
بسم الله الرحمن الرحيم

# GROSS ANATOMY OF FACIAL NERVES

By

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- The facial nerve contains many different types of fibers, including
- general sensory (afferent) fibers,
- special sensory fibers,
- visceral/autonomic motor (efferent) fibers,
- and somatic motor fibers.

| | |
|---|---|
| Brancial motor (special visceral efferent) | Supplies the muscles of facial expression; posterior belly of digastric muscle; stylohyoid, and stapedius. |
| Visceral motor (general visceral efferent) | Parasympathetic innervation of the lcrimal, submandibular, and sublingual glands, as well as mucous membranes of nasopharynx, hard and soft palate. |
| Special sensory (special afferent) | Taste sensation from the anterior 2/3 of tongue; hard and soft palates. |
| General sensory (general somatic afferent) | General sensation from the skin of the concha of the auricle and from a small area behind the ear. |

- **General sensory fibers** in the facial nerve are responsible for transmitting signals to the brain from the external acoustic meatus, as well as the skin over the mastoid and lateral pinna.
- **Special sensory fibers** in the facial nerve are responsible for receiving and transmitting taste information from the anterior two-thirds of the tongue.

- **Visceral/autonomic motor fibers** in the facial nerve are responsible for innervating the lacrimal gland, submandibular gland, sublingual gland, and the mucous membranes of the nasal cavity and hard and soft palates, allowing for production of tears, saliva, etc., from these locations.

- **Somatic motor fibers** in the facial nerve are responsible for innervating the muscles of facial expression and muscles in the scalp (which are derived from the second pharyngeal arch), as well as the stapedius muscle in the ear, the posterior belly of the digastric muscle, and the stylohyoid muscle.

# COURSE

- The motor root of the facial nerve originates in the facial (motor) nerve nucleus in the pons of the brainstem
- The fibers travel towards the floor of IV ventricle and go around the abducens nucleus and descend.
- The facial nerve emerges from the lateral surface of brainstem at the pontine-medullary junction between the VI and VIII nerves

- The motor root travels with the nervus intermedius (a smaller sensory root containing parasympathetic fibers, general sensory fibers, and special sensory fibers) in the cerebellopontine angle and
- enters the internal auditory meatus of the temporal bone
- ( accompanied by the vestibulocochlear nerve (CN VIII) and the labyrinthine artery and vein)

- The facial nerve roots then enter the facial canal in petrous part of temporal bone,----------GENICULATE GANGLION-------DONOT SYNAPSE HERE-----.I t is here, at the geniculate ganglion in the facial canal of the temporal bone, that the facial nerve gives off the greater petrosal nerve
- the first in a series of nerves which eventually carry preganglionic parasympathetic fibers to the lacrimal gland, stimulating lacrimation (tearing).

- It passes beneath the trigeminal ganglion and reach the foramen lacerum where it is joined by deep petrosal nerve to become the nerve of the pterygoid canal (Vidian nerve).
- The greater petrosal nerves contain parasympathetic fibers for the pterygopalatine ganglion and taste fibers.
- As the facial nerve continues to travel along bony canal, two more branches emerge:
- the nerve to stapedius, the chorda tympani, and preganglionic parasympathetic fibers.

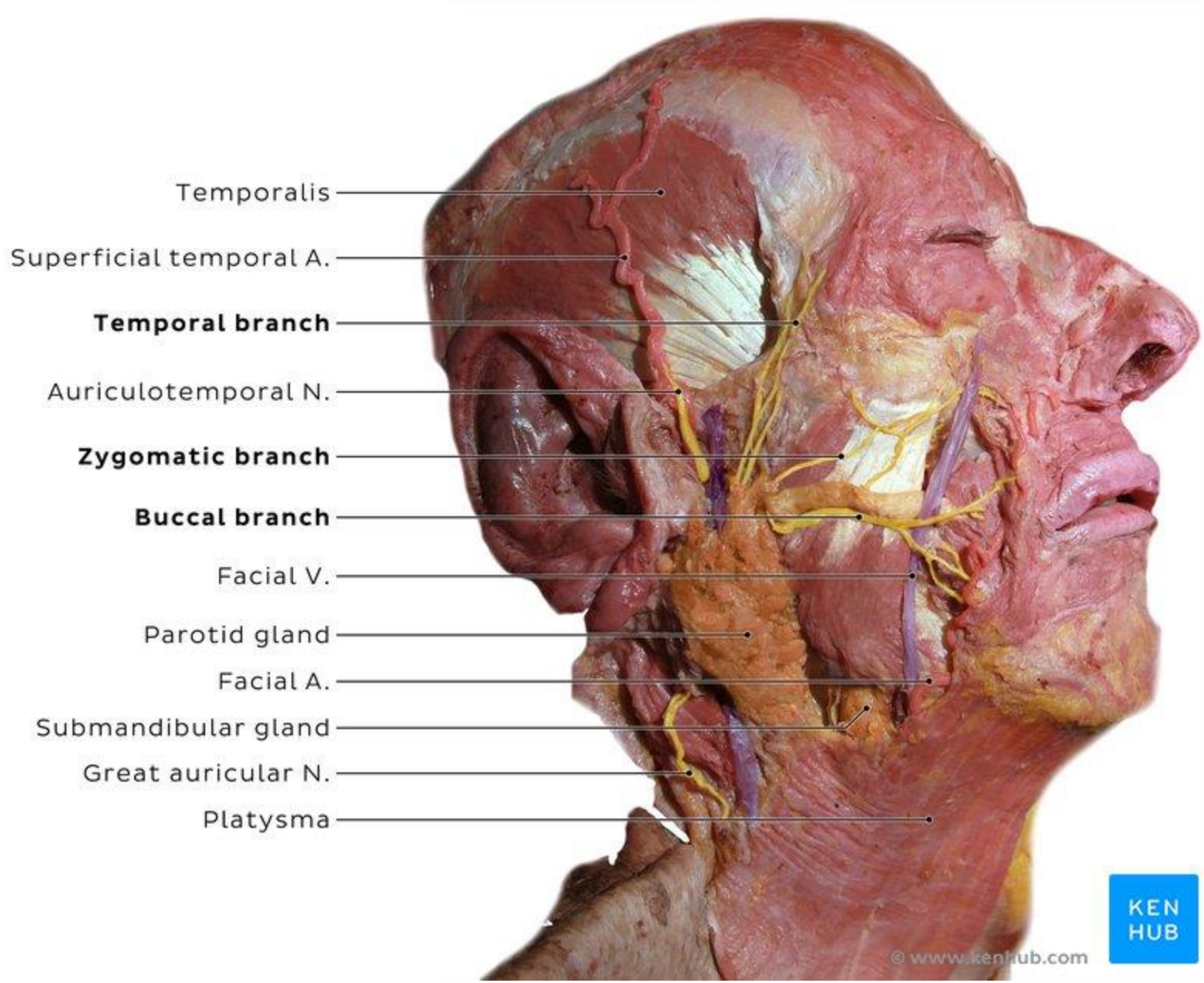
- The nerve to stapedius innervates the stapedius muscle, as its name suggests.
- The stapedius muscle attaches to the posterior surface of the stapes, one of the three ossicles of the middle ear.

