

## I. Components of the Nervous System

### A. Functional Component of the Nervous System (Neuron):

**Dendrites:** Receive impulses from other neurons and carry them to the cell body. Impulses stimulate it.

**Axon:** The long fiber that carries impulses away from the cell body

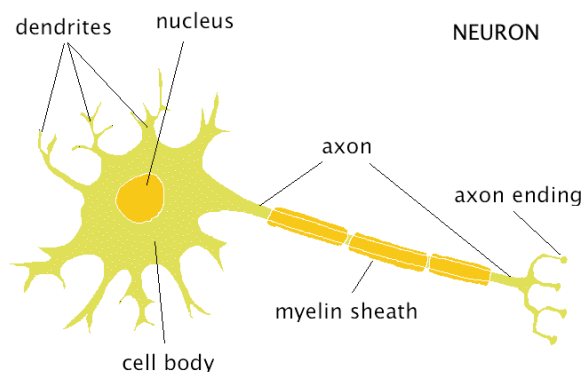
**Cell Body:** The largest part of a typical neuron. Contains the nucleus and much of the cytoplasm.

**Nucleus:** Controls the action of the neuron

**Myelin Sheath:** An insulating membrane that surrounds the axon in some neurons. Surrounds a single, long axon, has many gaps, called nodes, where the axon membrane is exposed.

Speeds up the rate of the impulses.

**Axon Terminal:** Sends neurotransmitters from one neuron to another.

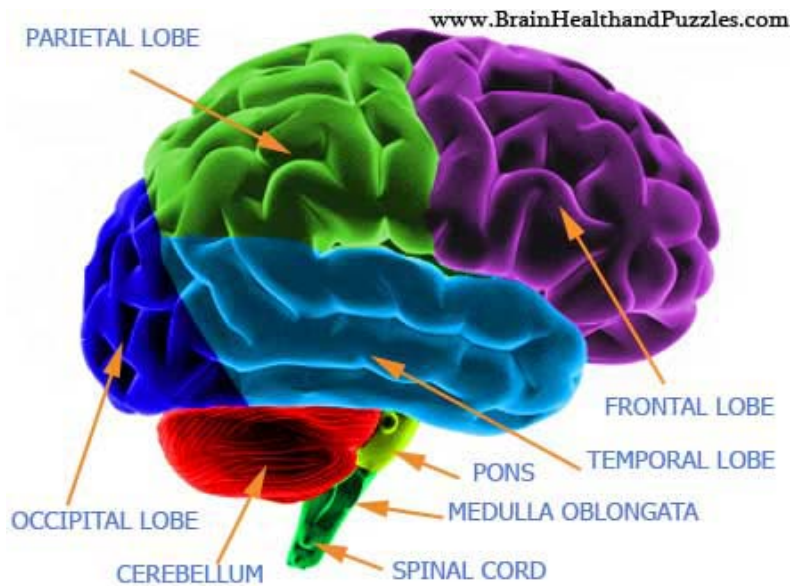


### B. Components of the Neuron involvement in conducting Nerve Impulses:

1. Dendrites receive impulses from other neurons and carry impulses to the cell body
2. The axon carries impulses away from the cell body, as it moves through the axon, it jumps from one node to the next, causing the impulse to travel faster than it would without the myelin sheath.
3. The cell body contains the nucleus and controls the metabolic activity that powers the cell.
4. Nucleus controls stuff.
5. The myelin sheath acts as an insulator that increases the rate of transmission of the nerve impulse along the axon
6. Axon Terminals make contact with other neurons at synapses

