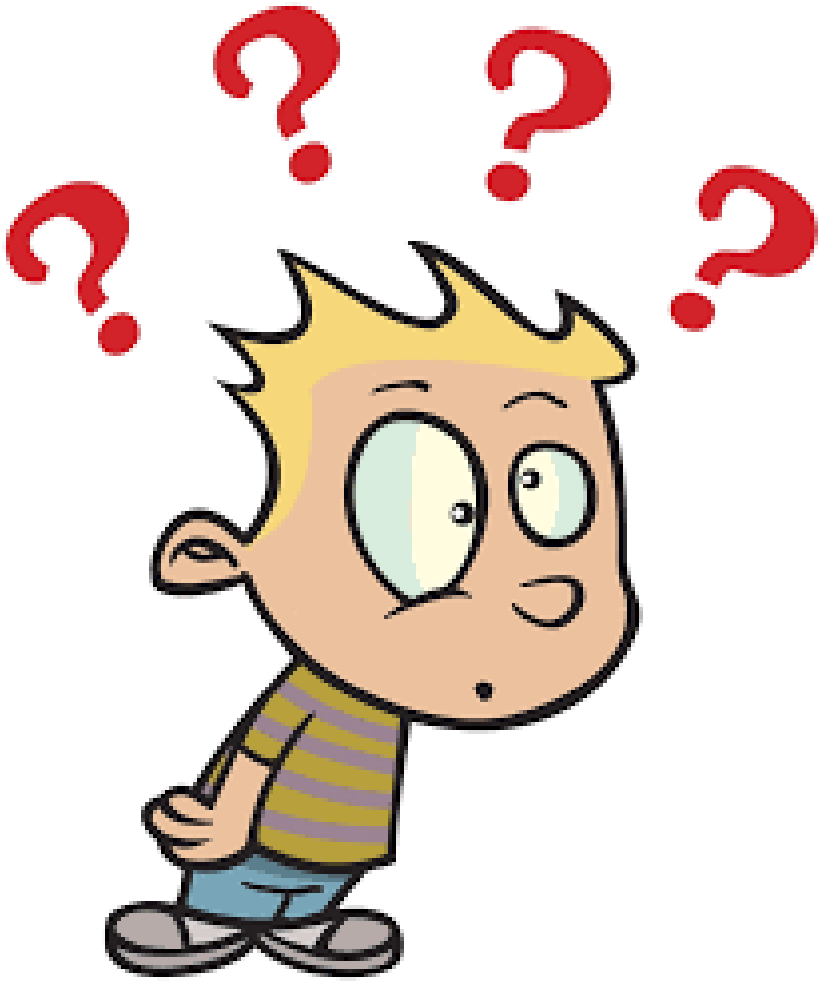
Introductory Module

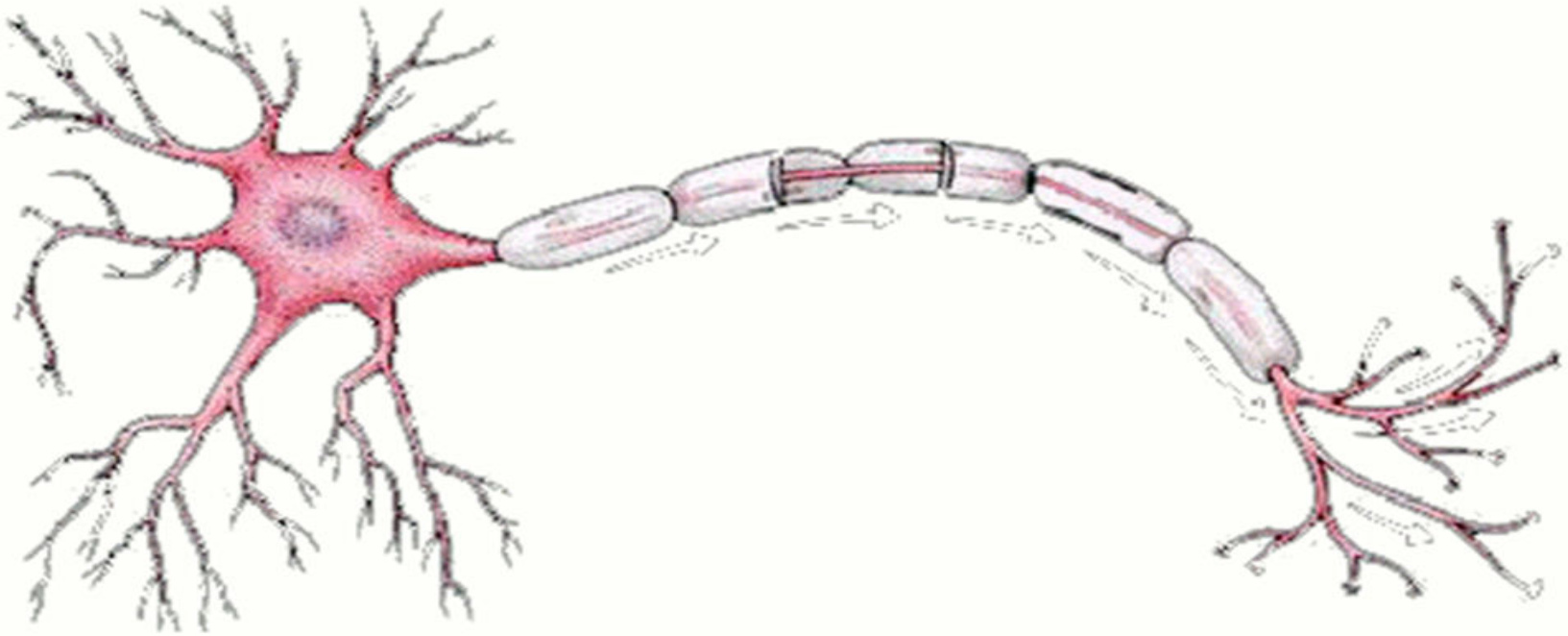
Nervous Tissue


Good Morning


بسم الله الرحمن الرحيم
قالوا سبحانك لا علم لنا إلا ما
علمتنا إنك أنت العليم الحكيم
صدق الله العظيم
البقرة (٣٢)



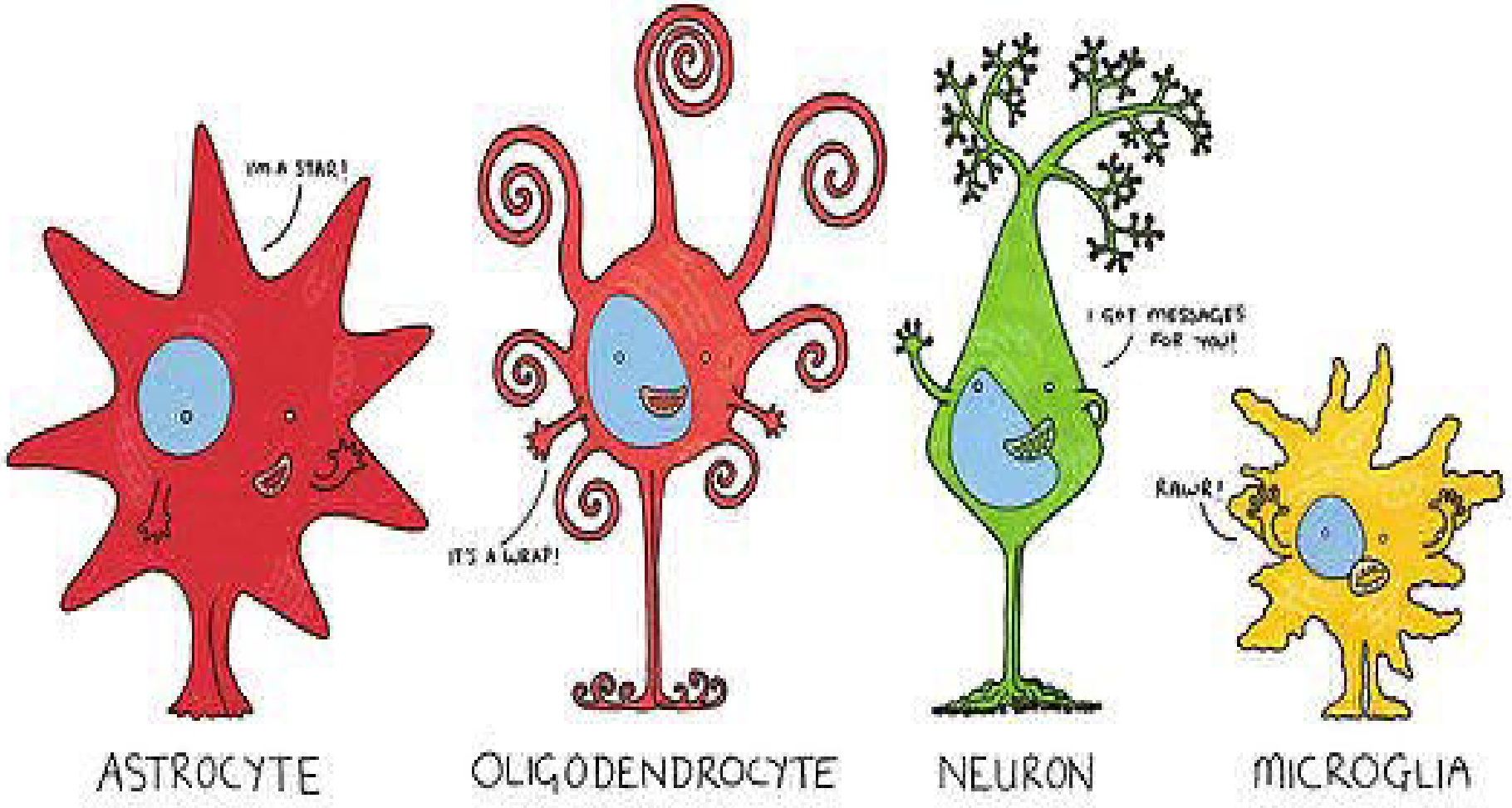
If you don’t understand…TELL ME!



