
بسم الله الرحمن الرحيم

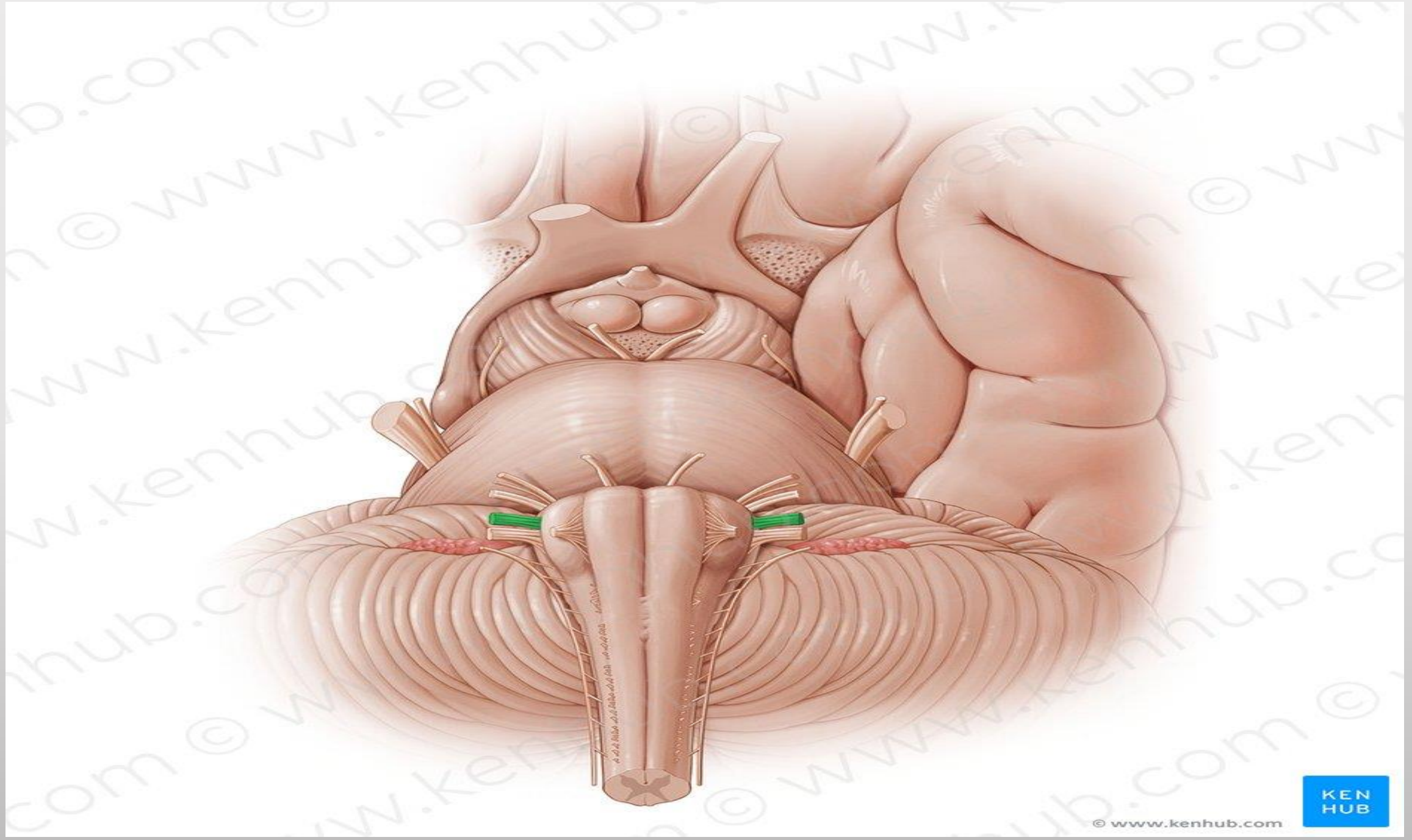
GROSS ANATOMY OF
GLOSSOPHARYNGEAL NERVE

By

DR. MAHVISH JAVED

Assistant Professor, Anatomy Department

Khyber Girls Medical College Peshawar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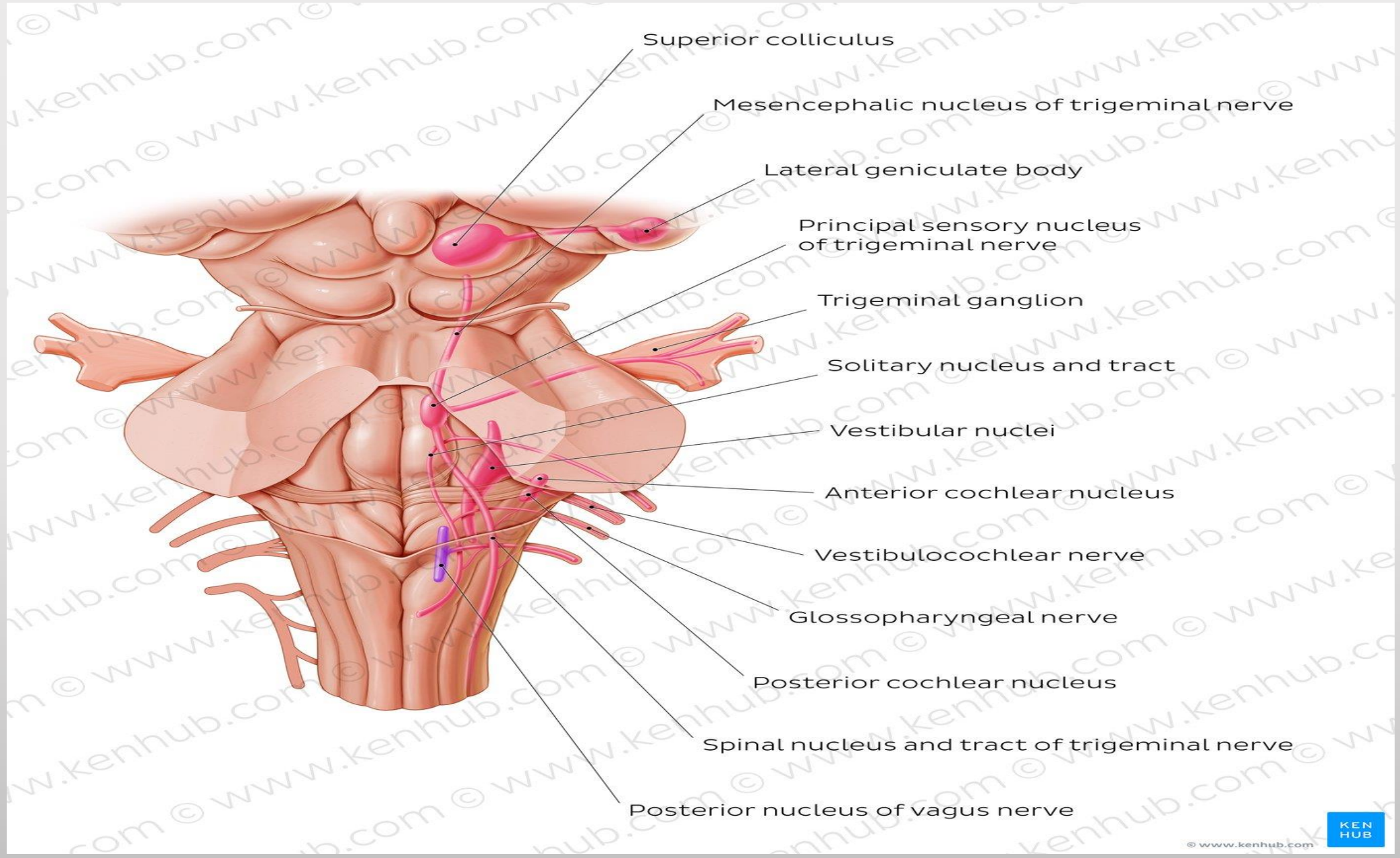
KEY FACTS	
Type	Mixed nerve
Origin	Brainstem
Field of innervation	Afferent: posterior one-third of tongue, palatine tonsils, oropharynx, mucosa of the middle ear, pharyngotympanic tube and the mastoid air cells, carotid body, taste Efferent: parotid gland, stylopharyngeus muscle, superior pharyngeal constrictor muscle
Branches	Tympanic nerve Carotid sinus nerve Pharyngeal nerves Muscular branch to stylopharyngeus Tonsilar branch Lingual nerves Mnemonic: This Could Pull Me To Love


