

Summary of Function of Cranial Nerves

Cranial nerves I - VI	Sensory function	Motor function	PS* fibers	Cranial nerves VII - XII	Sensory function	Motor function	PS* fibers
I Olfactory	Yes (smell)	No	No	VII Facial	Yes (taste)	Yes	Yes
II Optic	Yes (vision)	No	No	VIII Vestibulocochlear	Yes (hearing and balance)	No	No
III Oculomotor	No	Yes	Yes	IX Glossopharyngeal	Yes (taste)	Yes	Yes
IV Trochlear	No	Yes	No	X Vagus	Yes (taste)	Yes	Yes
V Trigeminal	Yes (general sensation)	Yes	No	XI Accessory	No	Yes	No
VI Abducens	No	Yes	No	XII Hypoglossal	No	Yes	No

(b) *PS = parasympathetic

Cranial Nerve I: Olfactory

- Arises from the olfactory epithelium
- Passes through the cribriform plate of the ethmoid bone
- Fibers run through the olfactory bulb and terminate in the primary olfactory cortex
- Functions solely by carrying afferent impulses for the sense of smell

Cranial Nerve I: Olfactory

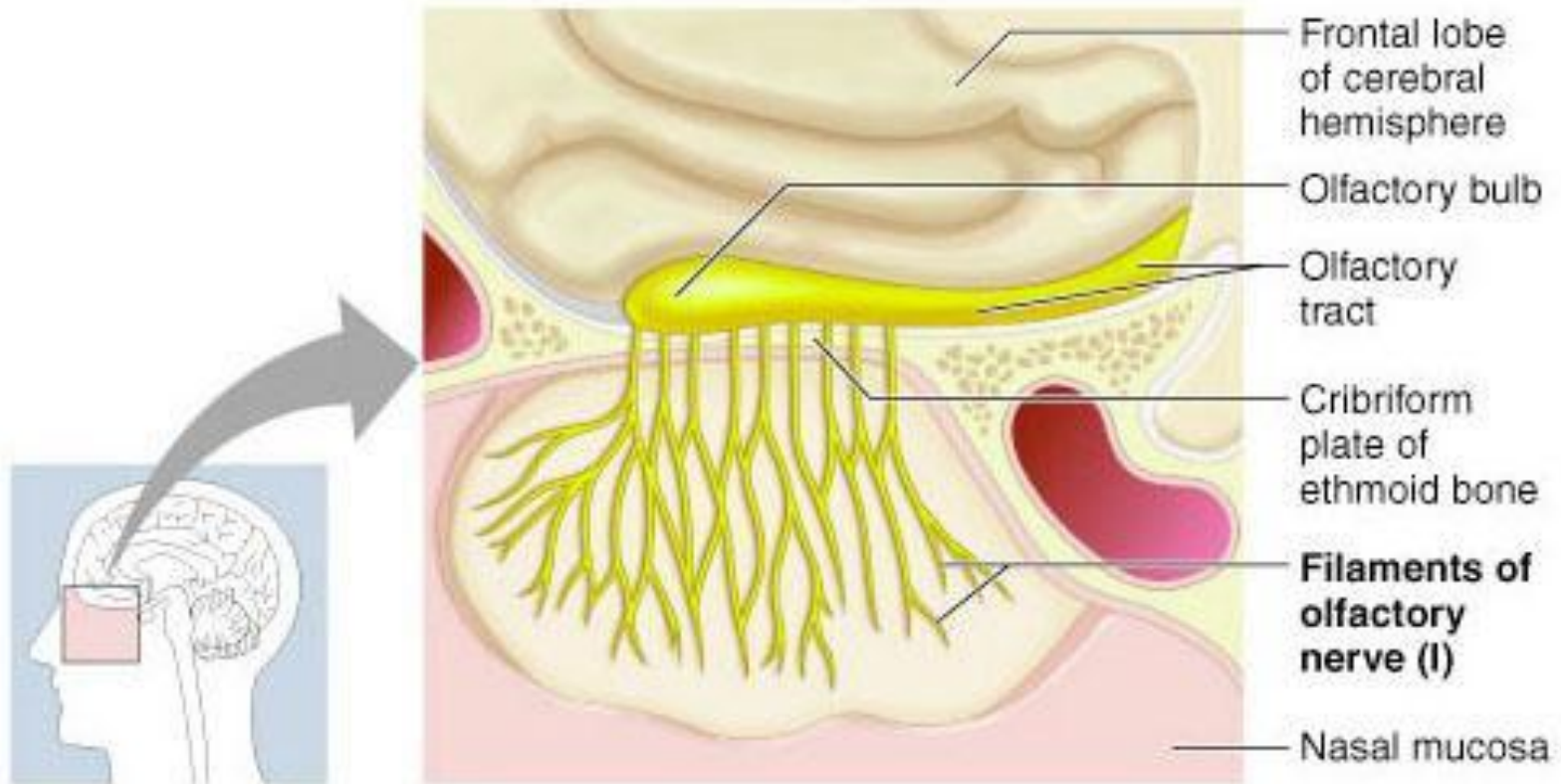


Figure I from Table 13.2

Cranial Nerve II: Optic

- Arises from the retina of the eye
- Optic nerves pass through the optic canals and converge at the optic chiasm
- They continue to the thalamus where they synapse
- From there, the optic radiation fibers run to the visual cortex
- Functions solely by carrying afferent impulses for vision

