



Anesthesia Department

Human Nervous System

Human Biology (ANE106)

Year 1/ Spring semester

Lecture 2

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How does your body detect and respond to the environment?



Nervous System

A complex network of cells and organs that controls, coordinates, and communicates body functions by receiving, processing, and responding to information.

Organization of the Nervous System

1. Structural Division

- Central Nervous System (CNS)
- Peripheral Nervous System (PNS)

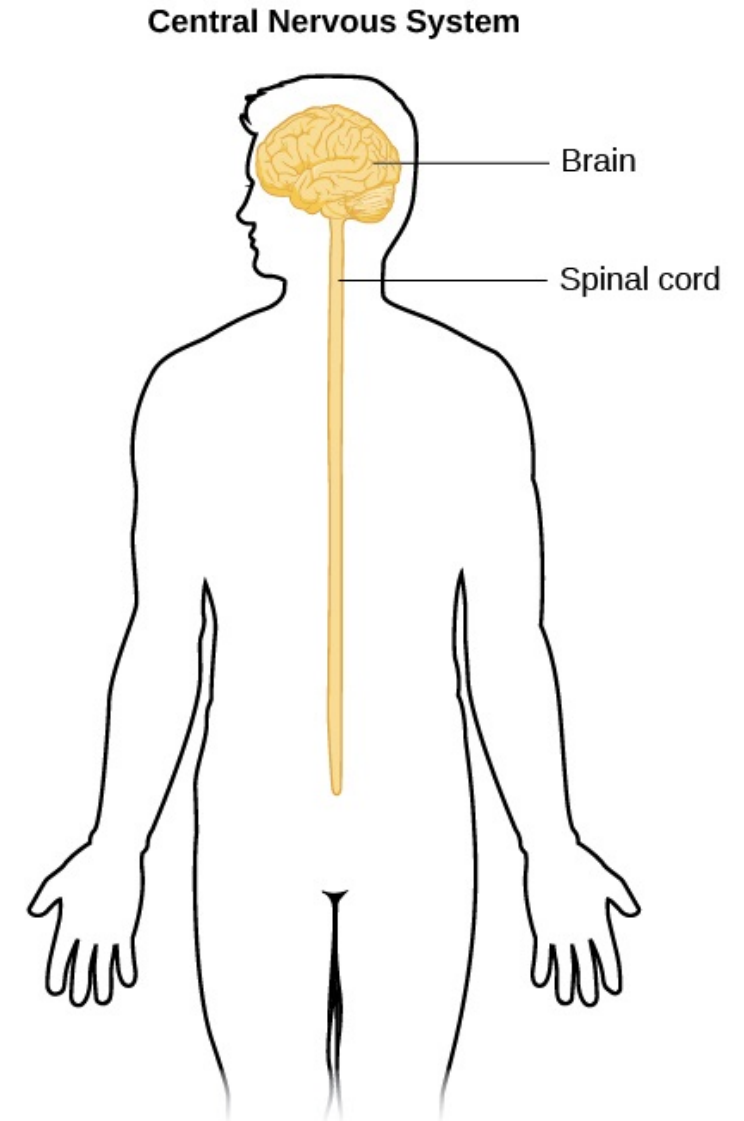
2. Functional Division

- Sensory (Afferent)
- Motor (Efferent)

Central Nervous System (CNS)

1. Brain
2. Spinal cord

Function: control and integration center

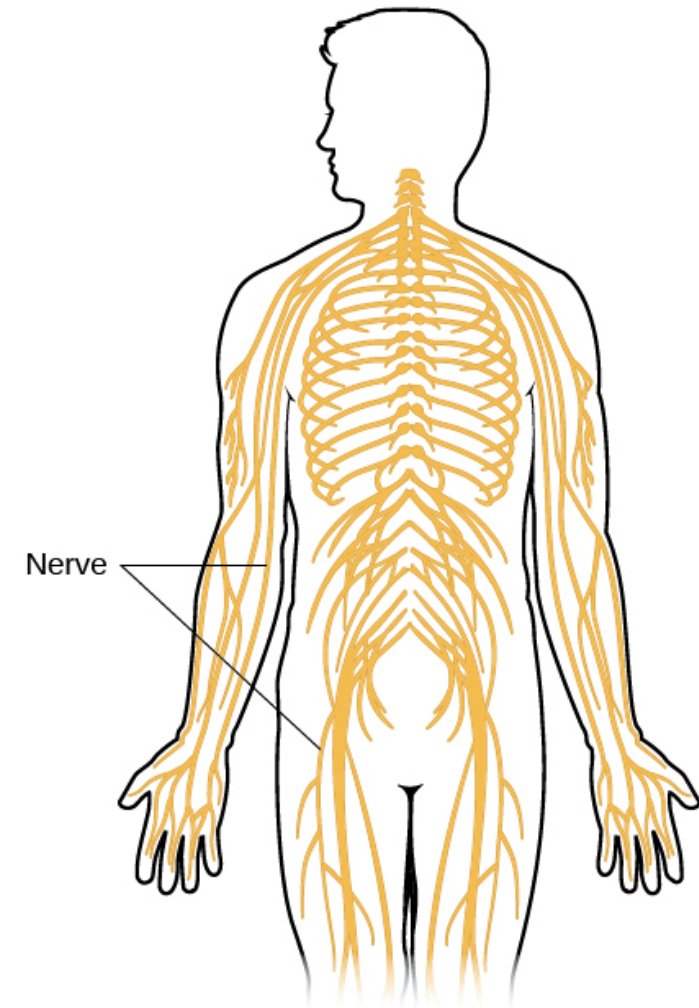


Peripheral Nervous System (PNS)

- Cranial nerves
- Spinal nerves

Function: connects body to CNS

Peripheral Nervous System

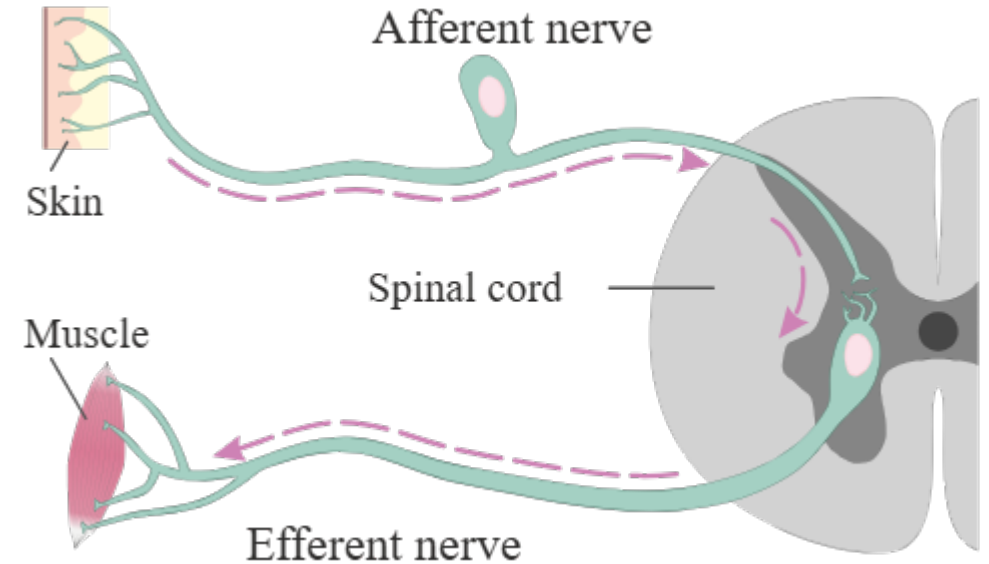


Sensory (Afferent)

