



Motivational Corner:

"Patience, persistence and perspiration make an unbeatable combination for success."



Objectives:

At the end of this lecture, you should describe the microscopic structure and the function of:

1. Neurons:

- Cell body (perikaryon).
- Processes: An axon and dendrites.

2. Neuroglia:

- Astrocytes.
- Oligodendrocytes.
- Microglia.
- Ependymal cells.

1-

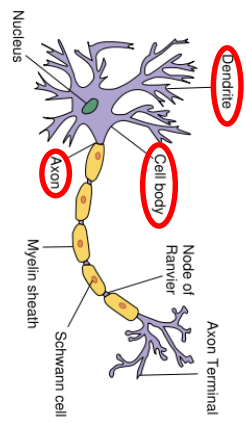
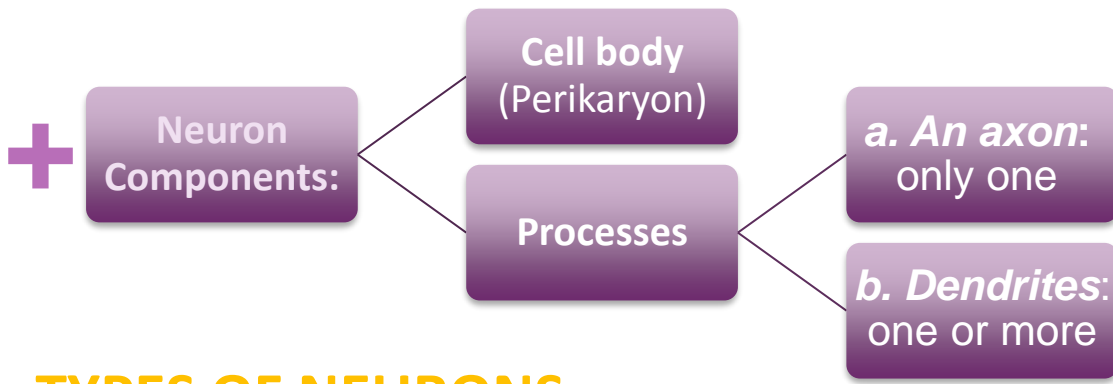
NORMAL CELLS OF CNS

Extra notes: Gray

Important notes: Red

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TYPES OF NEURONS

Based on number of processes

Unipolar (Pseudounipolar neurons.)

"Rounded neuron"

Has one process only, that divides into two branches; one acts as a dendrite and the other as an axon.
e.g. Mesencephalic nucleus of trigeminal nerve and dorsal root (spinal) ganglion

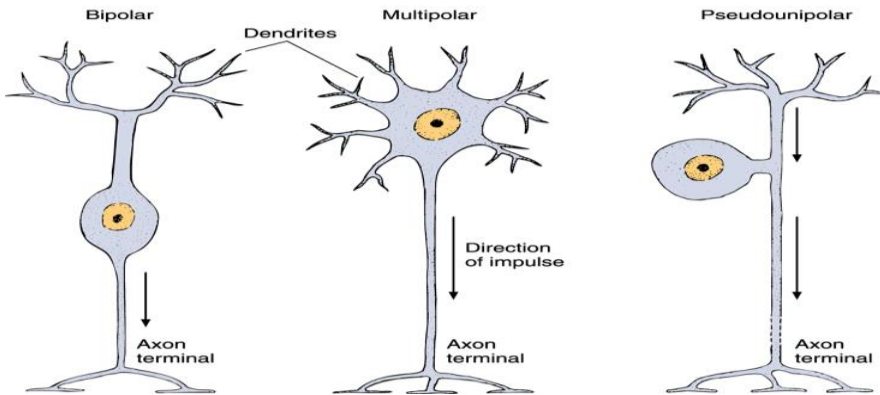
Bipolar neurons.

"spindle-shaped neuron"

Has two processes (one arising from each pole of the cell body). One of them is the dendrite and the other is the axon, e.g. retina & olfactory epithelium.

Multipolar neurons.

Has one axon and multiple dendrites.



Types of multipolar neurons:

Stellate neuron:

- The commonest type.
- Distributed in most areas of CNS.