Superior colliculus
Mesencephalic nucleus of trigeminal nerve
Lateral geniculate body
Principal sensory nucleus of trigeminal nerve
Trigeminal ganglion
Solitary nucleus and tract
Vestibular nuclei
Anterior cochlear nucleus
Vestibulocochlear nerve
Glossopharyngeal nerve
Posterior cochlear nucleus
Spinal nucleus and tract of trigeminal nerve
Posterior nucleus of vagus nerve
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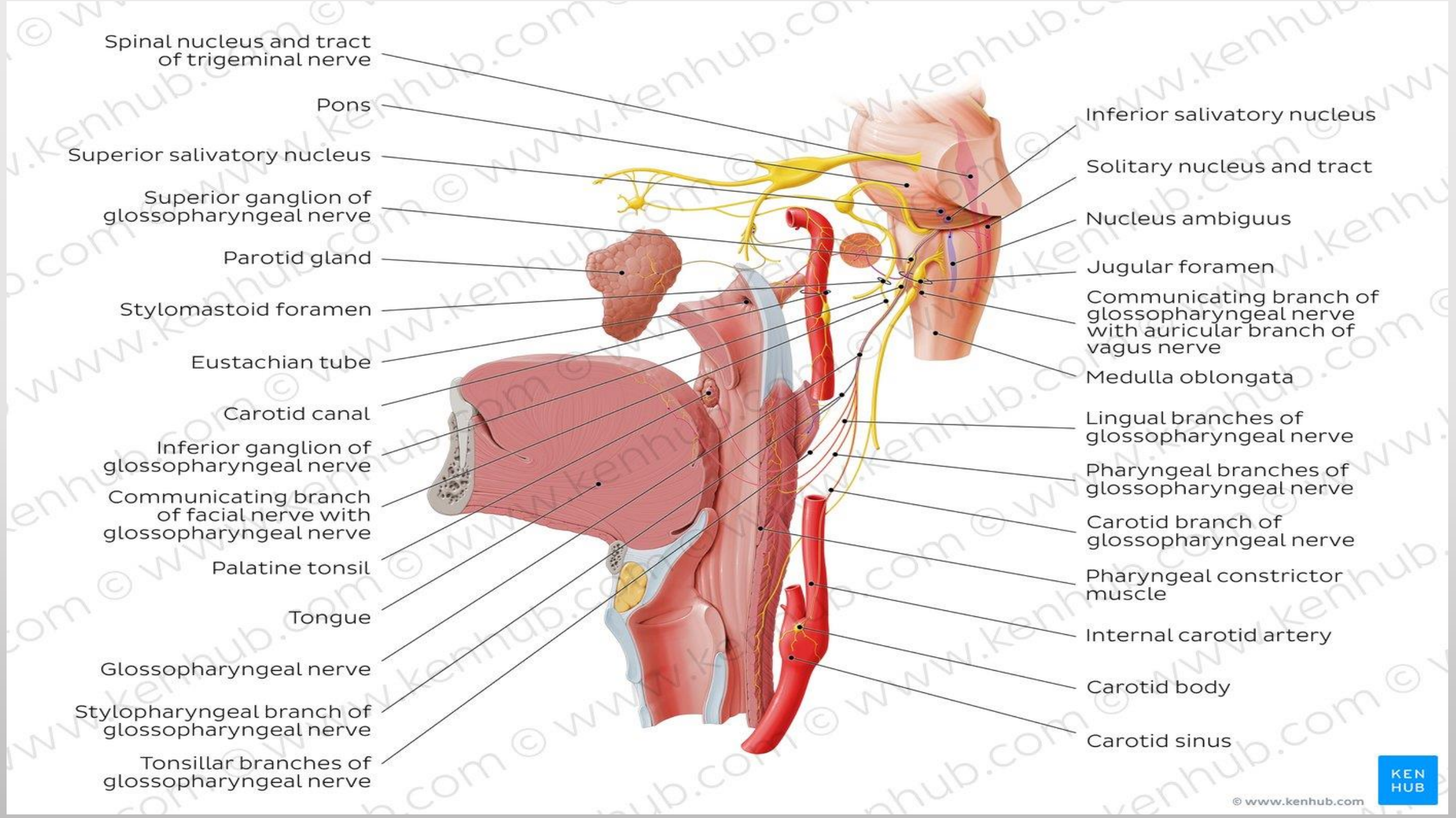
Spinal nucleus and tract of trigeminal nerve
Pons
Superior salivatory nucleus
Superior ganglion of glossopharyngeal nerve
Parotid gland
Stylomastoid foramen
Eustachian tube
Carotid canal
Inferior ganglion of glossopharyngeal nerve
