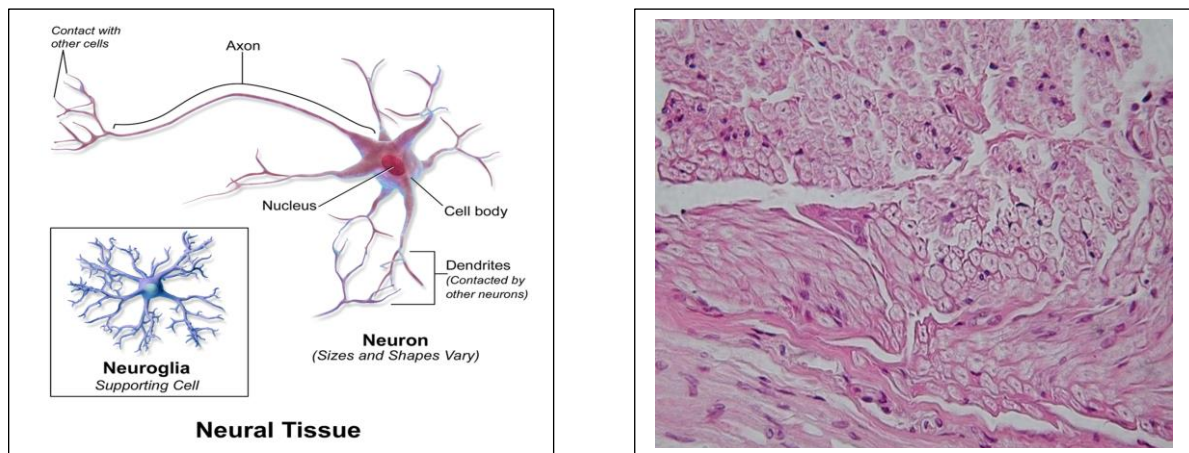


## NERVOUS TISSUE

**Nervous tissue**, also called **neural tissue** or **nerve tissue**, is the main tissue component of the nervous system. The nervous system regulates and controls bodily functions and activity and it consists of two parts: **the central nervous system (CNS)** comprising the brain and spinal cord, and **the peripheral nervous system (PNS)** comprising the branching peripheral nerves.

Nervous tissue cells is grouped into two main categories: neurons and neuroglia. Neurons, or nerves, transmit electrical impulses, while neuroglia do not; neuroglia have many other functions including provide nutrients, assist the propagation of the nerve impulse as well as supporting and protecting neurons.



### Structure

Nervous tissue is composed of neurons, also called nerve cells, and neuroglial cells. Four types of neuroglia found in the central nervous system (CNS) are astrocytes, microglial cells, ependymal cells and oligodendrocytes. Two types of neuroglia found in the peripheral nerve system (PNS) are satellite cells and Schwann cells.

### Neuroglia in the CNS

There are four types of neuroglia found within the central nervous system:

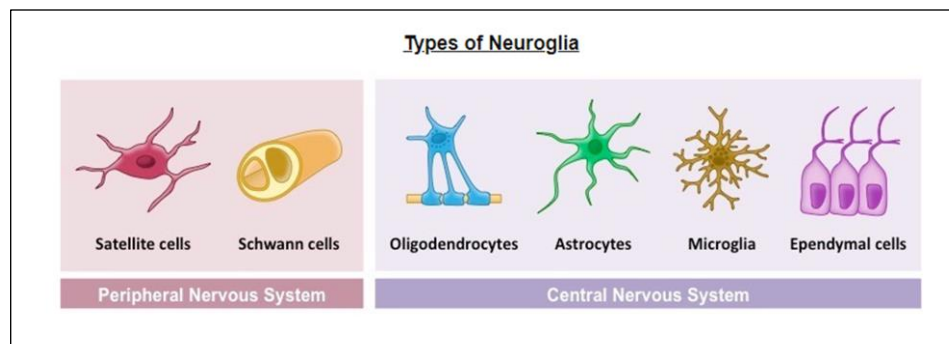
- Astrocytes – maintain the blood brain barrier and preserve the chemical environment by recycling ions and neurotransmitters
- Oligodendrocytes – myelinate axons in the central nervous system and provide an overall structural framework

- Ependymal cells – line ventricles (brain) and central canal (spine) and are involved in the production of cerebrospinal fluid
- Microglia – remove cell debris, wastes and pathogens via phagocytosis.