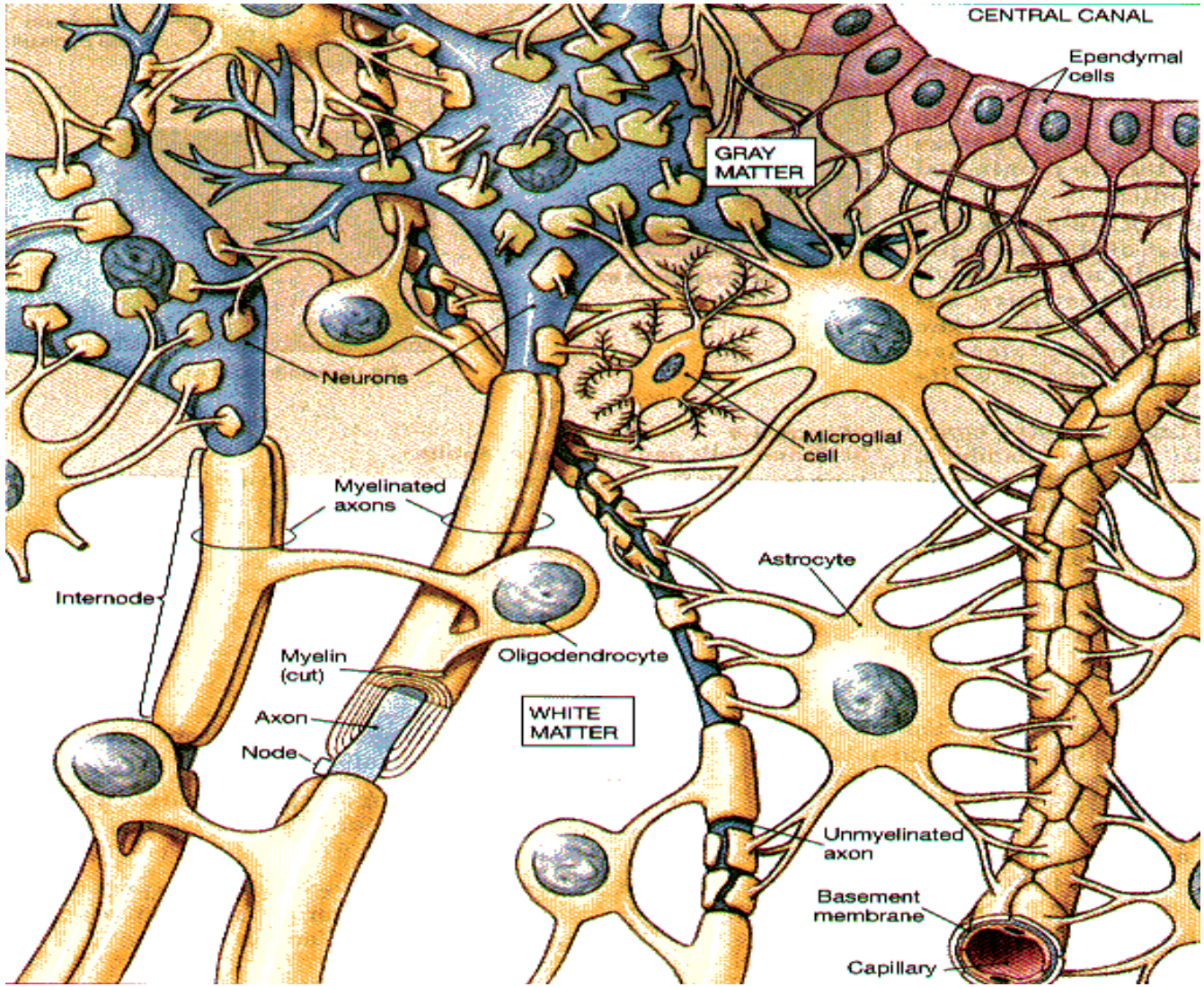
Nervous tissue

Samraa Hussein Abdel-Kawi

Cells of Nervous Tissue

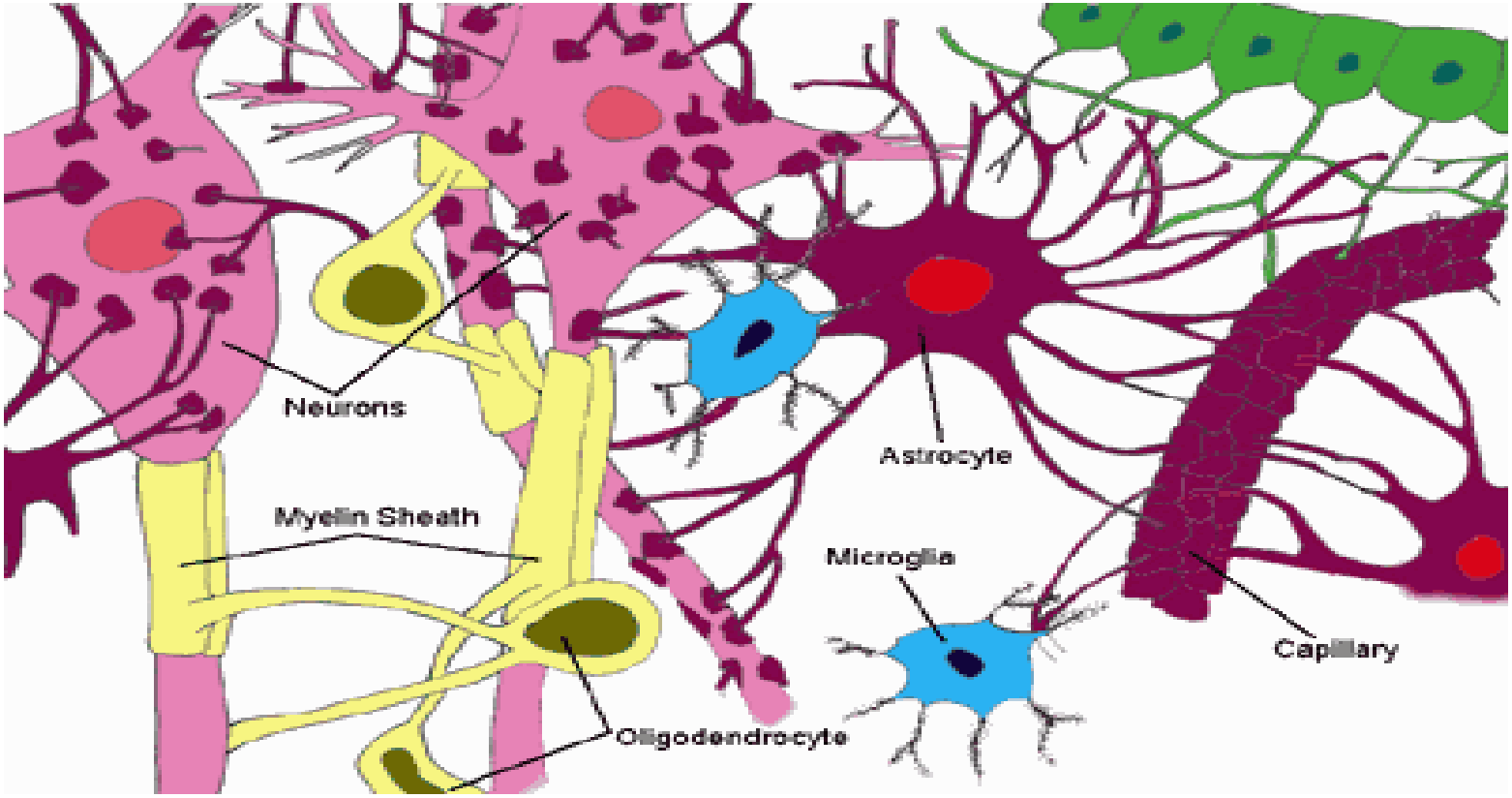


NEUROGLIA

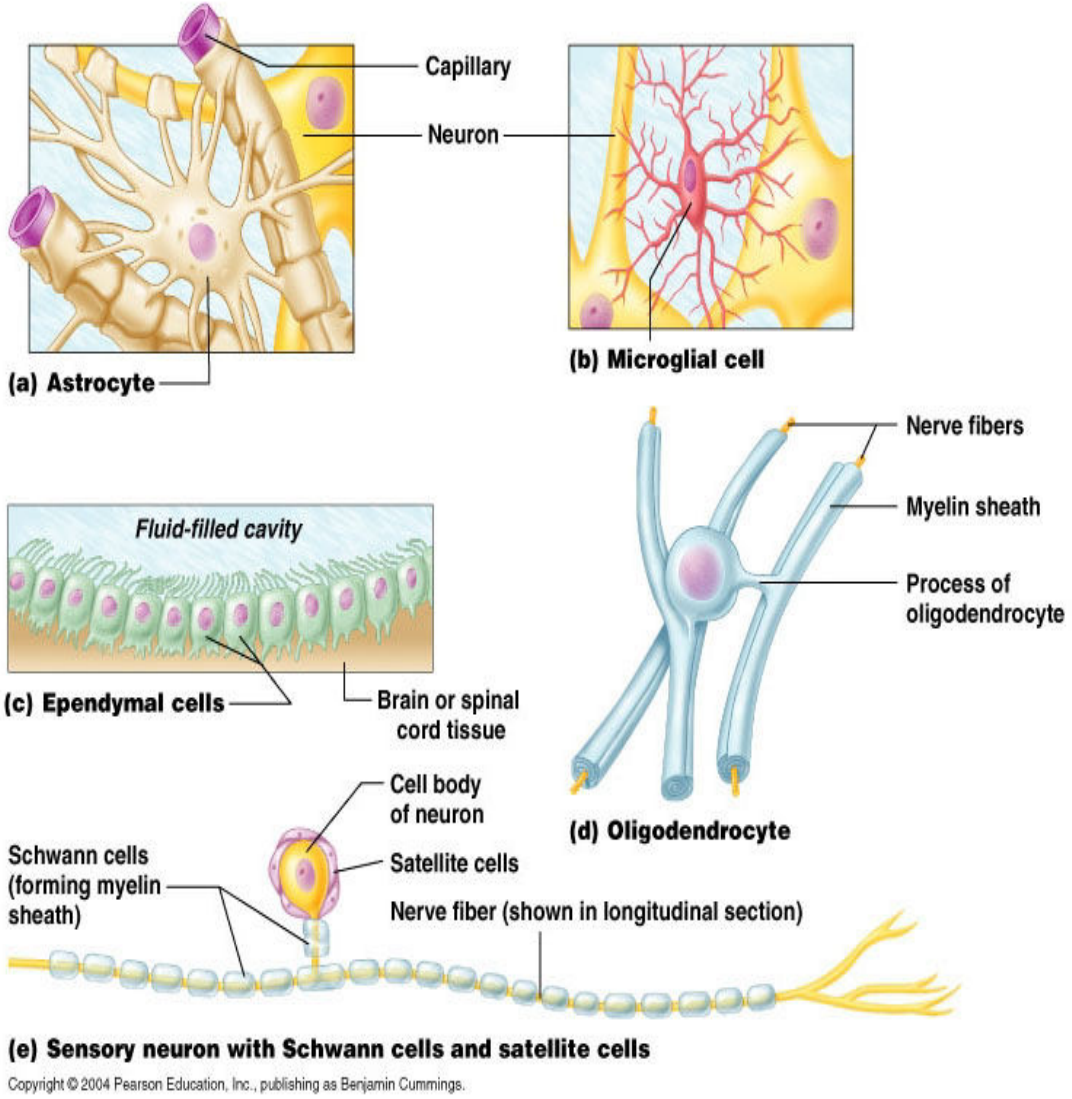

CENTRAL CANAL
Ependymal cells
GRAY MATTER
Neurons
Microglial cell
Myelinated axons
Astrocyte
Internode
Oligodendrocyte
Myelin (cut)
Axon
Node
WHITE MATTER
Unmyelinated axon
Basement membrane
Capillary

NEUROGLIA

Glial cells are 10 times more abundant in the mammalian brain than neurons. They surround the cell bodies and processes. Furnishing a microenvironment suitable for neuronal activity



