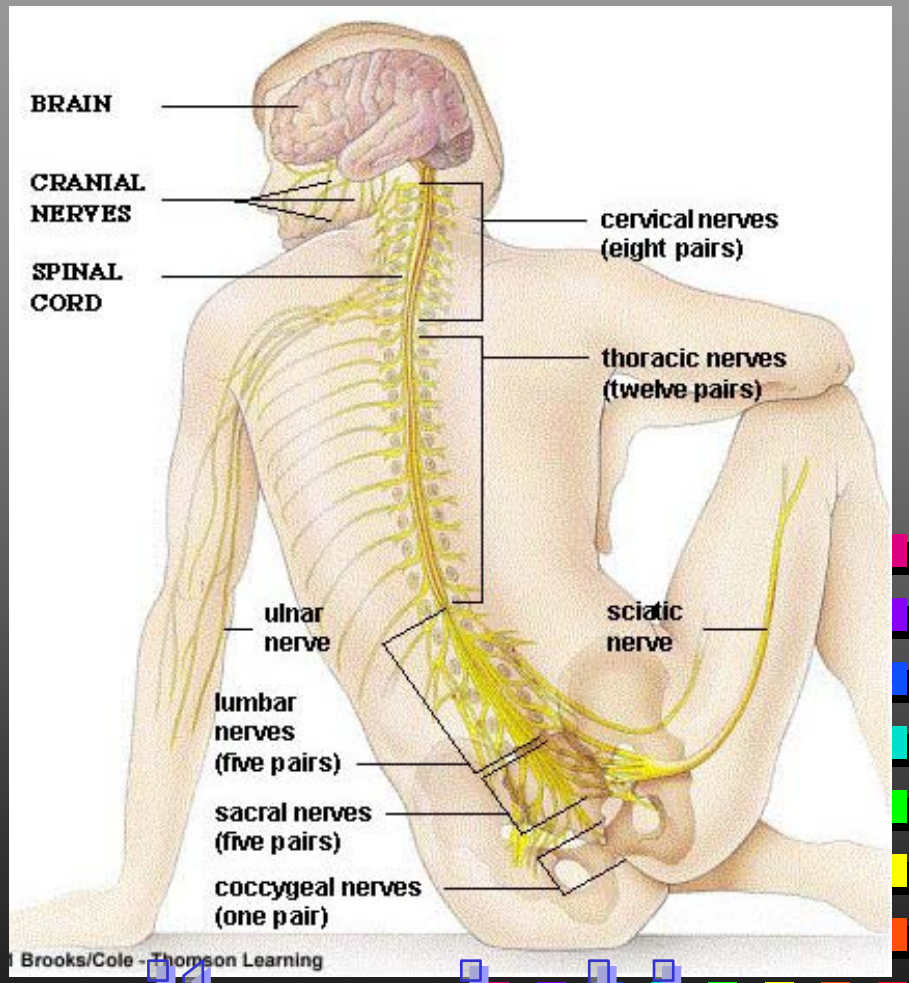
Peripheral Nervous System

- Sensory Receptors
- Motor Endings
- Cranial Nerves
- The Four Plexuses
  - Extremities



Review of Reflexes

Fast, preprogrammed, inborn, automatic responses

Occur in the CNS at the spinal cord or brainstem levels

May be either monosynaptic or polysynaptic

All require
- a. stimulus at receptor
- b. sensory information relay
- c. processing at CNS level
- d. activation of motor response
- e. response of peripheral effector

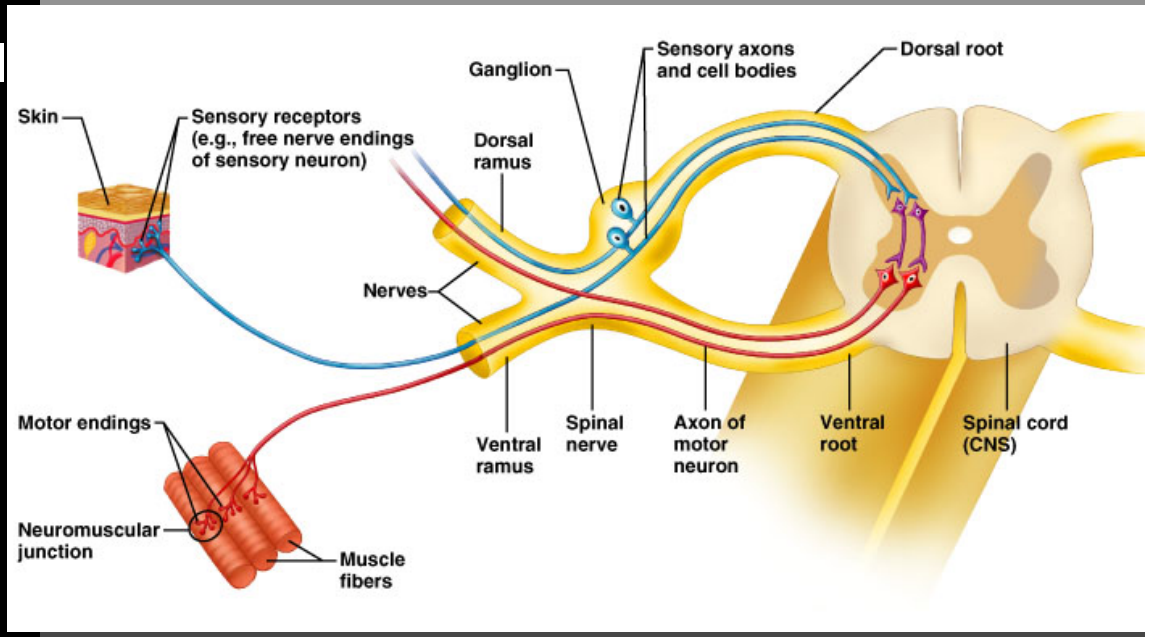
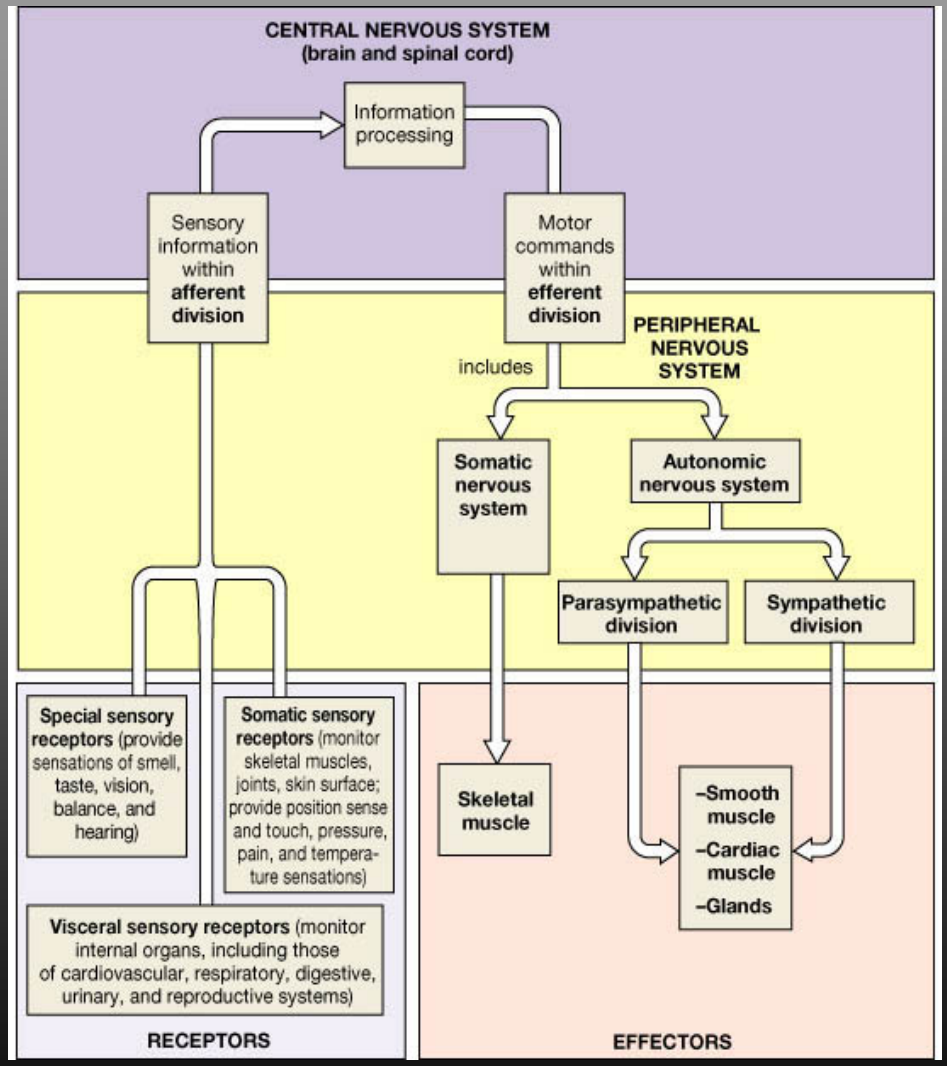


Fig 14.2

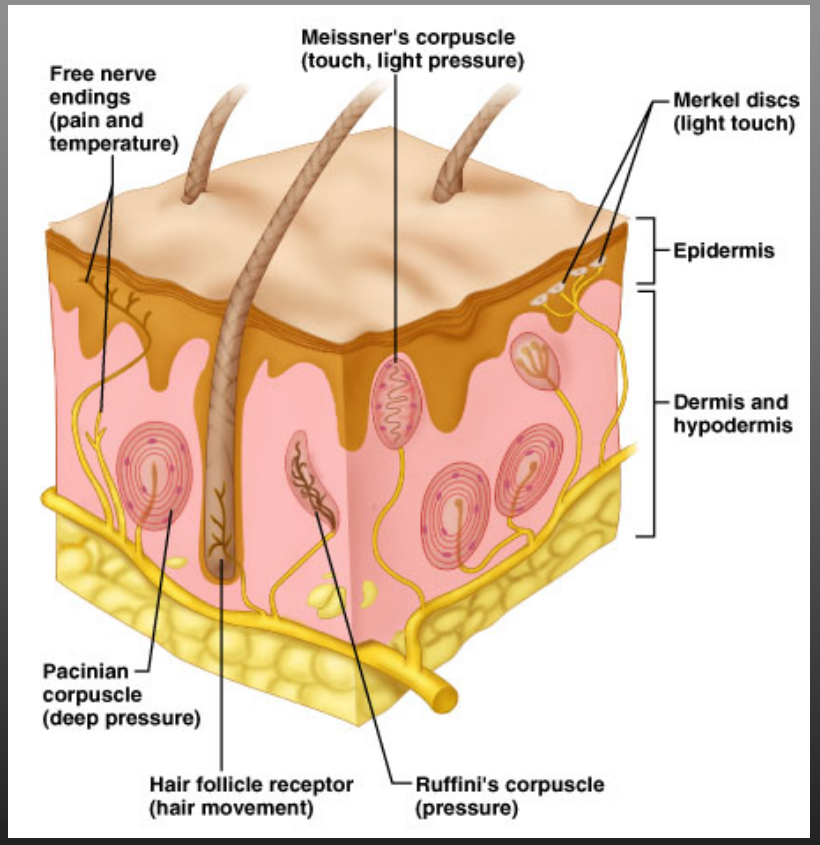
Peripheral Sensory Receptors

- Classified by
  - Location
    - Exteroceptors
    - Interoceptors
    - Proprioceptors
  - Stimulus
    - Thermoreceptors, etc.
  - Structure
    - Pacincian corpuscle
  - Adaptive abilities



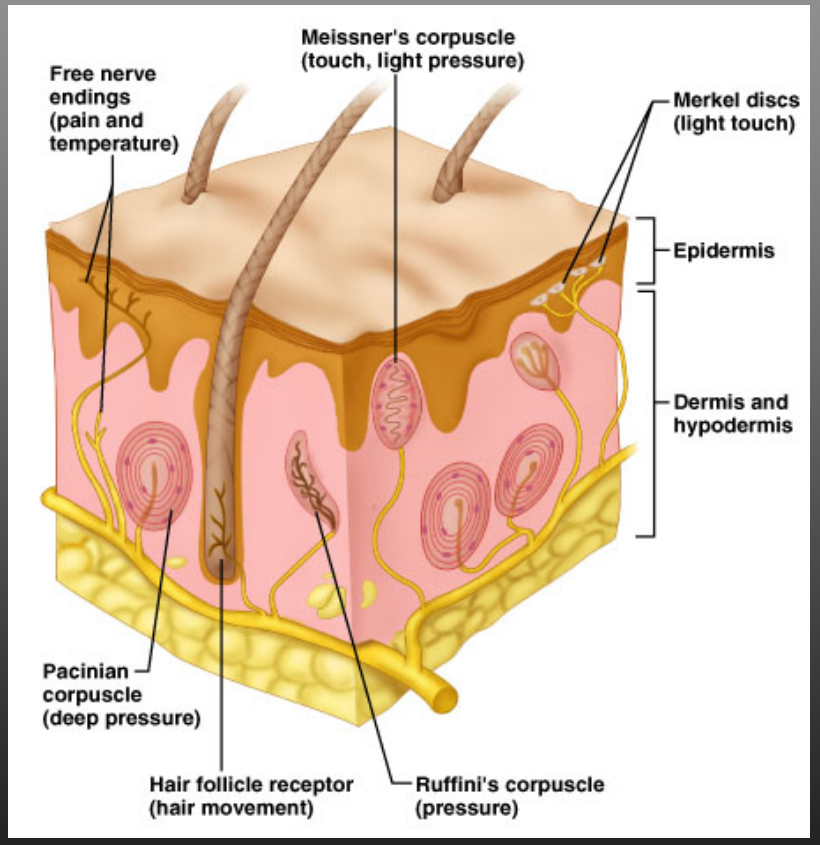
Peripheral Sensory Receptors, cont'd

- Free Nerve Endings
  - Prominent in epithelia
  - Pain and Temperature
  - Light touch (Merkel's discs)



