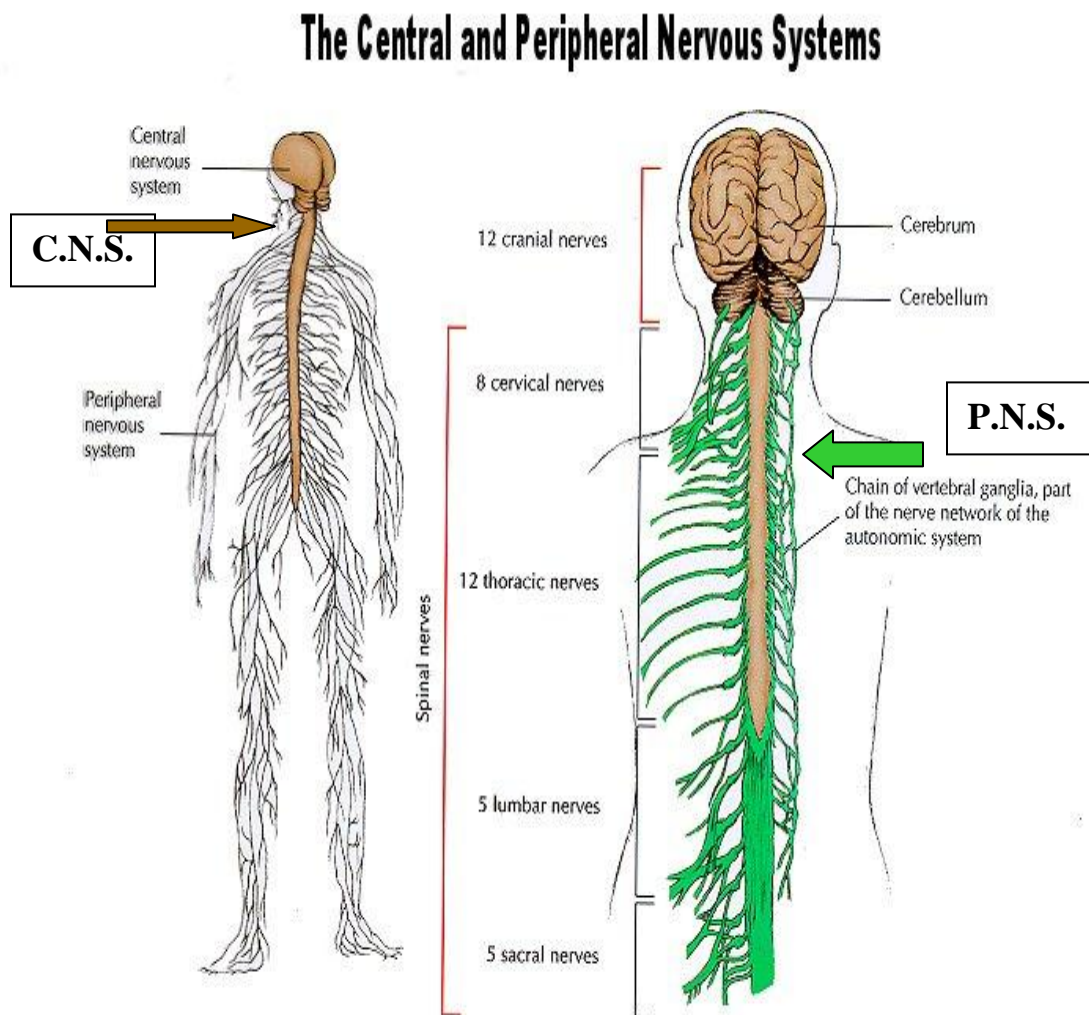


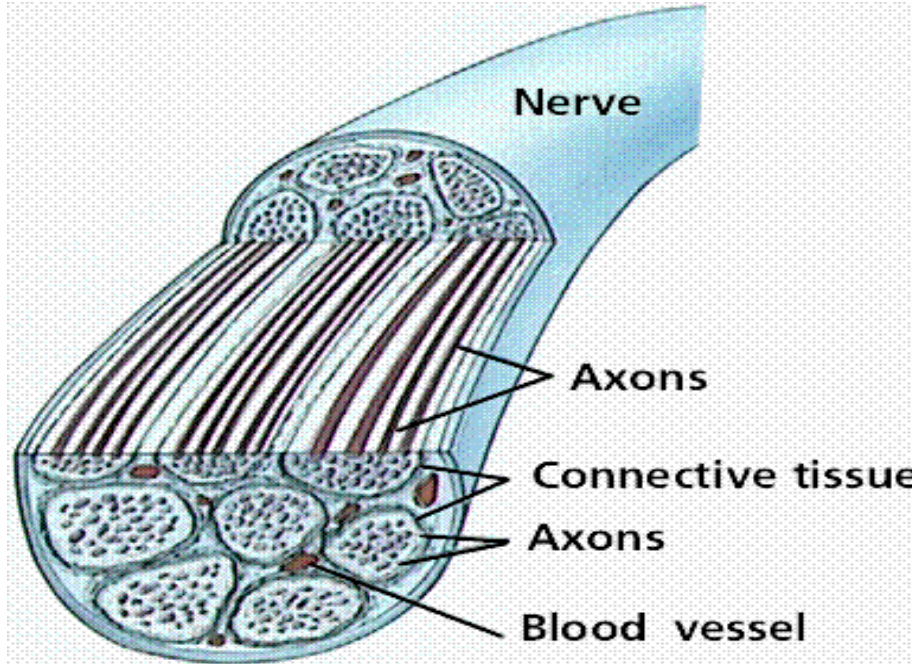
Unit N Notes #2 – The Peripheral Nervous System

A) Peripheral Nervous System:

- The PNS consist of all of the nerves, which project from and lie outside of the CNS. They connect the spine or brain to all peripheral bodily organs and structures.



-These nerves projecting out to the body from the CNS include three main types of nerves. A nerve is a bundle of neuron fibers.



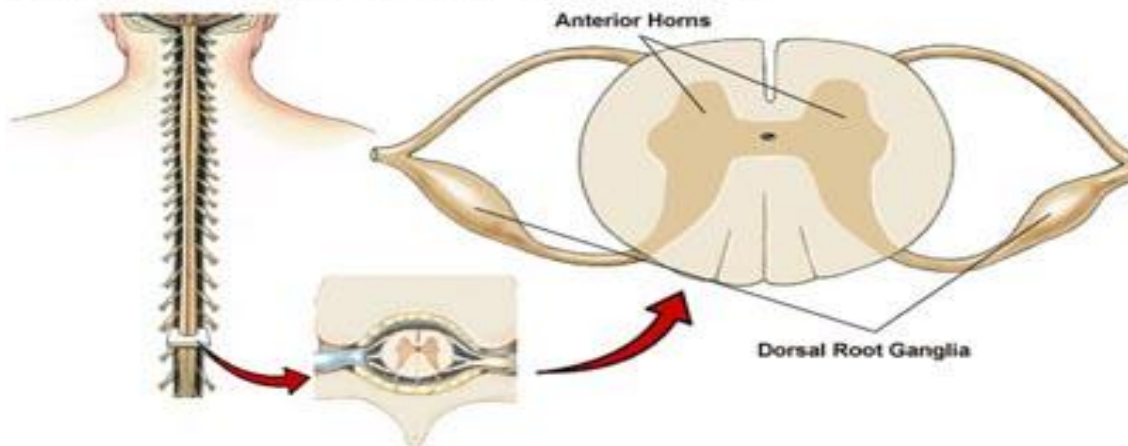
i) Sensory Nerves: Bundles of long dendrites from sensory neurons/receptors.

ii) Motor Nerves: Bundles of long axons from motor neurons.

iii) Mixed Nerves: Contain both long dendrites of sensory neurons and long axons of motor neurons.

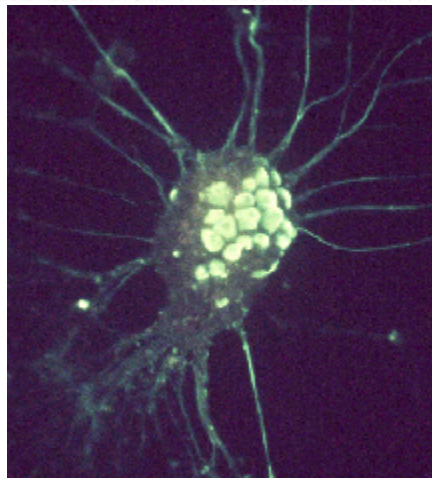
* Many nerves also have bulges called ganglia. A ganglion is a collection of cell bodies from many neurons. Appears as an enlarged portion of the nerve.

Figure F-6: Dorsal Root Ganglion & Anterior Horn



The dorsal root ganglion transmits sensory information while the anterior horn directs motor neurons.