1. Astrocyte
2. oligodendrocyte
3. Microglia
4. Ependymal cells
5. Schwann cells
6. Satellite cell of ganglia



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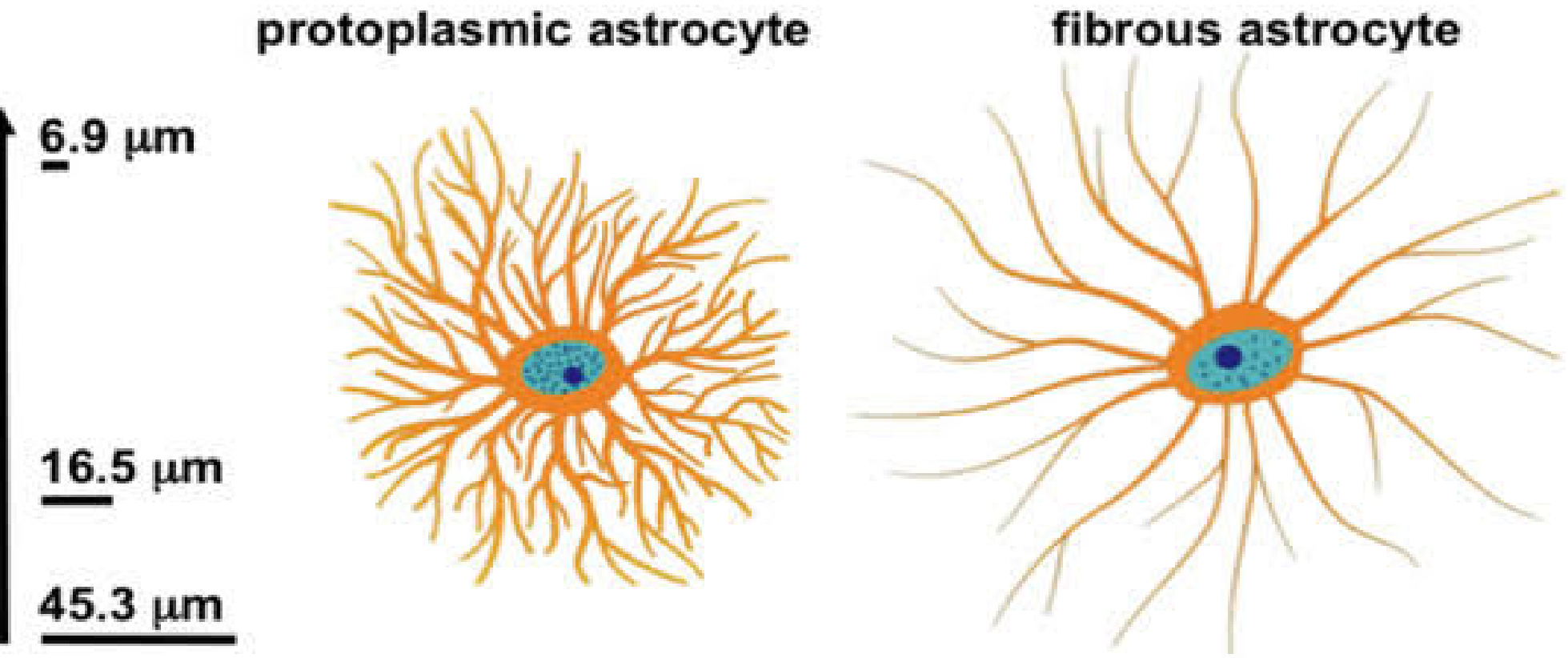
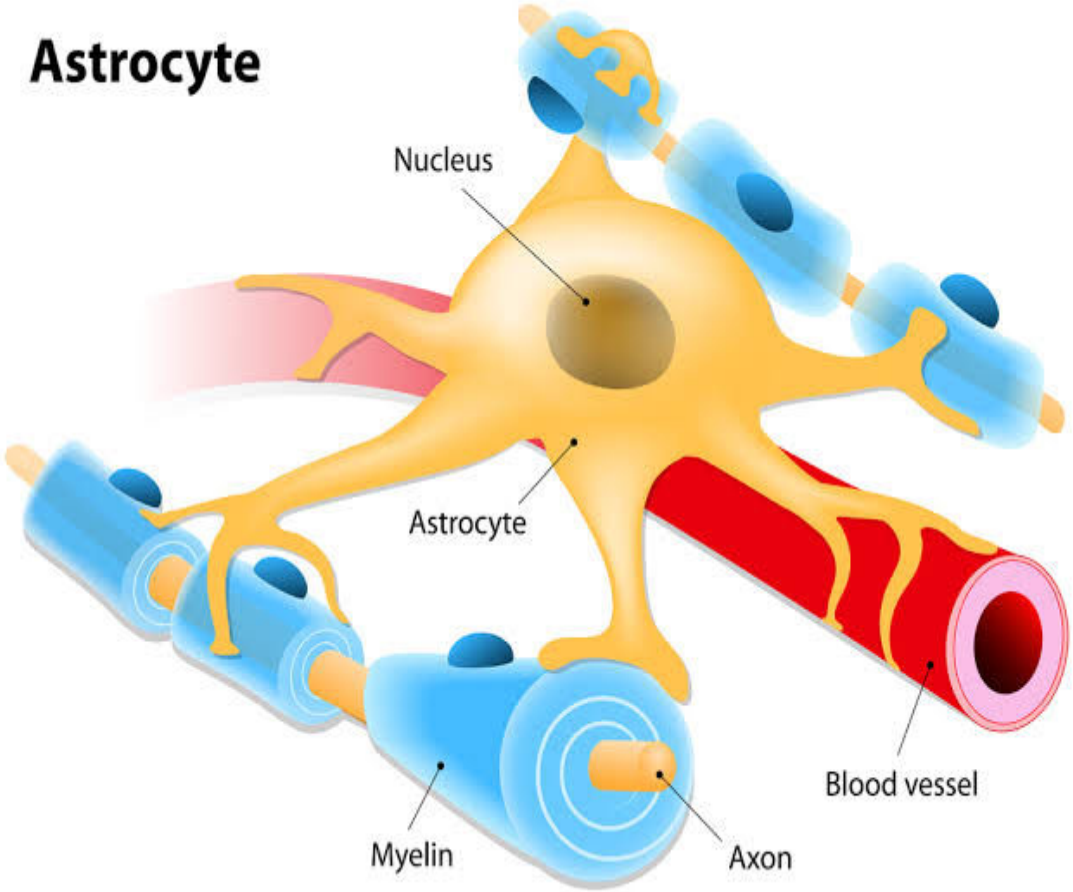
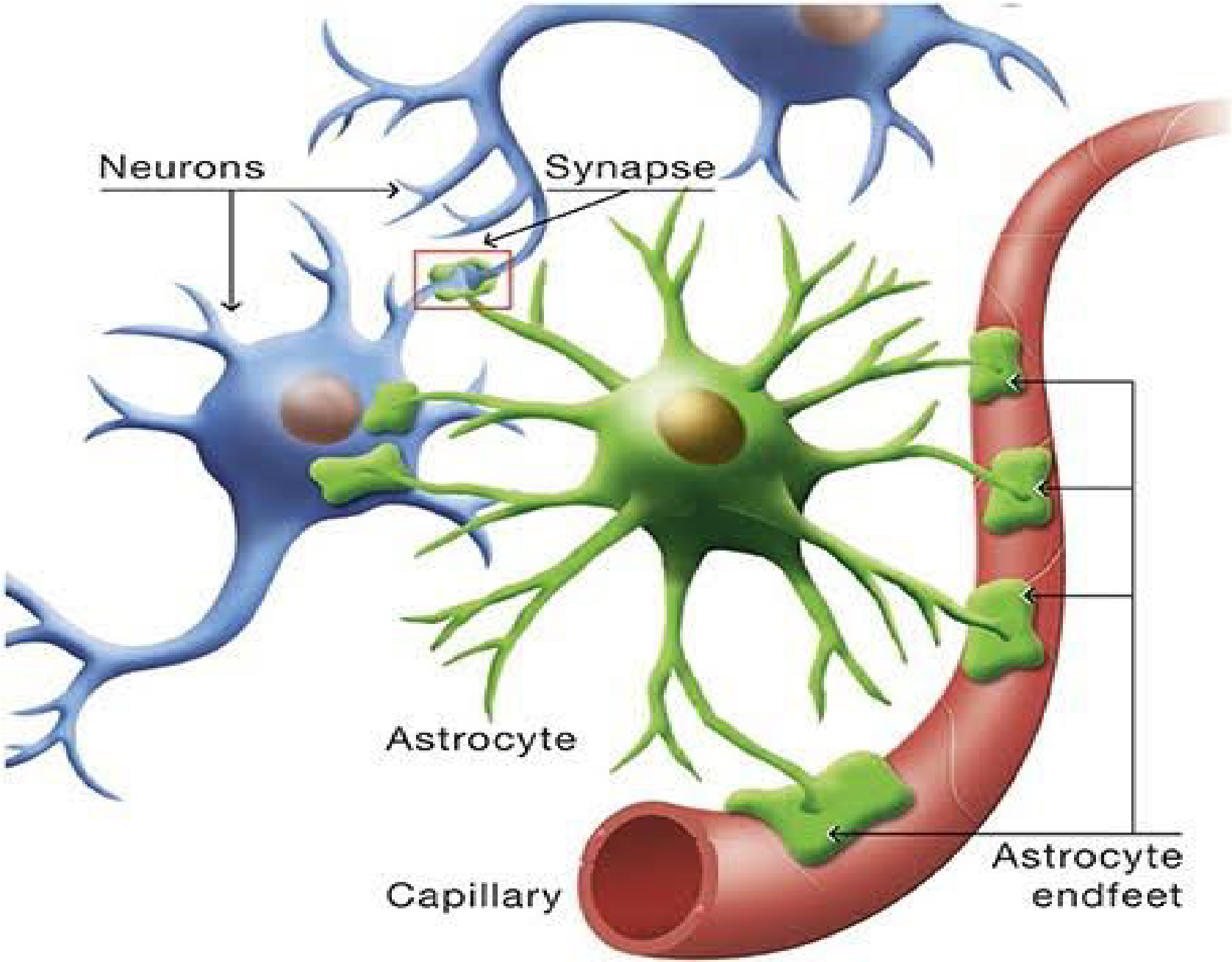
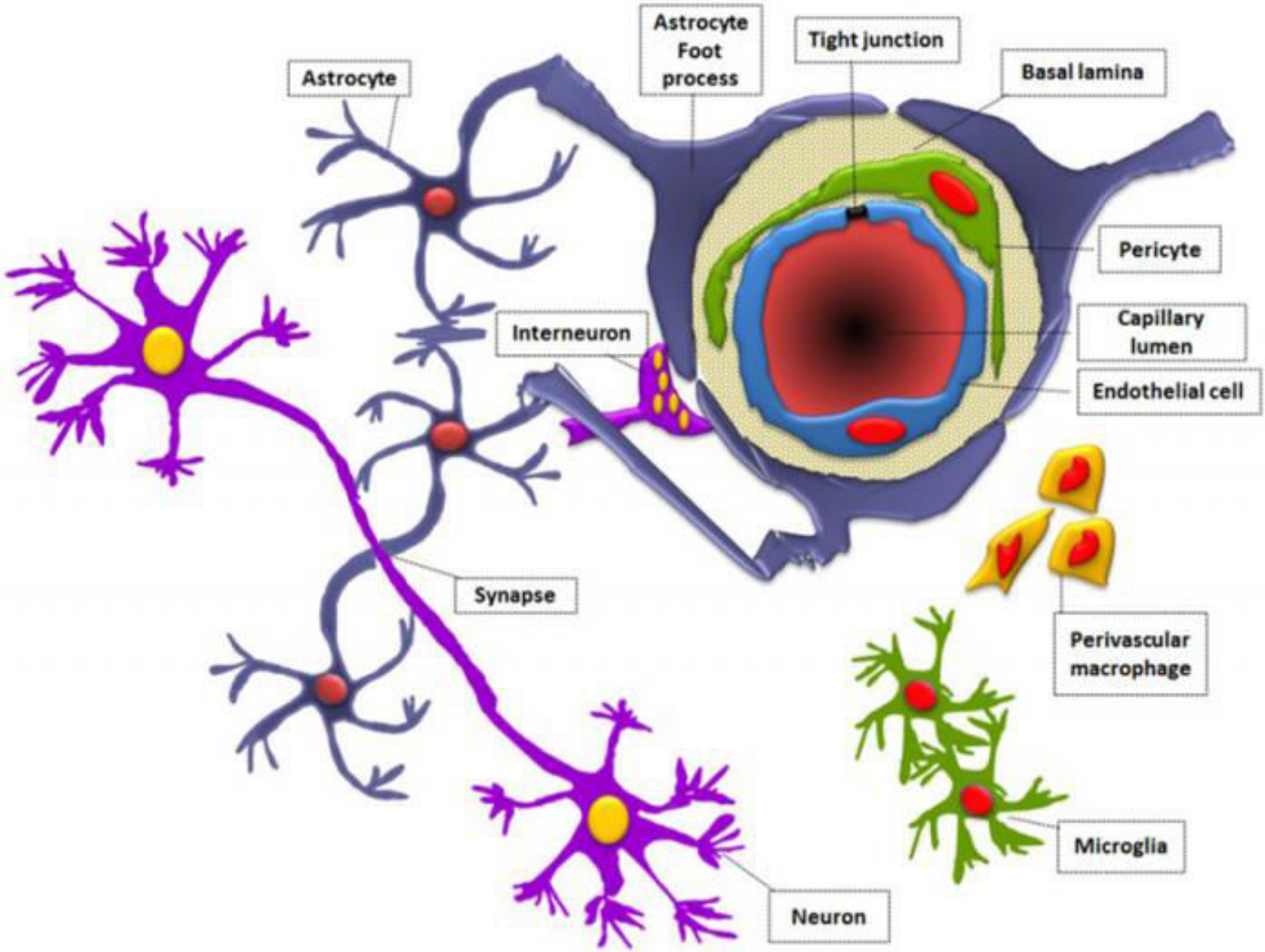
Astrocyte

