The Cranial Nerves 9 & 10

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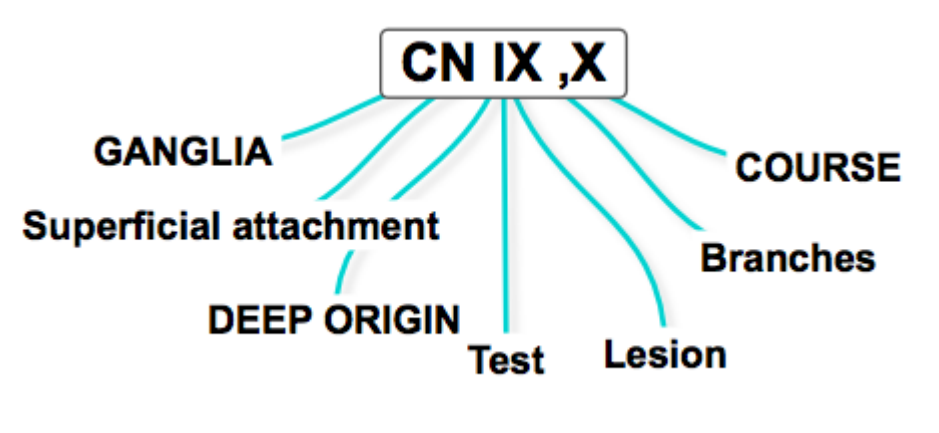
Objectives

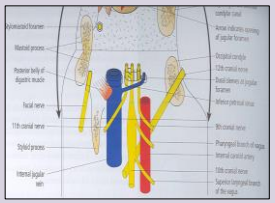
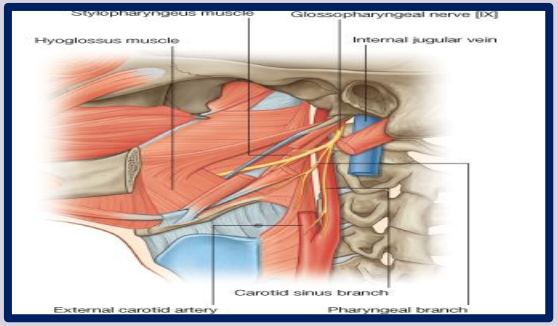
- Define the deep origin of both Glossopharyngeal and Vagus Nerves.
- Locate the exit of each nerve from the brain stem.
- Describe the course and distribution of each nerve .
- List the branches of both nerves.



ABBREVIATION:

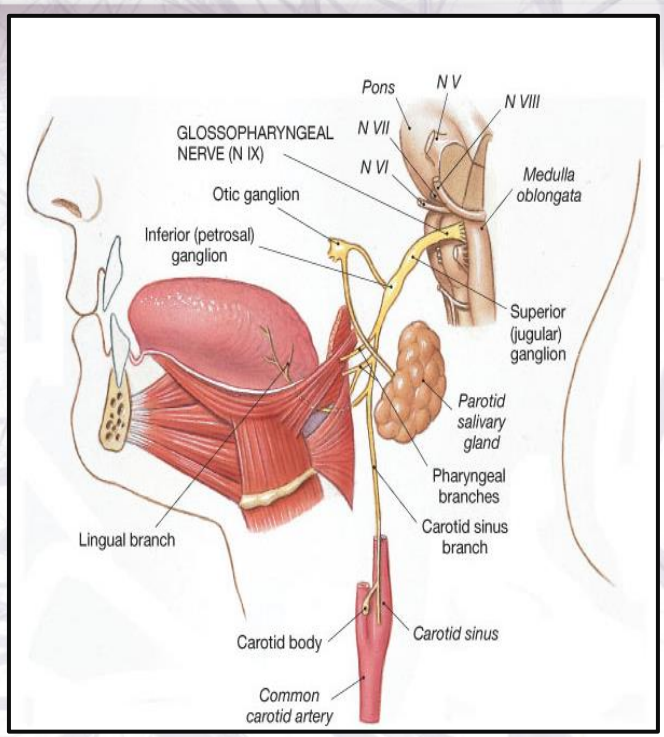
SVE: Special Visceral Efferent
GVE: General Visceral Efferent
SVA: Special Visceral Afferent
GVA: General Visceral Afferent

