

Peripheral Nervous System

Spinal Nerves and Nerve Plexuses

- Nerves come out of the spinal cord and then turn into nerve plexuses – serves motor and sensory needs of limbs
- Cervical Plexus – C1-C5
- Brachial Plexus – C5-C8, T1
- No plexus for intercostal nerves – T1-T12
- Lumbar Plexus – L1-L4
- Sacral Plexus – L4-L5, S1-S4
- (C=cervical vertebrae, T=thoracic vertebrae, L=lumbar vertebrae, S=sacrum)

Common Nerves

Brachial Plexus

- Ulnar nerve – medial groove of elbow
- Radial nerve – lateral side of humerus and forearm

Lumbar Plexus

- Femoral nerve – runs by head of femur

Sacral Plexus

- Sciatic nerve – comes through center of pelvic girdle and down femur
- Peroneal nerve – lateral lower leg

Autonomic Nervous System

- **ANS:** involuntary motor functions
- Neurons regulate heart, smooth muscle, and glands
- Internal stability depends largely upon ANS
 - Ex) blood moved to vital organs when you get too cold
 - Breathing can be slowed down or sped up
 - Stomach secretions can be increased or decreased

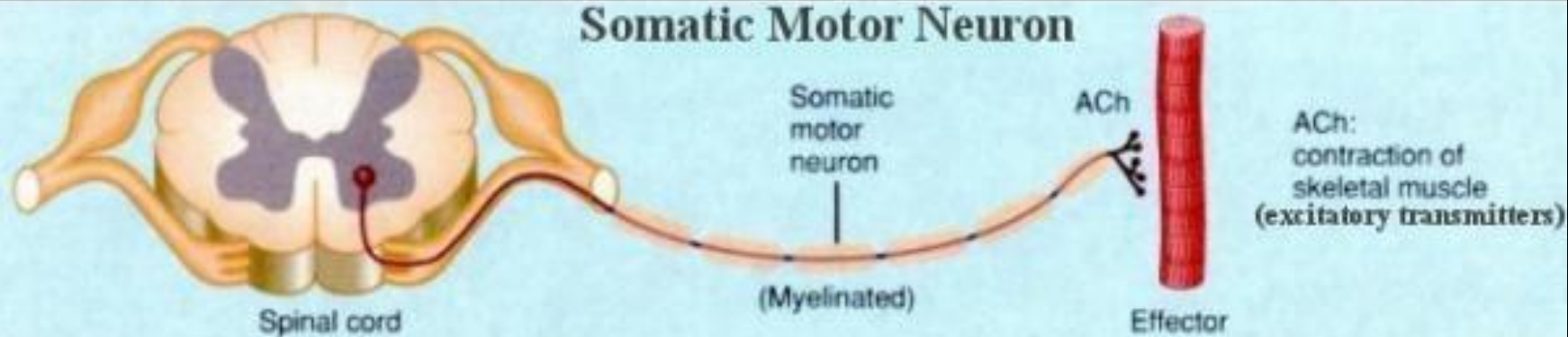
Somatic Nervous System

- **SNS:** controls skeletal muscles
- Voluntary control

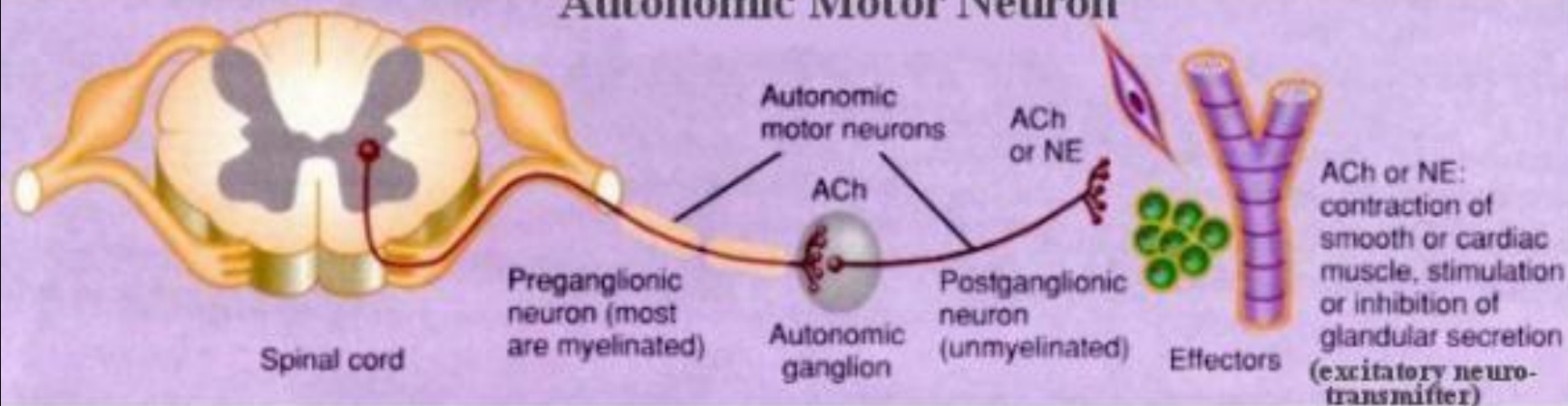
Differences

- 1) Effector organs neurons travel to
 - 2) Patterns of efferent pathways
- SNS – cell bodies of motor neurons are found in CNS and axons extend to skeletal muscles
 - ANS – has chain of 2 motor neurons (1st starts in brain or spinal cord, axon leaves CNS and synapses with 2nd motor neuron in a ganglion, and then axon travels to effector organ)

