

A microscopic image of nervous tissue, showing a dense network of blue-stained nerve fibers. Several bright orange-yellow spots are visible, likely representing areas of inflammation or specific cellular components. The text "Nervous tissue" is overlaid in white.

Nervous tissue

- **Definition:** is highly specialized tissue to employ modifications in membrane electrical potentials to relay signals throughout the body.

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- **Subdivision of nervous tissues:**

- 1. **Anatomical subdivisions:**

- A. Central nervous system (CNS)*

- 1) Brain

- 2) Spinal cord

- B. Peripheral nervous system (PNS)*

- 1) Nerves

- 2) Ganglia (singular, ganglion)

1. Structural subdivisions:

A. Nerve cell (neuron):

- 1) Functional units of the nervous system; receive, process, store, and transmit information to and from other neurons, muscle cells, or glands.
- 2) Composed of a cell body, dendrites, axon and its terminal arborization, and synapses.

B. Glial cells (neuroglia) (supporting cells):

- 1) Provide metabolic and structural support for neurons, insulation (myelin sheath), homeostasis, and phagocytic functions
- 2) Comprised of *astrocytes, oligodendrocytes, microglia, and ependymal* cells in the CNS; comprised of *satellite cells and Schwann cells* in the PNS.

■ Structure of a Typical Neuron:

1. Cell body (Soma):

a. Nucleus: Large, spherical, usually centrally located in the soma

b. Cytoplasm (perikaryon)

- 1) Intermediate filaments (*neurofilaments*), act As a skeleton transportation.
- 2) rough endoplasmic reticulum (*Nissl bodies*), which are the site of protein synthesis.

2. Dendrite(s):

- 1) Usually multiple and highly branched at acute angles, More than two processes.
- 2) Carrying impulses to the soma.

3. Axon:

1. Branches at right angles, fewer branches than dendrites, Usually only one per neuron, no Nissl bodies.
2. conducting signals from soma to ending (Muscle and glands).

■ Classification of neuron:

1. Structural classification: number of cytoplasmic processes (4 types):

- a. **Unipolar neurons** (*rare in the adult human*)
- b. **Pseudounipolar neurons**: only one process arising from the soma. Developmentally, divides into two branches. Found in *peripheral sensory ganglia*, such as dorsal root ganglia.
- c. **Bipolar neurons**: single axon and dendrite arise at opposite poles of the cell body. Found only in *sensory neurons*, such as in the retina, olfactory and auditory systems.
- d. **Multipolar neurons**: More than two dendrites just one axon ; found in brain, peripheral autonomic nervous system and spinal cord.

2. Functional classification (3 types):

- a. **Sensory neurons** (*afferent neurons*): involved in the reception of sensory stimuli from the environment & from within the body.
- b. **Motor neurons** (*efferent neurons*): conduct impulses to effectors organs (muscle, exocrine & endocrine glands) and control their functions.
- c. **Interneurons**: establish interrelationships among other neurons ; Modify and Integrate nerve impulses.

Neuroglia:

1. **Location:** between neurons
2. **Morphology:** smaller than neuron, have processes (no dendrites and axon), lack nucleoli.
3. **Number:** five to ten times of neurons.
4. **Types:** 4 in CNS (central nervous system), 2 in PNS (peripheral nervous system)
5. **Function:** support, protect, nourish neuron, influence neuron's activities and metabolism.

Supporting cells in CNS

Cells	Nucleus	Function
<i>Astrocytes</i>	largest glial nuclei.	form Blood-Brain Barrier(BBB)
<i>oligodendrocytes</i>	smaller than astrocytes	form myelin sheath of myelinated nerve fibers in CNS
<i>microglia</i>	smaller than astrocytes and oligodendrocytes	Act as macrophage
<i>ependymal</i>	epithelial-like cells which line the central canal of the CNS	Supporting

