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Nervous System

The nervous system may be divided structurally into two parts:

- The central nervous system (CNS), consisting of the brain and spinal cord
- The peripheral nervous system (PNS), consisting of all nervous tissue outside the brain and spinal cord

Functionally, the nervous system can be divided into the:

- Somatic nervous system, which controls skeletal muscles
- Autonomic nervous system (ANS), which controls smooth muscle, cardiac muscle, and glands

Central nervous system (CNS)

Regulates responses to stress and helps to maintain homeostasis. Two types of cells are found in the nervous system.

1-Neurons, The ANS or nerve cells, make up the conducting tissue of the nervous system.

Three types of neurons:

1- Sensory: Carry impulses from sense organs (eyes, ears, etc) to the spinal cord and brain.

2- Motor: carry impulses from the brain and spinal cord to muscles and glands.

3- Interneurons: connect sensory and motor neurons and carry impulses between them.

2-Neuroglia are the cells that support and protect nervous tissue.

3-The neuron is the nervous system's basic functional unit. Each neuron fibers extending from the cell body:

4-The dendrite is a Short, branched extensions, Carry impulses from environment toward cell body.

White Matter and Gray Matter in the Nervous System

The human nervous system is composed of two essential tissues known as white matter and gray matter, each playing a distinct and vital role in the communication and processing of information.

Some axons are covered with myelin, a whitey, fatty material that isolate and protects the axon and speeds electric conduction. Axons so covered are described as myelinated.

They make up the white matter of the nervous system. Unmyelinated tissue makes up the nervous system's gray matter.

Gray Matter	White Matter
Composed of non-myelinated nerve fibers	Composed of myelinated nerve fibers
Gray in color	White in color
Forms the outer layer of the brain and the inner layer of the spinal cord	Forms the inner part of the brain and the outer part of the spinal cord
Nerve impulse transmission is slow	Nerve impulse transmission is very fast

The Brain

Body control center and regulates all processes, thoughts, behaviors, and emotions.

Brain Consists of (Cerebrum, Cerebellum, Brain Stem)

1- The cerebrum: the major portion of the brain is the cerebrum, which divides the left and right.

2- The cerebellum: The largest of the hindbrain is the cerebellum. Maintains body balance during movement.

3- The brainstem: The cerebellum and spinal cord are connected to the cerebral hemispheres by the brainstem.

Brain Made of 50-100 billion neurons and have four lobes or regions:

- Frontal Lobe- memory.
- Temporal Lobe- Long term memory, auditory processing.
- Occipital Lobe- Vision processing.
- Parietal Lobe- Sensory integration.

Protecting the brain

- Within the brain are four ventricles (cavities) in which cerebrospinal fluid (CSF) is formed.
- This fluid around the brain and spinal cord, acting as a protective cushion for these tissues.
- Covering the brain and the spinal cord are three protective layers, together called the meninges.
- All are named with the Latin word mater, meaning “mother,” to indicate their protective function.
- They are the:
 - □ Dura mater, the outermost and toughest of the three, “hard”
 - □ Arachnoid mater, the thin, web-like middle layer. It is named for the Latin word for spider.
 - □ Pia mater, the thin, vascular inner layer, attached directly to the tissue of the brain and spinal cord, “tender”

Spinal Cord:

Spinal Cord: Main communications link between the brain and the rest of the body, certain kinds of info are processed in spinal cord, and reflex is a quick, automatic response to a stimulus.

Peripheral nervous system (PNS)

(PNS) Receives information from the environment and relays commands from the CNS to organs and glands, consists of:

A- Cranial nerves: They are the 12 pairs of nerves that emerge from the brain or brain stem.

B- Spinal nerves: They are the 31 pairs of nerves that come out of the spinal cord.

C- Sympathetic and parasympathetic nerves: the nerves that form the autonomic nervous system, which is responsible for controlling the involuntary organs in the body.

Nerve receptors

They are special compounds found at the terminal ends of the nerves that respond to the changes that occur in the external or internal medium, and thus the receptors are divided into:

- 1- Internal receptors: receptors that respond to changes and influences that occur inside the body, such as receptors in blood vessels, in the respiratory system, and others.
- 2- External receptors: receptors that respond to external variables and stimuli and are found in or near the surface of the body, such as receptors for touch, pain, temperature, smell, hearing, and others.