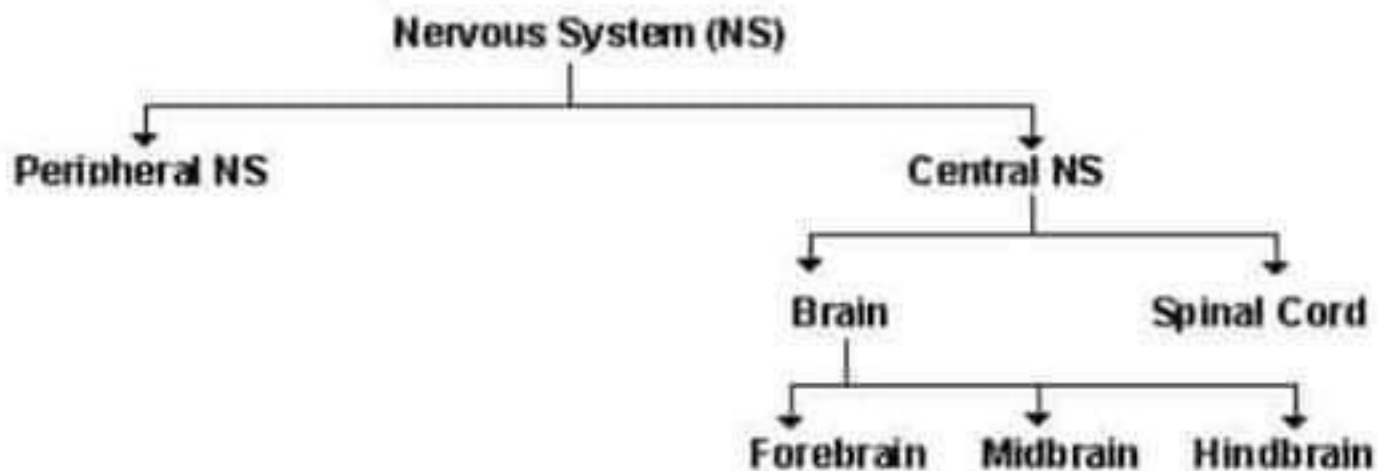


NERVOUS SYSTEM

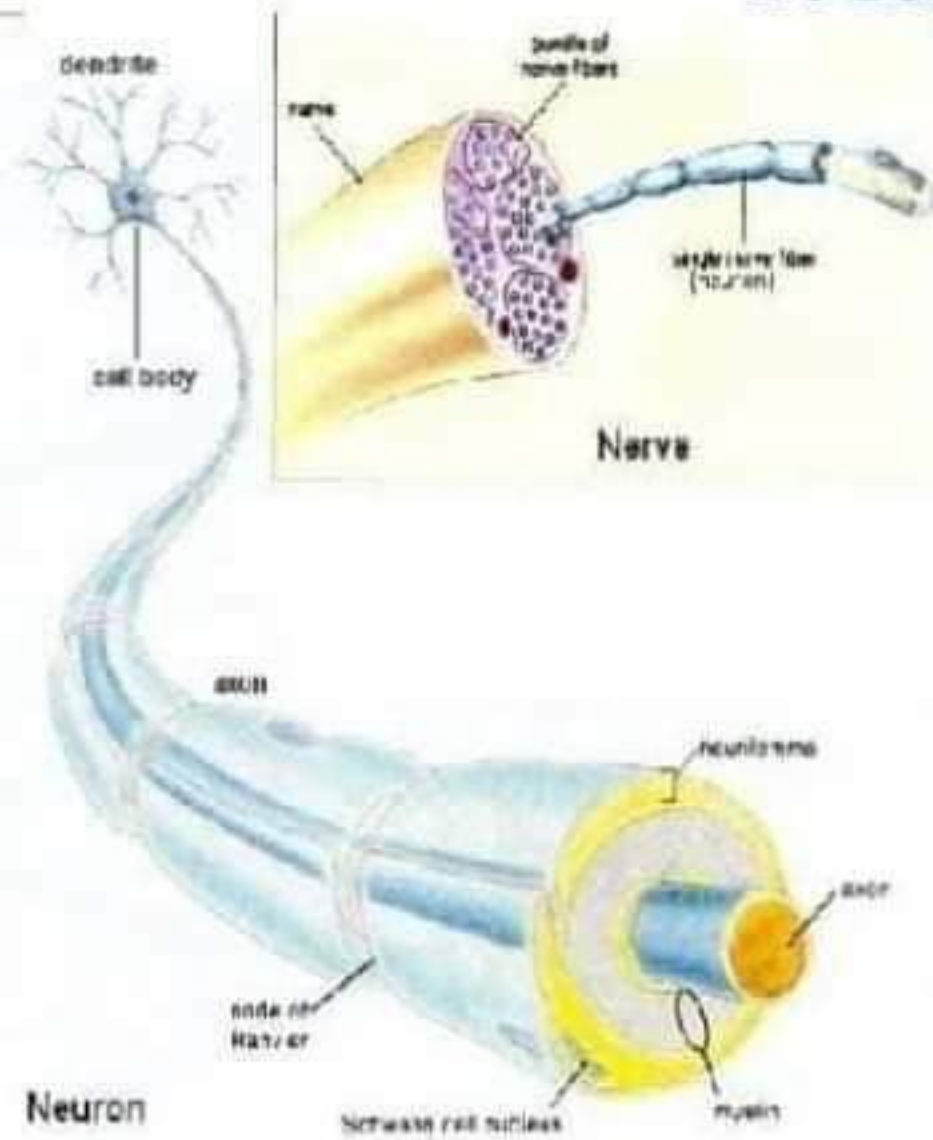


Fb/Nurse-Info

WHAT ARE NERVE CELLS?