Supporting cells in PNS

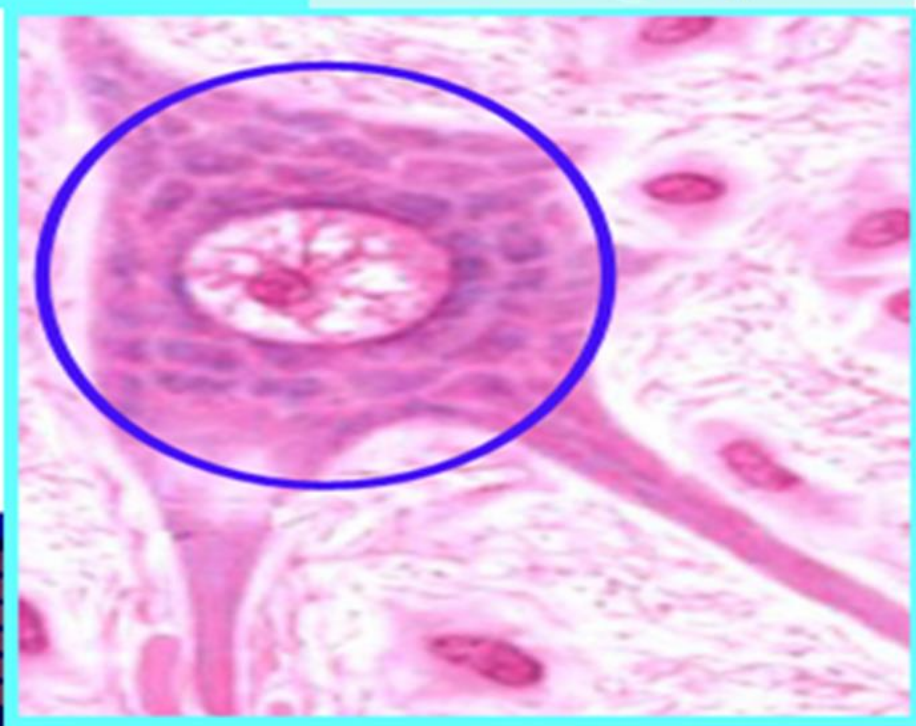
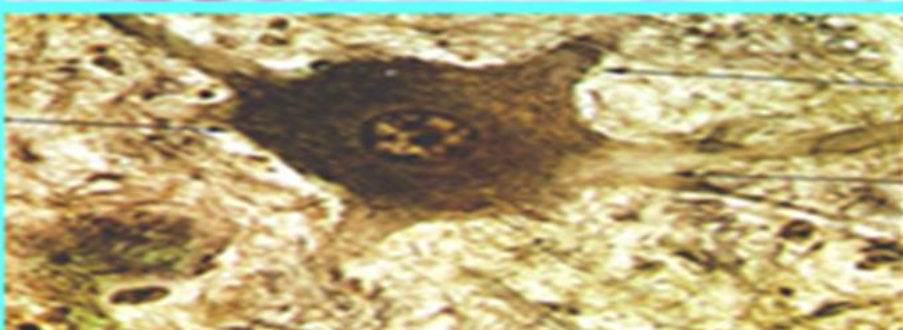
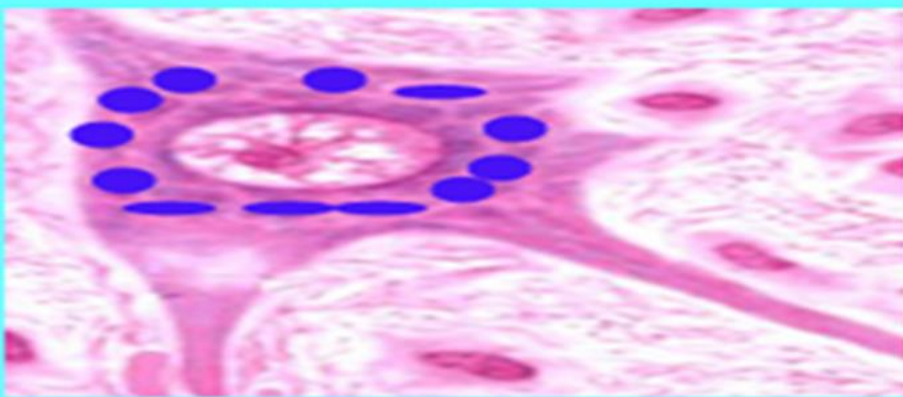
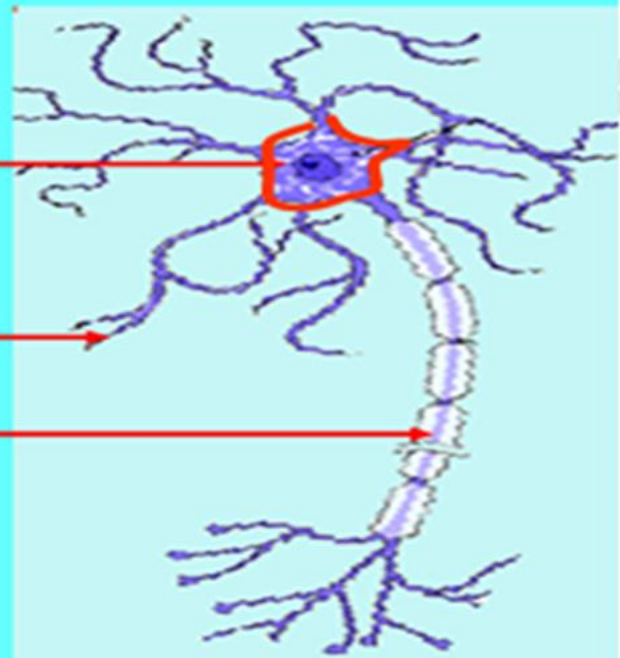