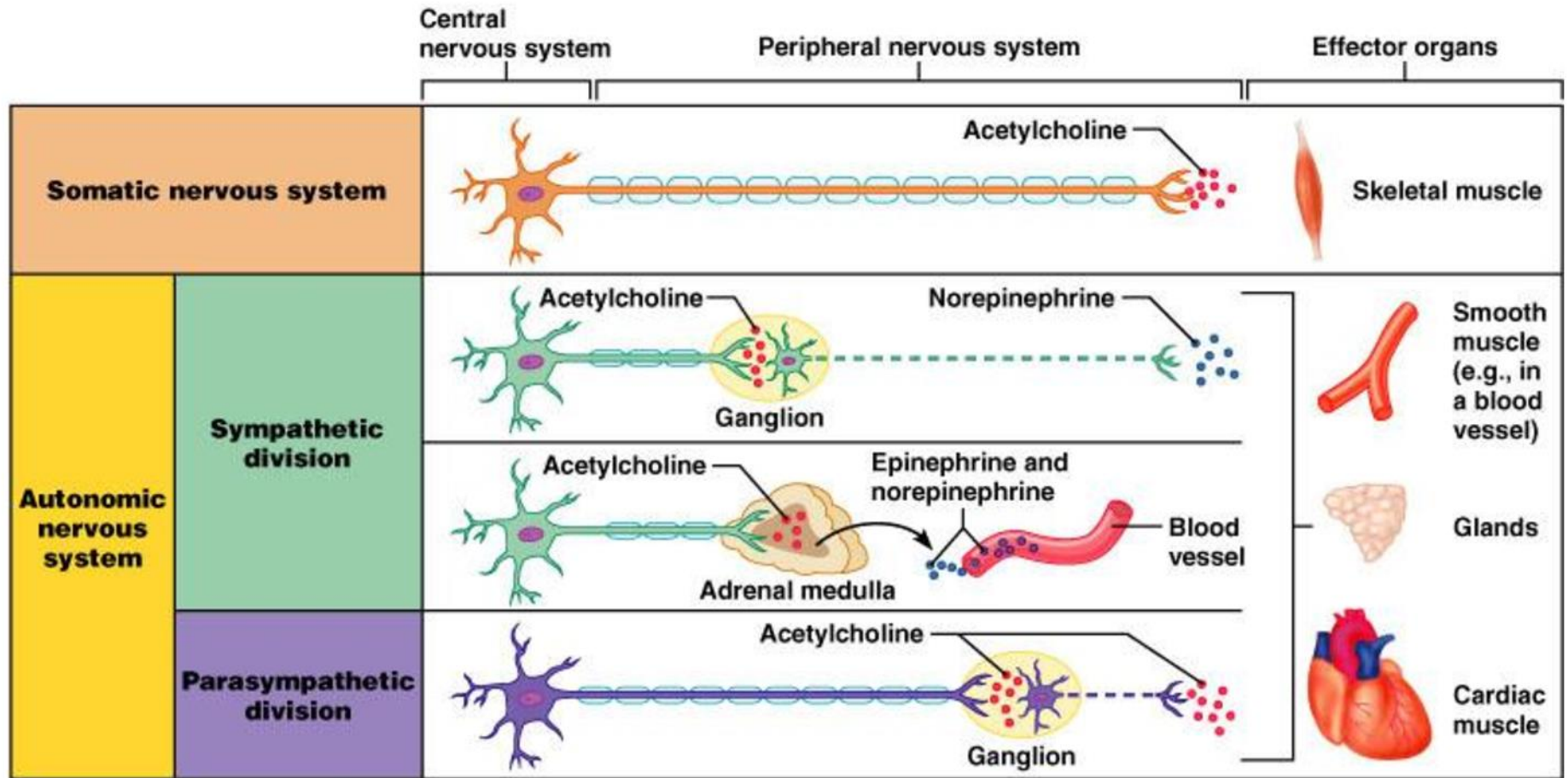
Somatic Motor Neuron



Autonomic Motor Neuron



Comparison of Somatic and Autonomic Systems



Key:

= Preganglionic axons (sympathetic)
 = Postganglionic axons (sympathetic)
 = Myelination
 = Preganglionic axons (parasympathetic)
 = Postganglionic axons (parasympathetic)

Two Divisions of ANS

- Sympathetic
- Parasympathetic

- Both serve same organ, but have opposite effects
 - Sympathetic – mobilizes the body during extreme situations
 - Parasympathetic – allows us to unwind and conserve energy

