Human Anatomy

Peripheral Nervous System

PNS

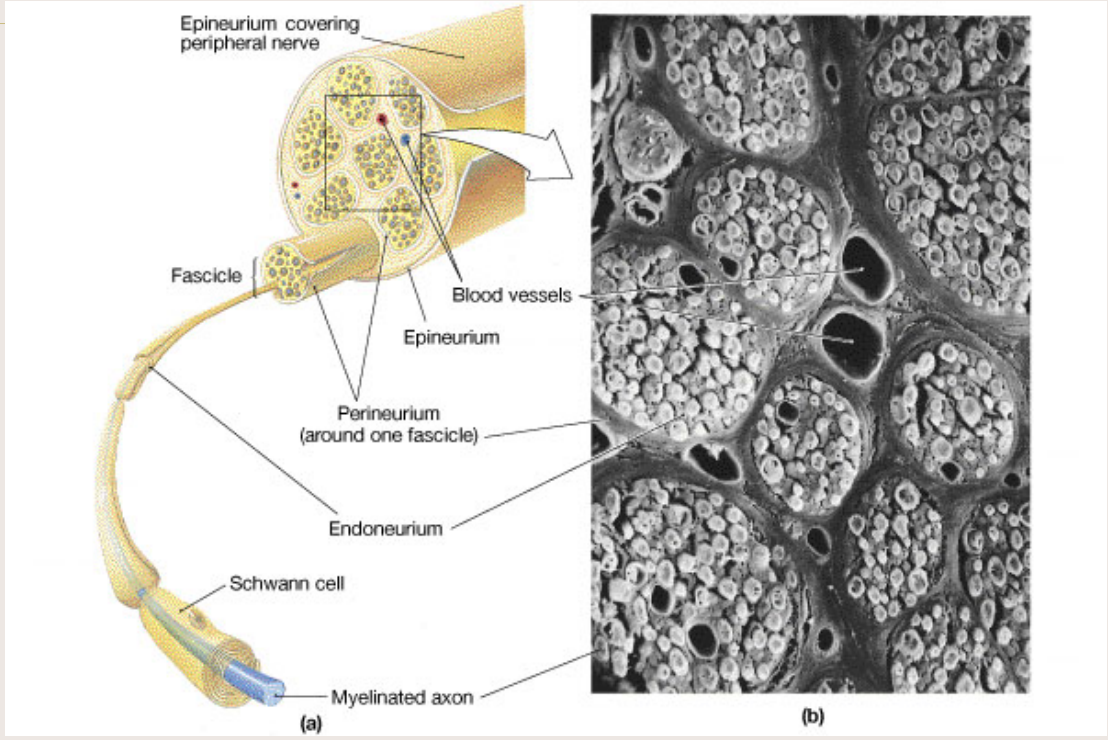
Part I

2 Components of PNS

1. 12 pr. of ***cranial nerves***
2. 31 pr. of ***spinal nerves***

So….what is the structure of a nerve?

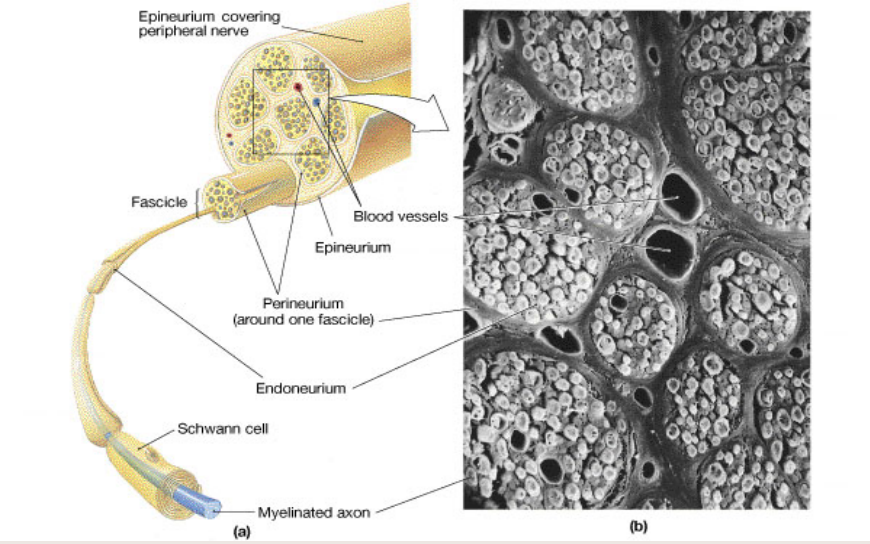
Structure of a Nerve



Structure of a Nerve

- Connective tissue organized similar to muscle

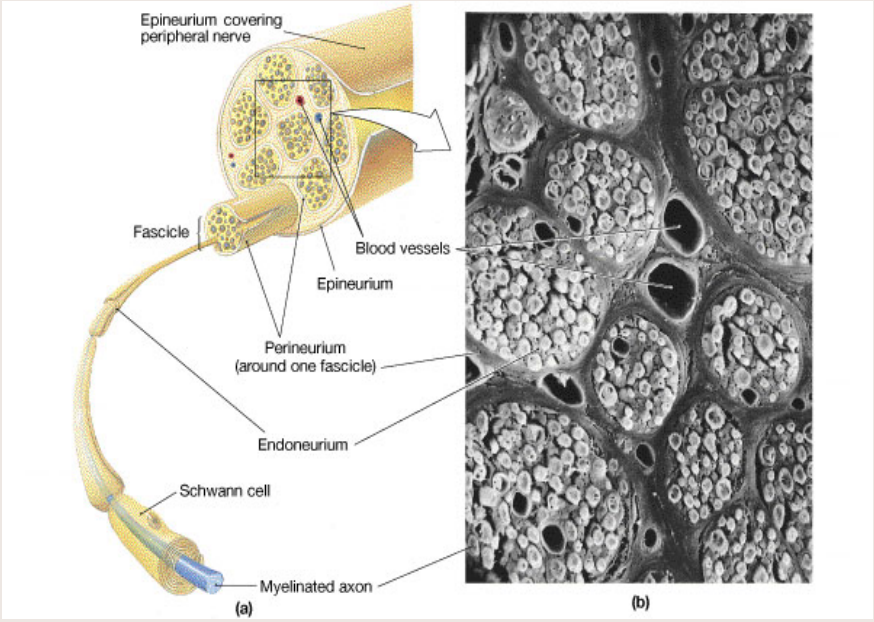
1. ***Epineurium*** – surrounds the entire nerve