- The chorda tympani leaves the facial nerve above the stylomastoid foramen and is responsible for transmitting taste sensation, from the anterior two-thirds of the tongue.
- It passes through the posterior wall of the middle ear, crosses the neck of the malleus and emerges at the medial end of petrotympanic fissure.
- It joins the posterior aspect of lingual nerve at an acute angle and carries taste fibers for the anterior two-third of tongue and
- efferent preganglionic parasympathetic fibers to the submandibular ganglion which are responsible for innervating the submandibular gland, stimulating salivary secretions.

- The facial nerve exits skull via stylomastoid foramen;
- nearby, it gives off the posterior auricular nerve which is meant to supply the occipital belly of the occipitofrontalis muscle
- and some of the auricular muscles
- , and nerves to the posterior belly of the digastric and
- the stylohyoid

# Terminal branches on face

- . The nerve then enters the parotid gland, from whence it gives off five terminal branches–
  the temporal, zygomatic, buccal, marginal mandibular,
  and cervical branches–
- which emerge from around the parotid gland and innervate structures across the entire face.


Temporalis
Superficial temporal A.
Temporal branch
Auriculotemporal N.
Zygomatic branch
Buccal branch
Facial V.
Parotid gland
Facial A.
Submandibular gland
Great auricular N.
Platysma
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# PARASYMPATHETIC FUNCTIONS

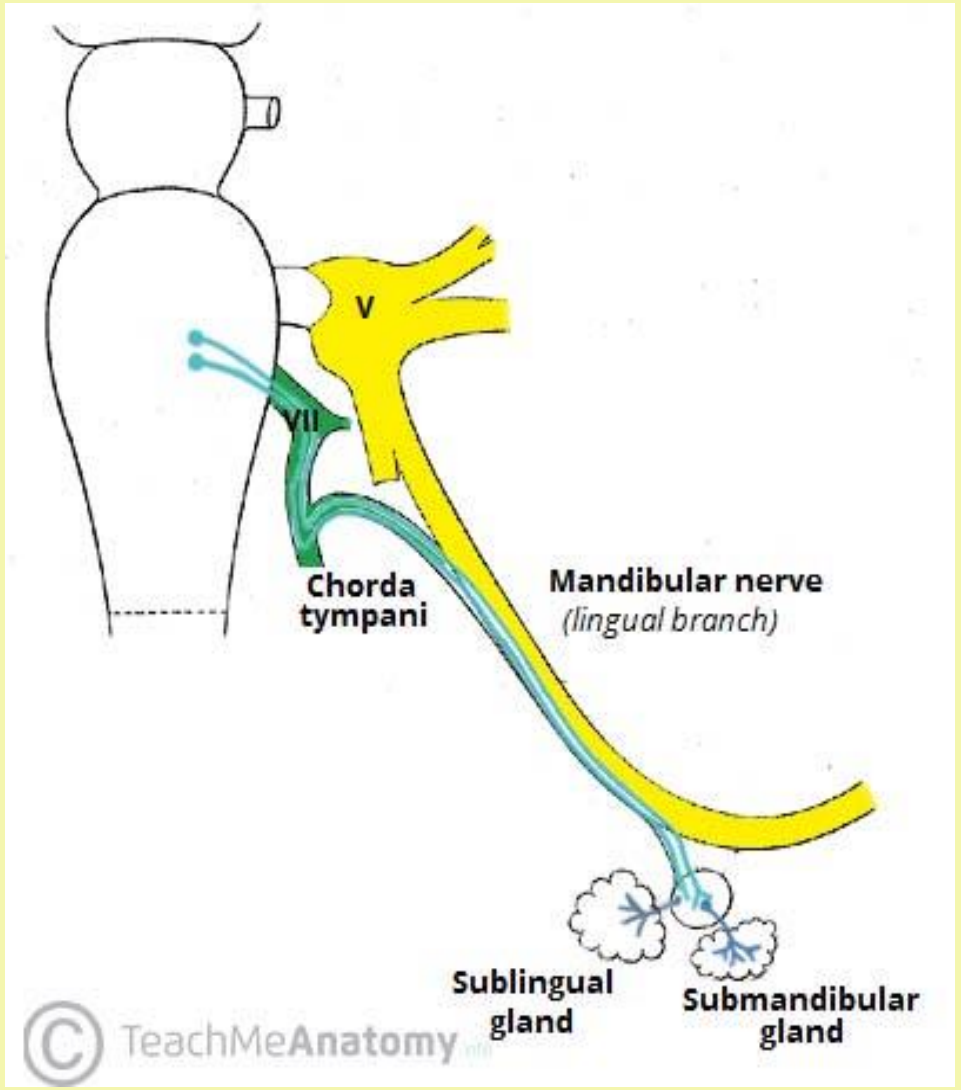
The parasympathetic fibres of the facial nerve are carried by the **greater petrosal** and **chorda tympani** branches.

- **Greater Petrosal Nerve**
- The greater petrosal nerve arises immediately distal to the **geniculate ganglion** within the facial canal. It then moves in anteromedial direction, exiting the temporal bone into the **middle cranial fossa**. From here, its travels across (but not through) the foramen lacerum, combining with the deep petrosal nerve to form the **nerve of the pterygoid canal**.
- The nerve of pterygoid canal then passes through the pterygoid canal (Vidian canal) to enter the **pterygopalatine fossa**, and synapses with the pterygopalatine ganglion. Branches from this ganglion then go on to provide parasympathetic innervation to the **mucous glands** of the oral cavity, nose and pharynx, and the **lacrimal gland**.

