Facial Nerve (CN VII)

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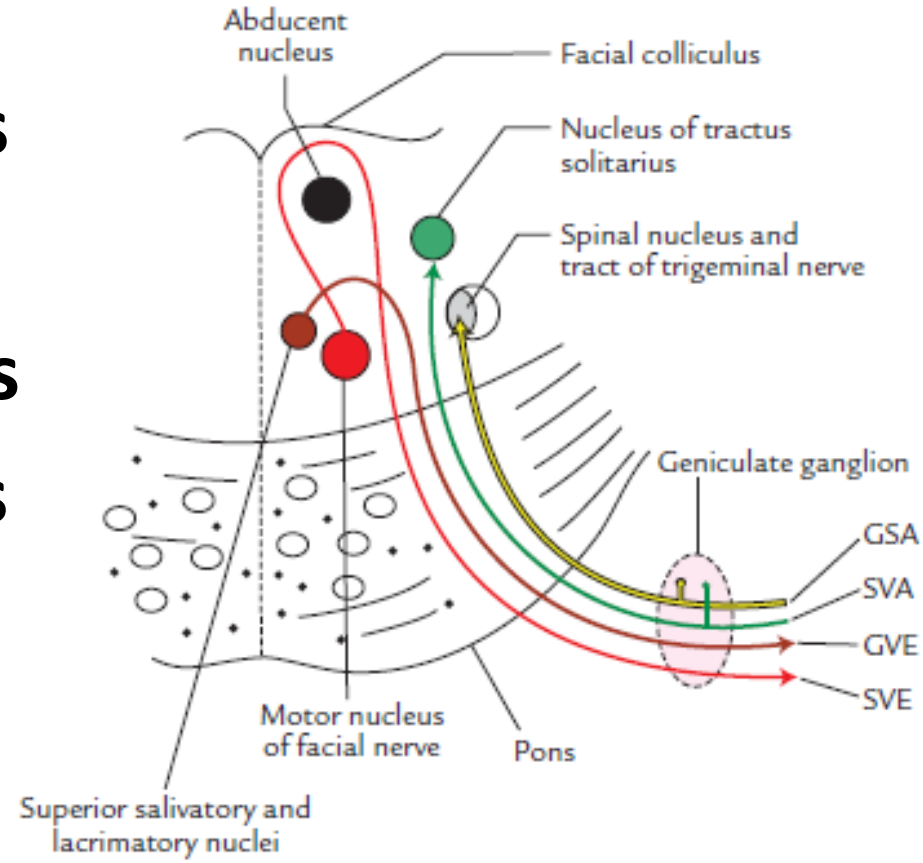
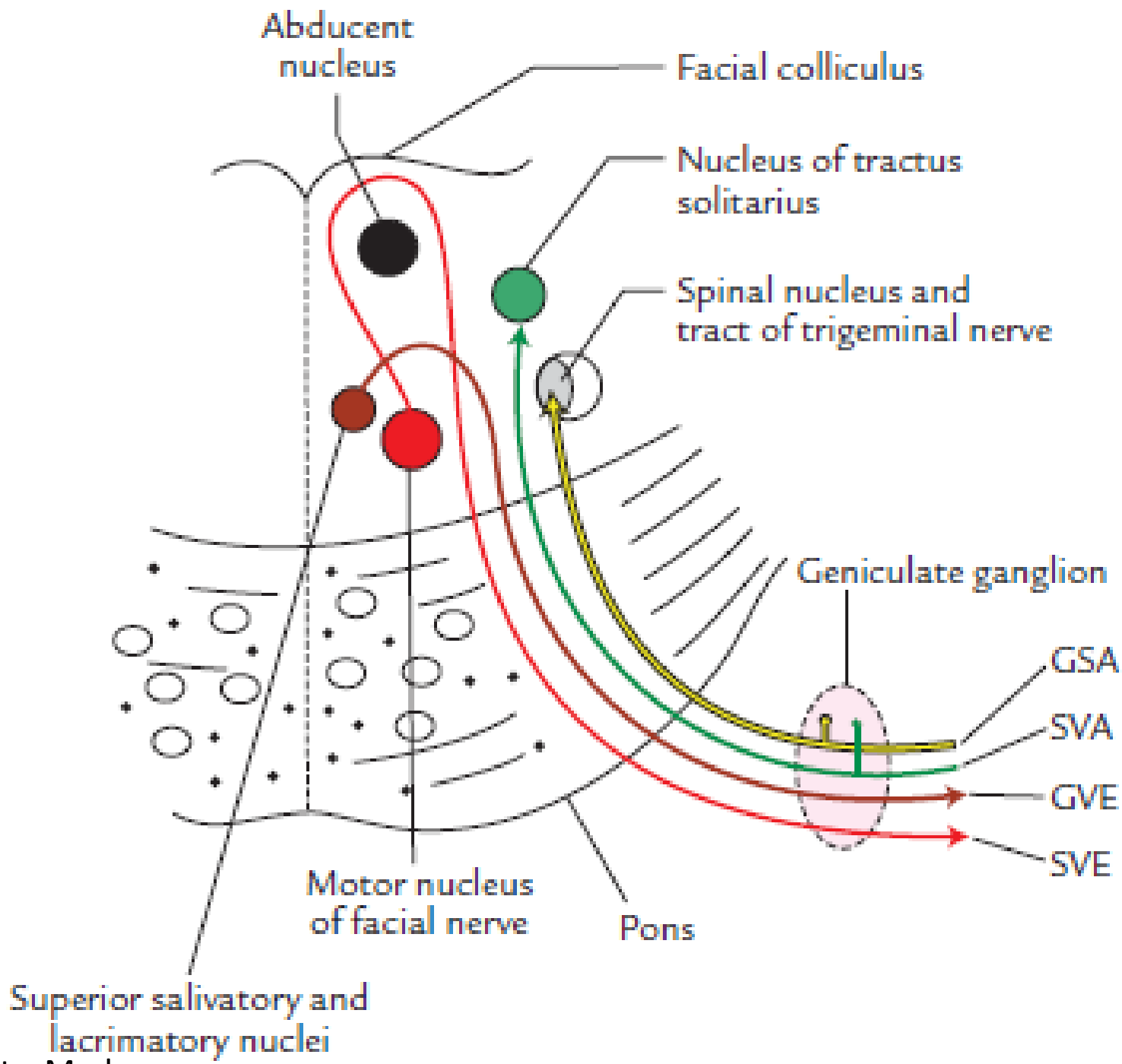
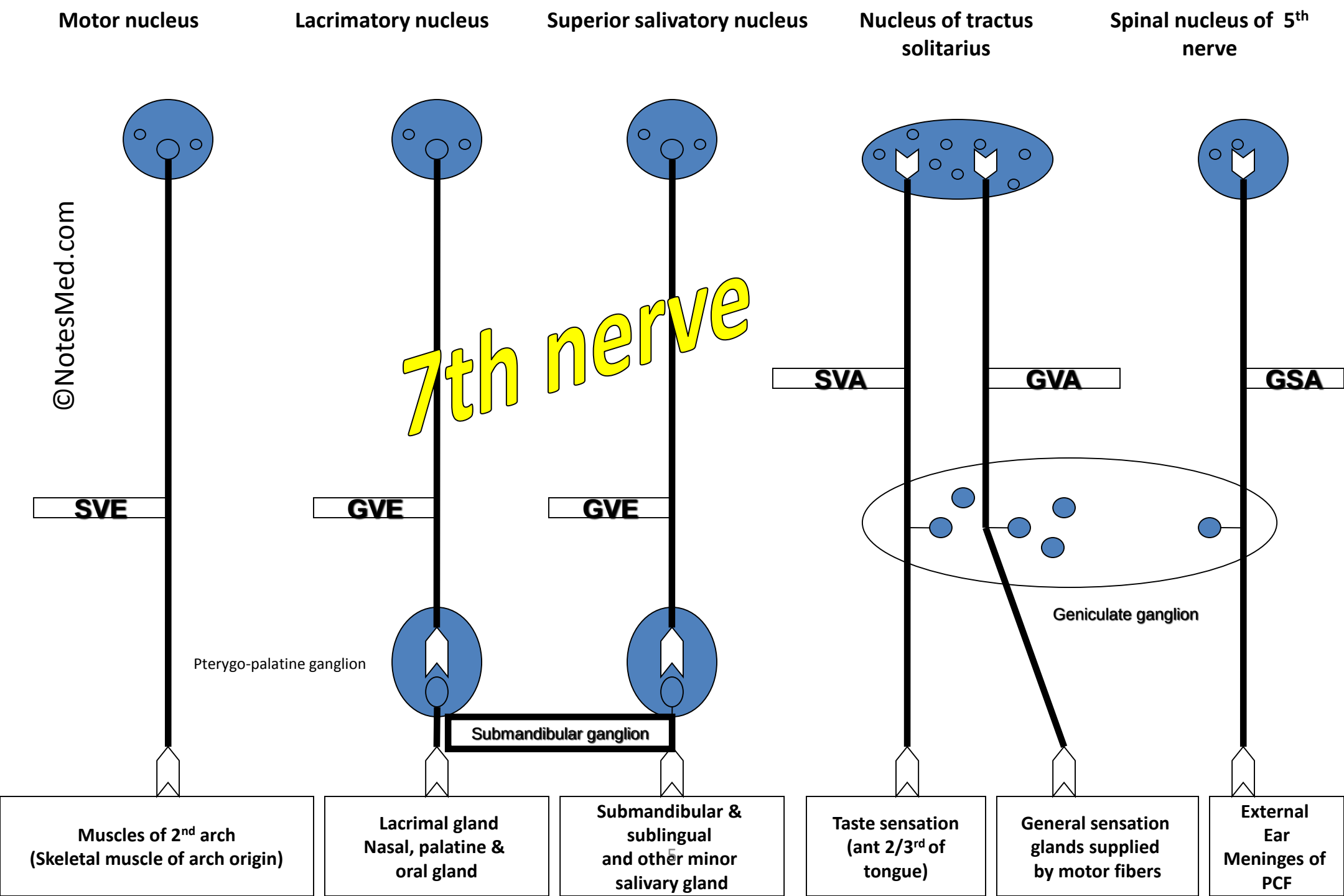
- It is a mixed (i.e., motor and sensory) nerve, but predominantly it is motor.
- It is so called facial nerve because it supplies the muscles of facial expression.
- It is most frequently paralyzed

