

# THE NERVOUS SYSTEM

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A decorative graphic consisting of several horizontal lines of varying lengths and colors (teal, light blue, white) extending from the right side of the slide towards the center.

# The nervous system

## Functions of the Nervous System •

1. Gathers information from both inside and outside the body - Sensory Function •
2. Transmits information to the processing areas of the brain and spine •
3. Processes the information in the brain and spine – Integration Function •
4. Sends information to the muscles, glands, and organs so they can respond appropriately – Motor Function •

It controls and coordinates all essential functions of the body including all other body systems allowing the body to maintain homeostasis or its delicate balance. •

## **It has two major divisions** •

- called the central nervous system (CNS) •
- and the peripheral nervous system (PNS) •

Nervous System

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graph TD; NS[Nervous System] --- CNS[Central Nervous System]; NS --- PNS[Peripheral Nervous System]; PNS --- SNS[Somatic Nervous System]; PNS --- ANS[Autonomic Nervous System]; ANS --- SyNS[Sympathetic Nervous System]; ANS --- PaNS[Parasympathetic Nervous System];
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Central Nervous System

Peripheral Nervous System

Somatic Nervous System

Autonomic Nervous System

Sympathetic Nervous System

Parasympathetic Nervous System

# *THE NERVOUS SYSTEM*

The central nervous system includes the brain • and spinal cord. The brain and spinal cord are protected by bony structures, membranes, and • fluid.

The brain is held in the cranial cavity of the • skull. •

The nerves involved are cranial • nerves and spinal nerves. •

# *Cells of the nervous system*

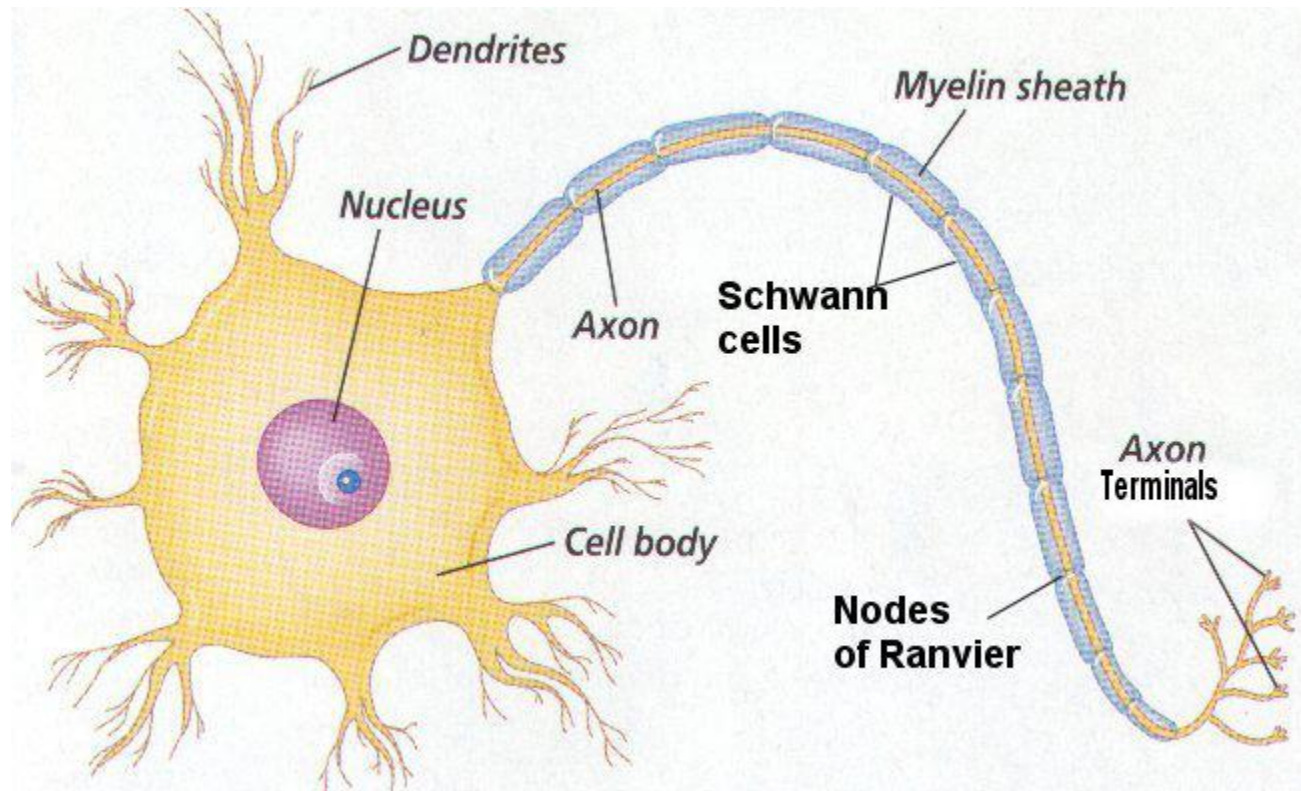
- Two basic types of cells are present in the nervous system;
- Neurons
- Glial cells