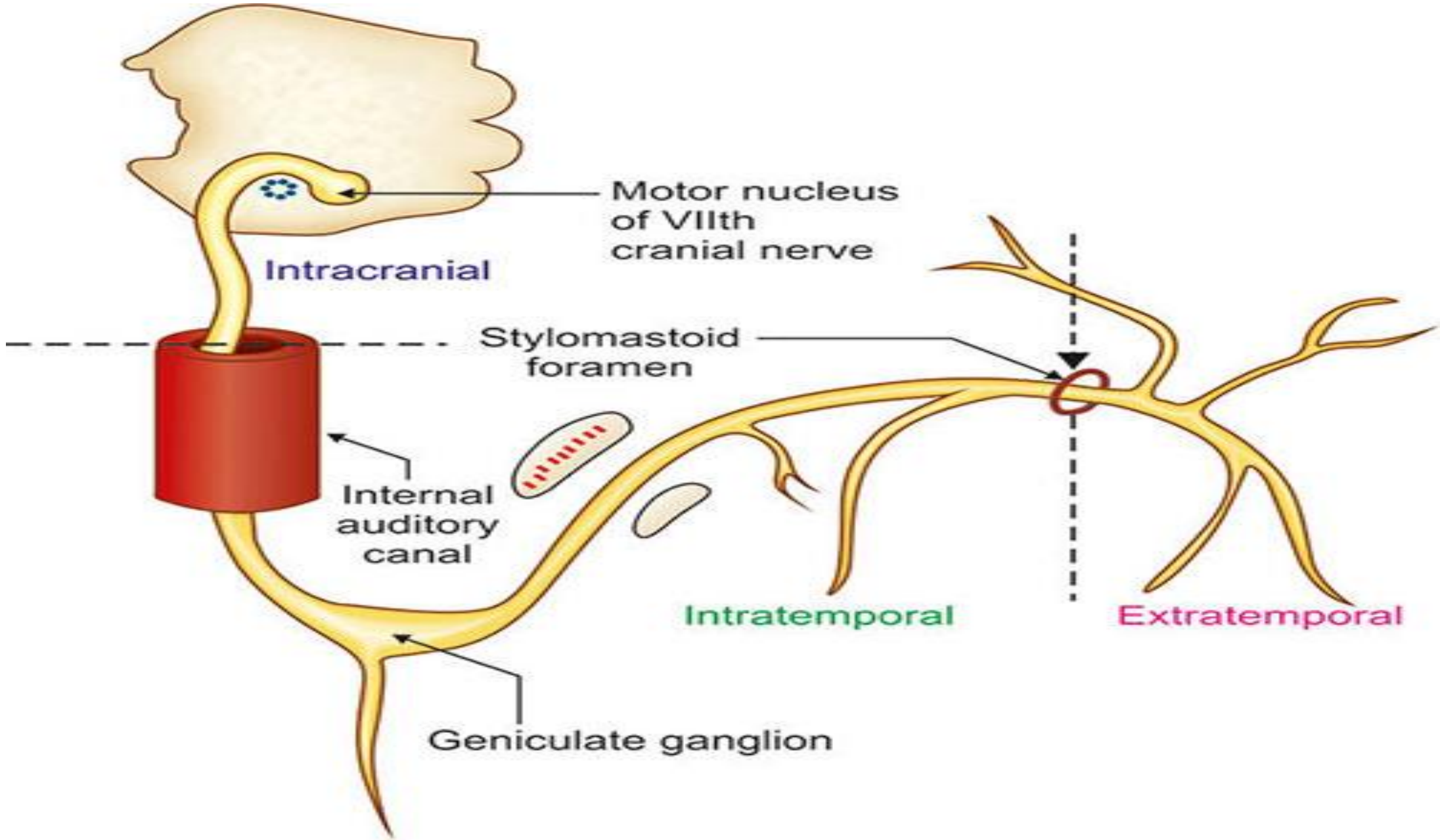
# PARASYMPATHETIC FUNCTIONS (CONTD)

## Chorda Tympani

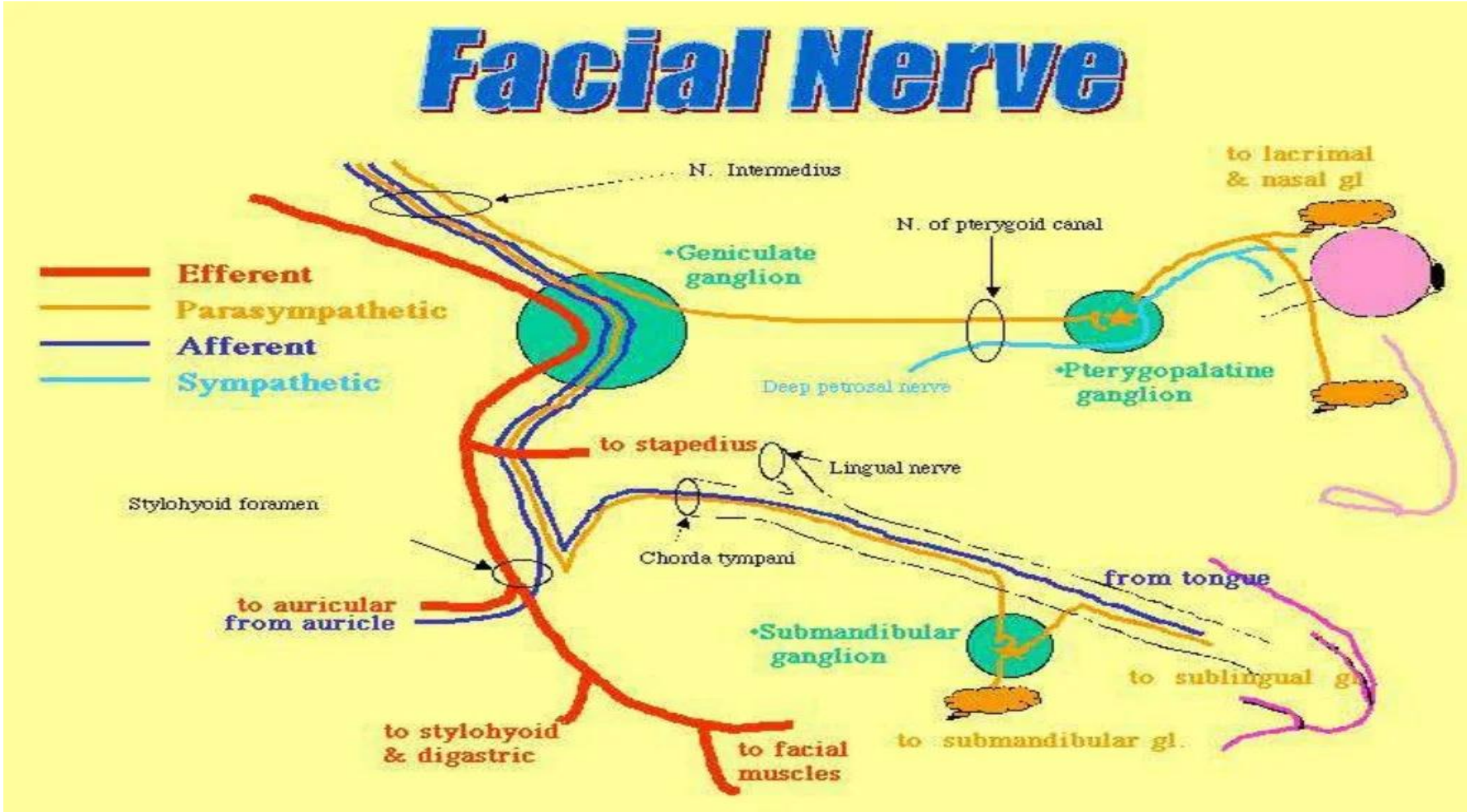
- The **chorda tympani** also carries some parasympathetic fibres. These combine with the **lingual nerve** (a branch of the trigeminal nerve) in the **infratemporal fossa** and separate from lingual nerve and enter **submandibular ganglion**. Branches from this ganglion travel to the submandibular and sublingual **salivary glands**.