- Neurons are similar to other cells in the body
 - Surrounded by cell membrane
 - Have a nucleus that contains genes
 - Contain cytoplasm, mitochondria and other organelles
 - Carry out basic cellular processes such as protein synthesis and ATP production
- Neurons are different by
 - Specialized extensions called dendrites and axons
 - Communicate with each other by electrochemical process
 - Contain some specialized structures (synapses) and chemicals (neurotransmitters)

Neurons



- Most neurons consist of a cell body and extensions called dendrites and axons.
- Cell Body contains the nucleus
- Dendrites carry impulses towards cell body
- Axons carry impulses away from the cell body

Types of Neurons

- **Sensory neurons**

- Carry nerve impulses from a receptor to the CNS
- Have long dendrites and short axons

- **Motor neurons**

- Carry nerve impulses from the CNS to an effector (ex. muscle or gland)
- Have short dendrites and long axons

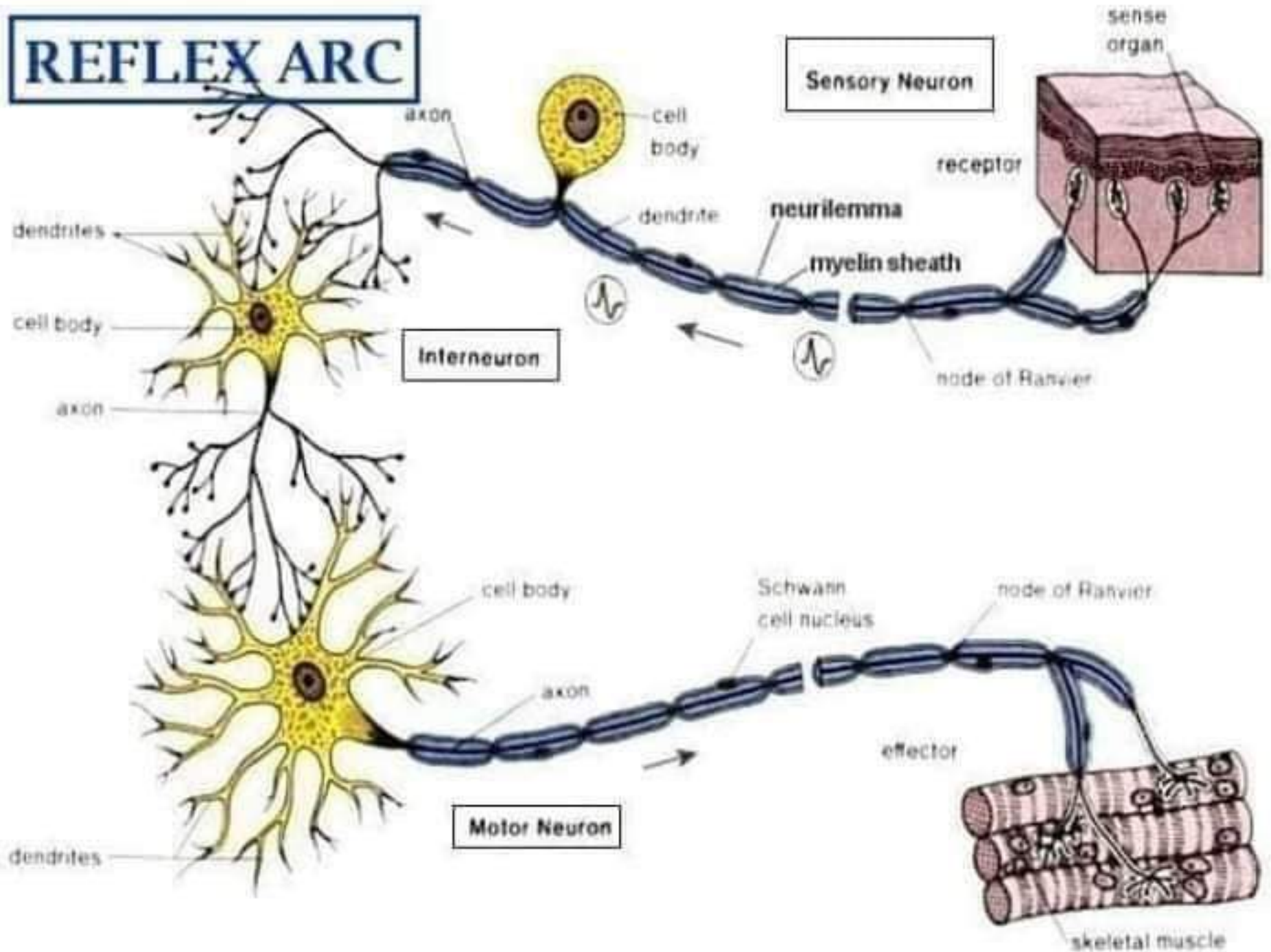
- **Interneurons**

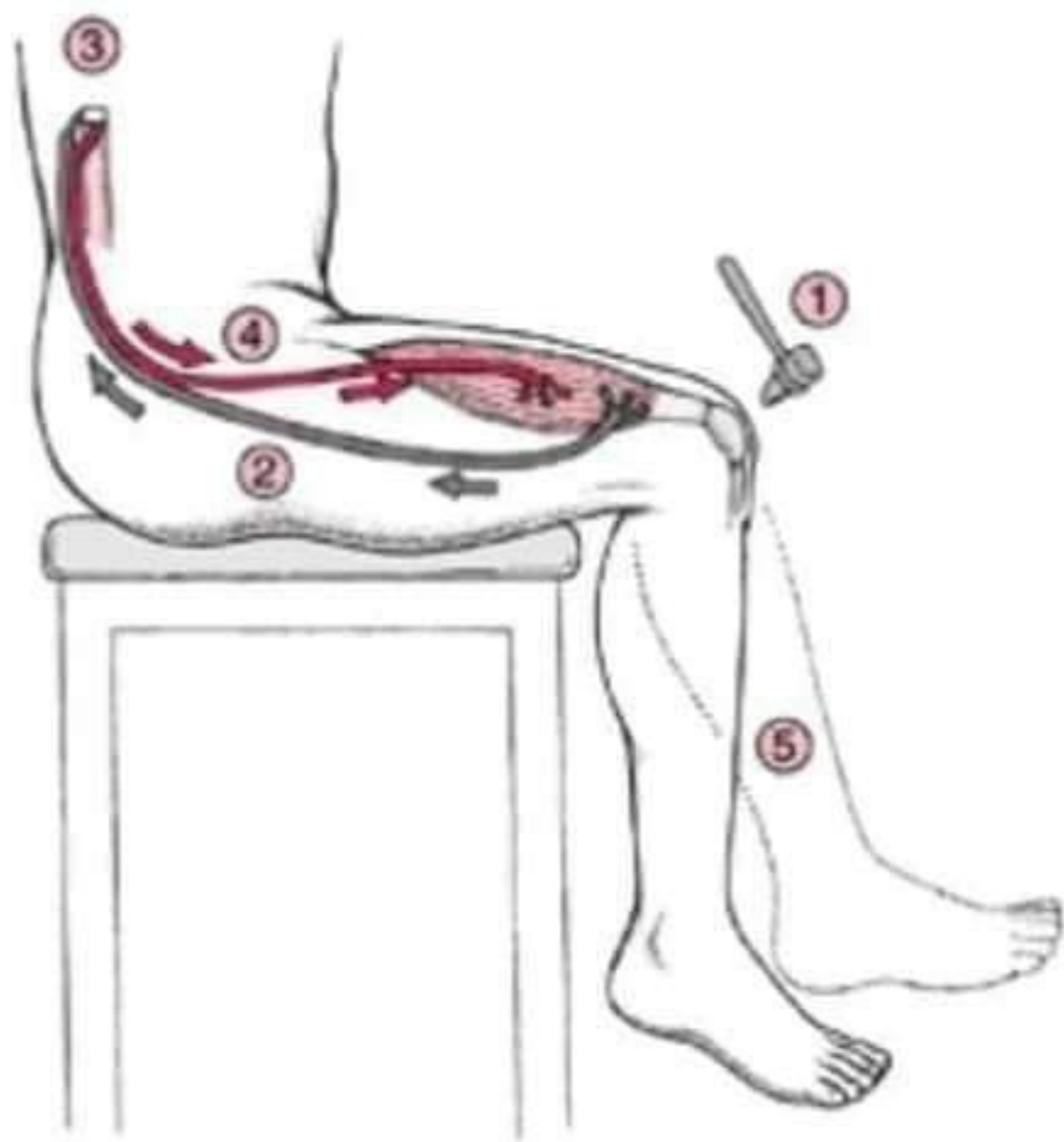
- Found completely within the CNS
- Provide a link within the CNS between sensory neurons and motor neurons
- Have short dendrites and long or short axons

Reflex Arc

- Simplest nerve pathway
- Occurs without brain coordination
- Five components
 - Receptor
 - Sensory neuron
 - Interneuron in spinal cord
 - Motor neuron
 - Effector

REFLEX ARC





Nerves

- Consist of many fibers (neurons) wrapped in myelin
- 3 Types of nerves
 - Sensory nerves contain only the long dendrites of sensory neurons wrapped in myelin
 - Carry impulses from a receptor to the CNS
 - Motor nerves contain only the long axons of motor neurons wrapped in myelin
 - Carry impulses from the CNS to an effector
 - Mixed nerves contain both the long dendrites of sensory neurons and the long axons of motor neurons wrapped in myelin
 - Conduct impulses to and from CNS

