



# Nervous System Basics II

PTA1010

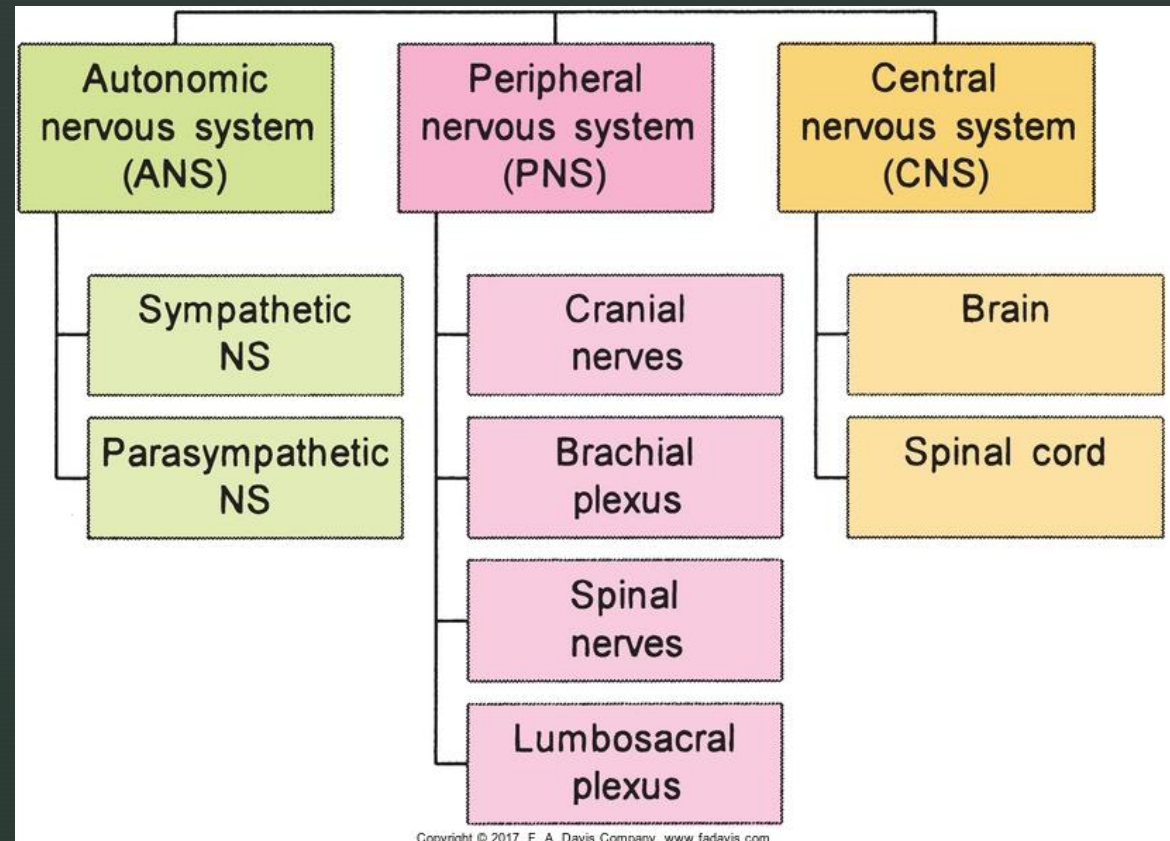


## Review:

CNS- brain and spinal cord

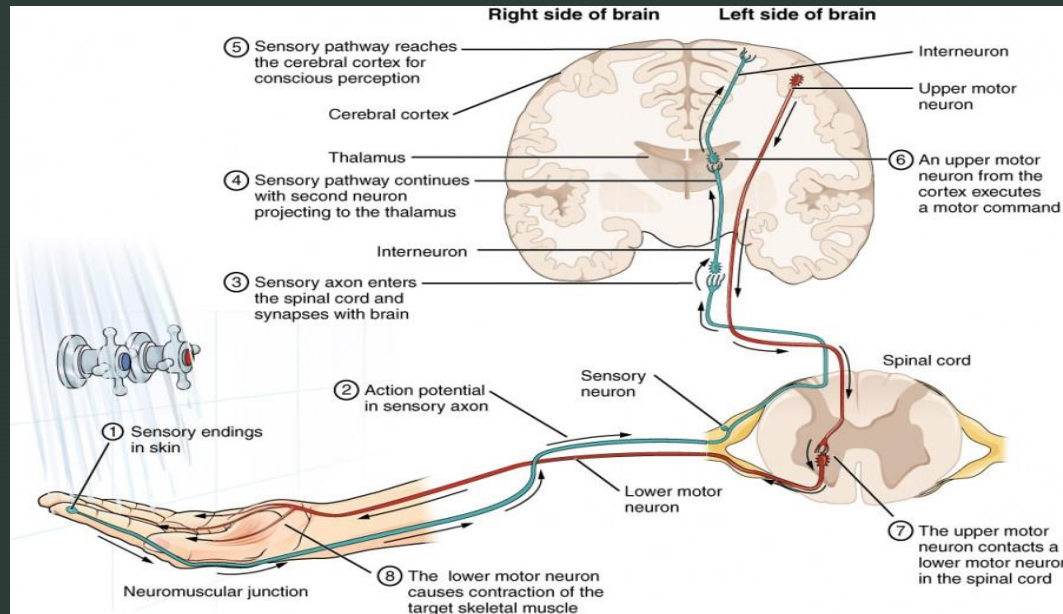
PNS- nerves outside the spinal cord and autonomic nervous system

ANS- sympathetic/parasympathetic (involuntary)