# The neuron

Neurons, or nerve cell, are the main structural and functional units of the nervous system.

Neurons, or nerve cells, carry out the functions of the nervous system by conducting nerve impulses. They are highly specialized and amitotic. This means that if a neuron is destroyed, it cannot be replaced because neurons do not go through mitosis.

neurons consist of three distinct regions, as shown in the diagram: (1) the cell body, or soma; (2) the nerve fiber, or axon; and (3) the receiving processes, or dendrites.



## Cell Body •

The cell body is similar to other types of cells. It has a nucleus with at least one nucleolus and contains many of the typical cytoplasmic Organelles. •

- . **Axons** are long and conduct impulses away from the neuronal body. Most axons are wrapped by a white insulating substance called the myelin sheath, produced by oligodendrocytes and Schwann cells. Myelin encloses an axon segmentally, leaving unmyelinated gaps between the segments called the **nodes of Ranvier**.
- **Dendrites** are short and act to receive impulses from other neurons, conducting the electrical signal towards the nerve cell body. Every neuron has a single axon, while the number of dendrites varies. Based on that number, there are four structural types of neurons; multipolar, bipolar, pseudounipolar and unipolar •



Functionally, neurons are classified as afferent, efferent, or interneurons according to the direction in which they transmit impulses relative to the central nervous system

\* *Afferent, or sensory, neurons* carry impulses from peripheral sense receptors to the CNS. They usually have long dendrites and relatively short axons.

*Efferent, or motor, neurons* transmit impulses • from the CNS to effector organs such as muscles and glands. Efferent neurons usually have short dendrites and long axons.

*Interneurons, or association neurons*, are • located entirely within the CNS in which they form the connecting link between the afferent and efferent neurons. They have short dendrites and may have either a short or long axon.

# *Types of neuroglia*

- (1) astrocytes, CNS and **satellite glial cells** (PNS) both share the function of supporting and protecting neurons. •
- (2) oligodendrocytes, in the CNS and **Schwann cells** in the PNS. produce the axon-insulating myelin sheath •
- (3) microglia. are the phagocytes cells of the CNS •
- (4) **ependymal** •  
which line the CNS •

## *White and gray matter*

The white color of myelinated axons is distinguished from the gray colored neuronal bodies and dendrites. Based on this, nervous tissue is divided into white matter and gray matter, both of which has a specific distribution

**White matter** comprises the outermost layer of the spinal cord and the inner part of the brain.

**Gray matter** is located in the central part of the spinal cord, outermost layer of the brain (cerebral cortex)

- o **Synapse - small gap or space between the axon of one neuron and the dendrite of another - the neurons do not actually touch at the synapse** •
- \*The synapse insures one-way transmission of impulses •