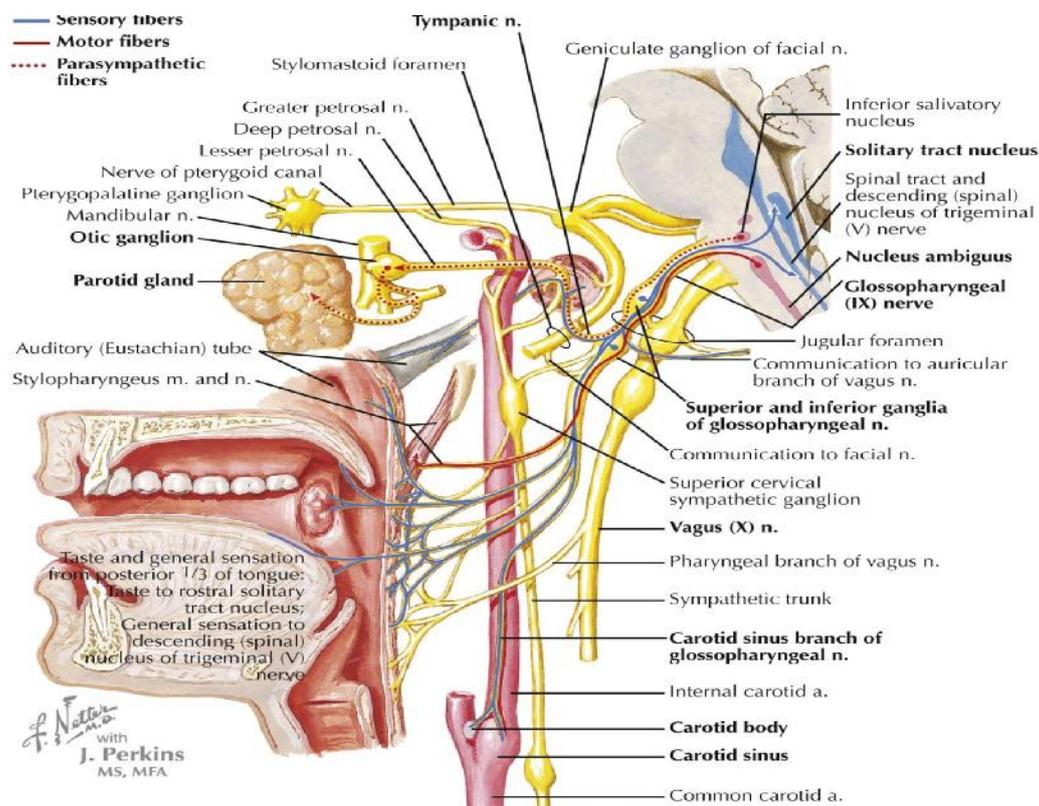
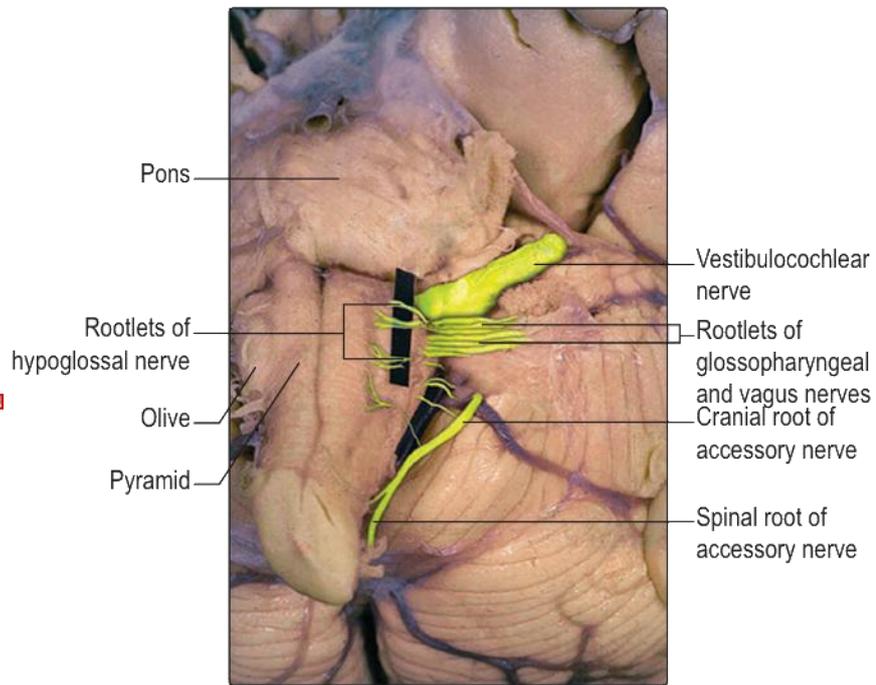