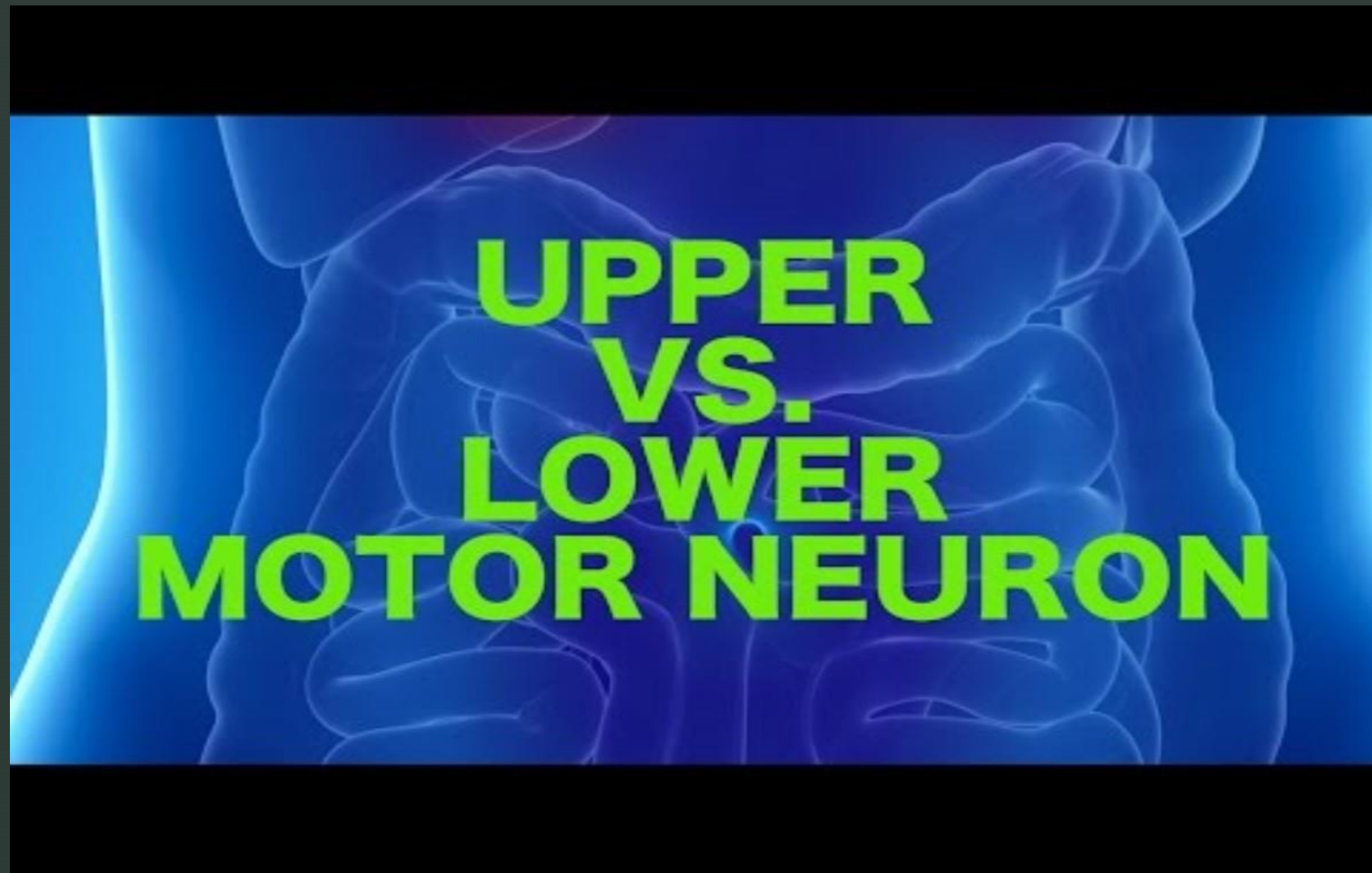


# Upper Motor Neuron or Lower Motor Neuron ?

- UMN
- Brain and spinal cord prior to the anterior horn
- LMN
- Anterior horn and spinal peripheral nerves

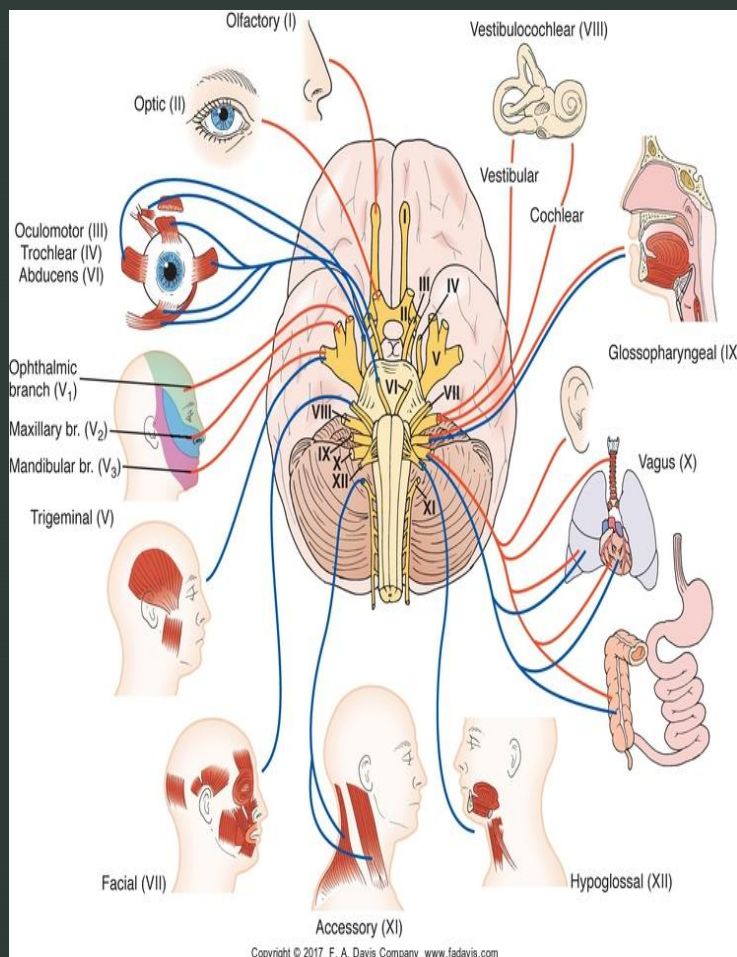


Peripheral or Central Nervous System?