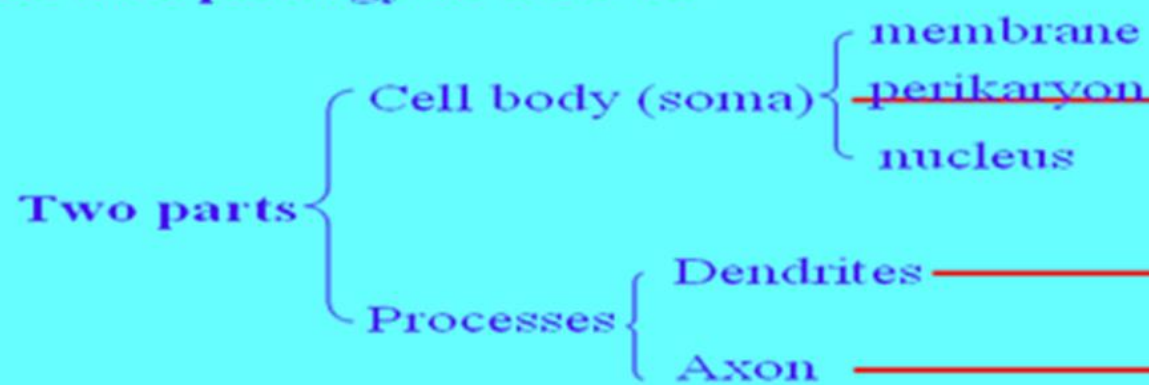
Cells	Function
satellite cells	form the myelin sheath around axons and surround unmyelinated axons in PNS nerves
Schwann cells	form myelin sheath of myelinated nerve fibers in PNS

