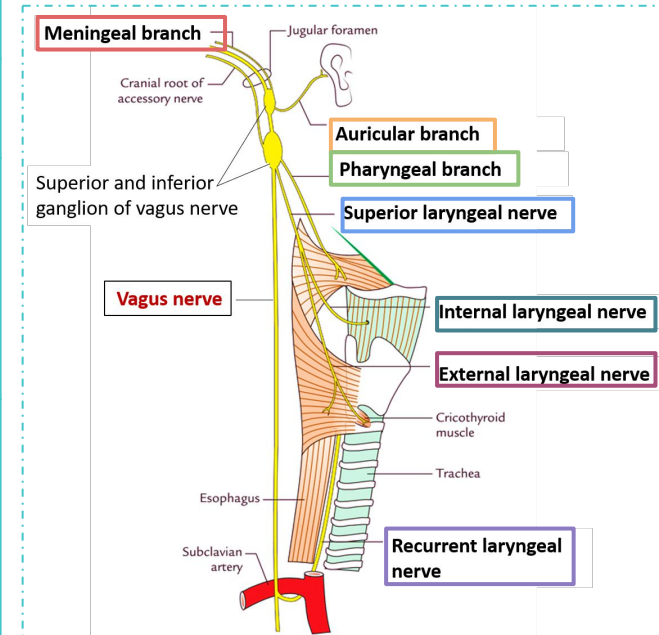
Type of fibers	Nuclei	Structure innervated
SVE fibers Special visceral efferent	Nucleus ambiguus (NA)	Muscles of : pharynx(except stylopharyngeus) larynx palate (except the tensor palati) upper part of esophagus
GVE fibers: General Efferent Visceral	Dorsal nucleus of vagus	Synapse in parasympathetic ganglia, short postganglionic fibers innervate cardiac muscle , smooth muscle respiratory, gastrointestinal systems and gland of viscera.
SVA fibers Special Visceral afferent	Spinal tract & nucleus of trigeminal	Sensation from auricle , external acoustic meatus and cerebral dura mater
GVA fibers: General Visceral Afferent	Nucleus of solitary tract (NST)	Carry impulse from viscera in neck, thoracic and abdominal cavities



Vagus nerve (X) cranial nerve

Branches

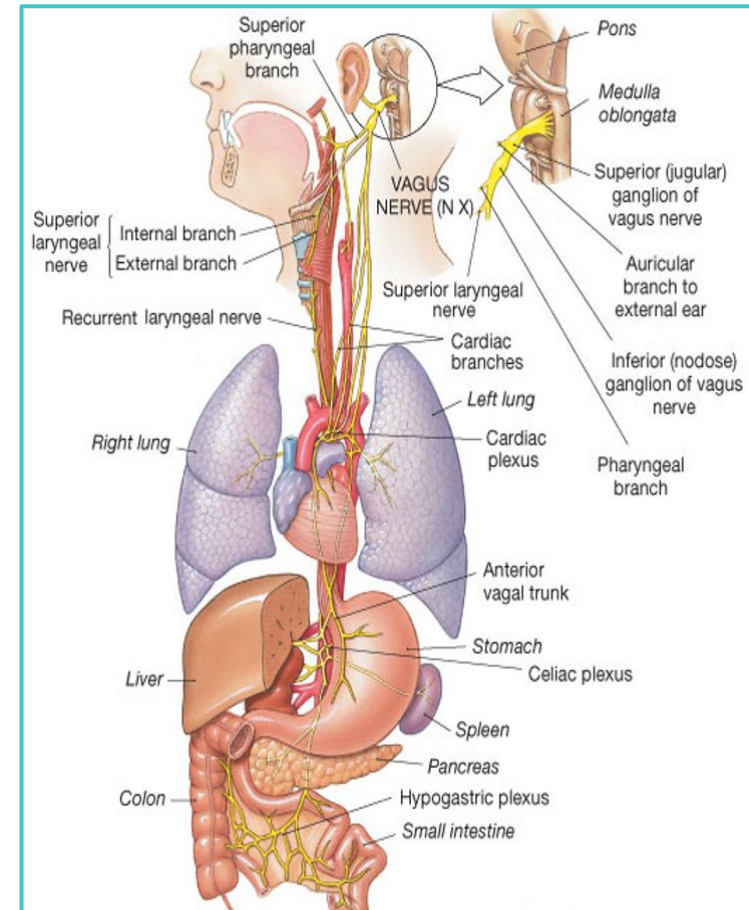
Meningeal	To the dura
Auricular nerve	To the external acoustic meatus and tympanic membrane.
To carotid body	-
Pharyngeal	It enters the wall of pharynx, it supplies the mucous membrane of the pharynx, superior and middle constructor muscles, and all the muscles of the palate except the tensor palati. The pharyngeal branch also forms the pharyngeal plexuses
Superior laryngeal	Divides into: Internal laryngeal (sensory) : it provides sensation to the hypopharynx, the epiglottis, the part of larynx above vocal folds. External laryngeal (motor) : supplies the cricothyroid muscles.
Recurrent laryngeal	-The recurrent laryngeal nerve goes round the subclavian artery on the right, and round the arch of aorta on the left. -It runs upwards and medially alongside the trachea and passes behind the lower pole of the thyroid gland -The recurrent laryngeal nerve gives motor supply to all the muscles of the larynx except the cricothyroid . It also provide sensation to the larynx below the vocal folds.