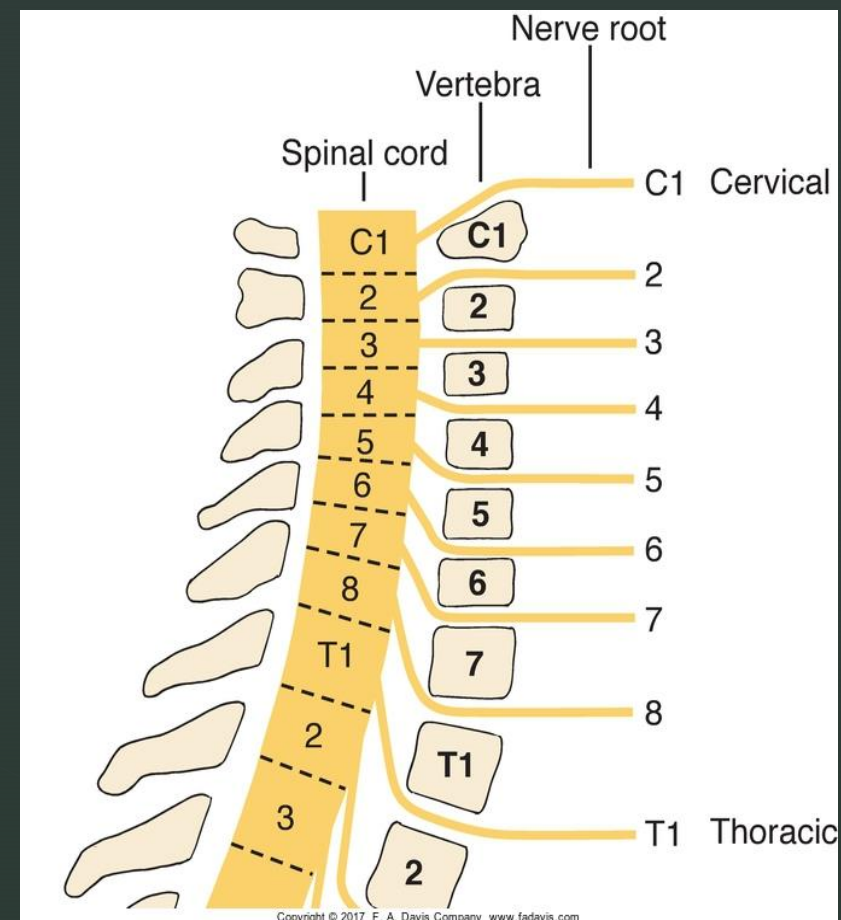


# Peripheral Nervous System

## Cranial Nerves



## Spinal Cord Nerves



# Cranial Nerves:

## On Old Olympus Towering Tops A Finn And German Viewed Some Hops

- 1 **Olfactory**: smell, **sensory**
- 2 **Optic**: vision, **sensory**
- 3 **Oculomotor**: **muscles** of eye, up/down/medially/raises eyelid/constricts pupil
- 4 **Trochlear**: **muscles** of eye, medial/down
- **\*5 Trigeminal**: **sensory** of face/ **motor** chewing muscles
- 6 **Abducens**: abducts eye, **motor**
- **\*7 Facial**: tongue, **sensory**; facial expressions. **motor**
- 8. **Auditory Vestibular or Vestibulocochlear**: hearing, equilibrium, **sensory**
- 9. **Glossopharyngeal**: taste, middle ear, **sensory**; swallowing, **motor**
- 10. **Vagus**: hearts, lungs, GI tract, **sensory**; heart, lungs, GI tract, **motor**
- **\*11. Spinal Accessory**: elevates shoulders(trap), turns head(SCM) **motor**
- 12. **Hypoglossal**: muscles of the tongue, **motor**



# Plexus and Functions

Muscle innervation level	Spinal nerve level	Vertebra level
	<b>C1</b>	
Diaphragm & trapezius	<b>C2</b>	<b>C1</b>
	<b>C3</b>	<b>C2</b>
	<b>C4</b>	<b>C3</b>
Deltoid & biceps	<b>C5</b>	<b>C4</b>
Wrist extensors	<b>C6</b>	<b>C5</b>
Triceps	<b>C7</b>	<b>C6</b>
Hand intrinsics	<b>C8</b>	<b>C7</b>
	<b>T1</b>	<b>T1</b>
Intercostals	<b>T2</b>	<b>T2</b>
	<b>T3</b>	<b>T3</b>
	<b>T4</b>	<b>T4</b>
	<b>T5</b>	<b>T5</b>
Abdominals	<b>T6</b>	<b>T6</b>
	<b>T7</b>	<b>T7</b>
	<b>T8</b>	<b>T8</b>
	<b>T9</b>	<b>T9</b>
	<b>T10</b>	<b>T10</b>
	<b>T11</b>	<b>T11</b>
	<b>T12</b>	<b>T12</b>
	<b>L1</b>	<b>L1</b>
Hip & leg muscles	<b>L2</b>	<b>L2</b>
	<b>L3</b>	<b>L3</b>
	<b>L4</b>	<b>L4</b>
	<b>L5</b>	<b>L5</b>
	<b>S1</b>	
Foot muscles	<b>S2</b>	
	<b>S3</b>	
	<b>S4</b>	
Bowel & bladder	<b>S5</b>	
	<b>S5</b>	