Nerve fibers

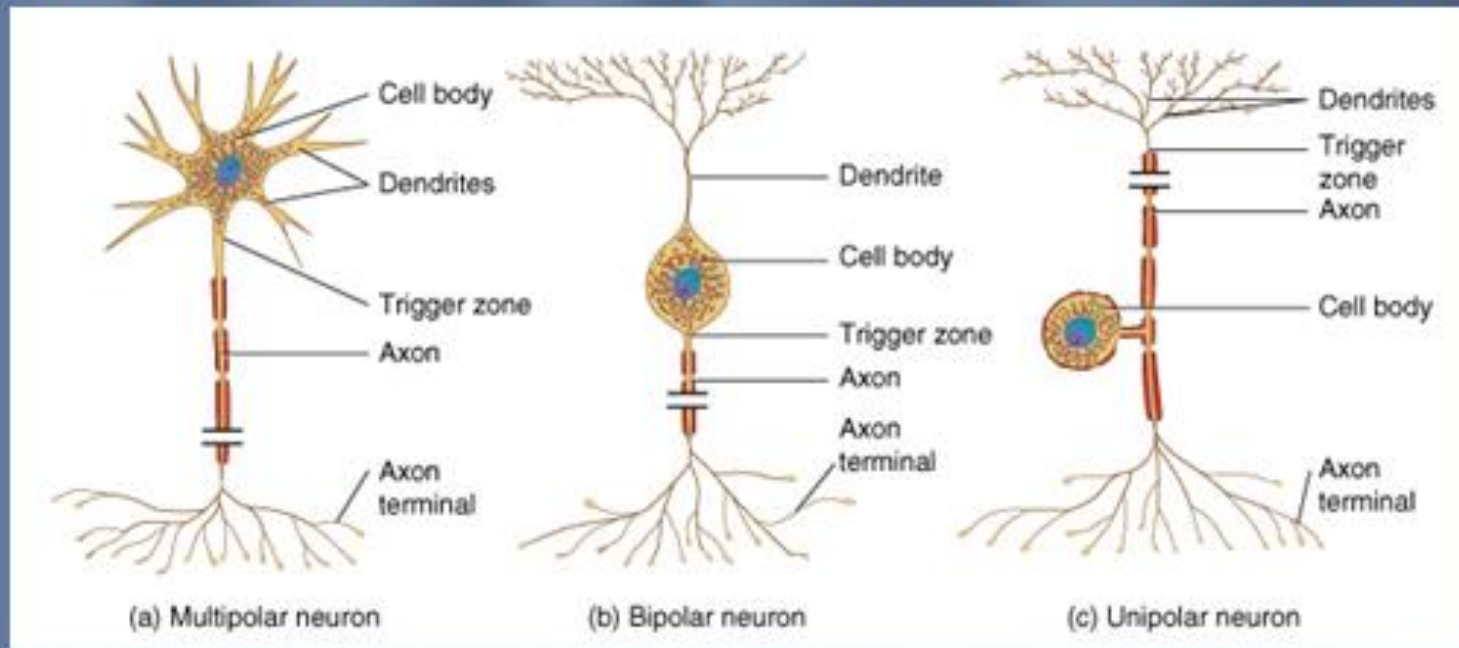
<i>myelinated nerve fiber</i>	<i>unmyelinated nerve fiber</i>
Around plasmalemma	Along entire axolemma
Nodes of Ranvier are presence	Node of Ranvier are absence
high velocity of impulse conduction	lower velocity of impulse conduction