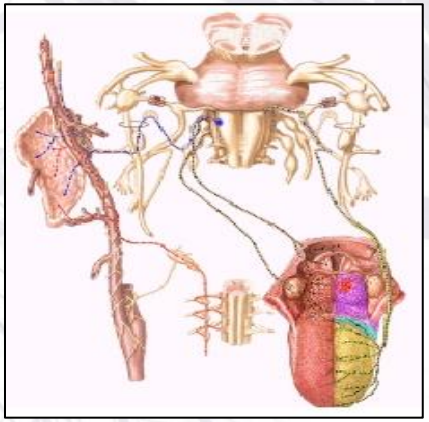
C 9 **Glossopharyngeal nerve**

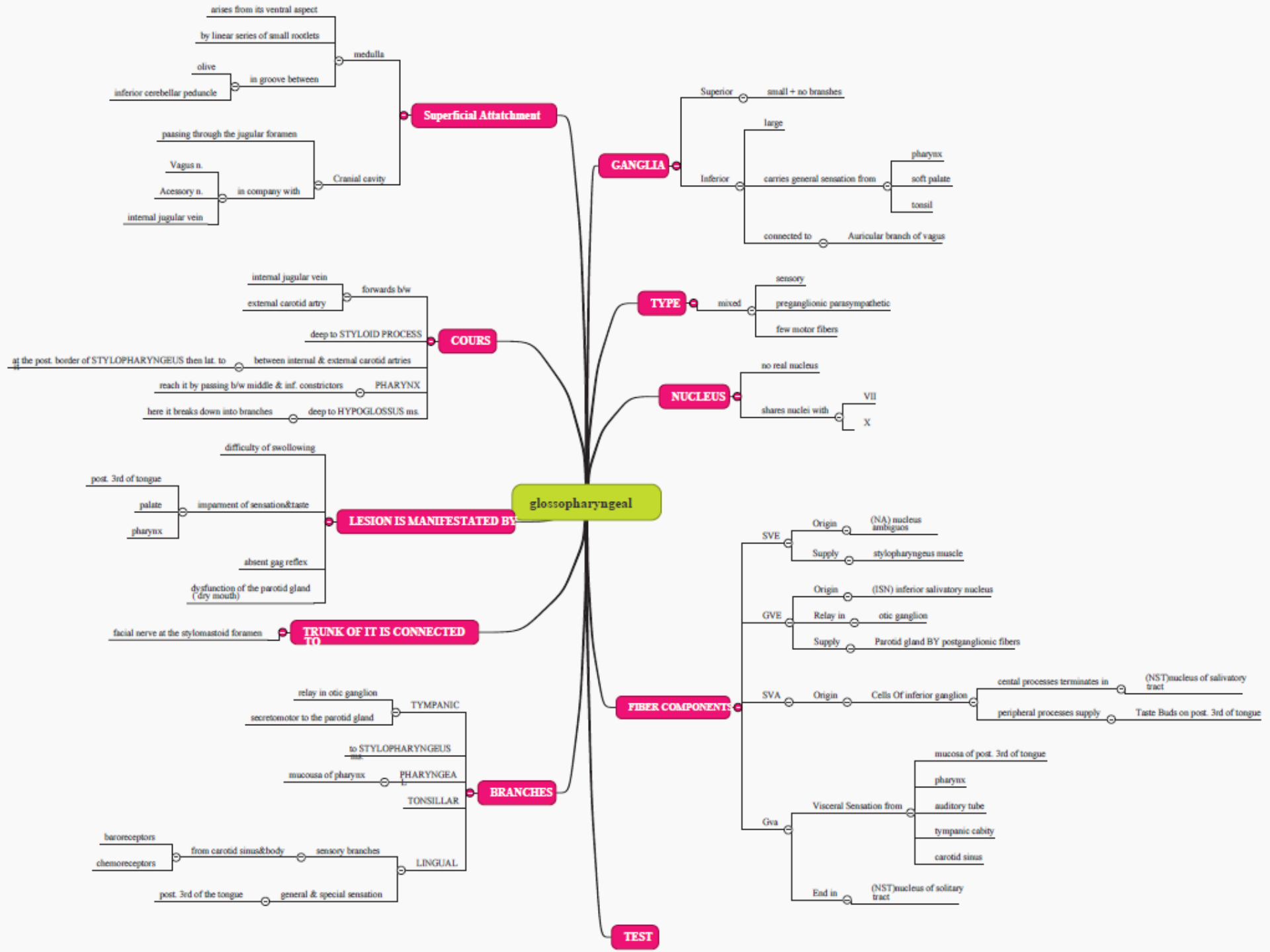
C 9 glosso-pharyngeal Nerve. Type: **MIXED:** SENSORY MOTOR parasympathetic *It has no real nucleus to itself. it shares nuclei with VII and X.	fibers & Deep origin	GANGLIA	Superficial attachment	COURSE
	SVE fibers originate from **nucleus ambiguus** supply stylopharyngeus muscle. **GVE** fibers: arise from **inferior salivatory nucleus** supply parotid gland. **SVA** fibers: arise from the cells of inferior ganglion, their central processes terminate in **nucleus of solitary tract,** peripheral processes supply the **taste** buds on posterior third of tongue. **GVA** fibers: visceral sensation from mucosa of posterior third of tongue, pharynx, auditory tube and tympanic cavity, carotid sinus, end in **nucleus of solitary tract**	**Superior ganglion:** Small. No branches. connected to **the** Superior Cervical sympathetic ganglion. **Inferior ganglion:** Large. carries **general sensations** from pharynx, soft palate & tonsil. Connected to Auricular branchof vagus. ***The Trunk of the nerve is connected to the Facial nerve at the stylomastoid foramen**	It arises from **ventral** aspect of medulla in groove between olive and inferior cerebellar peduncle. It leaves the cranial cavity by passing through the **jugular foramen** in company with the **Vagus , Acessory nerves** and the **Internal jugular vein**. 	The nerve passes forwards between **Internal jugular vein** **And** **External carotid artery**. Lies Deep to **Styloid process**. It passes between external and internal carotid arteries at the posterior border of **Stylopharyngeus** then lateral to it. It reaches the **pharynx** by passing between middle and inferior constrictors, deep to **Hyoglossusmuscle**, where it breaks into terminal branches. 