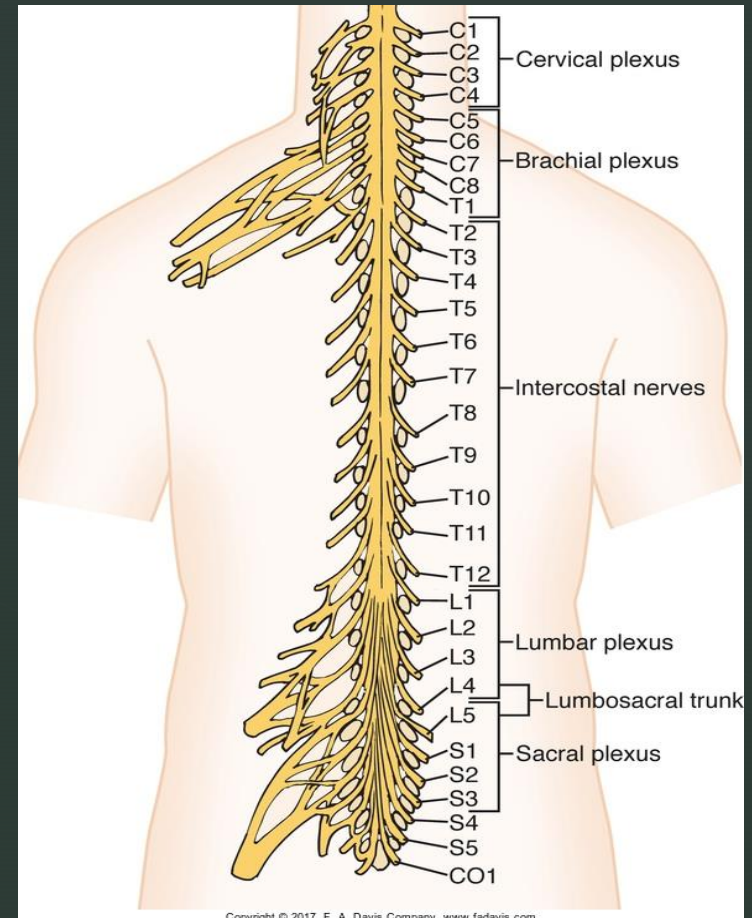
**Cervical**

**Thoracic**

**Lumbar**

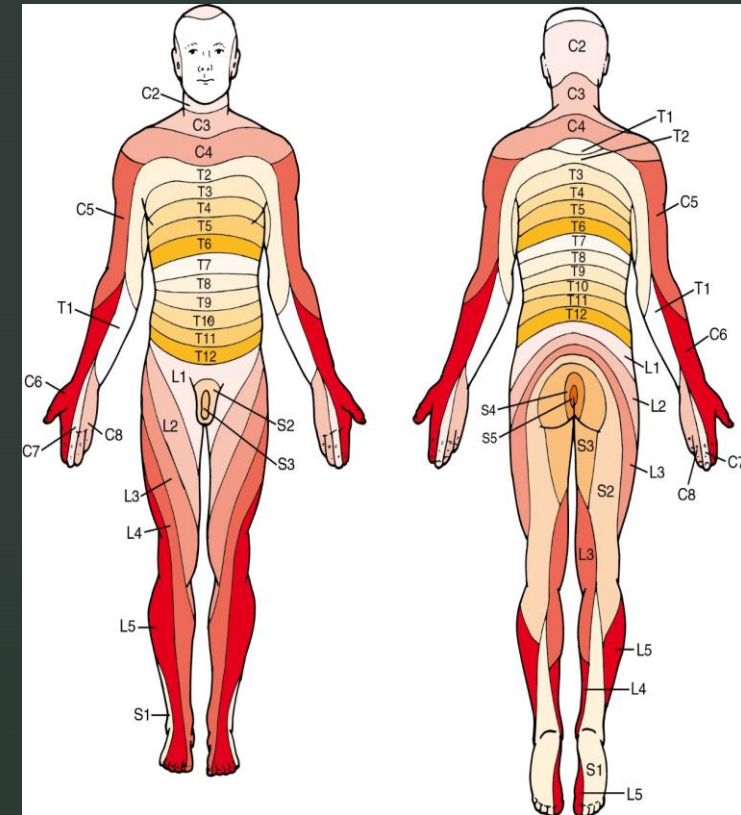
**Sacral**

**Coccyx**



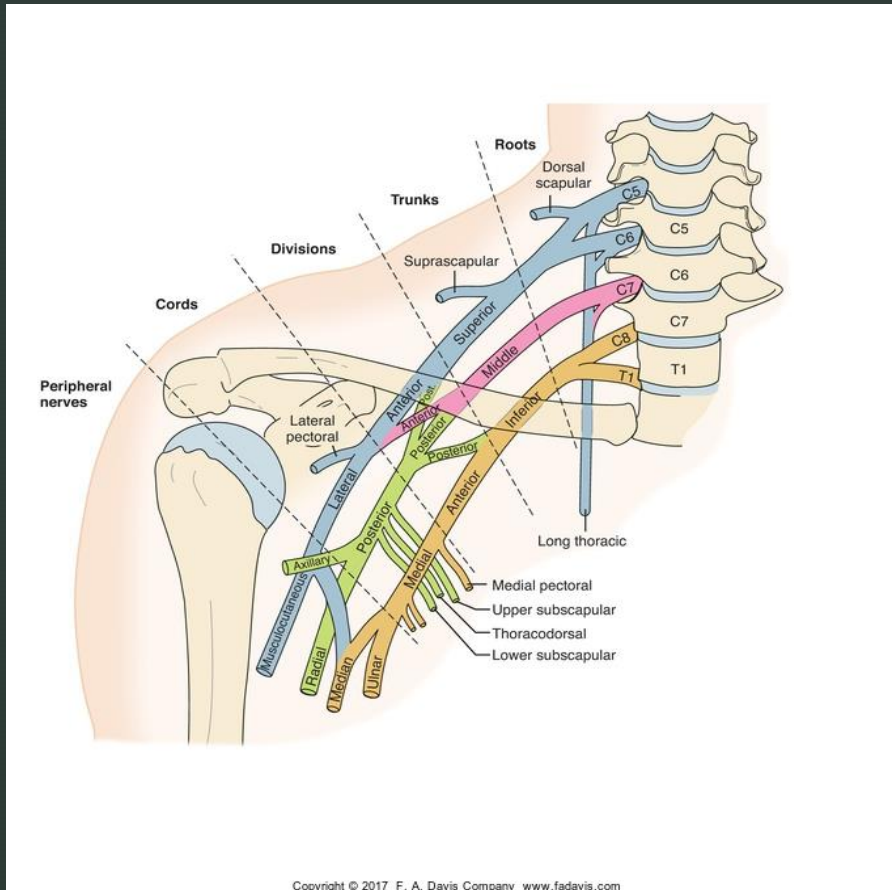
# Sensory and Motor Overlap=Plexus

- **Dermatomes:** areas of skin supplied with sensory fibers of specific SC level or specific peripheral nerve
- **Myotomes:** all muscles innervated from a specific SC level or specific peripheral nerve