Cranial Nerve II: Optic

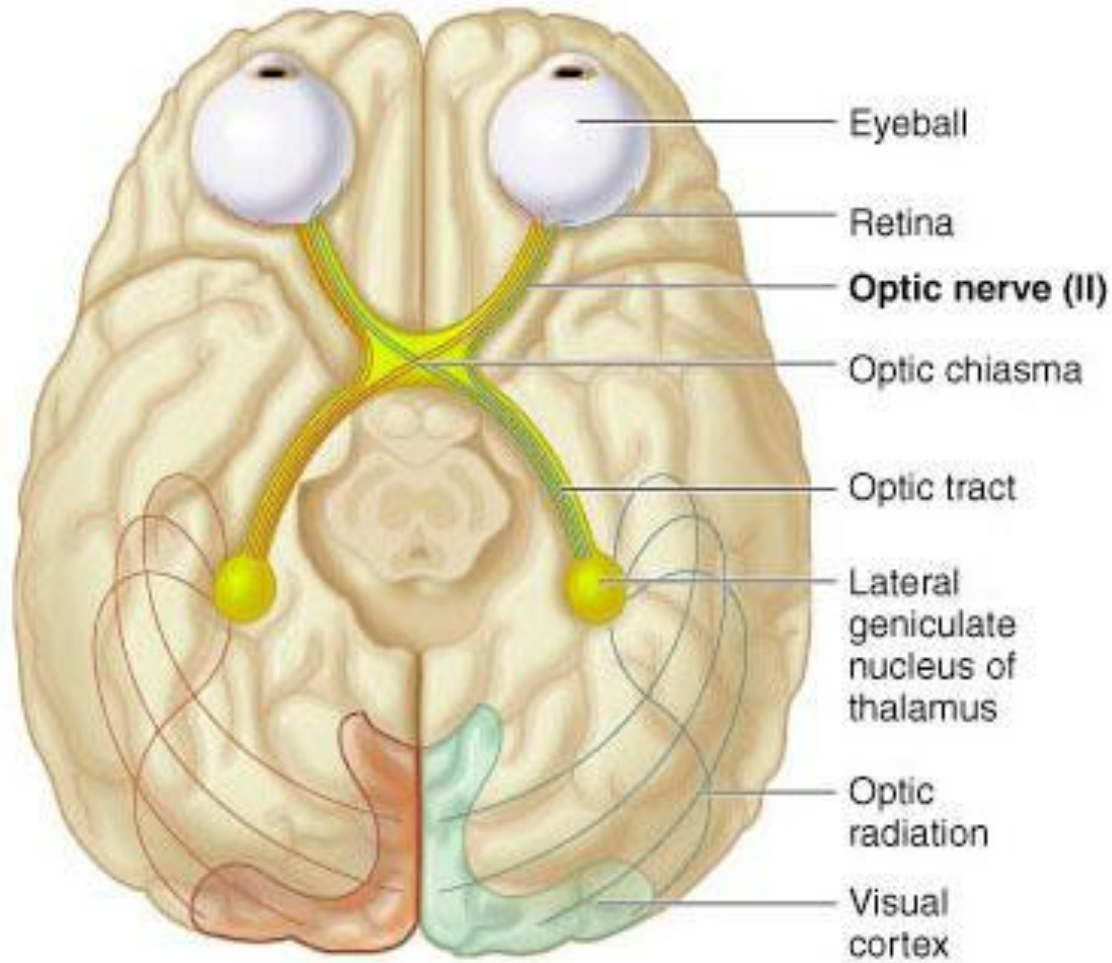


Figure II Table 13.2

Cranial Nerve III: Oculomotor

- Fibers extend from the ventral midbrain, pass through the superior orbital fissure, and go to the extrinsic eye muscles
- Functions in raising the eyelid, directing the eyeball, constricting the iris, and controlling lens shape
- The latter 2 functions are parasympathetically controlled
- Parasympathetic cell bodies are in the ciliary ganglia