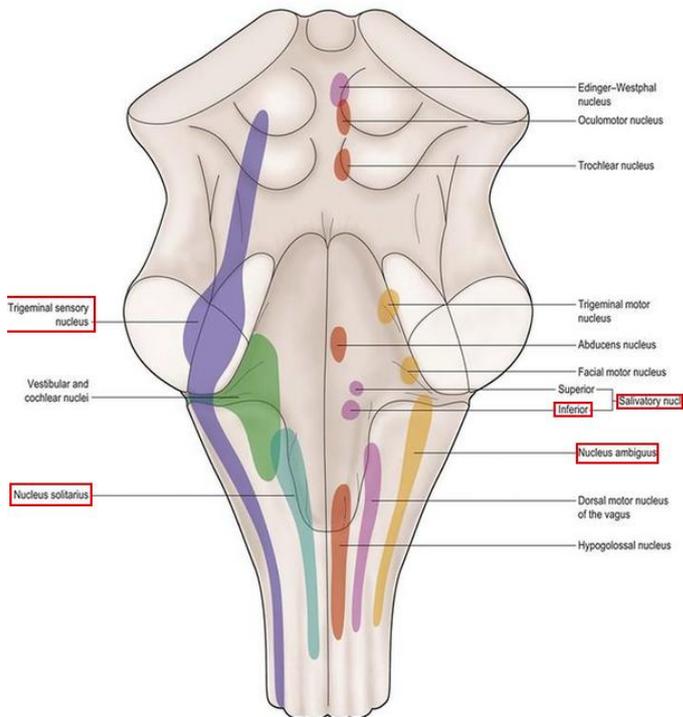


