

Nervous tissue

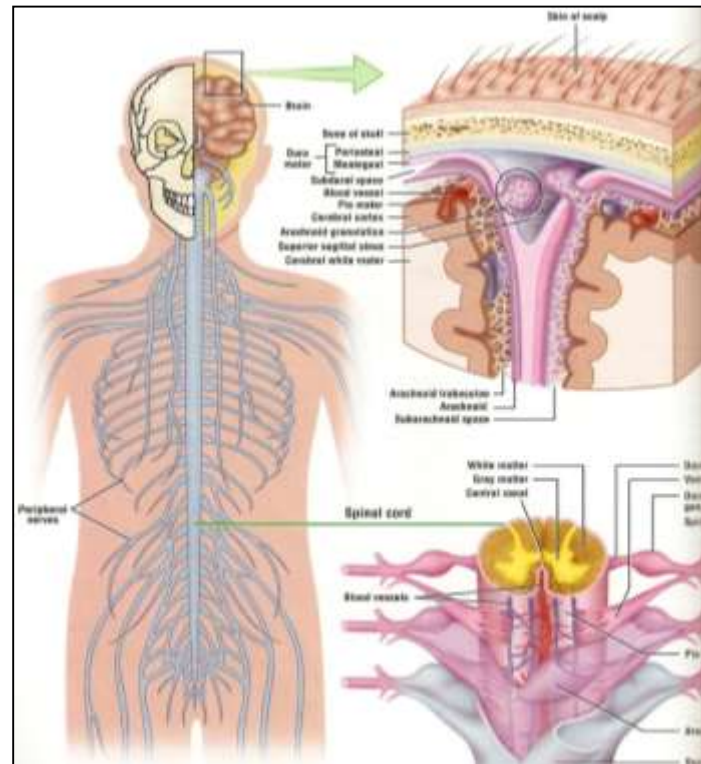
The mammalian nervous system is divided into two major parts :-

- 1- Central nervous system (CNS) consists of (brain and spinal cord).
- 2- Peripheral nervous system (PNS) consists of (spinal and cranial nerves) .

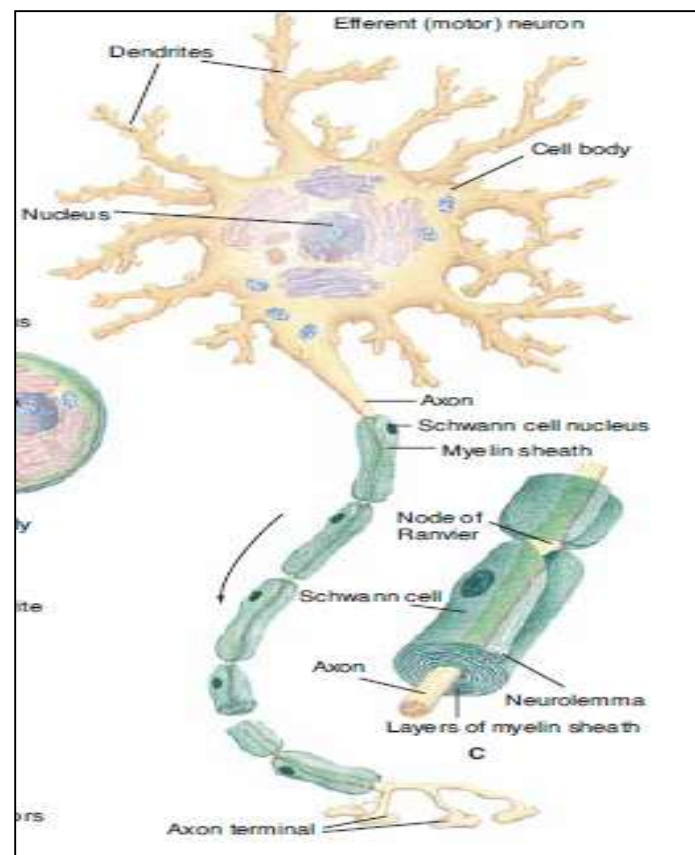
The structural and functional cells of the nervous tissue are neurons .