Functional Components

- Special visceral efferent fibres
- General visceral efferent fibres
- Special visceral afferent fibres
- General somatic afferent fibres
- General visceral afferent fibres






Motor nucleus
Lacrimatory nucleus
Superior salivatory nucleus
Nucleus of tractus solitarius
Spinal nucleus of 5th nerve
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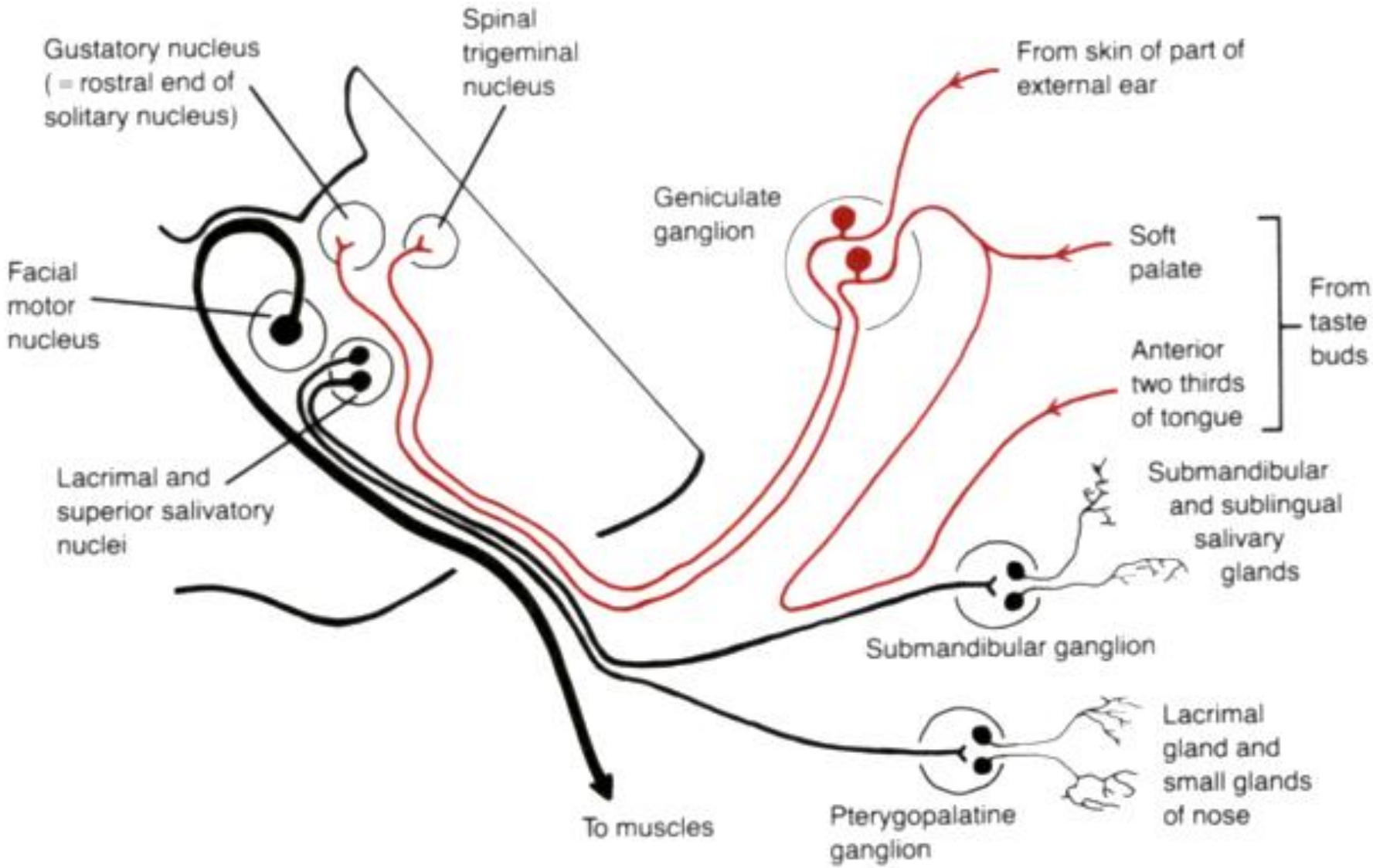
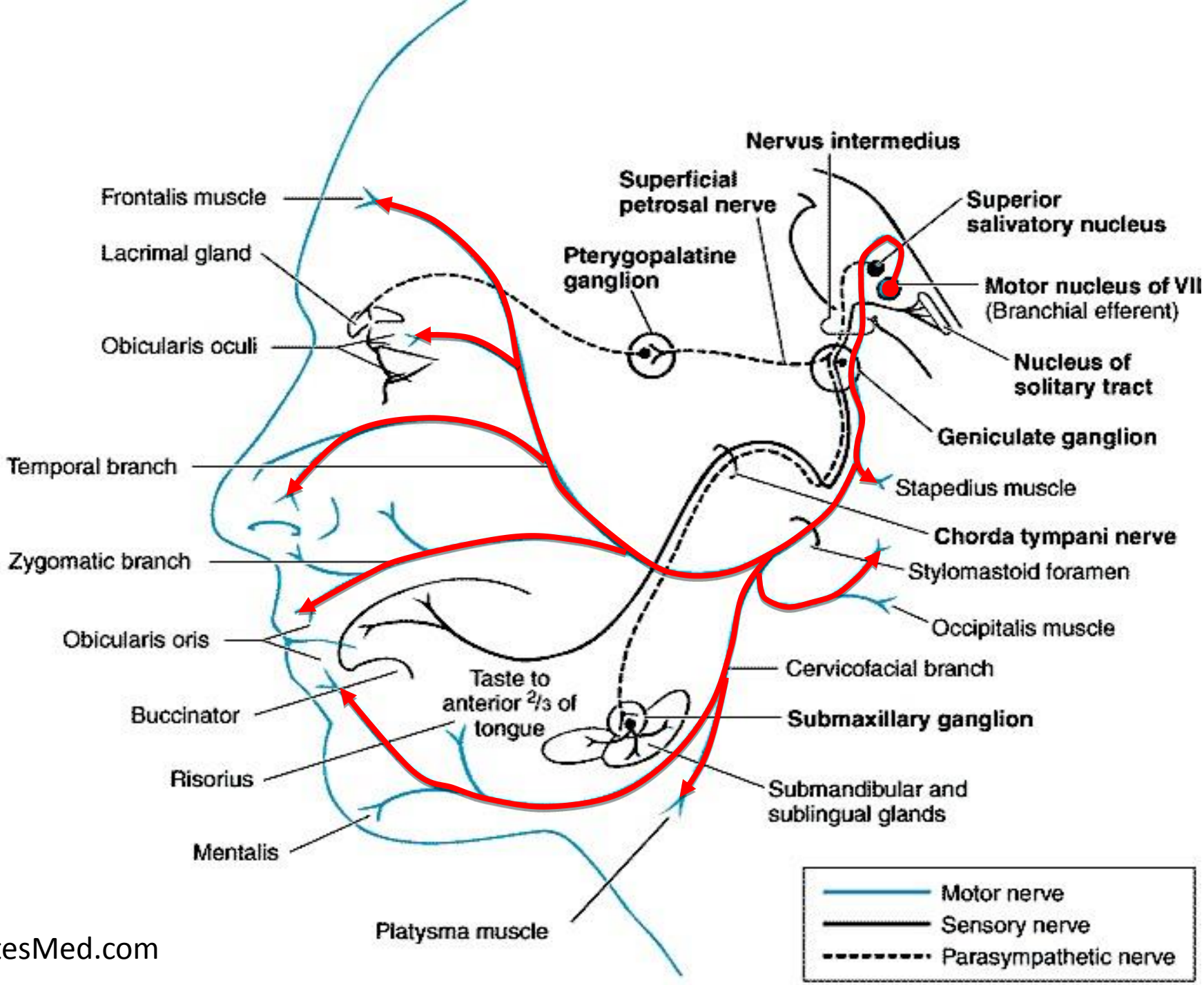
7th nerve
SVE
GVE
GVE
SVA
GVA
GSA
Pterygo-palatine ganglion
Submandibular ganglion
Geniculate ganglion
Muscles of 2nd arch (Skeletal muscle of arch origin)
Lacrimal gland Nasal, palatine & oral gland
Submandibular & sublingual and other minor salivary gland
Taste sensation (ant 2/3rd of tongue)
General sensation glands supplied by motor fibers
External Ear Meninges of PCF