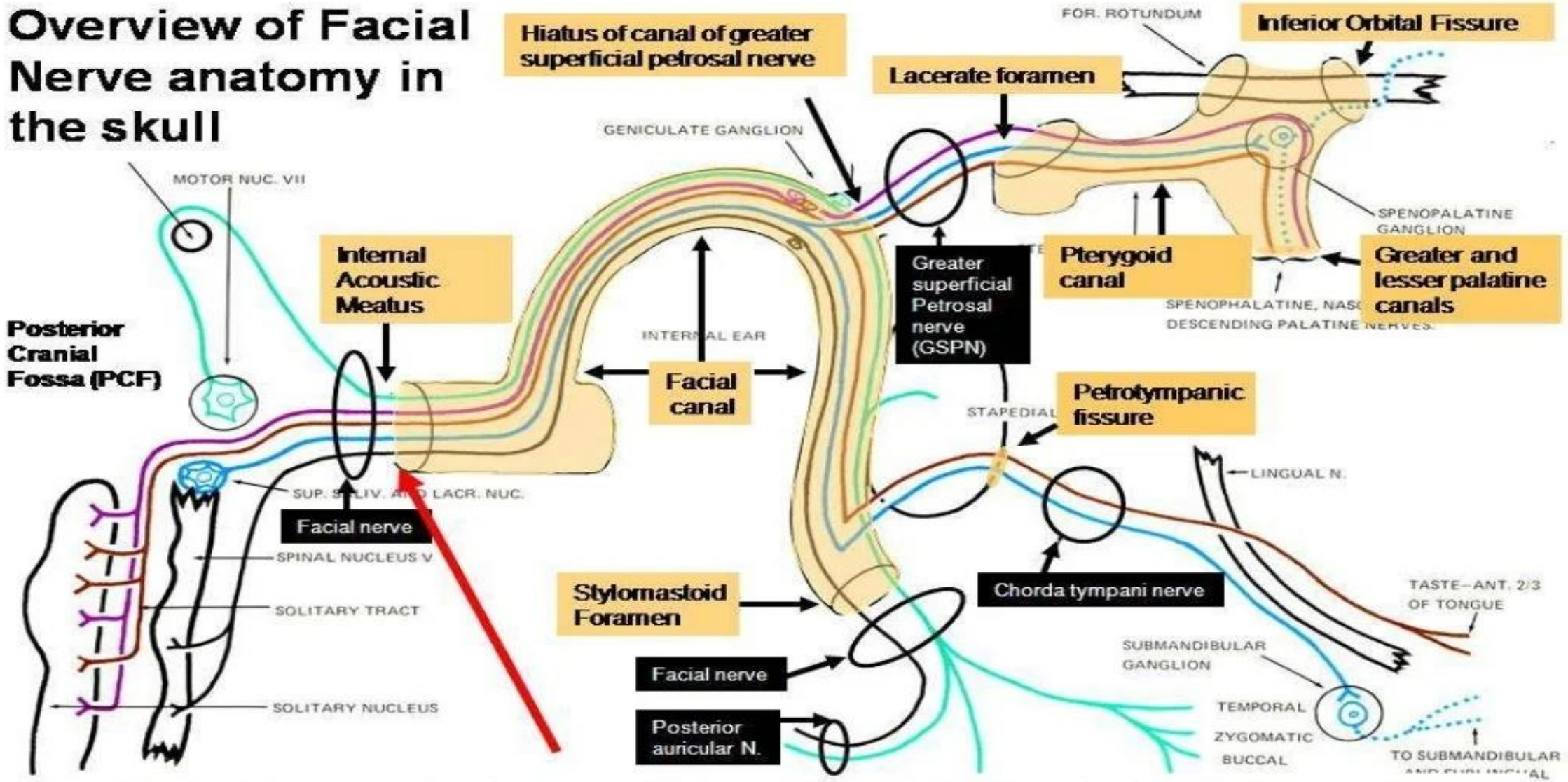

THE SUBMANDIBULAR GANGLION.


Motor nucleus
of VIIth
cranial nerve
Intracranial
Stylomastoid
foramen
Internal
auditory
canal
Intratemporal
Extratemporal
Geniculate ganglion