Cranial Nerve III: Oculomotor

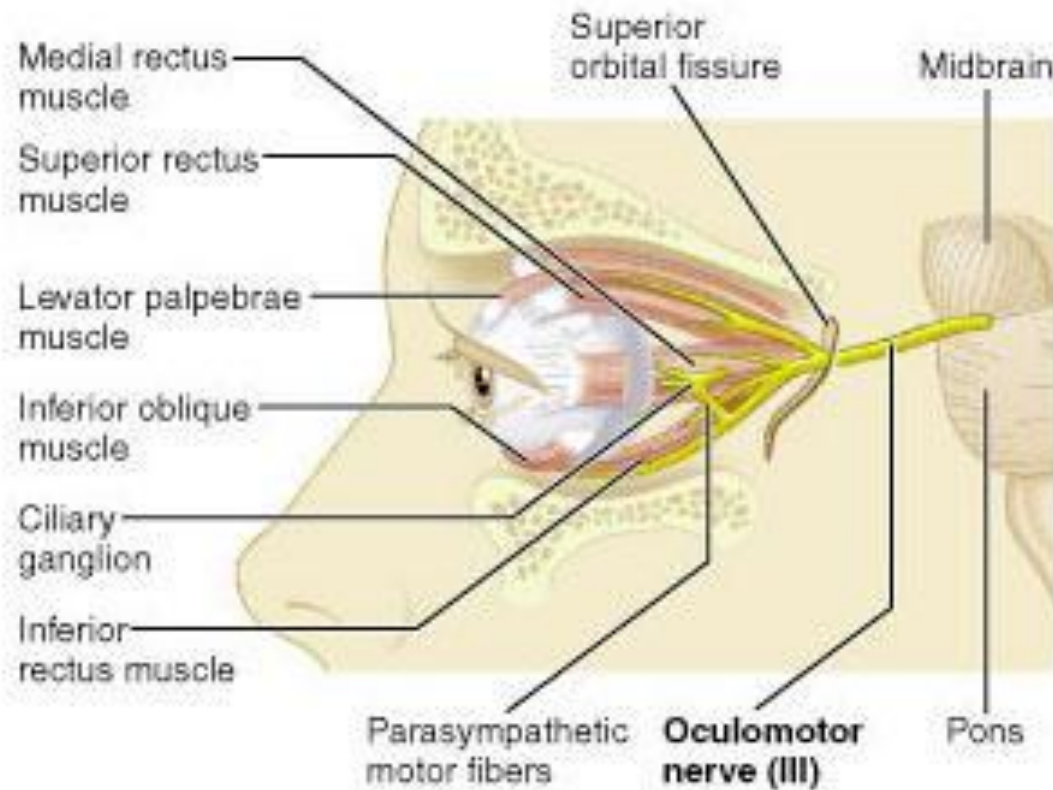
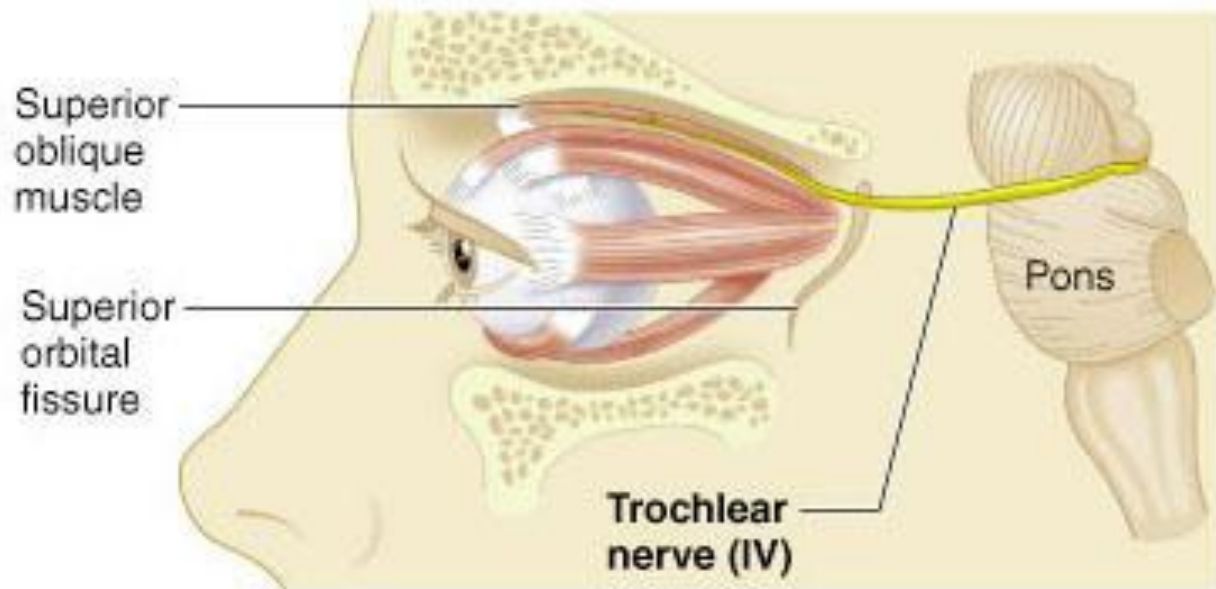


Figure III from Table 13.2

Cranial Nerve IV: Trochlear

- Fibers emerge from the dorsal midbrain and enter the orbits via the superior orbital fissures; innervate the superior oblique muscle
- Primarily a motor nerve that directs the eyeball