- Carries information to the CNS
- Example: touch, temperature

Motor (Efferent)

- Carries commands from CNS

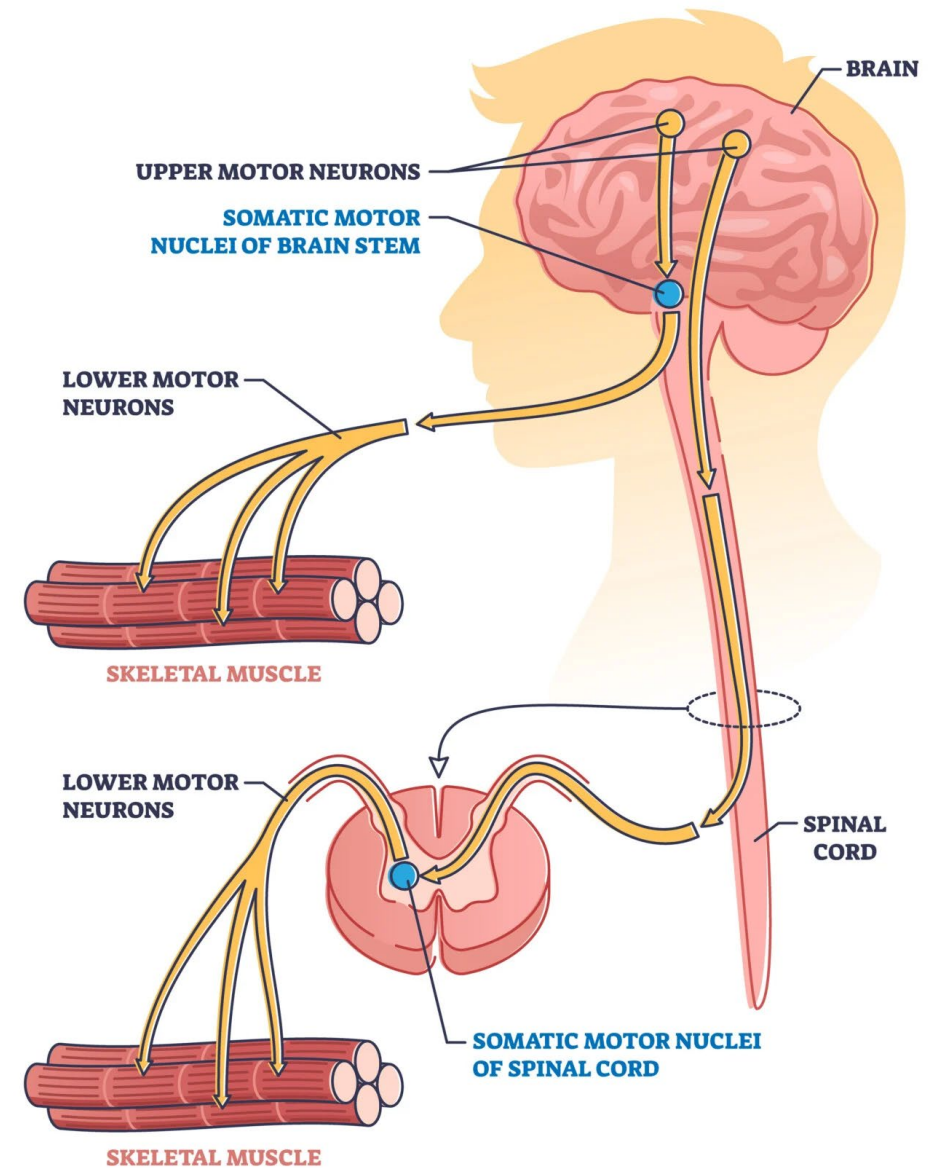


Motor Subdivisions

- Somatic Nervous System
- Autonomic Nervous System (ANS)

Somatic Nervous System

The part of the nervous system responsible for voluntary control of skeletal muscles and conscious actions.





Autonomic Nervous System (ANS)

The part of the nervous system that controls involuntary functions such as heart rate, digestion, and gland activity.

Two branches:

- **Sympathetic Nervous System**
- **Parasympathetic Nervous System**

Autonomic Nervous System (ANS)

- **Sympathetic**

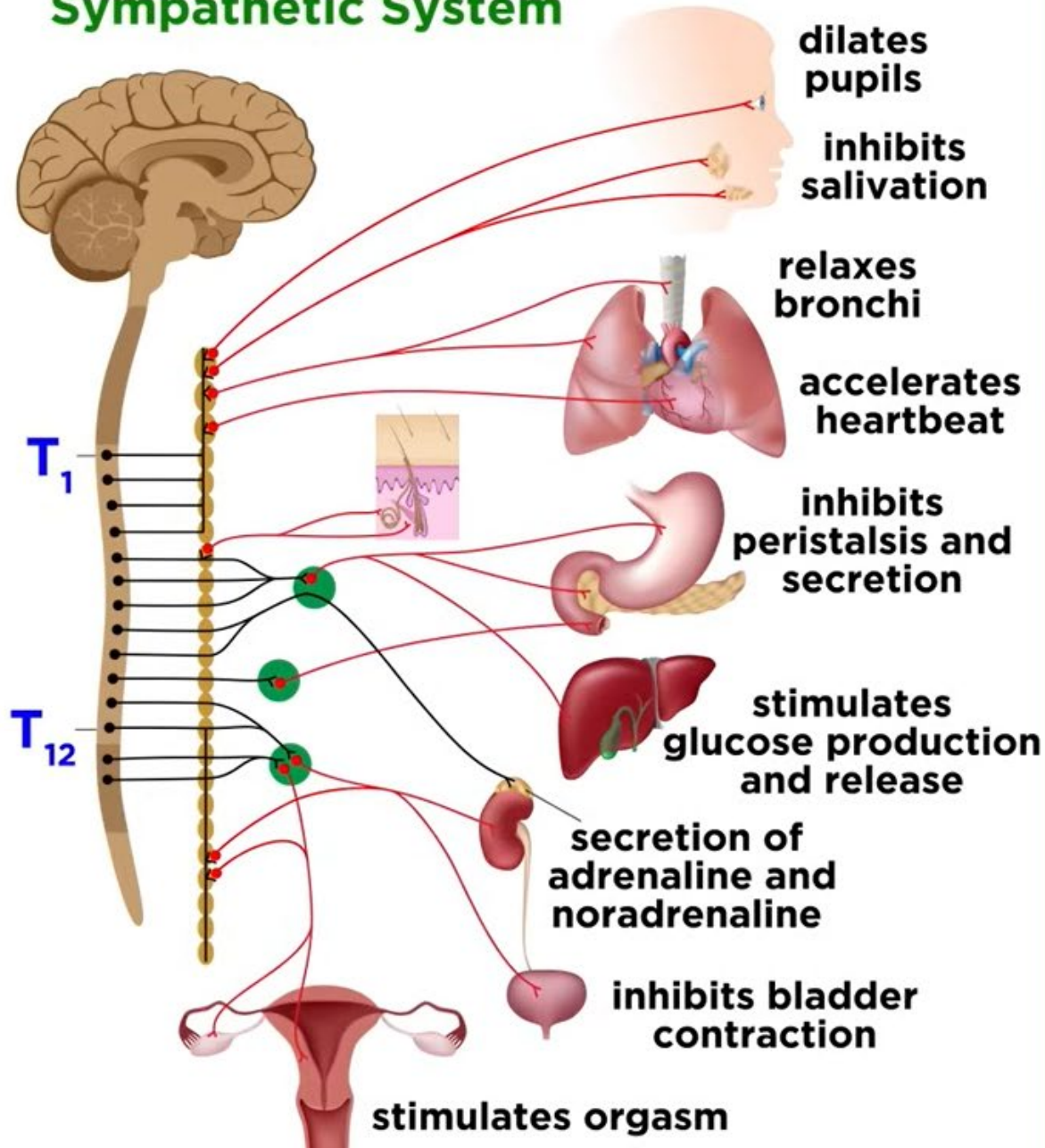
A division of the autonomic nervous system that prepares the body for stress or emergencies (“fight or flight”), increasing heart rate and energy availability.