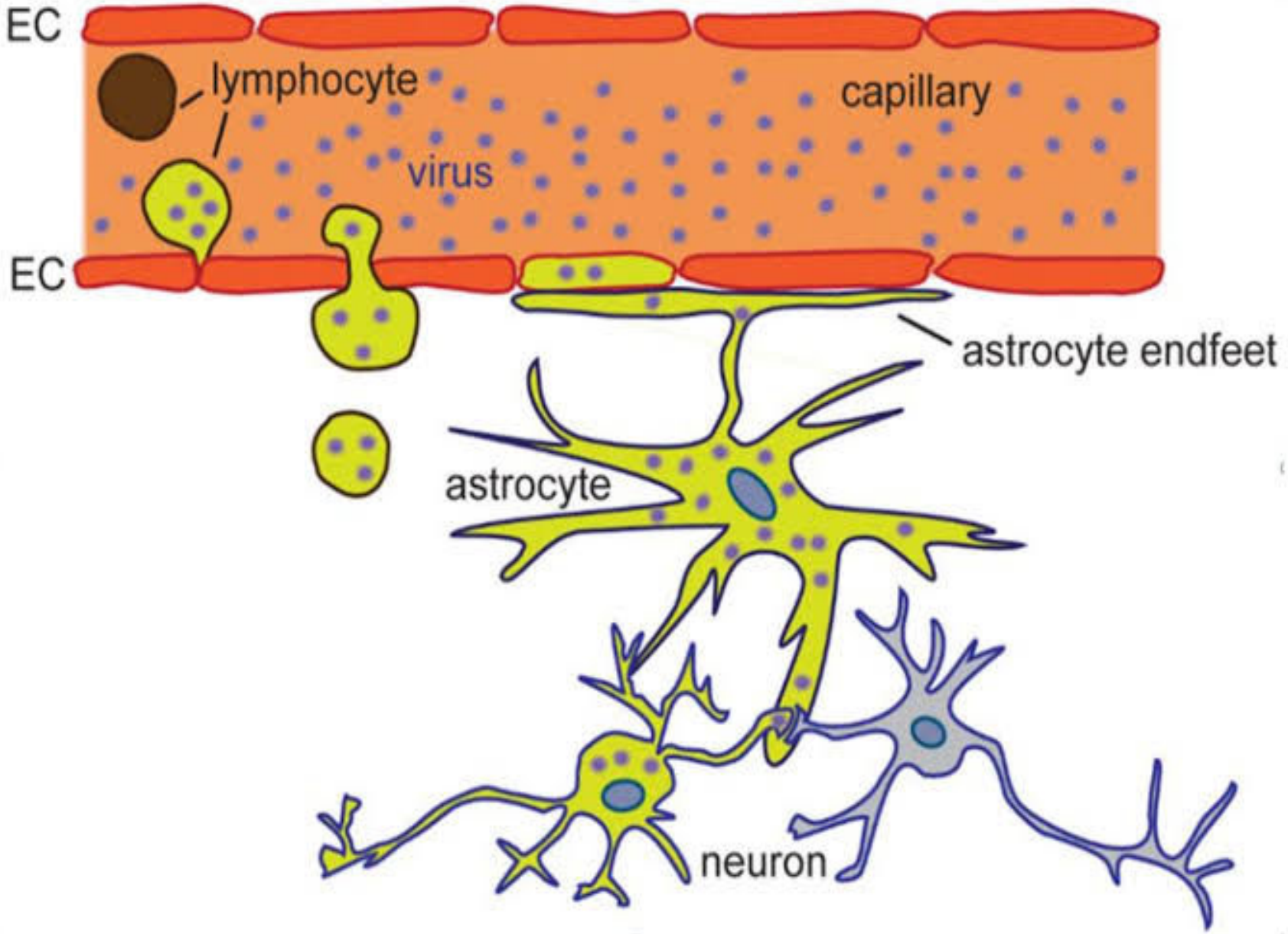

protoplasmic astrocyte
fibrous astrocyte
6.9 µm
16.5 µm
45.3 µm

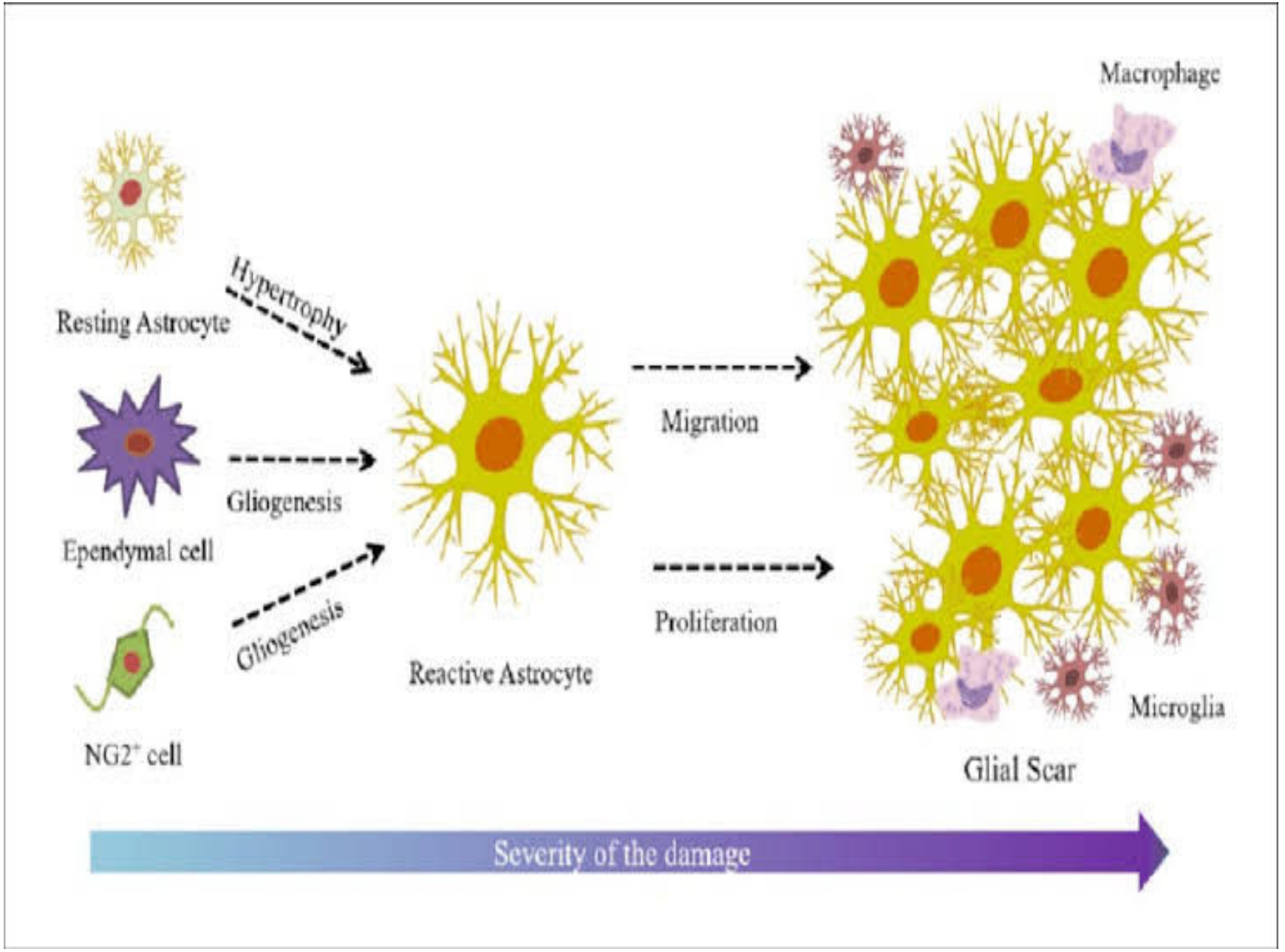


- Structural support
- Blood brain barrier
- Control metabolic exchange
- repair processes by forming astrocytic scar

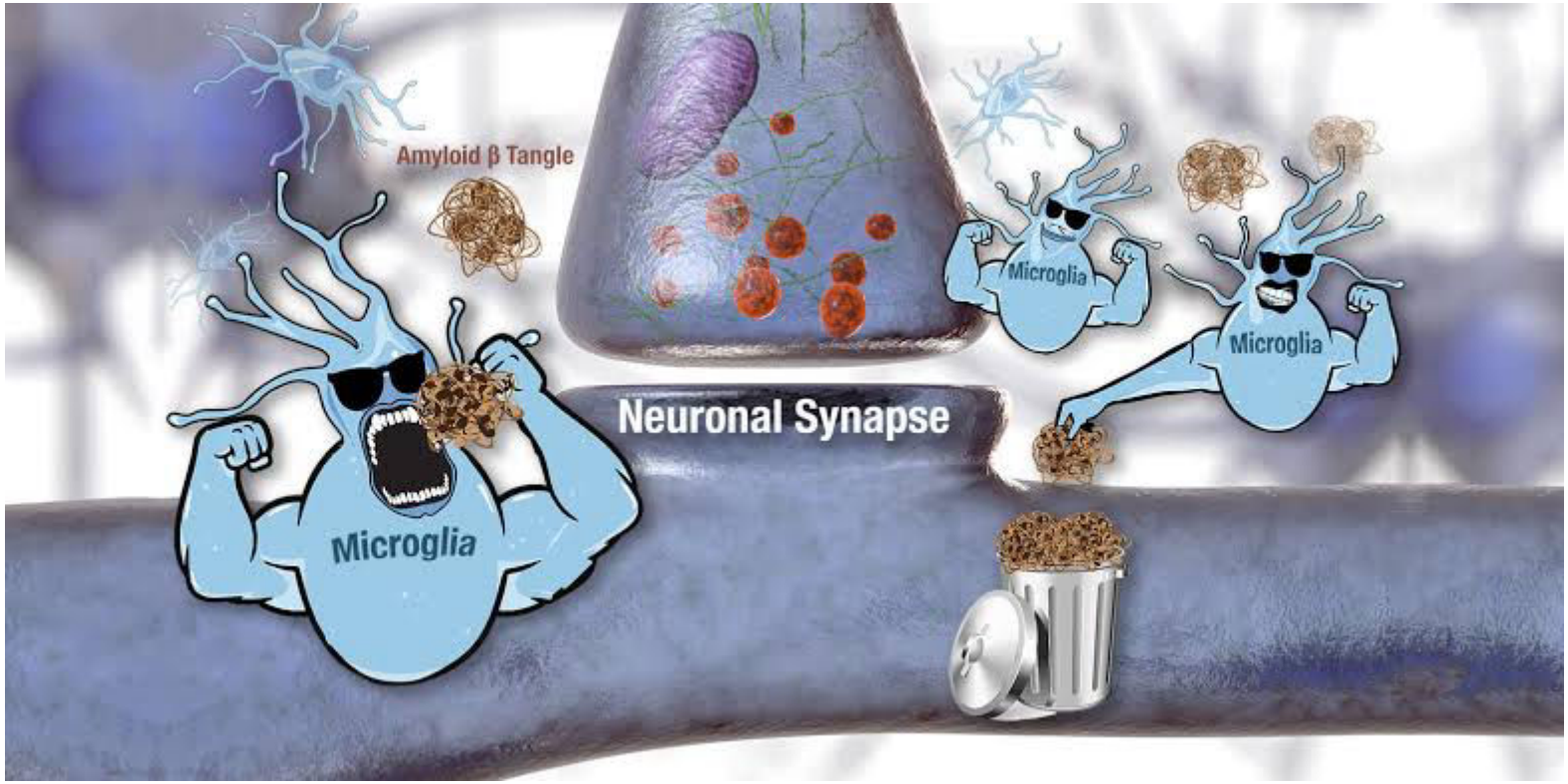

Neurons
Synapse
Astrocyte
Capillary
Astrocyte endfeet


Astrocyte
Astrocyte Foot process
Tight junction
Basal lamina
Pericyte
Capillary lumen
Endothelial cell
Interneuron
Synapse
Perivascular macrophage
Microglia
Neuron

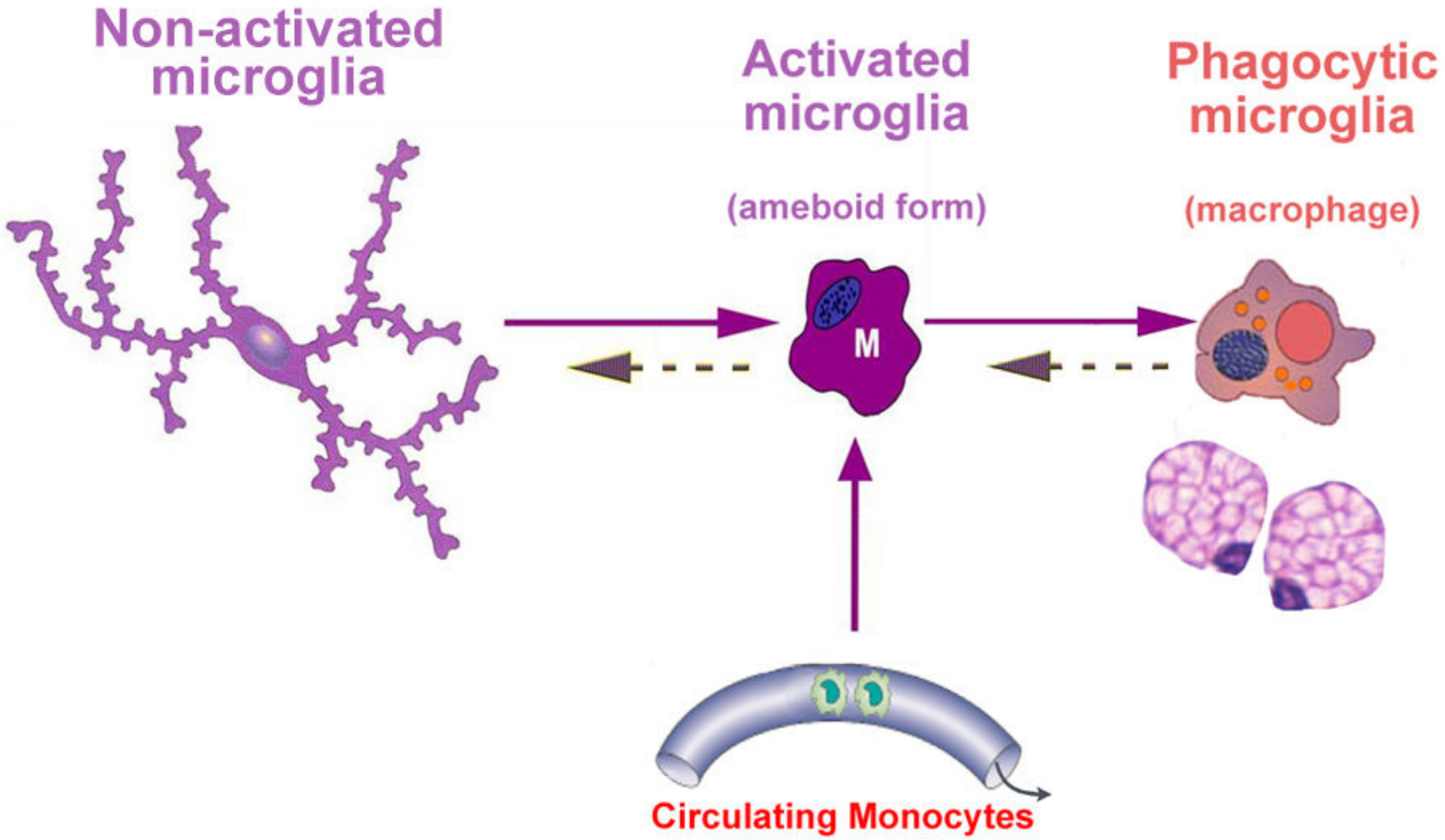

EC
lymphocyte
capillary
virus
EC
astrocyte endfeet
astrocyte
neuron


Macrophage
Resting Astrocyte
Hypertrophy
Migration
Gliogenesis
Ependymal cell
Proliferation
Gliogenesis
Reactive Astrocyte
NG2+ cell
Microglia
Glial Scar
Severity of the damage

