

PHYSIOLOGY OF NERVOUS SYSTEM

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1st stage

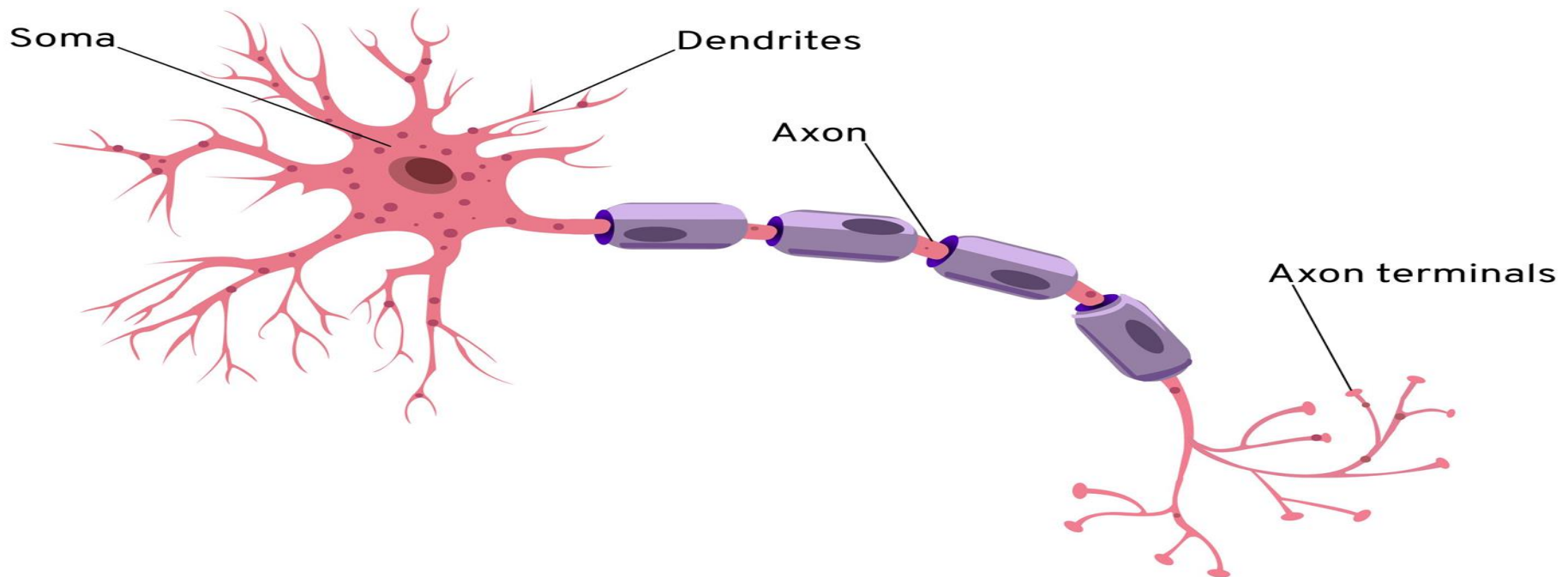
➤ **The Nervous System:** is a complex network of nerves and nerve cells (neurons) that carry signals to and from the brain and spinal cord to different parts of the body.

- **The Neurons:** are excitable cells specialized for reception, integration and transmission of nerve impulses.
- **The neurons in general are composed of 3 major parts:**
- **1- The soma:** which is the main body of the neuron, contains specialized cytoplasm, single nucleus and other granules.
- **2- Dendrites :** which are great number of branching projections from the soma that conduct towards the cell body.

3- Axon (nerve fiber) is a long, slender projection of a nerve cell.

The function of the axon is to transmit information (electrical impulse) to different neurons, muscles, and glands.

Neuron



Nervous System

Peripheral Nervous System

Central Nervous System

Afferent
(Sensory)

Efferent
(Motor)

Brain

Spinal Cord

Somatic
Nervous
System

Autonomic
Nervous
System

Parasympathetic

Sympathetic

The Central Nervous System (CNS)

