AL-Mustaqbal University College

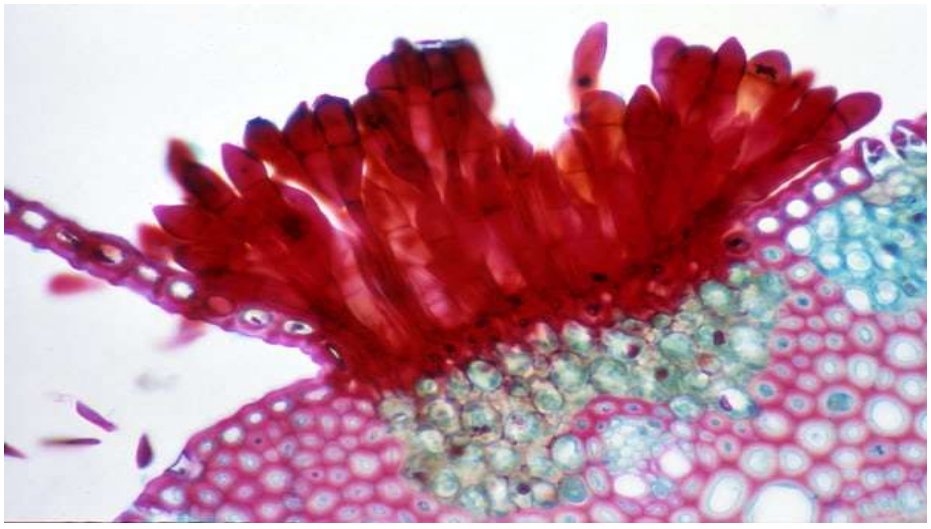
Pharmacy Department

First stage

Practical Histology

(Nervous system)

Lab 3



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Nervous system

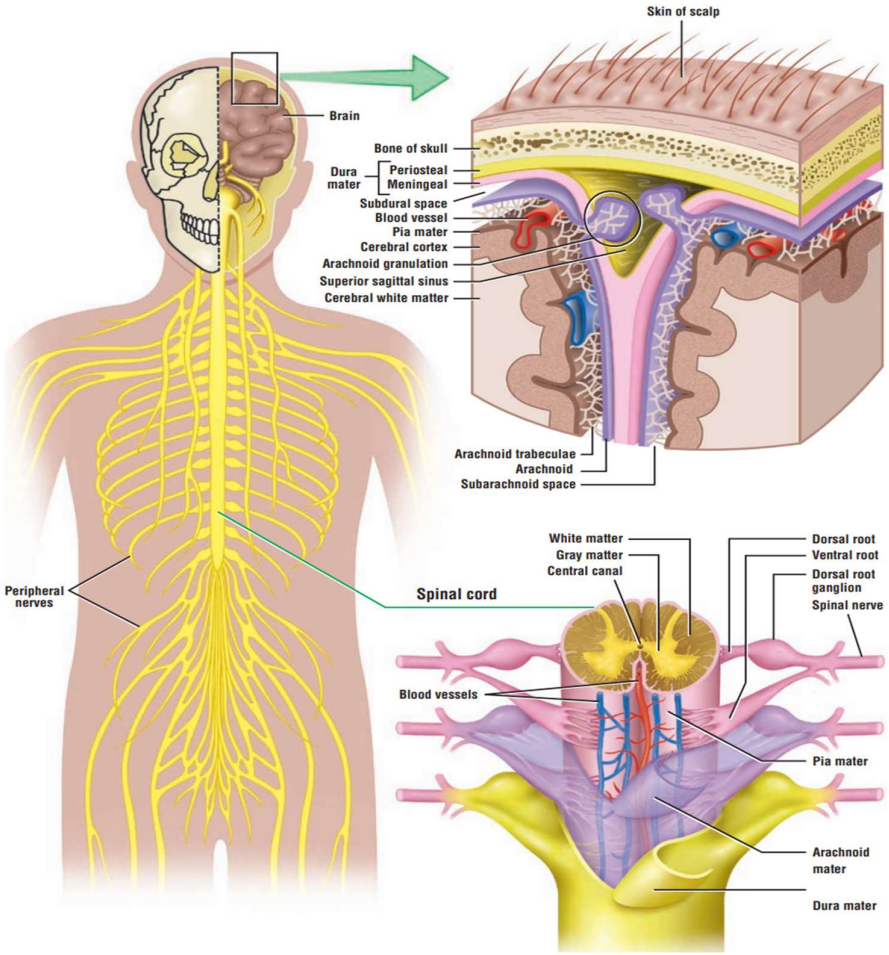
The nervous system is a complex collection of nerves and specialized cells known as neurons that transmit signals between different parts of the body. It is essentially the body's electrical wiring.