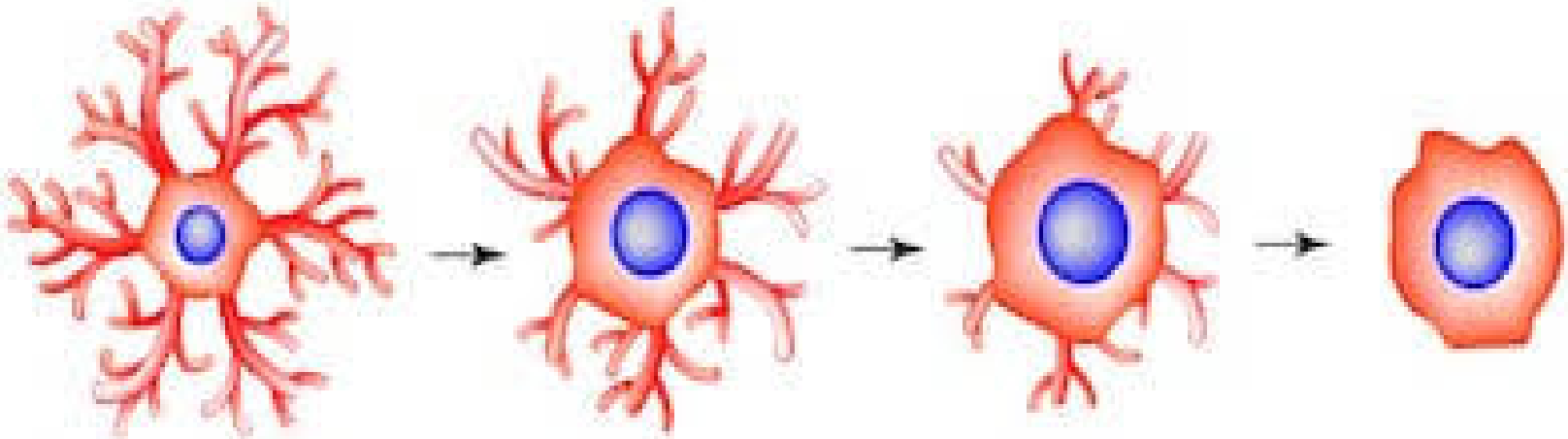
Microglia


Amyloid β Tangle
Microglia
Microglia
Microglia
Neuronal Synapse

Microglia


Non-activated microglia
Activated microglia
(ameboid form)
Phagocytic microglia
(macrophage)
M
Circulating Monocytes

MICROGLIAL ACTIVATION



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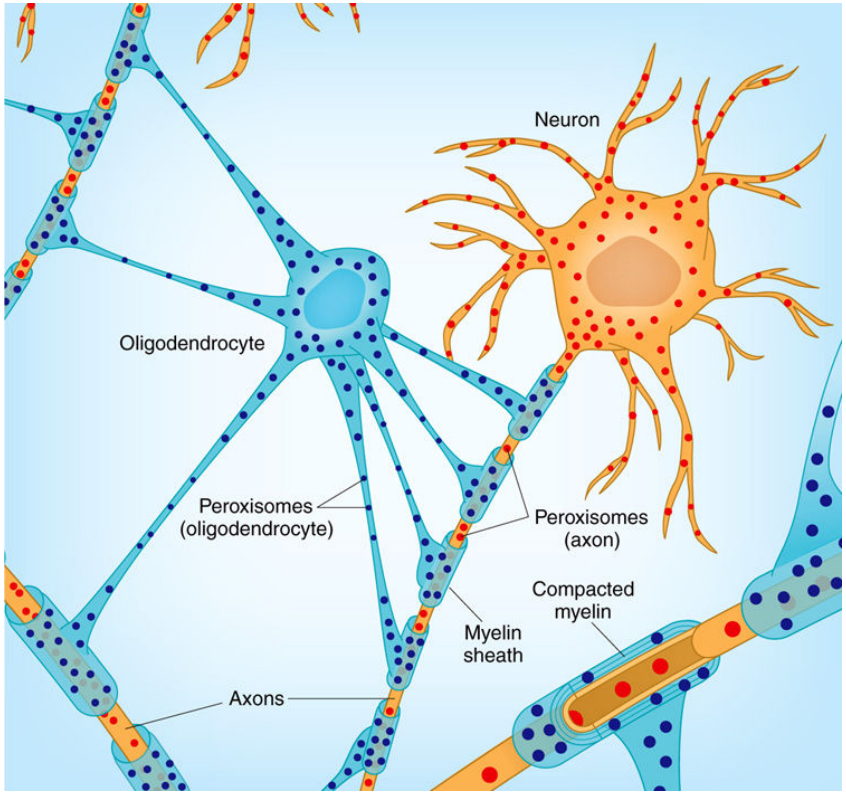
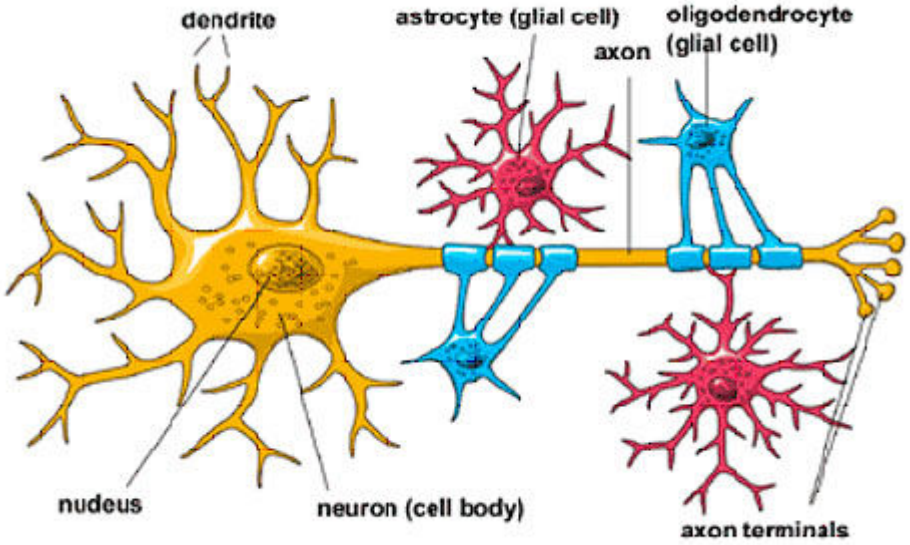
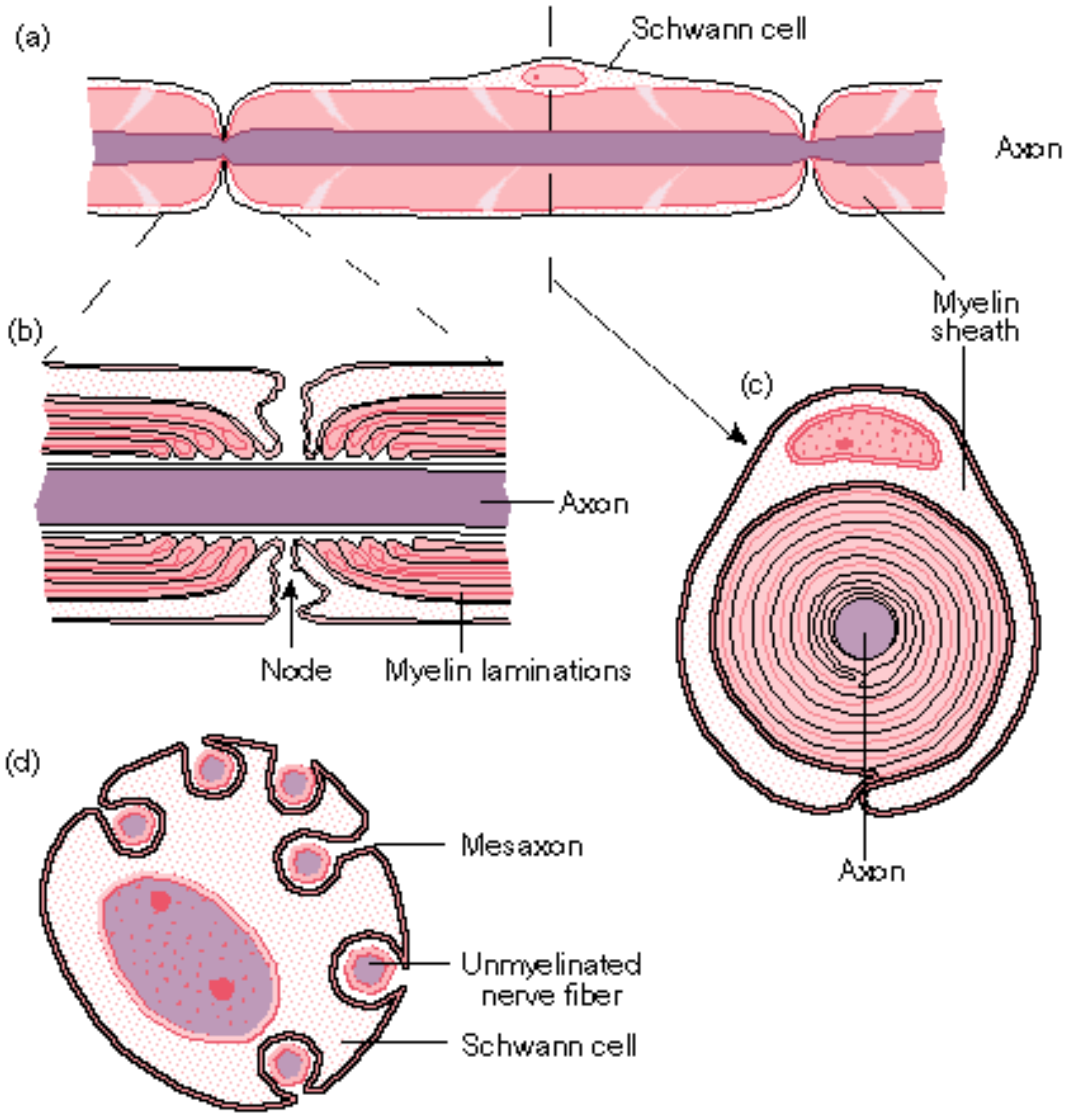
MYELIN