Structure of a Nerve

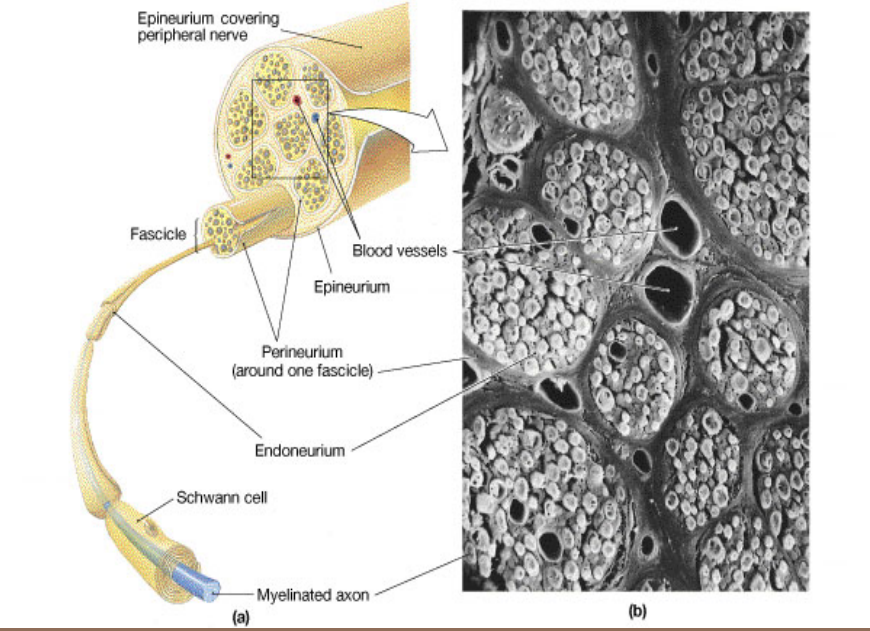
2. *perineurium*– surrounds a fascicle

Fascicle – a bundle of axons



Structure of a Nerve

3. ***Endoneurium*** – surrounds each axon

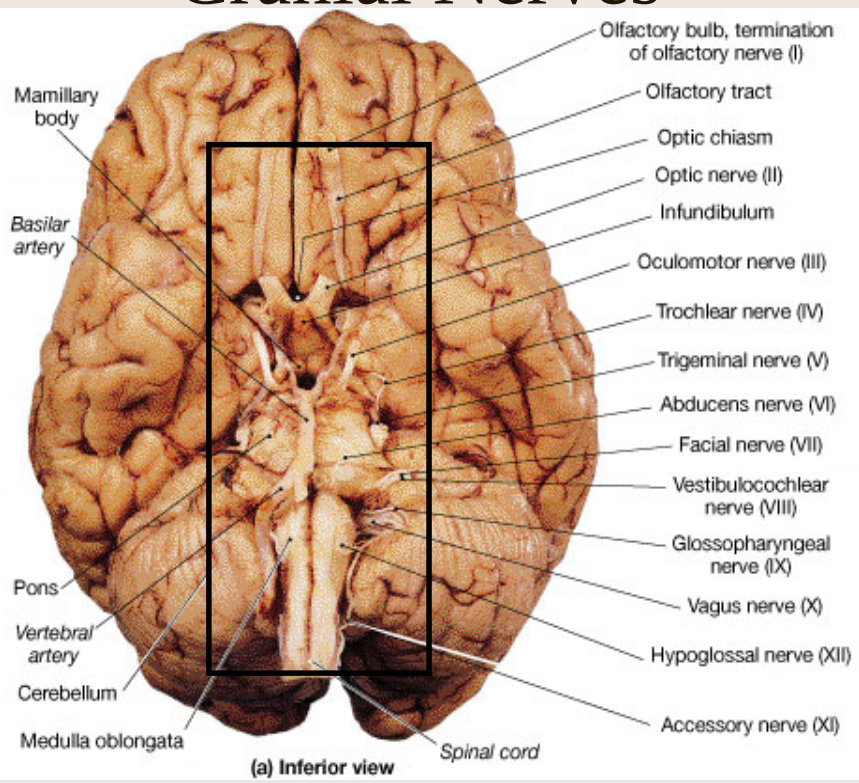


Types of Nerves

1. ***Sensory*** – all axons in all fascicles going ***from periphery to spinal cord***
2. ***Motor*** – all axons in all fascicles going ***from spinal cord to skeletal muscle*** (or other organs)
3. ***Mixed*** – axons within the nerve going in different directions BUT not within the same fascicles.

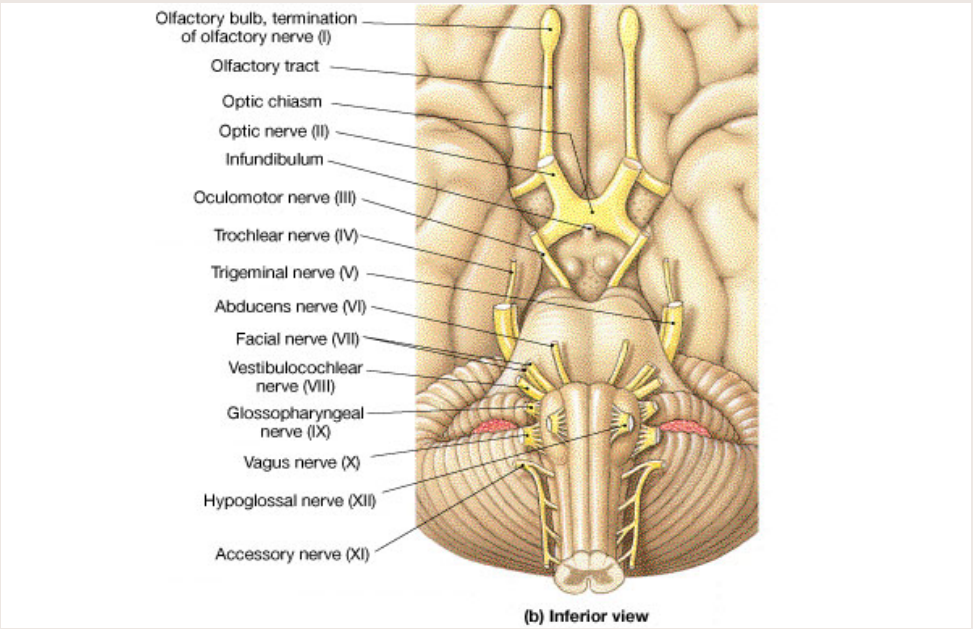
- ***All axons within a single fascicle are going in only one direction***

Cranial Nerves



Cranial Nerves

- Found on inferior surface of brain

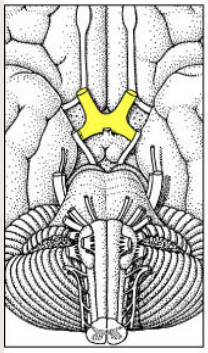


Cranial Nerves

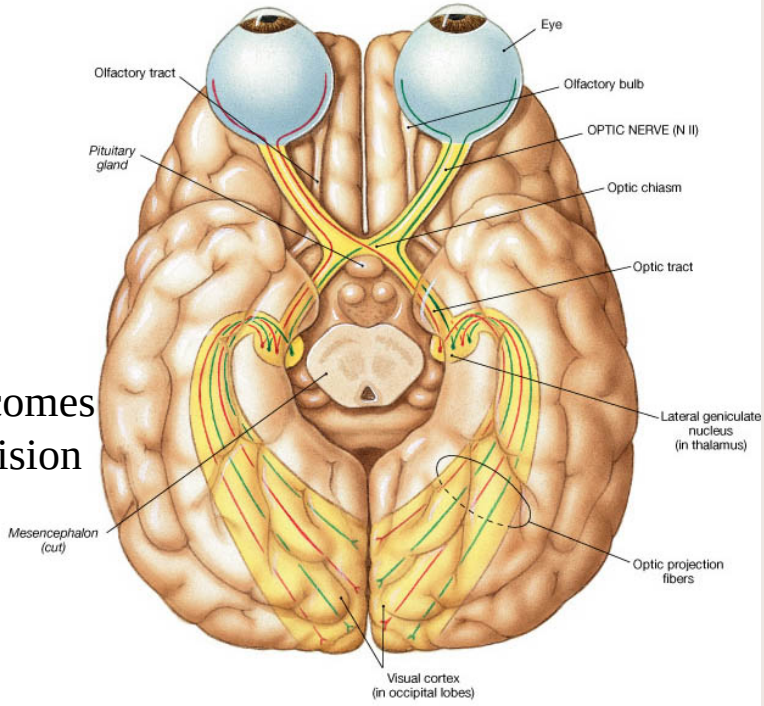
1. Some are ***sensory n.***
   - Periphery (skin or other organs) to brain
2. Some are ***motor n.***
   - Brain to periphery (muscle or another organ)
3. Some are ***mixed n.***
   - Both directions
4. All 12 pr. can be used to test various areas of the brain

For instance….