BRANCHES & Nerve lesion OF CN 9

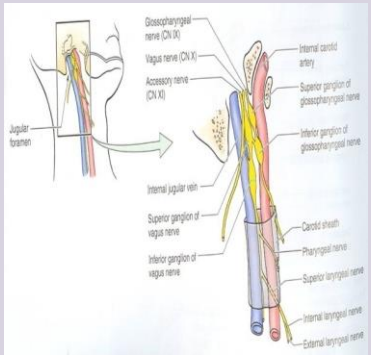
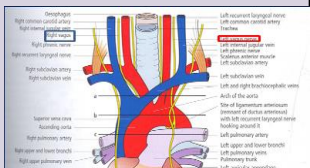
BRANCHES		NERVE LESION
BRANCHE	**SUPPLY**	**Manifestation**
Tympanic	**secretomotor to the parotid gland**	Difficulty of swallowing Absent gag reflex. Dysfunction of the parotid gland (dry mouth). Impairment of taste and sensation over the posterior one-third of the tongue ,palate and pharynx
Nerve to Stylopharyngeus muscle.		
Pharyngeal	**to the mucosa of pharynx**	
Tonsillar		
Lingual	**carries sensory branches, general and special (taste) from the posterior third of the tongue.**	
Sensory branches	**from the carotid sinus and body (baroreceptors and chemoreceptors).**	