Autonomic Nervous System (ANS)

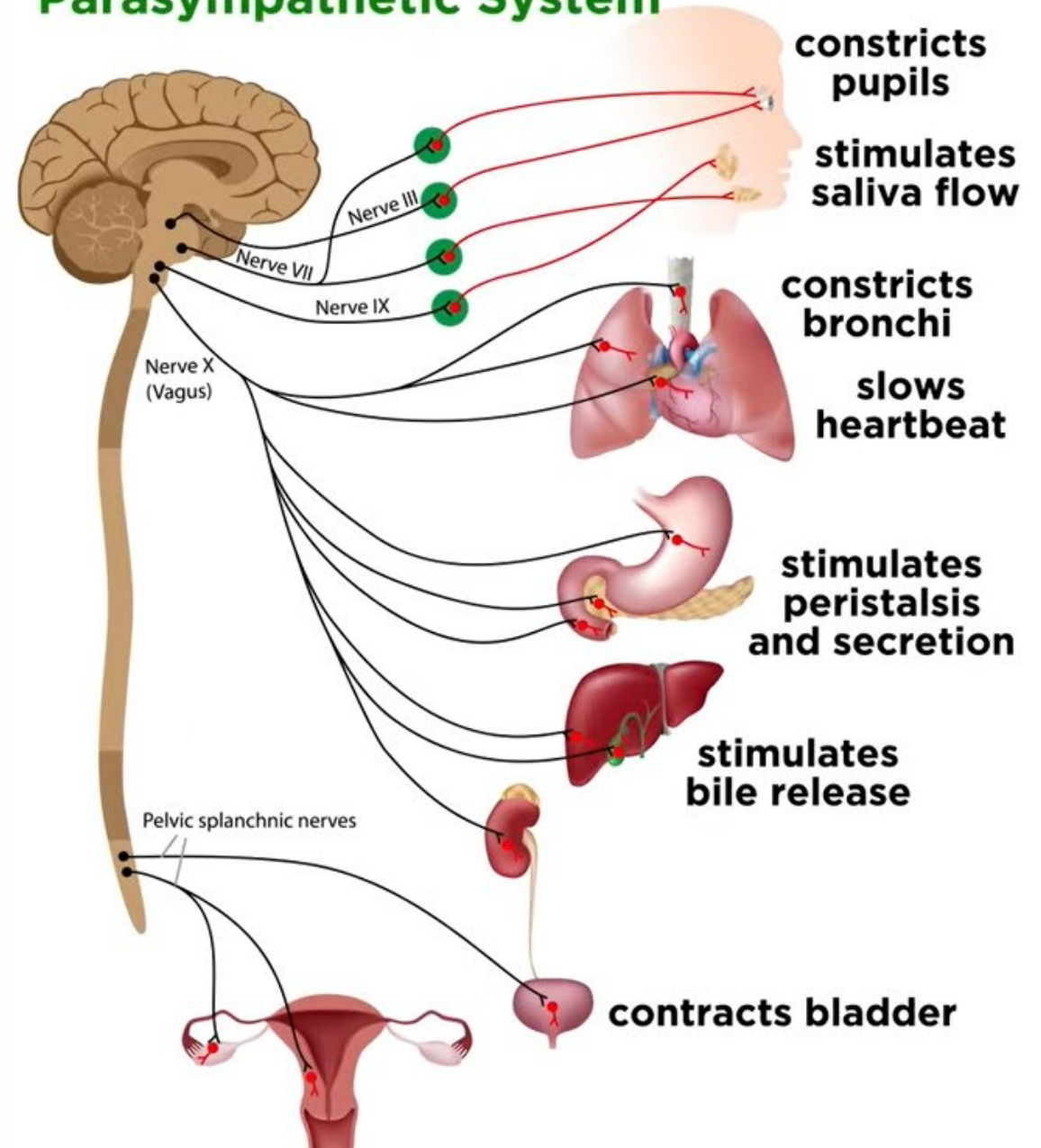
- **Parasympathetic**

A division of the autonomic nervous system that promotes rest and maintenance (“rest and digest”), conserving energy and supporting normal body functions like digestion.