Neurons :- varies in size and shape , each neuron consists of cell body (soma), dendrites and single axon .

- Cell body consists of cytoplasm containing numerous organelles and basophilic granules contains RNA protein
- called Nissls bodies and large central nucleus with clear nucleolus , cytoplasm of neuron without centrosome.
- Dendrites:- numerous short cell process which increase the surface area for connecting with other neurons . transmit the signals to the cell body from other neurons varies in diameter .

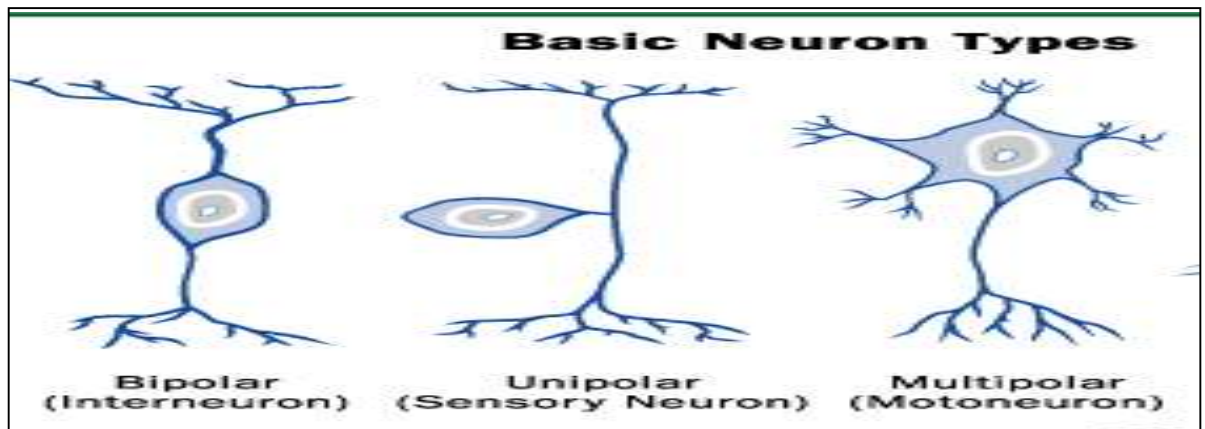


nervous tissues



- **Axon :-** a long cell process extending from the cell which responsible for transmitting signals from the cell body to other neuron . stable in diameter

The axons of many neurons are myelinated, they acquire a sheath of myelin, a protein–lipid complex that is wrapped around the axon. Outside the CNS, the myelin is produced by Schwann cells, glia-like cells found along the axon. Myelin forms when a Schwann cell wraps its membrane around an axon up to 100 times. The myelin sheath envelops the axon except at its ending and at the nodes of Ranvier, periodic 1- μ m constrictions that are about 1 mm apart. Not all mammalian neurons are myelinated; some are unmyelinated are simply surrounded by Schwann cells without the wrapping of the Schwann cell membrane around the axon that produces myelin.



Types of neuron:-

*** classification of neuron by morphology**

1-Unipolar neuron (only in fetus)

2-Pseudounipolar neuron (sensory organ)

3-Bipolar neuron in (organ of smell and retina)

4- Multipolar neuron in CNS(spinal cord , brain)

Classification of neuron by function :-

1- Afferent neuron (sensory neuron)

2- Efferent neuron (motor neuron)

3-Association neuron

Neuralgia:- four types of neuroglial cells are recognized in the CNS.