Cranial Nerves IX, X, XI, XII

1) CN IX (Glossopharyngeal N.)

Type	Mixed nerve		
Deep origin	4 Nuclei	Motor	- Upper part of nucleus ambiguus - Supplies the stylopharyngeus muscle
		Parasympathetic	- Inferior salivatory nucleus - Supplies the parotid gland
		Two sensory	- Nucleus solitarius - taste from the posterior 1/3 of the tongue
			- Spinal trigeminal nucleus - Sensation from a small area behind the ear
Convey information from	Receptors for general sensation in	Pharynx – Posterior 1/3 of tongue – Eustachian tube – Middle ear	
	Taste buds of	Pharynx – Posterior 1/3 of tongue	
	Chemoreceptors in	Carotid bodies	
	Baroreceptors in	Carotid Sinus	
Lesion	<ul style="list-style-type: none"> - Loss of taste sensation from the posterior 1/3 of the tongue. - Loss of the pharyngeal gag reflex. - Loss of the carotid sinus reflex. 		





Carotid body and carotid sinus

Glossopharyngeal (IX) nerve

Carotid sinus nerve

Veins from carotid body

External carotid artery

Carotid body

Artery to carotid body

Superior thyroid artery

Common carotid artery

Vagus (X) nerve

Superior cervical sympathetic trunk ganglion

Retromandibular and facial veins

Lingual vein

Internal jugular vein

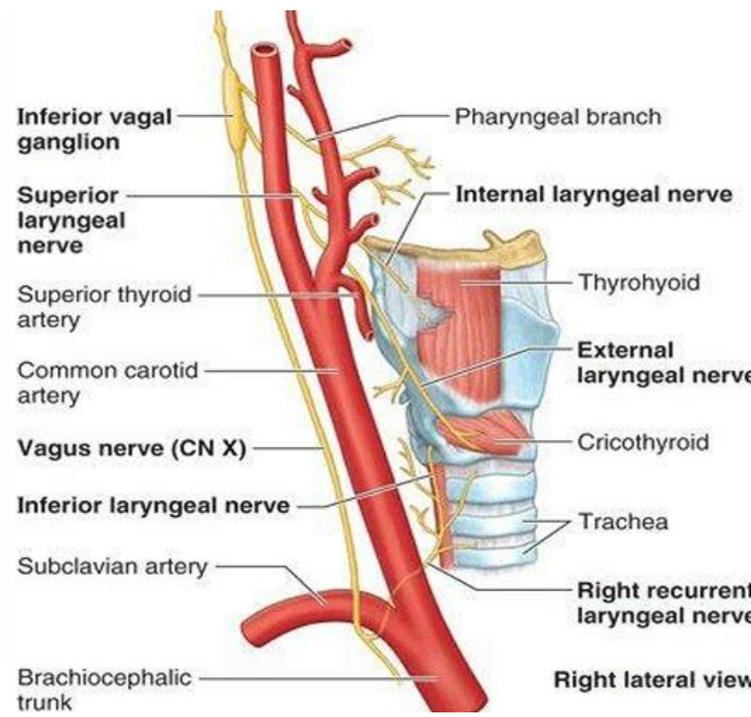
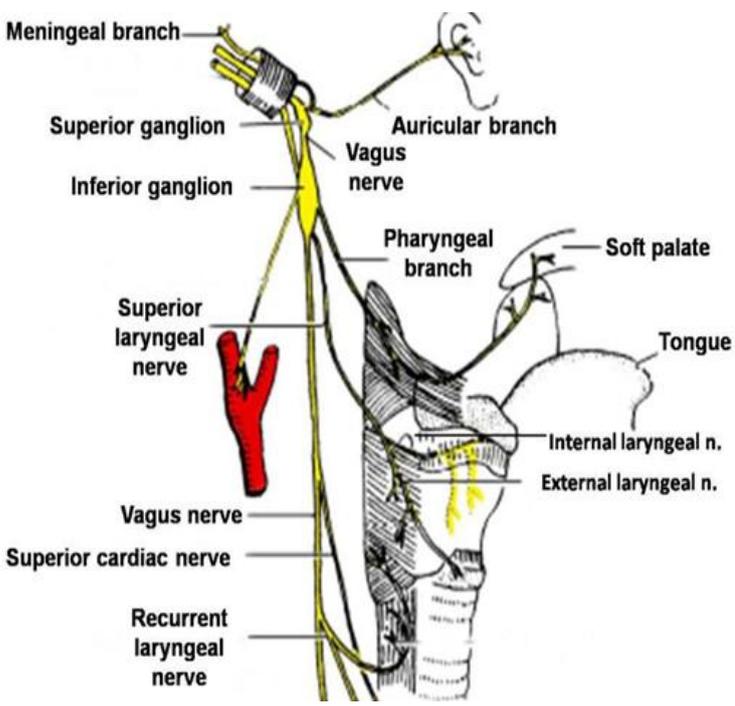
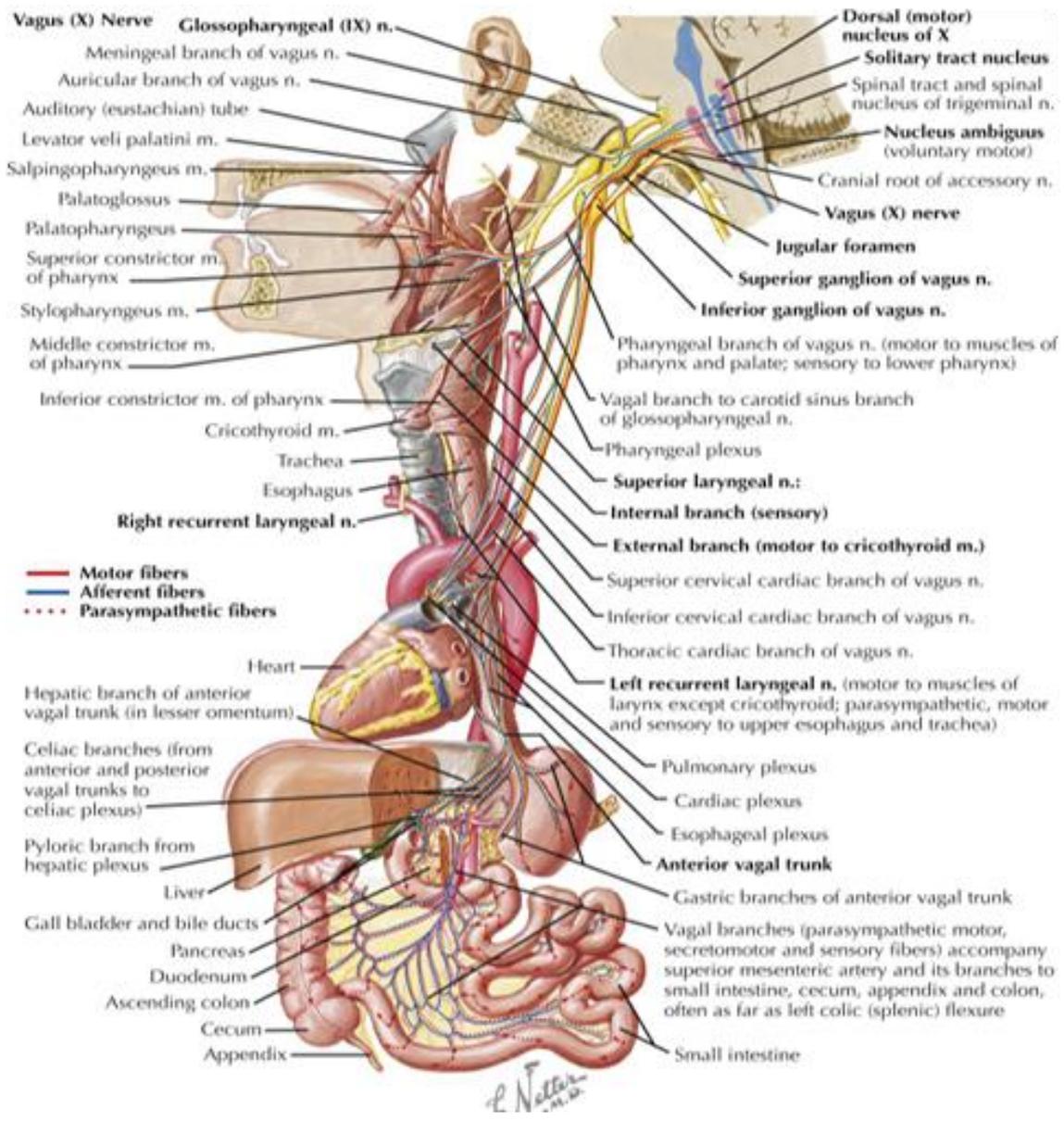
Internal carotid artery