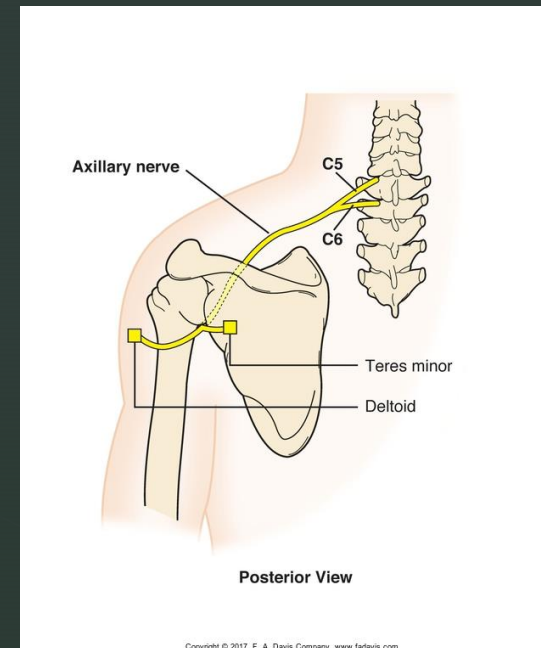




# Brachial Plexus: C5- T1



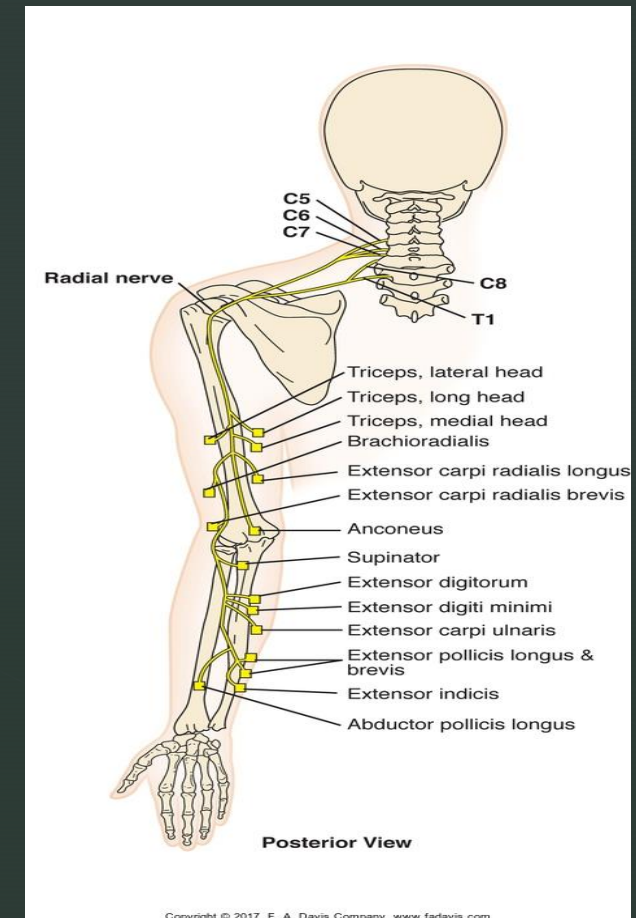
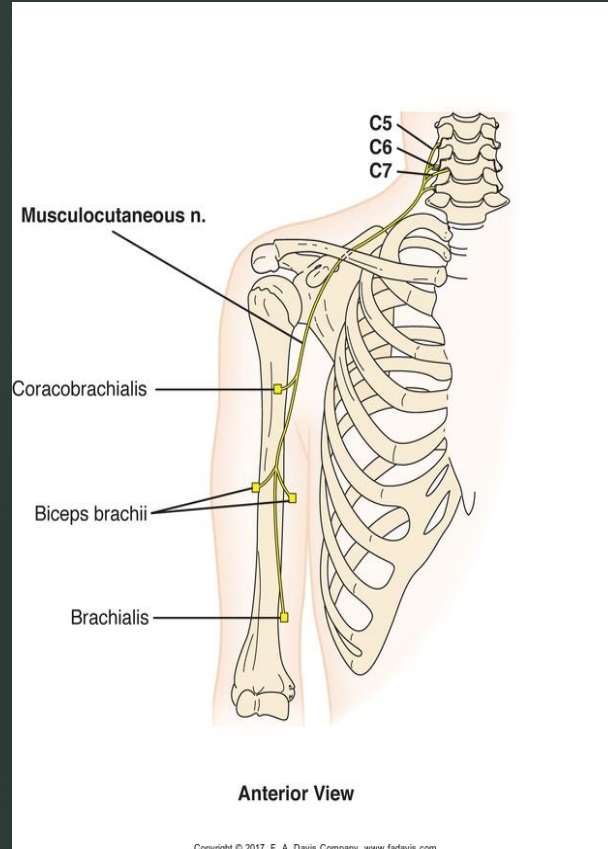
## C5 shoulder AB/ER