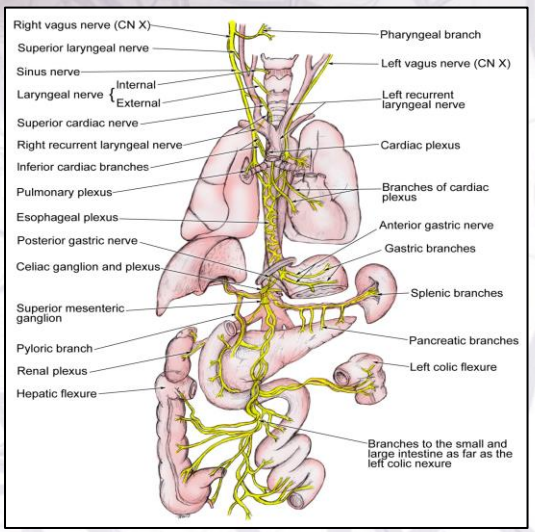

glossopharyngeal
Superficial Attatchment
arises from its ventral aspect
by linear series of small rootlets
medulla
olive
in groove between
inferior cerebellar peduncle
paasing through the jugular foramen
Vagus n.
Acessory n.
in company with
internal jugular vein
Cranial cavity
GANGLIA
Superior
small + no branshes
Inferior
large
carries general sensation from
pharynx
soft palate
tonsil
connected to
Auricular branch of vagus
TYPE
mixed
sensory
preganglionic parasympathetic
few motor fibers
NUCLEUS
no real nucleus
shares nuclei with
VII
X
COURS
internal jugular vein
external carotid artry
forwards b/w
deep to STYLOID PROCESS
at the post. border of STYLOPHARYNGEUS then lat. to
between internal & external carotid artries
reach it by passing b/w middle & inf. constrictors
PHARYNX
here it breaks down into branches
deep to HYPOGLOSSUS ms.
LESION IS MANIFESTATED BY
difficulty of swollowing
post. 3rd of tongue
palate
pharynx
impairment of sensation&taste
absent gag reflex
dysfunction of the parotid gland (dry mouth)
TRUNK OF IT IS CONNECTED TO
facial nerve at the stylomastoid foramen
FIBER COMPONENTS
SVE
Origin
(NA) nucleus ambiguus
Supply
stylopharyngeus muscle
GVE
Origin
(ISN) inferior salivatory nucleus
Relay in
otic ganglion
Supply
Parotid gland BY postganglionic fibers
SVA
Origin
Cells Of inferior ganglion
cental processes terminates in
(NST)nucleus of salivatory tract
peripheral processes supply
Taste Buds on post. 3rd of tongue
Gva
Visceral Sensation from
mucosa of post. 3rd of tongue
pharynx
auditory tube
tympanic cabity
carotid sinus
End in
(NST)nucleus of solitary tract
BRANCHES
TYMPANIC
relay in otic ganglion
secretomotor to the parotid gland
PHARYNGEAL
to STYLOPHARYNGEUS ms.
mucousa of pharynx
TONSILLAR
LINGUAL
sensory branches
from carotid sinus&body
baroreceptors
chemoreceptors
general & special sensation
post. 3rd of the tongue
TEST