Sympathetic Division

Anatomy

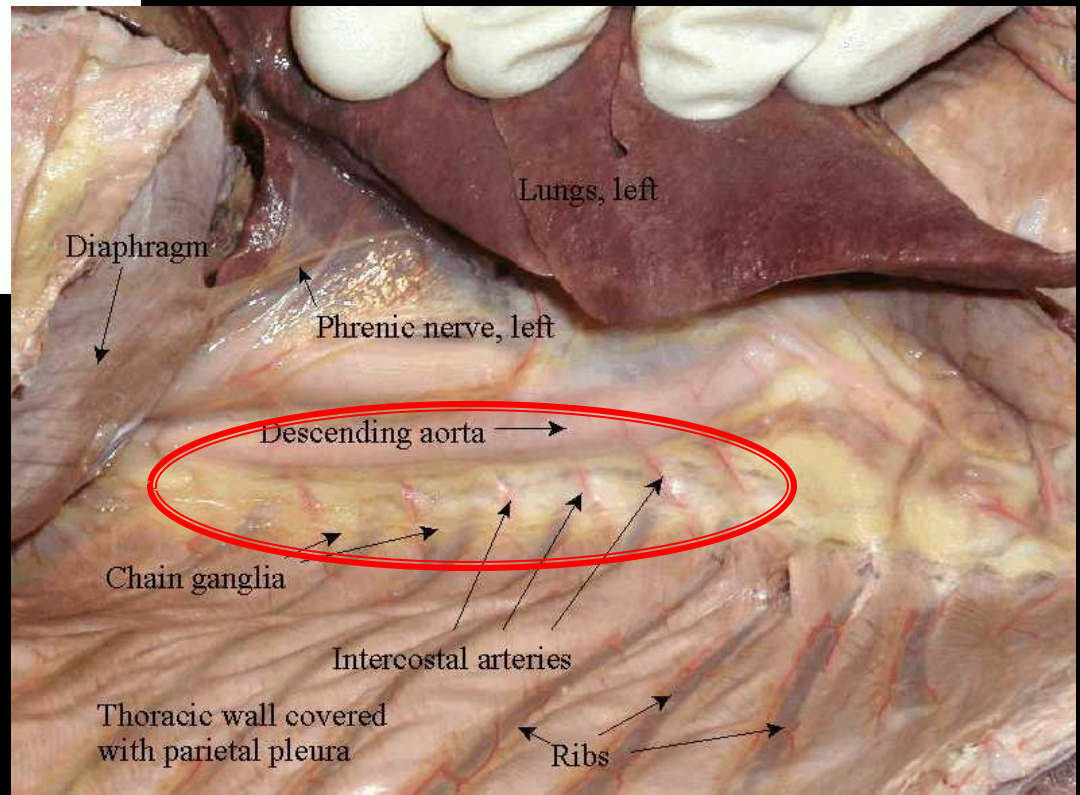
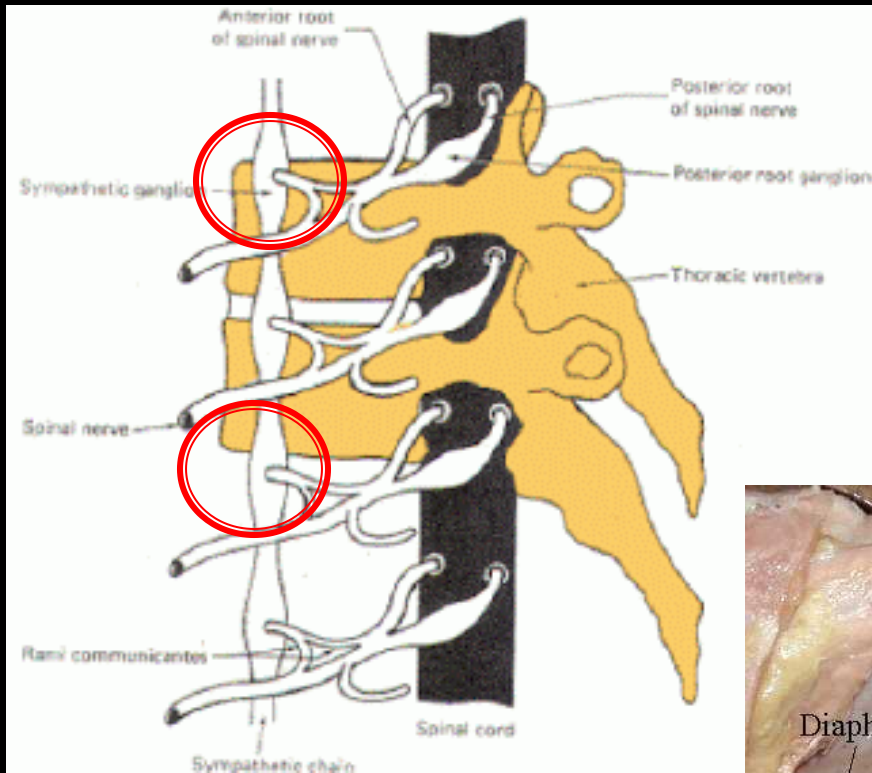
- 1st neurons leave the spinal cord at the T1 through L2 level
- Travel to the sympathetic chain ganglion (group of cell bodies)
- Synapse for 1st and 2nd neuron is found in ganglion
- 2nd neuron sends the signal out to the effector organ

- *Think of a building with an elevator: neurons can travel up to different levels using the sympathetic chain ganglion*
- *Once the signal gets to the right "floor" or vertebrae, it can travel down the "hallways" or 2nd neurons to the correct "door" or effector organ*

Sympathetic Division

Function

- Fight or flight
- heart pounding, deep breathing, cold sweaty skin, dilated pupils
- Enables the body to cope rapidly and vigorously to situations that threaten homeostasis