- C6 elbow flexion/wrist extension
- C7 elbow extension/wrist flexion

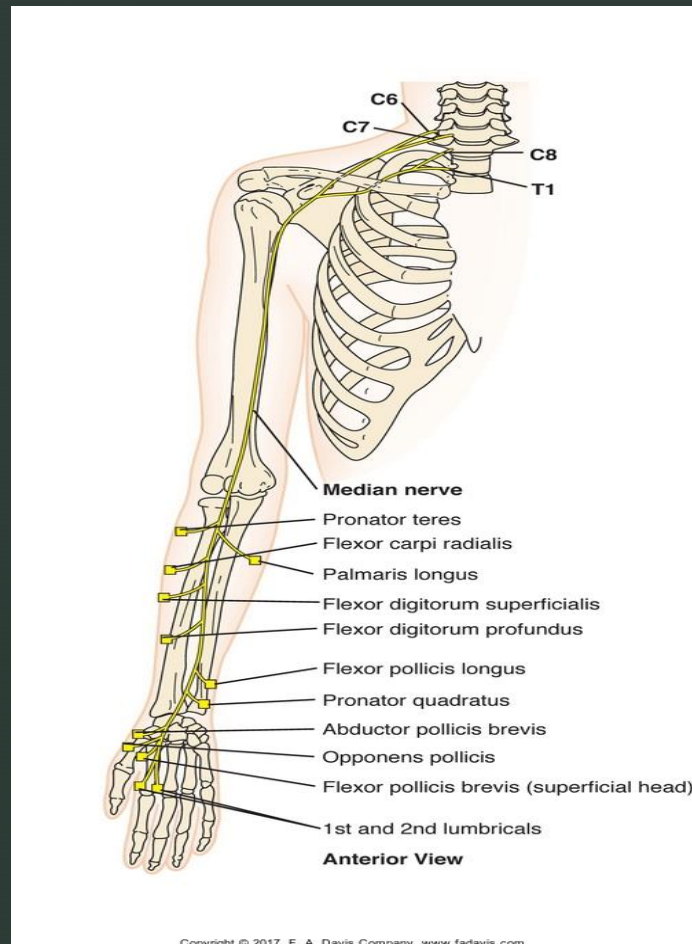
Radial: elbow/wrist extension

Musculocutaneous: elbow flexion

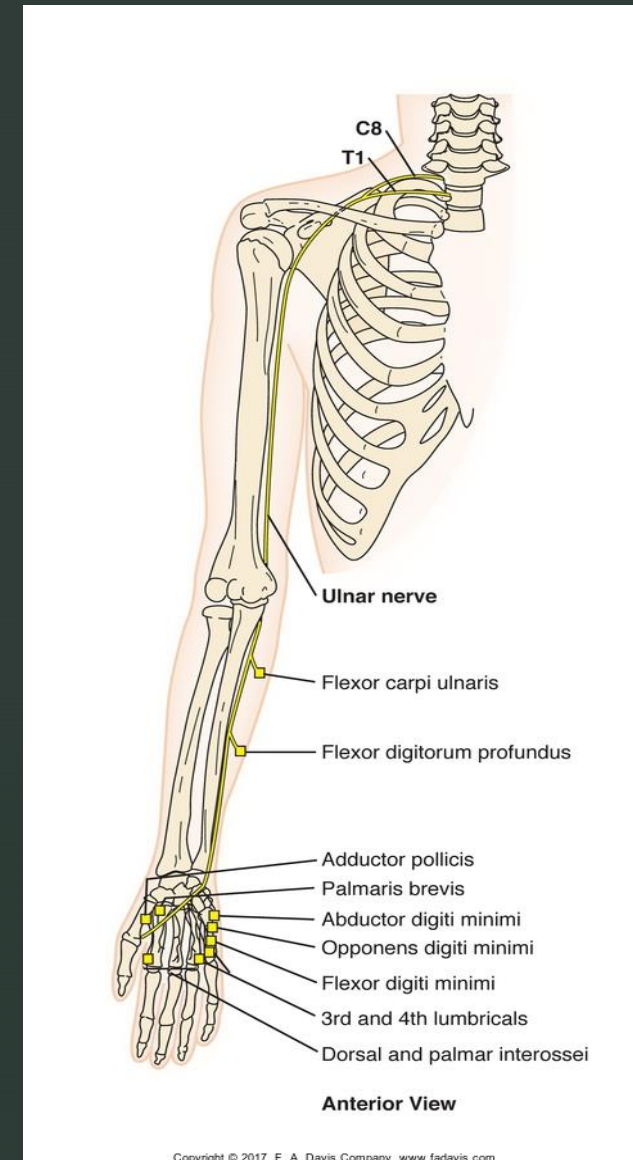


# Wrist- hand C7- T1

Median nerve: wrist, finger flexors/thumb AB