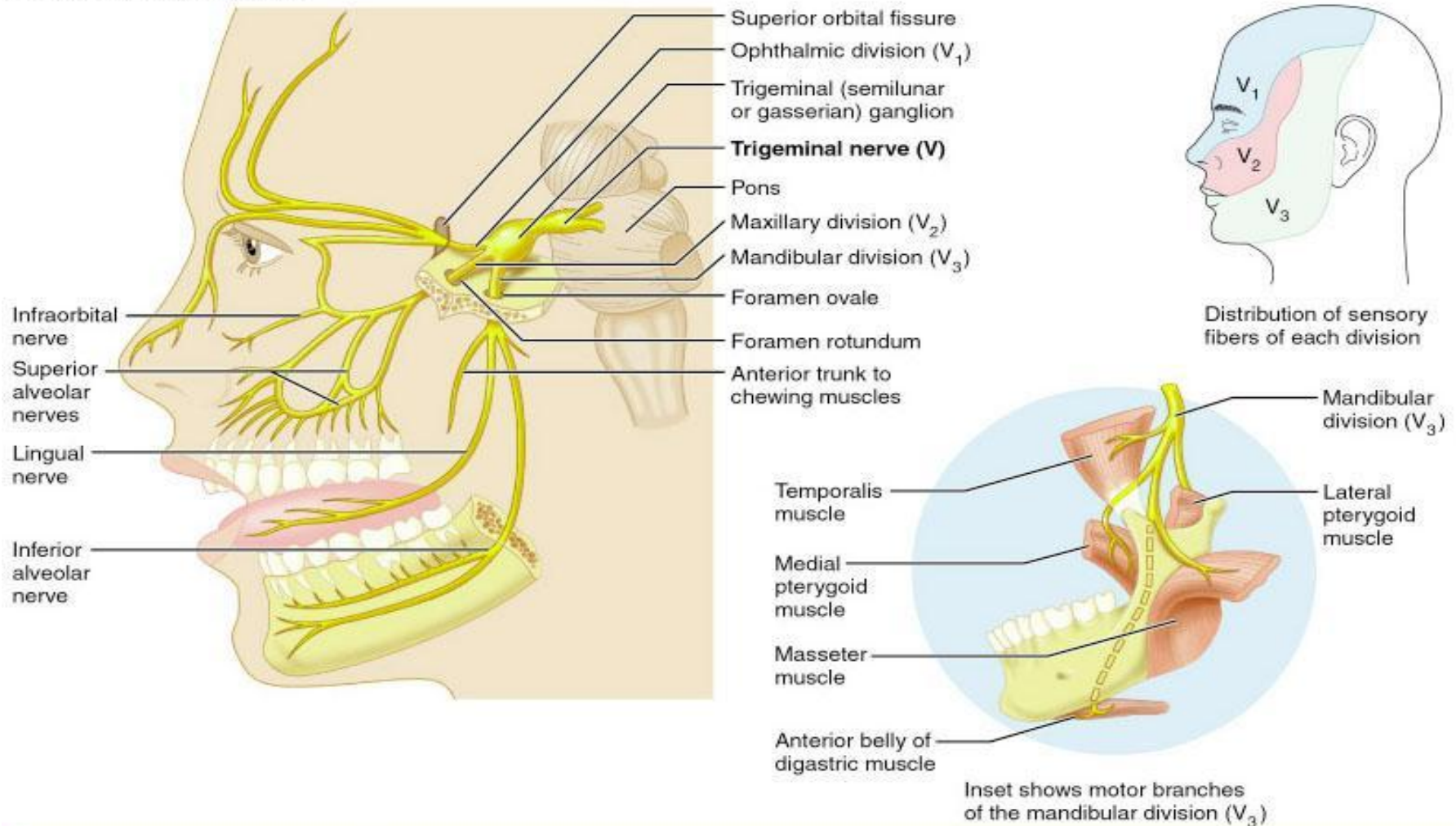
Cranial Nerve IV: Trochlear



Cranial Nerve V: Trigeminal

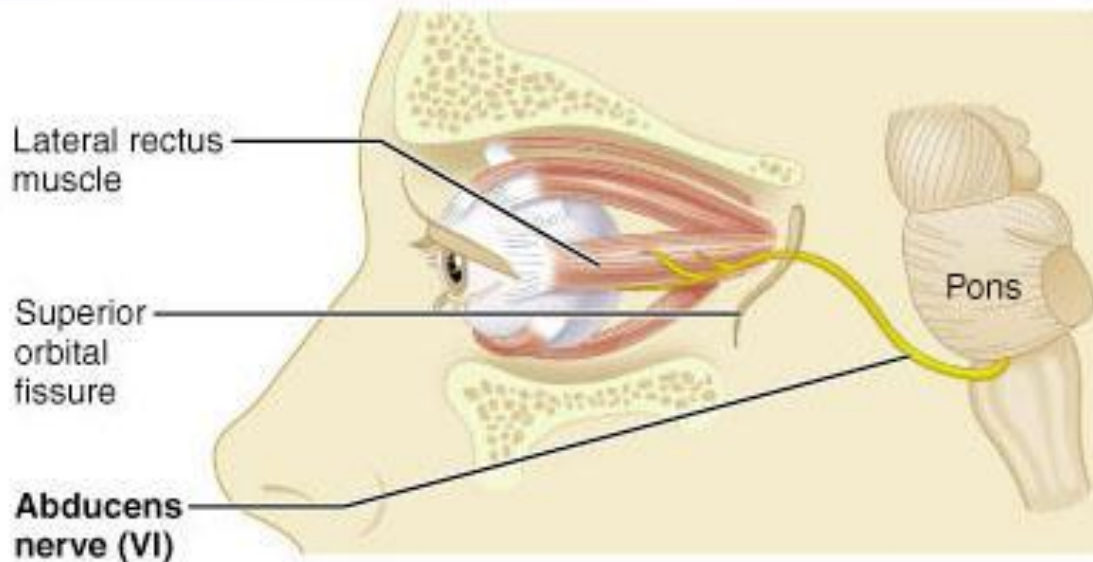
- Composed of three divisions
 - Ophthalmic (V_1)
 - Maxillary (V_2)
 - Mandibular (V_3)
- Fibers run from the face to the pons via the superior orbital fissure (V_1), the foramen rotundum (V_2), and the foramen ovale (V_3)
- Conveys sensory impulses from various areas of the face (V_1) and (V_2), and supplies motor fibers (V_3) for mastication
- *Tic douloureux* or trigeminal neuralgia
 - Most excruciating pain known (?)
 - Caused by inflammation of nerve
 - In severe cases, nerve is cut; relieves agony but results in loss of sensation on that side of the face