Carotid sinus

F. Netter M.D.

2) CN X (Vagus N.)

Type	Mixed nerve		
Deep origin	4 Nuclei	Motor	<ul style="list-style-type: none"> - Middle part of nucleus ambiguus - Supplies: muscles of the pharynx (except stylopharyngeus), larynx, and palate (except tensor palati muscle).
		Parasympathetic	<ul style="list-style-type: none"> - Dorsal motor nucleus of the vagus - It supplies the thoracic and abdominal organs as far as the left colic flexure.
		Two sensory	<ul style="list-style-type: none"> - Nucleus solitarius - taste from the most posterior part of the tongue and epiglottis. - terminate in the upper third of the nucleus.
			<ul style="list-style-type: none"> - Spinal trigeminal nucleus - Sensation from the external auditory meatus and tympanic membrane.
Convey information from	Receptors for general sensation in	Pharynx – Larynx – Esophagus – Tympanic membrane – External auditory meatus – part of the concha of external ear.	
	Receptors widely distributed	Thoracic and abdominal viscera	
	Chemoreceptors in	Aortic bodies	
	Baroreceptors in	Aortic arch	
Lesion	<ul style="list-style-type: none"> - <u>Paralysis of pharyngeal muscles</u> causes dysphagia & loss of the pharyngeal gag reflex. - <u>Paralysis of laryngeal muscles</u> causes hoarseness of voice. - <u>Paralysis of muscles of the palate</u> causes: <ol style="list-style-type: none"> 1. Regurgitation of food from the nose. 2. Deviation of the uvula to the normal side. - <u>Anesthesia of the larynx</u> causes loss of the cough reflex. 		

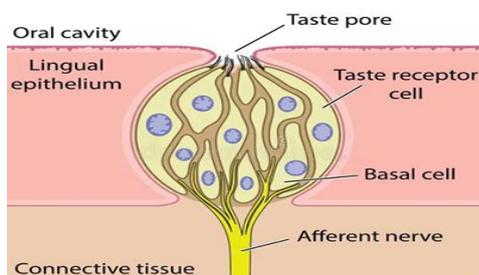


3) Taste pathway

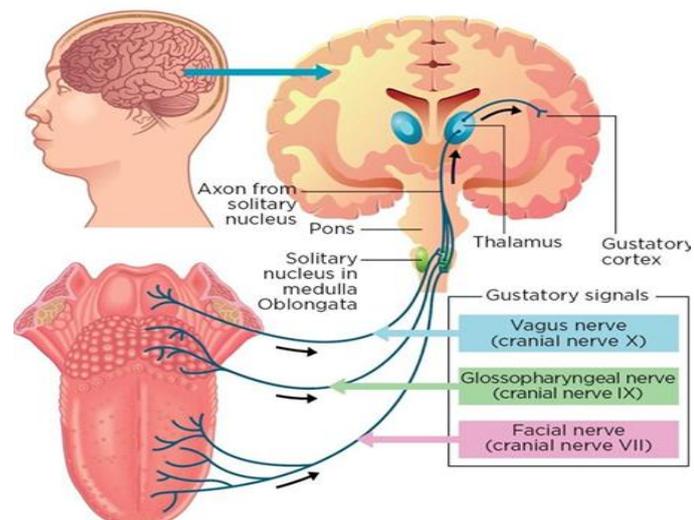
- Receptors:
 - **Taste buds** of the tongue, epiglottis, soft palate, and oropharynx.
- Nerves:
 - Chorda tympani (branch of the facial nerve) → **Anterior 2/3 of the tongue.**
 - CN IX → **Posterior 1/3 of the tongue, vallate papillae, soft palate, & oropharynx.**
 - Internal laryngeal branch of vagus → **Epiglottis & most posterior part of the tongue.**

First order neuron (GANGLIA)	Anterior 2/3 of the tongue	Geniculate ganglion of the facial nerve.
	Posterior 1/3 of the tongue	Inferior ganglion of the glossopharyngeal nerve.
	Epiglottis and most posterior part of the tongue	Inferior ganglion of the vagus nerve.
Second order neuron (Upper 1/3 of Nucleus solitarius)	<p>- Axons of the nucleus solitarius cross to the opposite side and ascend in the central tegmental tract, dorsal to the medial lemniscus, to end in the ventral posterior medial nucleus of the thalamus (VPMNT).</p> <p>- Collateral branches reach the salivatory nuclei for reflex activity.</p>	
Third order neuron (VPMNT)	Axons of the VPMNT pass through the posterior limb of the internal capsule and terminate in the taste area (area 43) (gustatory area) in the lower part of the postcentral gyrus.	

- The **peripheral branches** of the ganglia end in the **taste buds**.
- The **central branches** enter the brainstem and end in the **nucleus solitarius**.