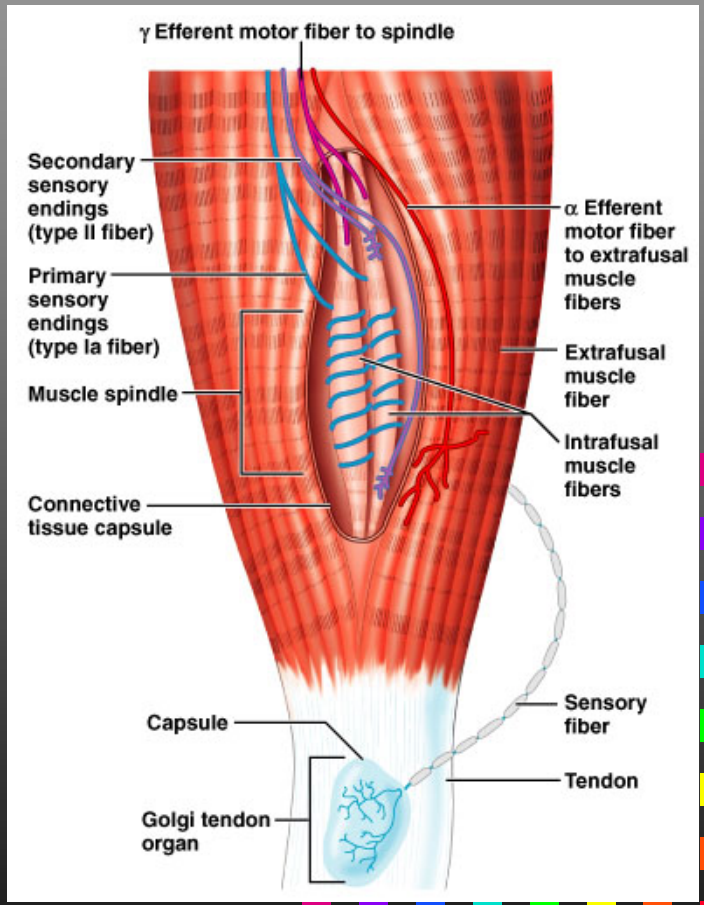
Peripheral Sensory Receptors, cont'd

- Encapsulated Nerve Endings
  - Meissner's Corpuscles (Light Touch)
  - Pacinian (lamellated) Corpuscles
    - Throughout the Body
    - Adaptive
    - Mechanical Pressure
  - Ruffini's Corpuscles
    - Pressure and Touch
    - Not very Adaptive



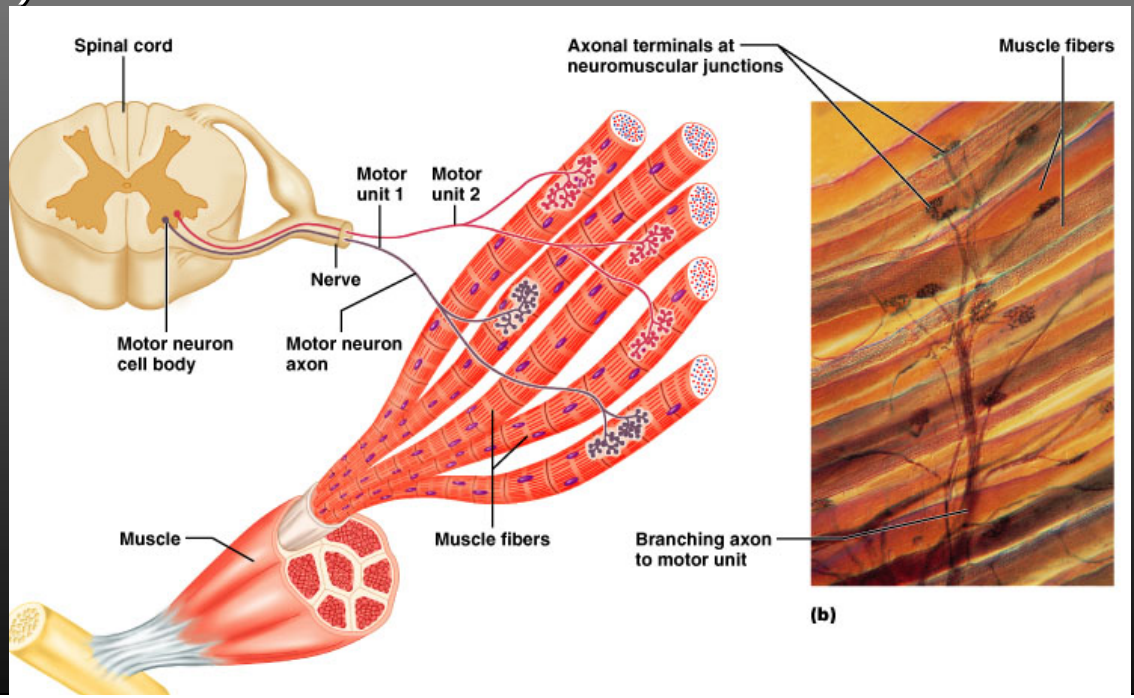
Proprioception

- Stretch Monitors detect position in space
  - Modified muscle fibers (cells)
- Golgi Tendon Organ
  - Monitors tendon tension
  - “Knee Jerk Reflex” is monosynaptic
- Joint Kinesthetic Receptors
  - Joint Capsules
  - All of the above types of receptors



The Other End (Effectors)

- Motor End Plate: Similar to Synapse
  - Skeletal Muscle
  - ACh
    - Broken down quickly, compared to nerve synapse
  - Remember definition of Motor Unit
- Visceral (smooth) Muscle and Glands
  - Varicosities



Peripheral Nerves (repetitio est…)

Definition: bundles of axons. AKA tracts in CNS

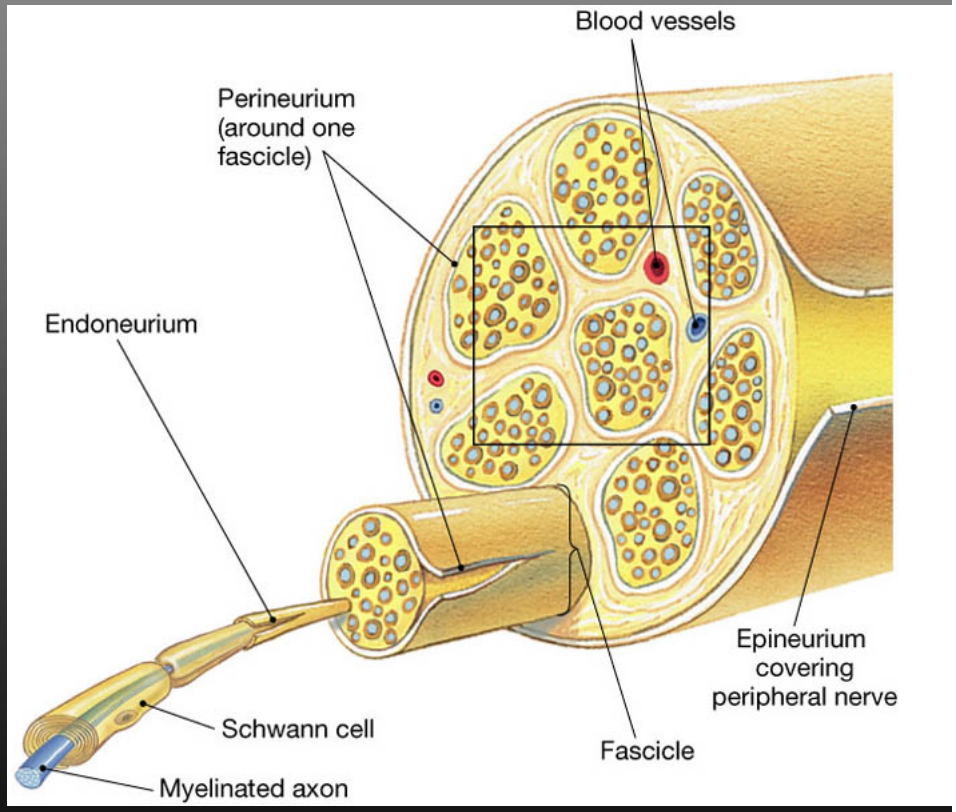
Organization – coverings (chapter 12):