1-Astrocytes :- are the largest and most abundant neuroglial cells in the gray matter and they consists of two types :-

Astrocyte



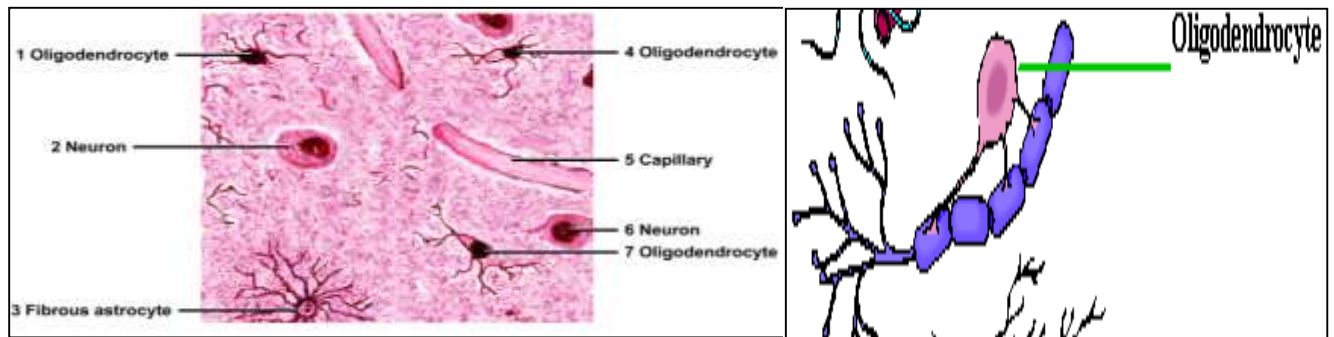
Fibrous astrocytes

a- Fibrous astrocytes

b- Protoplasmic astrocytes

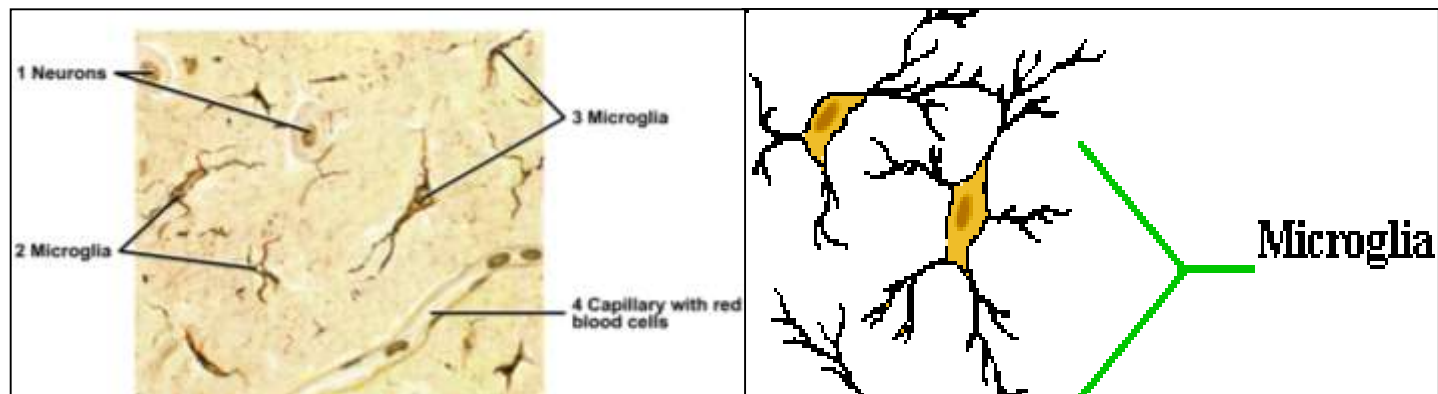
Both types of astrocytes are attached to the walls of the capillaries .

2-Oligodendrocytes:- are smallest astrocytes and have fewer cytoplasmic process , these neuralgia form myelin sheaths around the axons in the CNS.