# Facial Nerve



# Overview of Facial Nerve anatomy in the skull




**The facial nerve exits the posterior cranial fossa (PCF) at the internal acoustic meatus.**

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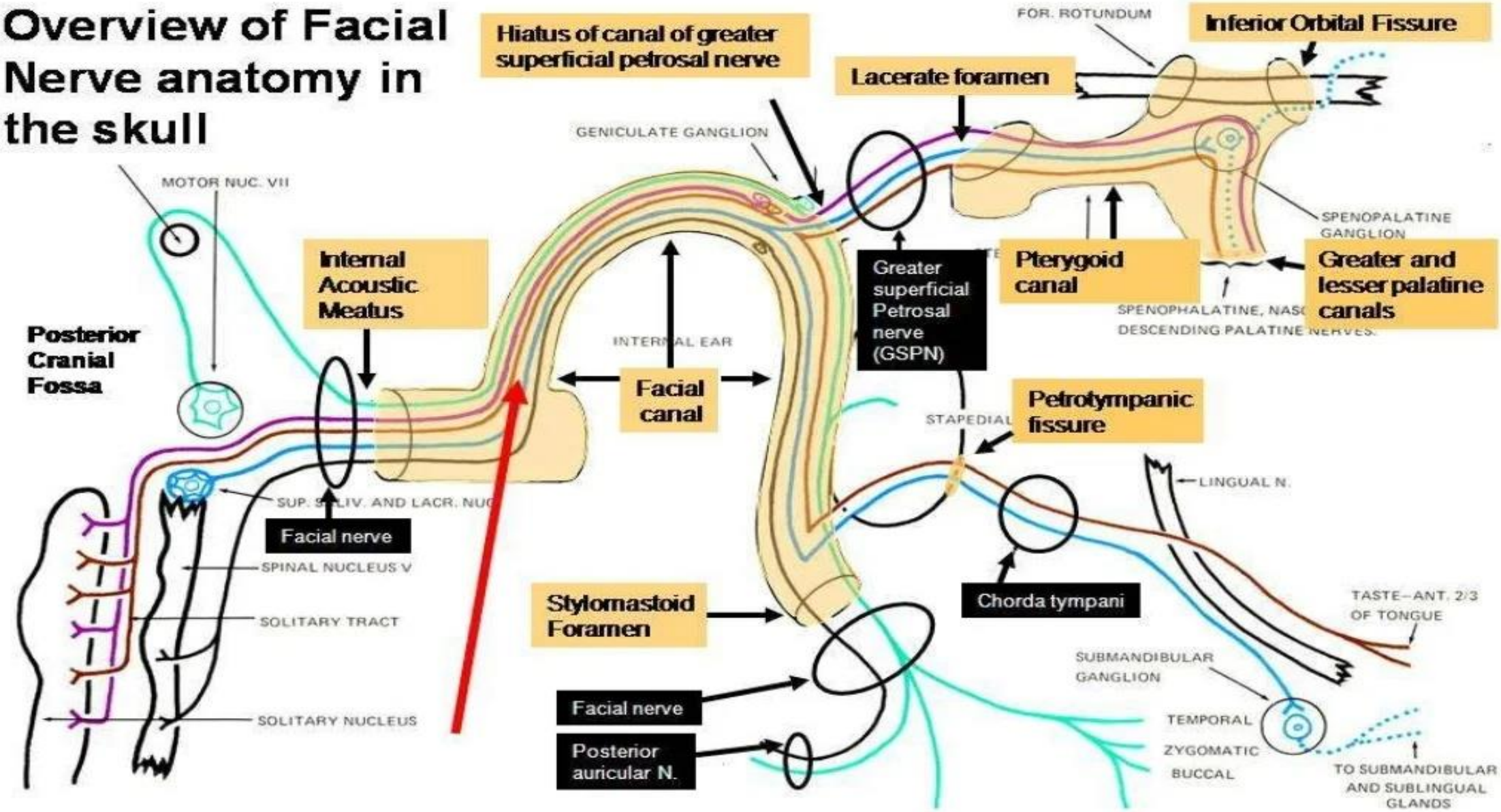
# Overview of Facial Nerve anatomy in the skull




**Within the internal acoustic meatus the facial nerve enters the facial canal.**

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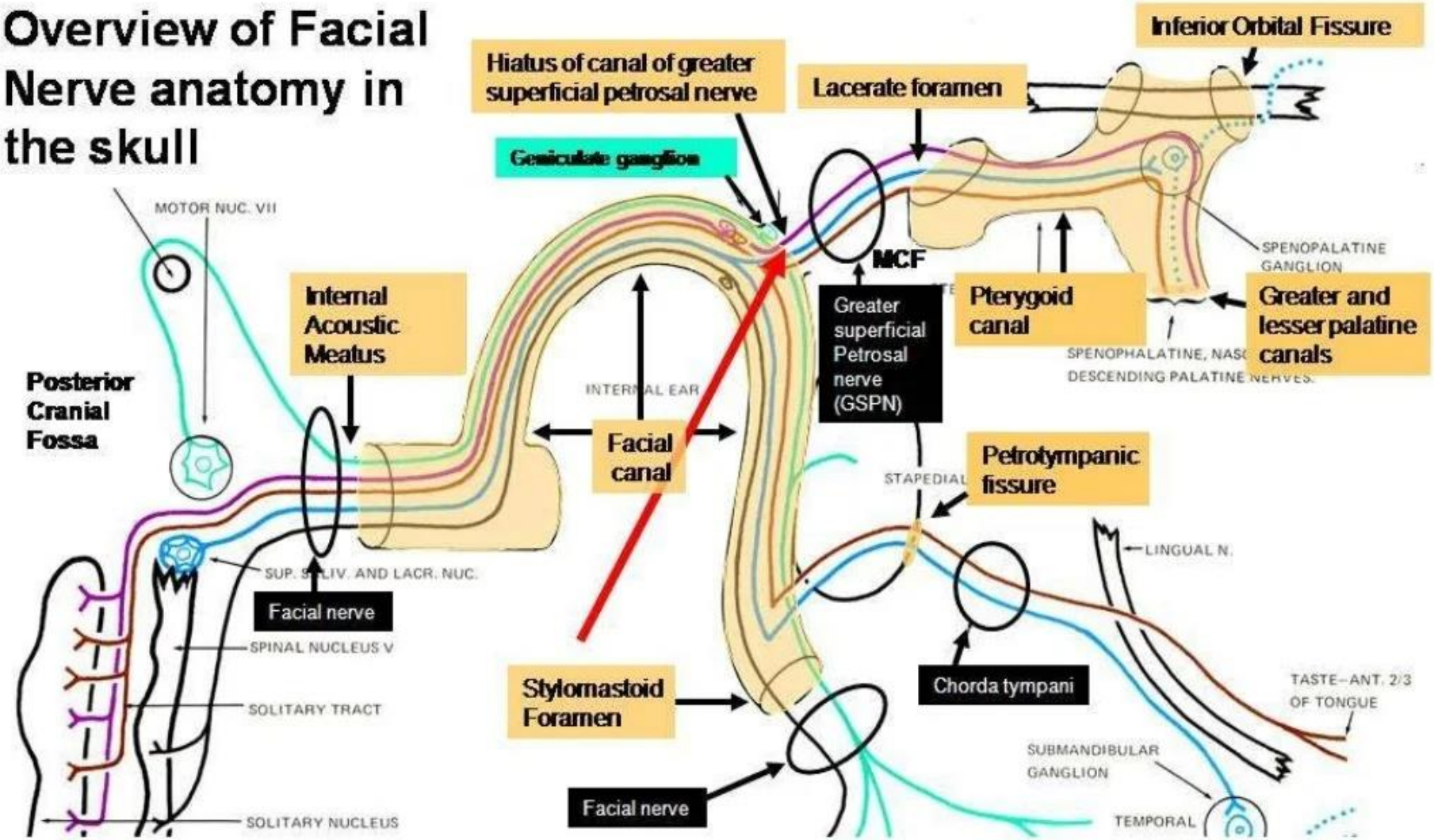
# Overview of Facial Nerve anatomy in the skull