Epineurium – wraps entire nerve

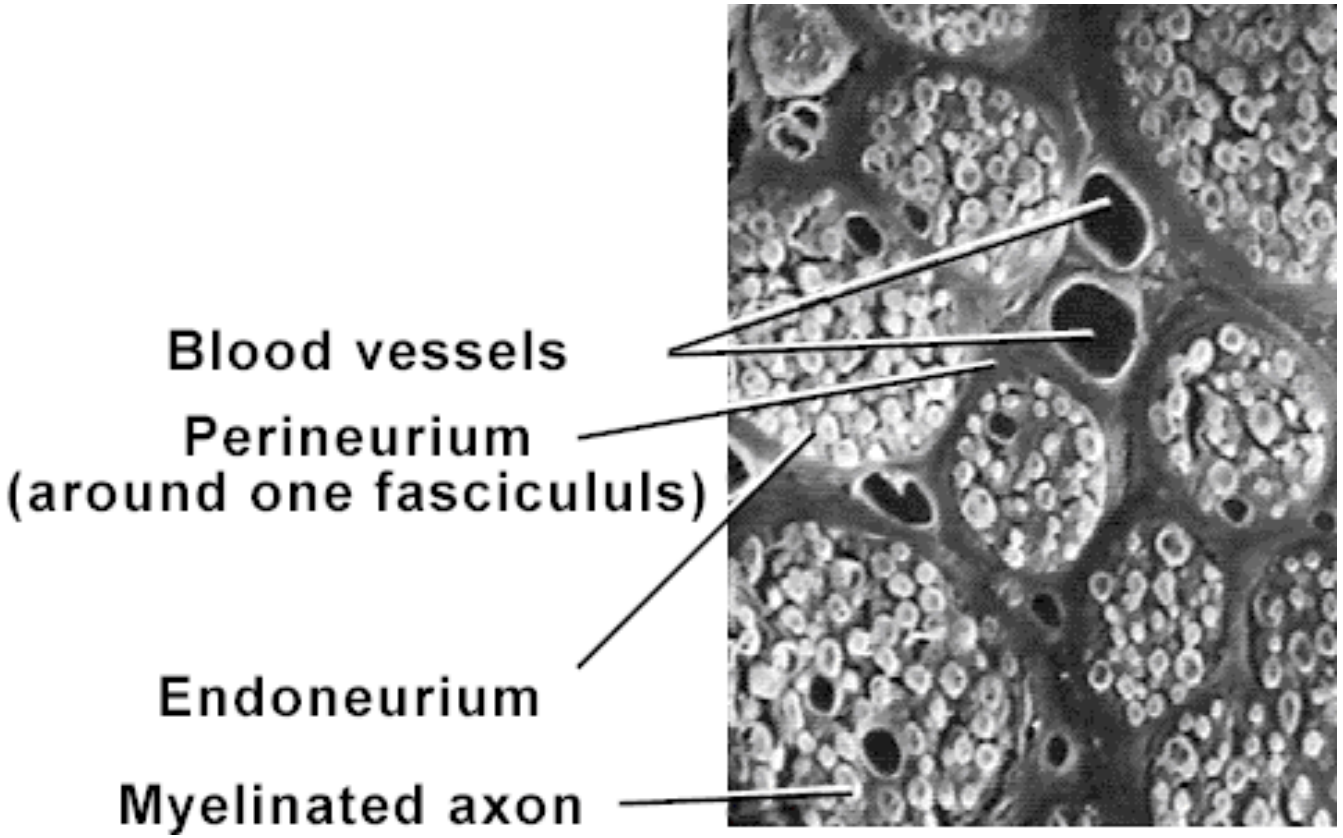
Perineurium – wraps fascicles of tracts

Endoneurium - wraps individual axons

Function:
sensory - afferent
motor - efferent
mixed - contains axons of both



Anatomy of a Peripheral Nerve



Cranial Nerves

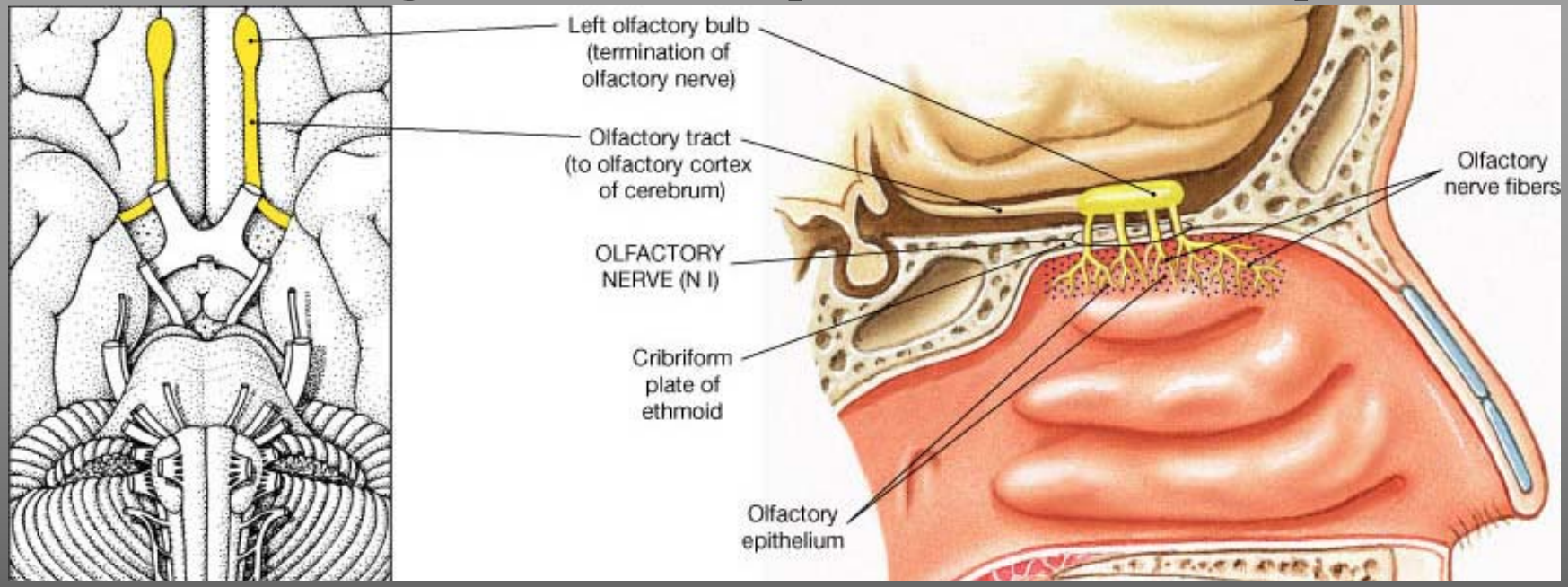
- Twelve pairs:
  - 2 attach to forebrain (Tel- & Diencephalon)
  - 10 attach to brainstem

    (Mes-, Met- and Myelencephalon)

- Names relate to appearance or function

  Classification
  Origin
  Destination

Olfactory Nerve (= CN or N I)



C: Sensory

O: Olfactory Epithelium in nasal cavity

D: Olfactory bulbs (by way of cribriform plate of ethmoid)

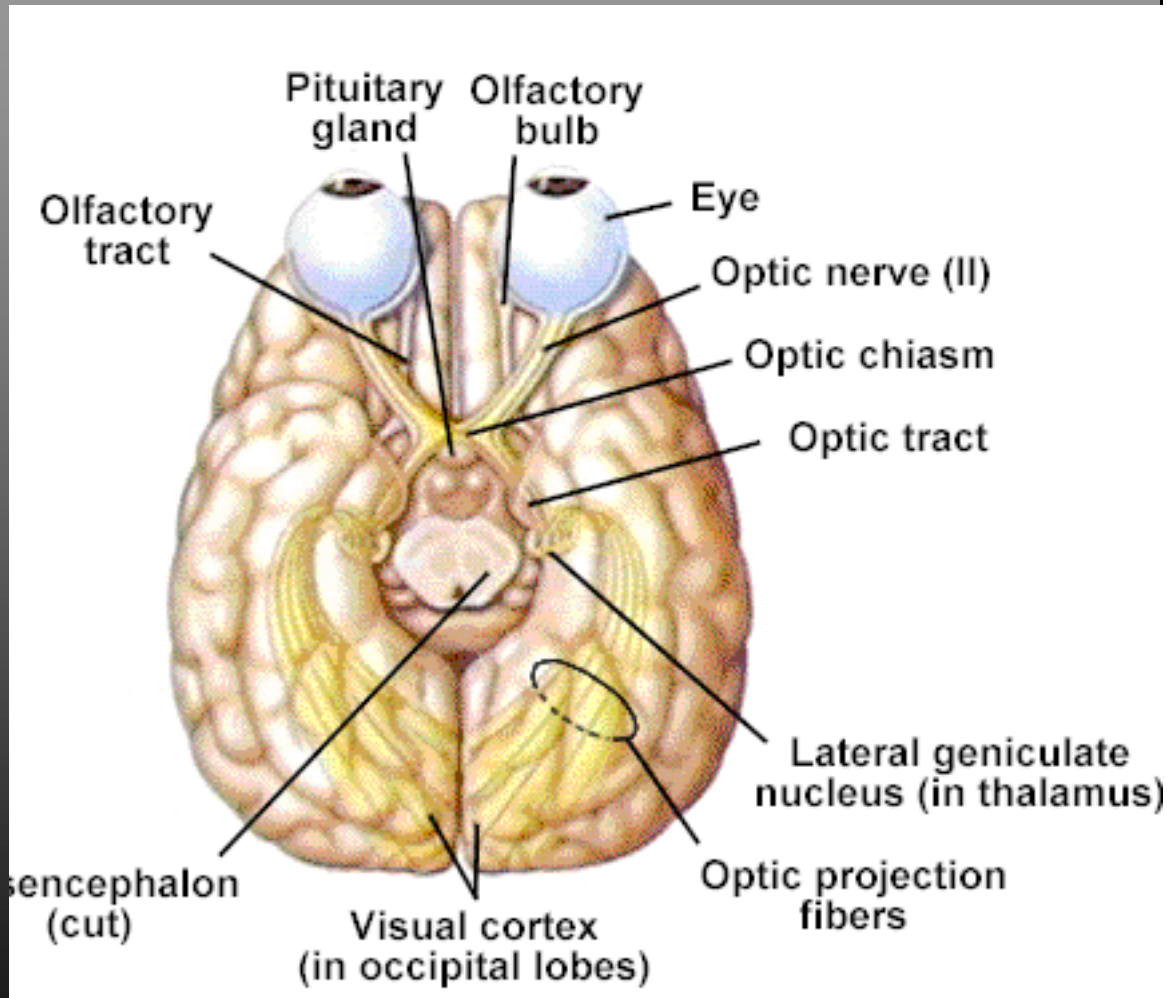
Only CN directly attached to Cerebrum

Optic Nerve (N II)

C: Sensory

O: Retina

D: by way of optic foramen of sphenoid to Diencephalon (optic chiasma) and to occipital lobe

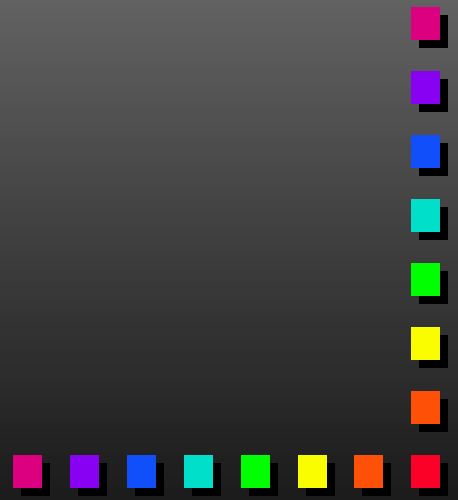


Oculomotor (N III)

C: Motor

O: Mesencephalon

D: Somatic motor to superior, inferior, medial recti and inferior oblique; visceral motor to intrinsic eye muscles by way of superior orbital fissure

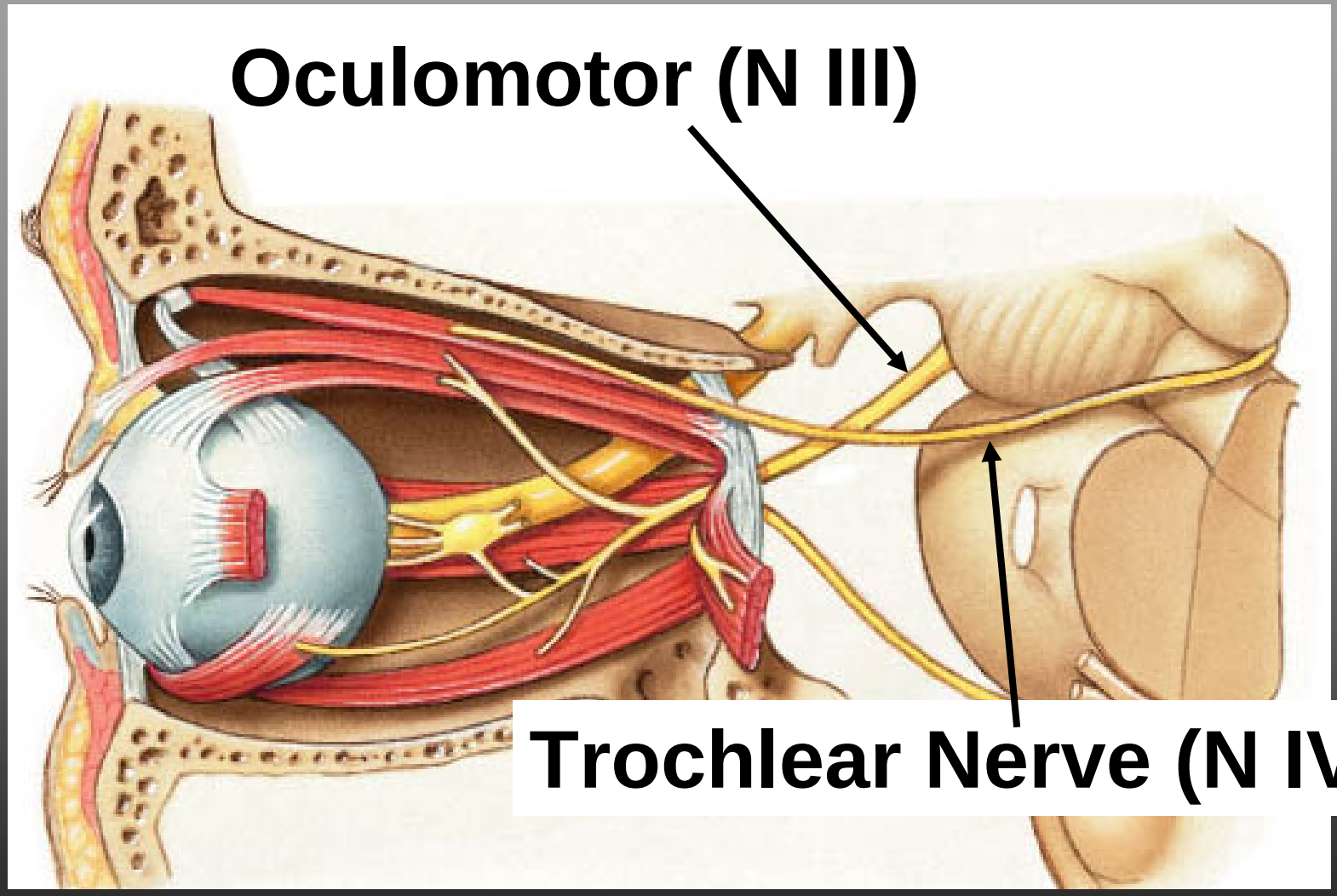


Trochlear (N IV)

C: Motor

O: Mesencephalon

D: superior oblique muscle
by way of superior
orbital fissure



Lateral view

Trigeminal (CN V)