### Neuroglia in the PNS

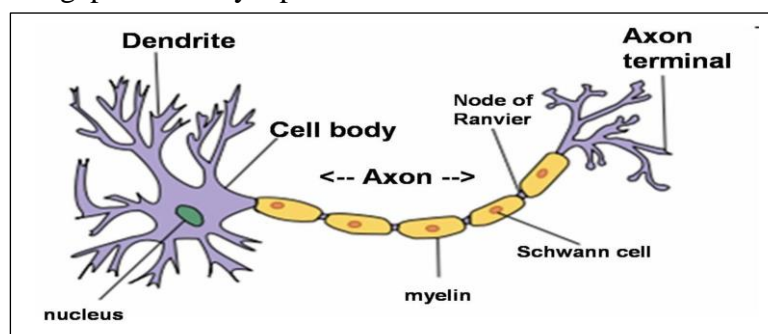
There are two types of neuroglia found within the peripheral nervous system:

- Schwann cells – myelinate axons in the peripheral nervous system
- Satellite cells – regulate nutrient and neurotransmitter levels around neurons in ganglia



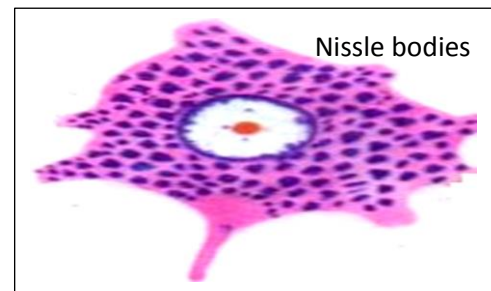
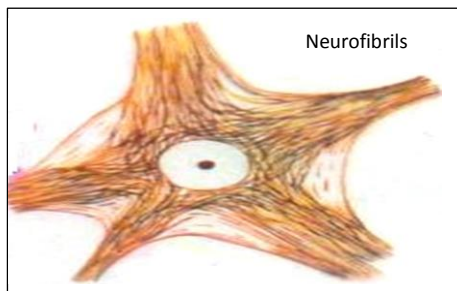
### Components

Neurons are cells with specialized features that allow them to receive and facilitate nerve impulses, or action potentials, across their membrane to the next neuron. They possess a large cell body (soma) { perikaryon contain nucleus}, with cell projections called dendrites and an axon. Dendrites are thin, branching projections that receive electrochemical signaling (neurotransmitters) to create a change in voltage in the cell. Axons are long projections that carry the action potential away from the cell body toward the next neuron. The bulb-like end of the axon, called the axon terminal (nerve ending), is separated from the dendrite of the following neuron by a small gap called a synaptic cleft.