**The first branch of the facial nerve, the greater superficial petrosal nerve (GSPN) branches from the geniculate ganglion within the genu of the facial canal and enters the middle cranial fossa (MCF) by way of the hiatus of the canal for the GSPN.**

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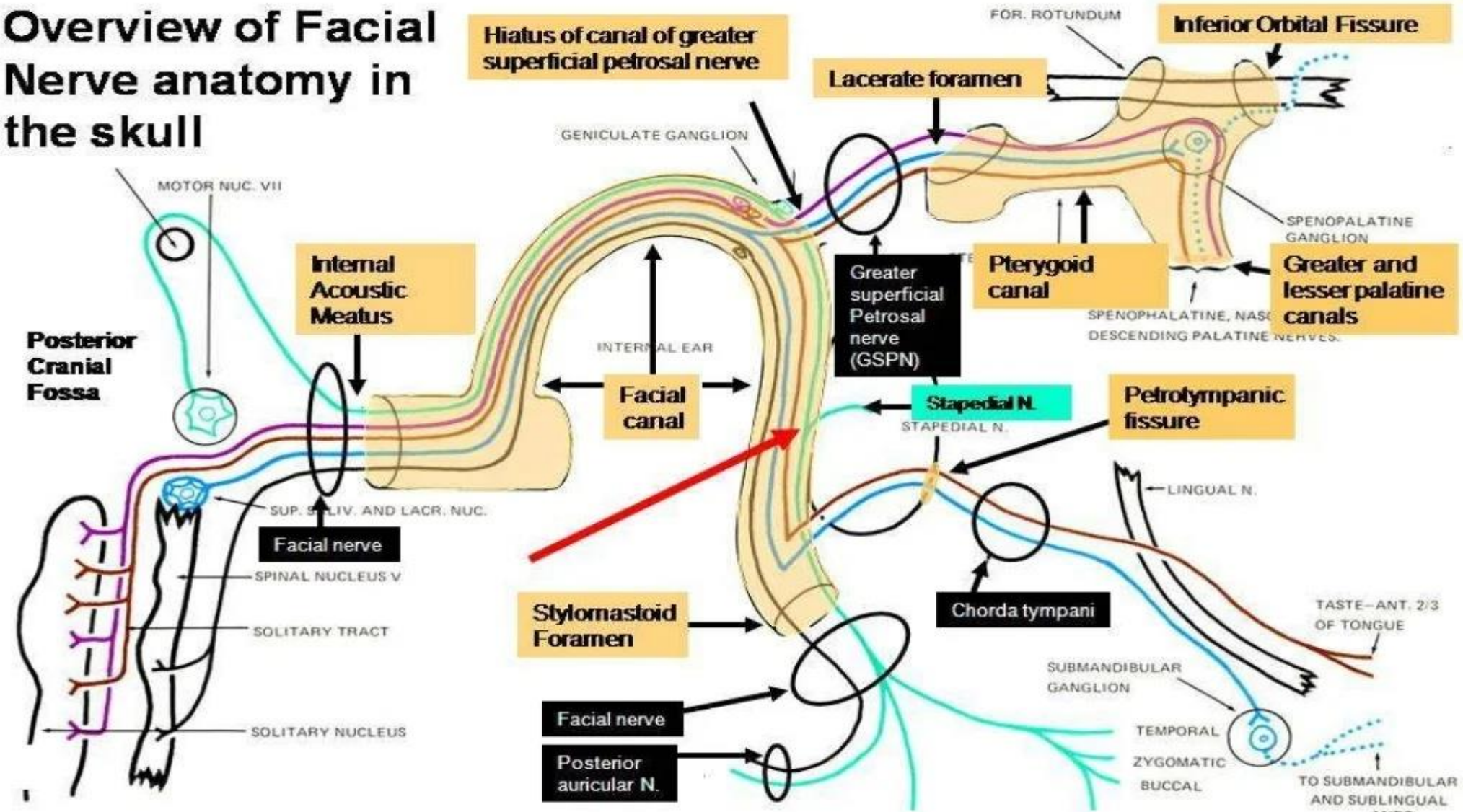
# Overview of Facial Nerve anatomy in the skull




**The second branch of the facial nerve, the stapedial nerve, branches from the descending portion of the facial nerve and enters the middle ear.**