C: Mixed

three major branches

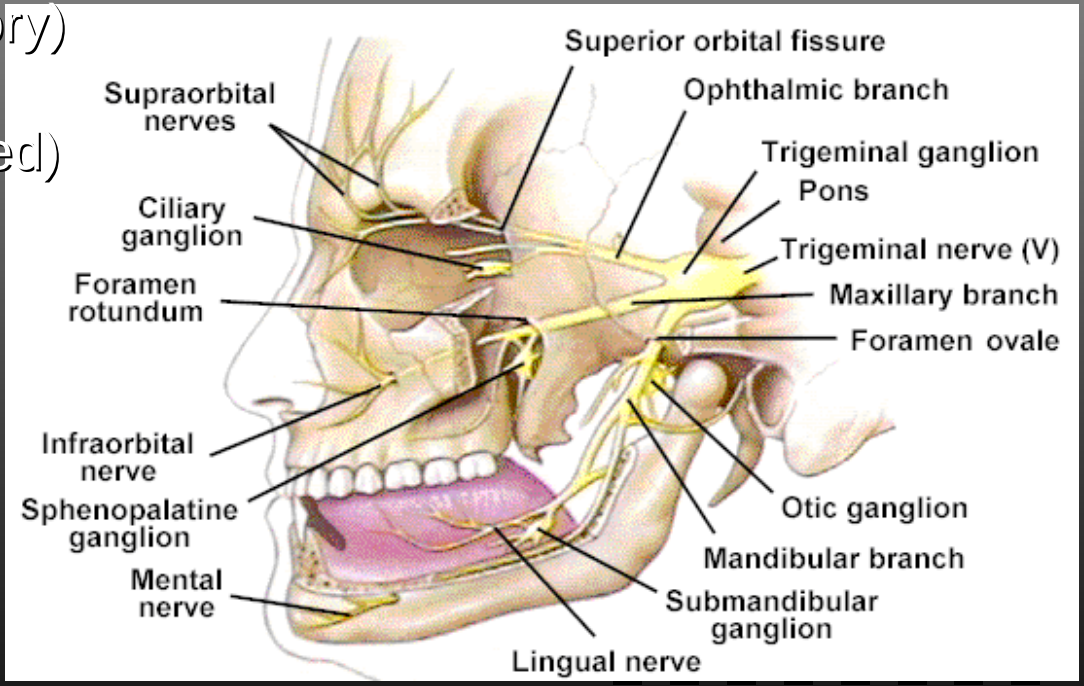
1. Ophthalmic (sensory)

2. Maxillary (sensory)

3. Mandibular (mixed)

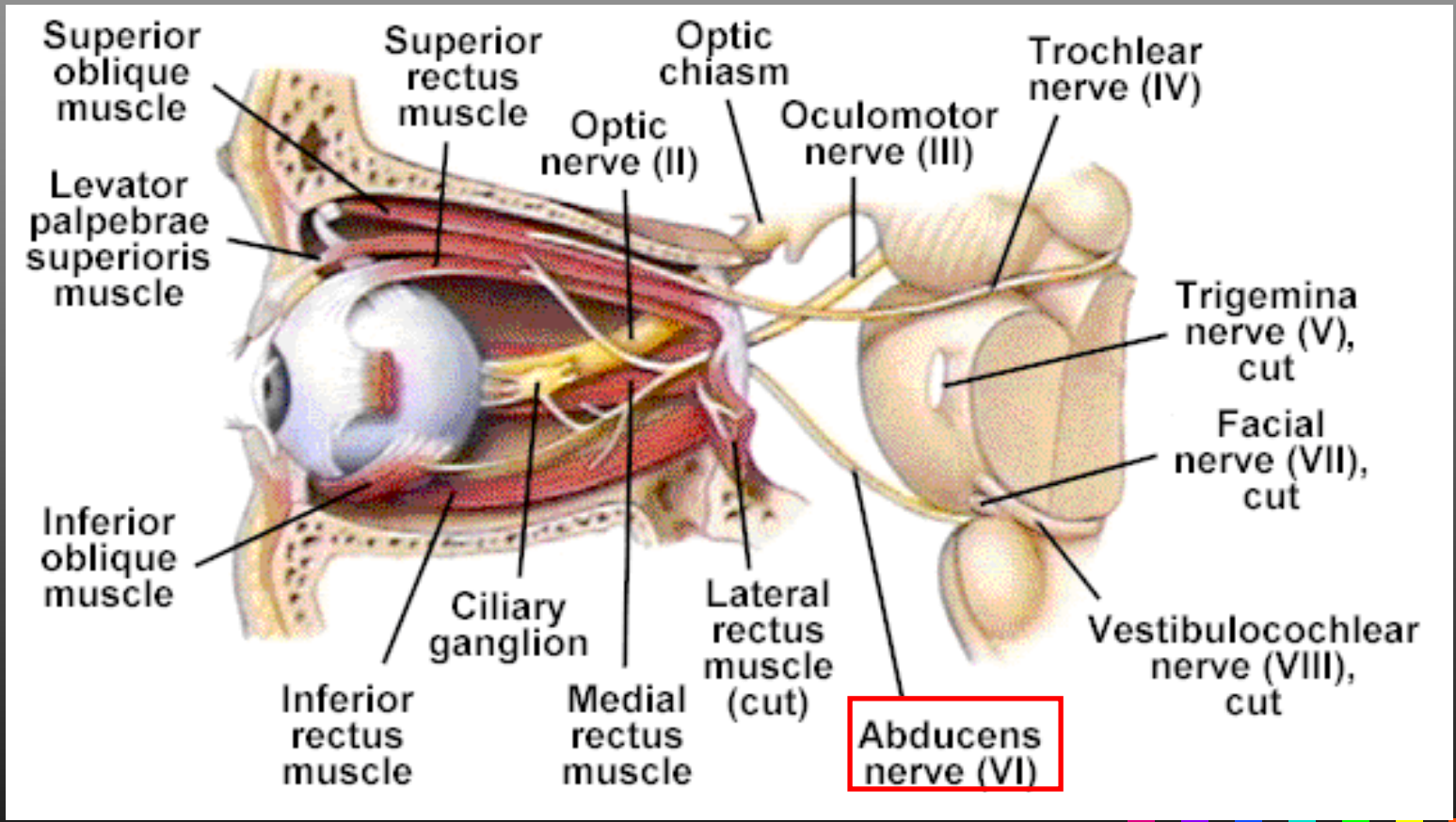
O: face / nuclei of pons

D: sensory nuclei in pons / muscles of mastication



Abducens (CN VI)

C: Motor
O: Pons
D: Lateral rectus eye muscle



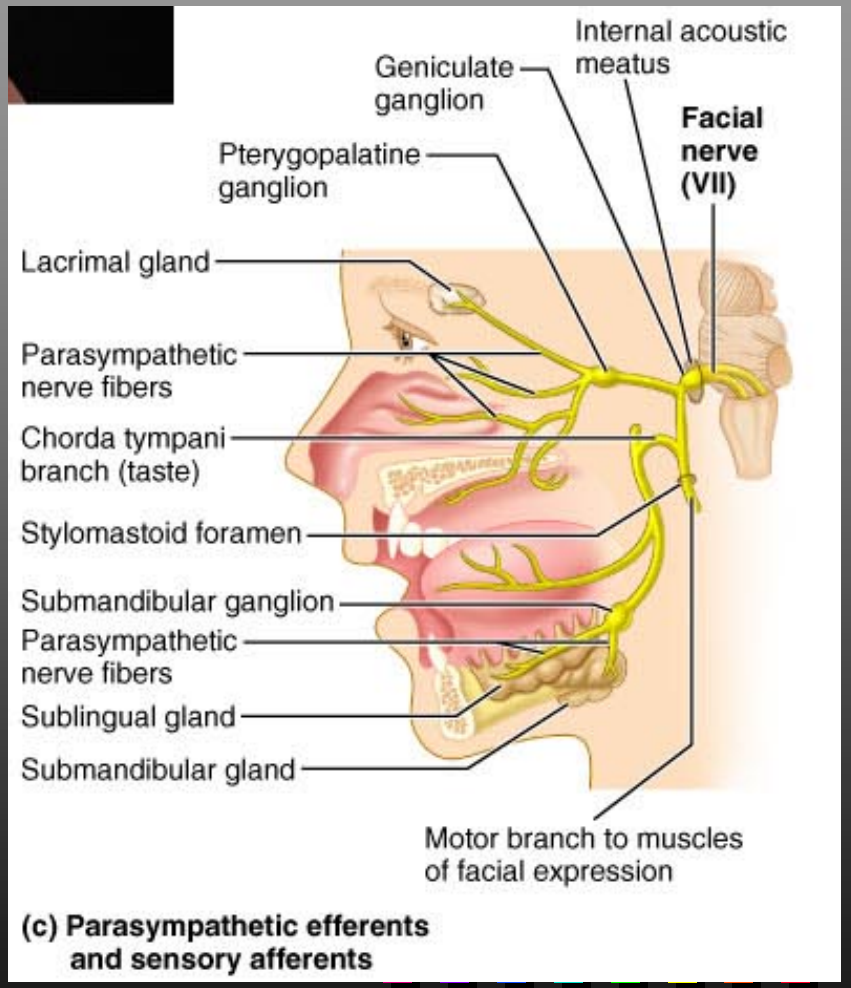
Facial (CN VII)

C: Mixed

O: sensory from taste receptors of anterior 2/3 of tongue / motor from pons

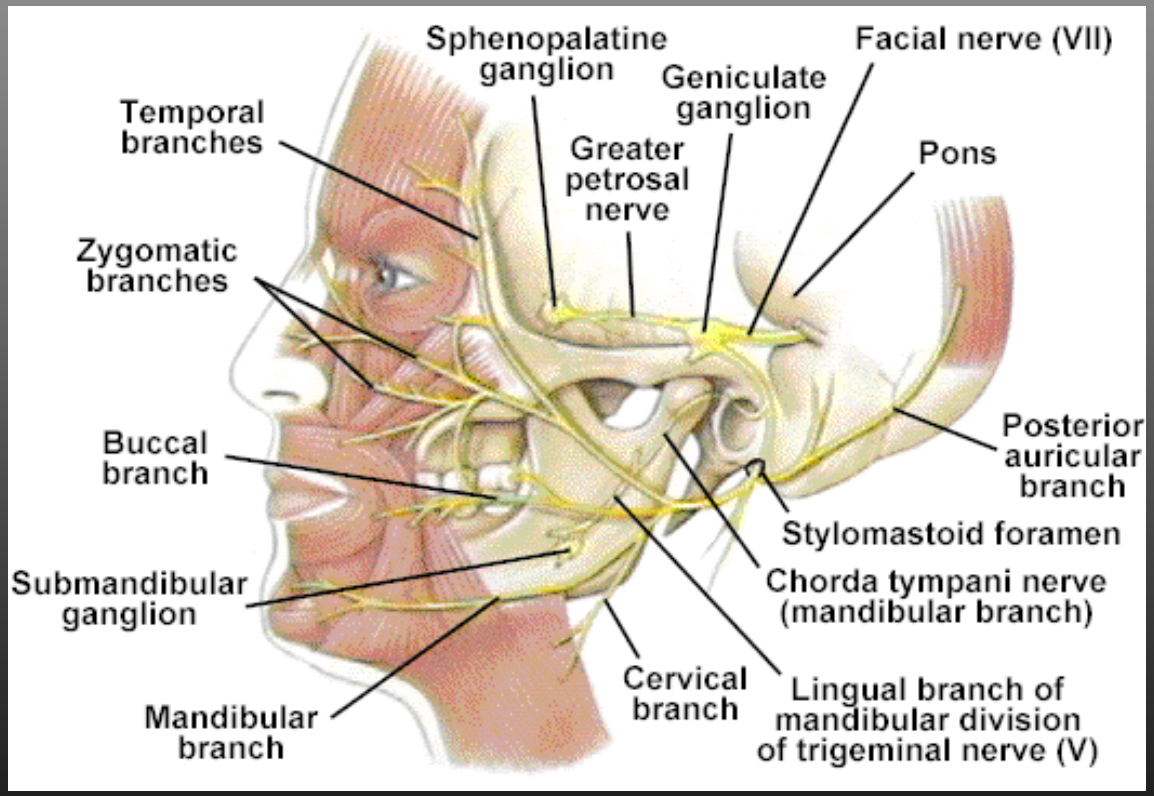
D: Sensory to sensory nuclei of pons / motor muscles of facial expression, visceral motor to tear gland.