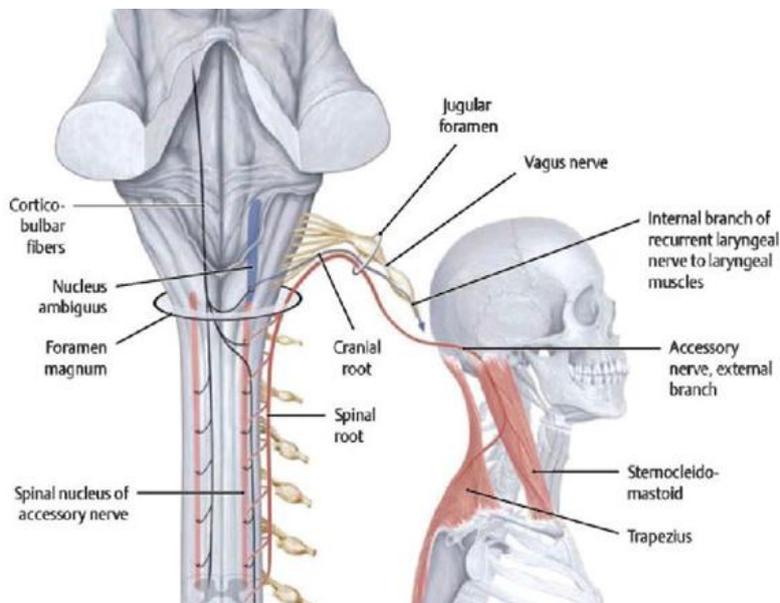
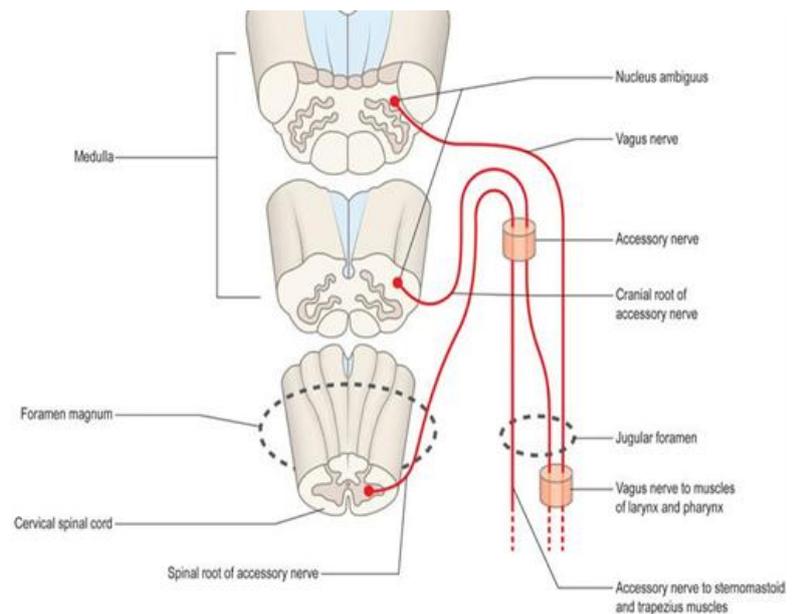
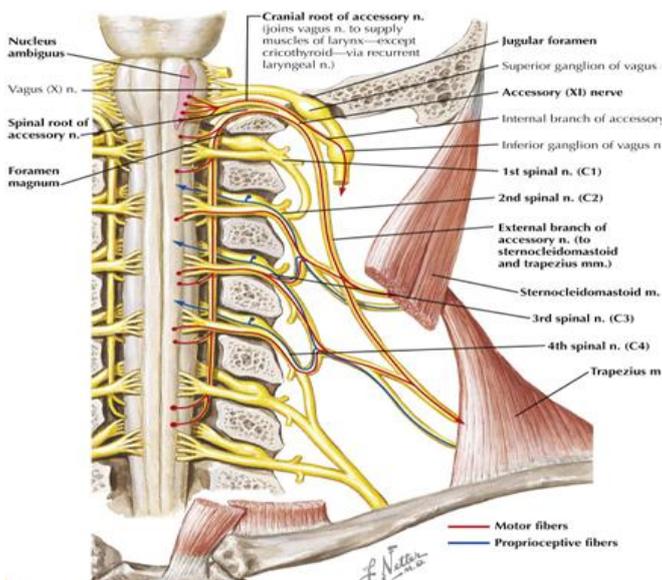