All nerves within the PNS contain a thin membrane called the **neurilemma**

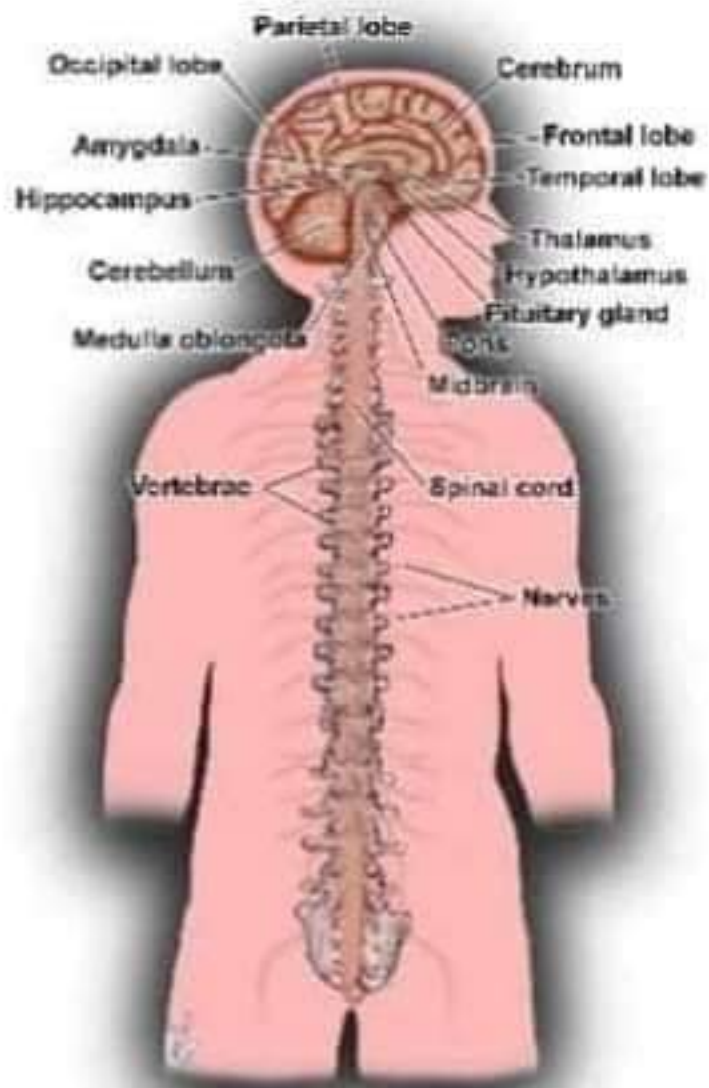
- Neurilemma promotes the regeneration of damaged axons
- Grey Matter
 - Nerves in the brain and spinal cord (CNS) that lack myelin and neurilemma
- White matter
 - Nerves in the brain and spinal cord (CNS) that contain myelin and neurilemma

Ganglia

- Groups of neuron cell bodies that lie within the PNS
- Not included with nerves since nerves only contain axons and dendrites

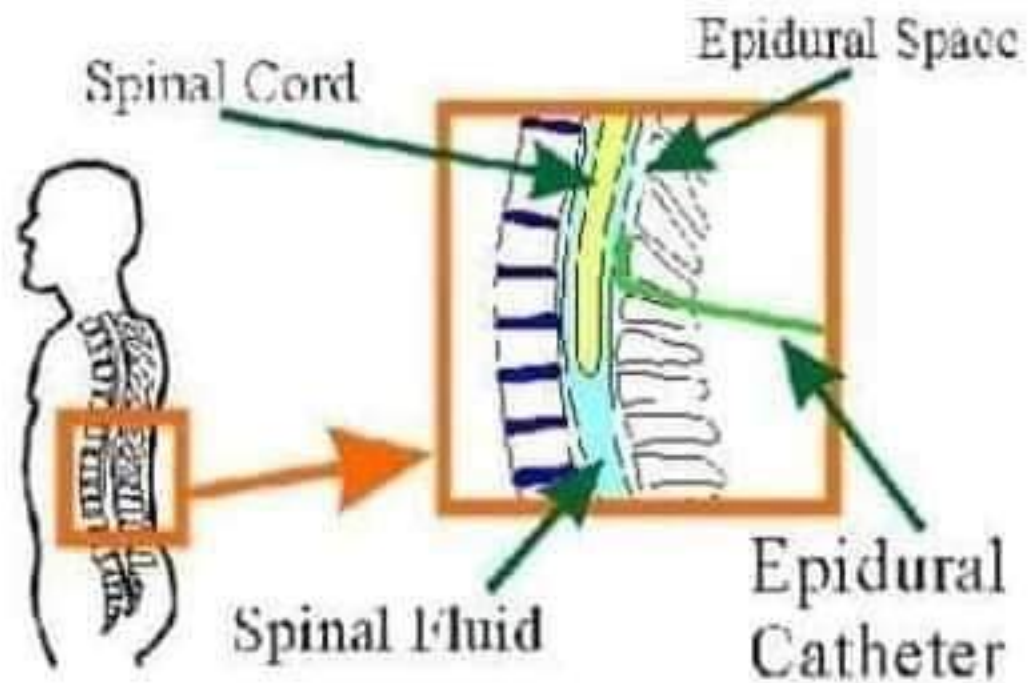
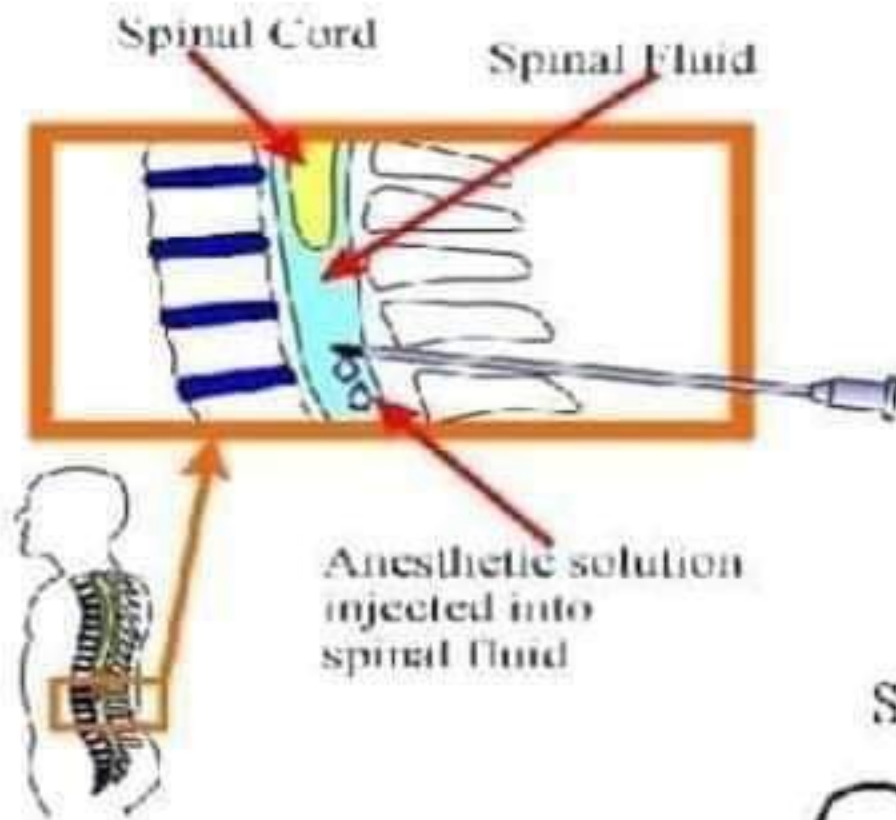
Central Nervous System (CNS)