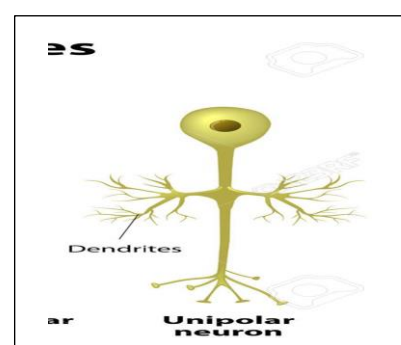
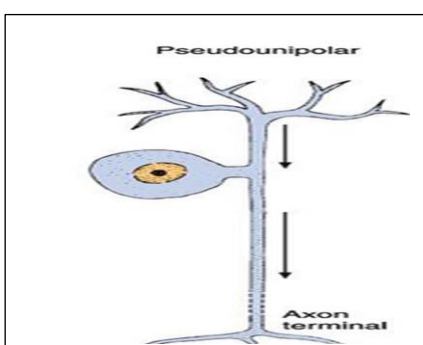
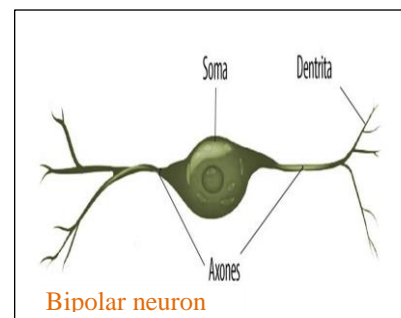
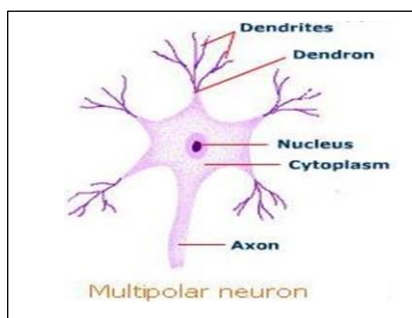
Cell body has:

- 1- Nucleus with large nucleolus.
- 2- Neurofibrils are present in the perikaryon, dendrites and axon and are unique to neurons. = “Skeleton” of the neurons
- 3- “Nissl bodies” (chromophilic substance) large clumps of basophilic material around the nucleus, Function – protein synthesis (neurotransmitters).



**Neurons are classified both functionally and structurally. Structural classification:**

- Multipolar neurons: Have 3 or more processes coming off the soma (cell body). They are the major neuron type in the CNS.
- Bipolar neurons: Sensory neurons that have two processes coming off the soma, one dendrite and one axon
- Pseudounipolar neurons: Sensory neurons that have one process that splits into two branches, forming the axon and dendrite
- Unipolar brush cells: Are have a single short dendrite terminating in a brush-like tuft of dendrioles. These are found in the granular layer of the cerebellum.



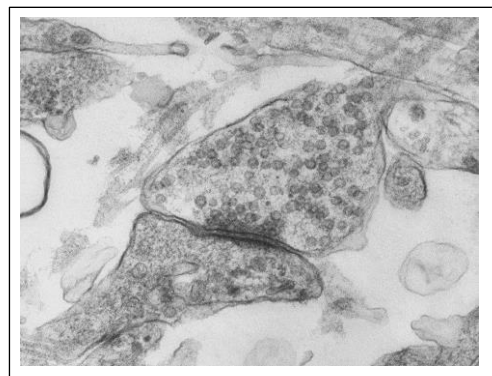
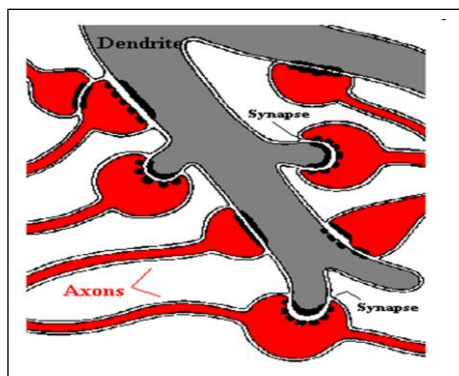
## Spinal cord

The **spinal cord** is a long, thin, tubular structure made up of nervous tissue, that extends from the medulla oblongata in the brainstem to the lumbar region of the vertebral column. It encloses the central canal of the spinal cord that contains cerebrospinal fluid. The brain and spinal cord together make up the central nervous system (CNS).



## Synapse

The specialized region of contact between 2 neurons. This structure permits a neuron (or nerve cell) to pass an electrical or chemical signal to another neuron or to the target effector cell.



## function of nerve tissue

The function of nervous tissue is to form the communication network of the nervous system by conducting electric signals across tissue.