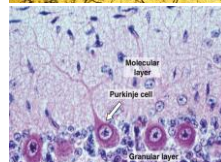
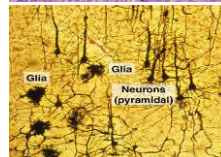
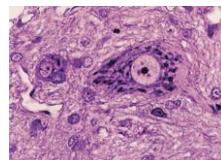
e.g. **anterior horn cells of the spinal cord**

Pyramidal neurons

Distributed in motor area 4 of the **cerebral cortex**.

Pyriform neurons

Pear-shaped, e.g. **Purkinje cells of cerebellar cortex**



+ Cell body (Perikaryon)

Cell body

Cytoplasm

Its main components include:

Nucleus:

Single, usually central, rounded and vesicular with prominent nucleolus.

1. Nissl bodies:

Are basophilic patches of rER and **free ribosomes** in the cell body and bases of wide "large" dendrites.

2. Neurofilaments:

Are intermediate filaments which are bundled together to form neurofibrils. Are found in the cell body, axon and dendrites.

3. Microtubules:

Are found in the cell body, axon and dendrites.

4. Golgi apparatus:

Surrounds the nucleus all around.

5. Mitochondria:

Are numerous.

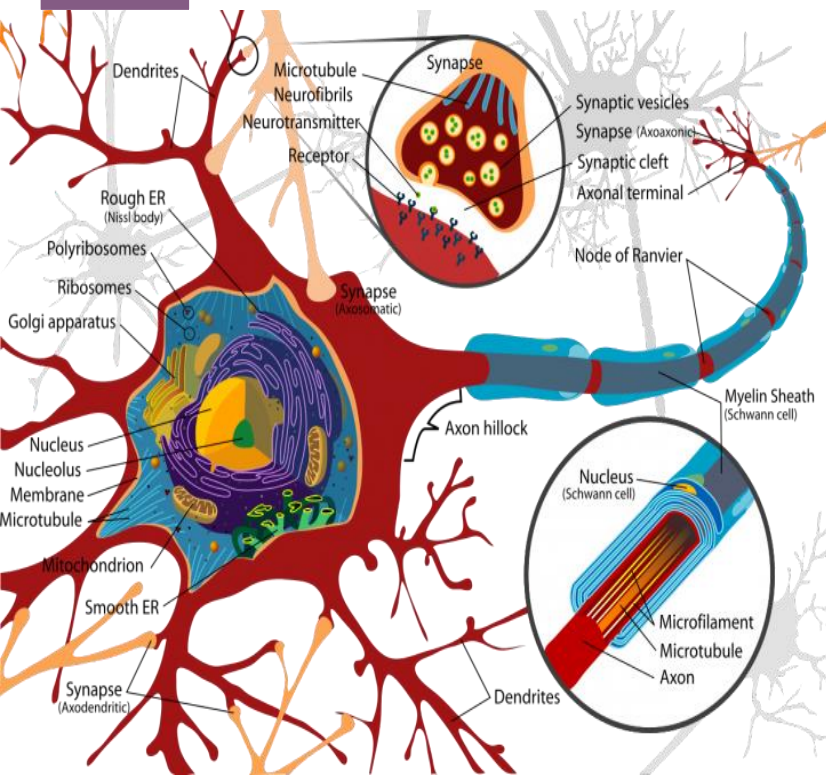
6. Centriole:

Most adult neurons have only one rudimentary centriole, so they cannot divide.

7. Some fat and glycogen granules.

8. Pigments:

- Lipofuscin pigments (in old age).
- Melanin pigments (in neurons of substantia nigra of the midbrain).

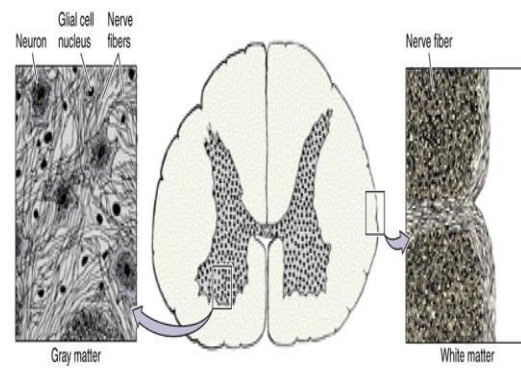


TYPES OF NERVE FIBERS IN CNS



Unmyelinated without neurilemmal sheath (in grey matter).