- Contains the nerves of the brain and spinal cord
 - Function = coordinating center of incoming/outgoing information



- Brain is found in the skull & serves as overall control center for the nervous system
- Spinal Cord is surrounded by vertebrae and extends down the back of the neck, thorax and abdomen
 - Center of many reflex actions
 - Provides a link between sensory and motor nerves
- Both are enclosed in 3 protective membranes called the meninge
- Space between meninge contains cerebrospinal fluid which protects and cushions the CNS

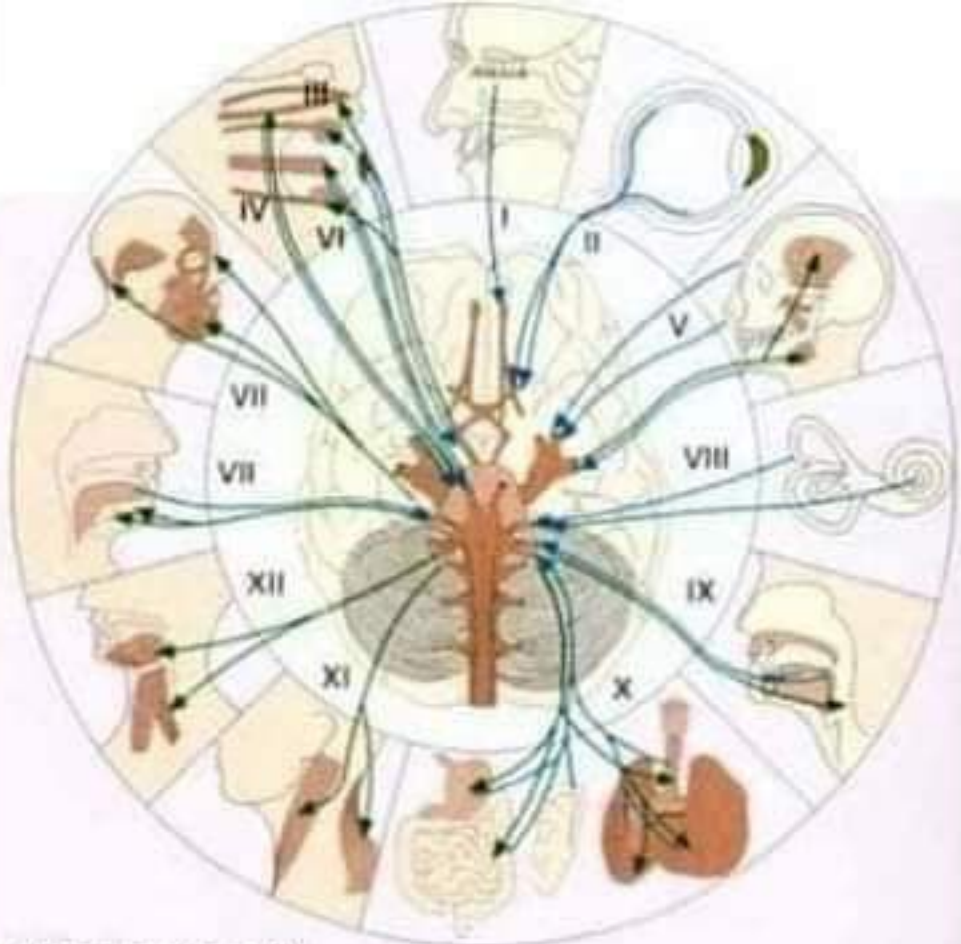
Spinal VS Epidural



Peripheral Nervous System (PNS)