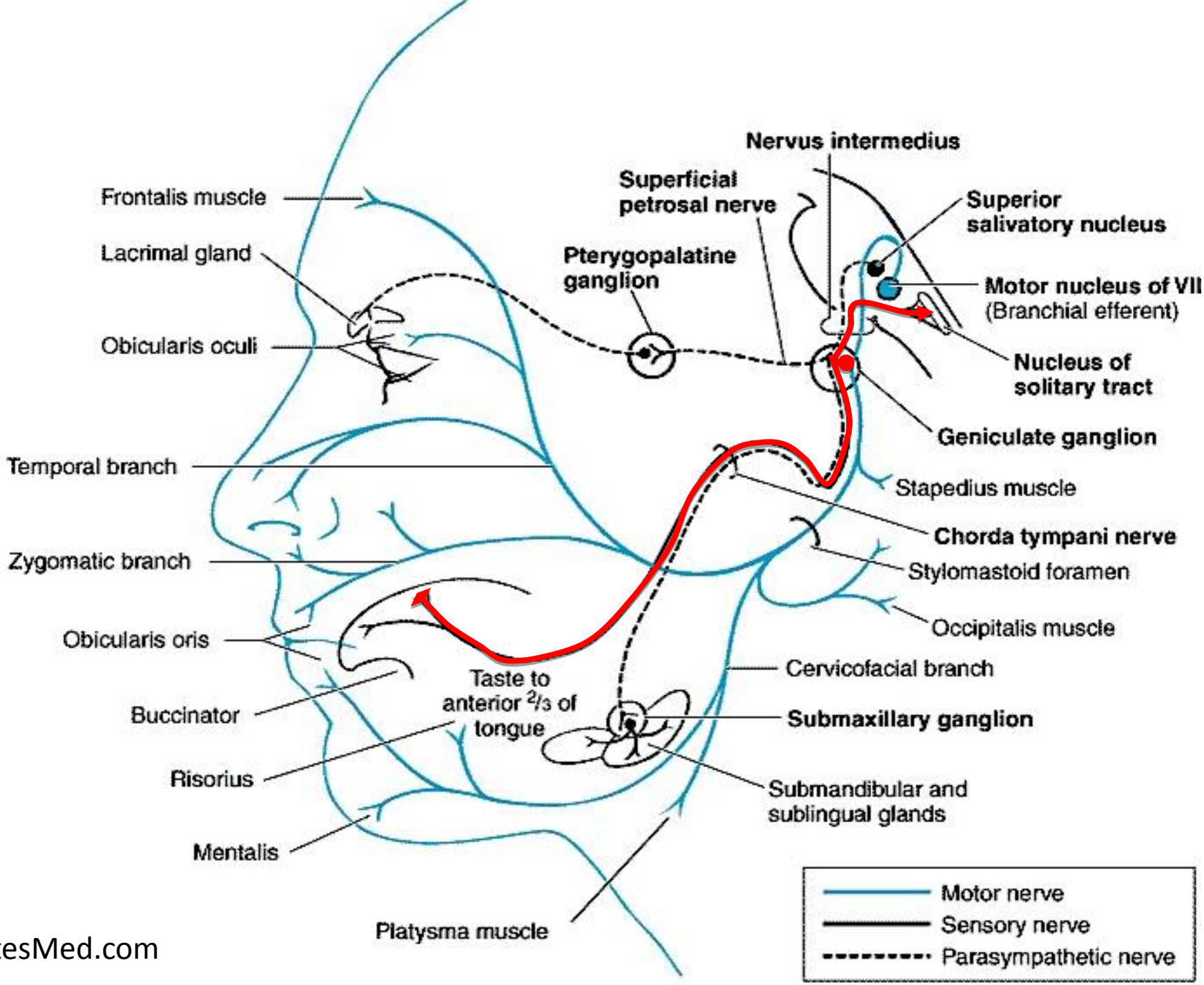
Facial Nerve Nuclei

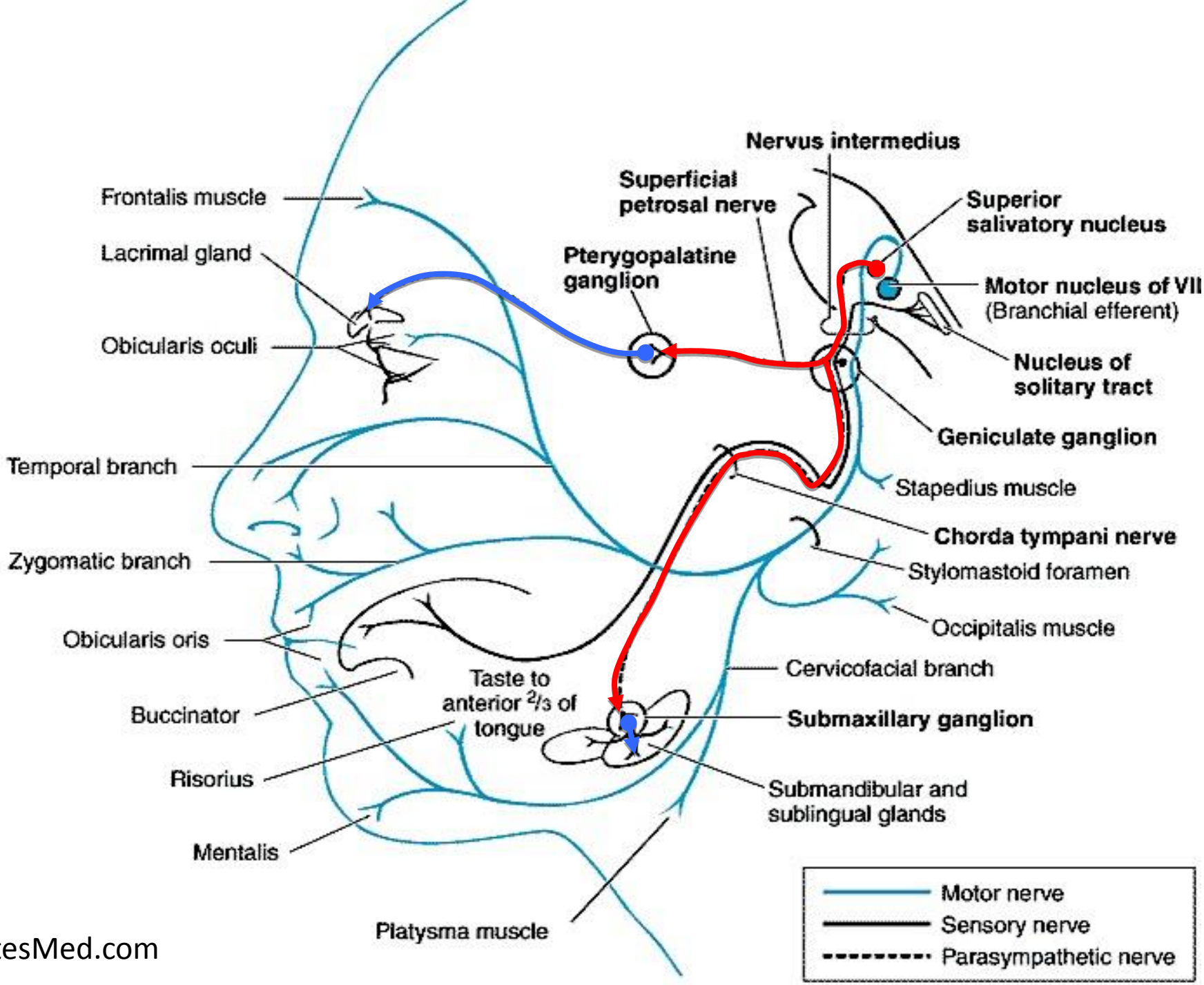
The facial nerve has **three nuclei:**

- **Main motor nucleus.**
- **Parasympathetic nuclei.**
- **Sensory nucleus.**





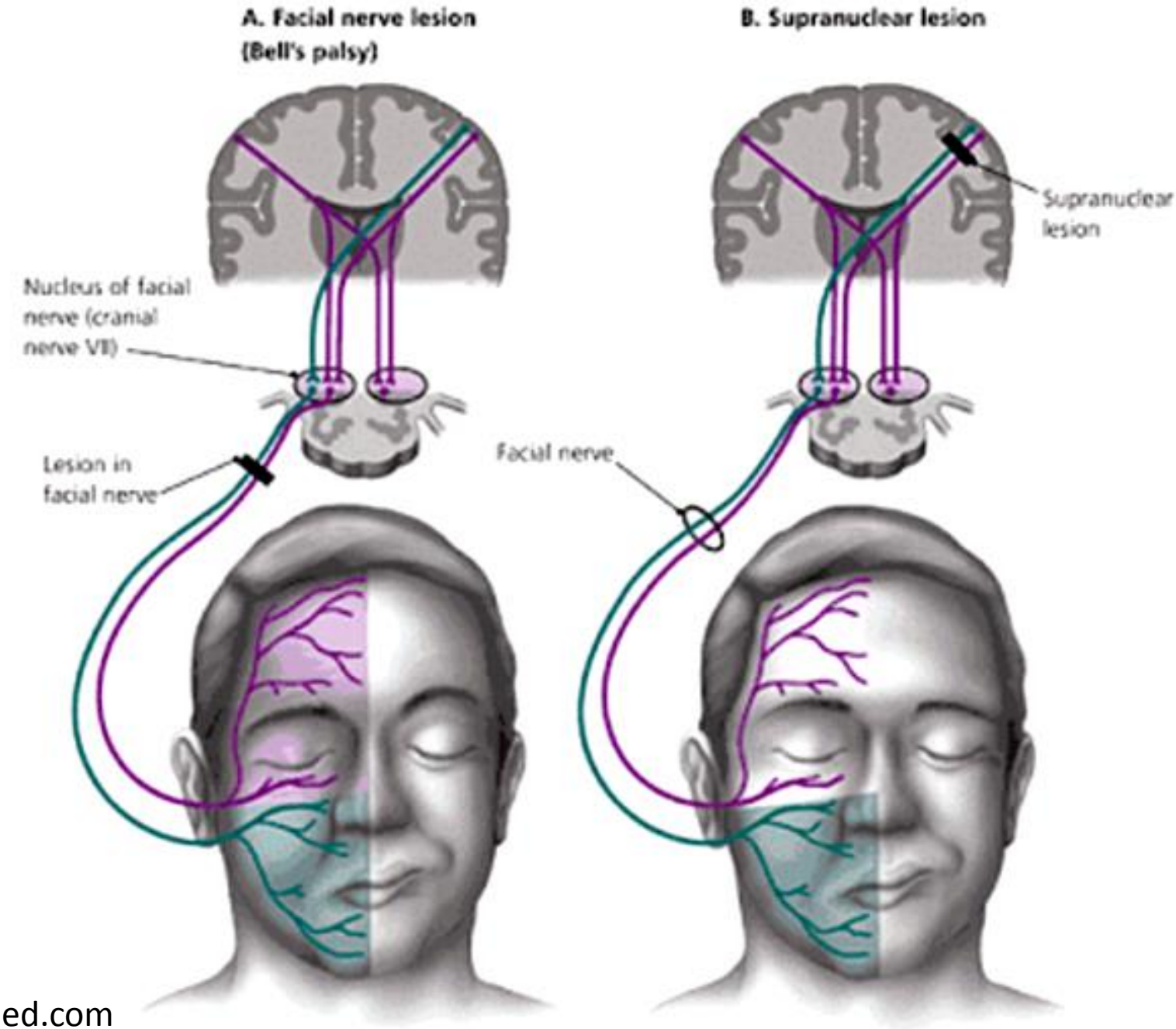




Main Motor Nucleus

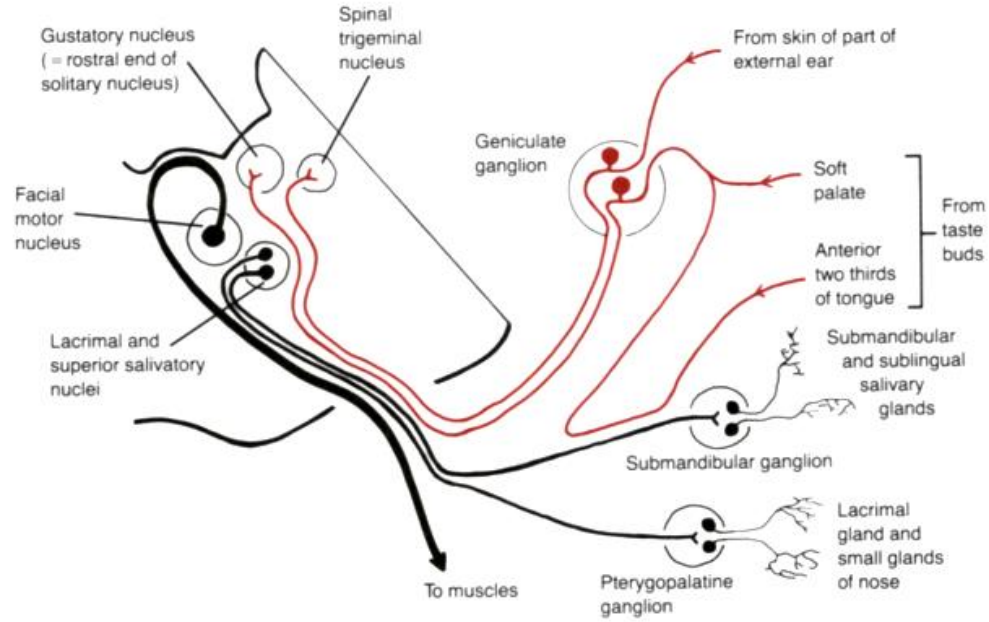
- Lower part of the pons of the brainstem.

- The part of nucleus supplying muscles of the upper part of the face receives corticonuclear fibers from both cerebral hemispheres.



Parasympathetic nuclei

- Posterolateral to the main motor nucleus.
- **Superior salivatory nucleus**
- **Lacrimal nuclei.**
- supply the secretomotor fibres to lacrimal, submandibular, and sublingual glands.