Cranial Nerve V: Trigeminal



Cranial Nerve VI: Abducens

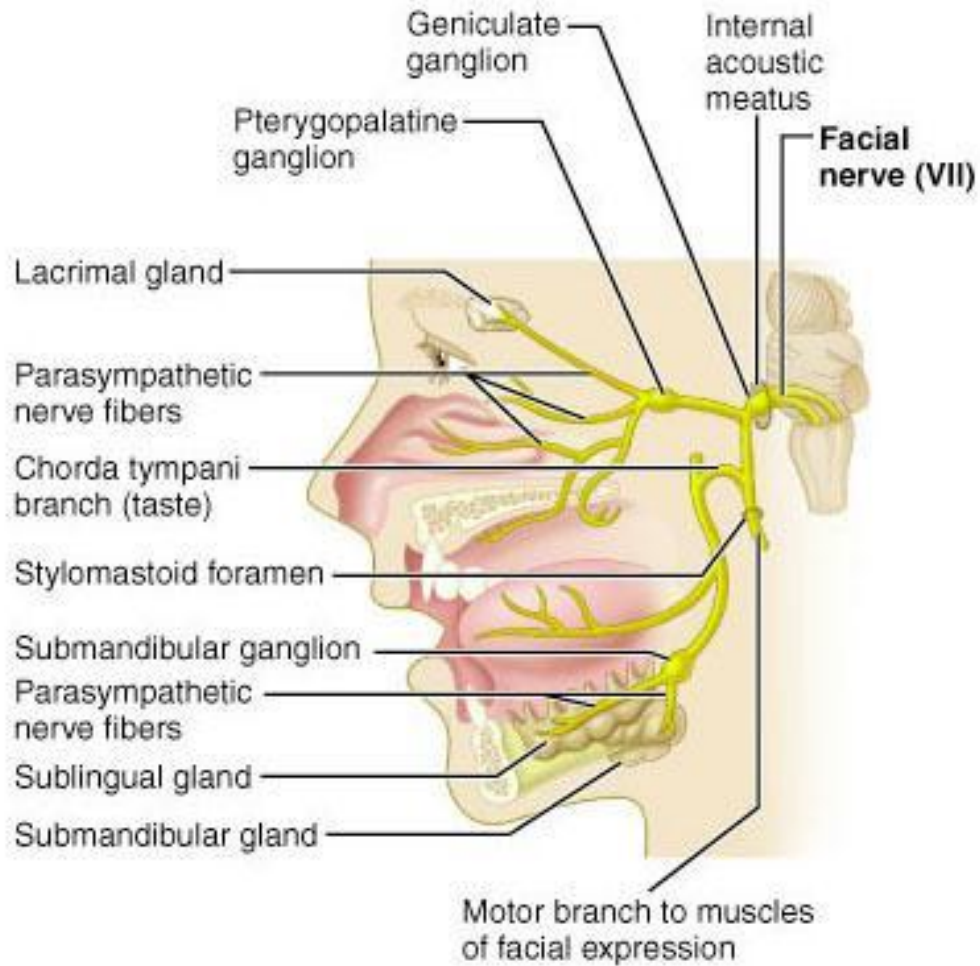
- Fibers leave the inferior pons and enter the orbit via the superior orbital fissure
- Primarily a motor nerve innervating the lateral rectus muscle (abducts the eye; thus the name *abducens*)



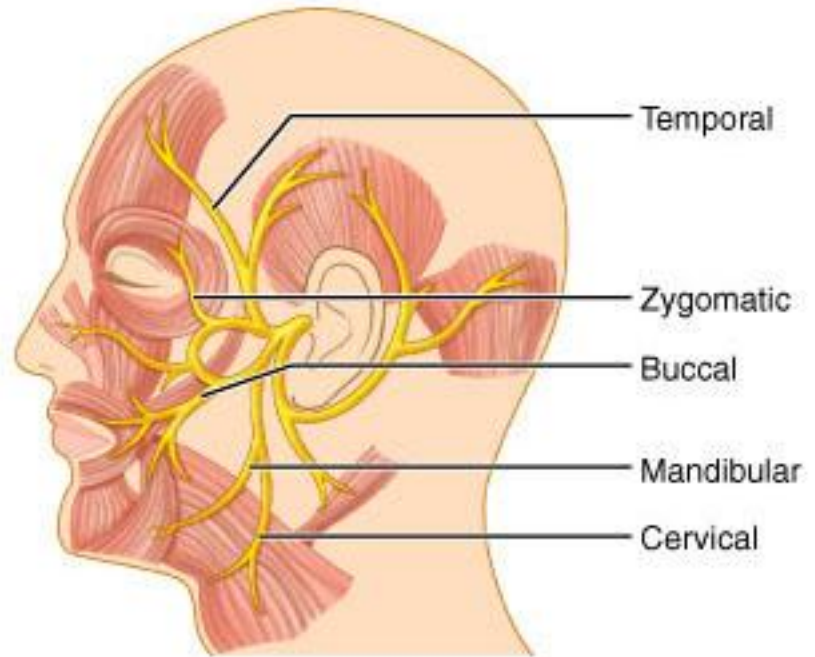
Cranial Nerve VII: Facial

- Fibers leave the pons, travel through the internal acoustic meatus, and emerge through the stylomastoid foramen to the lateral aspect of the face
- Motor functions include;
 - Facial expression
 - Transmittal of parasympathetic impulses to lacrimal and salivary glands (submandibular and sublingual glands)
- Sensory function is taste from taste buds of anterior two-thirds of the tongue

Cranial Nerve VII: Facial



(a) Parasympathetic efferents and sensory afferents



(b) Motor branches to muscles of facial expression and scalp muscles

Facial Nerve (CN VII)

- *Bell's palsy*: paralysis of facial muscles on affected side and loss of taste sensation
- Caused by herpes simplex I virus
- Lower eyelid droops
- Corner of mouth sags
- Tears drip continuously and eye cannot be completely closed (dry eye may occur)
- Condition may disappear spontaneously without treatment

Cranial Nerve VIII: Vestibulocochlear

- Fibers arise from the hearing and equilibrium apparatus of the inner ear, pass through the internal acoustic meatus, and enter the brainstem at the pons-medulla border
- Two divisions – cochlear (hearing) and vestibular (balance)
- Functions are solely sensory – equilibrium and hearing