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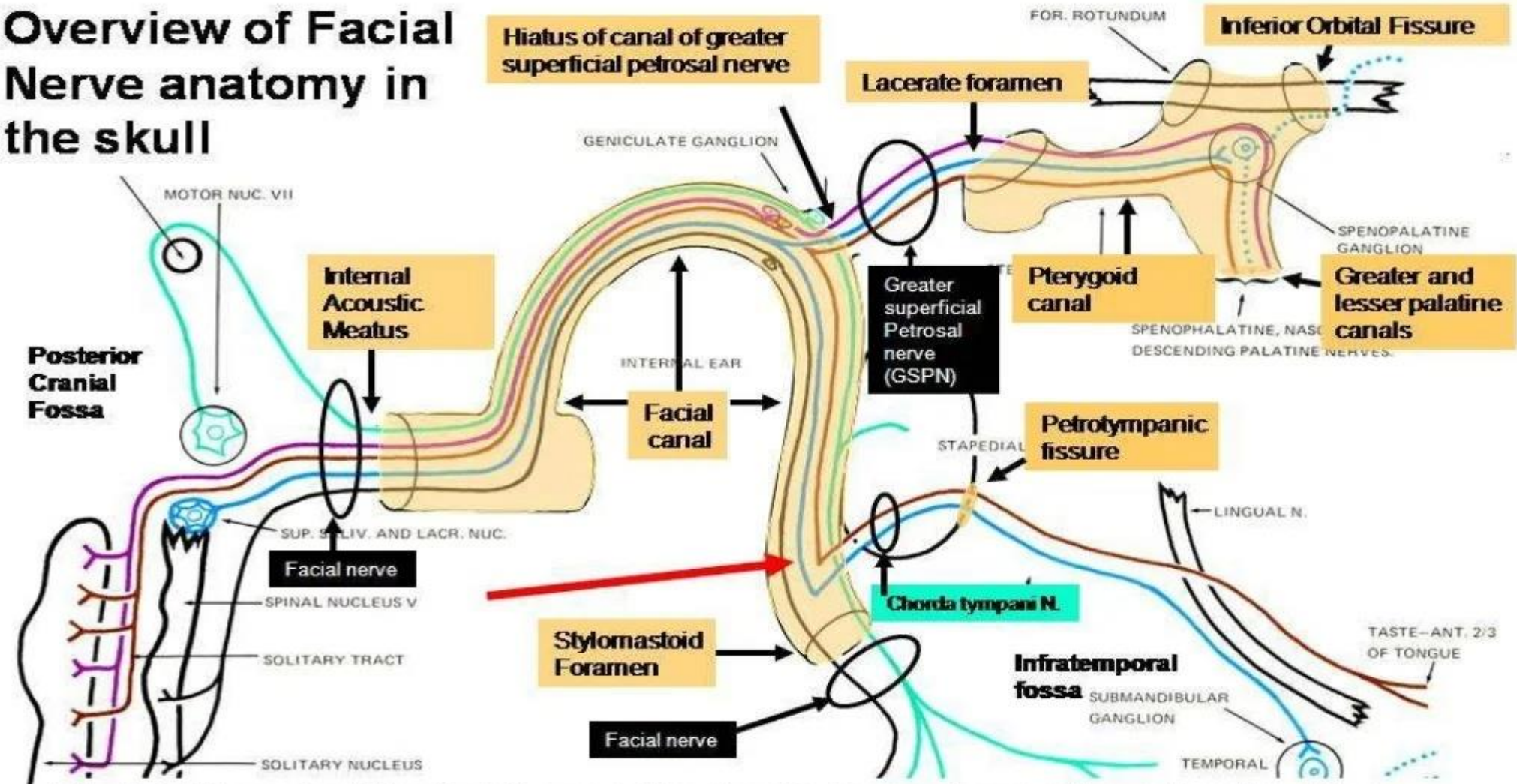
# Overview of Facial Nerve anatomy in the skull




**The third branch of the facial nerve, the chorda tympani nerve, branches from the descending portion of the facial nerve and enters the middle ear. Within the middle ear the chorda tympani nerve crosses the medial surface of the tympanic membrane. It then passes through the petrotympanic fissure to enter the infratemporal fossa.**

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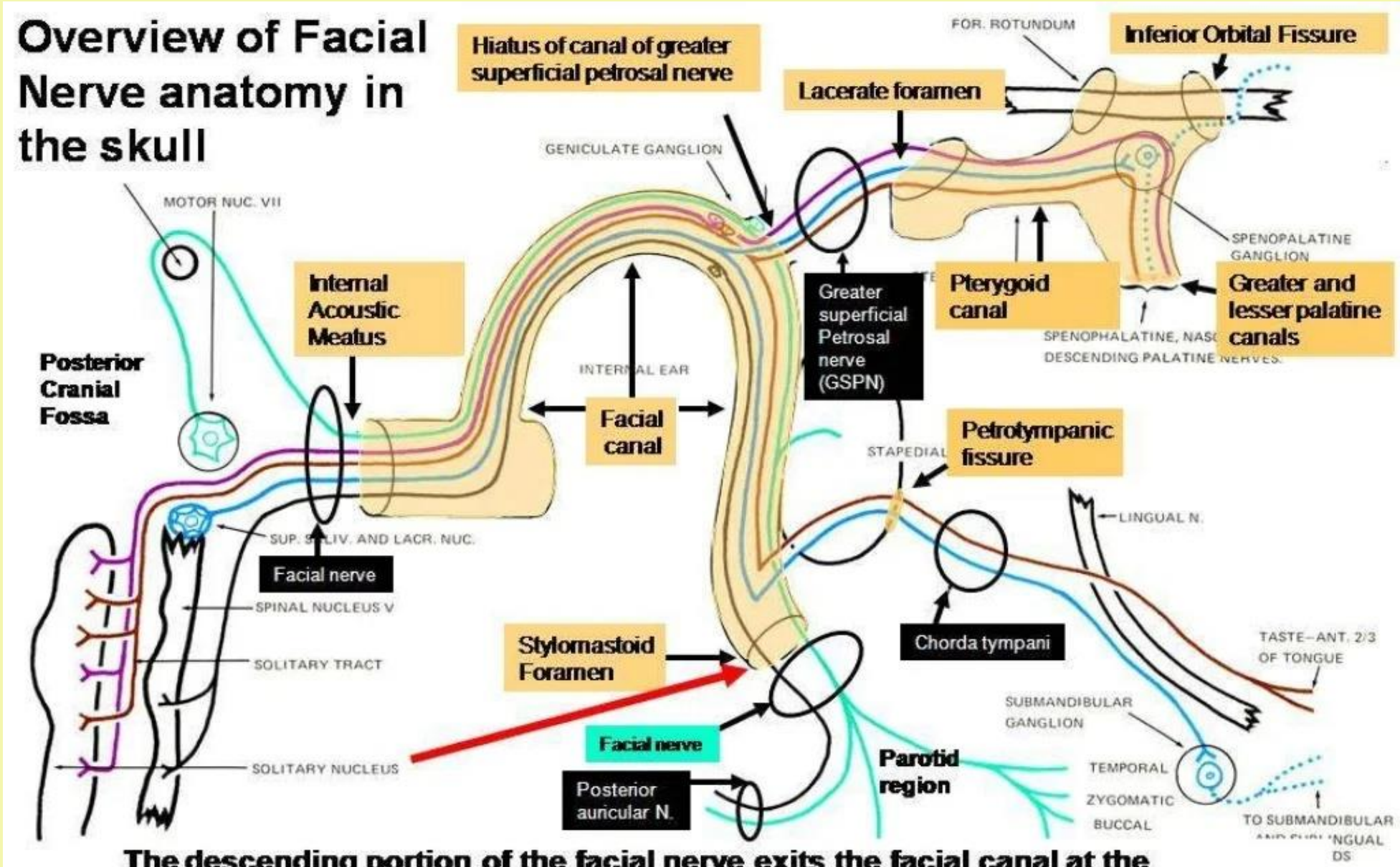
# Overview of Facial Nerve anatomy in the skull