Oligodendrocytes





Schwann cell



Ependymal cells

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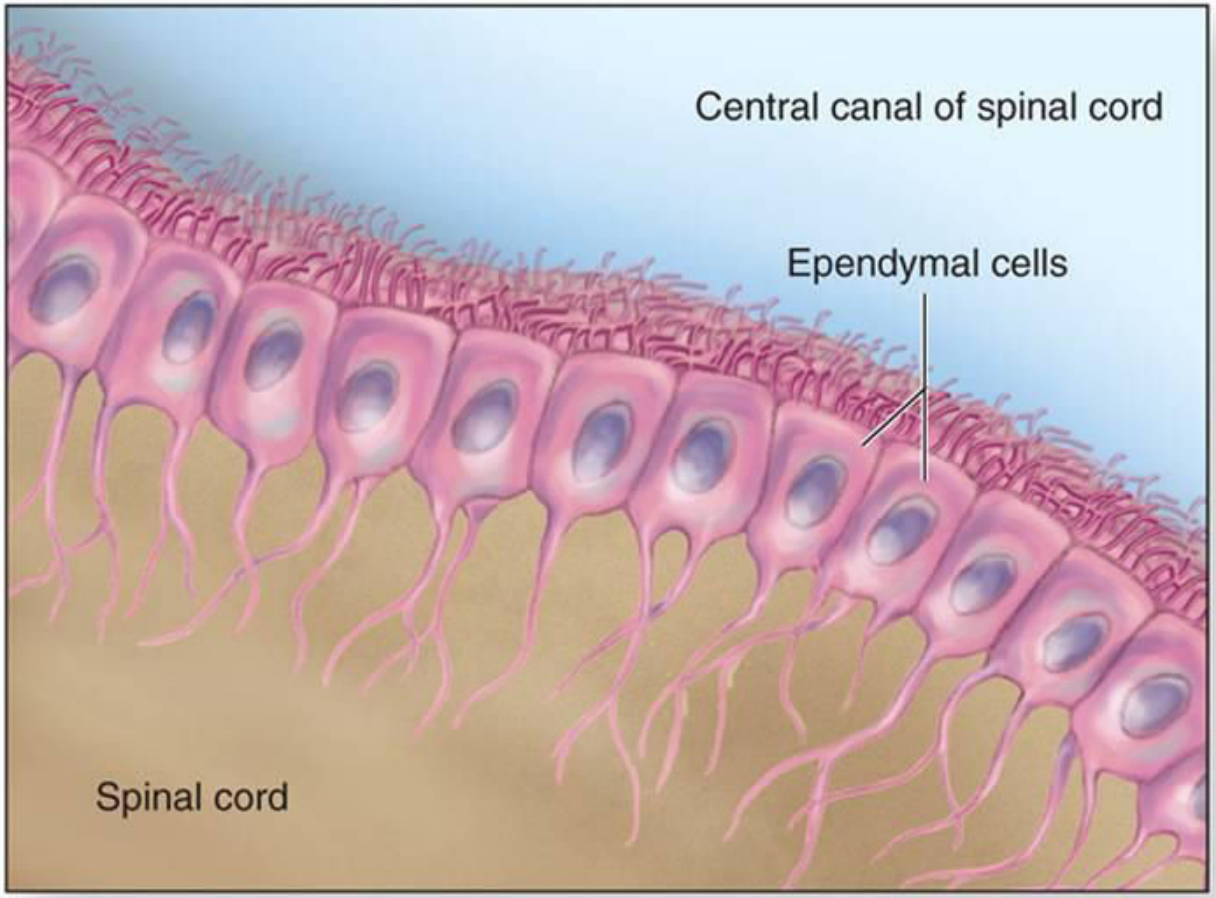
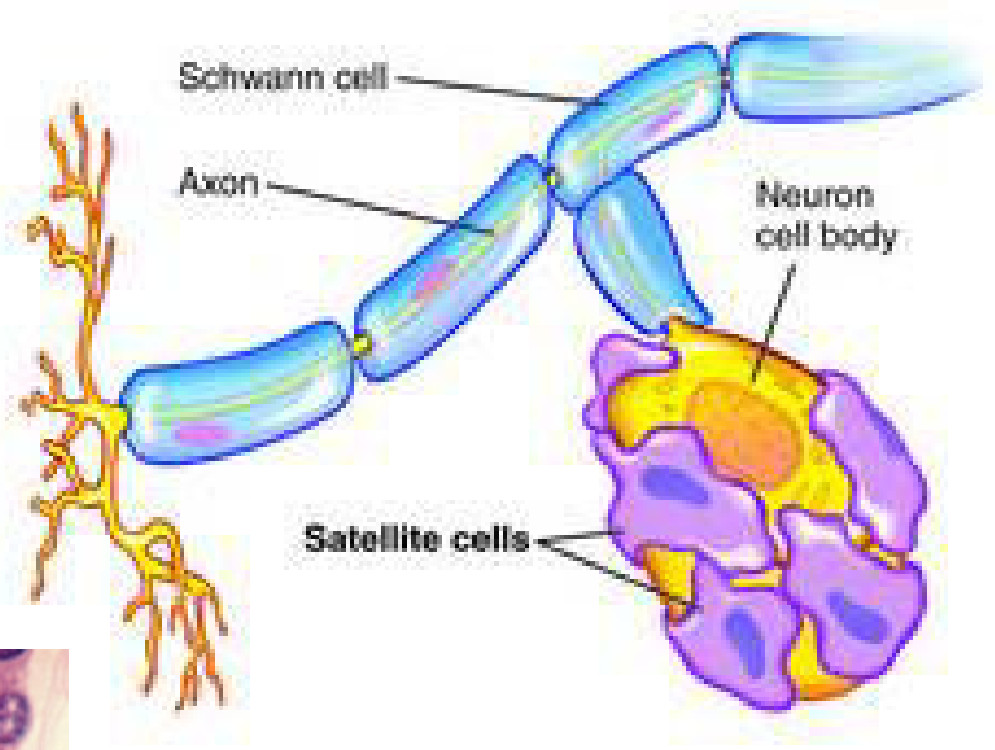
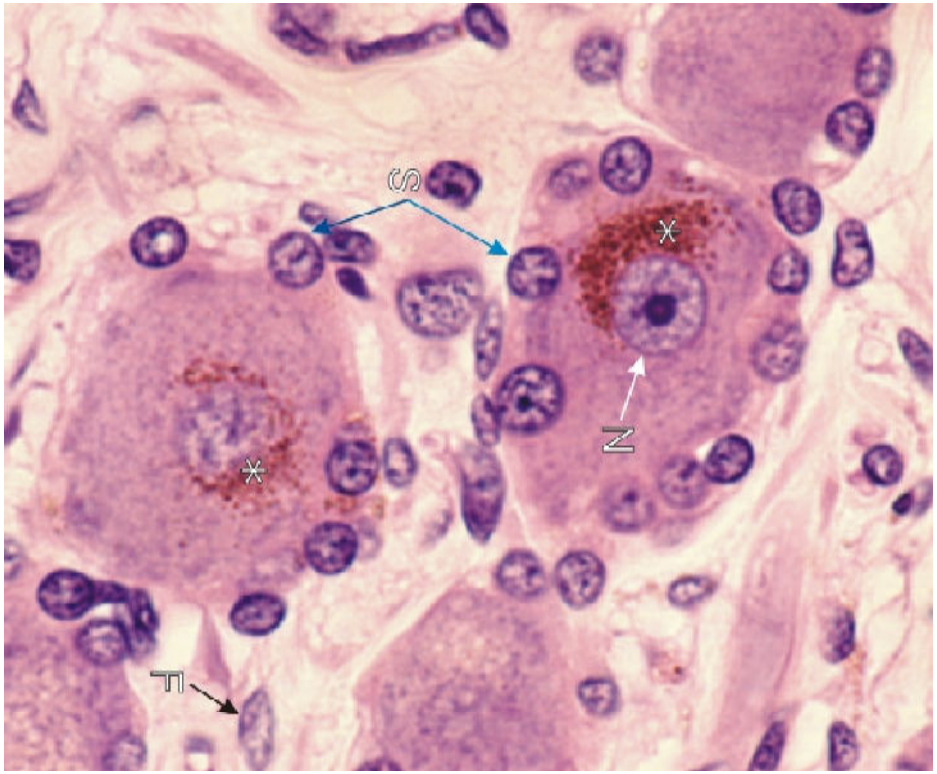