Table 14.3



(c) Parasympathetic efferents and sensory afferents

Facial (CN VII), cont'd



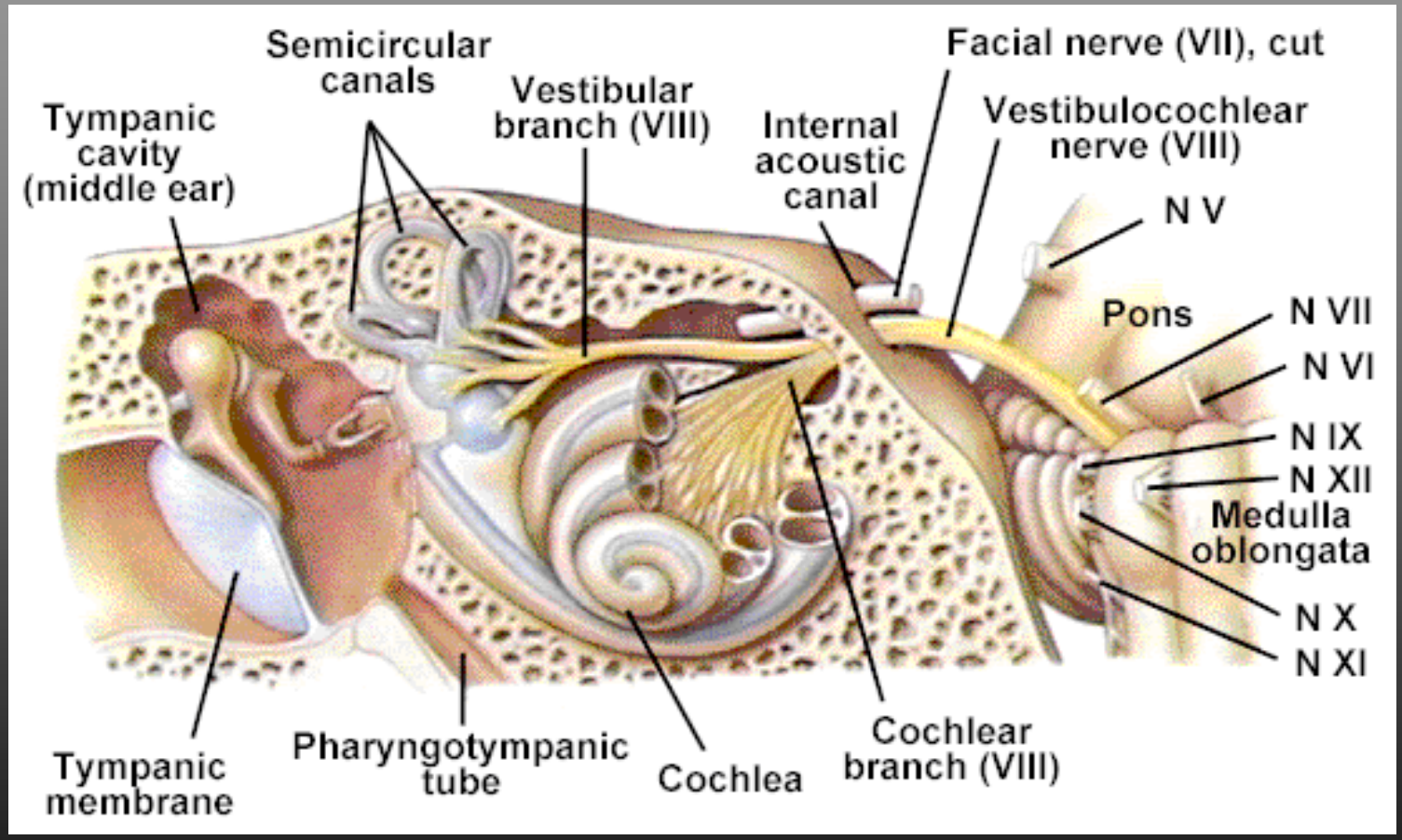
Bell's Palsy

Vestibulocochlear (CN VIII)

- C: Sensory
- O: Receptors of inner Ear
- D: Nuclei in Pons and medulla oblongata

- AKA acoustic nerve

Vestibulocochlear (CN VIII)

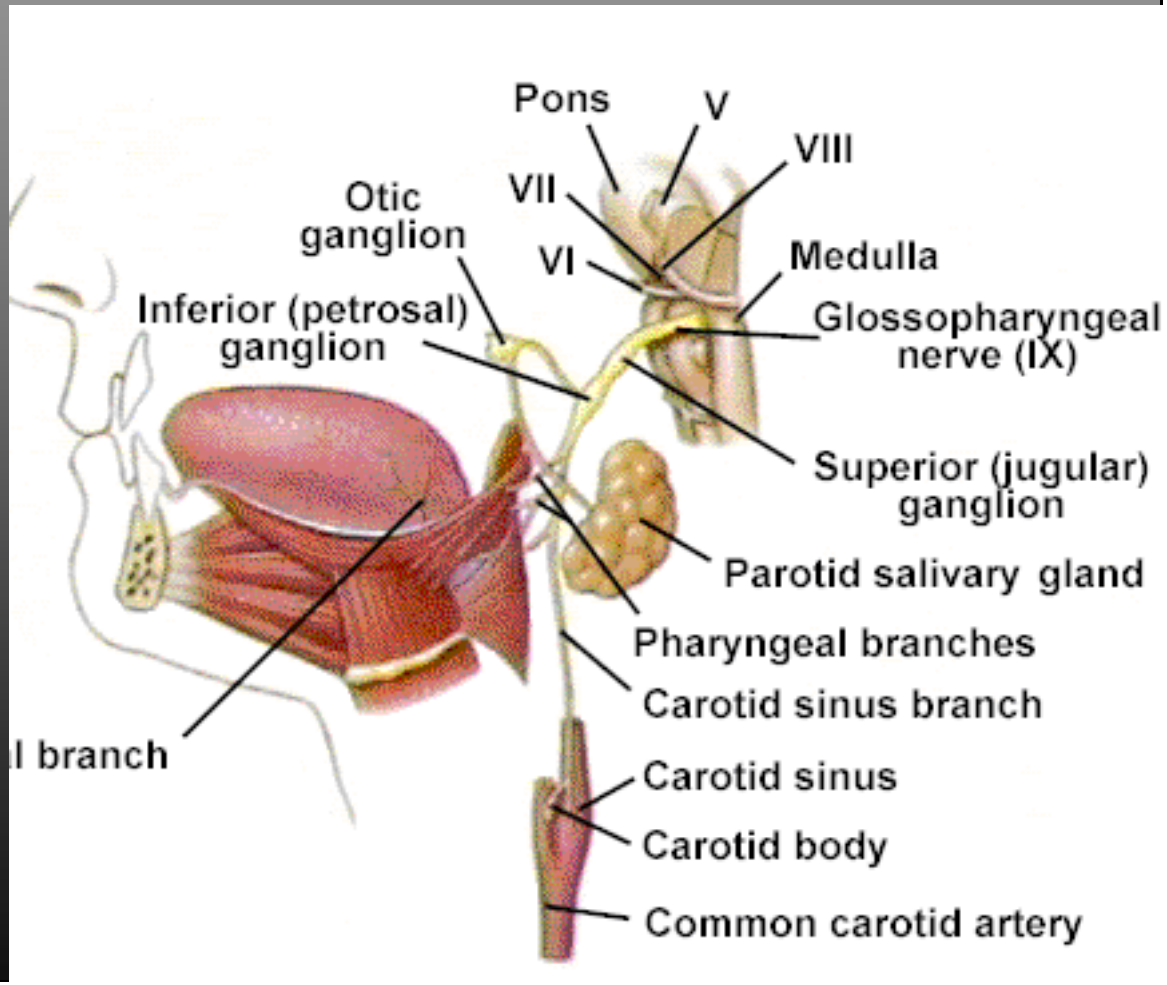


Glossopharyngeal (CN IX)

C: mixed

O: sensory from posterior 1/3 of tongue / motor from medulla oblongata

D: medulla / muscles for swallowing, parotid gland



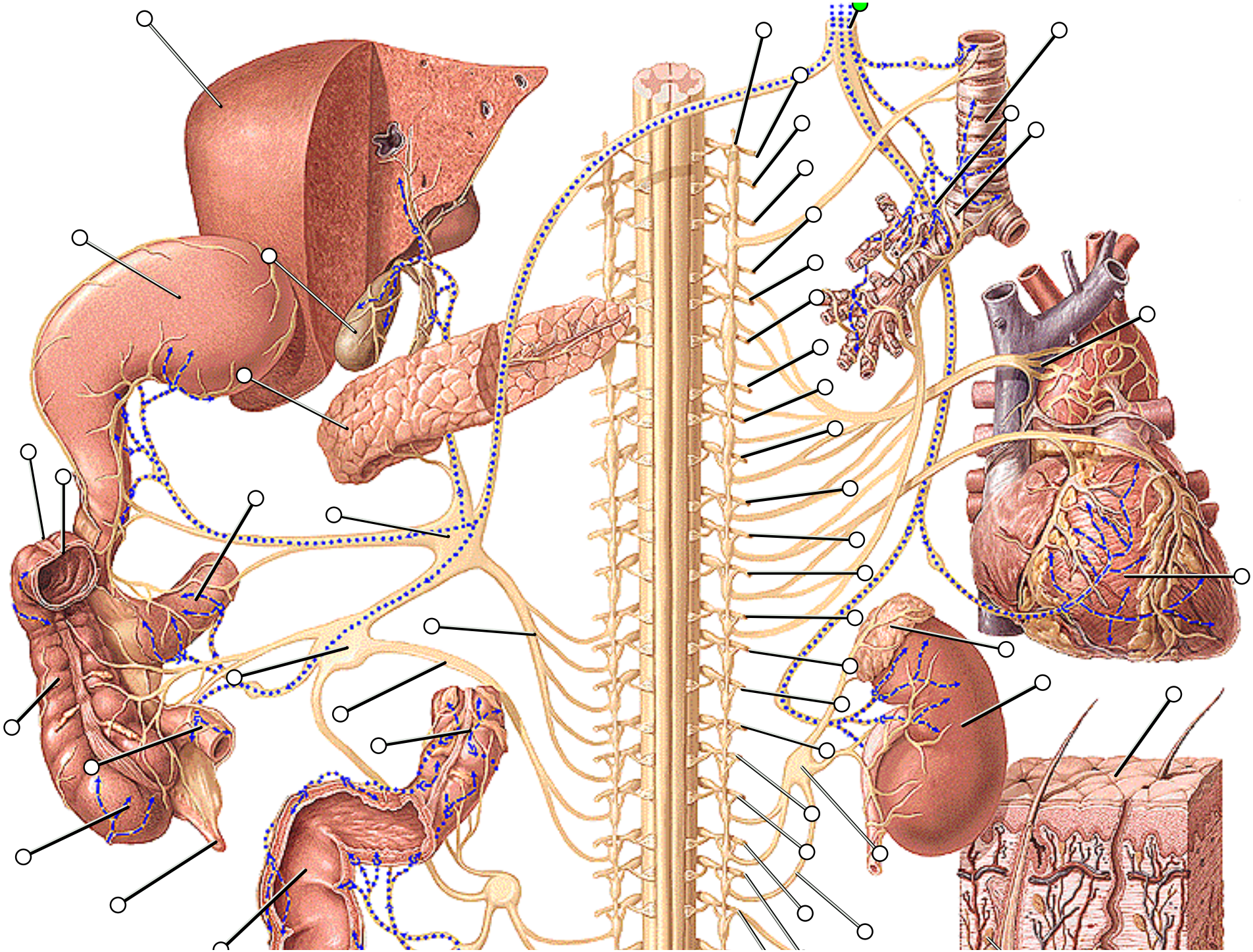
Vagus (CN X)

C: Mixed

O: Sensation from pharyngeal area and outer ear **/ motor from medulla**

D: Sensory to medulla **/ visceral (autonomic) motor to thoracic and abdominal cavities and their organs. Major motor pathway for ANS**

Most important Cranial Nerve!

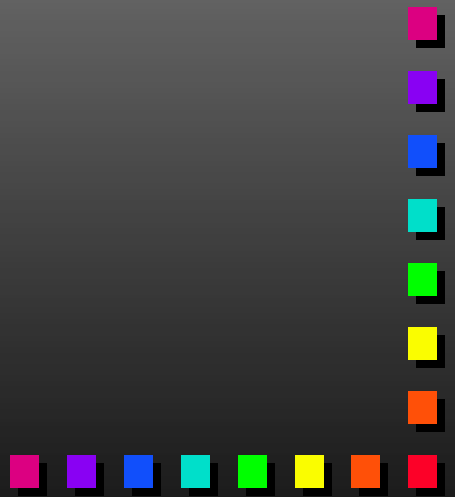


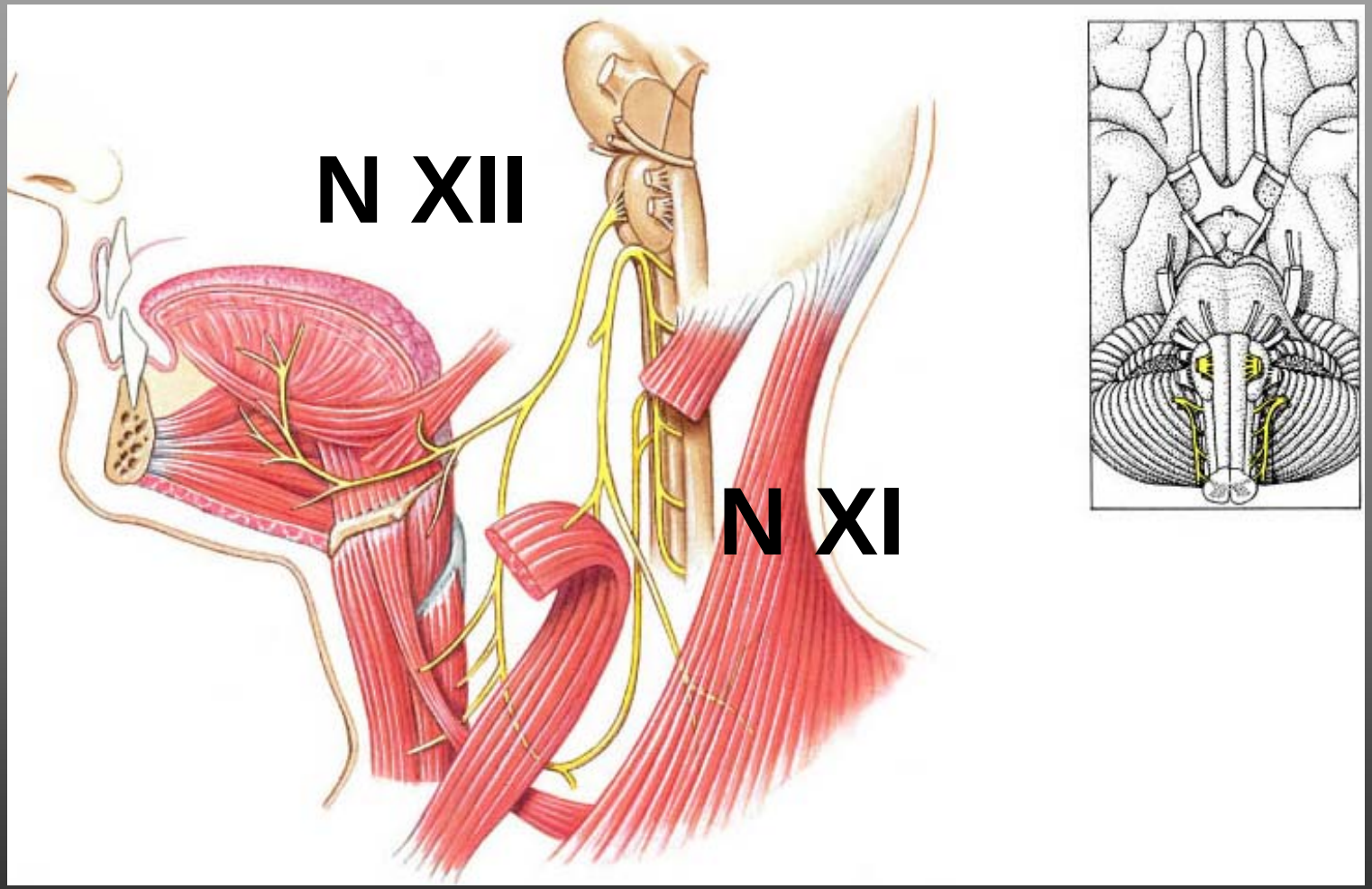
Accessory (CN XI) AKA Spinal Accessory

C: Motor
O: Motor nuclei of medulla and spinal cord
D: Swallowing, trapezius & scm muscles