Communicating branch of facial nerve with glossopharyngeal nerve
Palatine tonsil
Tongue
Glossopharyngeal nerve
Stylopharyngeal branch of glossopharyngeal nerve
Tonsillar branches of glossopharyngeal nerve
Inferior salivatory nucleus
Solitary nucleus and tract
Nucleus ambiguus
Jugular foramen
Communicating branch of glossopharyngeal nerve with auricular branch of vagus nerve
Medulla oblongata
Lingual branches of glossopharyngeal nerve
Pharyngeal branches of glossopharyngeal nerve
Carotid branch of glossopharyngeal nerve
Pharyngeal constrictor muscle
Internal carotid artery
Carotid body
Carotid sinus
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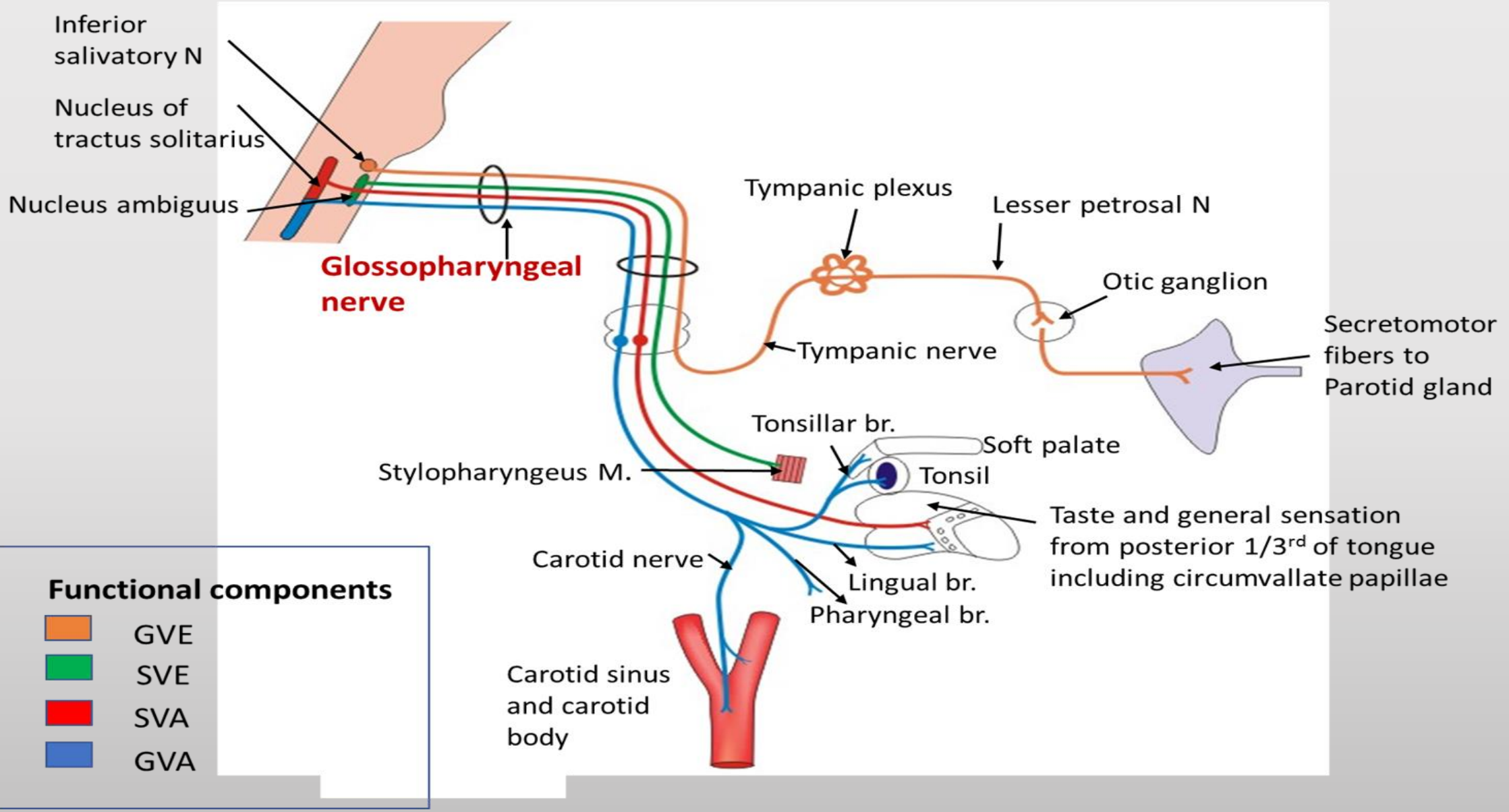
The Glossopharyngeal Nerve (CN IX)