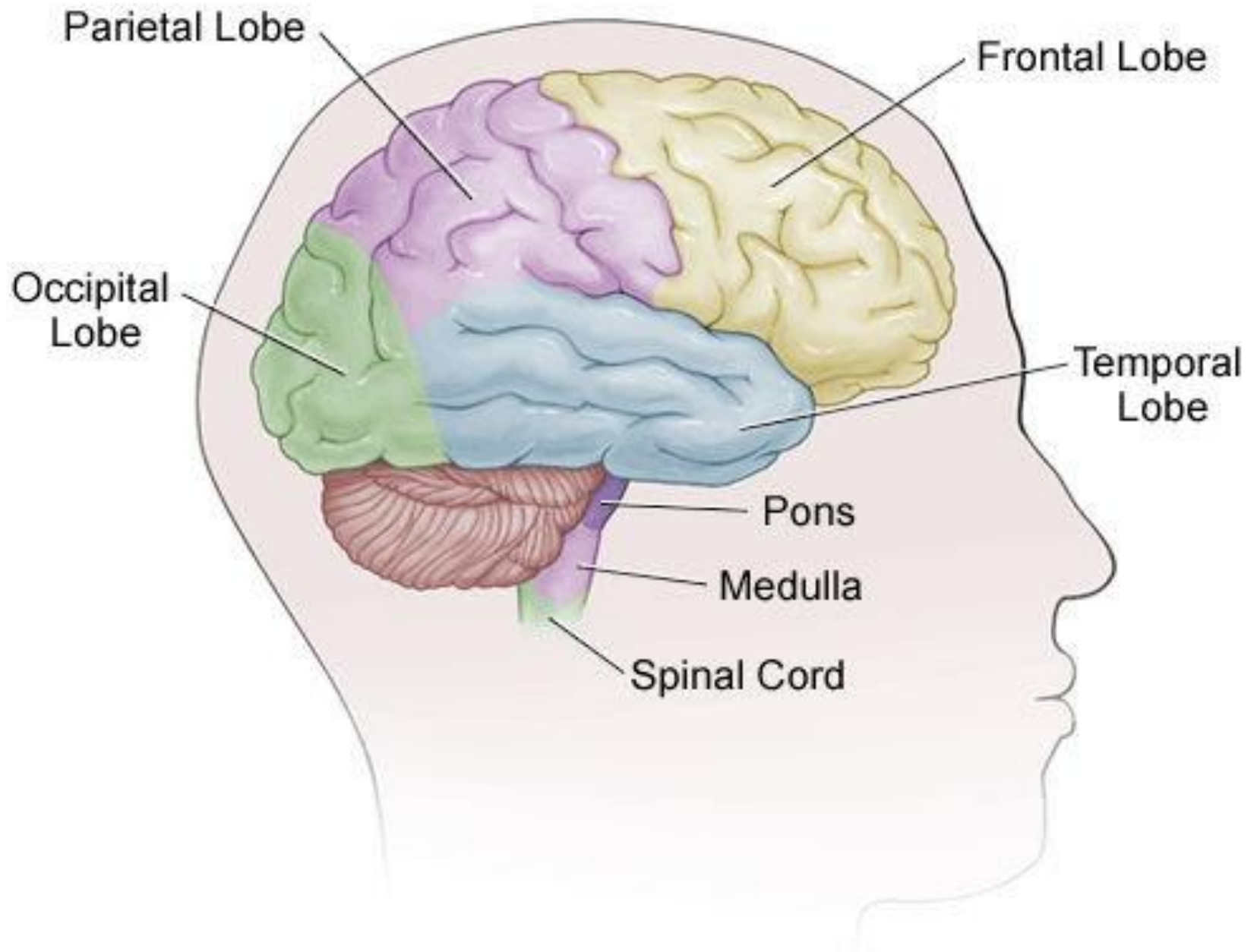
- The CNS is made up of :