(b) Ependymal cells

Satellite cells



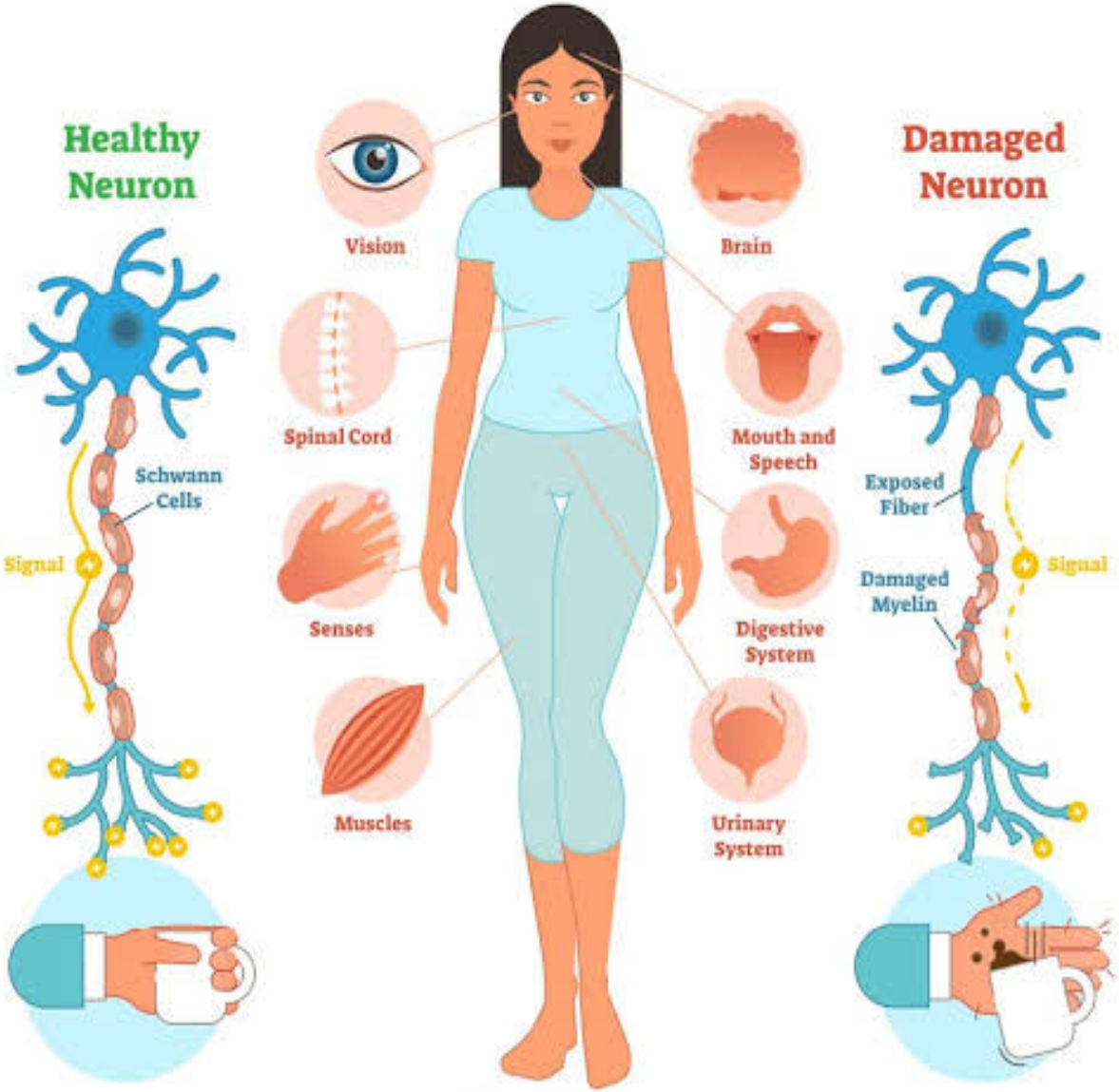


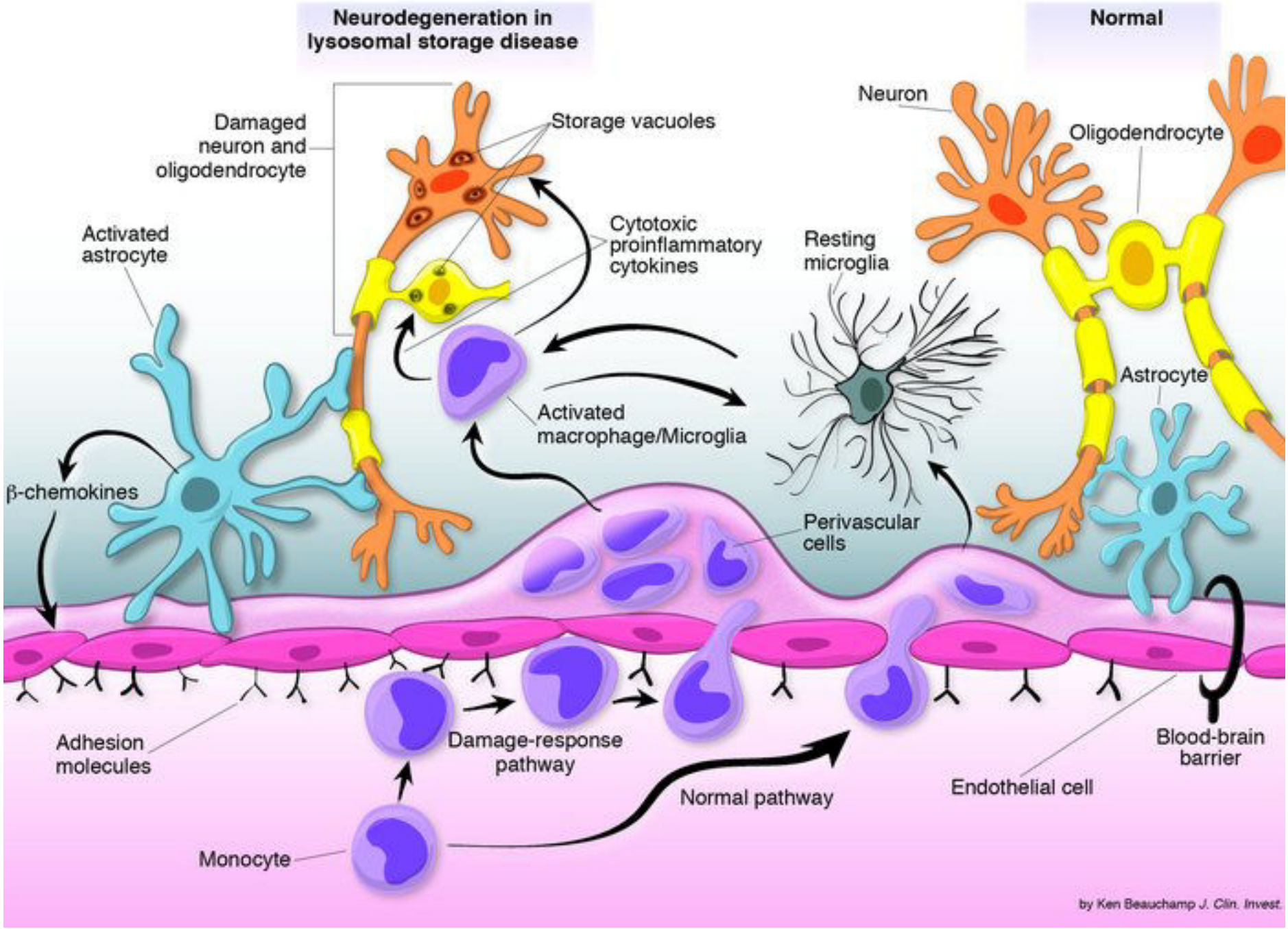
MS


24013
2
25
Ax S17.1
Nov
4000.0
30.0/1
04:21
2

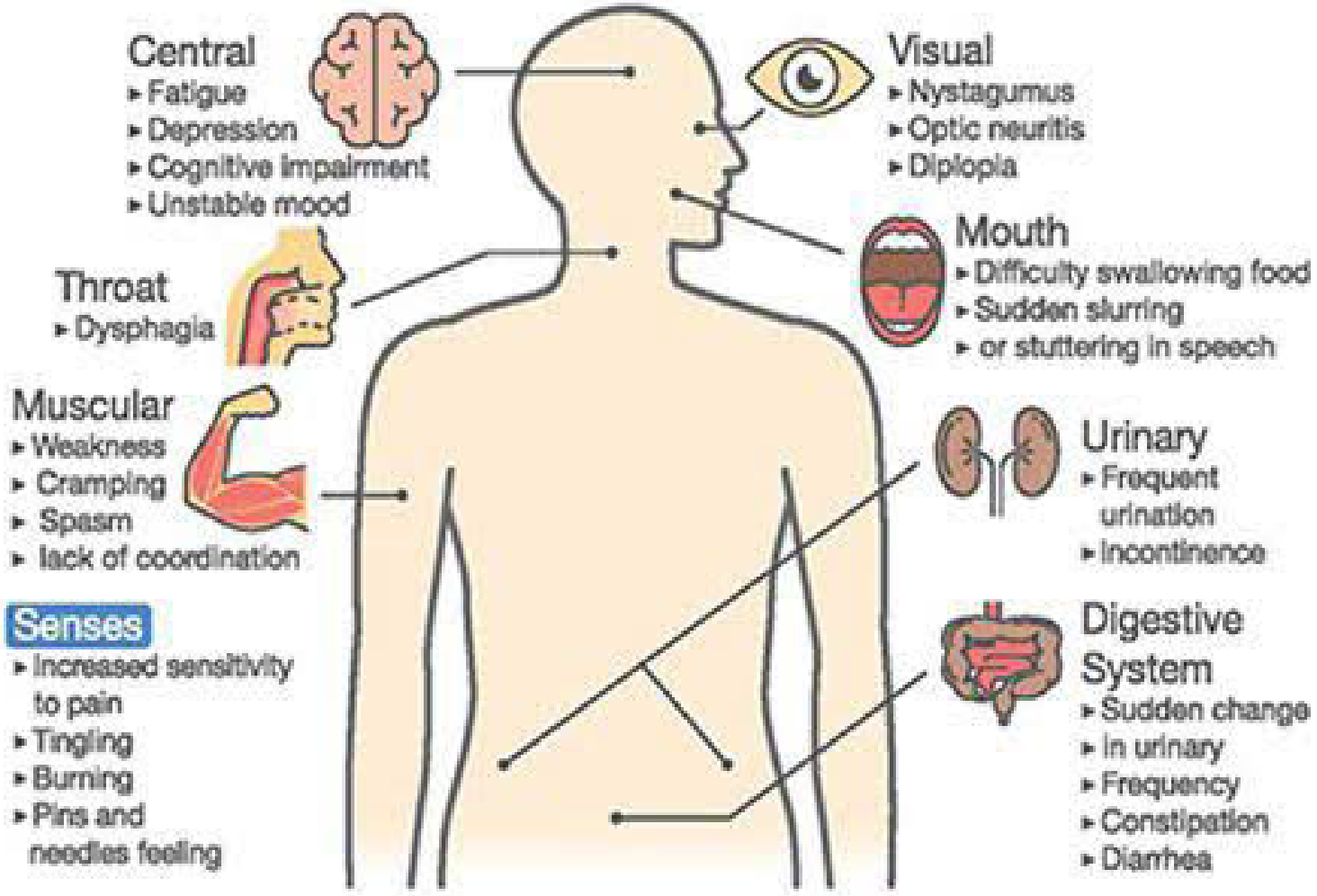

SP
SL
3.0
Sag
4000.0
30.0/1
04:21
2
JAF

MULTIPLE SCLEROSIS



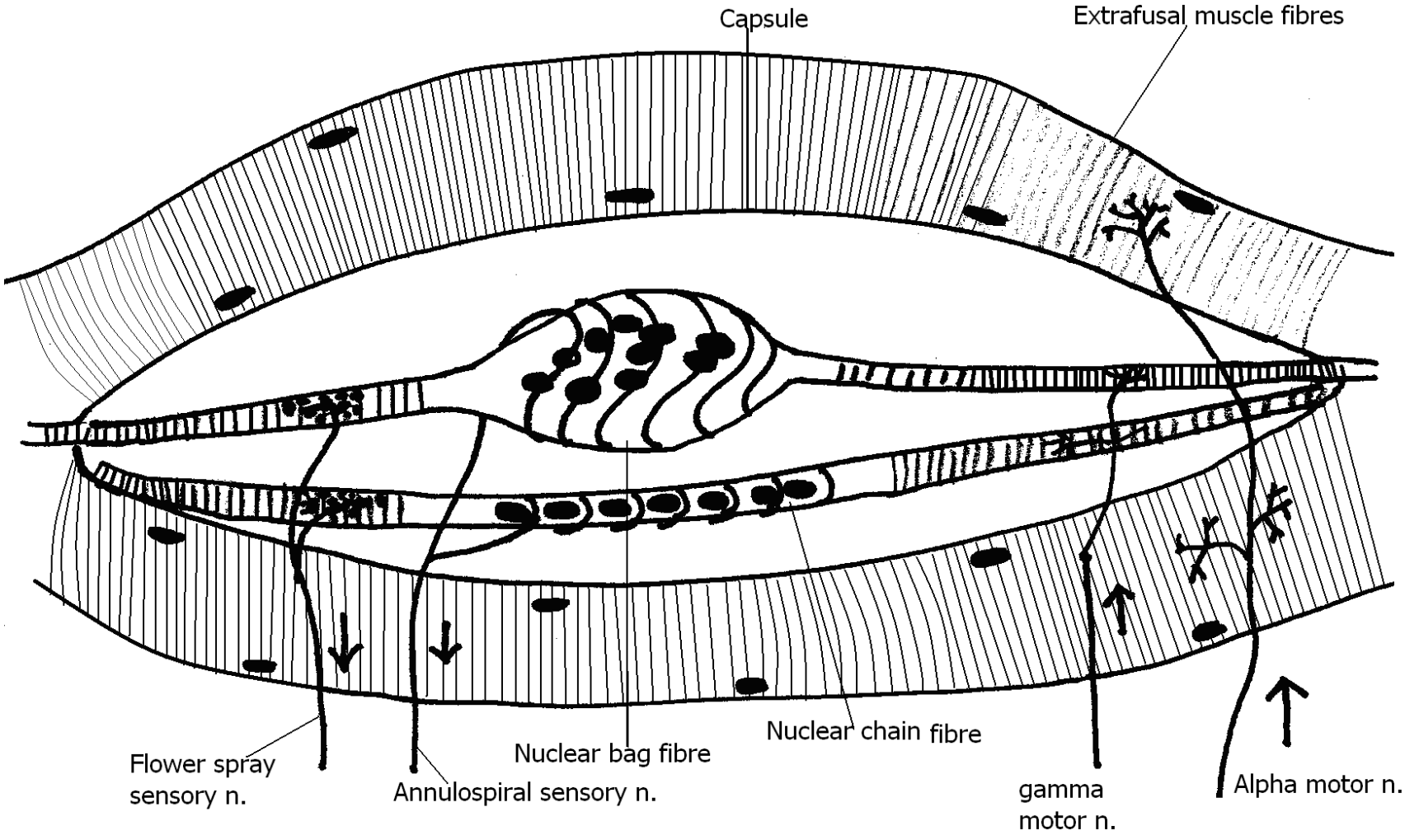

Neurodegeneration in lysosomal storage disease
Normal
Damaged neuron and oligodendrocyte
Storage vacuoles
Neuron
Oligodendrocyte
Activated astrocyte
Cytotoxic proinflammatory cytokines
Resting microglia
Activated macrophage/Microglia
Astrocyte
β-chemokines
Perivascular cells
Adhesion molecules
Damage-response pathway
Normal pathway
Blood-brain barrier
Endothelial cell
Monocyte
by Ken Beauchamp J. Clin. Invest.