Vagus nerve (X) cranial nerve

Summary

- X is a mixed nerve.
- It contains afferent, motor, and parasympathetic fibers.
- The afferent fibers convey information from
- Esophagus, tympanic membrane, external auditory meatus and part of concha of the middle ear. End in trigeminal sensory nucleus.
- Chemoreceptors in aortic bodies and baroreceptors in aortic arch.
- Receptors from thoracic & abdominal viscera, end in nucleus solitarius.
- The motor fibers arise from (nucleus ambiguus of medulla to innervate muscles of soft palate, pharynx, larynx, and upper part of esophagus.
- The parasympathetic fibers originate from dorsal motor nucleus of vagus in medulla distributed to cardiovascular, respiratory and gastrointestinal systems.

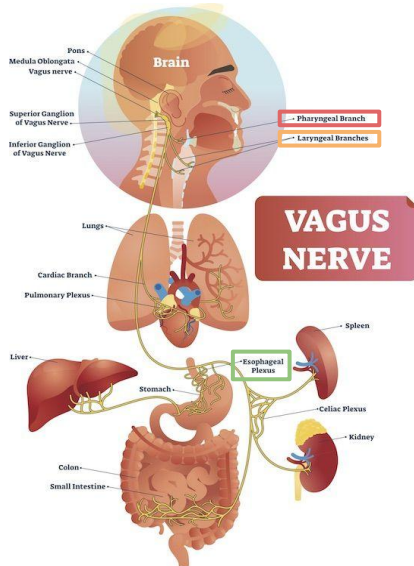


Vagus nerve (X) cranial nerve

Vagus nerve lesions

Vagus nerve lesions produce palatal and **pharyngeal** and **laryngeal** paralysis.

Abnormalities of **esophageal** motility, gastric acid secretion, gallbladder emptying, and heart rate, and other autonomic dysfunction.



How to diagnose Vagus (X) nerve lesions

Listen to the patient talk as you are taking the history.

Hoarseness, whispering, nasal speech, or the complaints of aspiration or regurgitation of liquids through the nose should make you especially mindful of abnormality.

Give the patient a glass of water to see if there is choking or any complaint as it is swallowed.

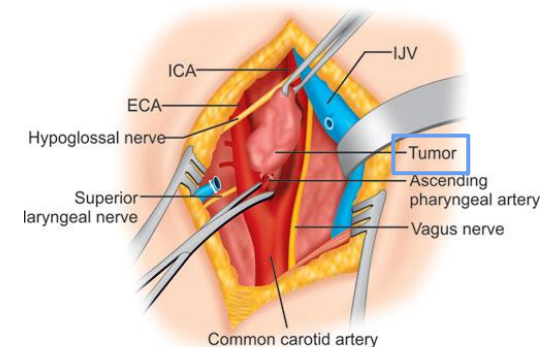
Laryngoscopy is necessary to evaluate the vocal cord.

Causes of Vagus(X) and Glossopharyngeal(IX) nerve lesions

Lateral medullary syndrome: A Degenerative disorder seen over the age of 50 mostly, due to thrombosis of the inferior cerebellar artery.

Tumors: Compressing the cranial nerves in their exiting foramina from the cranium via the skull base.

Manifested by: Ipsilateral paralysis of the muscles of the palate, pharynx and larynx. loss of taste from the posterior third of tongue.



MCQ

Q1: Cranial nerves 9 and 10 exit the cranial cavity through:

A: Foramen ovale

B: Carotid foramen

C: Foramen magnum

D: Jugular foramen

Q2: A patient was shown to have absent gag reflex. Which nerve is most likely affected

A: Hypoglossal

B: Glossopharyngeal

C: Facial

D: Vagus

Q3: glossopharyngeal shares its nuclei with:

A: CN 7 and 8

B: CN 10 and 7

C: CN 8 and 10

D: CN 11

Q4: The tympanic branch of glossopharyngeal supplies

A: Parotid gland

B: Pituitary gland

C: Pineal gland

D: Sublingual gland

Q5: Vagus nerve is

A: Sensory

B: Mixed

C: Motor

D: I don't know :(

Q6: glossopharyngeal It Passes forwards between

A: Internal jugular vein and External carotid artery.

B: Aorta and common carotid artery

C: A & B

D: None of the above

Answer key:
1 (D) , 2 (B) , 3 (B) , 4 (A) , 5 (B) , 6 (A)

MCQ

Q7: Vagus nerve is one of the following

A: Sensory **B: Motor** **C: Mixed** **D: Parasympathetic**

Q8: Which nerve is called wandering?

A: CN5 **B: CN9** **C: CN7** **D: CN10**

Q9: Vagus superior ganglion communicate with?

A: Cranial part of accessory nerve **B: Hypoglossal nerve** **C: 1st cervical nerve** **D: Facial nerve**

Q10: GVE fibers of vagus originate from?

A: Vegan dorsal nucleus **B: Nucleus ambiguus** **C: Nucleus of trigeminal** **D: Nucleus solitarius**

Q11: Vagus lesions produce abnormalities of?

A: Taste **B: Voice** **C: Walk** **D: Gag reflex**

Q12: Lateral medullary syndrome is due to?

A: Tumor **B: Congenital** **C: Thrombosis of inf cerebellar artery** **D: Radiation**

Answer key:
7(C) , 8(D) , 9(D) , 10(A) , 11(B) , 12(C)

SAQ

Q1: List three nuclei of Glossopharyngeal nerve:

Q2: List three branches of glossopharyngeal nerve:

Q3: List the branches of vagus nerve

Q4: What are the causes for IX & X nerve lesions

Answers

1 : Nucleus ambiguus, inferior salivatory nucleus and nucleus of solitary tract

2 : Lingual, Tonsillar and tympanic

3 : slide 10

4: lateral medullary syndrome , tumors

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A special thanks to Mohamed Alquhidan

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