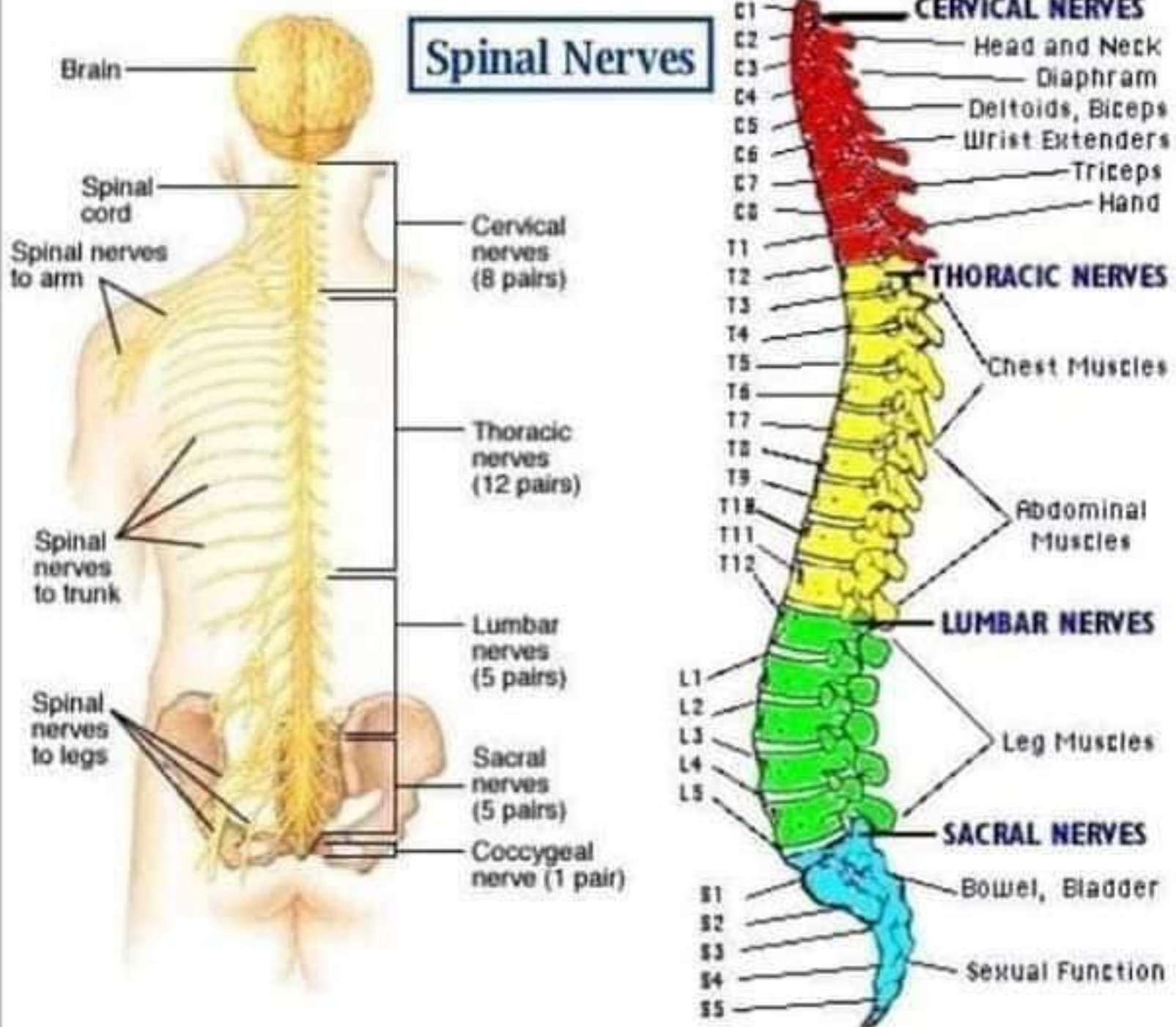
- All parts of the nervous system lying outside the brain and spinal cord.
- The sensory and motor neurons that connect to the CNS
 - Function = to carry info between organs of the body and the CNS
- Humans have
 - 12 pairs of cranial nerves (sensory/motor/mixed) which control the head, face, neck, shoulders
 - Except VAGUS nerve – controls internal organs
 - 31 pairs of spinal nerves (mixed) which take impulses to and from the spinal cord

Cranial nerves



- I. Olfactory (smell)**
- II. Optics (vision)**
- III, IV, VI. Oculomotor, Trochlear, Abducens**
(eye movement)
- V. Trigeminal (touch, pain)**
- VII. Facial (face muscles, taste)**
- VIII. Auditory (hearing)**
- IX. Glossopharyngeal (muscles of throat and larynx)**
- X. Vagus (internal organs)**
- XI. Spinal Accessory (neck muscles)**
- XII. Hypoglossal (tongue movements, taste)**