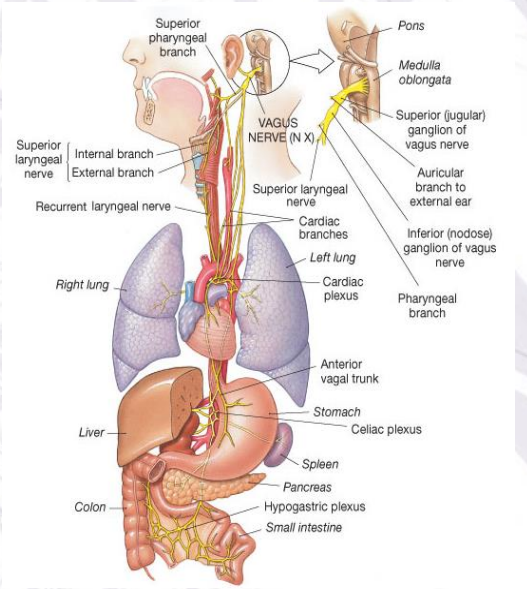
C10 VAGUS Nerve

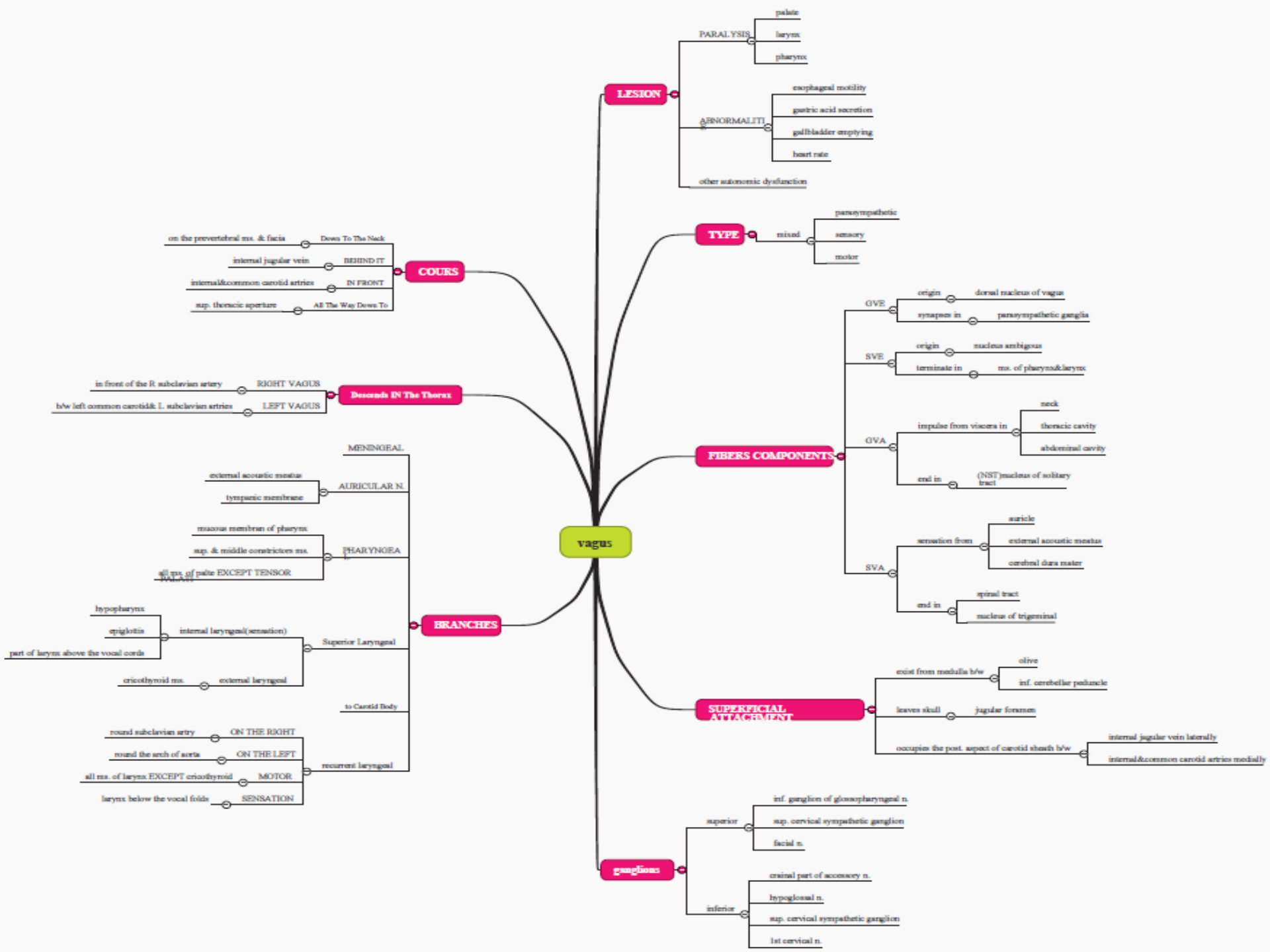
C 10 VAGUS Nerve. Type: **MIXED:** SENSORY MOTOR Parasympathetic *Supply organ of thorax & upper abdomen. Motor & sensory supply to pharynx & larynx.	fibers & Deep origin	GANGLIA	Superficial attachment	COURSE
	SVE fibers originate from **nucleus ambiguus** supply muscle of pharynx & larynx	**Superior ganglion:** **in** the jugular Foramen **Communicate with**: 1.Inferior ganglion of glossopharyngeal nerve, 2.Superior cervical sympathetic ganglion& 3.Facial nerve.	Its 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.** 	The vagus runs down the neck on the **prevertebral muscles and fascia**. **The internal jugular vein** lies **behind** it, and the **internal and common carotid arteries** are **in front** of it, all the way down to the **superior thoracic aperture.** **In THORAX:** Enters thorax through its inlet: **Right Vagus** descends in front of the Right subclavian artery. **Left Vagus** descends between the left common carotid and Left subclavian arteries. 
	GVE fibers: originate from **Dorsal Nucleus of Vagus** innervate cardiac muscle, smooth muscles and glands of viscera.			
	SVA fibers: sensation from **auricle, external acoustic meatus and cerebral dura mater**, to **Spinal Tract & Nucleus of Trigeminal**	**Inferior ganglion:** just **below** the jugular foramen **Communicate with:** 1.Cranial part of accessory nerve, 2.Hypoglossal nerve, 3.Superior cervical sympathetic ganglion. 4.1st cervical nerve.		
	GVA fibers: carry impulse from viscera in neck, thoracic and abdominal cavities to **Nucleus of Solitary Tract.**			