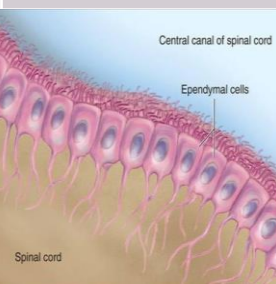
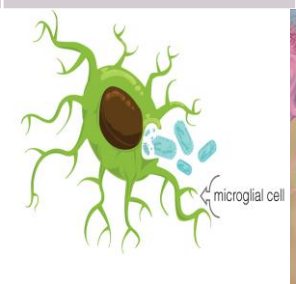
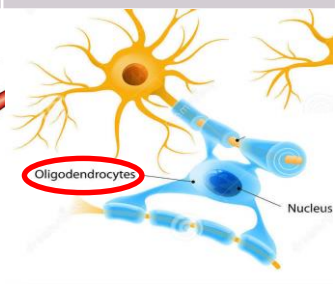
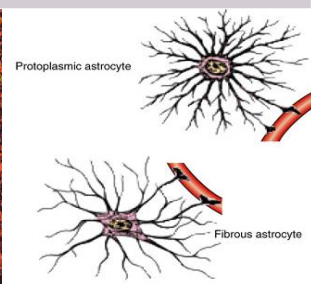
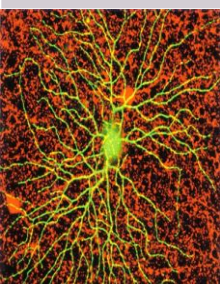
Myelinated without neurilemmal sheath (in white matter).



NEUROGLIA

Definition: Are group of cells that act as the supportive tissue of CNS.

Astrocytes	Oligodendrocytes	Microglia	Ependymal
<ul style="list-style-type: none"> - They are the commonest type of neuroglia cells. - They are found in both the grey and white matter. - They are star-shaped cells with numerous long processes. <p>Types:</p> <ol style="list-style-type: none"> 1. Protoplasmic astrocytes: <ul style="list-style-type: none"> - Are found in the grey matter of CNS. - Their processes branch extensively. 2. Fibrous astrocytes: <ul style="list-style-type: none"> - Are found in white matter of CNS. - Their processes have fewer branches but longer. <p>Functions:</p> <ol style="list-style-type: none"> 1. Repair of injury of CNS tissue (gliosis). 2. Supportive and nutritive functions to the neurons. 3. Participate in the formation of blood-brain barrier. 	<ul style="list-style-type: none"> - Are branching cells with few, short processes. - They are distributed in the grey and white matter of CNS. <p>Functions:</p> <ol style="list-style-type: none"> 1. Formation of myelin sheath in the CNS. 2. Insulation of nerve fibers. 	<ul style="list-style-type: none"> - Are spindle-shaped cells with branching processes raise from each pole of the cell. - Are distributed in the grey and white matter of CNS. - Are rich in lysosomes. - Their main function is phagocytosis. 	<p>Are simple columnar epithelial cells (partially ciliated) lining the brain ventricles and the central canal of spinal cord.</p>



Summary



Neurons:

Types of neurons:

- 1- Pseudounipolar
- 2- Bipolar
- 3- multipolar: stellate, Pyramidal, Pyriform.

Components:

- 1- Cell body
- 2- Processes: Axon and dendrites.

Types of nerve fibers in CNS:

Unmyelinated, Myelinated.

Neuroglia:

- 1- Astrocytes.
- 2- Oligodendrocytes.
- 3- Microglia.
- 4- Ependyma.

1
2
3
4
5

MCQs

1- Where is the ependyma found?

- a. Lining ventricles
- b. Lining spinal canal
- c. Covering the brain
- d. Covering the spinal cord
- e. Both a and b

2-What is the cell body of a neuron called?

- a. Ganglion
- b. Perikaryon
- c. Astrocyte
- d. Nissl
- e. Terminal bouton

3-Which cell is a macrophage found in the central nervous system?

- a. Kupffer cells
- b. Histiocyte
- c. Dust cell
- d. Langerhans cell
- e. Microglia

4- Which of the following is involved in the blood brain barrier?

- a. Astrocytes
- b. Ependymal cells
- c. Oligodendrocytes
- d. Microglia
- e. Schwann cells

5- Which of the following lines the ventricles?

- a. Astrocytes
- b. Ependymal cells
- c. Oligodendrocytes
- d. Microglia
- e. Schwann cells

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Thanks you for checking
our work, Good luck.

-Team histology.

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