Spinal Nerves

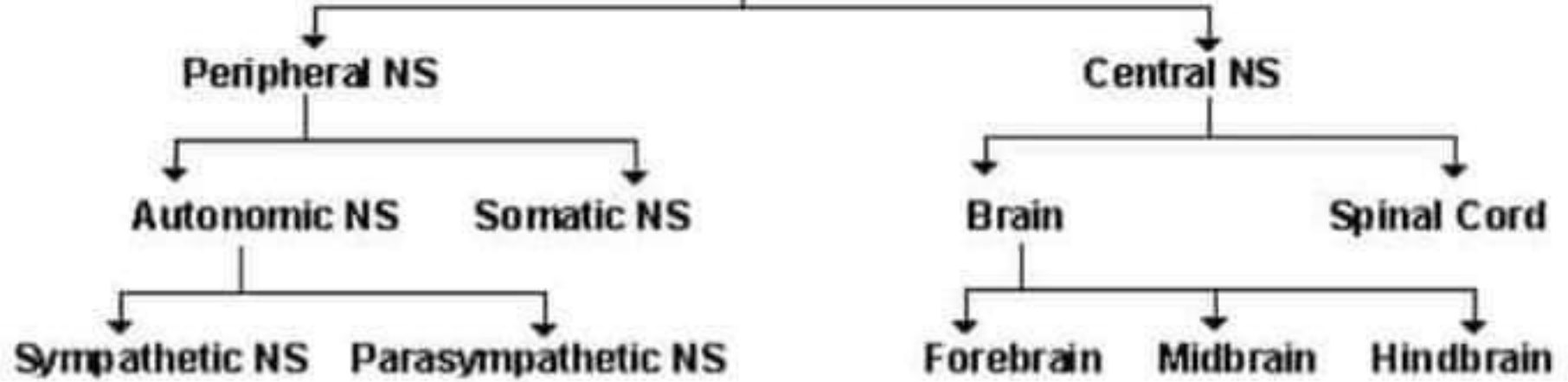


Spinal Nerve(s)	Innervated Body Part(s)	Symptom(s) of SCI
C1	Head and Neck	Quadriplegia
C2-C4	Diaphragm	Breathing problem
C5	Deltoids, biceps	No control at wrist or hand
C6	Wrist extenders	No hand function
C7-T1	Triceps, hand	dexterity problems with hand and fingers
T2-T8	Chest muscles	Paraplegia, poor trunk control
T9-T12	Abdominal muscles	Paraplegia
Lumbar and Sacral	Leg muscles, bowel, bladder, sexual organs	Decreasing control of hip flexors and legs, dysfunction of bowel, bladder, and sex

Table 04 Symptom(s) of Spinal Cord Injury

Note: Other effects of SCI may include low blood pressure, inability to regulate blood pressure effectively, reduced control of body temperature, inability to sweat below the level of injury, and chronic pain.

Nervous System (NS)



PNS

Somatic & Autonomic Nerves

- Somatic nerves control skeletal muscle, bones, skin that a person can control
 - Sensory neurons which relay info about environment to CNS
 - Motor neurons which initiate appropriate response
- Autonomic nerves control the muscles of the glands and internal organs which we can't control
 - Sympathetic & parasympathetic components

Reflex Arc

“FLIGHT OR FIGHT RESPONSE”

Sympathetic component prepares body for stress
[neurotransmitter used=norepinephrine]

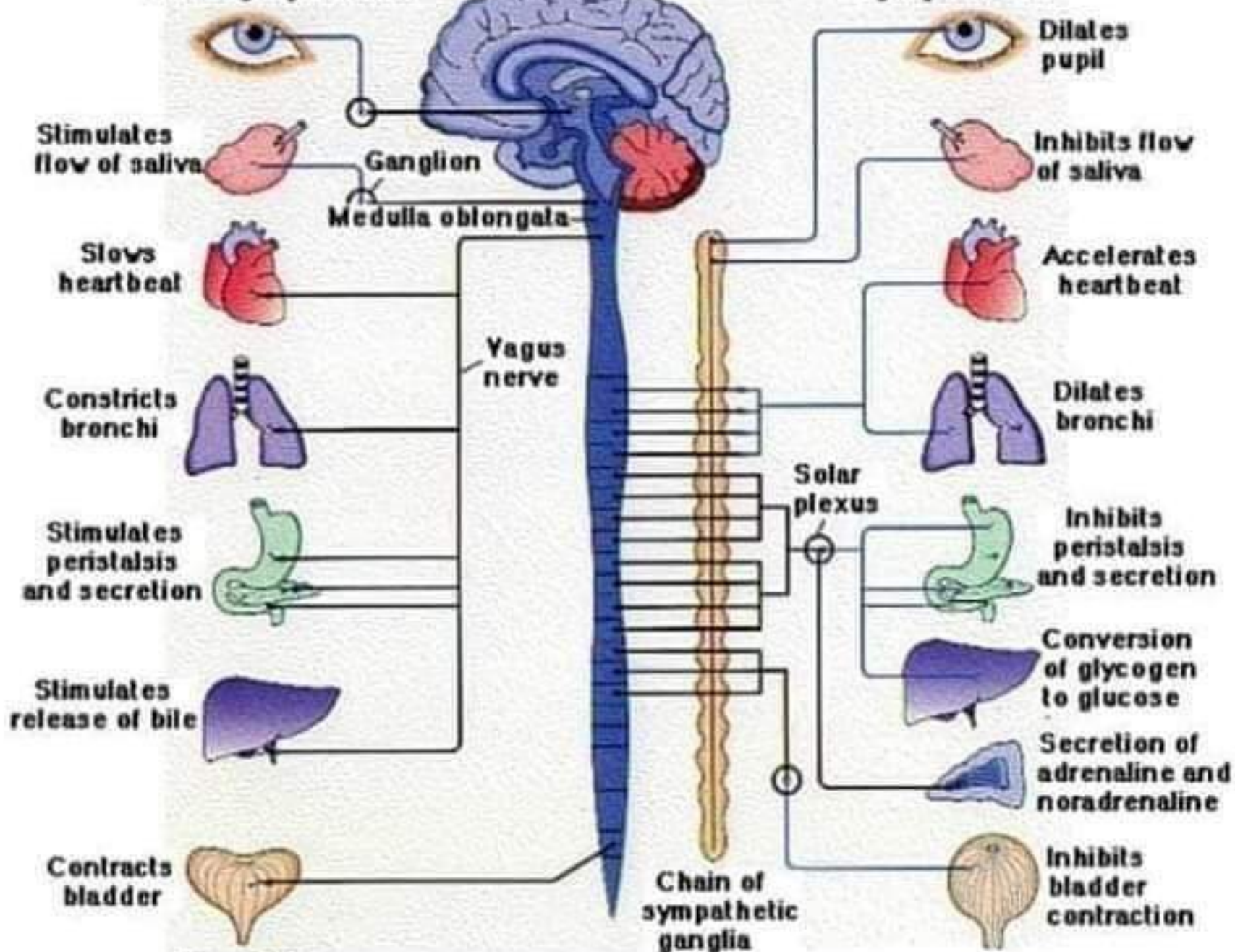
- Diverts blood from internal organs to skeletal muscles, heart & brain