A. The Brain

B. The Spinal Cord.

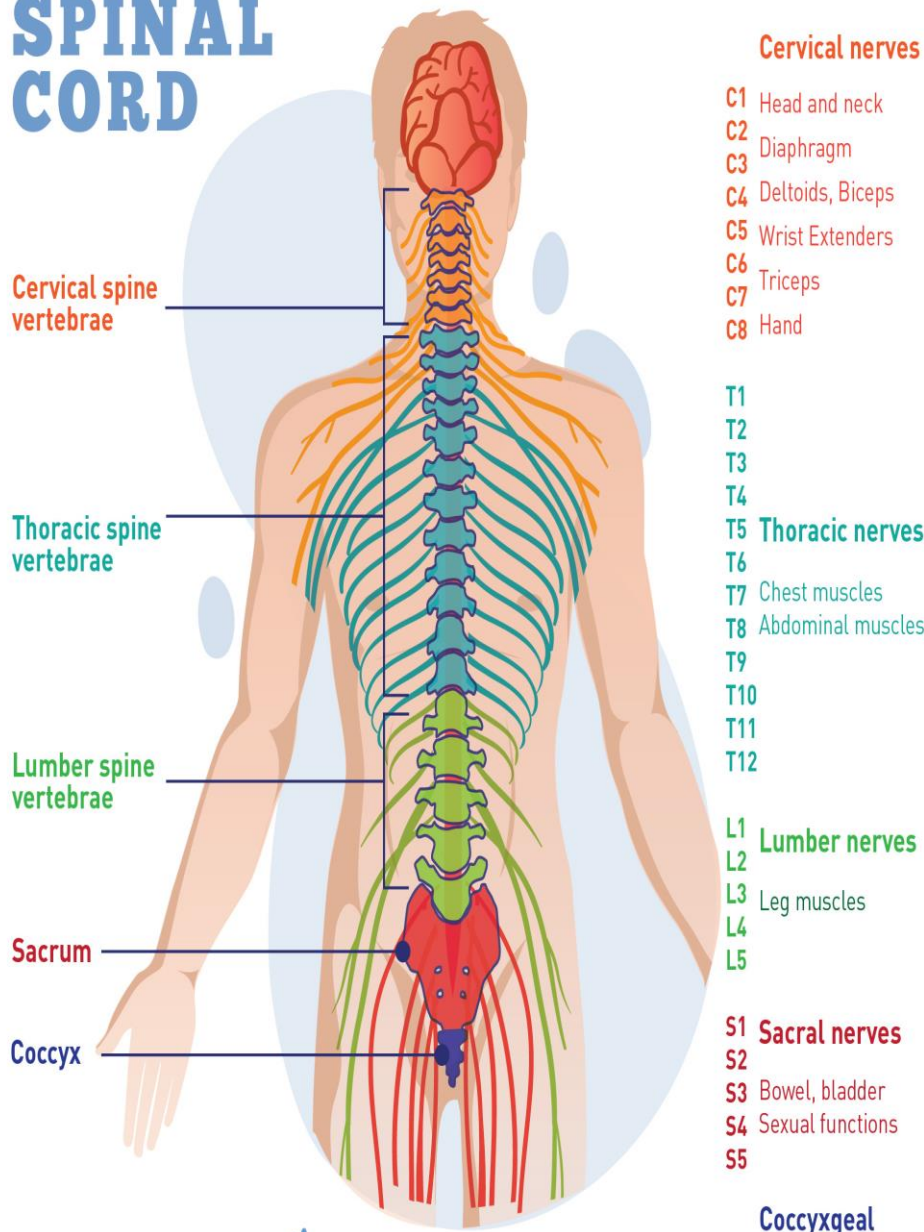
- **The brain** controls most body functions, including movements, sensations, thoughts, speech and memory.
- The brain is made up of three main parts, which are the **cerebrum**, **cerebellum**, and **brain stem**. Each of these has a unique function and is made up of several parts as well.

- The cerebrum is the front part of the brain and includes the cerebral cortex.
- The cerebral cortex has four lobes:
 1. **Frontal lobe:** This area is responsible for language, motor function, memory, personality, and other cognitive functions.
 2. **Temporal lobe:** it contains the language area, it also processes memories and emotions and plays a major part in hearing.
 3. **Parietal lobe:** processes what a person sees and hears.
 4. **Occipital lobe:** The occipital lobe interprets visual information.



- **The spinal cord** is connected to the brain at the brain stem and is covered by the vertebrae of the spine. Nerves exit the spinal cord to both sides of the body.
- **The function of spinal cord** carries signals back and forth between the brain and the nerves in the rest of the body.

SPINAL CORD



The Peripheral Nervous System (PNS)

- The PNS is the part of the nervous system outside of the CNS.
- It is made up of **nerve fiber and ganglia** (ganglia are clusters of nerve cell bodies) that carry nerve signals to and from the central nervous system.
- The PNS is divided into:
 1. **The Somatic Nervous System:** Controls voluntary body movements such as walking.
 2. **The Autonomic Nervous System:** Controls the involuntary activities of the body, such as breathing and digestion.

Somatic Nervous System

- The somatic nervous system consists of:
 1. **Sensory nerves (afferent nerve fibers)** that relay sensation from the body to the central nervous system (CNS).
 2. **Motor nerves (efferent nerve fibers)** that relay motor commands from the CNS to stimulate muscle contraction.

Autonomic Nervous System

- The autonomic nervous system is further divided into
 1. **The Sympathetic Nervous Systems**
 - It prepares the body for situations that need strength and awareness, like fear, rage, excitement or shame.
 - This is called **The Fight-or-flight Response** that causes:
 1. Increase the rate of heart beats(tachycardia)
 2. Increase the respiratory rate(tachypnea).
 3. Increases metabolism(Increased conversion of glycogen to glucose in the liver).
 4. Dilation of pupil.

The Parasympathetic Nervous Systems

- The parasympathetic nervous system, also known as “rest and digest,” can be thought of as functioning in opposition to the sympathetic nervous system. Its functions include:
 1. A decrease in heart rate(bradycardia).
 2. Bronchial spasm.
 3. Glycogen synthesis by the liver.
 4. Constriction of the pupil for near vision.
 5. Increased secretion by lacrimal glands and salivary glands.