5. The taste (gustatory) pathways



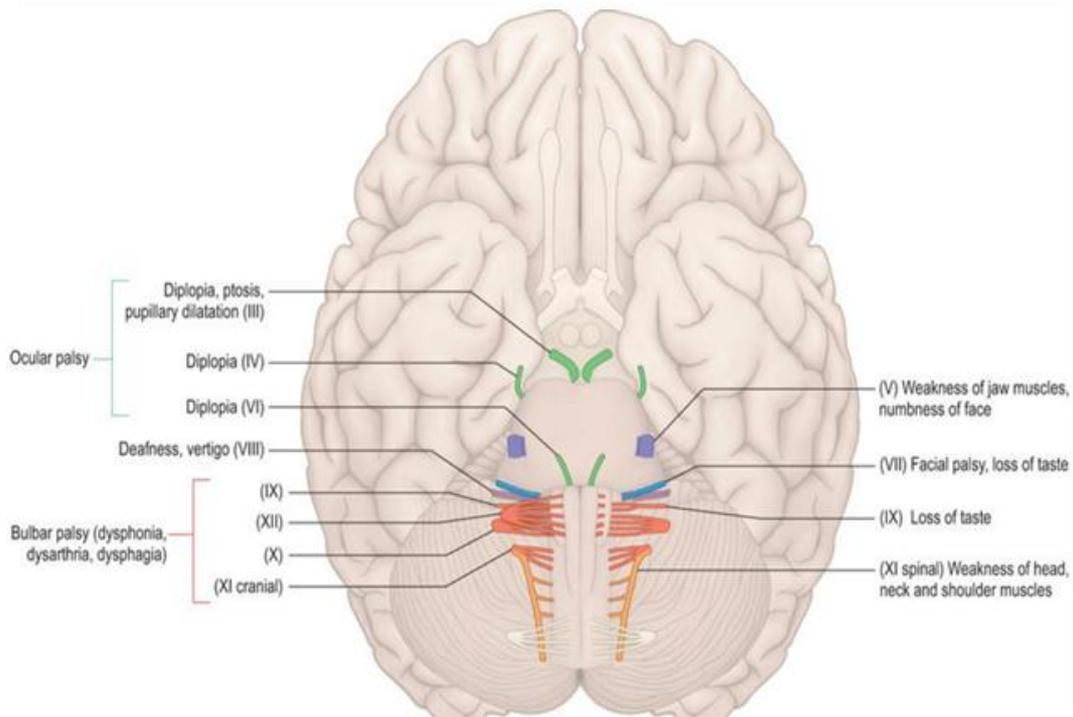
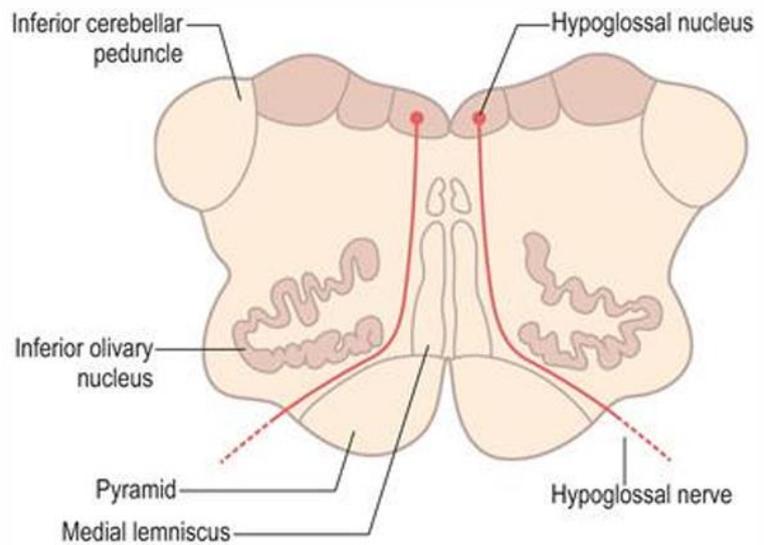
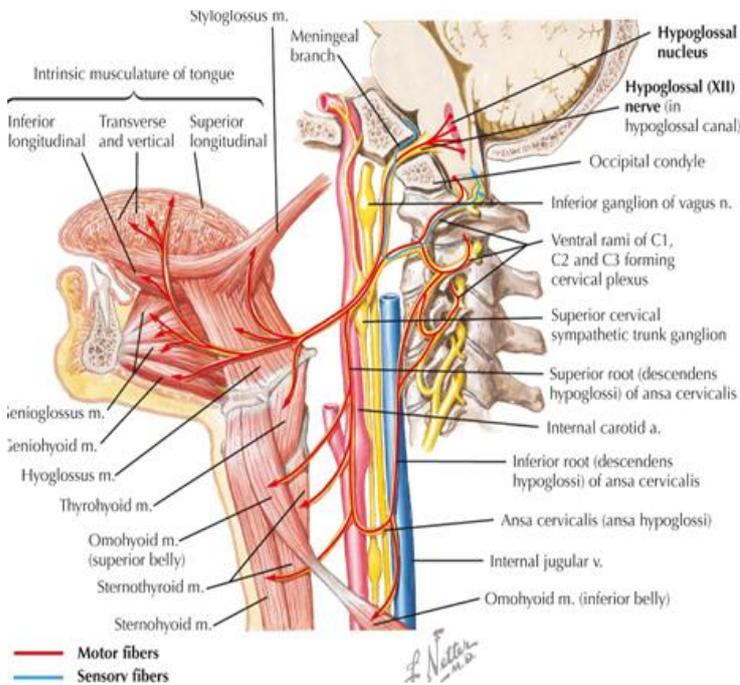
4) CN XI (Accessory N.)