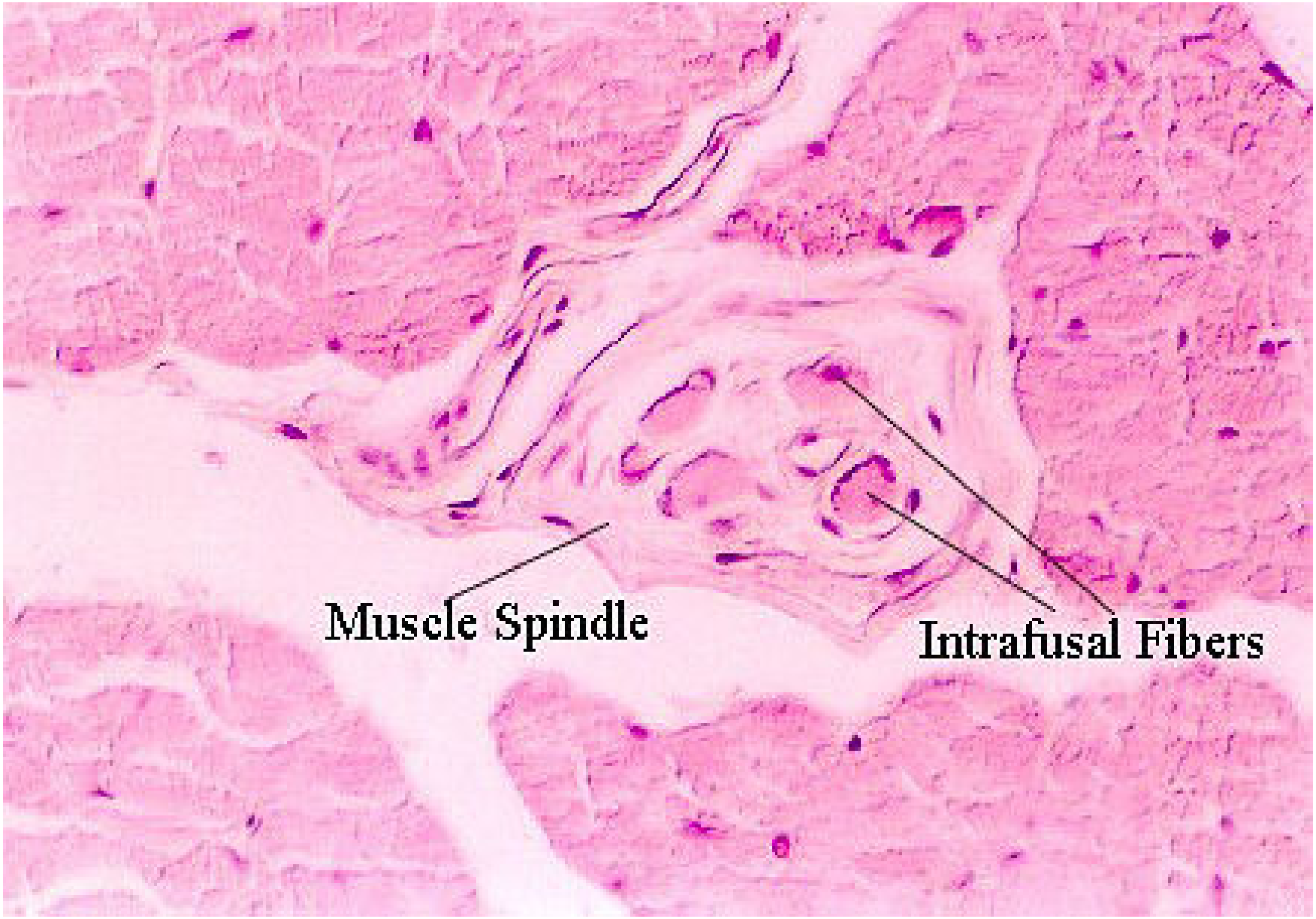
Main symptoms of Multiple Sclerosis

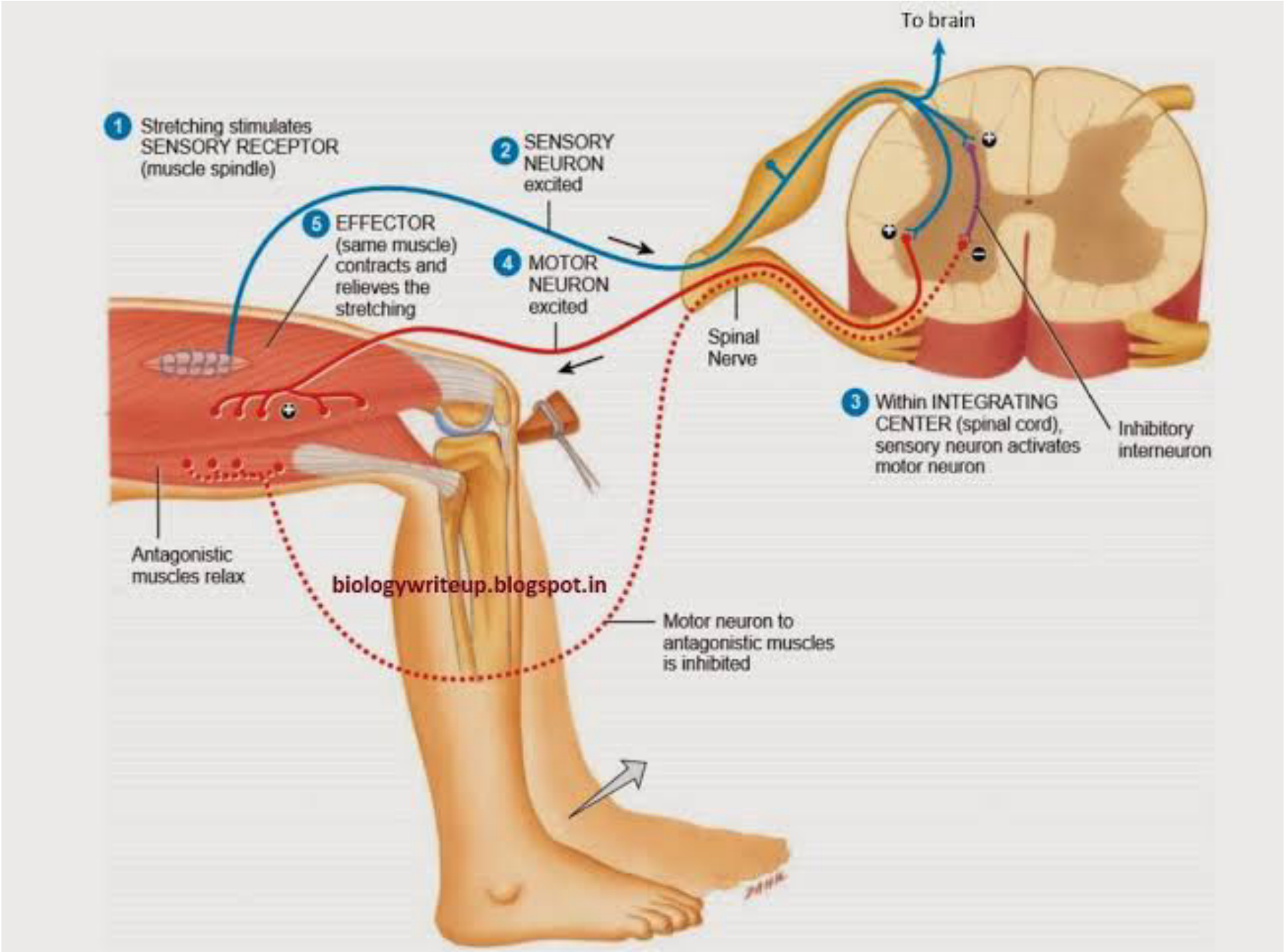


Muscle Spindles:

- **Proprioceptors** within the skeletal muscle which are responsible for regulation of the muscle tone through stretch reflex, participate in control of body posture and the coordinate action of opposing muscles.
- Site: more in muscles of fine movements and antigravity muscles
- Paralell to muscle fibers
- Fusiform
- Capsulated
- Cotains:
  - Lymph
  - Intrafusal fibers
  - Afferent nerves
  - Efferent nerves


Capsule
Extrafusal muscle fibres
Flower spray sensory n.
Annulospiral sensory n.
Nuclear bag fibre
Nuclear chain fibre
gamma motor n.
Alpha motor n.


Muscle Spindle
Intrafusal Fibers


To brain
1 Stretching stimulates SENSORY RECEPTOR (muscle spindle)
2 SENSORY NEURON excited
5 EFFECTOR (same muscle) contracts and relieves the stretching
4 MOTOR NEURON excited
Spinal Nerve
3 Within INTEGRATING CENTER (spinal cord), sensory neuron activates motor neuron
Inhibitory interneuron
Antagonistic muscles relax
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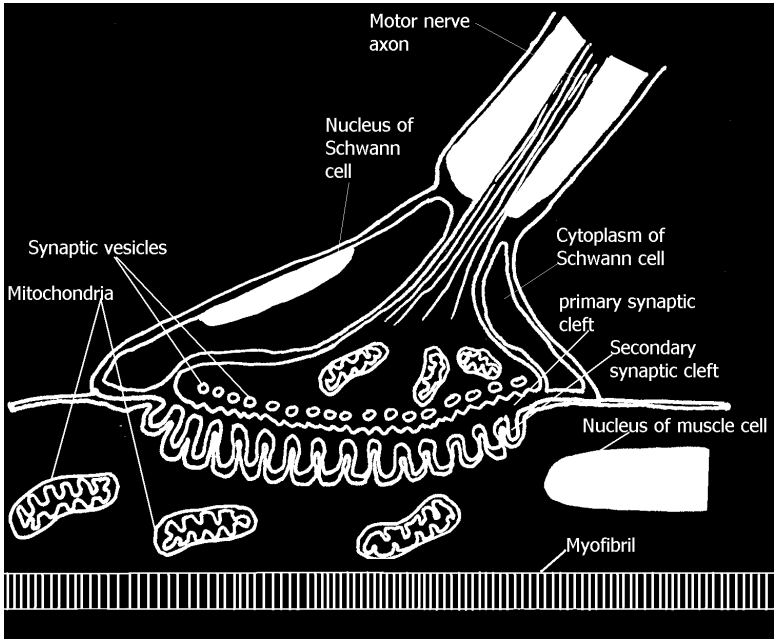
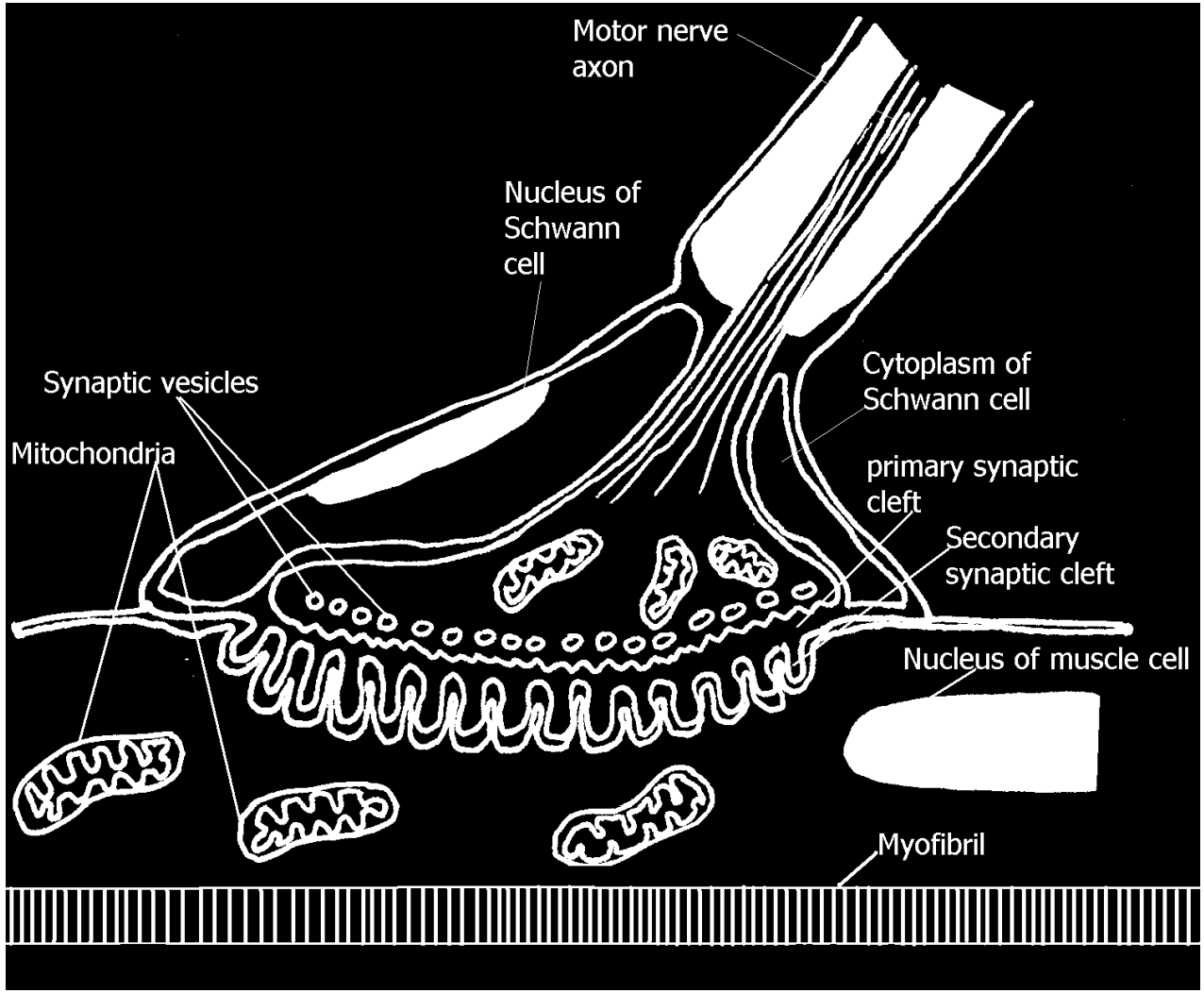
Motor neuron to antagonistic muscles is inhibited

- **<u>Effectors</u>:**
- **<u>Motor End Plate (Neuromuscular Junction)</u>:**
- The myelinated motor nerve branches out to several terminal branches.
- The nerve loses its myelin sheath and forms a dilated terminal that sits in a depression on the muscle cell surface called **sole plate**.
- The basement membrane of Schwann cells fuses with that of the muscle fiber.
- The terminal swelling is rich in mitochondria and synaptic vesicles.
- The space between the terminal swelling and the muscle fiber is called **primary synaptic cleft**.
- The post synaptic membrane is folded to form **secondary synaptic clefts.**
- The sole plate of the muscle fiber contains many mitochondria and nuclei.



Motor end plate




Thank you