Cranial Nerve VIII: Vestibulocochlear

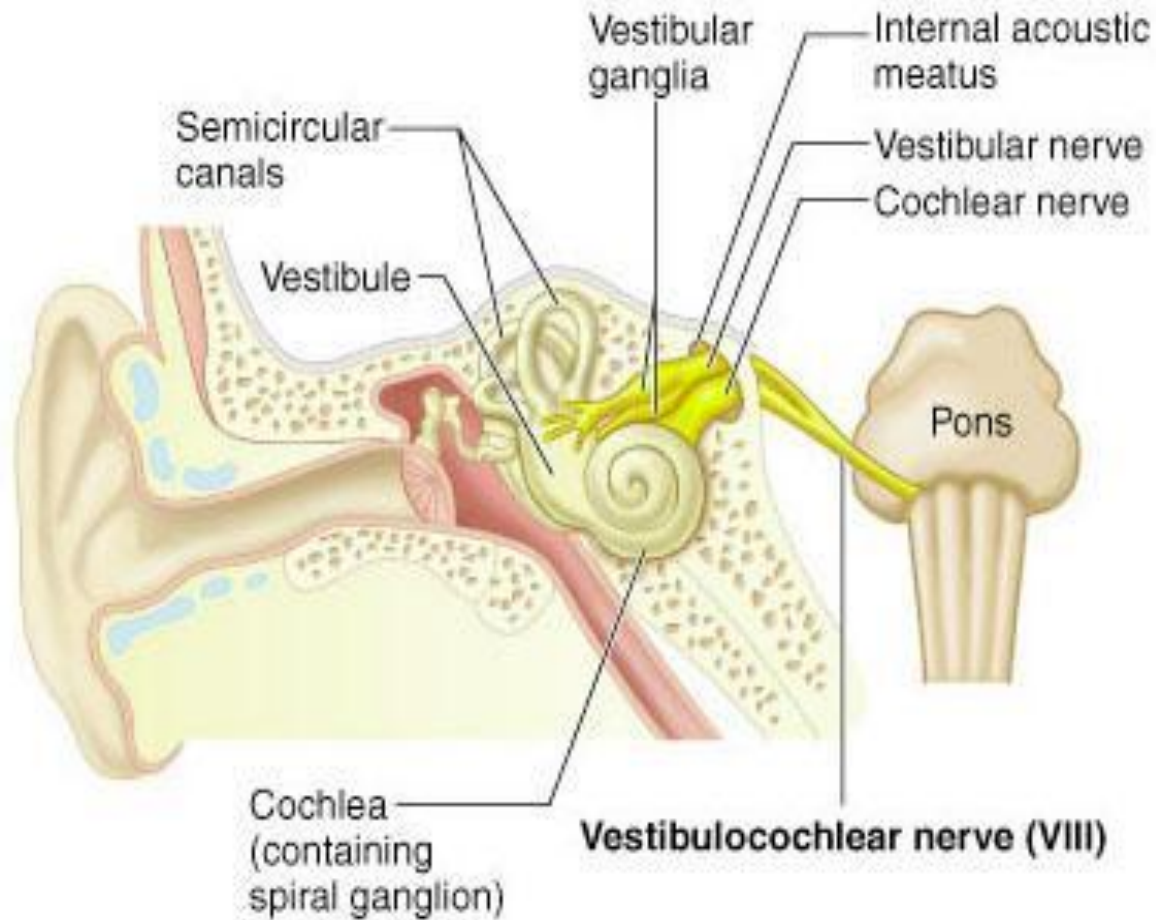


Figure VIII from Table 13.2

Cranial Nerve IX: Glossopharyngeal

- Fibers emerge from the medulla, leave the skull via the jugular foramen, and run to the throat
- Nerve IX is a mixed nerve with motor and sensory functions
- Motor – innervates part of the tongue and pharynx, and provides motor fibers to the parotid salivary gland
- Sensory – fibers conduct taste and general sensory impulses from the tongue and pharynx