Hypoglossal (N XII)

C: Motor
O: Motor nuclei of medulla
D: Tongue musculature





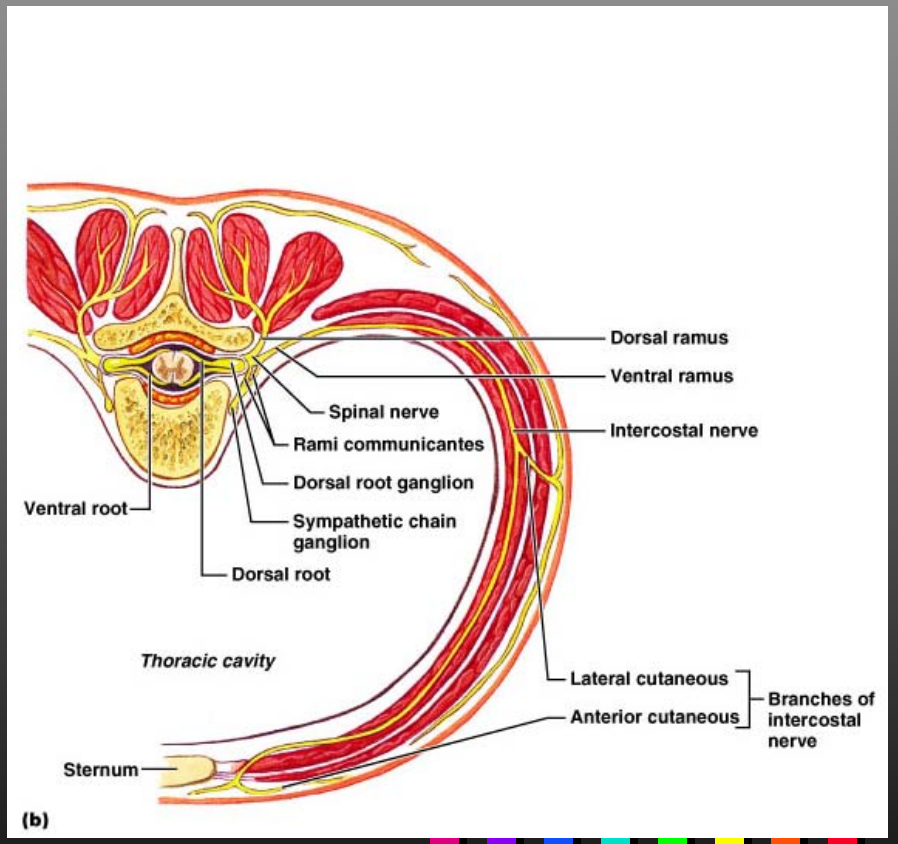
Mnemonics

Out On Our Table Top Are Fruits, Very Green Veggies And Hamburgers

Oh, Once One Takes The Anatomy Final, Very Good Vacations Appear Heavenly

Spinal Nerves

- Sensory and Motor (of course)
- Through the Intervertebral Foramina
- Dermatomes



4 Principal Plexuses

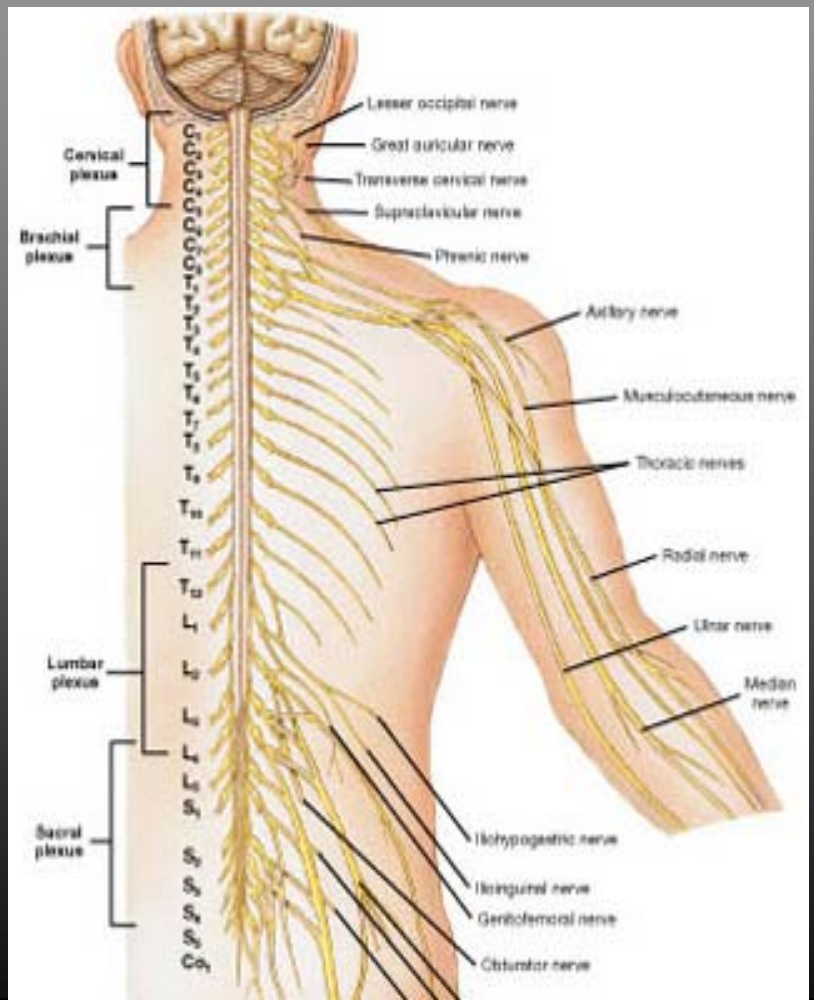
A blend, or network, of nerve fibers from several spinal roots.