BRANCHES & Nerve lesion of CN 10

BRANCHES		NERVE LESION
BRANCHES	**SUPPLY**	**Manifestation**
Meningeal	**to the dura**	**palatal ,pharyngeal and laryngeal paralysis** **Abnormalities of : esophageal motility, gastric acid secretion, gallbladder emptying, heart rate and other autonomic dysfunction.**
Auricular	**external acoustic meatus & tympanic membrane.**	
Pharyngeal	**the mucous membrane of the pharynx, superior and middle constrictor muscles, and all the muscles of the palate except the tensor palati**	
To carotid body		
Superior Laryngeal:	It divides into	
1) Internal Laryngeal	sensation to the hypopharynx, the epiglottis, and the part of the larynx that lies above the vocal folds.	
2) External Laryngeal :	the cricothyroid muscle.	
Recurrent Laryngeal	motor supply to all the muscles of the larynx, except the **cricothyroid.** It also provides sensation to the larynx below the vocal folds	






vagus
LESION
PARALYSIS
palate
larynx
pharynx
ABNORMALITI
esophageal motility
gastric acid secretion
gallbladder emptying
heart rate
other autonomic dysfunction
TYPE
mixed
parasympathetic
sensory
motor
FIBERS COMPONENTS
GVE
origin
dorsal nucleus of vagus
synapses in
parasympathetic ganglia
SVE
origin
nucleus ambigous
terminate in
mx. of pharynx&larynx
GVA
impulse from viscera in
neck
thoracic cavity
abdominal cavity
end in
(NST)nucleus of solitary tract
SVA
sensation from
auricle
external acoustic meatus
cerebral dura mater
end in
spinal tract
nucleus of trigeminal
SUPERFICIAL ATTACHMENT
exist from medulla b/w
olive
inf. cerebellar peduncle
leaves skull
jugular foramen
occupies the post. aspect of carotid sheath b/w
internal jugular vein laterally
internal&common carotid arteries medially
ganglions
superior
inf. ganglion of glossopharyngeal n.
sup. cervical sympathetic ganglion
facial n.
inferior
cranial part of accessory n.
hypoglossal n.
sup. cervical sympathetic ganglion
1st cervical n.
BRANCHES
MENINGEAL
AURICULAR N.
external acoustic meatus
tympanic membrane
PHARYNGEAL
mucous membran of pharynx
sup. & middle constrictors mx.
all mx. of palte EXCEPT TENSOR PALATI
Superior Laryngeal
internal laryngeal(sensation)
hypopharynx
epiglottis
part of larynx above the vocal cords
external laryngeal
cricothyroid mx.
to Carotid Body
recurrent laryngeal
ON THE RIGHT
round subclavian artry
ON THE LEFT
round the arch of aorta
MOTOR
all mx. of larynx EXCEPT cricothyroid
SENSATION
larynx below the vocal folds
COURS
Down To The Neck
on the prevertebral mx. & facia
BEHIND IT
internal jugular vein
IN FRONT
internal&common carotid artries
All The Way Down To
sup. thoracic aperture
Descends IN The Thorax
RIGHT VAGUS
in front of the R subclavian artery
LEFT VAGUS
b/w left common carotid& L subclavian artries