Cranial Nerve IX: Glossopharyngeal

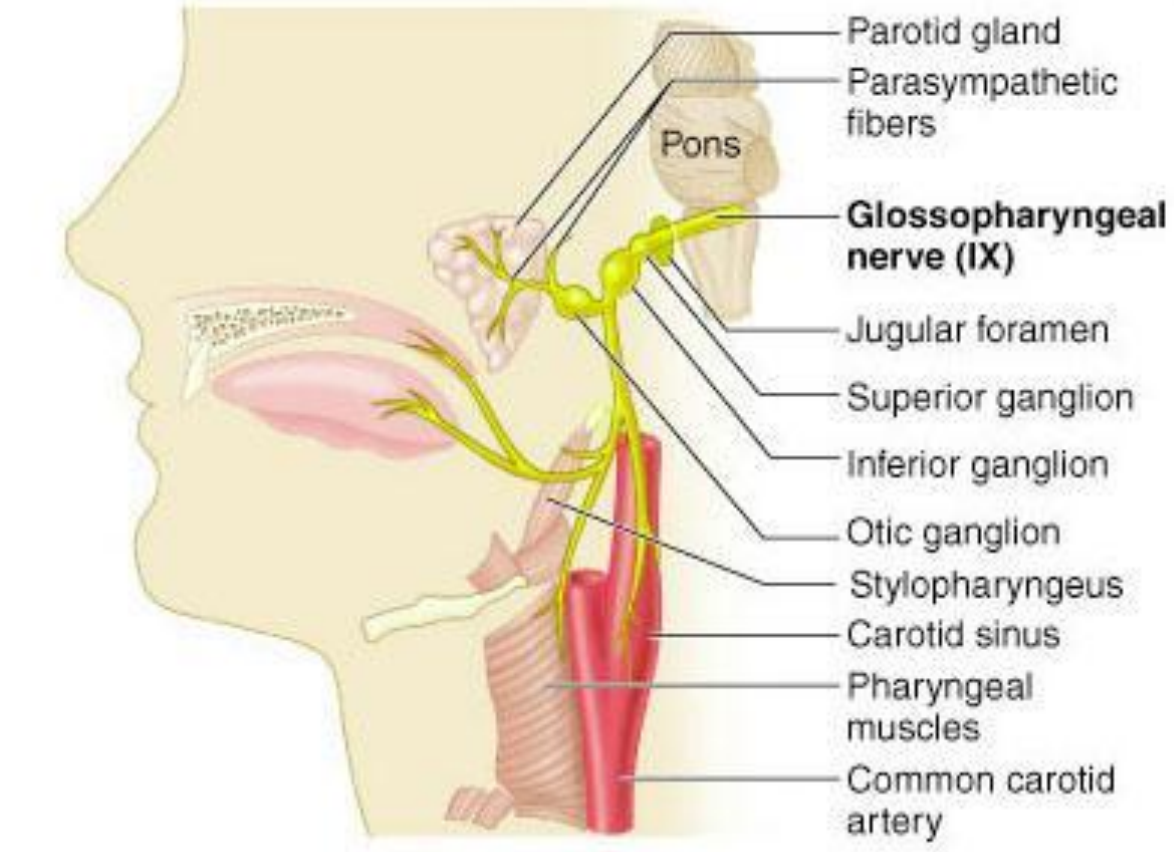
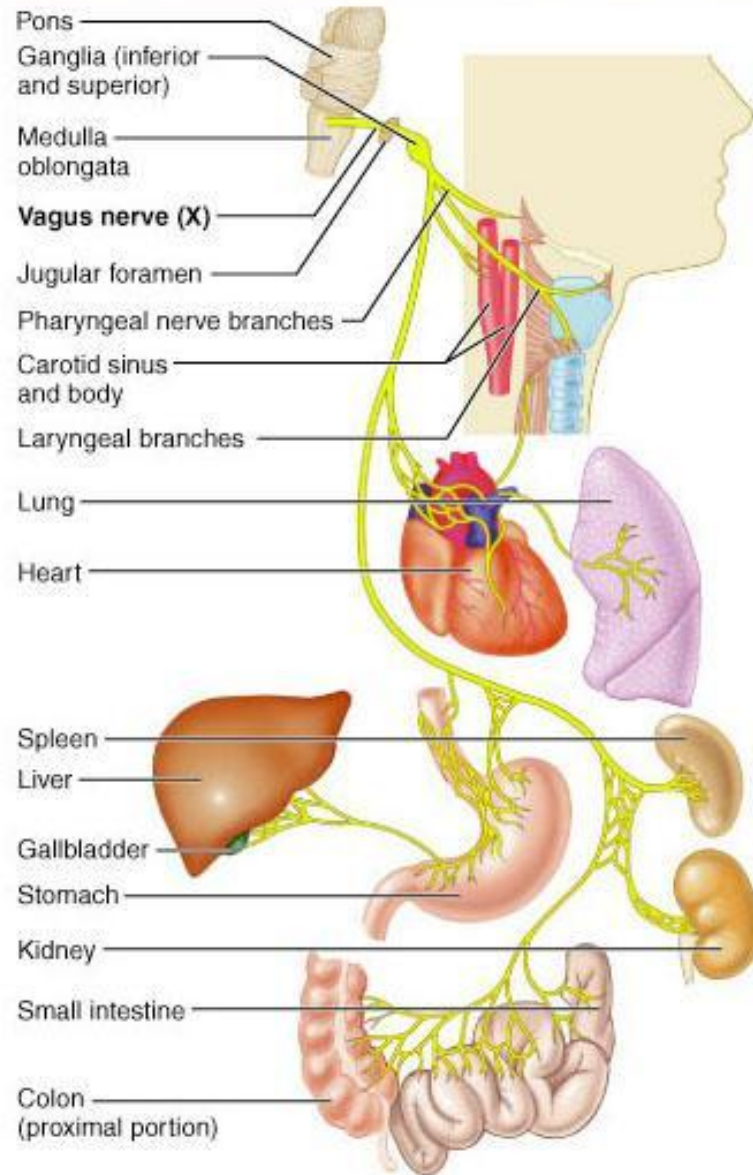


Figure IX from Table 13.2

Cranial Nerve X: Vagus

- The only cranial nerve that extends beyond the head and neck
- Fibers emerge from the medulla via the jugular foramen
- The vagus is a mixed nerve
- Most motor fibers are parasympathetic fibers to the heart, lungs, and visceral organs
- Its sensory function is in taste
- Paralysis leads to hoarseness
- Total destruction incompatible with life

Cranial Nerve X: Vagus



Cranial Nerve XI: Accessory

- Formed from a cranial root emerging from the medulla and a spinal root arising from the superior region of the spinal cord
- The spinal root passes upward into the cranium via the foramen magnum
- The accessory nerve leaves the cranium via the jugular foramen
- Primarily a motor nerve
 - Supplies fibers to the larynx, pharynx, and soft palate
 - Innervates the trapezius and sternocleidomastoid, which move the head and neck