Cervical, includes
- **Phrenic N.**

Brachial

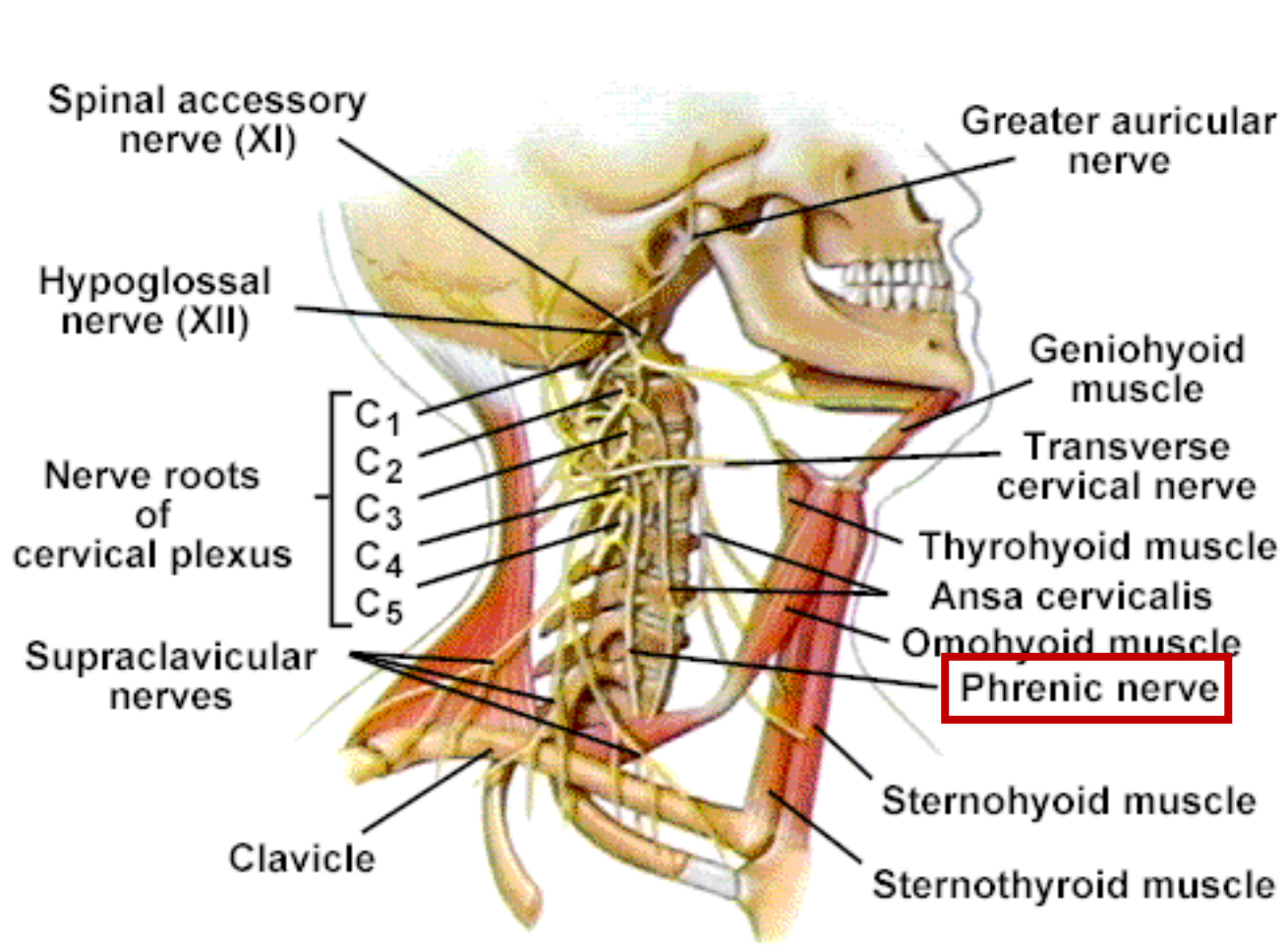
Lumbar

Sacral

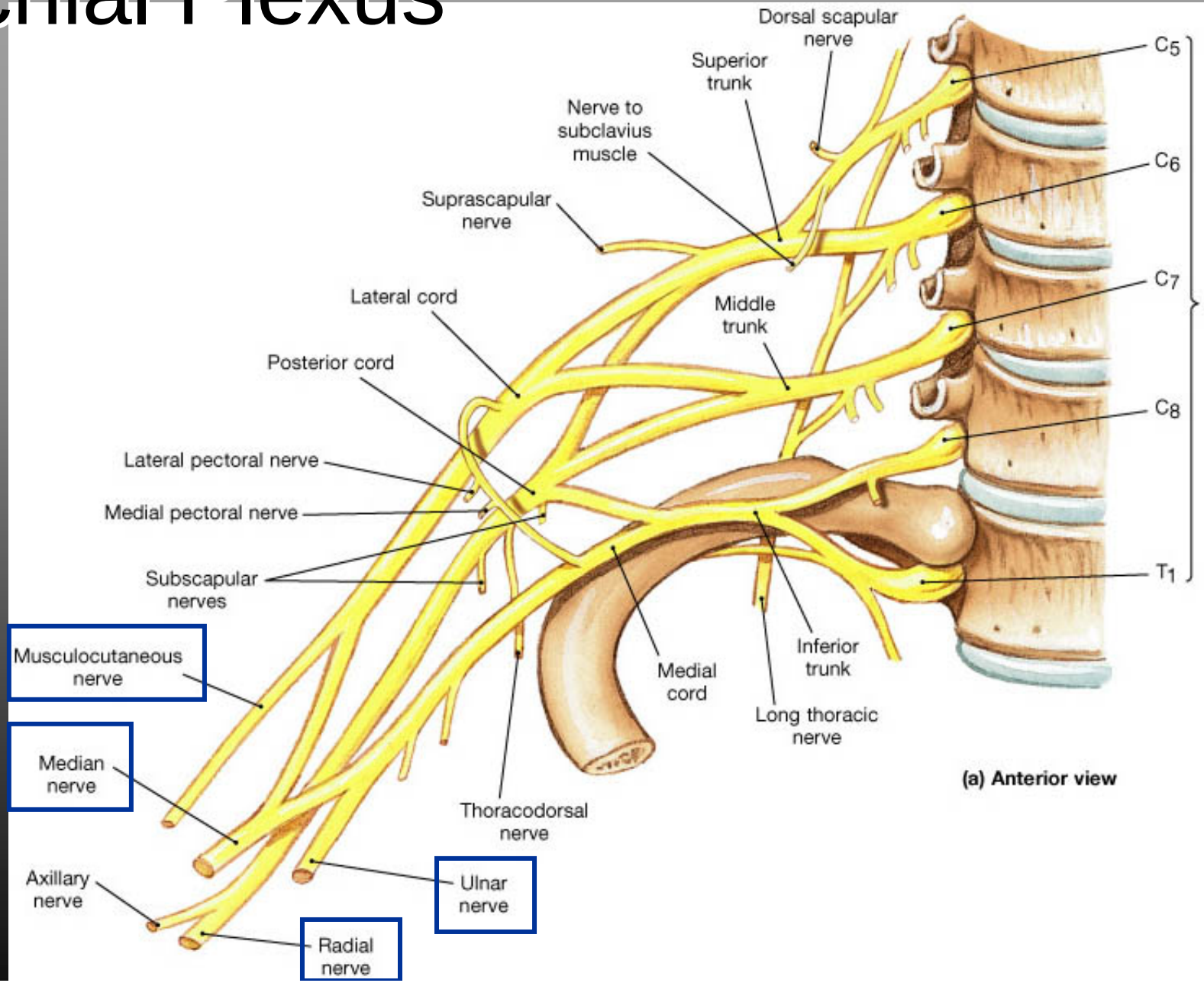


Cervical Plexus

Phrenic nerve
- innervates diaphragm

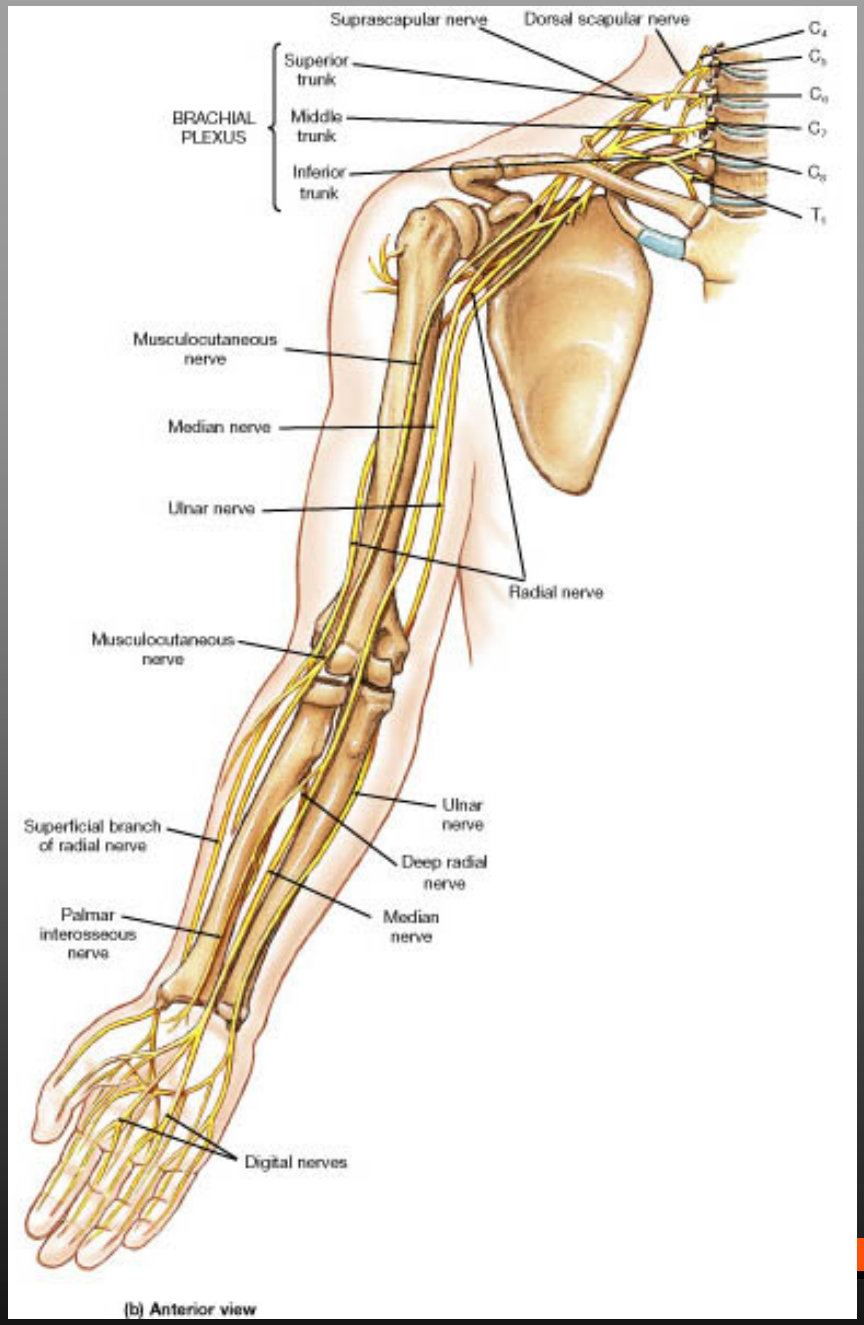


Brachial Plexus



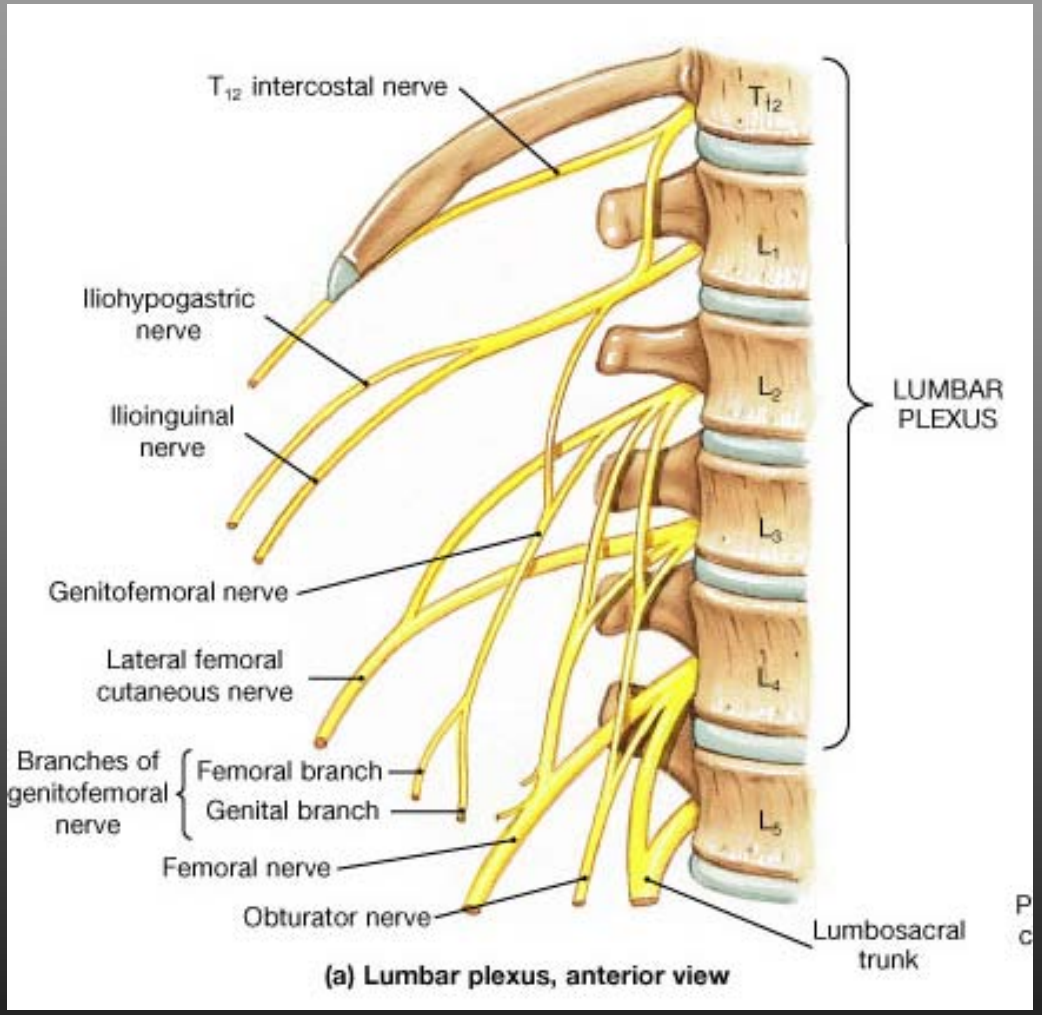
Nerves of the Arm

Musculocutaneous nerve – innervates biceps and brachialis muscles
Median nerve - innervates lateral flexors
Ulnar nerve - innervates medial flexors
Radial nerve - innervates forearm extensors

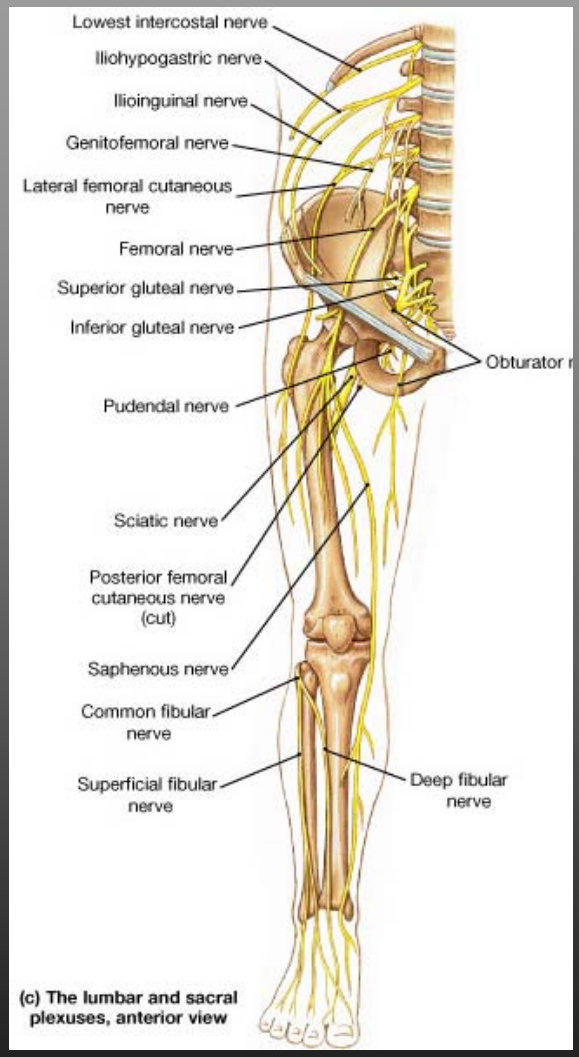


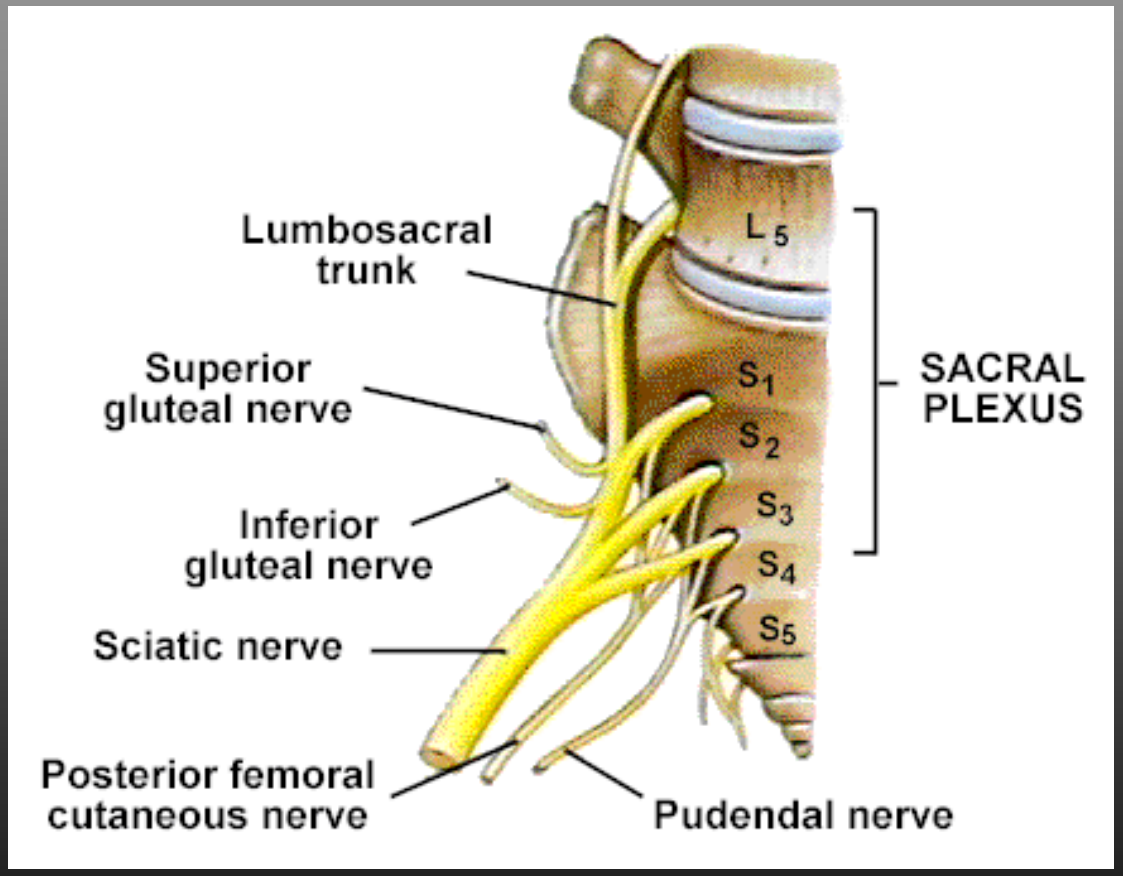
Lumbar Plexus

- **Femoral Nerve**
- **Lumbosacral Trunk (to Sciatic Nerve)**
- **Obturator Nerve**



