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PART TWELVE:

NORMAL CELLS OF NERVOUS SYSTEM

Cell of Nervous System:

Neuron:

- Cell body (Perikaryon).
- Processes: an Axon and Dendrites.

Neuroglia:

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

Notes

Cells never found in the CNS : Schwan cell and C.T. Cell (such as Macrophage)

- Connective tissue is replaced in the CNS by supporting tissue.
- Supporting cell is (Neuroglia)

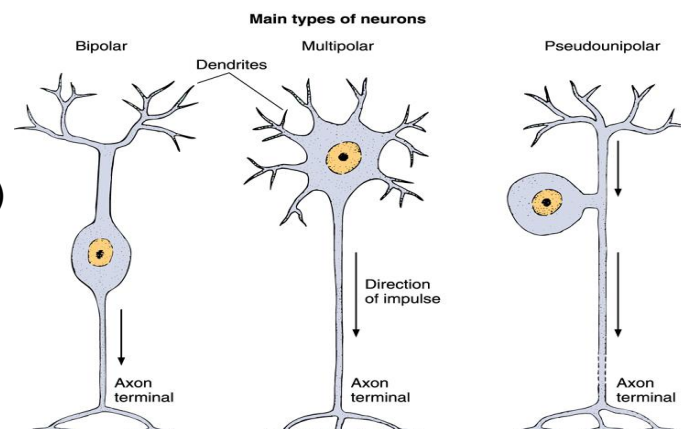
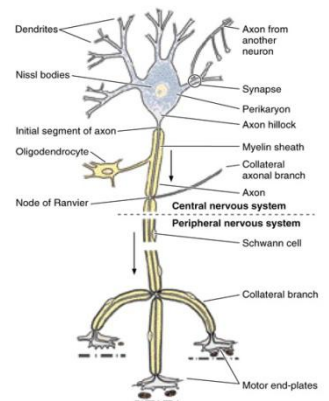
NEURONS

Components:

1. Cell body (Perikaryon)
2. Processes:
 - a. An axon: only one in a neuron.
 - b. Dendrites: one or more in a neuron.

Types of neurons:

- ❖ **Pseudounipolar neuron (rounded neuron):**
Has one process only, which divides into two branches e.g. Mesencephalic nucleus of trigeminal nerve.
- ❖ **Bipolar Neuron (spindle-shaped neuron):**
Has two processes arising from the poles of the cell body (one axon and one dendrite) e.g. retina, & olfactory epithelium, vestibular cochlear ganglia
- ❖ **Multipolar neuron:**
Has one axon and more than one dendrite.



Types of multipolar neurons:

1. Stellate neuron:

- The commencement type.
- Distributed in most areas of CNS, e.g. anterior horn cells of the spinal cord.

2. Pyramidal neurons:

- Distributed in the cerebral cortex of the brain.

3. Pyriform neurons:

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

Notes

Schwann cells are absent in CNS "only in PNS".

- Axon transfer the impulses away from cell body
- Dendrite transfer the impulses toward cell body

Cell Body (PERIKARYON):

Structure of cell body:

A. Nucleus.

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

B. Cytoplasm.

Its main components include:

1) Nissl bodies:

Are patches of rER and free ribosomes in the cell body and bases of wide dendrites.

2) Neurofilaments:

Are intermediate filaments which are bundled together to form neurofibrils. 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:

Mature neuron has only one centriole.

7) Some fat and glycogen granules.

8) Pigments:

Lipofuscin pigments (in old neurons).

Melanin pigments (in neurons of substantia nigra of the midbrain).



TYPES OF NERVE FIBERS in CNS:

1. Unmyelinated without neurilemmal sheath.
2. Myelinated without neurilemmal sheath.

Notes

Largest cell in the body is (Pyramidal cell).

Bipolar neurons = spiral (as in retina).

Multipolar is the commonest shape of the neurons in the body .

Axon hillock : connection between axon and cell body .

Neuroglial = Schwann cell .

NEUROGLIA

Are group of cells that act the supportive tissue of CNS.

Type of Neuroglia:

1. Astrocytes

- ✓ Star-shaped cells with numerous long processes.
- ✓ They are the commonest type of neuroglia cells.
- ✓ They are found in both the gray and white matter.

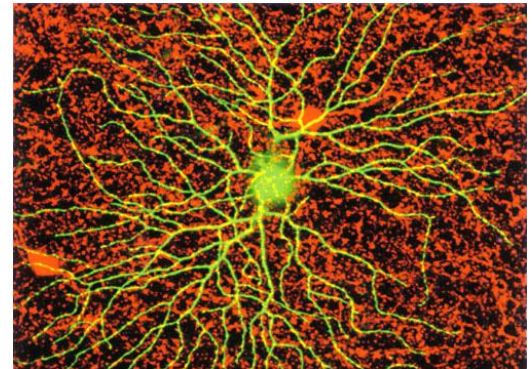
Types:

a. Protoplasmic Astrocytes:

- Found in the gray matter of CNS.
- Their processes branch extensively.
- The cytoplasm is rich in lysosomes (granular cytoplasm).

b. Fibrous Astrocytes:

- Found in white matter of CNS.
- Their processes have fewer branches but longer.
- The cytoplasm has few lysosomes.



Functions:

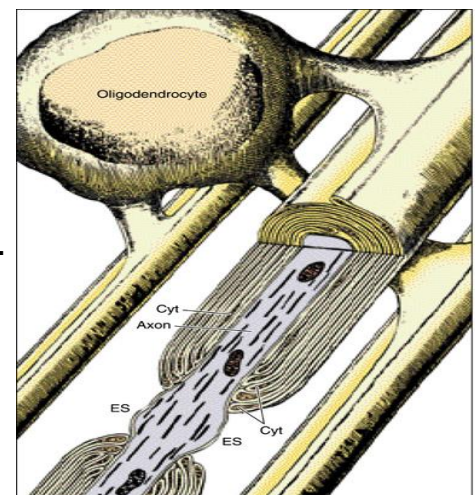
1. Repair of injury of CNS tissue (gliosis).
2. Supportive and nutritive functions to the neurons.
3. Participate in the formation of blood-brain barrier

2. Oligodendrocytes

- Are branching cells with few and short processes.
- They are distributed in the gray and white matter of CNS.

Functions:

- A. Formation of myelin sheath in the CNS.
- B. Insulation of nerve fibers



3. Microglia

- Spindle-shaped cell with branching processes .
- Rise from each pole of the cell.
- Distributed in the gray and white matter of CNS.
- Rich in lysosomes.
- Their main function is phagocytosis.

4. Ependymal cells

Simple columnar epithelial cells (partially ciliated) lining the central canal of spinal cord and the brain ventricles.

Notes

neuron to neuroglia is 1:6 or 1:10

neuroglia doesn't have any axon or dendrites. we can see cytoplasmic processes
oligodendrocyte in CNS & schwann cell in PNS -> synthesize the myelin sheath .