The Optic Nerve



A patient comes in with a vision problem

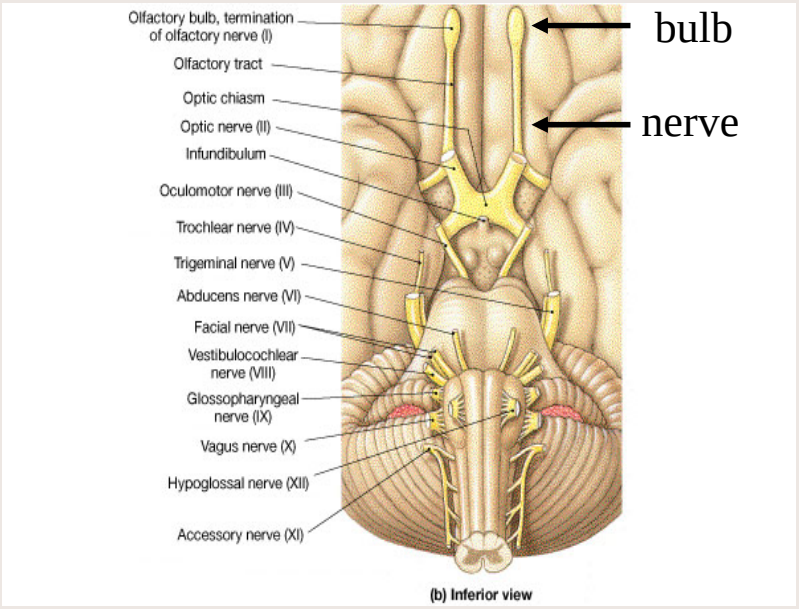


Study Hint for the Cranial Nerves

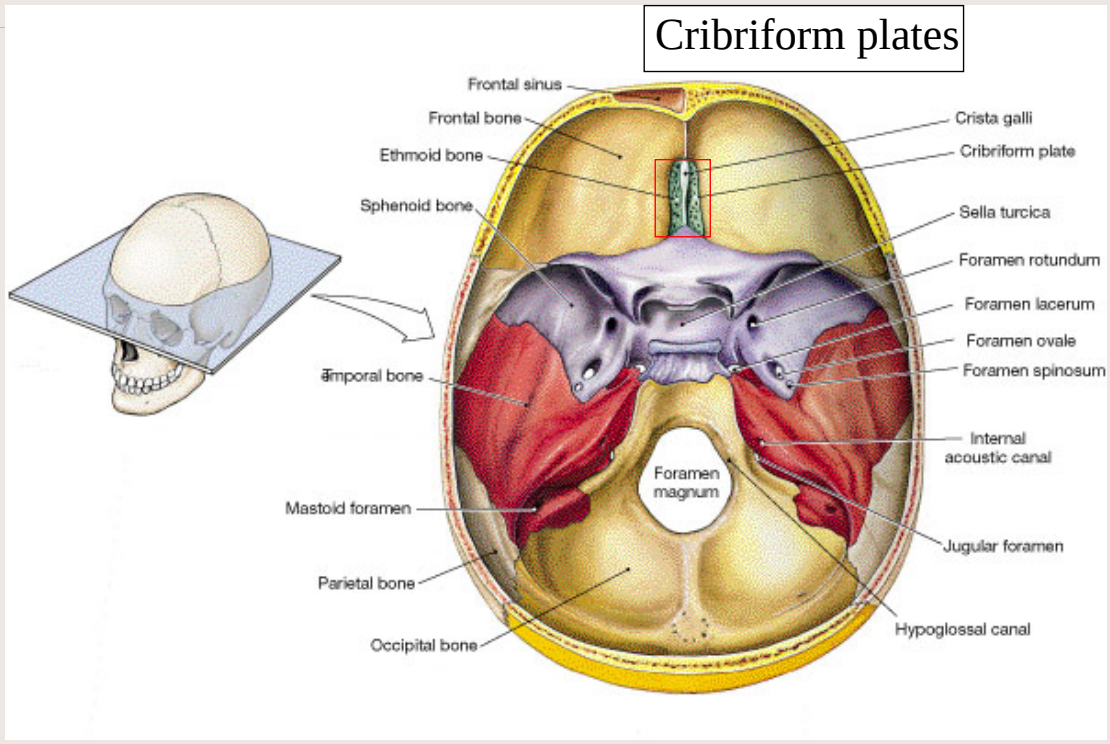
- Make a table with 6 columns
- The headings for the 6 columns (L to R) should be:
- Number
- Name
- Sensory, Motor, or B (B = mixed)
- Function
- Test
- Special features