CAUSES OF IX & X NERVE LESIONS

1. Lateral medullary syndrome:

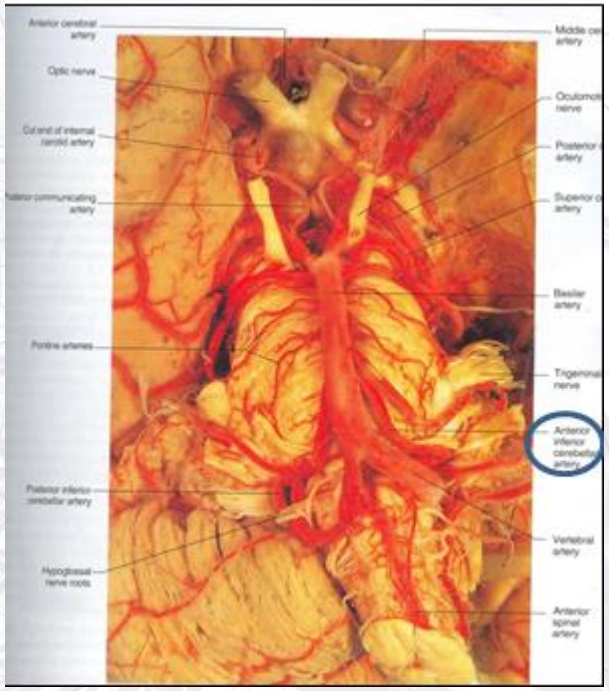
A degenerative disorder seen over age of 50 mostly due to

- **Thrombosis of the Inferior Cerebellar Artery.**

2. 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.**



Examination of Cranial Nerve 9, 10, 11 and 12“
http://youtu.be/LpRD292SqiM
http://youtu.be/Jbq4Env_UXw

Table 8.4 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]; accessory nerve [XI]; 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]
General visceral efferent**	BE	Motor innervation to skeletal muscles derived from pharyngeal arch mesoderm	Trigeminal nerve [V]; facial nerve [VII]; glossopharyngeal nerve [IX]; vagus nerve [X]

Other terminology used when describing functional components:
*Special sensory, or special visceral afferent (SVA): smell, taste. Special somatic afferent (SSA): vision, hearing, balance.
**Special visceral efferent (SVE) or branchial motor.

Table 8.5 Cranial nerves (see Table 8.4 for abbreviations)

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
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
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

Table 8.5—cont'd Cranial nerves (see Table 8.4 for abbreviations)

Nerve	COMPONENT		Exit from skull	Function
	Afferent	Efferent		
Abducent nerve [VI]		GSE	Superior orbital fissure	Innervates lateral rectus muscle
Facial nerve [VII]	GSA, SA	GVE, BE	Stylomastoid foramen [nerve leaves cranial cavity through internal acoustic meatus]	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
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 and pharyngotympanic tube SA—taste from posterior one-third of tongue GVE—innervates parotid salivary gland BE—innervates stylopharyngeus muscle
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]		GSE	Jugular foramen	Innervates sternocleidomastoid and trapezius muscles
Hypoglossal nerve [XII]		GSE	Hypoglossal canal	Innervates hyoglossus, genioglossus, and styloglossus muscles and all intrinsic muscles of the tongue

Questions

1-which one of Cranial nerves arise in groove between olive & inferior cerebellar peduncle:
A-accessory XI
B-glossopharyngeal IX
C-hpoglossal XII

2-Vagus nerve X is:
A- motor
B- sensory
C- mixed

3- where the IX cranial nerve break into terminal branch?
A) in the posterior triangle
B) in the pelvic
C) deep to Hyoglossus

4-which branch of IX cranial nerve supply the parotid gland ?
A) Pharyngeal
B) Tonsillar
C) Tympanic

5-Glossopharyngeal nerve lesions cause ?
A) palatal and pharyngeal and laryngeal paralysis
B) Absent gag reflex
C) Abnormalities of gastric acid secretion

6-which branch of X cranial nerve provide sensation to larynx above the vocal fold ?
A) External Laryngeal
B) Recurrent Laryngeal
C) Internal Laryngeal

GOOD LUCK ☺

1.B 2.C 3.C 4.C 5.B 6.C