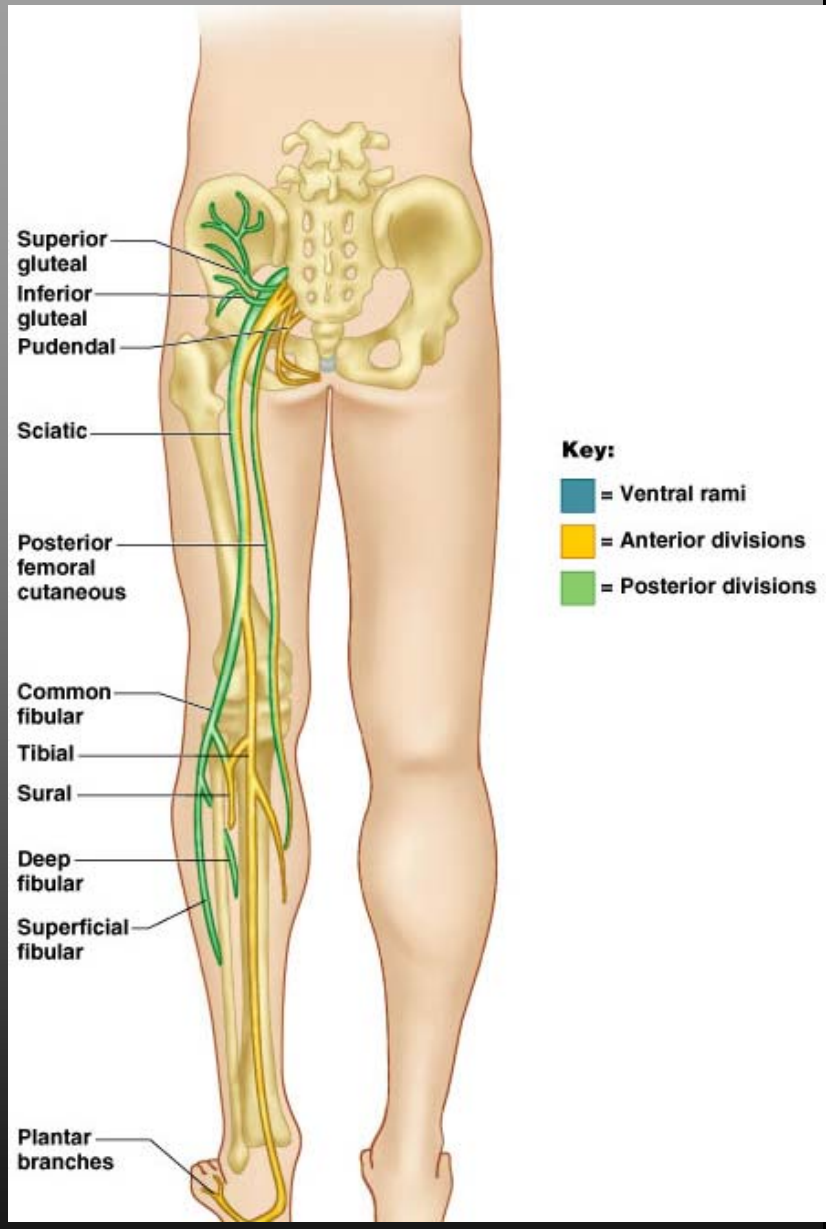
Sacral Plexus



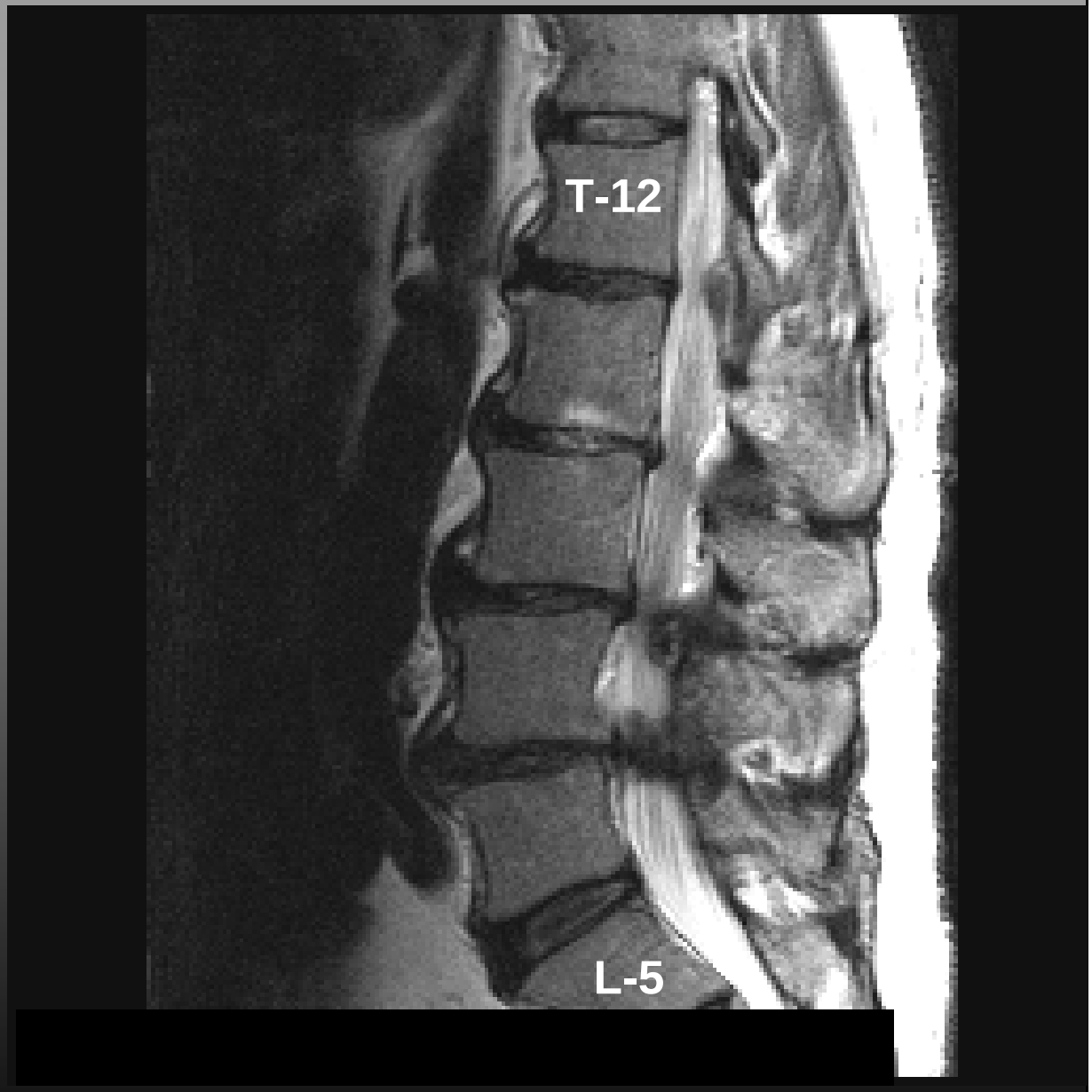


Nerves of the Leg

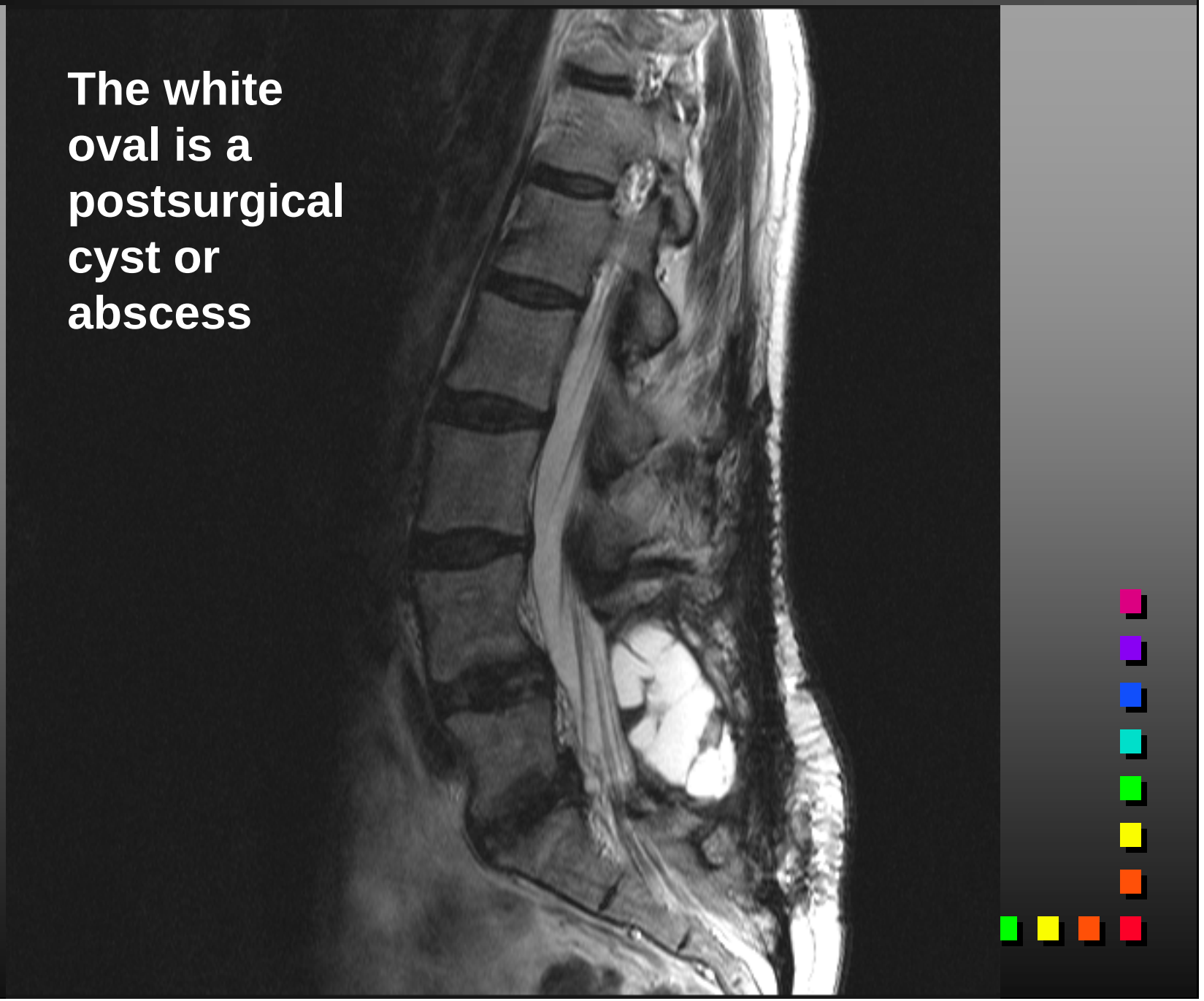
- **Sciatic N.**
  - Thickest and Longest
  - Branches to Tibial and Fibular Nerves
- **Femoral N.**
  - Posterior aspect of leg



Narrow lumbar disk spaces result in pressure on the spinal roots



The white oval is a postsurgical cyst or abscess



Shingles

- ***Varicella-zoster virus*** **(of the herpes family)**
- **In dorsal root ganglia and cranial nerves**
- **Initial infection: chicken pox**