Dorsal Root
Ganglion of
Mouse

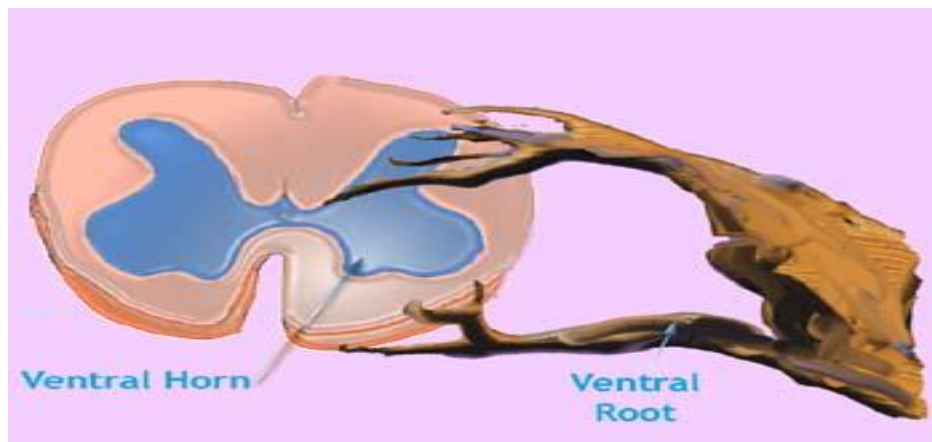


- These nerves are further categorized based on where they originate.

i) Cranial Nerves (12 pairs, both **sensory**, **mixed** and **motor**): Arise from Brain.
Ex. Optic nerve → eye, Vagus nerve → heart.

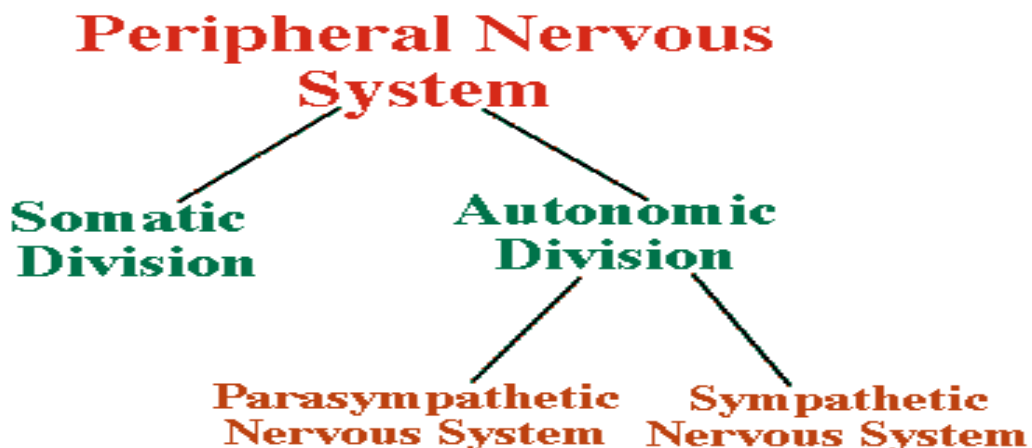
ii) Spinal Nerves (31 pairs, both sensory and motor): Arise from the spinal cord.
Ex. C3, C4, and C5. → diaphragm.

- Each spinal nerve forms from two branches that come out of the spine. A dorsal root (sensory) and a ventral root (motor), these roots then merge to form the mixed spinal nerve.



B) Divisions of PNS: Autonomic vs. Somatic:

- A third level of classifying peripheral nerves is based on whether they are voluntary (under our control) or involuntary (automatically controlled).



- Nerves that we have voluntary control over are considered to be part of the “Somatic” system.

- Nerves that we do not have control over (automatic) are classified as belonging to the “Autonomic” system.

i) Somatic: Contains nerves that control skeletal muscles, joints, and skin. They receive information from external stimuli (via sensory neurons) and send out nerve impulses to help us appropriately respond (via motor neurons).

Ex. Hearing the phone ring, and deciding to get up, pick up the phone and say “hello”.

- Requires Thought.

ii) Autonomic: Contains nerves that control the smooth muscles of the internal organs and the glands. Automatic, usually without the need for conscious thought.