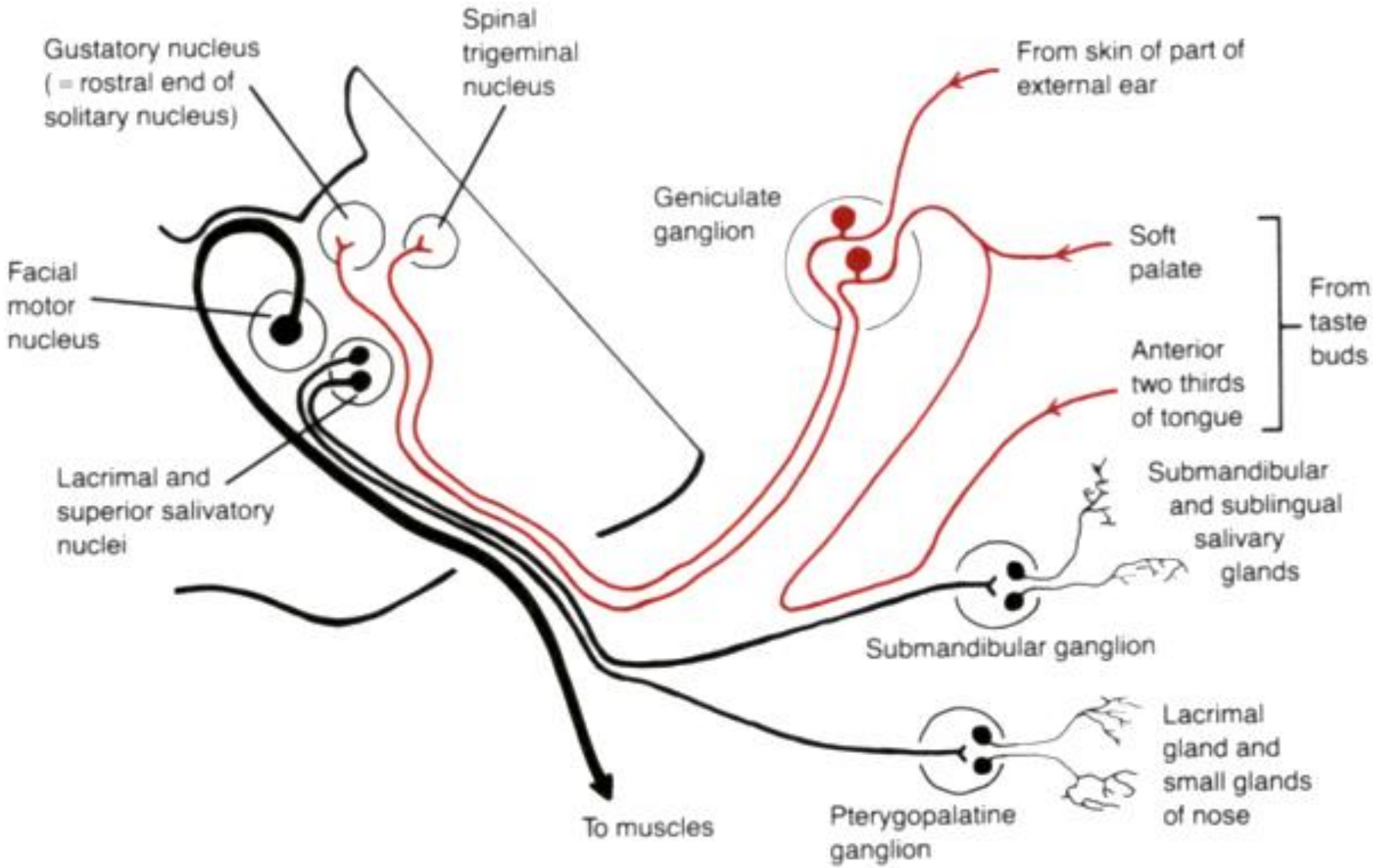
The lacrimal nucleus

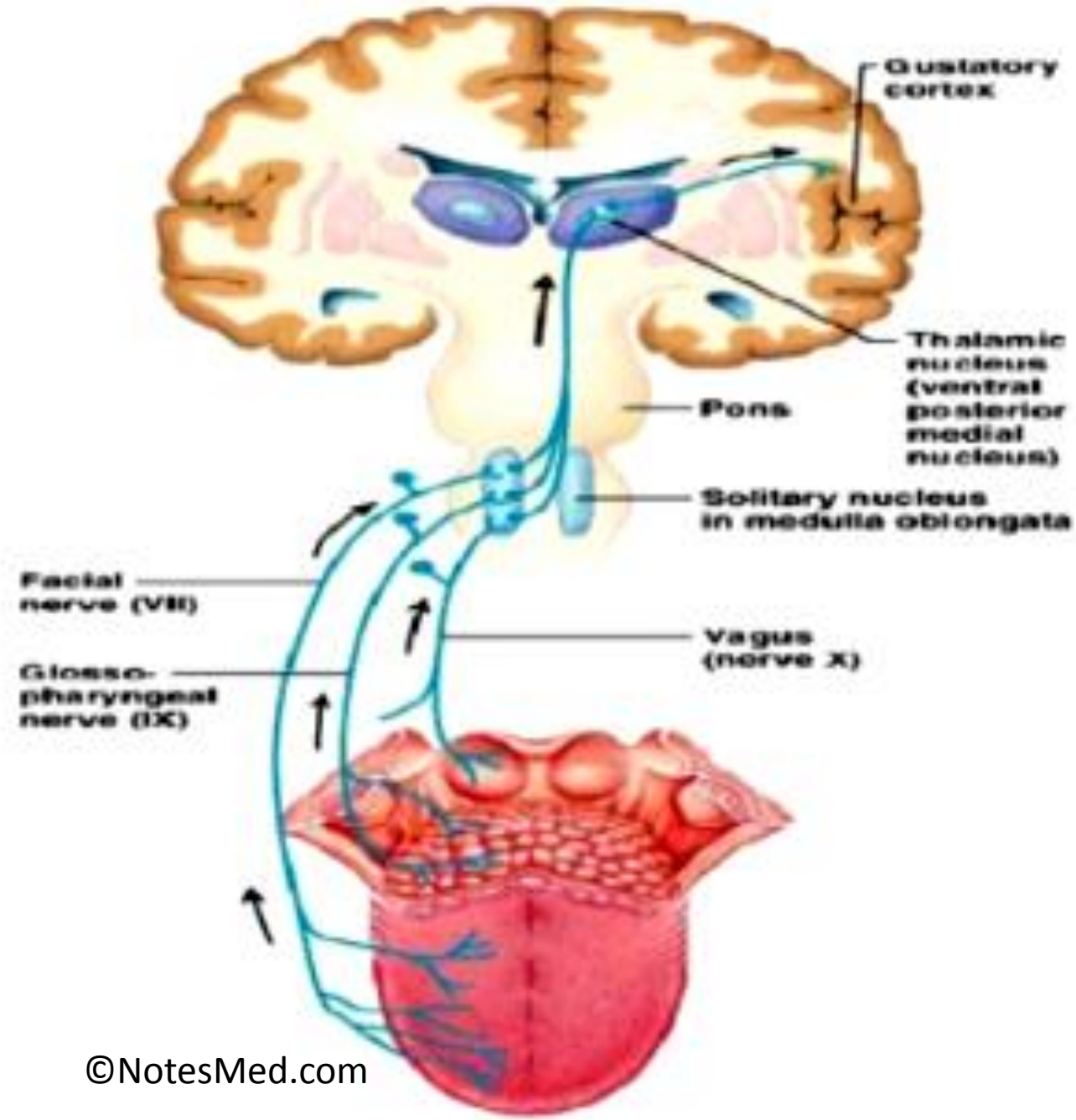
- Afferent fibers from the hypothalamus for emotional responses

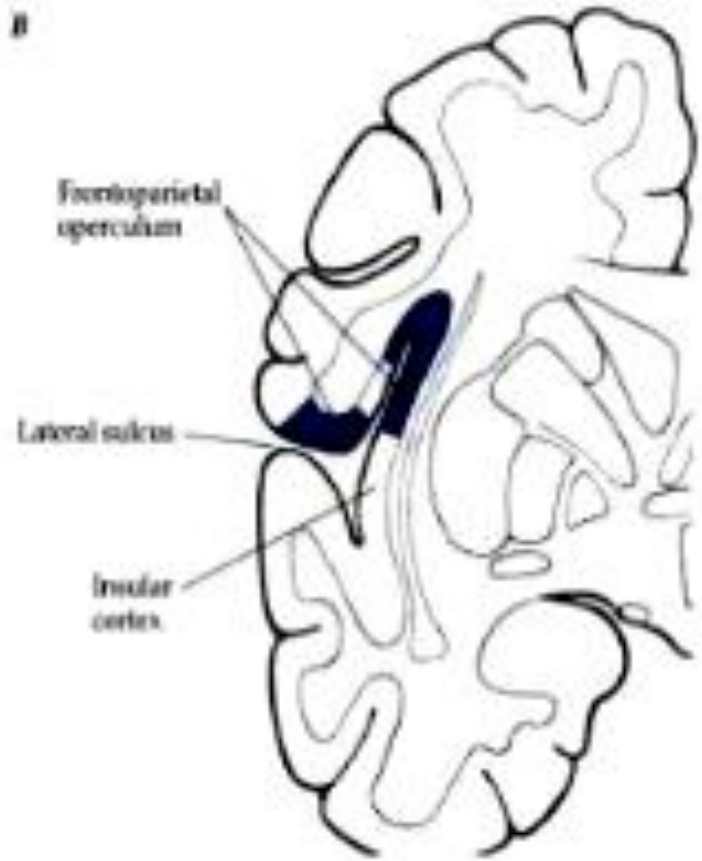
- Sensory nuclei of the trigeminal nerve for reflex lacrimation secondary to irritation of the cornea or conjunctiva.

The sensory nucleus

- The upper part of the **nucleus of the tractus solitarius**
- Close to the motor nucleus.
- Sensations of taste travel through the peripheral axons of nerve cells situated in the geniculate ganglion on the seventh cranial nerve.







