UNIT-1 NEUROGLIA

Neuroglia or glia (glia = glue) is the **supporting cell** of the nervous system. Neuroglial cells are **non-excitable** and do not transmit nerve impulse (action potential). So, these cells are also called **non-neural cells** or **glial cells.**

Classification of neuroglial cells

Neuroglial cells are distributed in central nervous system (CNS) as well as peripheral nervous system (PNS). Accordingly the neuroglial cells are classified into two types:

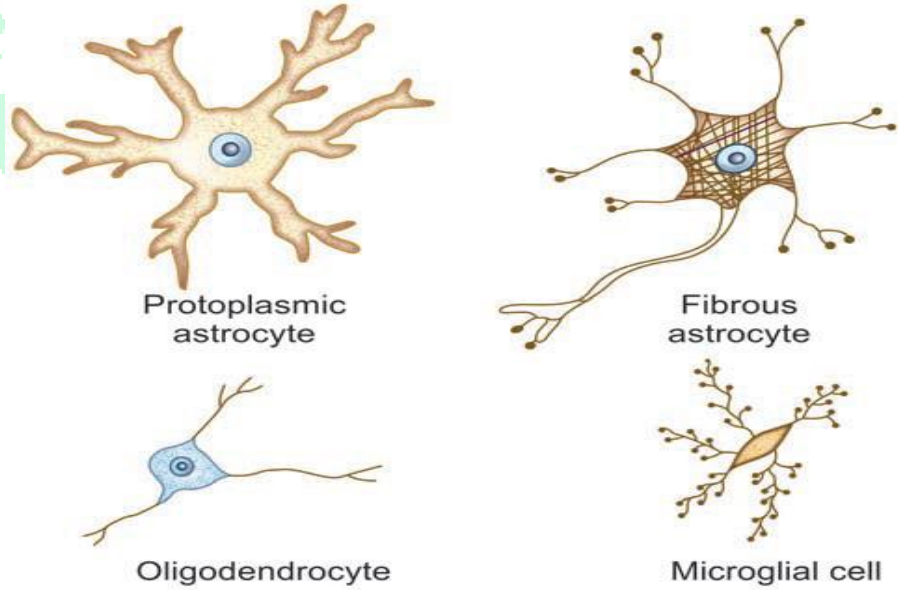
A. Central neuroglial cells

B. Peripheral neuroglial cells.

Central neuroglial cells

Neuroglial cells in CNS are of three types:

- Astrocytes
- Microglia
- Oligodendrocytes.



Astrocytes

Astrocytes are star-shaped neuroglial cells present in all the parts of the brain. Two types of astrocytes are found in human brain:

- Fibrous astrocytes
- Protoplasmic astrocytes

Fibrous Astrocytes

- Fibrous astrocytes occupy mainly the white matter.
- Few fibrous astrocytes are seen in gray matter also.
- The processes of these cells cover the nerve cells and synapses. This type of astrocytes play an important role in the formation of **blood-brain barrier** by sending processes to the blood vessels of brain, particularly the capillaries, forming tight junction with capillary membrane. **Tight junction** in turn forms the blood-brain barrier.

Protoplasmic Astrocytes

Protoplasmic astrocytes are present mainly in gray matter. The processes of neuroglia run between nerve cell bodies.

Functions of Astrocytes

- Twist around the nerve cells and form the **supporting network** in brain and spinal cord
- Form the **blood-brain barrier** and thereby regulate the entry of substances from blood into brain tissues
- Maintain the **chemical environment** of ECF around CNS neurons
- Provide calcium and potassium and regulate neurotransmitter level in synapses
- Regulate **recycling of neurotransmitter** during synaptic transmission.

Microglia

- Microglia are the smallest neuroglial cells. These cells are derived from monocytes and enter the tissues of nervous system from blood.
- These **phagocytic cells** migrate to the site of infection or injury and are often called the **macrophages of CNS.**

Functions of Microglia

- Engulf and destroy the microorganisms and cellular debris by means of **phagocytosis**
- Migrate to the injured or infected area of CNS and act as miniature macrophages.

Oligodendrocytes

- Oligodendrocytes are the neuroglial cells, which produce myelin sheath around the nerve fibers in CNS.
- Oligodentrocytes are also called **oligodendroglia.** Oligodendrocytes have only few processes, which are short.

Functions of Oligodendrocytes

- **Provide myelination** around the nerve fibers in CNS where Schwann cells are absent
- **Provide support** to the CNS neurons by forming a semi-stiff connective tissue between the neurons.

Peripheral neuroglial cells

Neuroglial cells in PNS are of two types:

- Schwann cells
- Satellite cells.

Schwann cells

Schwann cells are the major glial cells in PNS.

Functions of Schwann Cells

- **Provide myelination** (insulation) around the nerve fibers in PNS
- Play important role in **nerve regeneration**
- Remove cellular debris during regeneration by their phagocytic activity.

Satellite cells

Satellite cells are the glial cells present on the exterior surface of PNS neurons.

Functions of Satellite Cells

- Provide **physical support** to the PNS neurons
- Help in regulation of chemical environment of ECF around the PNS neurons.