The nervous system is formed by the nervous tissue, which is distributed throughout the body as an integrated network of neurons assisted by neuroglial cells.

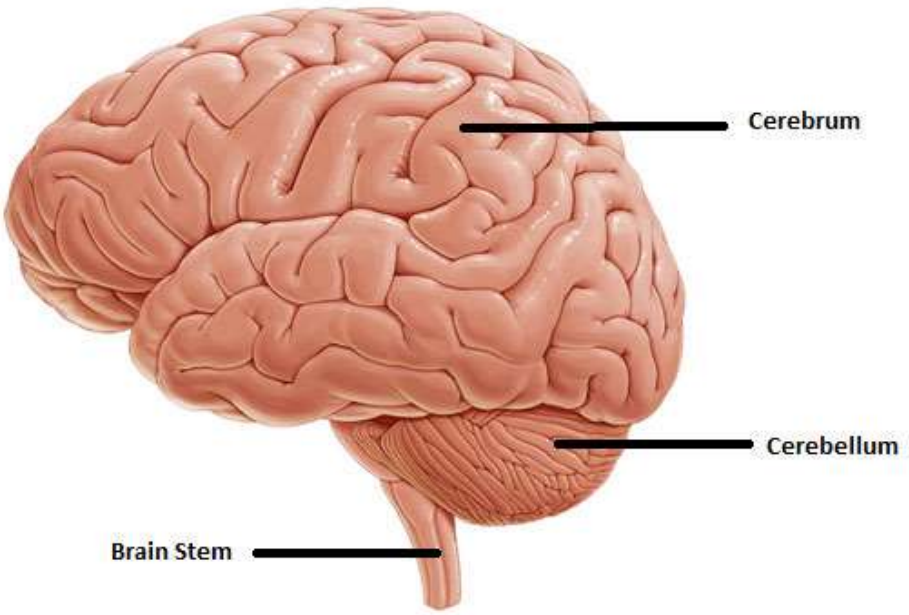
Structurally, the nervous system has two components:

a- Central nervous system (CNS) (brain and spinal cord).

b- Peripheral nervous system (PNS) (nerve fibers and nerve ganglia).



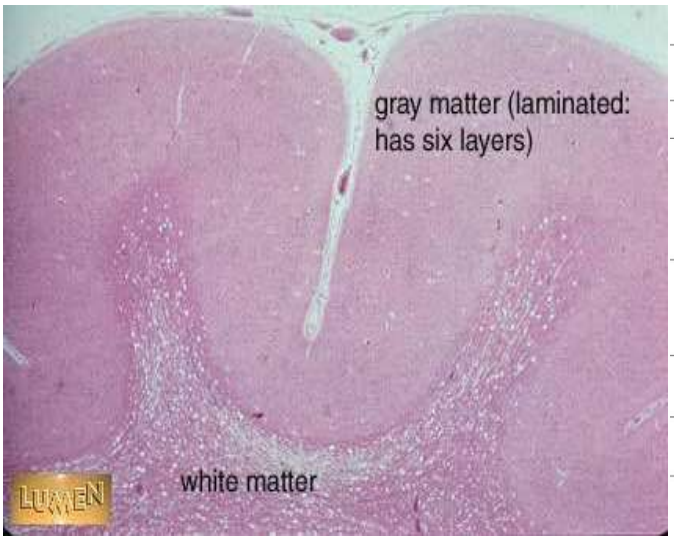
The **human brain:** Is the central organ of the human nervous system, and with the spinal cord makes up the central nervous system. The brain consists of the **cerebrum**, the **brain stem** and the **cerebellum**. It controls most of the activities of the body, processing, integrating, and coordinating the information it receives from the sense organs.

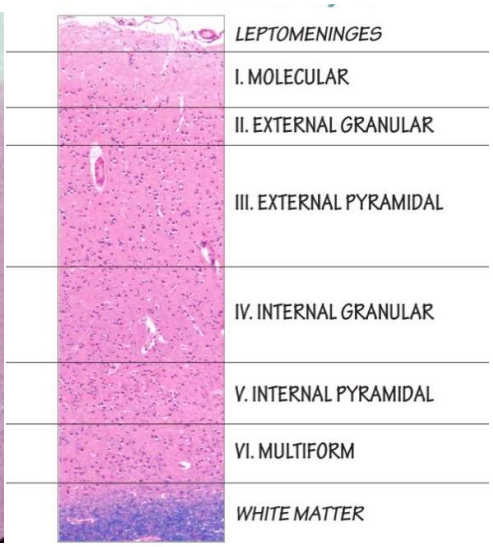


The **cerebrum**, also known as the forebrain, is the largest part of the brain containing the cerebral cortex. It is derived embryologically from the telencephalon. The cerebrum describes the whole main part of the brain. It consists of two types of tissues called grey and white matter.