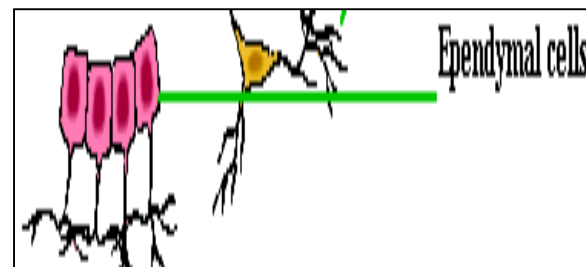
Oligodendrocytes

3-Microglia cells :- are the smallest neuroglial cells the main function is similar to that of the macrophage cells



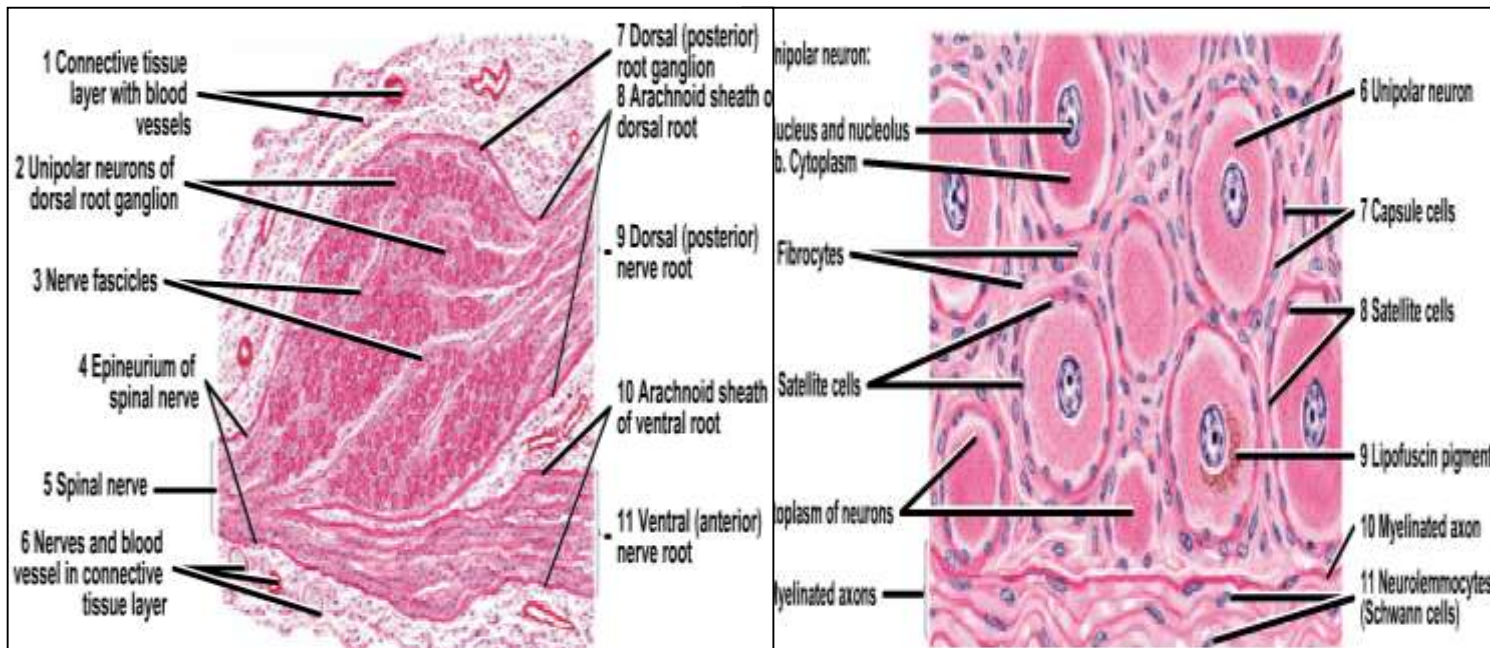
Microglia

4-Ependymal cell :- are the simple cuboidal or columnar cells .