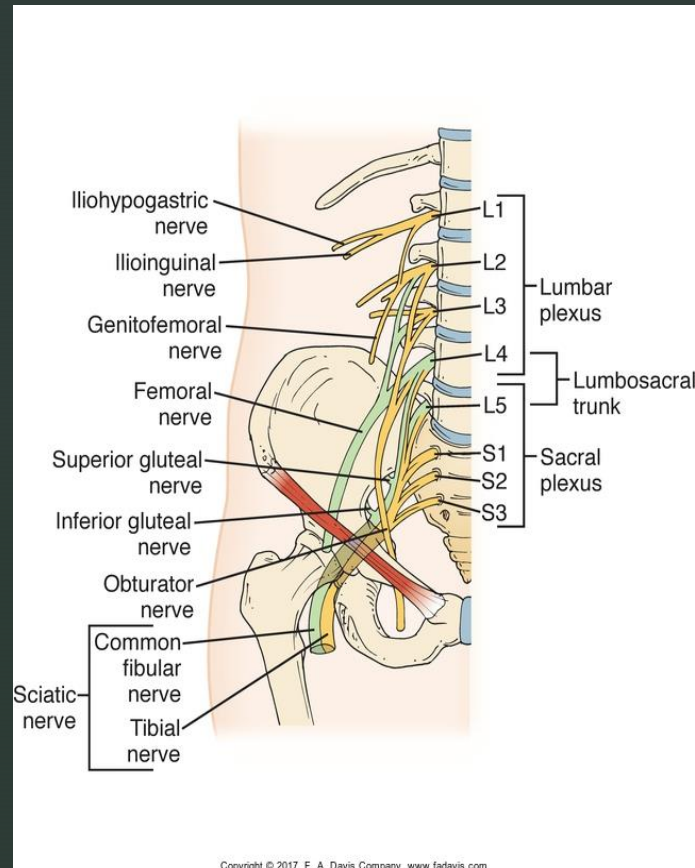


Ulnar nerve: hand/thumb AD

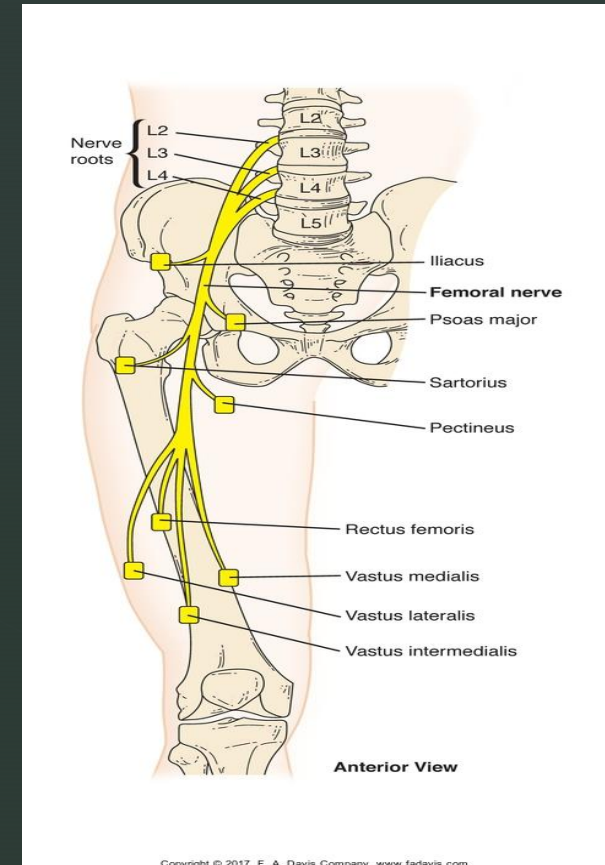


# Lumbar and Sacral Plexus

## Sciatic/gluteal- L4-S3

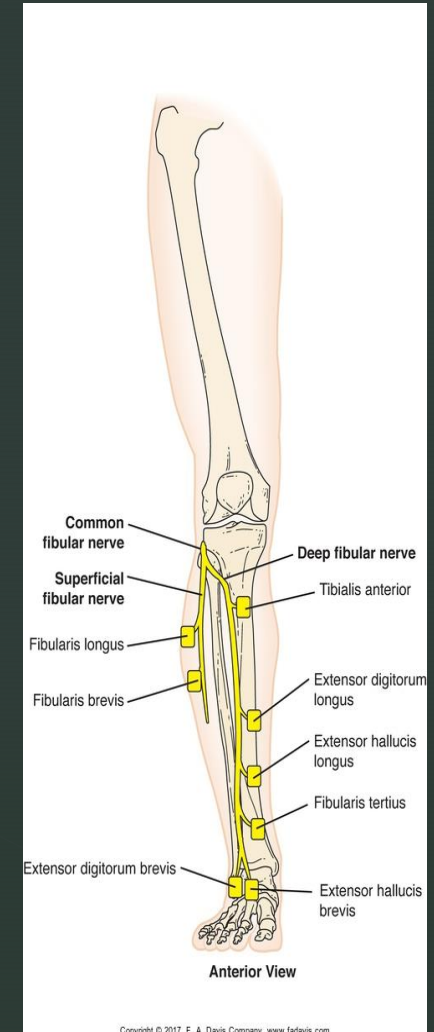
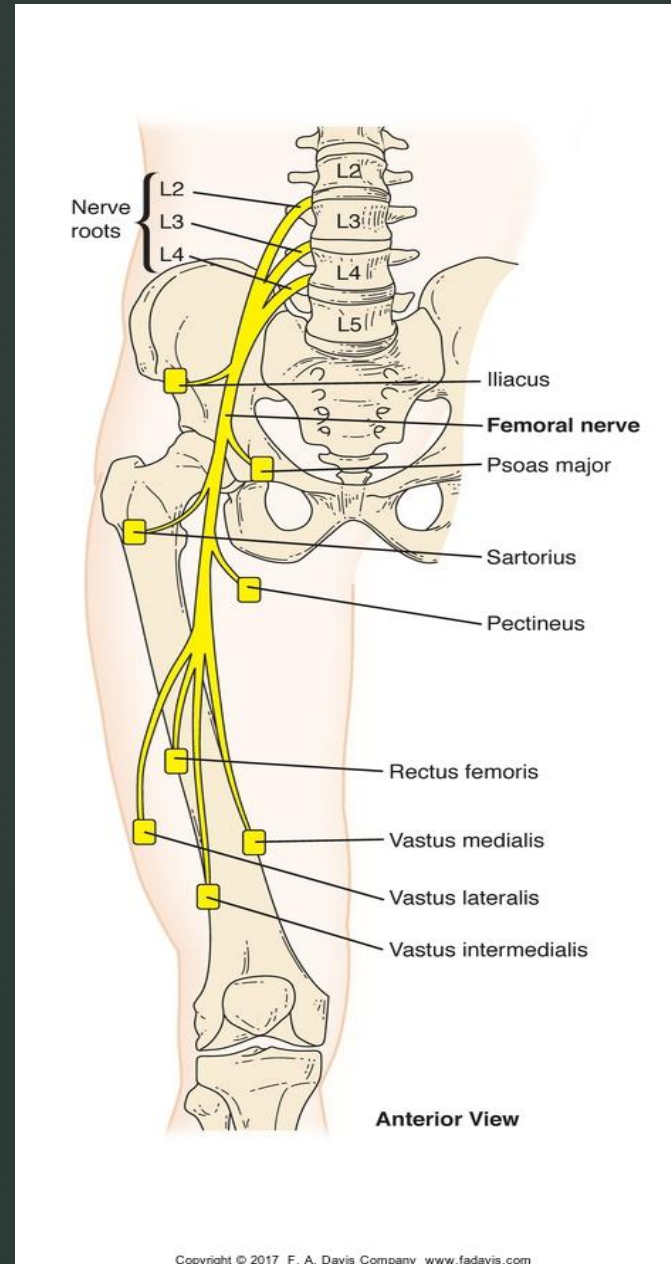
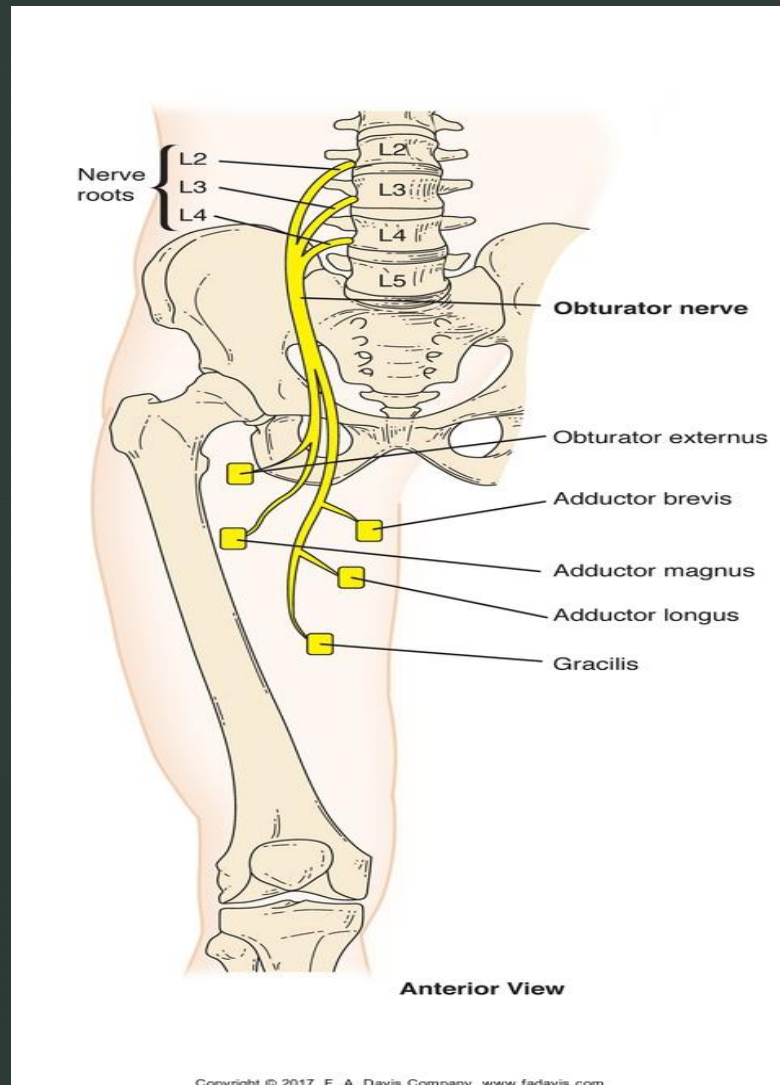