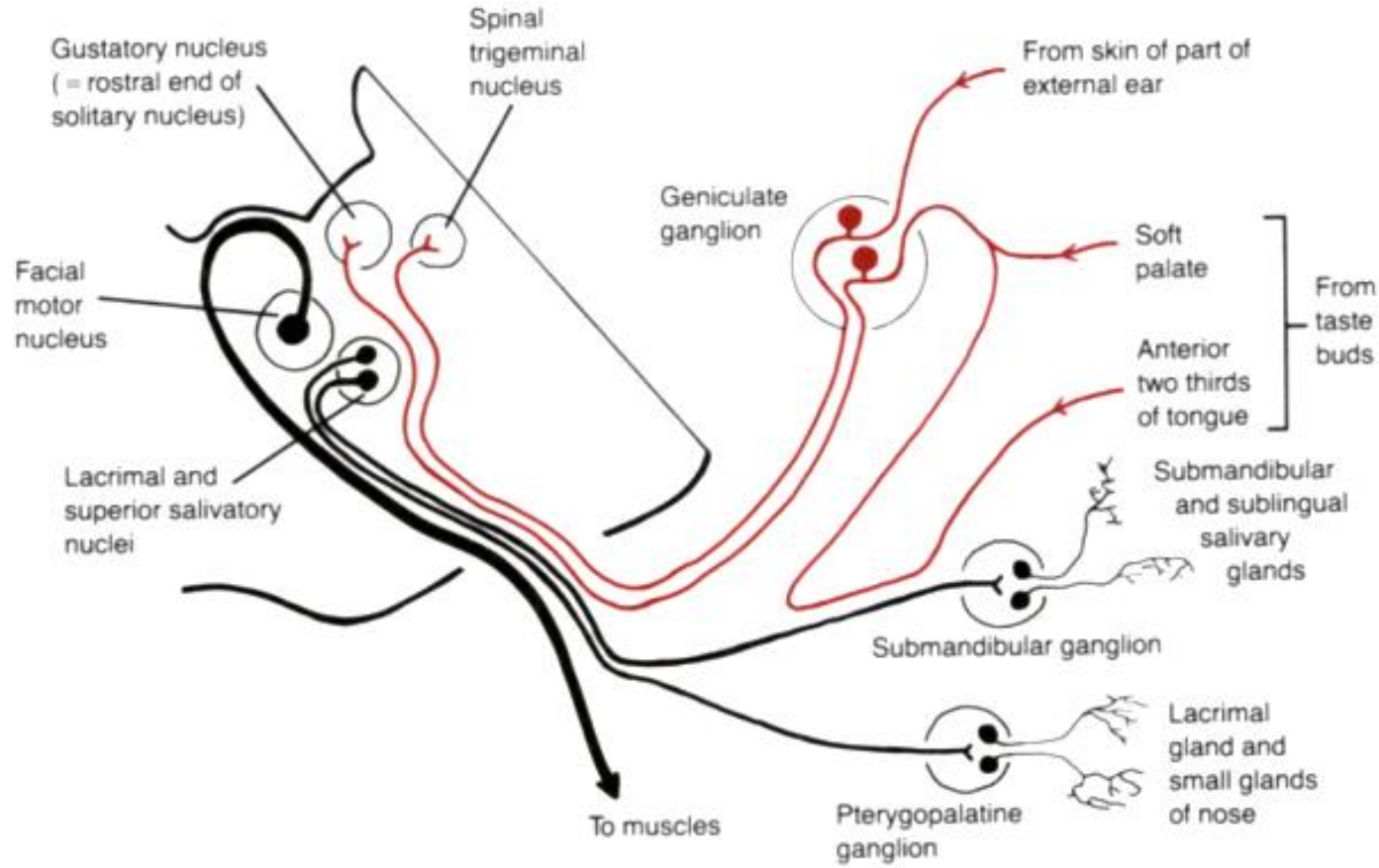
The sensory nucleus

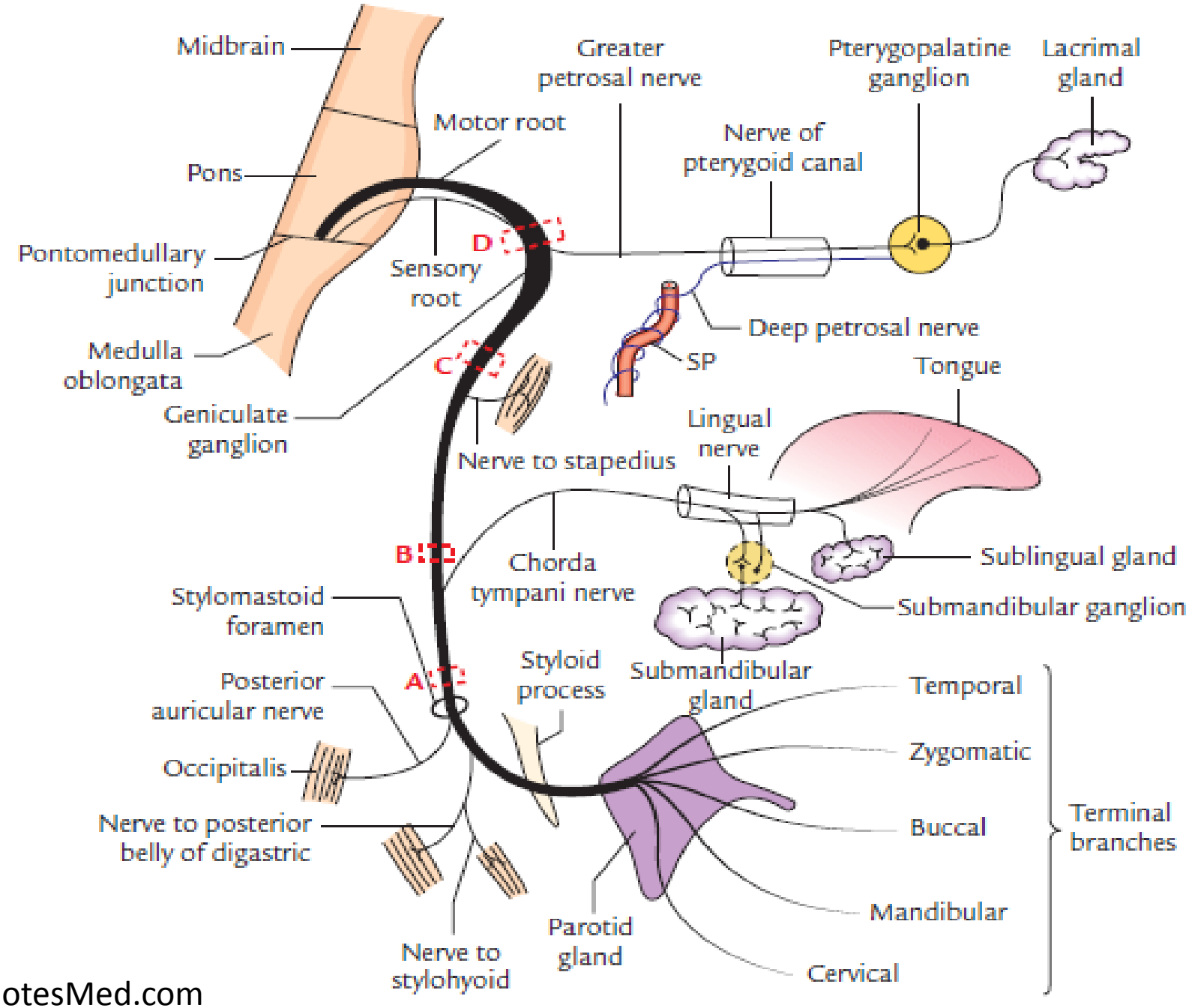
- Efferent fibers cross the median plane and ascend to the ventral posterior medial nucleus of the opposite thalamus and to a number of hypothalamic nuclei.

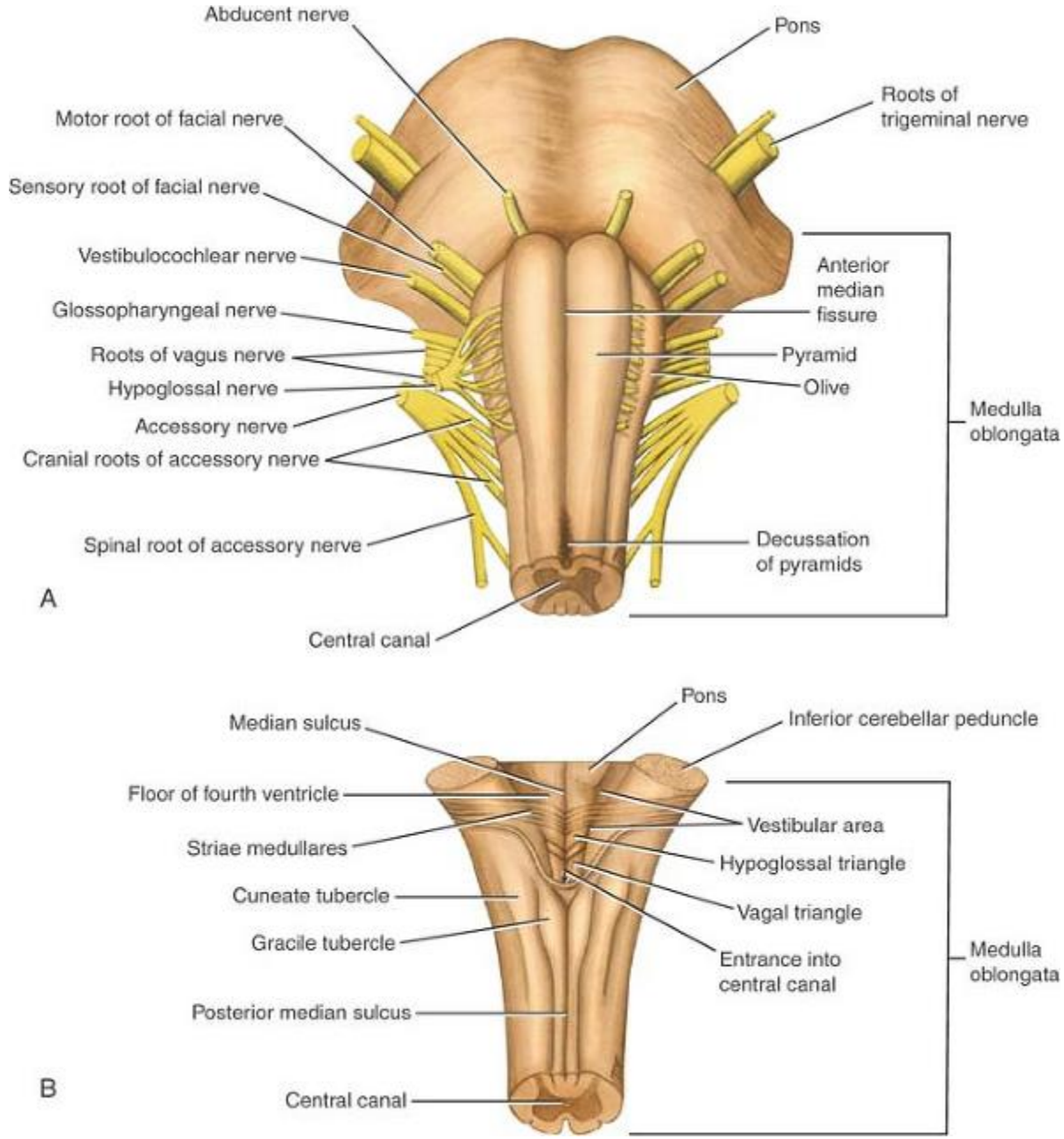
- From the thalamus, the axons of the thalamic cells pass through the internal capsule and corona radiata to end in the taste area of the cortex in the lower part of the postcentral gyrus.