2 Neurons

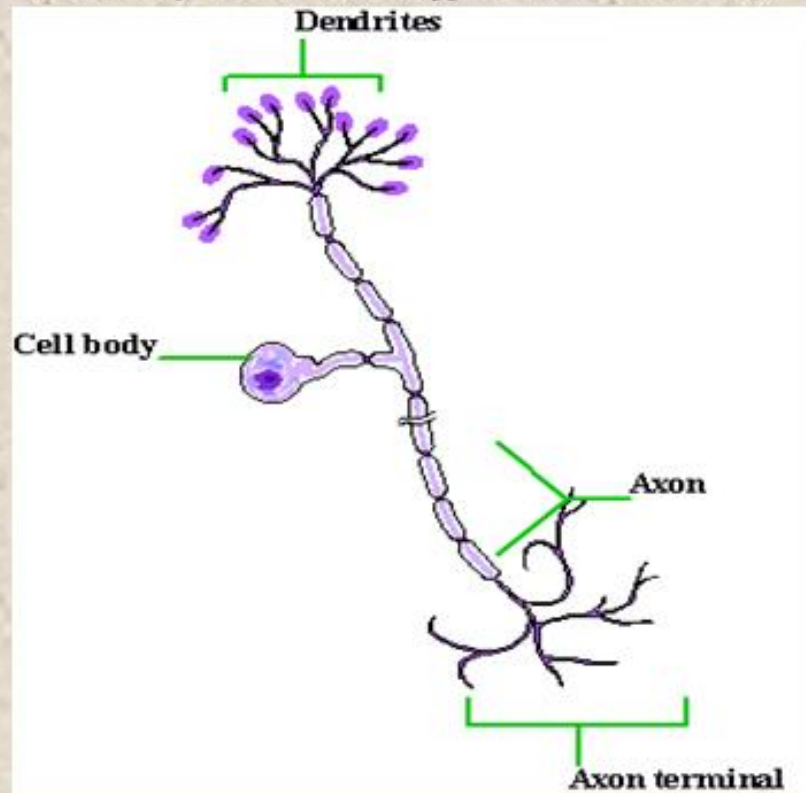
2.2 Morphology of neuron



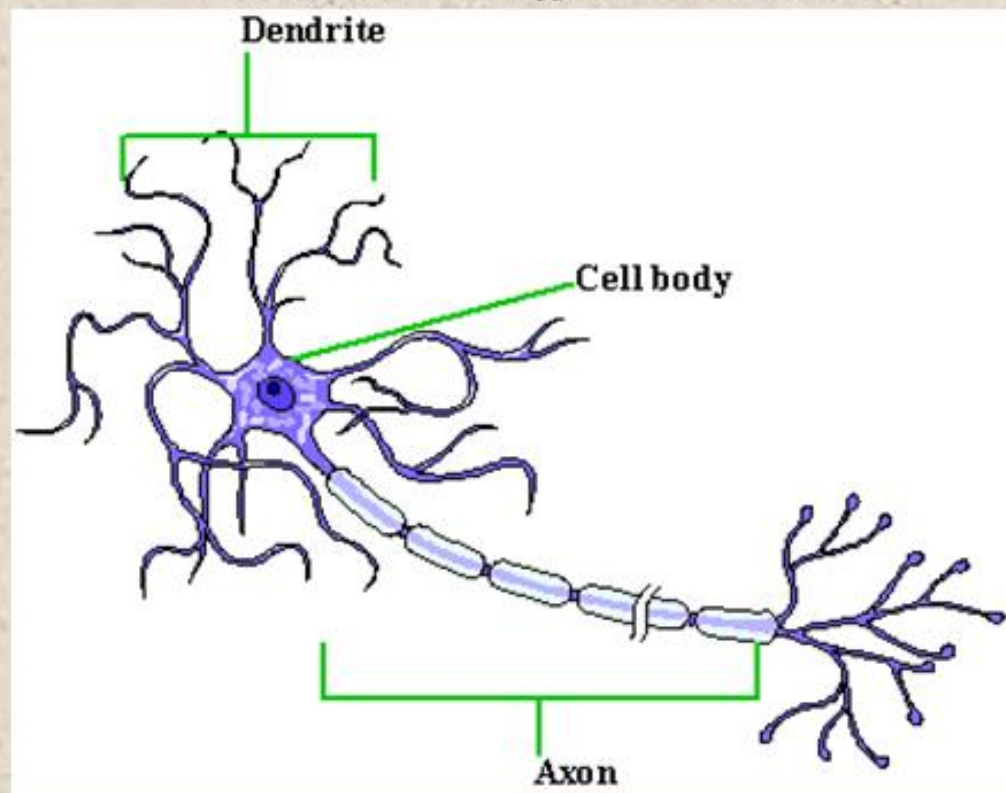
Structural Classification of Neurons



Sensory neurons (afferent neurons)

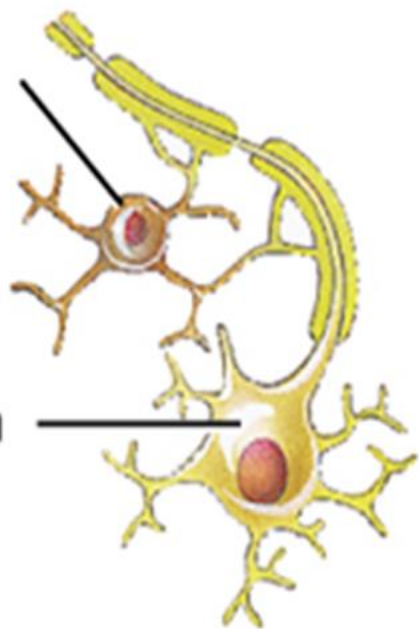


Motor neurons (efferent neurons)