### C. Components of the Brain

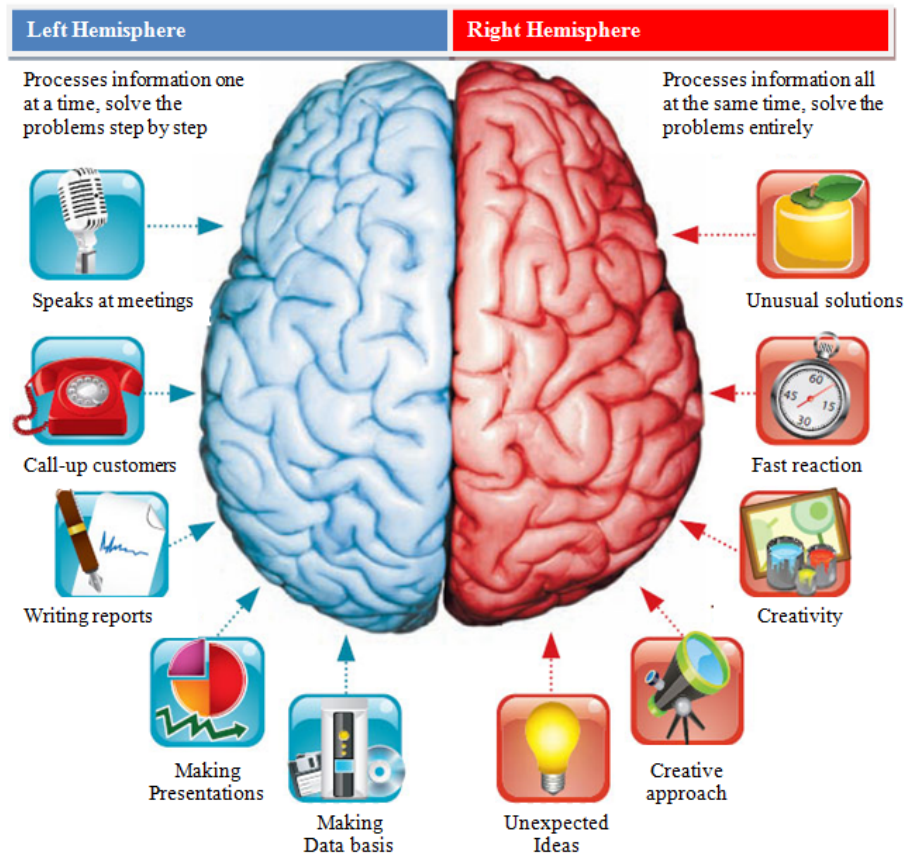
- **Cerebrum**-receives and interprets sensory information and determines a response. It is also involved in learning memory and conscious thought.
- **Cerebellum**-coordinates and balances the action of muscles=makes the body move efficiently.
- **Brain Stem**-controls the involuntary movements of the body.



## D. Functions

### Cerebral hemispheres

- Right-Touch, left side of body
- Left- Speech, Writing, Language, Math, right side of body



### Cerebral Lobes

- Frontal Lobe-Evaluating consequences, making judgments, forming plans
- Temporal Lobe- Hearing and smelling
- Parietal Lobe-Reading and speech
- Occipital Lobe-Vision

2. Corpus Callosum-connects parts of the cerebrum from different hemispheres.

## II. Divisions of the nervous system

A+B+D.Divisions, types of neurons, and voluntary/involuntary, which situation

**Central Nervous System:** Consists of brain and spinal cord. Processes information and creates a response that is delivered to the appropriate part of the body through the peripheral nervous system. Brain-interneurons-receives information from sensory neurons and send commands to motor neurons.

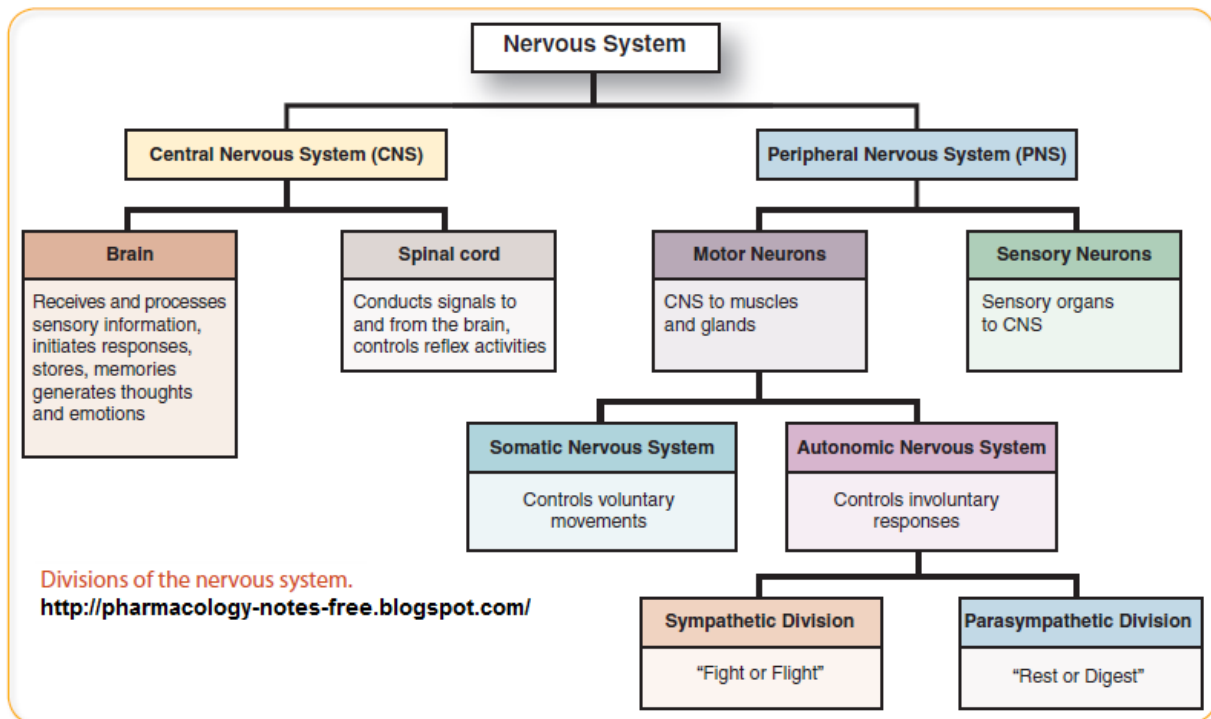
**Peripheral Nervous system**-Consists of nerves and supporting cells, collects information about the body's external and internal environment. Involuntarily