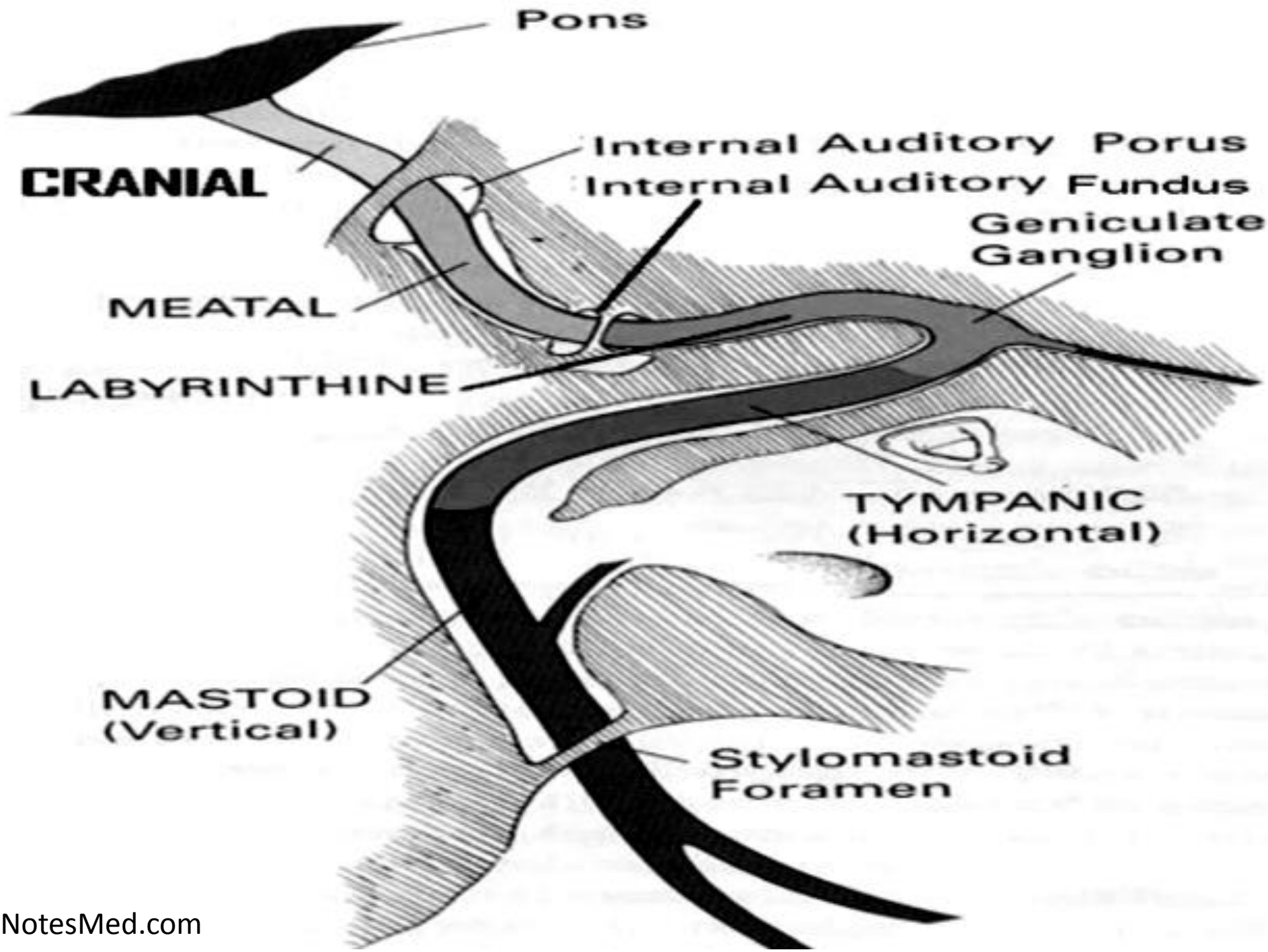
Course of the Facial Nerve

- The facial nerve consists of a motor and a sensory root.