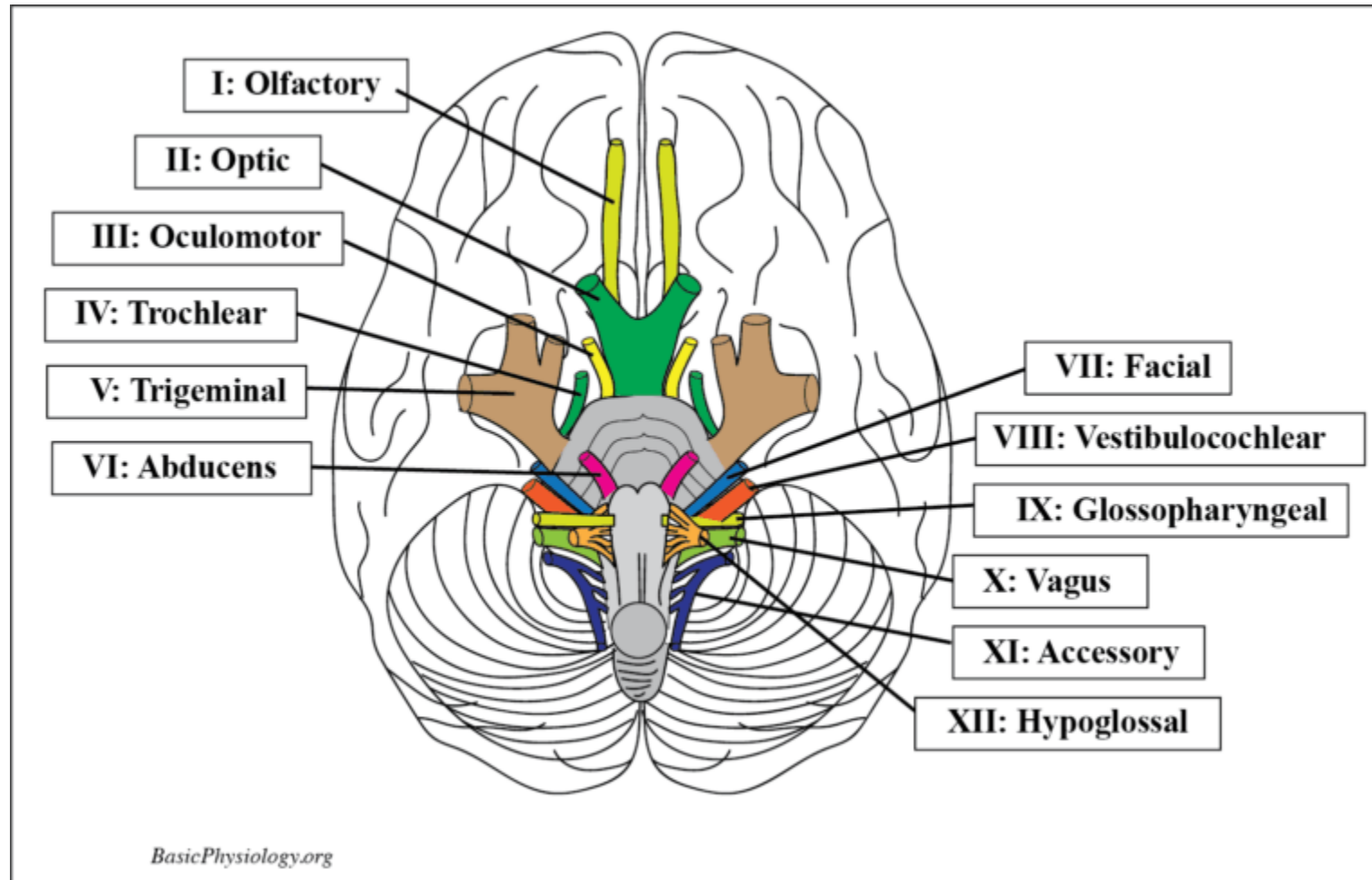
Sympathetic System

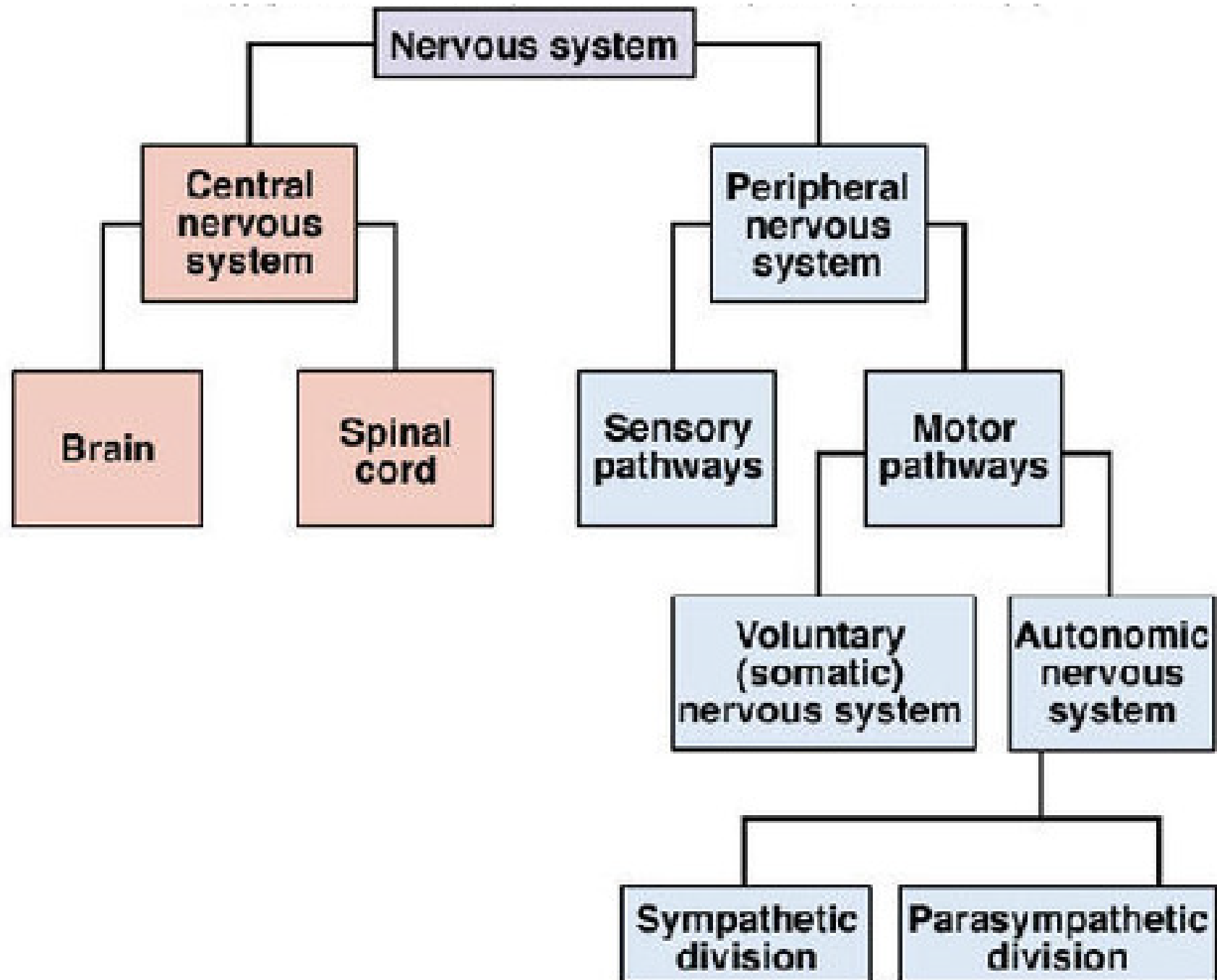


Parasympathetic System



Cranial nerves

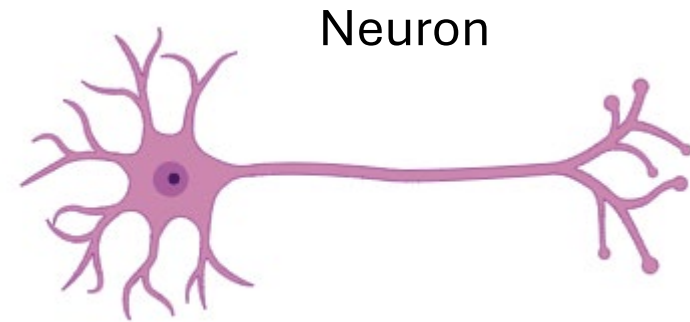




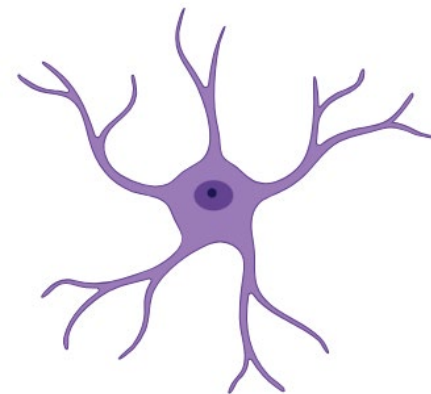
Nervous Tissue & Cells

Main cells:

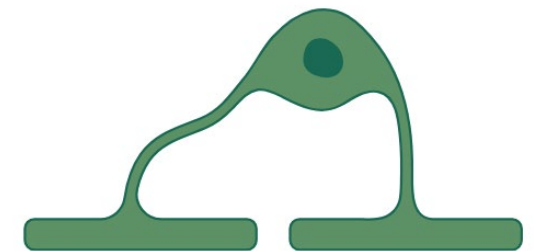
- **Neurons:** transmit signals
- **Glial cells:** support neurons
Ex/ Astrocyte, oligodendrocyte,
Schwann cell, ependymal cell



Astrocyte



Oligodendrocyte



Nervous Tissue & Cells

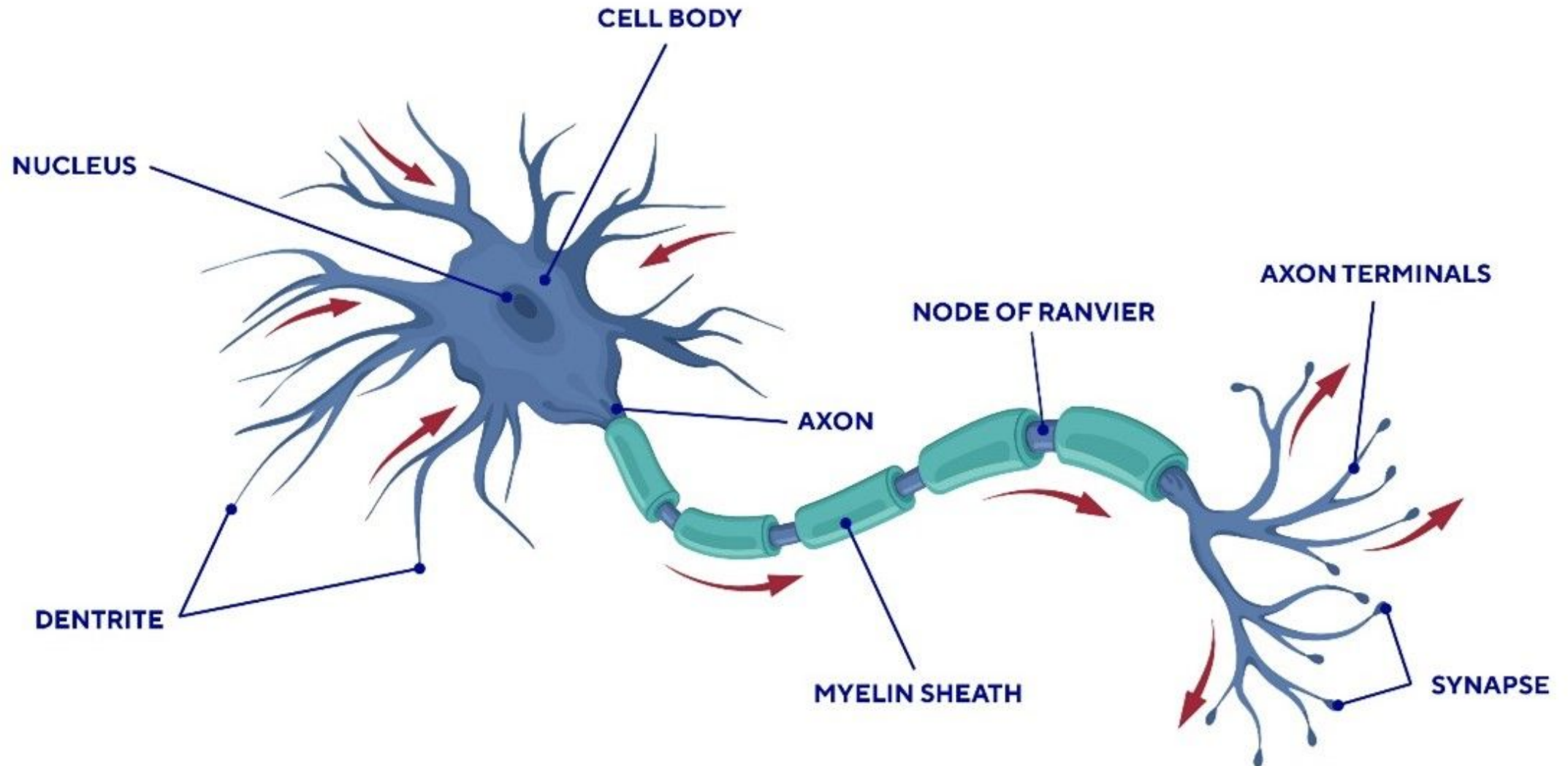
Neuron

A specialized cell of the nervous system that receives, processes, and transmits information through electrical and chemical signals.

It consists of:

- Cell body
- Dendrites that receive input
- Axon that sends signals to other cells.

NEURON STRUCTURE





Nervous Tissue & Cells

Neuroglia

Supporting cells of the nervous system that protect, nourish, and maintain neurons and help maintain a stable environment for their function.

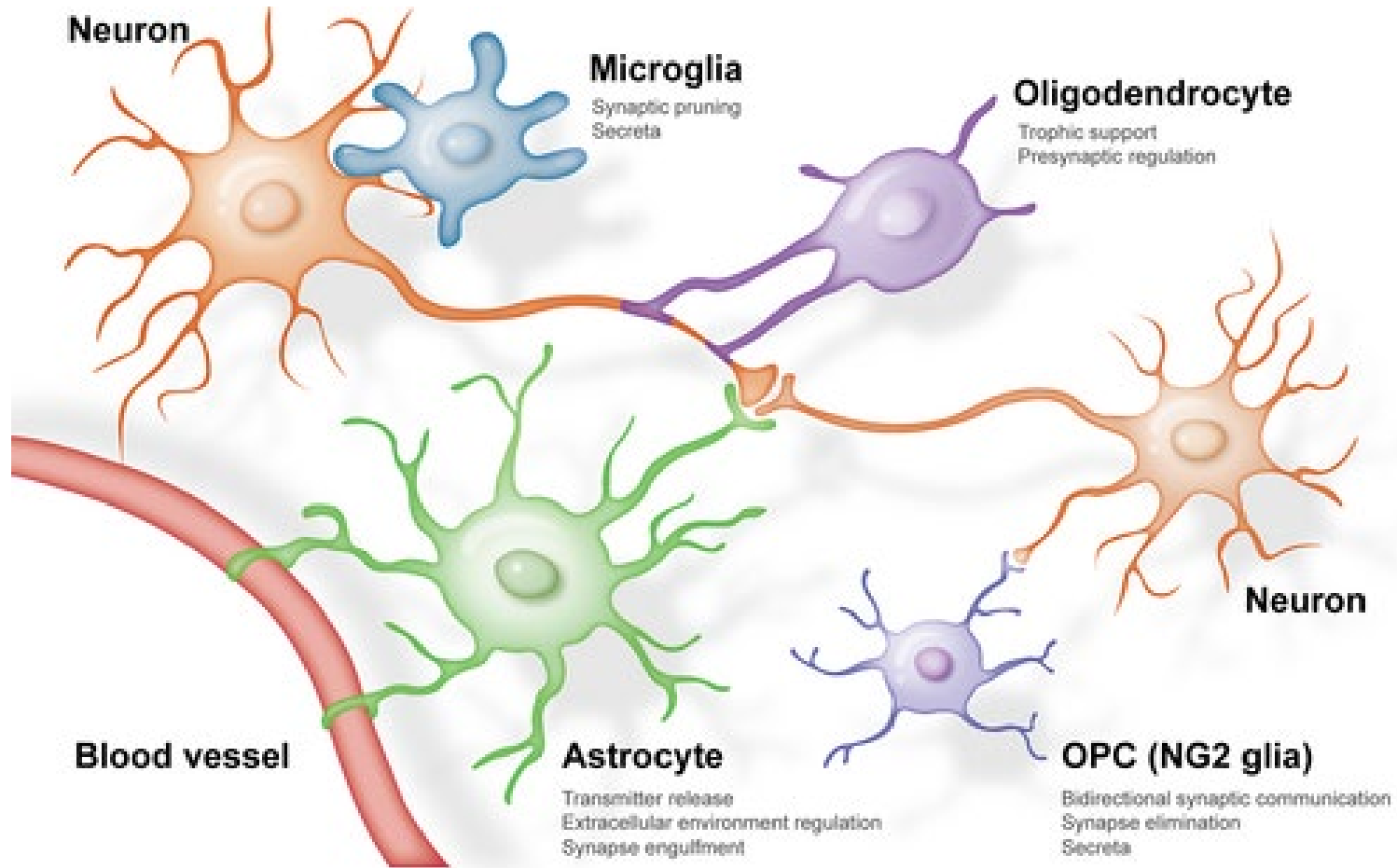
Example:

Astrocytes: support neurons

Microglia: immune defense

Oligodendrocytes: form myelin in the CNS

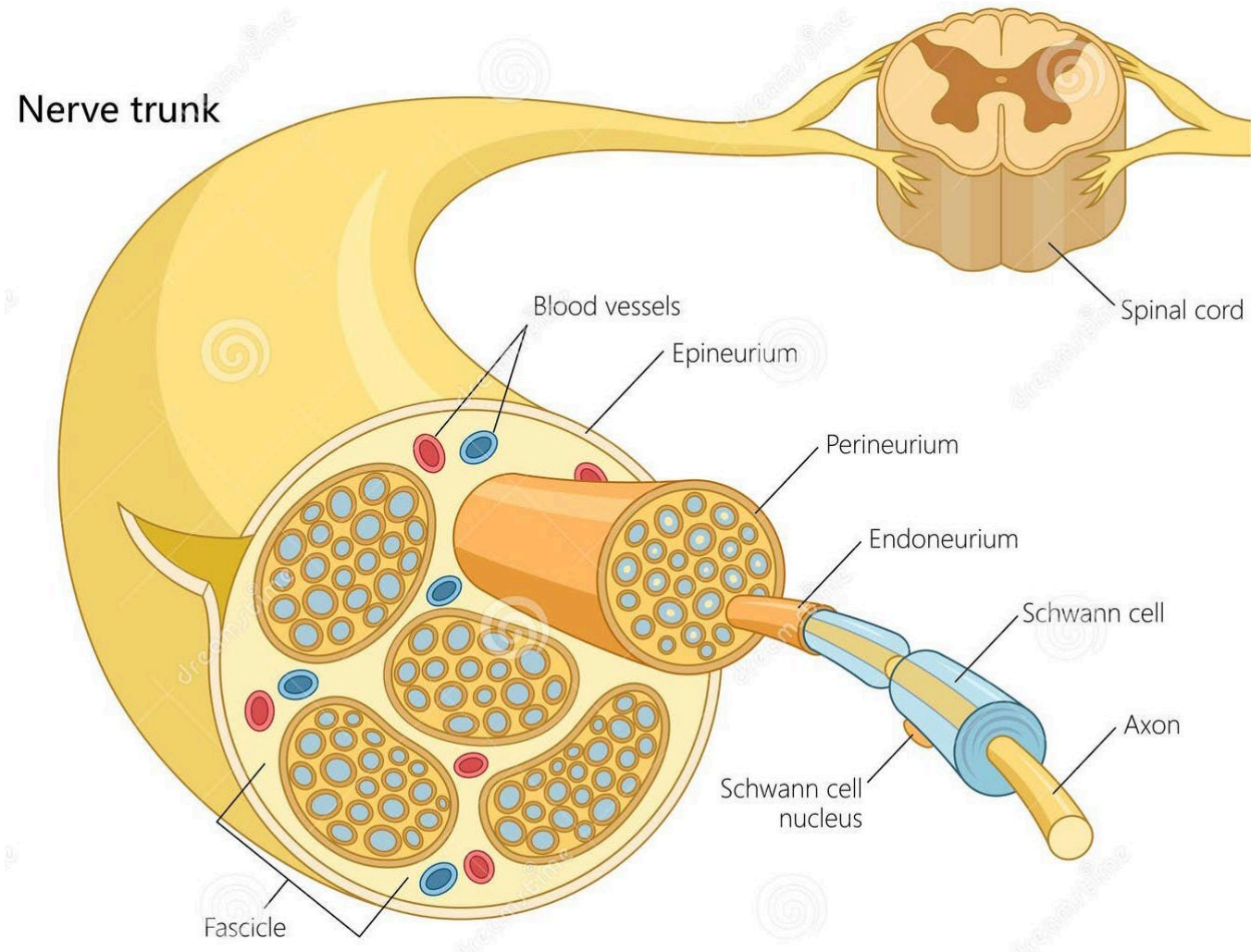
Schwann cells: myelin in PNS



Nerves & Signal Pathways

What is a Nerve?

A bundle of axons (nerve fibers) in the peripheral nervous system that transmits signals between the body and the central nervous system.



Nerves & Signal Pathways

Types of Nerves:

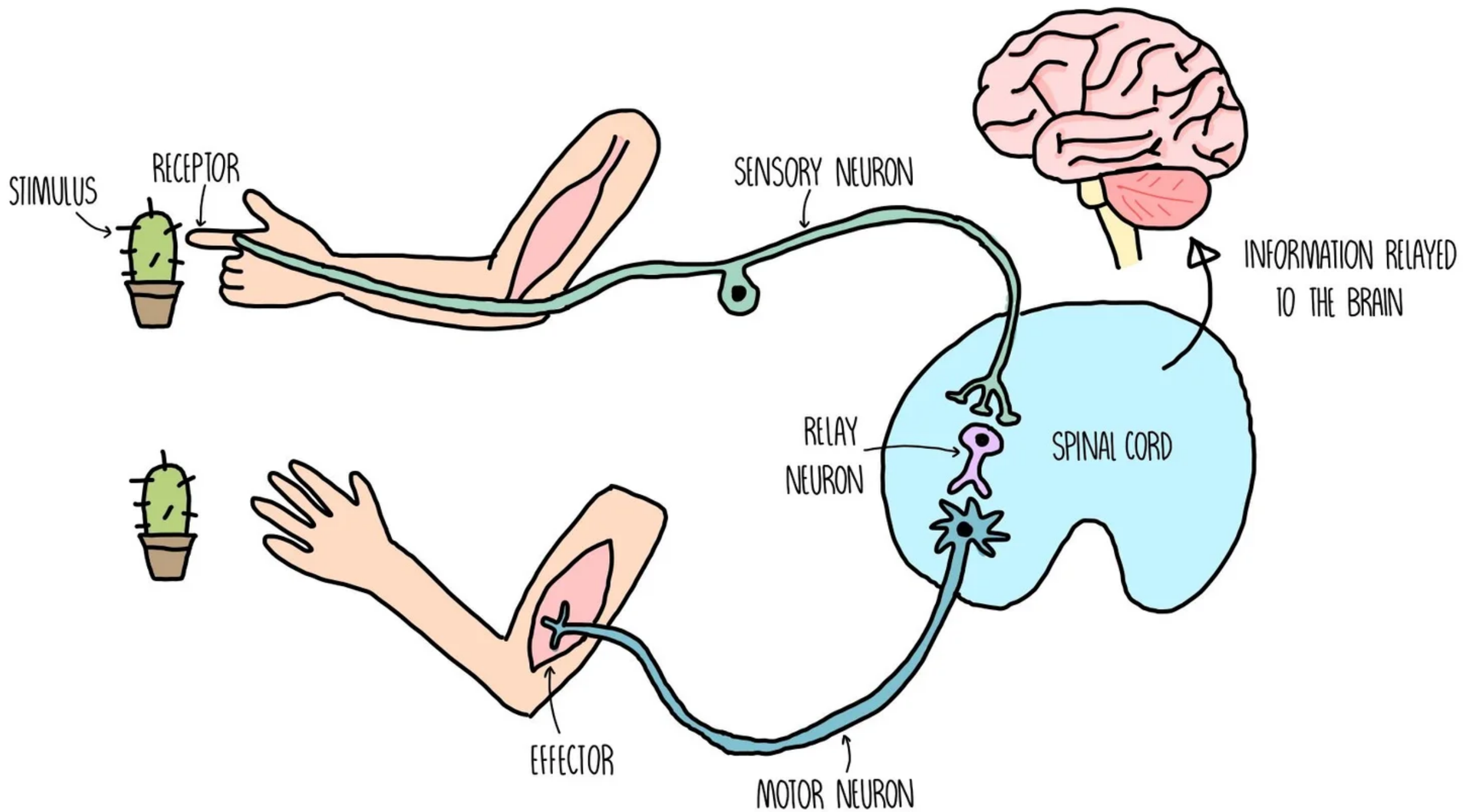
- Sensory nerves
- Motor nerves
- Mixed nerves



Nerves & Signal Pathways

Basic Signal Flow

Stimulus → receptor → sensory neuron → CNS → motor neuron → effector



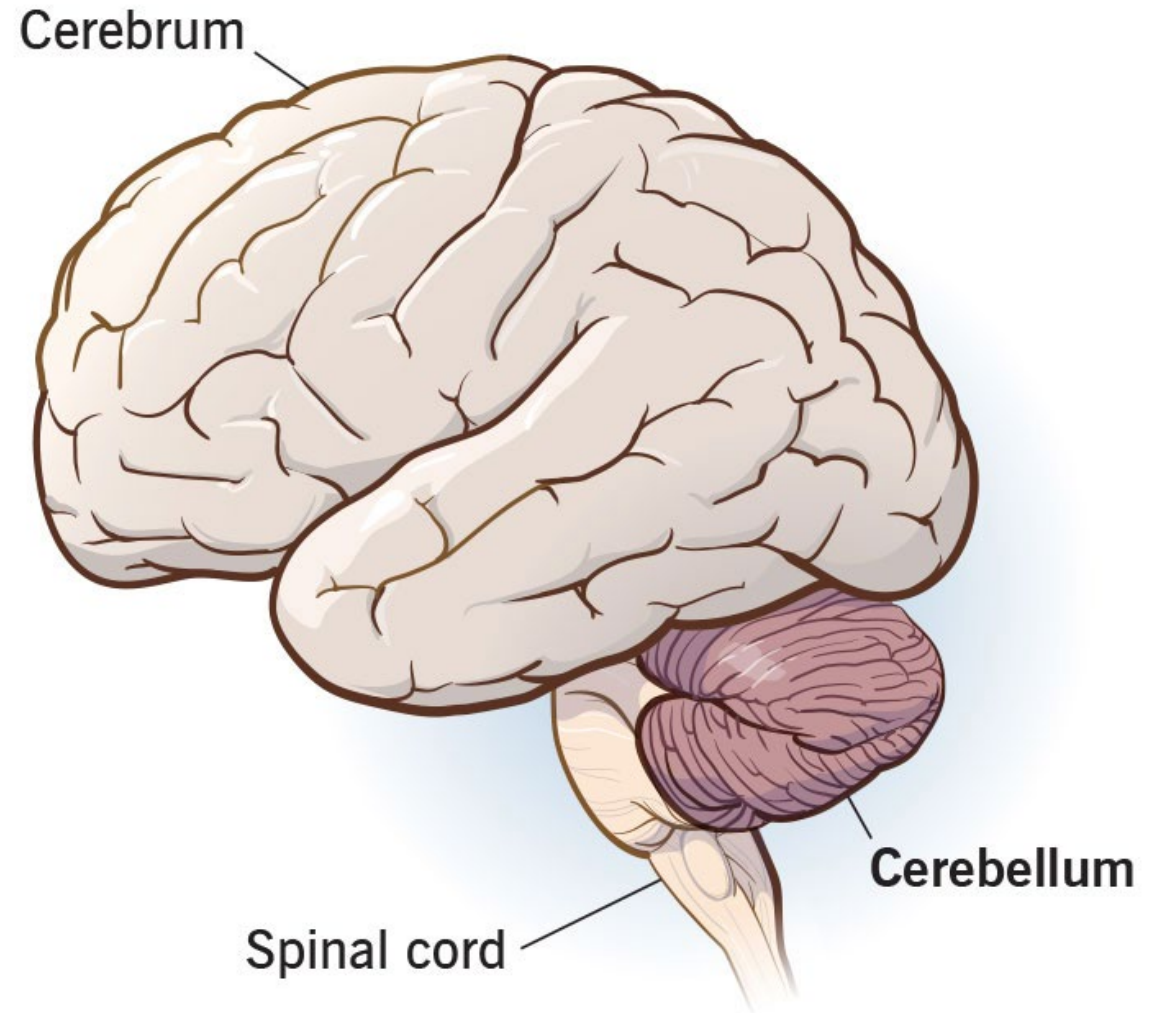
Nerves & Signal Pathways

Receptors:

1. Mechanoreceptor
2. Nociceptor
3. Thermoreceptor
4. Photoreceptor
5. Chemoreceptor

Brain Anatomy

1. Cerebrum
2. Cerebellum
3. Brainstem

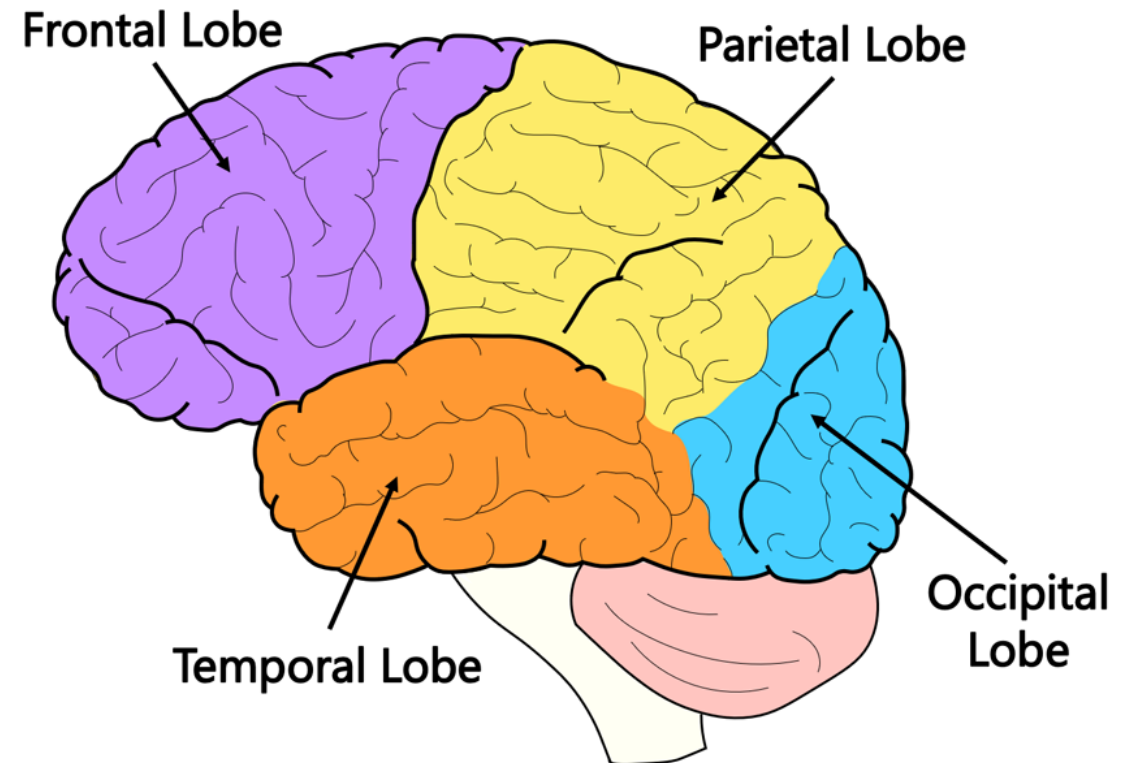


Cerebrum:

The largest part of the brain is responsible for conscious activities such as thinking, memory, sensory processing, and voluntary movement.

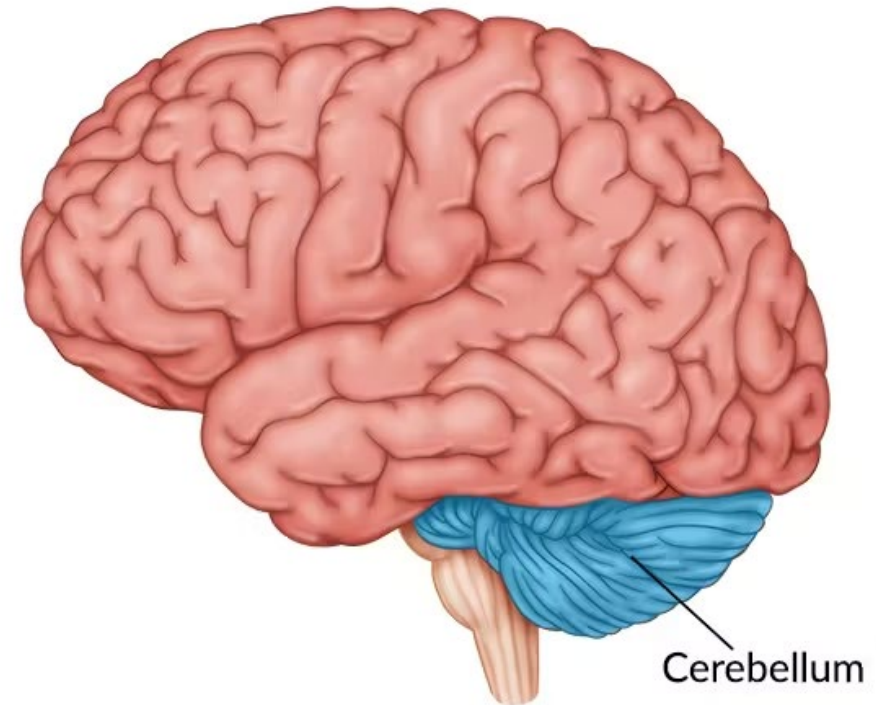
Lobes of Cerebrum:

1. **Frontal lobe:** Decision making, Movement
2. **Parietal lobe:** Sensation
3. **Temporal lobe:** Hearing, Memory
4. **Occipital lobe:** Vision



Cerebellum

A part of the brain that coordinates movement, balance, and posture to ensure smooth and precise actions.

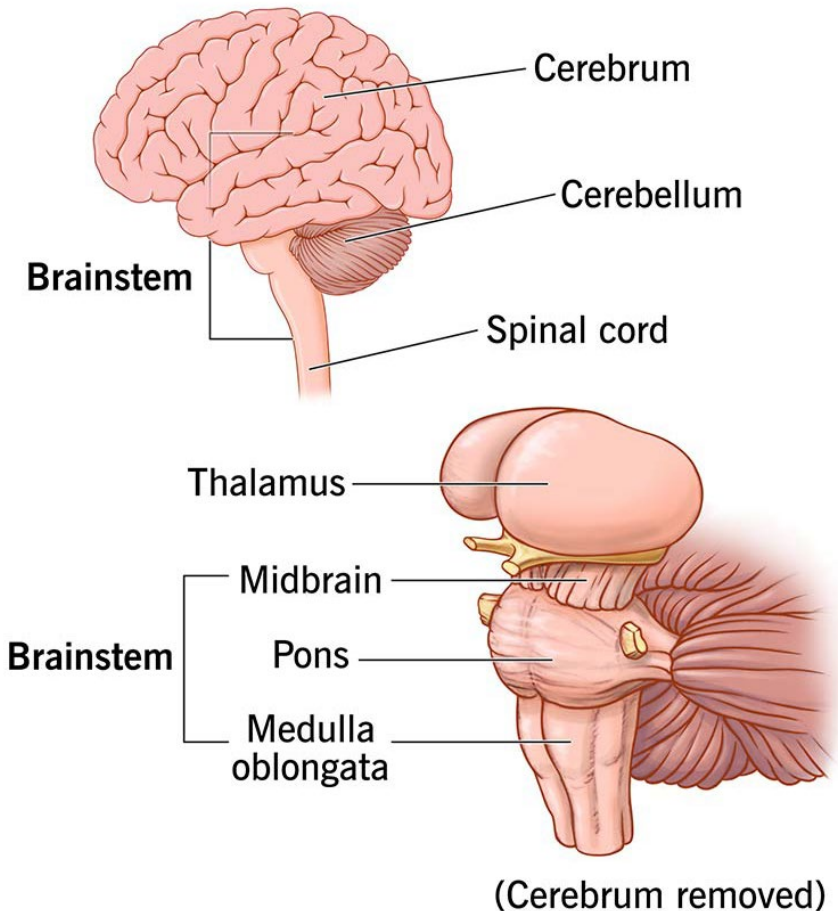


Brainstem

The part of the brain that connects the cerebrum to the spinal cord and controls vital functions such as breathing, heart rate, and consciousness.

Brainstem Parts:

- Midbrain
- Pons
- Medulla oblongata



Discussion

- How does the presence of myelin improve overall body coordination and speed of response?
- What might happen if the myelin sheath is damaged? How would it affect body function?
- Why are reflex actions faster than voluntary actions?