The glossopharyngeal nerve, CN IX, is the ninth paired cranial nerve. In this article, we shall look at the anatomical course of the nerve, and the motor, sensory and parasympathetic functions of its terminal branches.

- Embryologically, the glossopharyngeal nerve is associated with the derivatives of the third pharyngeal arch.
- **Sensory**: Innervates the oropharynx, carotid body and sinus, posterior 1/3 of the tongue, middle ear cavity and Eustachian tube.
- **Special sensory**: Provides taste sensation to the posterior 1/3 of the tongue.
- **Parasympathetic**: Provides parasympathetic innervation to the parotid gland.
- **Motor**: Innervates the stylopharyngeus muscle of the pharynx.

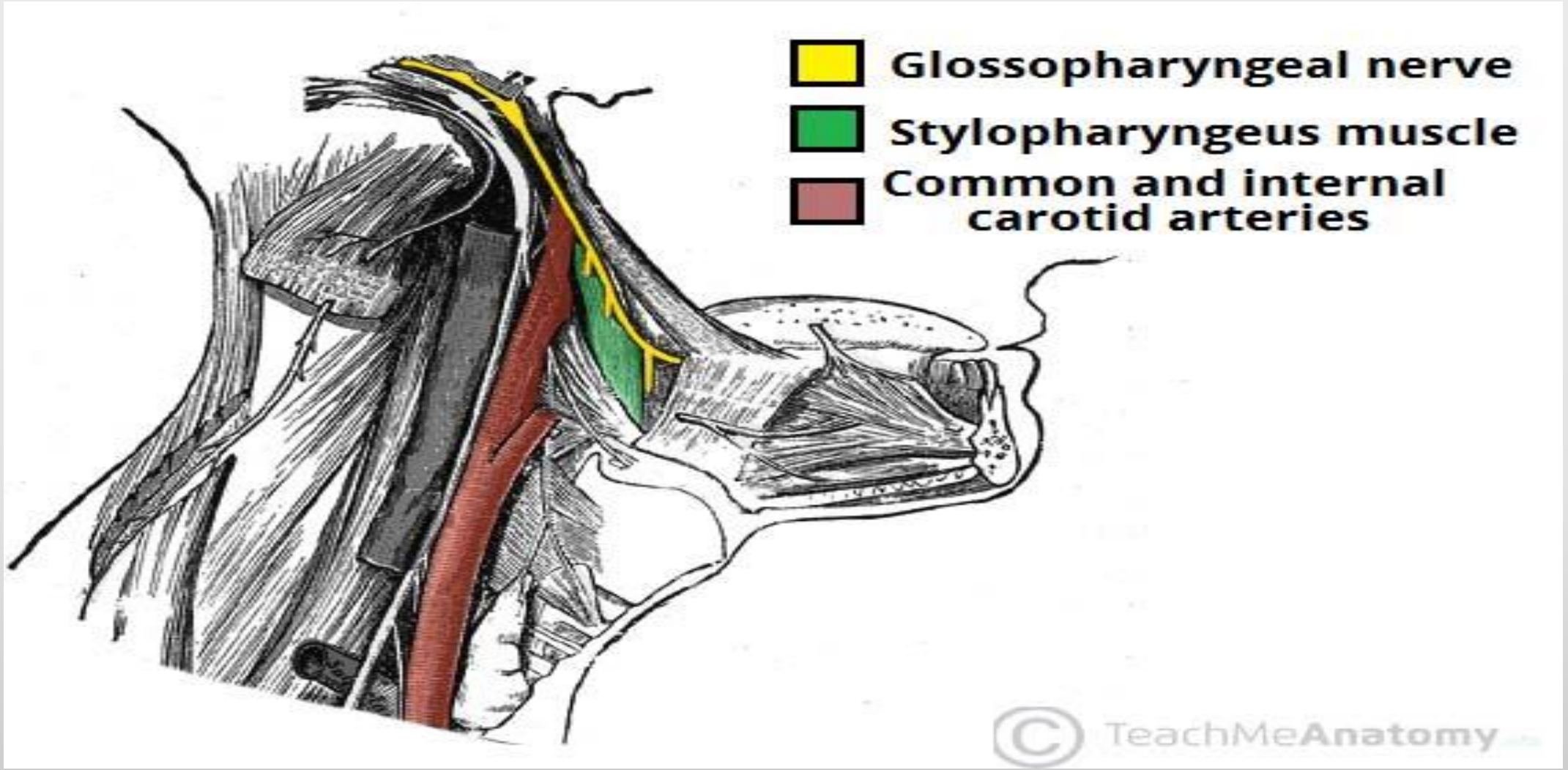
ANATOMICAL COURSE

- The glossopharyngeal nerve originates in the **medulla oblongata** of the brain. It emerges from the anterior aspect of the medulla, moving laterally in the posterior cranial fossa. The nerve leaves the cranium via the **jugular foramen**. At this point, the **tympanic nerve** arises. It has a mixed sensory and parasympathetic composition.
- Immediately outside the jugular foramen lie two ganglia (collections of nerve cell bodies). They are known as the **superior** and **inferior (or petrous) ganglia** – they contain the cell bodies of the sensory fibres in the glossopharyngeal nerve.


Inferior salivatory N
Nucleus of tractus solitarius
Nucleus ambiguus
Glossopharyngeal nerve
Tympanic plexus
Lesser petrosal N
Otic ganglion
Secretomotor fibers to Parotid gland
Tympanic nerve
Tonsillar br.
Soft palate
Tonsil
Stylopharyngeus M.
Taste and general sensation from posterior 1/3rd of tongue including circumvallate papillae
Carotid nerve
Lingual br.
Pharyngeal br.
Carotid sinus and carotid body
Functional components
GVE
SVE
SVA
GVA

ANATOMICAL COURSE CONTD

- Now extracranial, the glossopharyngeal nerve descends down the neck, anterolateral to the internal carotid artery. At the inferior margin of the **stylopharyngeus**, several branches arise to provide motor innervation to the muscle. It also gives rise to the **carotid sinus nerve**, which provides sensation to the carotid sinus and body.
- The nerve enters the pharynx by passing between the **superior and middle pharyngeal constrictors.** Within the pharynx, it terminates by dividing into several branches – lingual, tonsil and pharyngeal.



Lateral view of the neck, showing the innervation of the stylopharyngeus muscle.