## Femoral- L2- L4





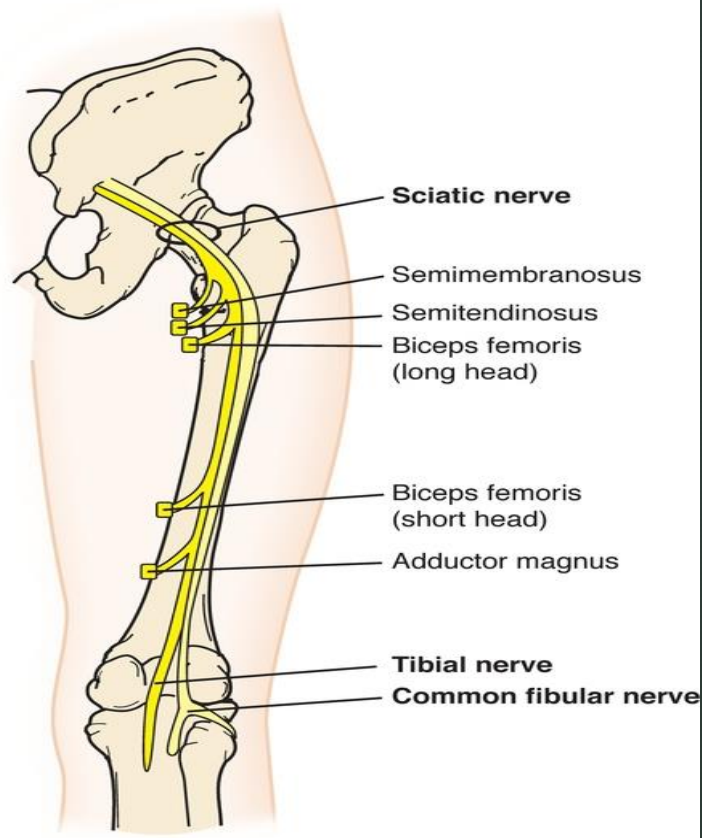
# Anterior LE L2- L4



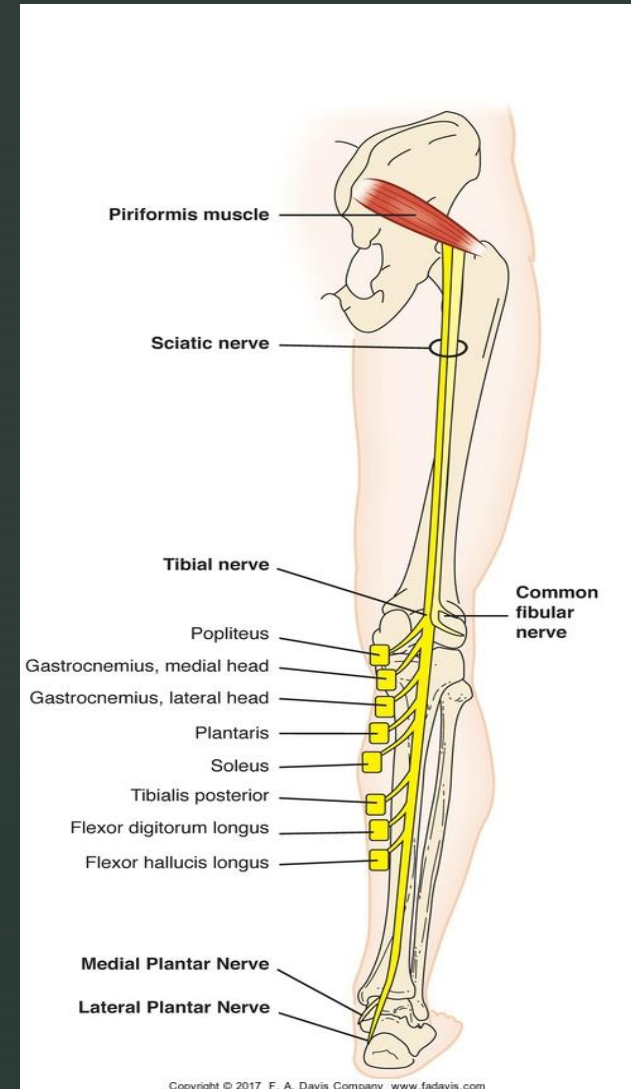


# Posterior LE L5-S2

## Hip extensors, knee flexors



Posterior View



# Common Pathologies:

## Congenital Defects

- **Spina Bifida:** Failure of the posterior segments of the spine to close
- **Hydrocephalus:**  
“Water on the brain” puts pressure on the brain tissues
- **Cerebral Palsy:** damage in utero, or at birth

## Spinal Cord Trauma

- SCI: Spinal Cord Injury
- Central Cord Syndrome: UE > LE
- Brown-Sequard Syndrome: weakness ipsilateral/sensory loss contralateral
- Anterior Cord Syndrome: Motor/pain/temp loss

# Pathologies continued

## Disorders of Muscle and the Neuromuscular Junction:

- **Myasthenia Gravis:** defect in the axon synapse: acetylcholine receptor altered by antibodies
- **Muscular Dystrophy:** progressive hereditary dz

## Degenerative Disease:

- **Amyotrophic Lateral Sclerosis (ALS)** Upper and lower motor neurons affected
- **Alzheimer's Dz:** progressive brain disorder

## Demyelinating Disease:

- **Multiple Sclerosis**

# PNS Pathologies

- Neuropathy
- Bell's palsy
- Scapular Winging
- Thoracic Outlet Syndrome
- Burner
- Erb's Palsy
- Saturday Night Palsy
- Wrist Drop
- Carpal Tunnel Syndrome
- Cubital Tunnel Syndrome
- Ape Hand
- Pope's blessing
- Claw hand
- Sciatica Foot Drop
- Morton's Neuroma

Questions??