I Olfactory

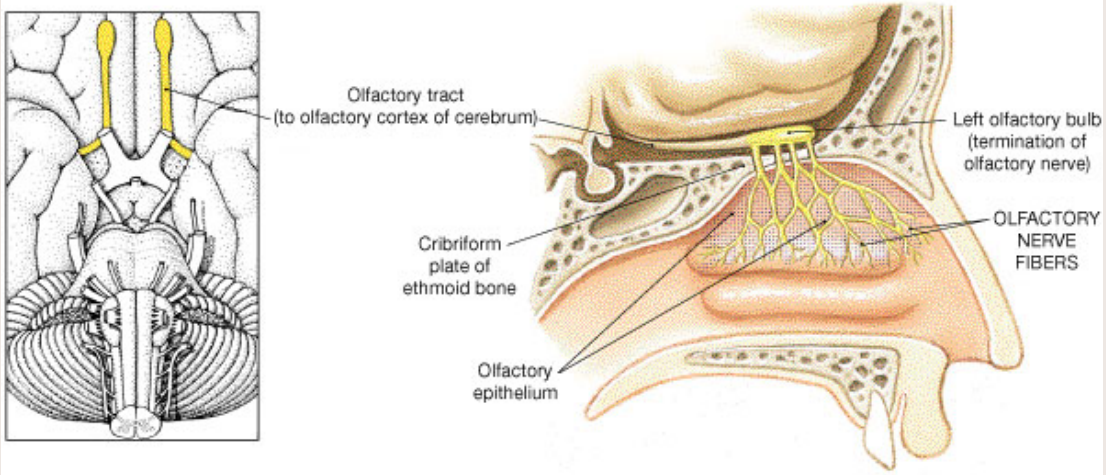
- Sensory
- Olfaction
- Bulb



Location of Olfactory Bulb



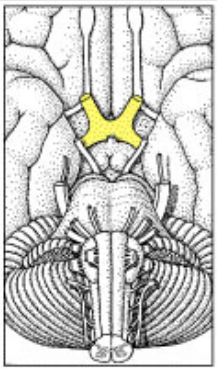
Olfactory Bulb

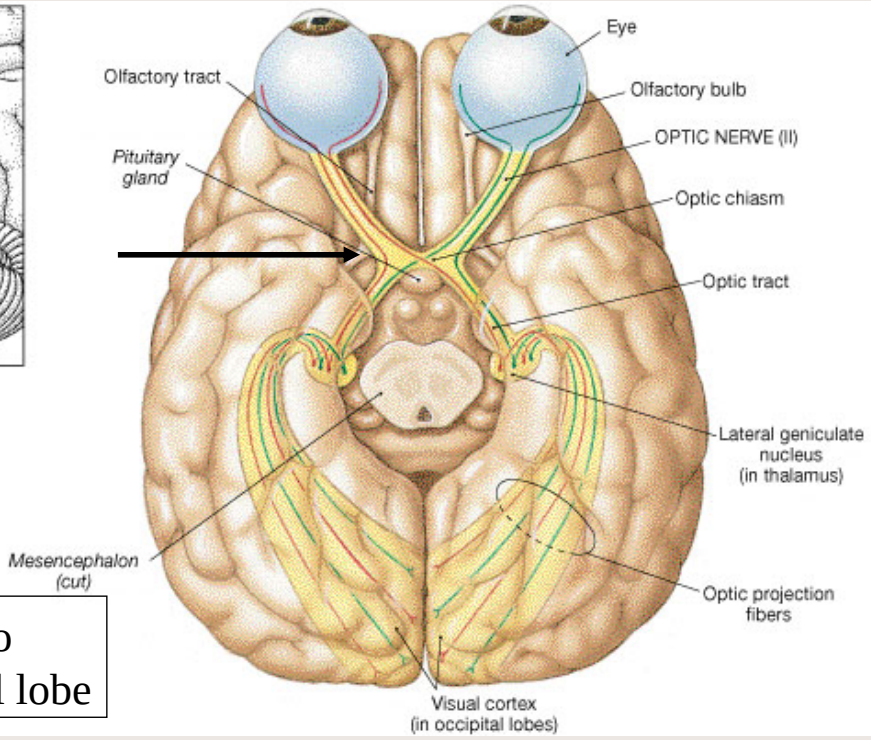


II Optic

- Sensory
- Vision
- Comprised of axons from rods and cones of retina

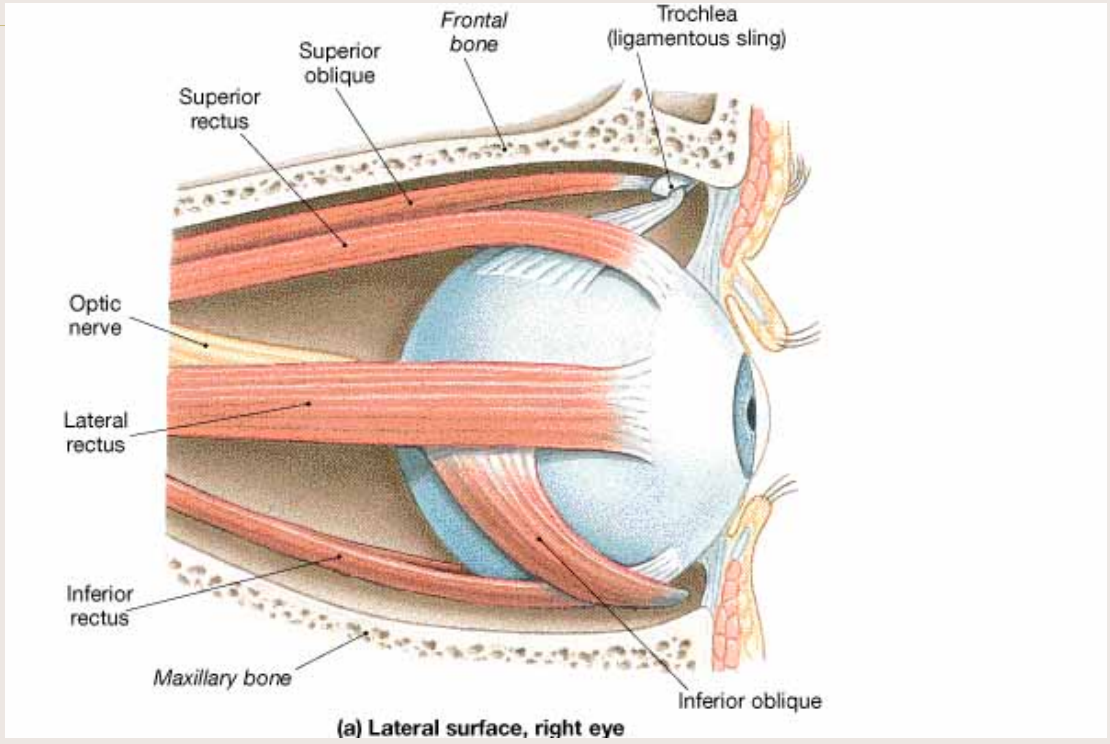
II Optic





Project to occipital lobe

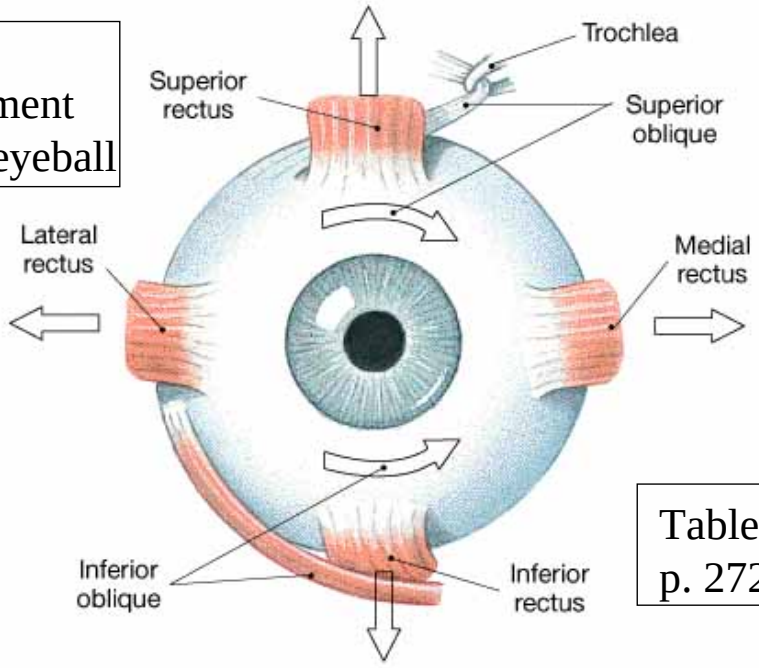
Extrinsic Eye Muscle



(a) Lateral surface, right eye

Extrinsic Eye Muscles

Cause movement of the eyeball

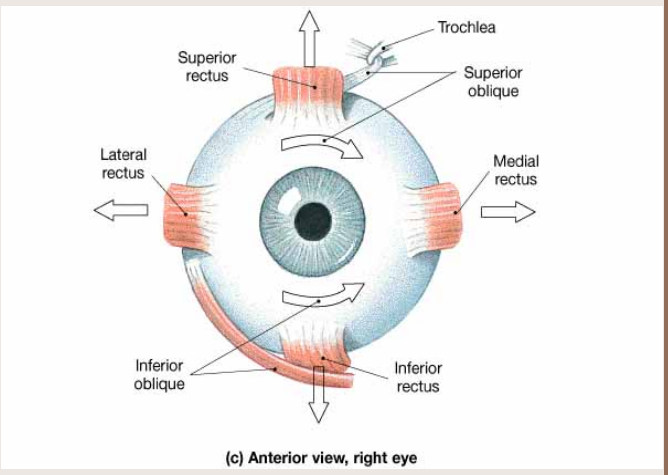


(c) Anterior view, right eye

Table 10-2 p. 272

Extrinsic Eye Muscles

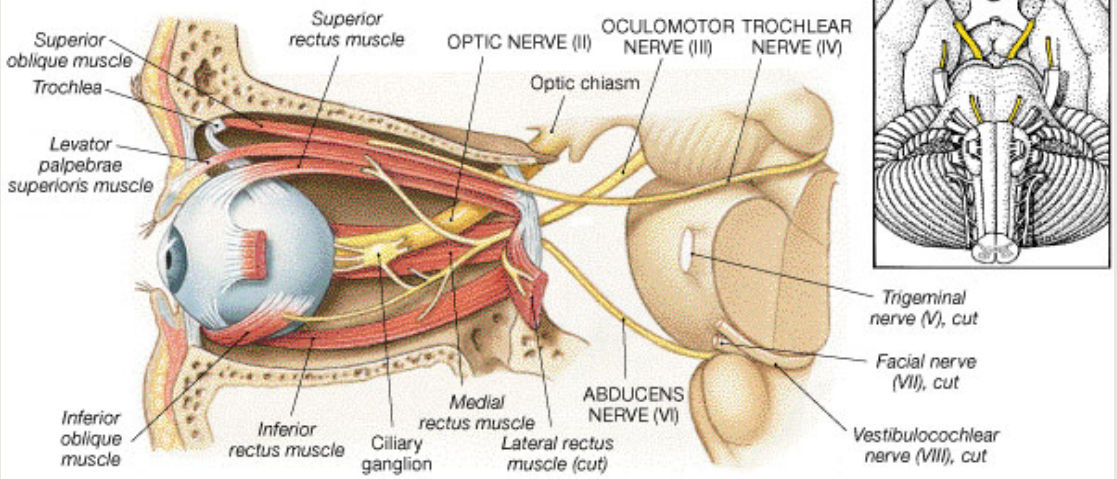
1. Superior rectus
2. Inferior rectus
3. Medial rectus
4. Lateral Rectus
5. Superior oblique
6. Inferior oblique



Superior oblique=eye rolls, looks down and medial
Inferior oblique=eye rolls, looks up and medial

Extrinsic Eye Muscles

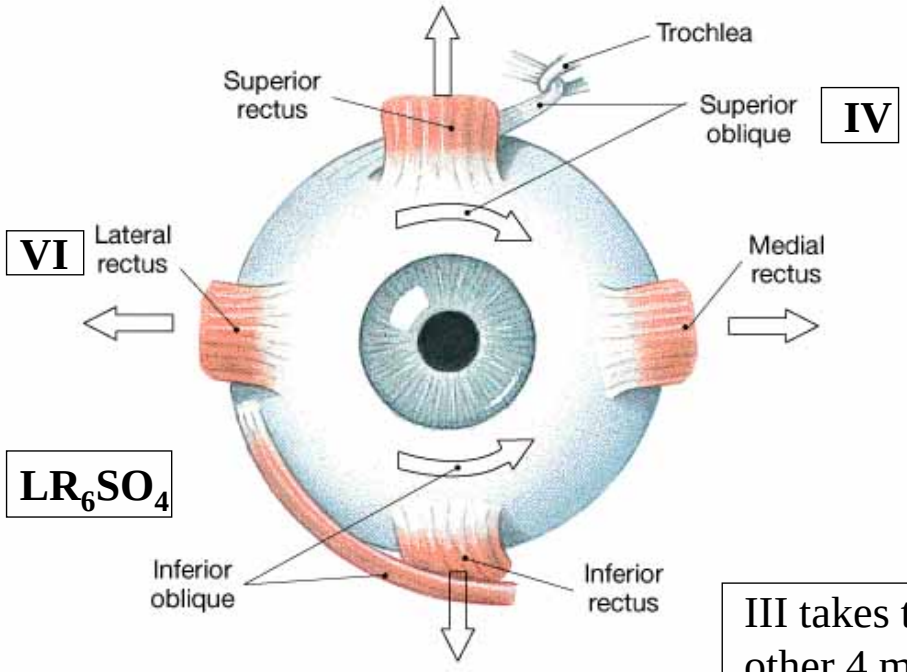
3 cranial n. innervate
6 extrinsic eye m.