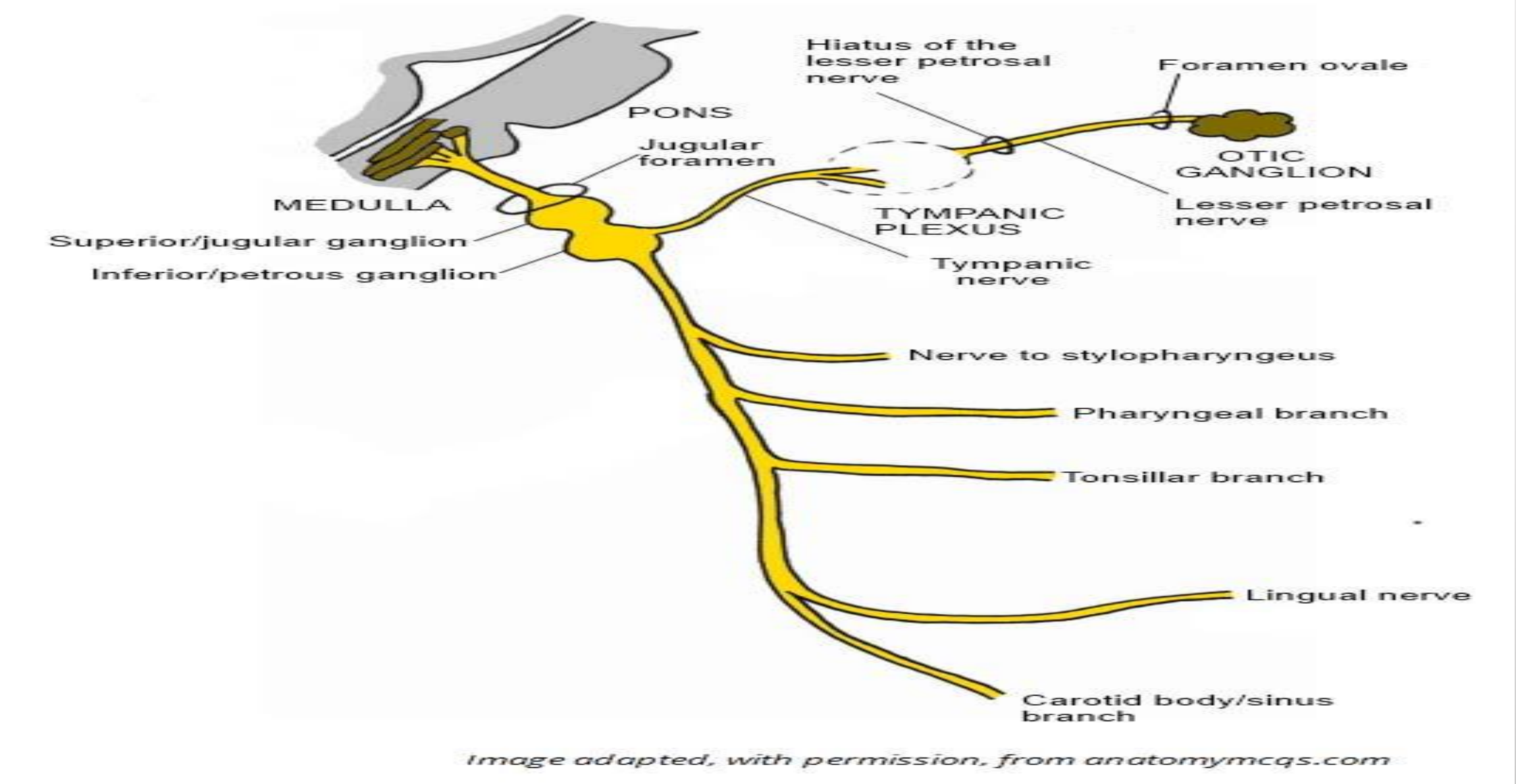
SENSORY FUNCTIONS

- The glossopharyngeal nerve provides sensory innervation a variety of structures in the head and neck.
- The **tympanic nerve** arises as the nerve traverses the jugular foramen. It penetrates the temporal bone and enters the cavity of the middle ear. Here, it forms the tympanic plexus – a network of nerves that provide sensory innervation to the **middle ear**, **internal surface of the tympanic membrane** and **Eustachian tube**.

SENSORY FUNCTIONS (CONTD)

At the level of the stylopharyngeus, the **carotid sinus nerve** arises. It descends down the neck to innervate both the carotid sinus and carotid body, which provide information about blood pressure and oxygen saturation respectively.

- The glossopharyngeal nerve terminates by splitting into several sensory branches:
- **Pharyngeal branch** – combines with fibres of the vagus nerve to form the pharyngeal plexus. It innervates the mucosa of the oropharynx.
- **Lingual branch** – provides the posterior 1/3 of the tongue with general and taste sensation
- **Tonsillar branch** – forms a network of nerves, known as the tonsillar plexus, which innervates the palatine tonsils.



Overview of the branches of the glossopharyngeal nerve.

SPECIAL SENSORY

- The glossopharyngeal nerve provides **taste sensation** to the posterior 1/3 of the tongue, via its lingual branch (*Note: not to be confused with the lingual nerve*).