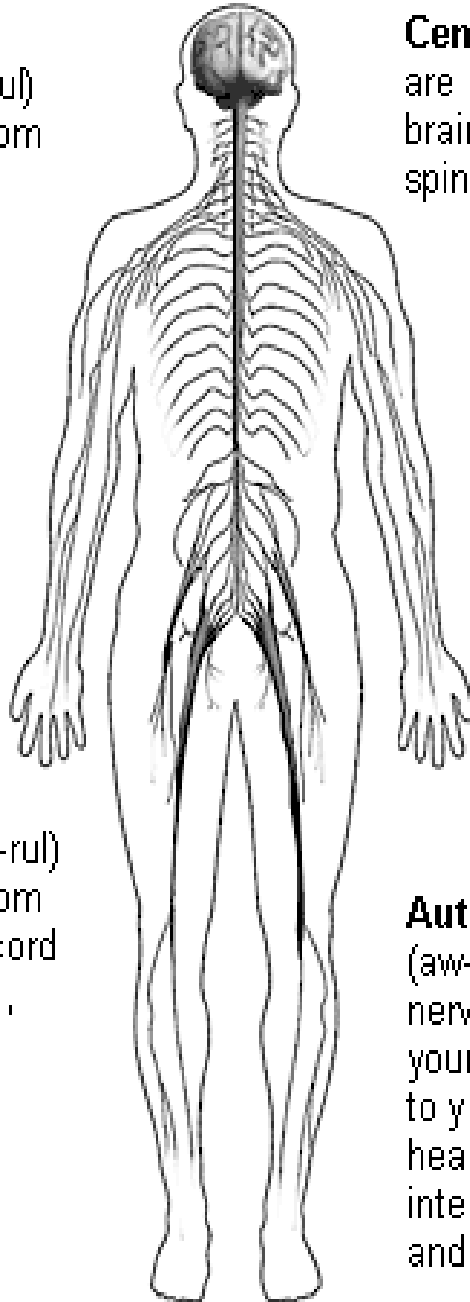
Ex. As body gets hot, sweat glands are stimulated to increase perspiration while

blood vessels under skin dilate to send more blood out to the cool skin.

- Does Not Require Any Thought.

Cranial

(KRAY-nee-ul)
nerves go from your brain to your eyes, mouth, ears, and other parts of your head.



Central nerves

are in your brain and spinal cord.

Peripheral

(puh-RIF-uh-rul)
nerves go from your spinal cord to your arms, hands, legs, and feet.

Autonomic

(aw-toh-NOM-ik)
nerves go from your spinal cord to your lungs, heart, stomach, intestines, bladder, and sex organs.

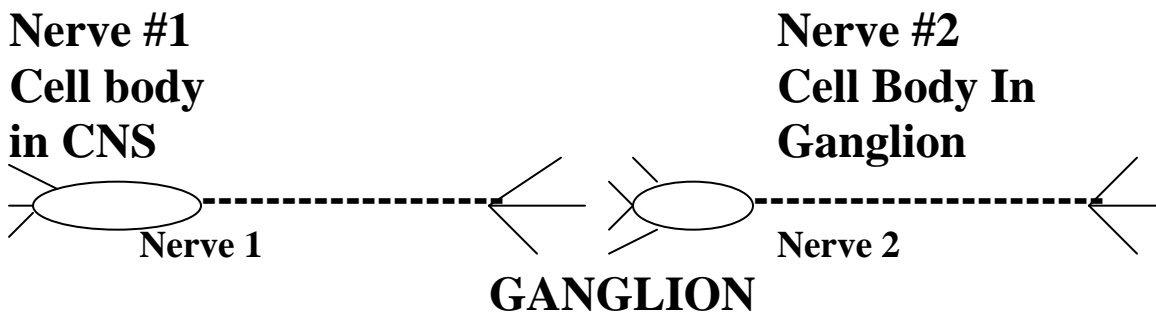
**C) The Autonomic Nervous System:
Sympathetic vs. Parasympathetic**

Two Divisions of Autonomic NS:

- 1. Sympathetic (Excitatory) - State of Excitation**
- 2. Parasympathetic (Normal) – State of Relaxation**

Similarities Between Two Divisions:

- **Function automatically (involuntarily)**
- **Serve all internal organs.**
- **Utilize two motor neurons with a ganglion (bundle of cell bodies of all neurons in that nerve) between them to send out each impulse.**



Differences

Sympathetic:

-Fight or flight

Parasympathetic:

-Normal activity

**-Accelerates
Heart Beat**

**-Neurotransmitter is
Noradrenalin (Norepinephrine)
(Excitatory manner)**

**-Neurotransmitter is
Acetylcholine
(Normal manner)**

**- Short preganglionic fiber,
long postganglionic fiber**

**-Long preganglionic fiber,
short postganglionic fiber**

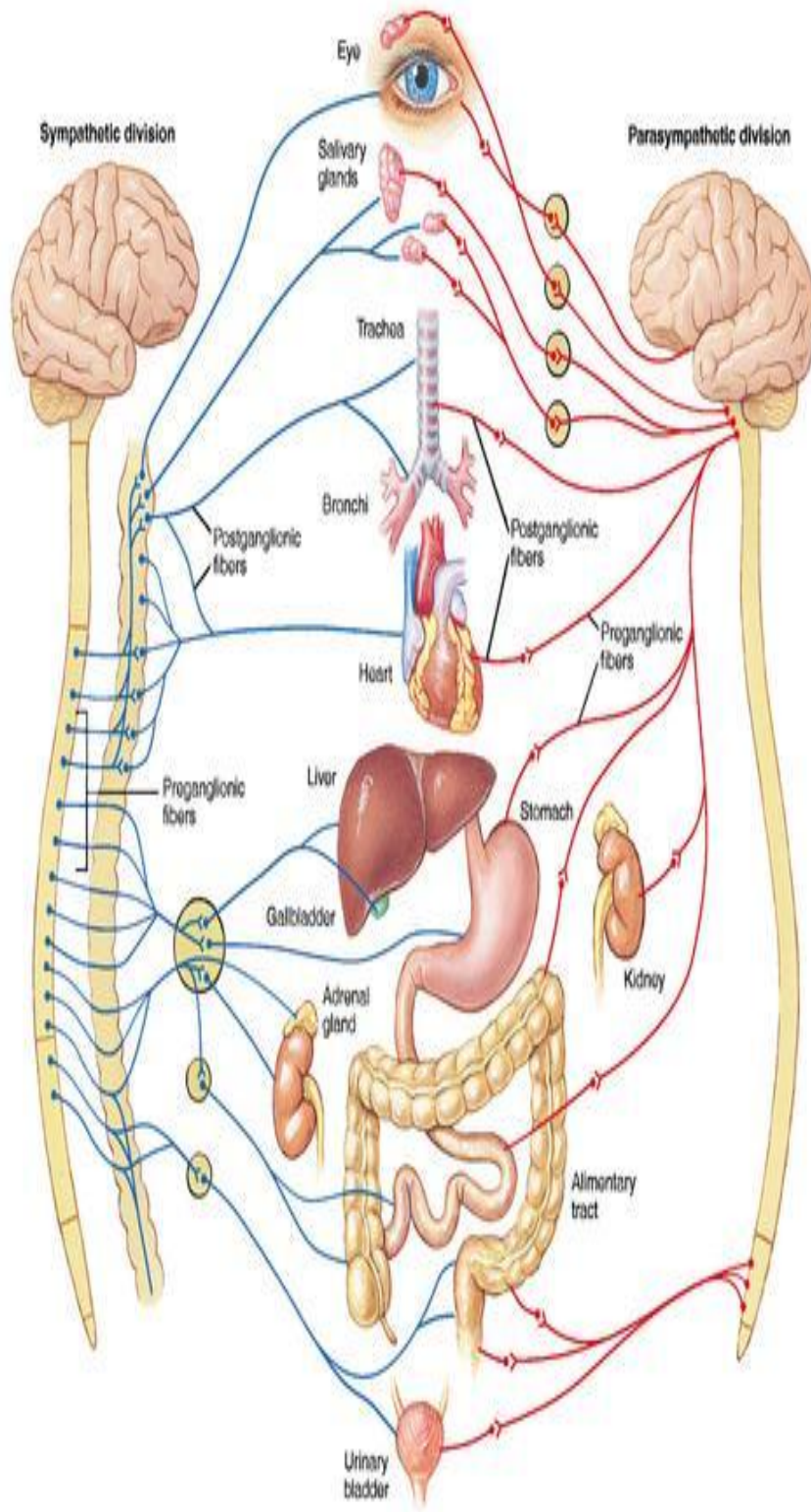
-Ganglion near spinal cord

-Ganglion near organ

**-Nerves arise from middle
of spinal cord.**

**-Nerves arise from cranium
And bottom of spinal cord**

SYMPATHETIC vs. PARASYMPATHETIC



Bases of Comparison	Sympathetic Neurons	Parasympathetic Neurons
Effect	Active body function	Vegetative body function
Spinal origin	Thoracic and lumbar	Cranial and sacral
Neurotransmitter	Noradrenalin	Acetylcholine
Restoring enzyme	Monoamine oxidase	Acetylcholinesterase
Location of motor ganglion	Closer to CNS	Farther from the CNS

Somatic and Autonomic (Symp and Parasymp) Pathways