3 Cranial Nerves

- III Oculomotor motor
- IV Trochlear motor
- VI Abducens motor
- But…..which nerves innervate which muscles????

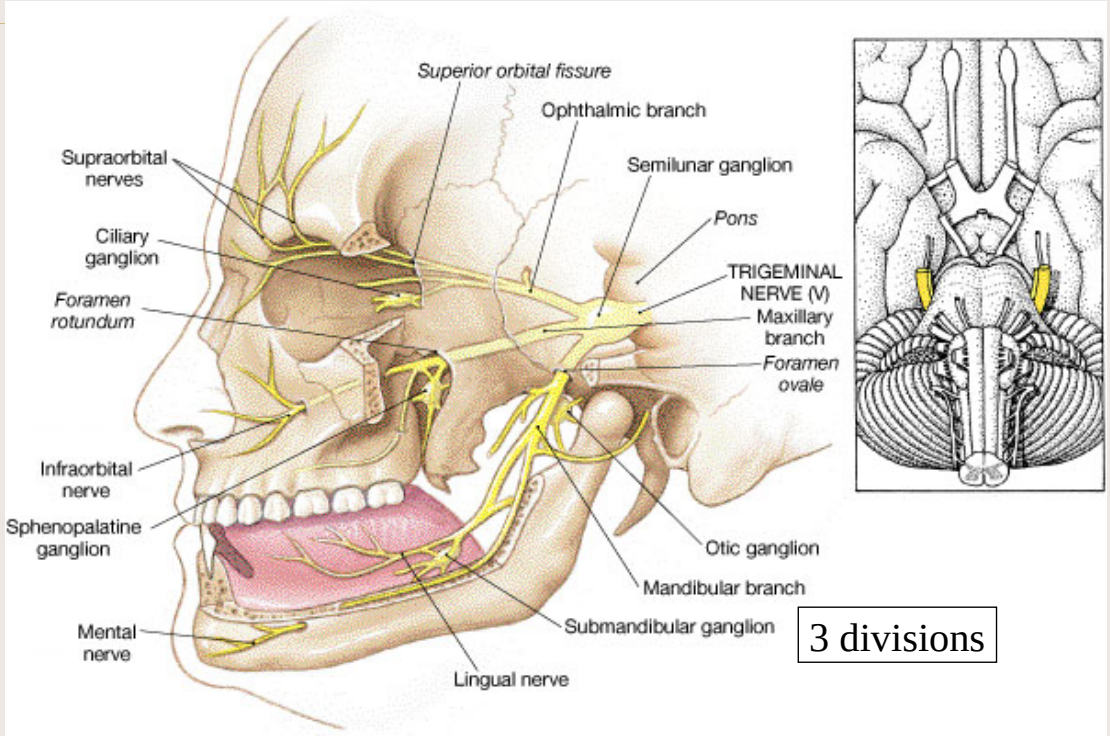
Innervation Pattern



LR_6SO_4

III takes the other 4 m

V Trigeminal



3 divisions

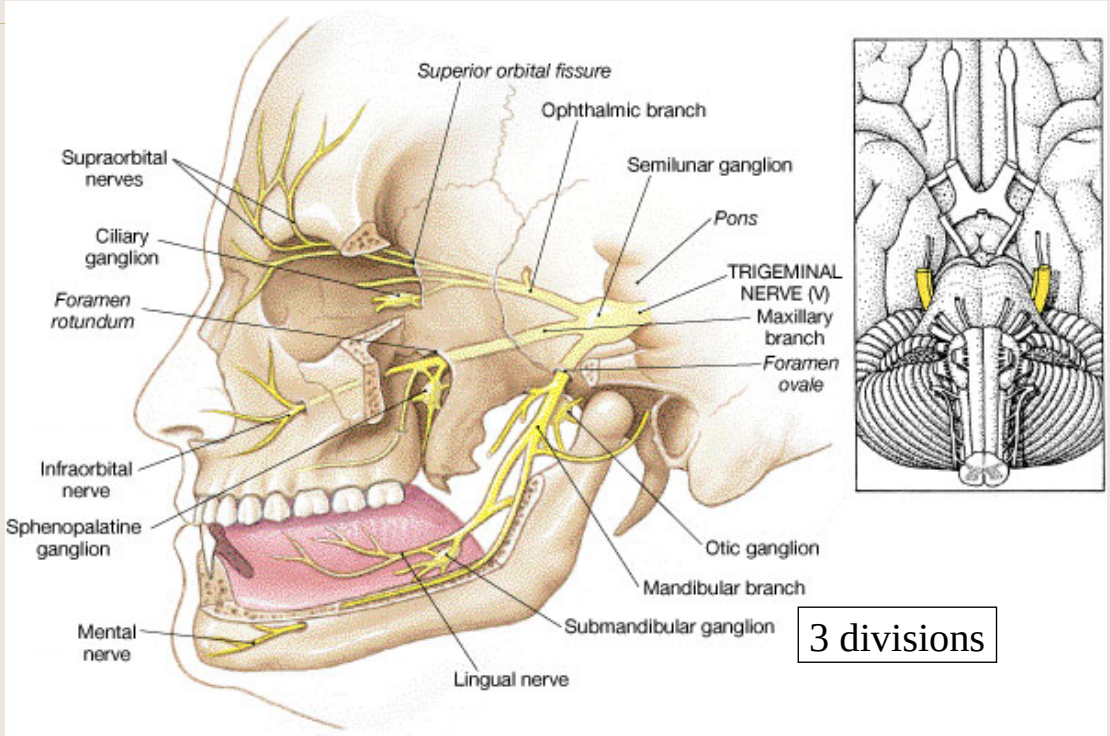
V Trigeminal

- V1 Ophthalmic Sensory
- Sensory from:

1. Skin of forehead
2. Eyebrows and eyelids
3. Nasal cavity and sinuses

- Exits through ***superior orbital foramen***

V Trigeminal



3 divisions

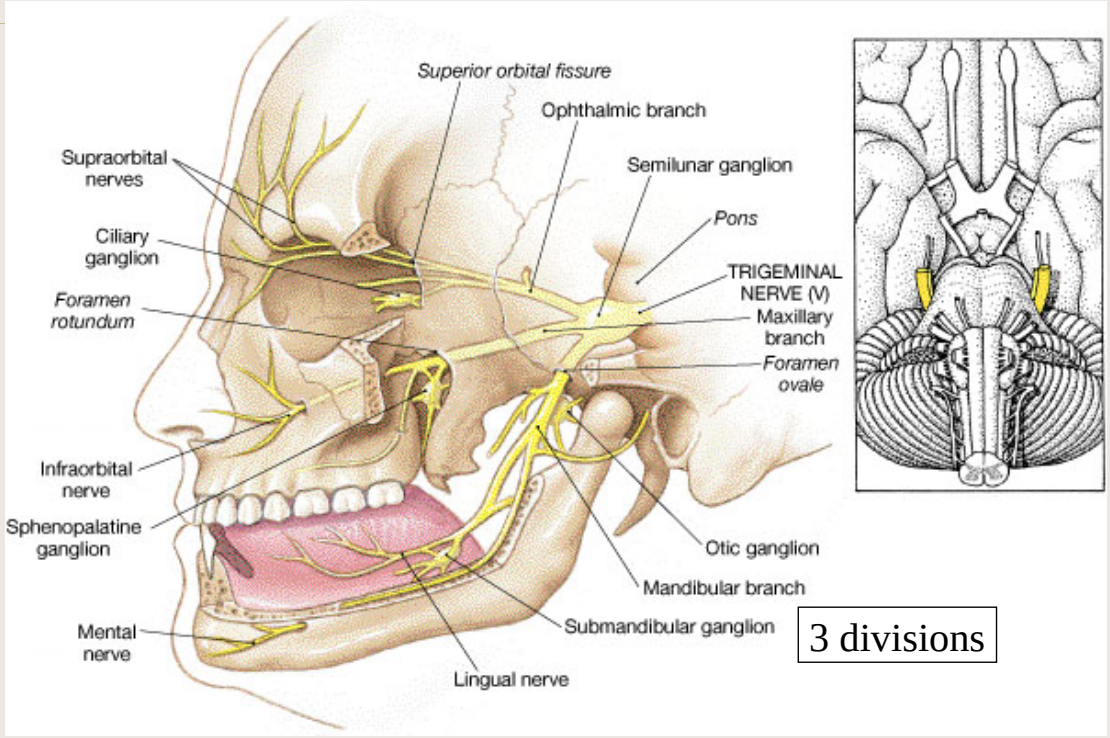
V Trigeminal

- V2 Maxillary Sensory
- Sensory from:

1. Lower eye lid, upper lip
2. Cheek and nose
3. Upper gums and teeth
4. Palate

- Exits through ***foramen rotundum***

V Trigeminal



3 divisions

V Trigeminal

- V3 Mandibular Both
- Sensory from:

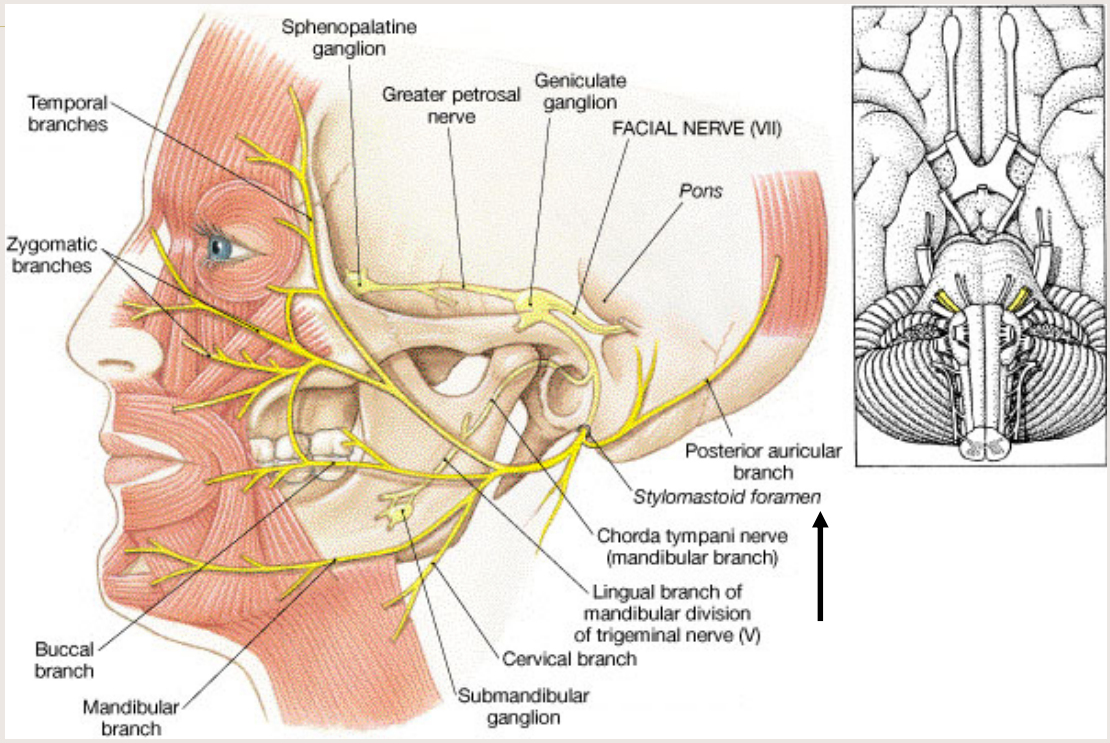
1. Lower lip, gums and teeth
2. Palate and tongue (touch)
3. Skin over chin

- Motor to:
- Muscles of mastication (chewing)

Tic Douloureux

- Sudden discharge of V2 and V3
- Causes intense pain to areas innervated by V2 and V3
- ***Trigeminal neuralgia***
- 1/25,000 and usually 40 yo and older

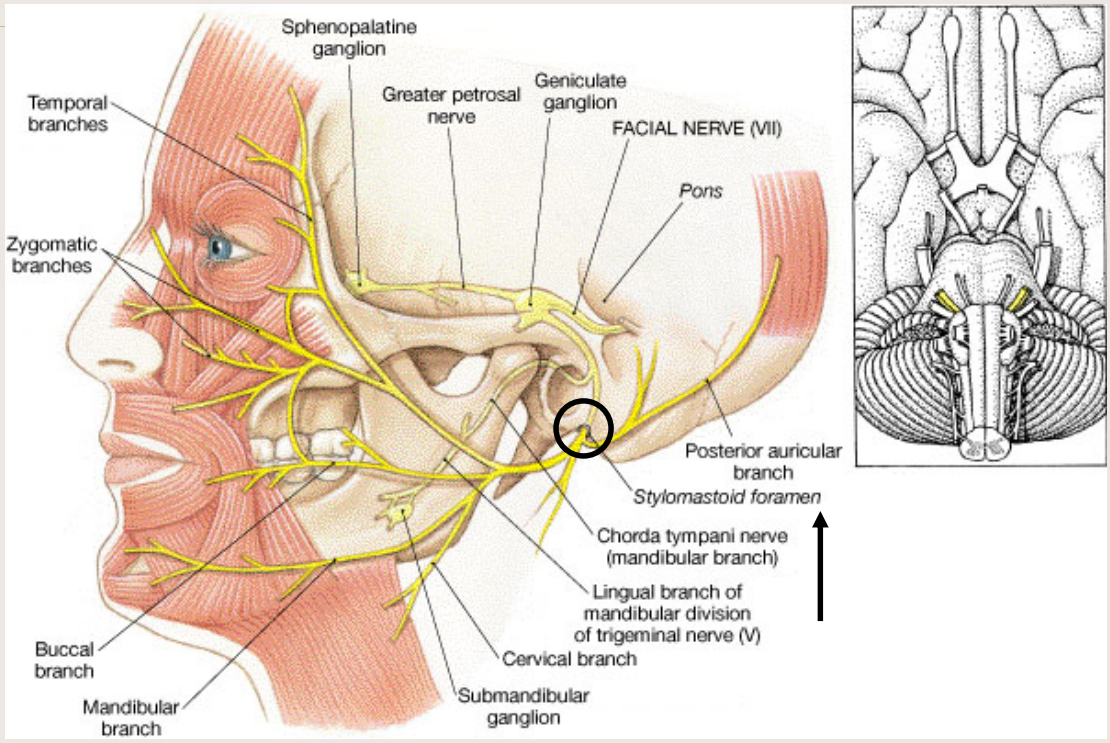
VII Facial


Sphenopalatine ganglion
Temporal branches
Greater petrosal nerve
Geniculate ganglion
FACIAL NERVE (VII)
Pons
Zygomatic branches
Posterior auricular branch
Stylomastoid foramen
Chorda tympani nerve (mandibular branch)
Lingual branch of mandibular division of trigeminal nerve (V)
Buccal branch
Cervical branch
Submandibular ganglion
Mandibular branch

VII Facial

- Mixed
- Motor to ***facial muscles*** (5 branches)
- Sensory from taste buds – anterior 2/3 of the tongue
- Exits through ***stylomastoid foramen***
- ***Bell's Palsey*** -- dysfunction of VII because of viral inflammation
- Results in facial muscle paralysis on one side
- Usually "cures itself" within weeks or a few months