**Sensory Division**-sensory neurons-detects stimuli

**Motor Division**-motor neurons-follows commands, moves, acts.

**Automatic Division**-controls involuntary functions like heartbeat or breathing rate, can speed up or slow down its actions

**Somatic**-voluntary movement



### C. Protection

- Bone-made up of 8 bony plates that grow along with the brain and protect it.
- Meninges-layer between the Cerebrospinal Fluid and skull
- Cerebrospinal Fluid-bathes brain, absorbs impact, supports/suspends the brain, allows material to diffuse into the brain without the blood touching the brain.

### III. Functions of the Nervous system

1. In the brain, the hypothalamus recognizes hunger, thirst, fatigue, anger, and body temperature which can then be responded to to maintain homeostasis
2. Sensory neurons transmit information to the central nervous system, which analyzes the information and transmits a command to the motor neurons..
3. A reflex arc is unique because it is an automatic response despite being controlled by the somatic division.

### IV. Nerve Impulse Transmission

A. **Electrochemical Nerve Impulse:** The flow of ions allow the impulse to move rapidly along the axon. When an impulse arrives at the synapse, neurotransmitters are released from the axon.

B.**Nerve Impulse movement** across from one neuron to the next: At the end of the neuron, the impulse reaches an axon terminal, which may pass the impulse along to another cell. The synaptic cleft separates the axon terminal from the adjacent cell.

**Synapse:** The point at which a neuron transfers an impulse to another cell.

C. **Resting Potential of a Neuron:** Active Transport pump sodium ions ( $\text{Na}^+$ ) out of the cell and potassium ions( $\text{K}^+$ ) into it. Ungated potassium channels make it easier for  $\text{K}^+$  ions than  $\text{Na}^+$  ions to diffuse back across the membrane. This results in a higher concentration of  $\text{K}^+$  ions inside the cell because of active transport, there is now a net movement of positively charged  $\text{K}^+$  ions out of the cell. As a result, the inside becomes negatively charged compared to the outside, producing the resting potential.

D.**Depolarization:**Resting Potential

E. **Repolarization:** When the  $\text{K}^+$  open and  $\text{Na}^+$  channels close.

F.**Threshold:** The minimum level of stimulus that is required to cause an impulse in a neuron. A nerve impulse is an “all- or- none” response. Either the stimulus produces an impulse, or it does not produce an impulse. The brain determines the strength of an impulse by the number of frequency of action potentials. Where a weak stimulus can go three action potential per second whereas a strong one can go 100 per sec.

G. **Presence of synapse** in allowing for regulation nerve impulses: permits a neuron to pass an electrical or chemical signal to another neuron. Neurons are cells that are specialized to pass signals to individual target cells, and synapses are the means by which they do so. At a synapse, the plasma membrane of the signal-passing neuron comes into close apposition with the membrane of the target cell. Both the presynaptic and postsynaptic sites contain extensive arrays of molecular machinery that link the two membranes together and carry out the signaling process. In many synapses, the presynaptic part is located on an axon, but some presynaptic sites are located on a dendrite or soma.