**The descending portion of the facial nerve exits the facial canal at the stylomastoid foramen and continues into the parotid region**

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# Clinical Relevance:
# Damage to the Facial Nerve

- The facial nerve has a wide range of functions. Thus, damage to the nerve can produce a varied set of symptoms, depending on the site of the lesion.
- **Intracranial Lesions**
- Intracranial lesions occur during the intracranial course of the facial nerve (proximal to the stylomastoid foramen).
- The muscles of facial expression will be paralysed or severely weakened. The other symptoms produced depend on the location of the lesion, and the branches that are affected:
- **Chorda tympani** – reduced salivation and loss of taste on the ipsilateral 2/3 of the tongue.
- **Nerve to stapedius** – ipsilateral hyperacusis (hypersensitive to sound).
- **Greater petrosal nerve** – ipsilateral reduced lacrimal fluid production.
- The most common cause of an intracranial lesion of the facial nerve is infection related to the external or middle ear. If no definitive cause can be found, the disease is termed Bell's palsy.

# Geniculate ganglion

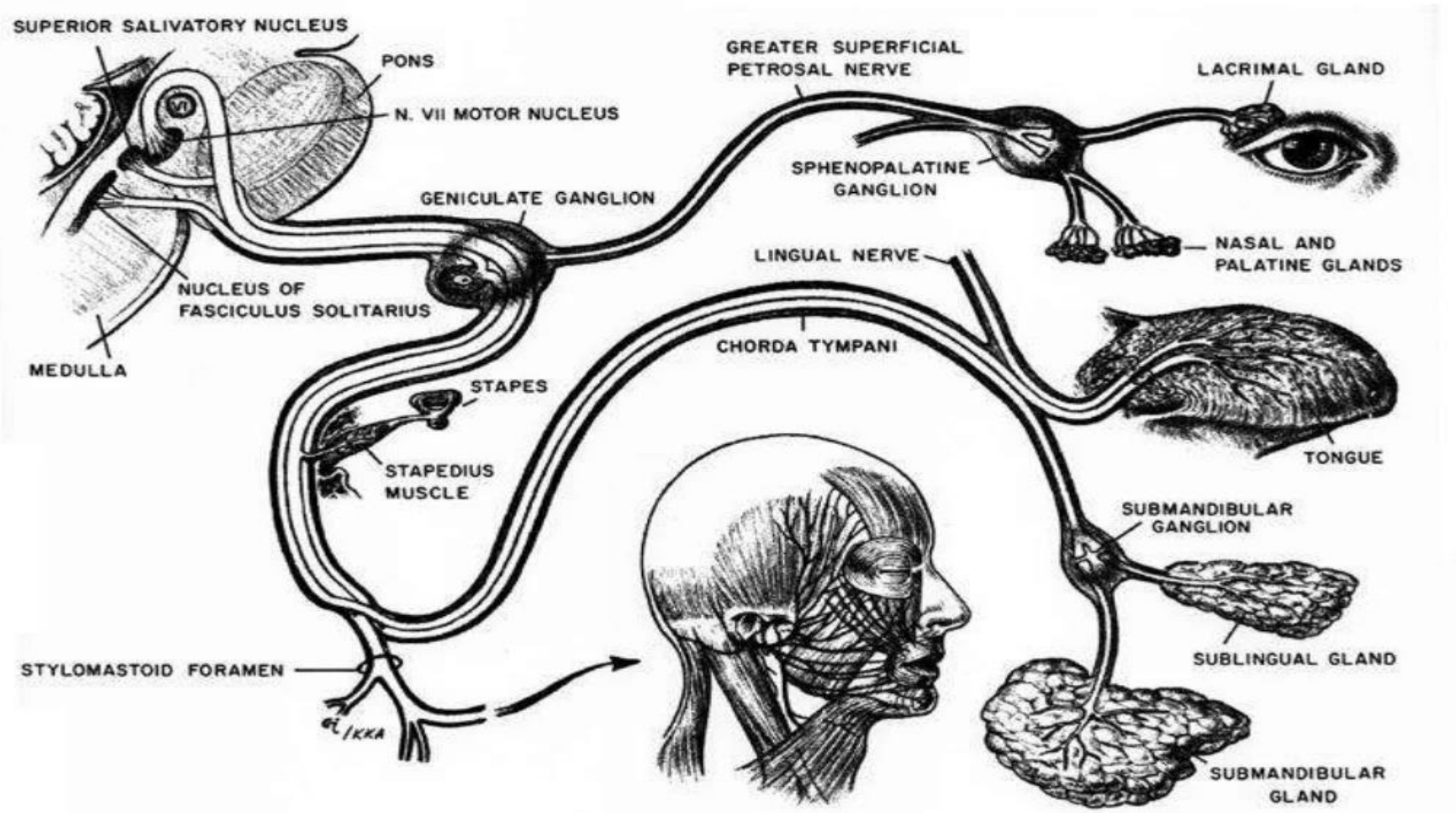
- Located on the 1st bend of facial nerve, in relation to the medial wall of the middle ear.
- It is a sensory ganglion.
- The taste fibers present in the nerve are peripheral processes of pseudounipolar neurons present in the geniculate ganglion.

# Submandibular ganglion

- Parasympathetic ganglion.
- For relay of secretomotor fibres to the submandibular and sublingual glands.

# Pterygopalatine ganglion

- Parasympathetic ganglion.
- Secretomotor fibers meant for the lacrimal gland relay in this ganglion.


SUPERIOR SALIVATORY NUCLEUS
PONS
N. VII MOTOR NUCLEUS
GENICULATE GANGLION
NUCLEUS OF FASCICULUS SOLITARIUS
MEDULLA
GREATER SUPERFICIAL PETROSAL NERVE
SPHENOPALATINE GANGLION
LACRIMAL GLAND
NASAL AND PALATINE GLANDS
LINGUAL NERVE
CHORDA TYMPANI
STAPES
STAPEDIUS MUSCLE
TONGUE
SUBMANDIBULAR GANGLION
SUBLINGUAL GLAND
SUBMANDIBULAR GLAND
STYLOMASTOID FORAMEN
GLIKKA