VII Facial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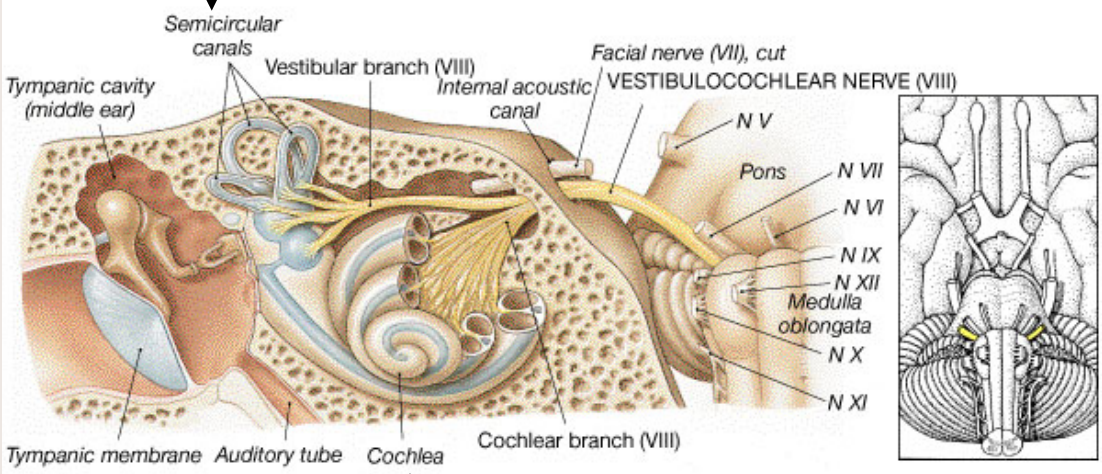
Lingual branch of mandibular division of trigeminal nerve (V)
Buccal branch
Cervical branch
Submandibular ganglion
Mandibular branch

VIII Vestibulocochlear

Semicircular canals – organ of balance



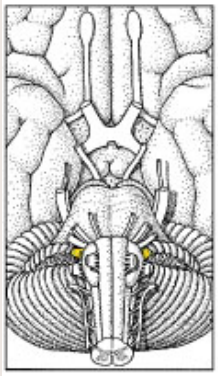
2 nerves in one

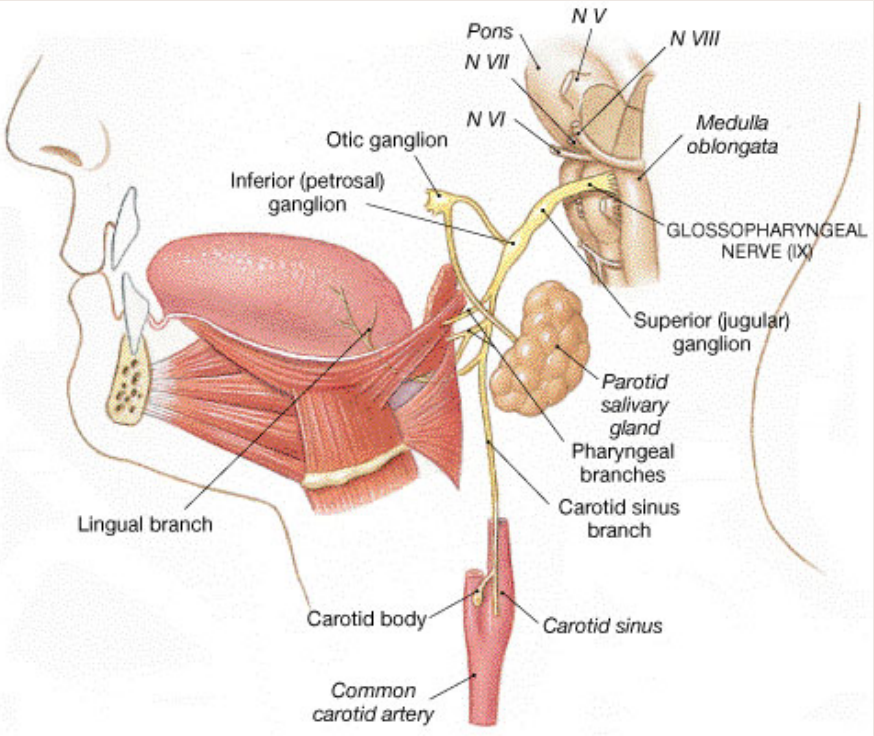
Cochlea – organ of hearing

VIII Vestibulocochlear

- Sensory
- Hearing and balance
- Cochlea and semicircular canals

IX Glossopharyngeal





IX Glossopharyngeal

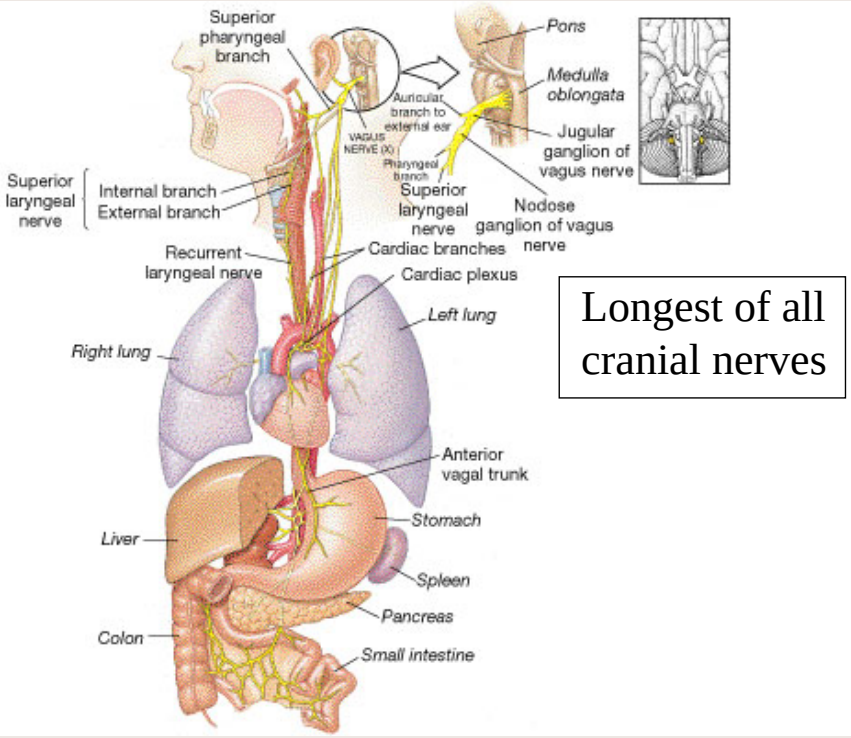
- Mixed
- Motor to:

1. Swallowing muscles of pharynx

- Sensory from:

1. Taste from posterior 1/3 of tongue
2. Lining of pharynx
3. Soft palate

X Vagus



Longest of all cranial nerves

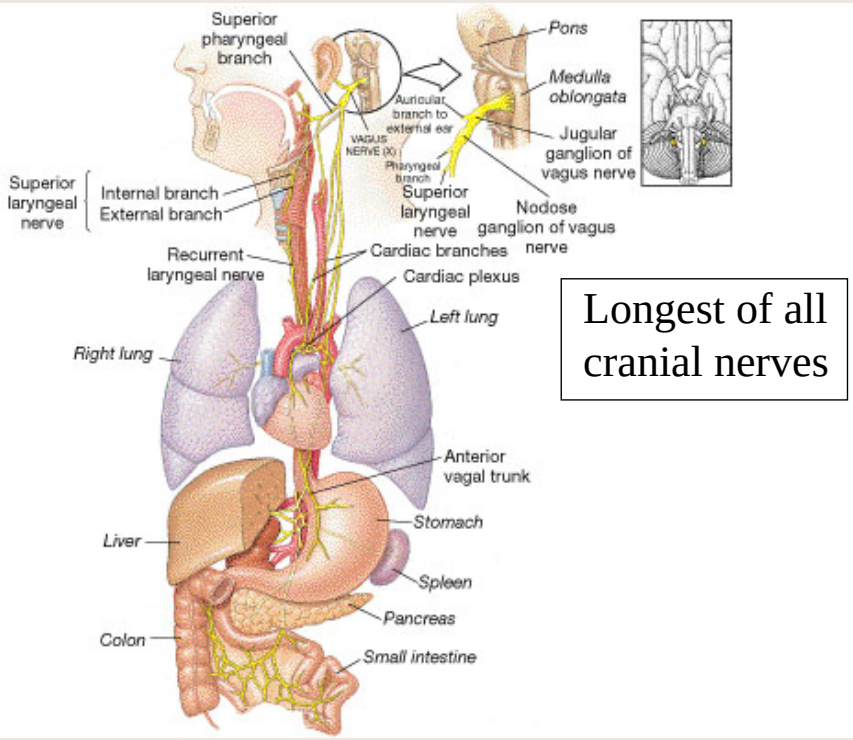
X Vagus

- Mixed
- Motor to:

1. Pharyngeal muscles
2. Organs in thorax and abdomen

- Lungs and heart
- Liver, stomach, intestines

X Vagus



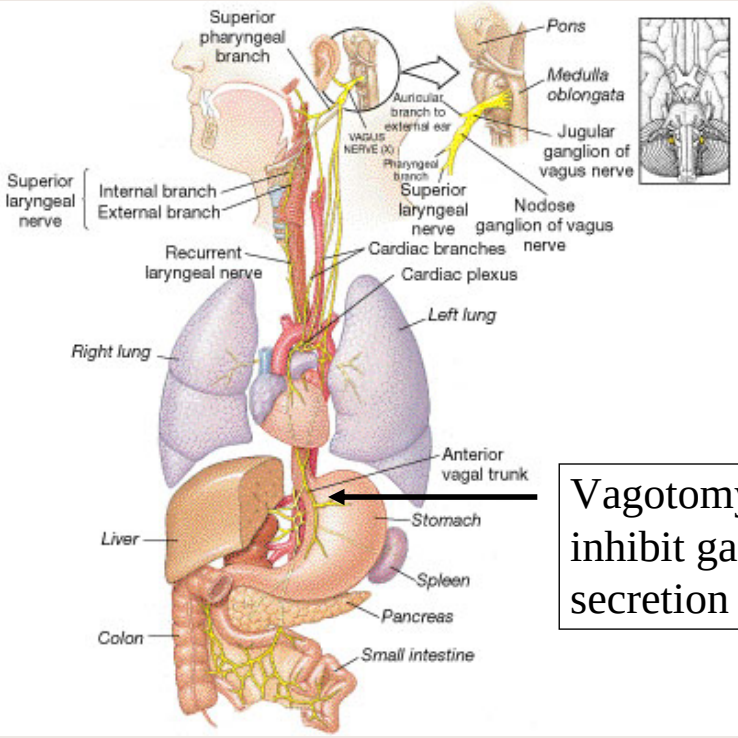
Longest of all cranial nerves

X Vagus

- Mixed
- Sensory from:

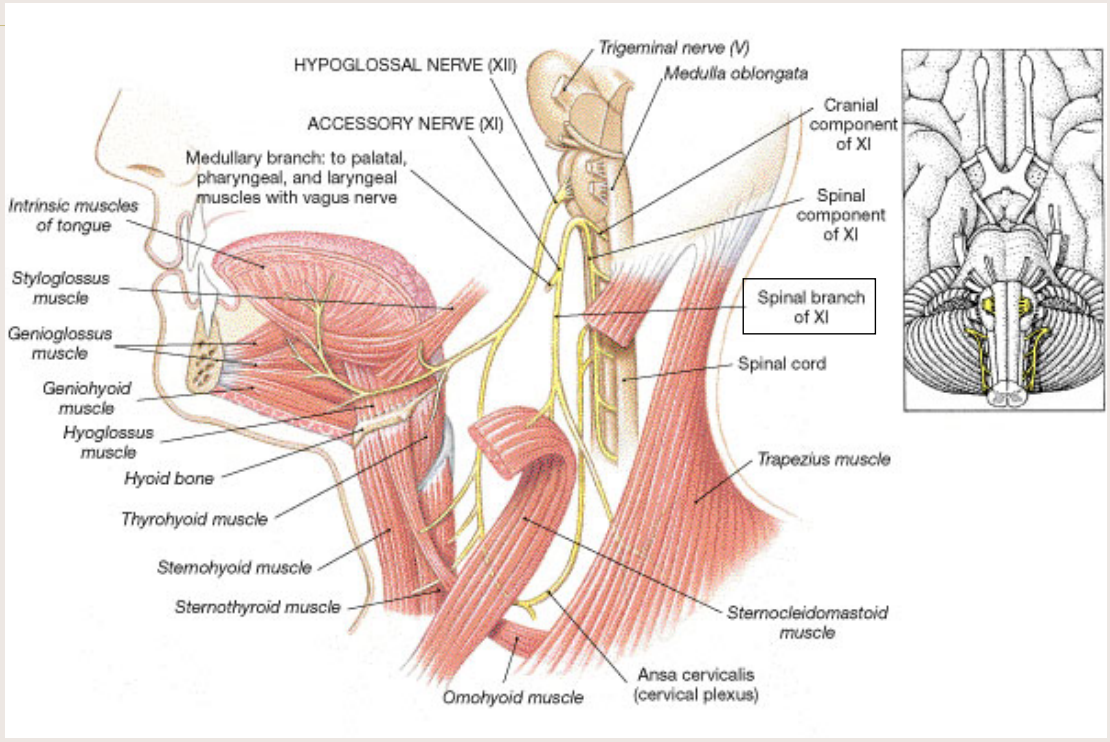
1. Pharynx
2. External auditory canal
3. Organs of thorax and abdomen

X Vagus



Vagotomy – to inhibit gastric acid secretion

XI Accessory

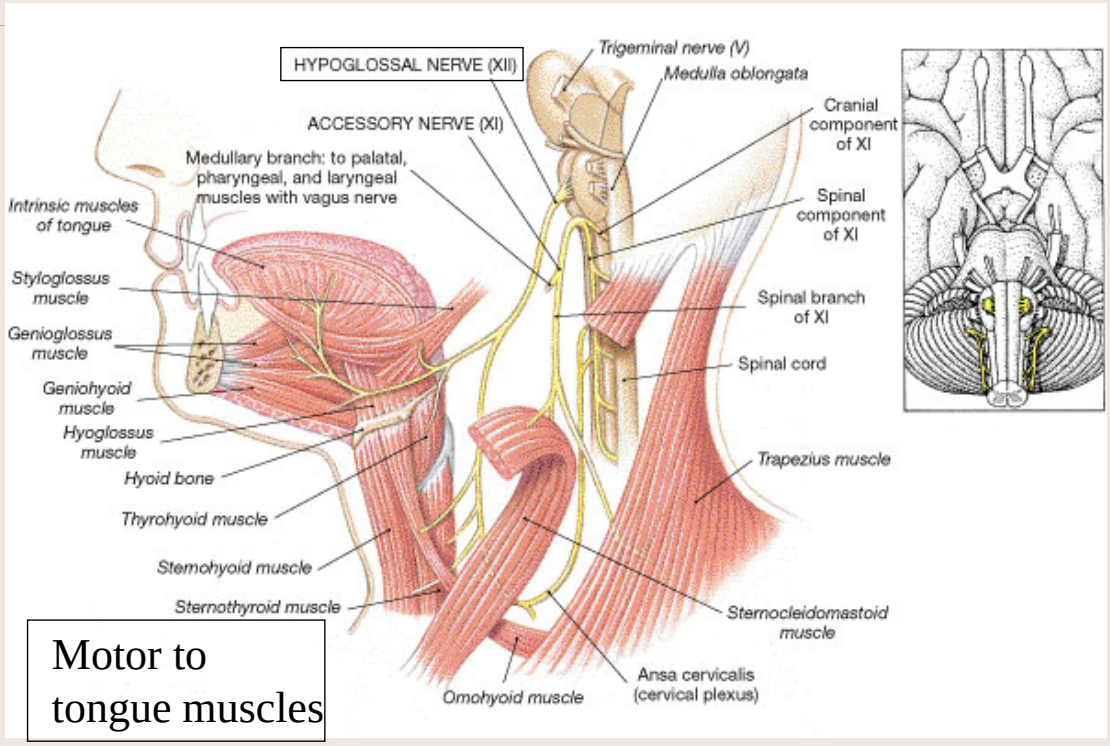


XI Accessory

- Motor
- Motor to:

1. Sternocleidomastoid
2. Trapezius
3. Pharyngeal and laryngeal muscles

XII Hypoglossal



Motor to tongue muscles