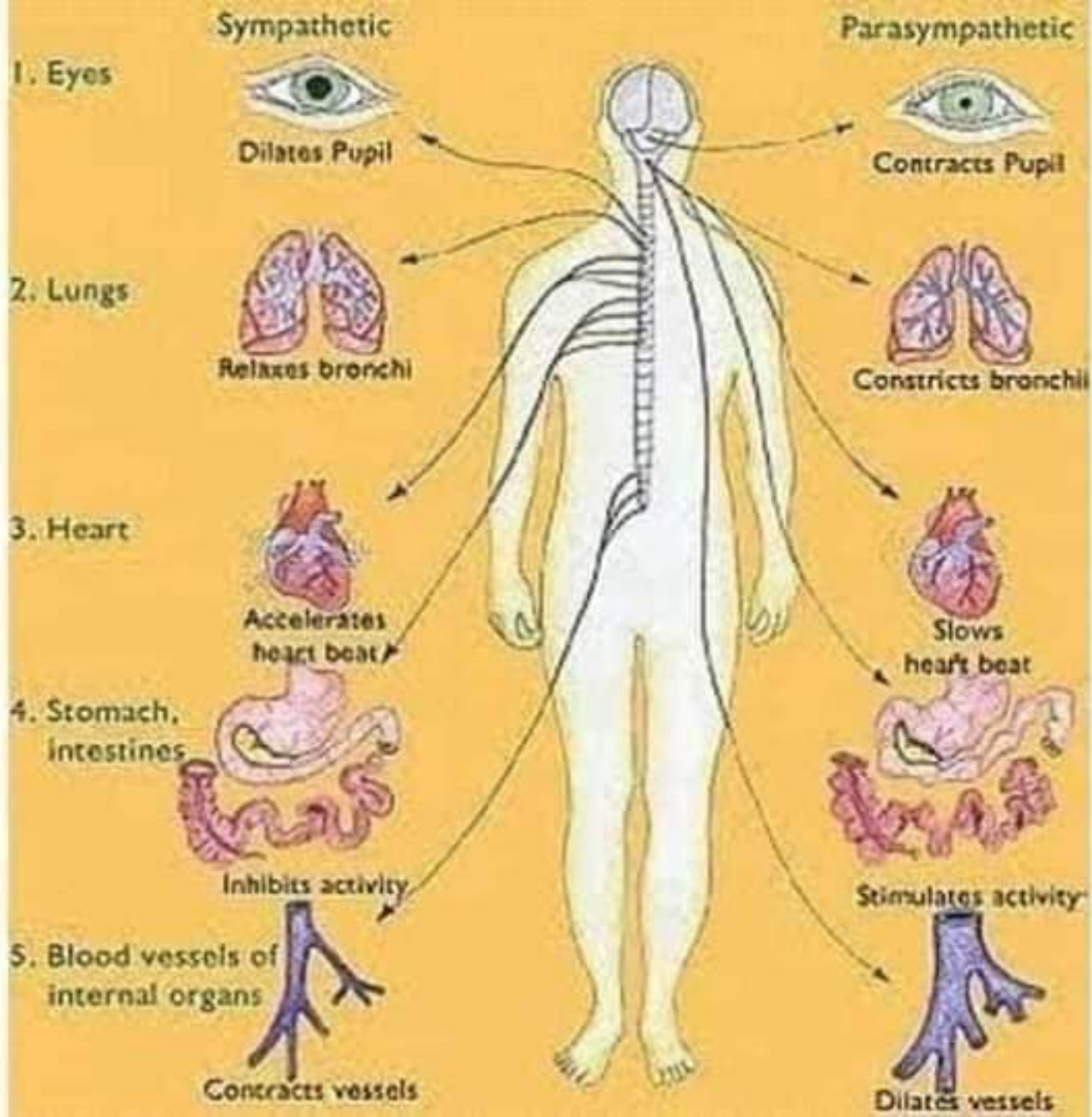
Parasympathetic brings things back to normal
[neurotransmitter used=acetylcholine]

- Work in conjunction/opposition to each other
 - Ex. “on” / “off” switches

Parasympathetic

Sympathetic





You come across a bear on your walk to school...what happens?

- Sympathetic nervous system does what?
- Increases heart rate
- Increases breathing rate
- Dilates bronchioles
- Dilates pupils
- Inhibits digestion

ADRENALIN (epinephrine)

- Sympathetic nervous system also stimulates secretion of epinephrine and nor-epinephrine from the medulla of the adrenal glands
- Prepares body for "flight or fight" response
- "Epi-pen" given in allergic reactions as it relaxes constricted airways