Type	Pure motor nerve.	
Roots	Cranial root	<ul style="list-style-type: none"> - Arises from the lower part of the nucleus ambiguus. - Leaves the cranial cavity through the jugular foramen and joins the vagus nerve. - Distributed with the recurrent laryngeal nerve to all muscles of the larynx (except the cricothyroid muscle).
	Spinal root	<ul style="list-style-type: none"> - Arises from the upper five or six cervical segments of the spinal cord. - Supplies the sternomastoid and trapezius muscles.
Lesion of spinal root	<ul style="list-style-type: none"> - Paralysis of sternomastoid → Inability to rotate the head to the opposite side. - Paralysis of trapezius → Inability to shrug (move up and down) the shoulder. 	



5) CN XII (Hypoglossal N.)

Type	Pure motor nerve.
Origin & Course	<ul style="list-style-type: none"> - Arises from the hypoglossal nucleus of the medulla in the floor of the 4th ventricle. - Exits from the pre-olivary fissure. - Supplies all muscles of the tongue (except the palatoglossus muscle).
Lesions	<ul style="list-style-type: none"> - LMN paralysis of the same side of the tongue (hemiparalysis). - Deviation of the protruded tongue toward the affected side.



▪ Quiz:

1. Which of the following related to hypoglossal nerve:

Answer: C

- a. It is a mixed nerve
- b. It exits from the post-olivary fissure.
- c. It supplies all muscles of the tongue except palatoglossus muscle.
- d. It arises from the upper five or six cervical segments of the spinal cord.
- e. Its lesion results in paralysis of muscles of the larynx causes hoarseness of voice.

2. Which of the following related to glossopharyngeal nerve:

Answer: E

- a. It supplies all muscles of the tongue except palatoglossus muscle.
- b. It exits from the pre-olivary fissure.
- c. Its lesion results in paralysis of muscles of the larynx causes hoarseness of voice.
- d. Its motor nucleus arises from middle part of nucleus ambiguus.
- e. Its parasympathetic nucleus (inferior salivatory nucleus) supplies the parotid gland.