Oligodendrocyte

Neuron

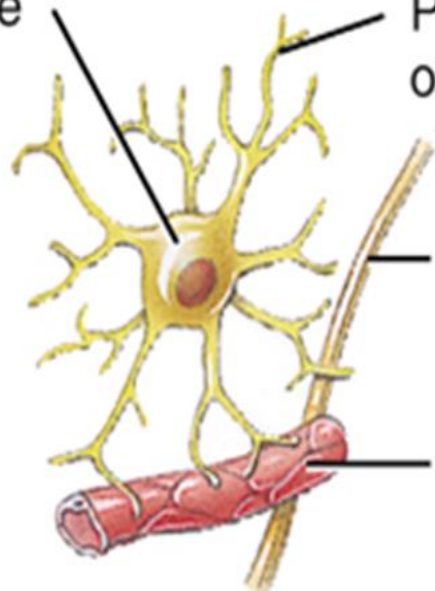


Astrocyte

Process of astrocyte

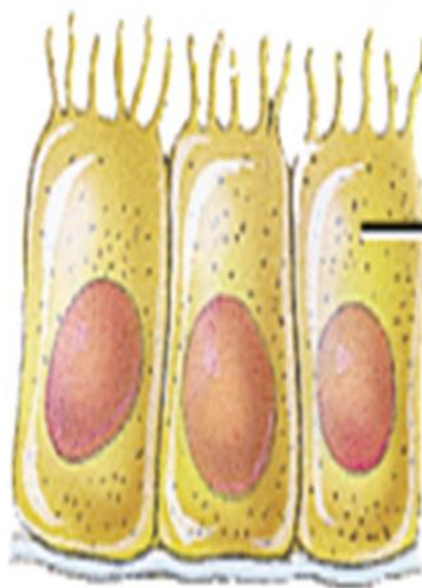
Process of neuron

Blood vessel