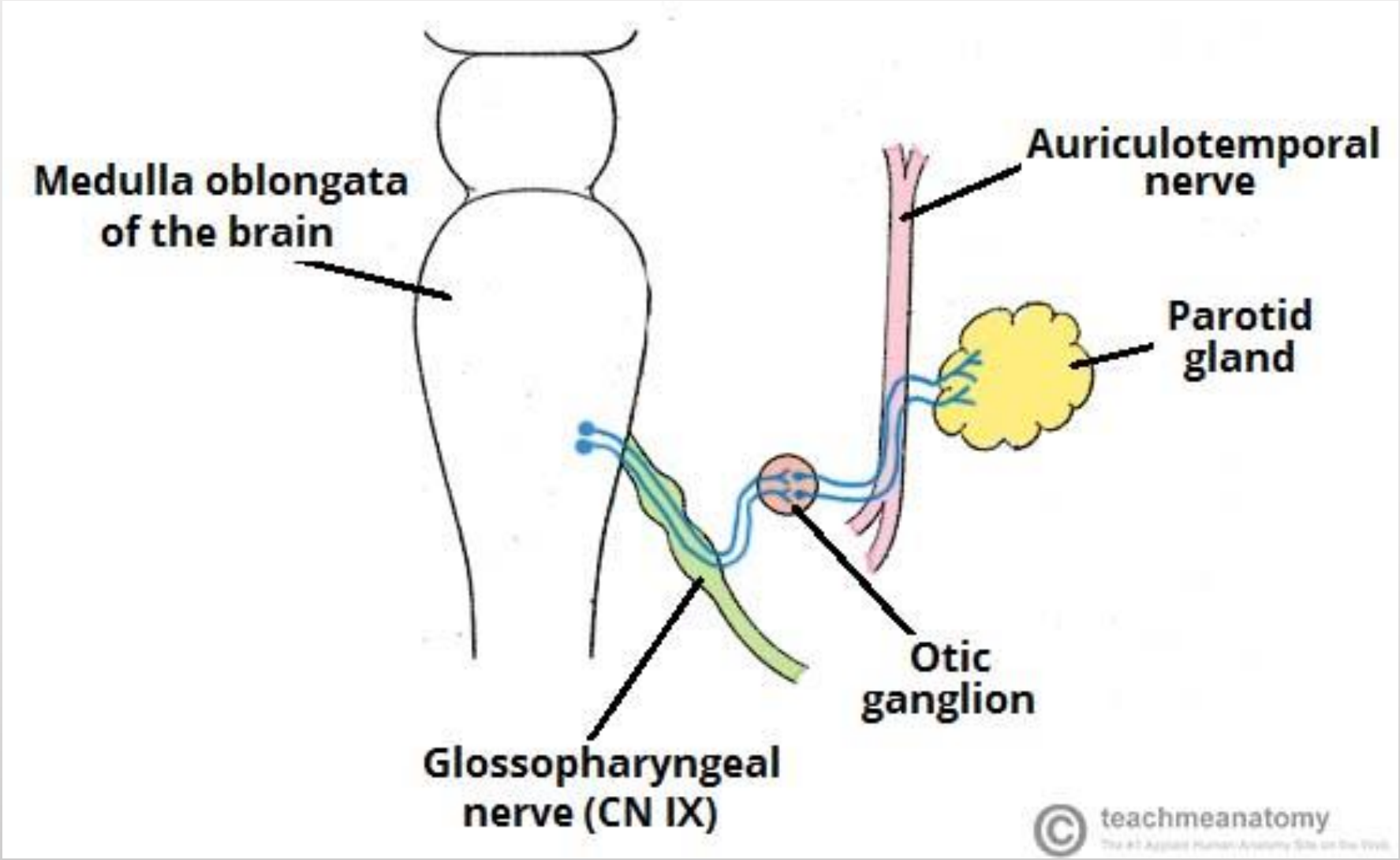
MOTOR FUNCTIONS

- The **stylopharyngeus** muscle of the pharynx is innervated by the glossopharyngeal nerve. This muscle acts to shorten and widen the pharynx and elevate the larynx during swallowing.

Parasympathetic Functions

The glossopharyngeal nerve provides parasympathetic innervation to the parotid gland. These fibres originate in the **inferior salivatory nucleus** of CN IX. These fibres travel with the **tympanic nerve** to the middle ear. From the ear, the fibres continue as the **lesser petrosal nerve,** before synapsing at the **otic ganglion**.

- The fibres then hitchhike on the **auriculotemporal nerve** to the **parotid gland**, where they have a secretomotor effect.
- ***Remember*** *– although the facial nerve splits into its five terminal branches in the parotid gland, it is the glossopharyngeal nerve that actually supplies the gland.*



Path of the parasympathetic fibres to the parotid gland.

Clinical Relevance - Gag Reflex

- The glossopharyngeal nerve supplies sensory innervation to the oropharynx, and thus carries the **afferent** information for the gag reflex. When a foreign object touches the back of the mouth, this stimulates CNIX, beginning the reflex. The efferent nerve in this process is the **vagus nerve, CNX**.
- An absent gag reflex signifies damage to the glossopharyngeal nerve.

Glossopharyngeal nerve lesions

Glossopharyngeal nerve lesions produce:

- Difficulty in swallowing
- Loss of general sensation over posterior 1/3rd of tongue, palate, pharynx.
- Loss of taste sensation over posterior 1/3rd of the tongue.
- Dysfunction of tongue.
- Loss of gag reflux.

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THANK
YOU!