Parasympathetic Division

Anatomy

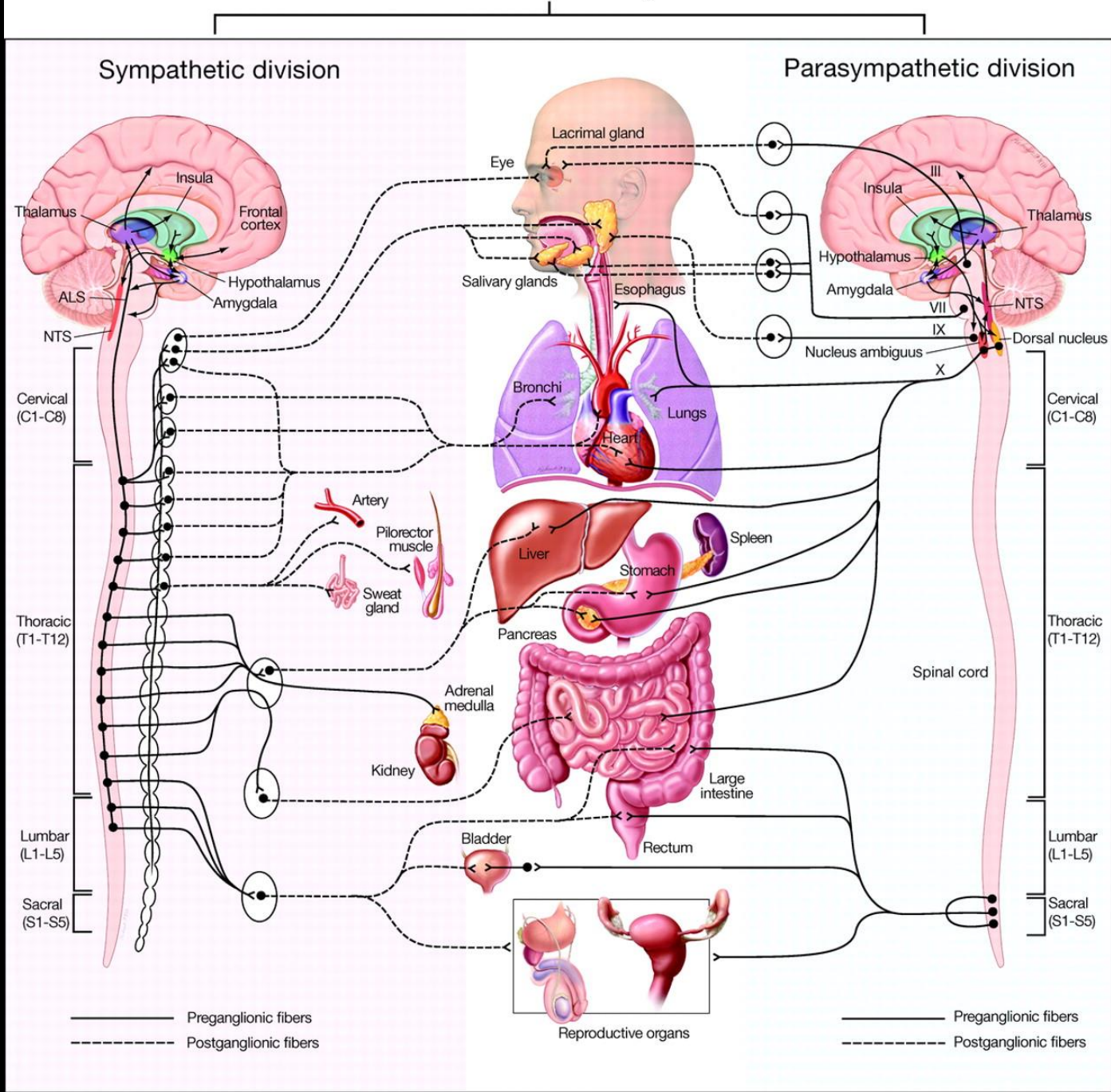
- Located in cranial nerves and runs through S2 through S4 level of spinal cord
- 1st neurons send axons down cranial nerves to head and neck regions
- Synapse with 2nd neuron at terminal ganglion – either short distance from effector organ or in the effector organ

Parasympathetic Division

Function

- Resting and digesting
- Digestion, elimination of feces and urine, conserving body energy

Autonomic Nervous System



Nervous Disorders

Cerebrovascular Accident (Stroke)

- 3rd leading cause of death in US
- Occurs when blood circulation to the brain is blocked (clot or ruptured blood vessel)
- Can determine where brain damage has occurred by watching the patients actions

Nervous Disorders

Alzheimer's Disease

- Progressive degenerative disease that leads to dementia
- Mostly seen in elderly but can occur in middle ages
- Memory loss, irritable, moody, cognitive frustrations
- Could be caused by abnormal protein deposits and twisted neuron fibers which causes localized atrophy

Nervous Disorders

Multiple Sclerosis

- Myelin sheath is destroyed
- Converted to hardened sheaths
- Person loses ability to control muscle
- Autoimmune disorder – protein of sheath is attached