Ganglion :- composed of neuron cell bodies , satellite cells , axons and surrounded by capsule which is composed of an irregular connective tissue layer that contains adipose cells and also blood vessels.

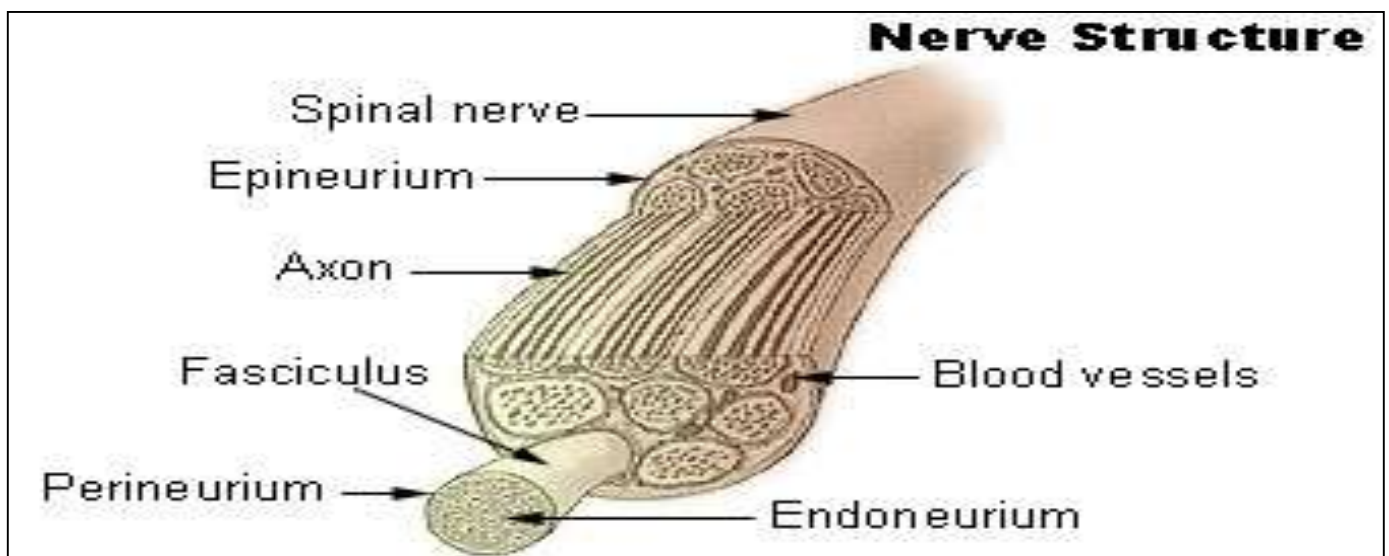
Satellite cells :- are the small cell , cuboidal cells that surround the neurons in different peripheral ganglia of the peripheral nervous system . these cells provide structural support and metabolic support to the neurons that they surround and provide for efficient metabolic exchange .



Longitudinal section of Ganglion
section of ganglion

Transverse

Nerve



A nerve contains bundles of nerve fibers, either axons, surrounded by connective tissue. Sensory nerves contain only afferent fibers, long dendrites of sensory neurons. Motor nerves have only efferent fibers, long axons of motor neurons. Mixed nerves contain both types of fibers. A connective tissue sheath called the epineurium surrounds each nerve. Each bundle of nerve fibers is called a fasciculus and is surrounded by a layer of connective tissue called the perineurium. Within the fasciculus, each individual nerve fiber, with its myelin and neurilemma, is surrounded by connective tissue called the endoneurium. A nerve may also have blood vessels enclosed in its connective tissue wrappings.

Synapses

The junction between a nerve cell and another cell is called a synapse.

Messages travel within the neuron as an electrical action potential. The

space between two cells is known as the synaptic cleft. To cross the synaptic cleft requires the actions of neurotransmitters.

Neurotransmitters are stored in small synaptic vesicles clustered at the tip of the axon.