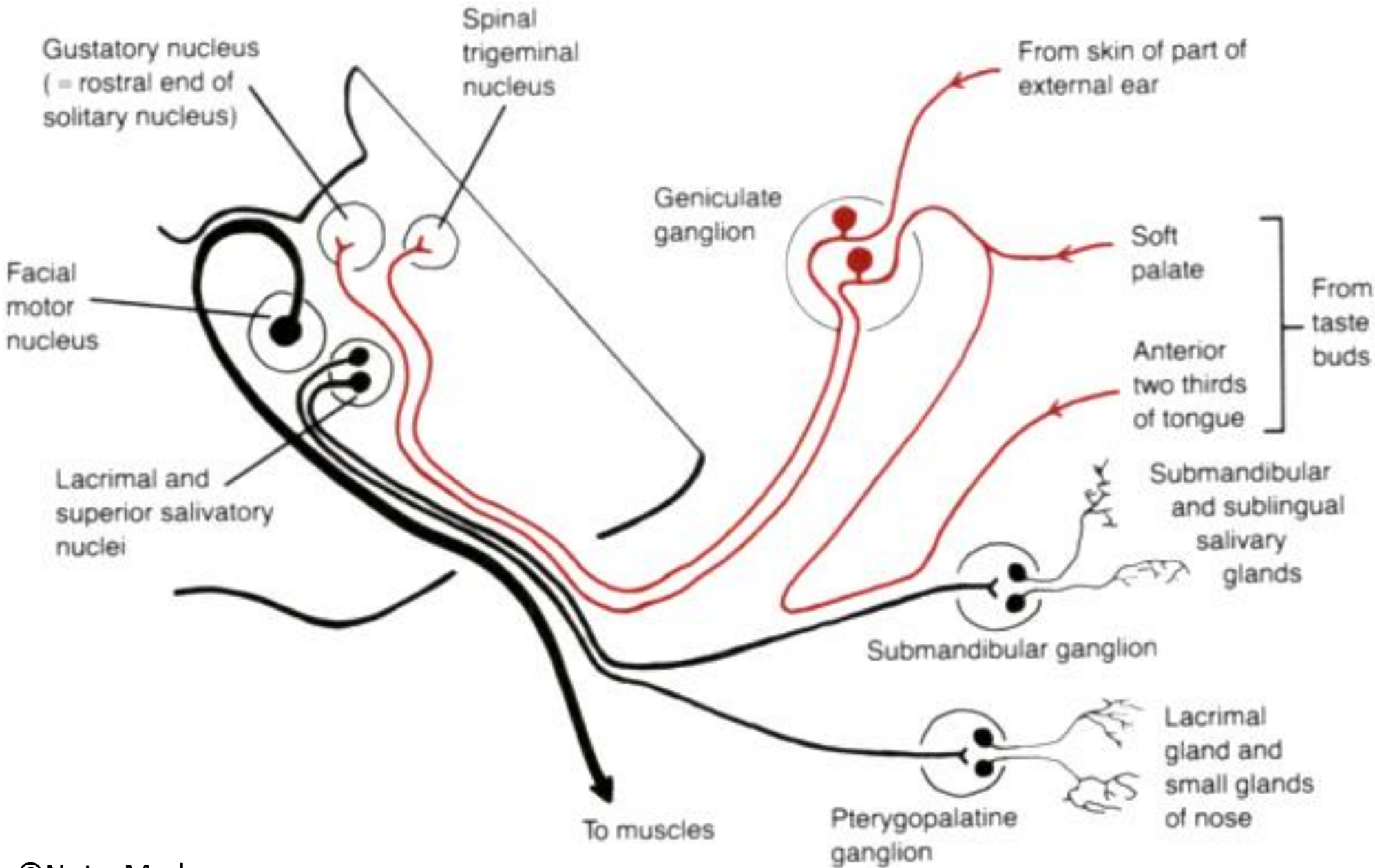






Course of the Facial Nerve

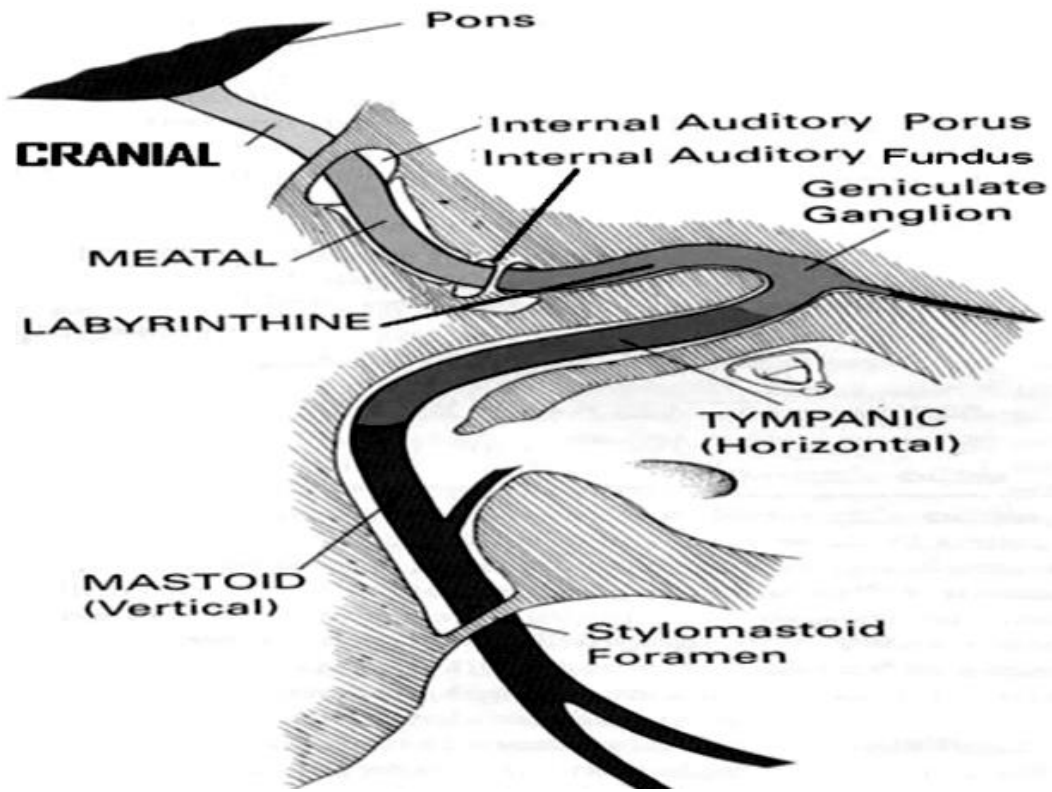
- The fibers of the motor root first travel posteriorly around the medial side of the abducent nucleus.
- They then pass around the nucleus beneath the colliculus facialis in the floor of the fourth ventricle and, finally, pass anteriorly to emerge from the brainstem.
- The sensory root (nervus intermedius) is formed of the central processes of the unipolar cells of the geniculate ganglion.
- It also contains the efferent preganglionic parasympathetic fibers from the parasympathetic nuclei.

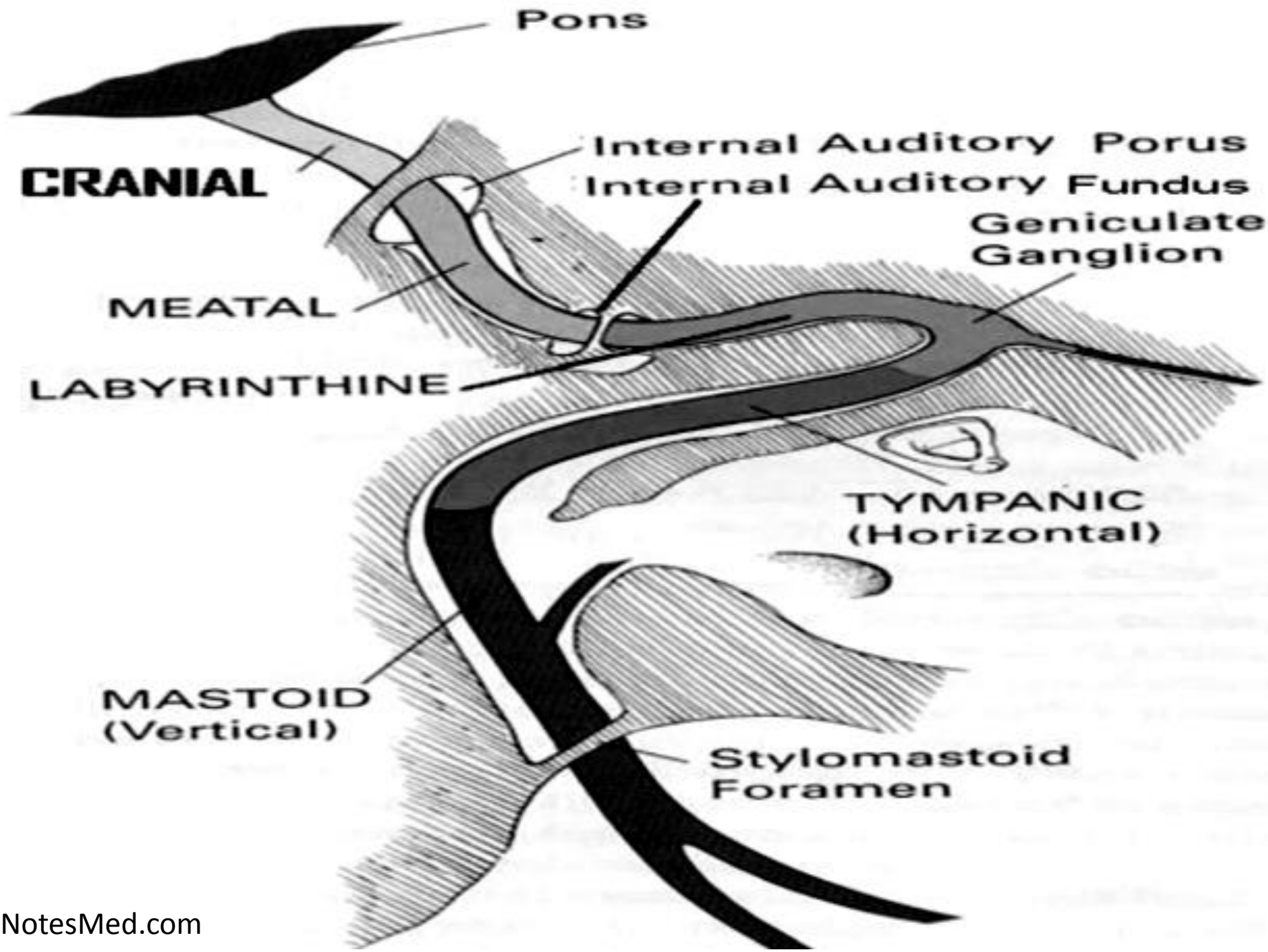


Course of the Facial Nerve

- The two roots of the facial nerve emerge from the anterior surface of the brain between the pons and the medulla oblongata.

- They pass laterally in the posterior cranial fossa with the vestibulocochlear nerve and enter the internal acoustic meatus in the petrous part of the temporal bone.





Course of the Facial Nerve

- At the bottom of the meatus, the nerve enters the **facial canal** and runs laterally through the inner ear.

- On reaching the medial wall of the tympanic cavity, the nerve expands to form **the sensory geniculate ganglion** and turns sharply backward above the promontory.

- At the posterior wall of the tympanic cavity, the facial nerve turns downward on the medial side of the aditus of **the mastoid antrum**, descends behind the pyramid, and emerges from **the stylomastoid foramen**.

Distribution of the Facial Nerve

- The motor nucleus supplies the muscles of facial expression, the auricular muscles, the stapedius, the posterior belly of the digastric, and the stylohyoid muscles.
- The superior salivatory nucleus supplies the submandibular and sublingual salivary glands and the nasal and palatine glands.
- The lacrimal nucleus supplies the lacrimal gland.
- The sensory nucleus receives taste fibers from the anterior two-thirds of the tongue, the floor of the mouth, and the palate.

Applied aspects

- **Lesions of facial nerve (supranuclear or infranuclear)- Bell's palsy.**
- **Crocodile tears syndrome** (due to facial nerve lesion).
- **Ramsay Hunt syndrome**

Ramsay Hunt syndrome

- Due to the involvement of geniculate ganglion in herpes zoster infection.
- Signs and symptoms:
  - Herpetic vesicles on the auricle.
  - Hyperacusis.
  - Loss of lacrimation.
  - Loss of taste sensations in the anterior two-third of the tongue.
  - Complete ipsilateral facial palsy (Bell's palsy).

THANKS