Cilia

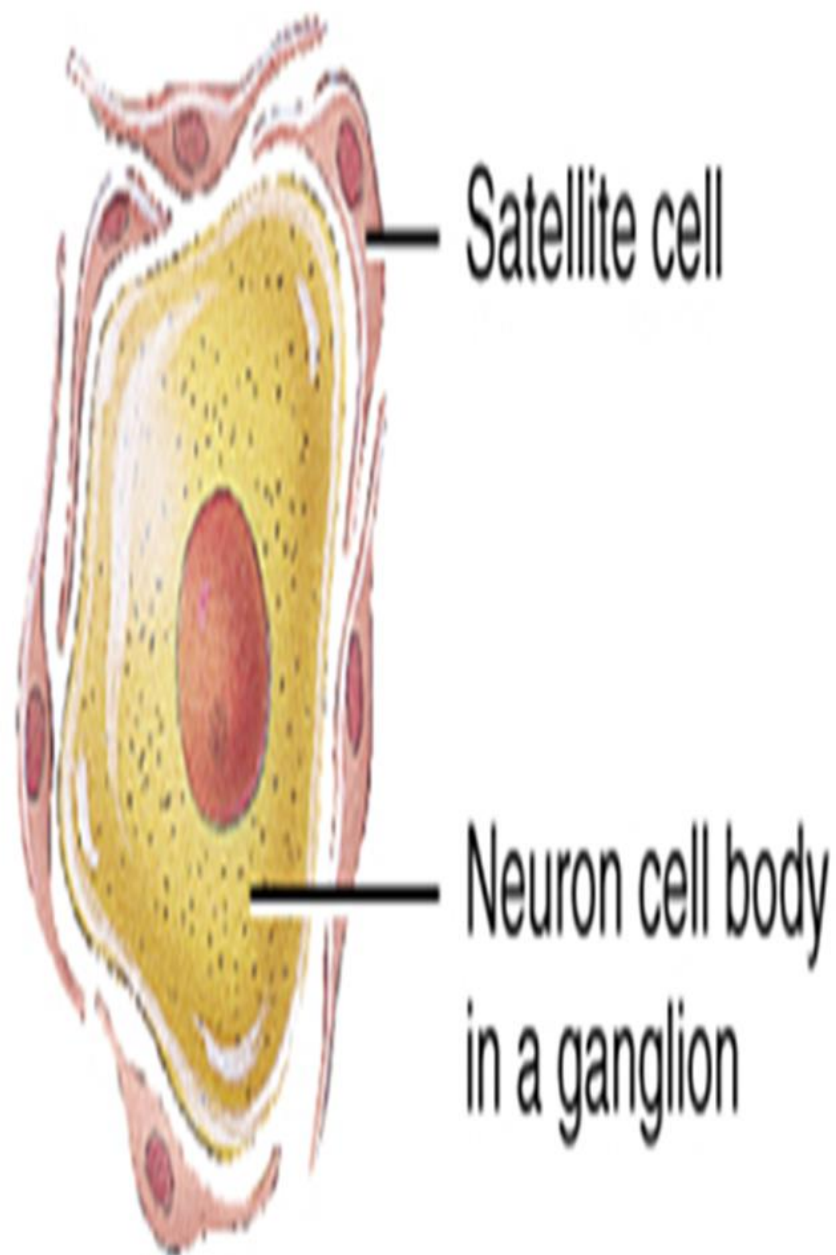
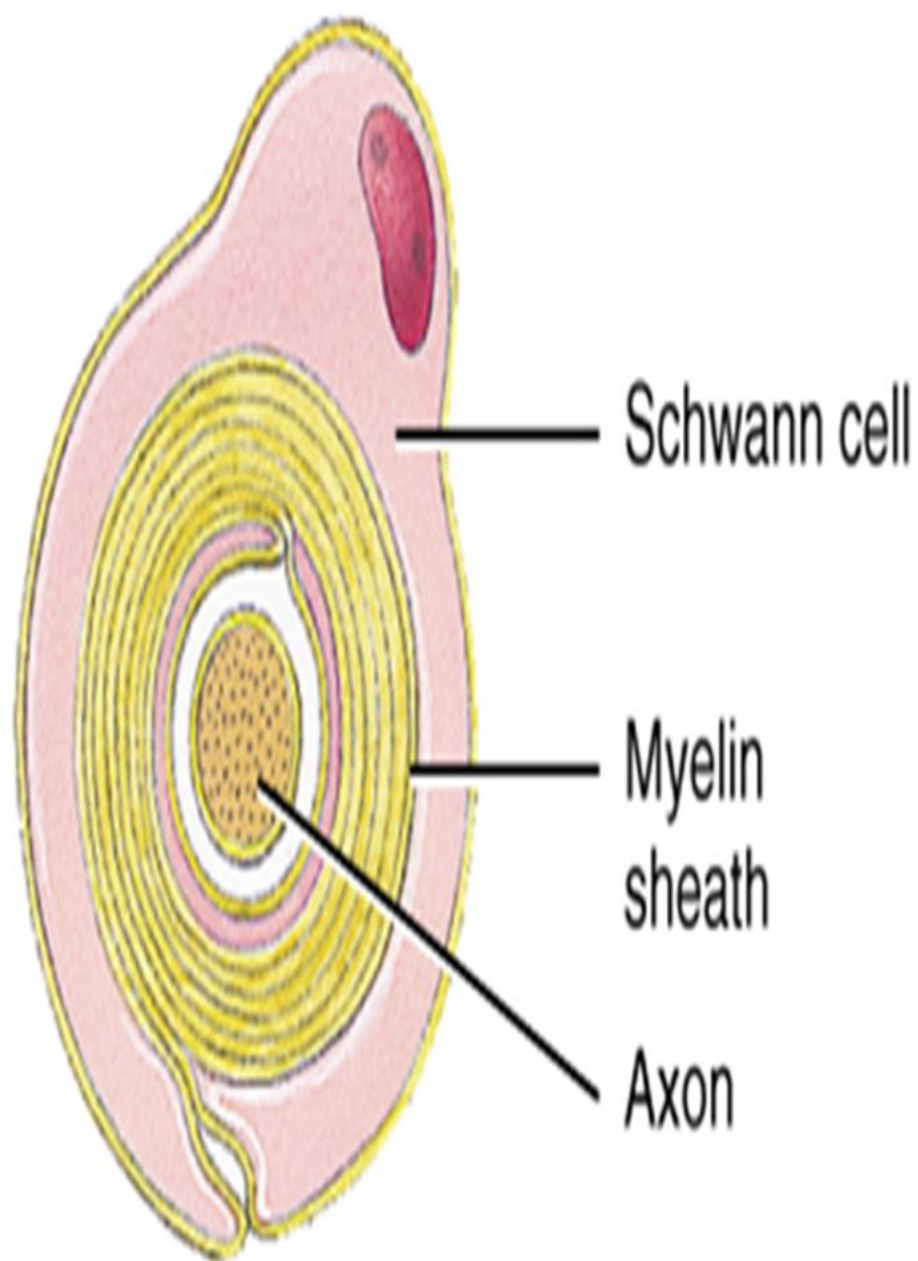
Ependymal cell



Microbes,
cellular debris

Microglial cell







thank
you