Cranial Nerve XI: Accessory

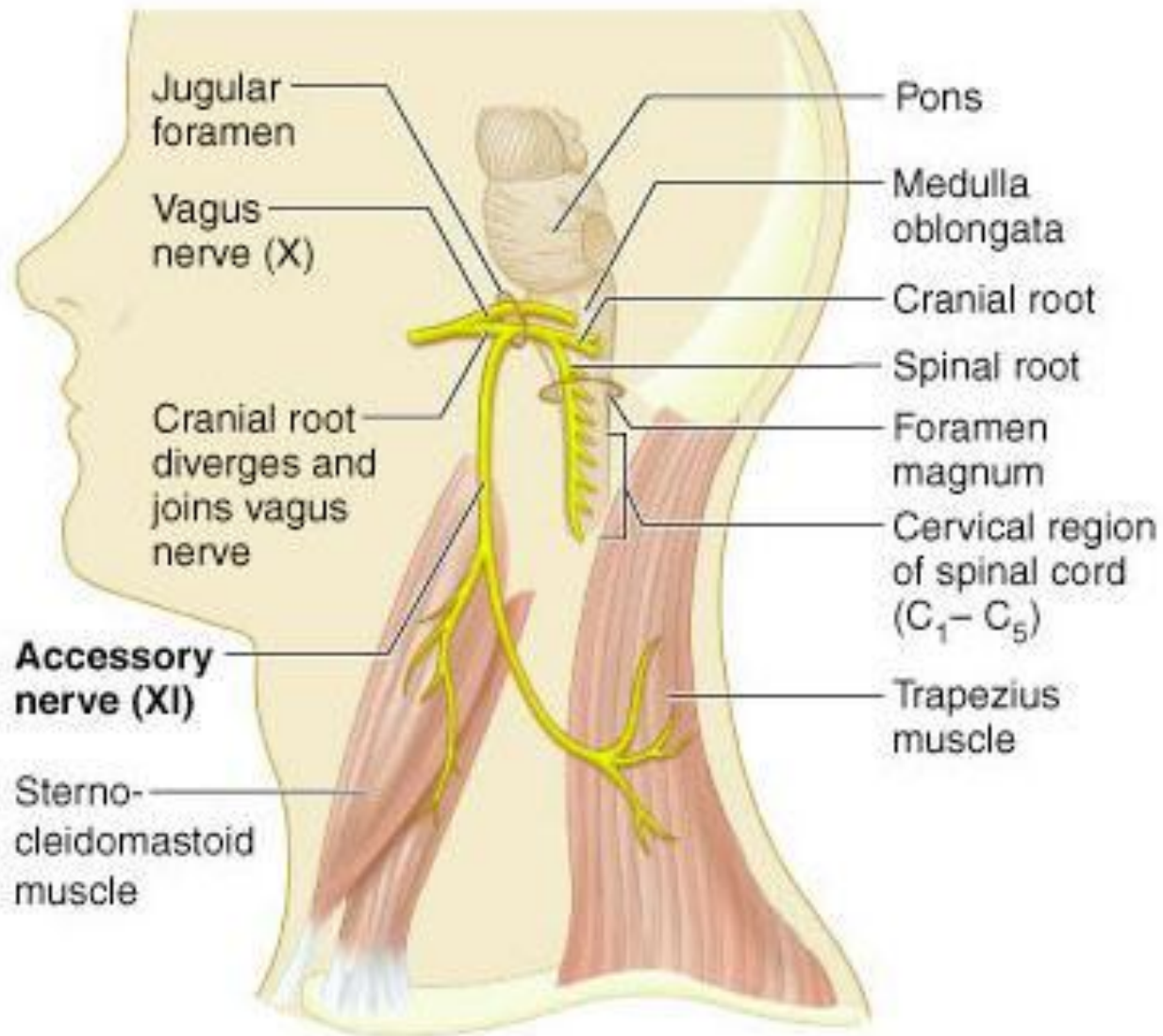


Figure XI from Table 13.2

Cranial Nerve XII: Hypoglossal

- Fibers arise from the medulla and exit the skull via the hypoglossal canal
- Innervates both extrinsic and intrinsic muscles of the tongue, which contribute to swallowing and speech
- If damaged, difficulties in speech and swallowing; inability to protrude tongue

Cranial Nerve XII: Hypoglossal

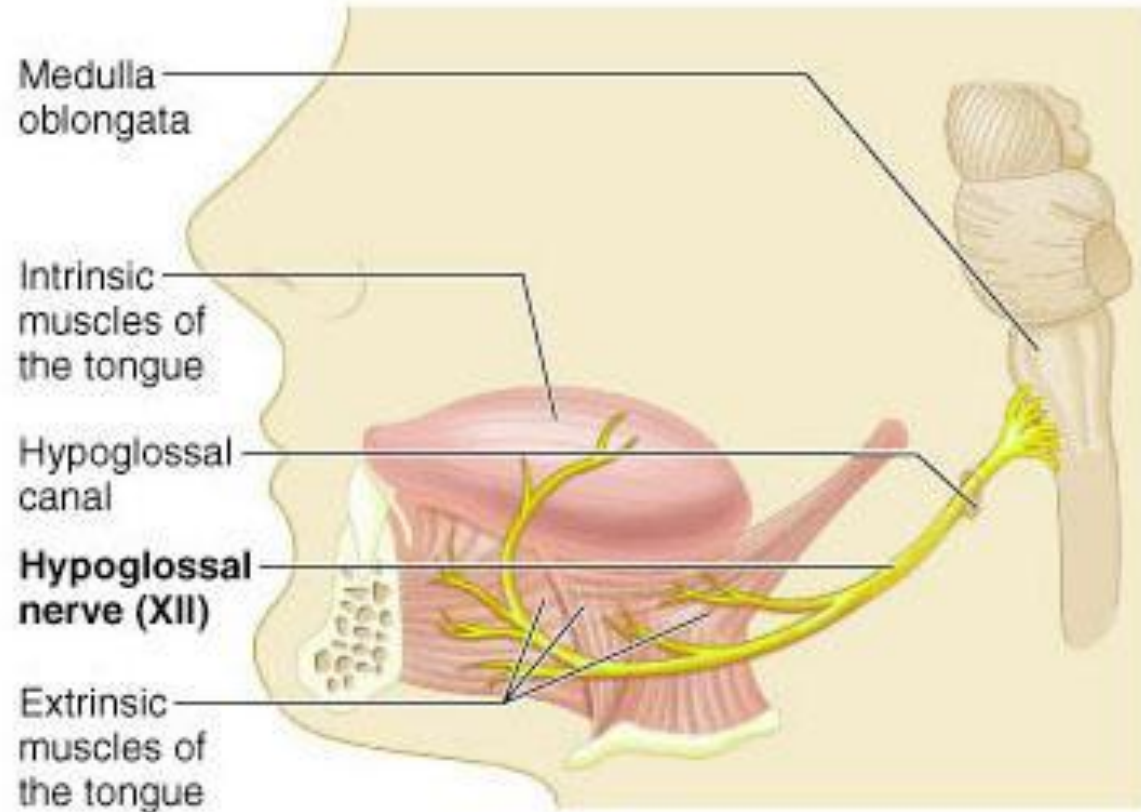


Figure XII from Table 13.2