- **Grey matter** is composed of neural cell bodies and forms the outer, surface layer of the cerebral hemispheres. It is involved in processing and cognition.
- **White matter**, on the other hand, is made up of myelinated axons and forms the bulk of the deeper structures of the cerebrum. Its role is to join various areas of the cerebrum together.

Strictly speaking, only the outer **grey matter layer** can be called the **cerebral cortex**.

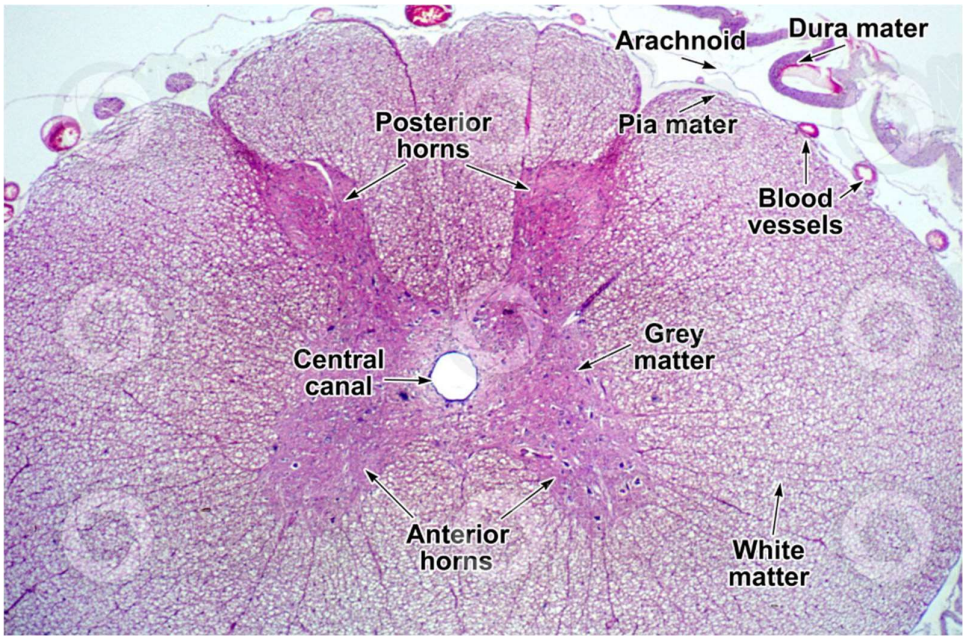




Layers of cerebral cortex:

- **I.** Molecular layer (*lamina molecularis*) - consists only a few nerve cells
- **II.** External granular layer (*lamina granularis externa*) – relatively thin layer consisting of numerous small, densely packed neurons
- **III.** Pyramidal layer or external pyramidal layer (*lamina pyramidalis externa*) - is composed of medium-sized pyramidal nerve cells
- **IV.** Inner granular layer (*lamina granularis interna*) - contains small, irregularly shaped nerve cells
- **V.** Ganglionic or inner pyramidal layer (*lamina pyramidalis interna*) - includes large pyramidal cells
- **VI.** Multiform layer (*lamina multiformis*) - small polymorphic and fusiform nerve cells.

The spinal cord is a cylindrical part of the CNS made up of nervous tissue, approximately 40-45 cm long and 1.5 cm wide, situated in the vertebral canal. The spinal cord consists of the gray and white matter.



- **Gray matter**: The gray matter is the dark, butterfly shaped region of the spinal cord made up of nerve cell bodies.
- **White matter**: The white matter surrounds the gray matter in the spinal cord and contains cells coated in myelin, which makes nerve transmission occur more quickly. Nerve cells in the gray matter are not as heavily coated with myelin.

➢ The spinal cord (and brain) are protected by three layers of tissue or membranes called **meninges** as follows:

1. The **dura mater** is the outermost layer and it forms a tough protective coating.
2. The **arachnoid mater**, the middle protective layer is named for its open, spiderweb-like appearance.
3. The **delicate pia mater**, the innermost protective layer, is tightly associated with the surface of the spinal cord.