



MED439
KING SAUD UNIVERSITY

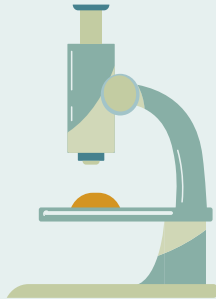
جامعة
الملك سعود
King Saud University



Revised & Approved



Abdullah Alsubaihi
Rania Almutiri



Histology Team
439

Normal cells of CNS

Color index:

Slides 

Important 

Doctors notes 

Extra 

Editing file

► Objectives:

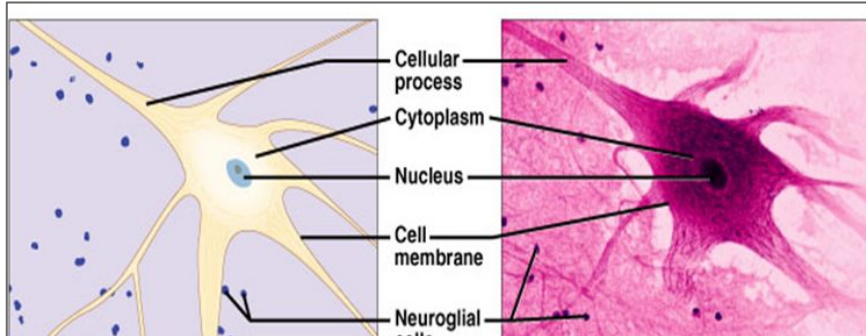
At the end of this lecture, you should describe the microscopic structure and the function of:

- ❖ Neurons:
 - Cell body (perikaryon)
 - Processes: An axon and dendrites
- ❖ Neuroglia:
 - Astrocytes
 - Oligodendrocytes
 - Microglia
 - Ependymal cells

► Neuron

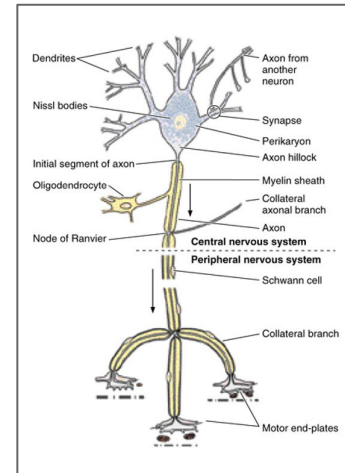
► Components:

1. Cell body (perikaryon “Involve nucleus”)
2. Processes:
 - a. An axon: only one
 - b. Dendrites: one or more



► Types:

1. Pseudounipolar neurons.
2. Bipolar neurons.
3. Multipolar neurons.



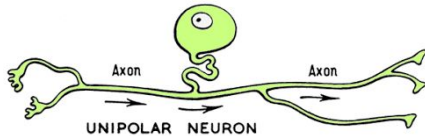
Types of neurons

(Based on number of processes)

(Pseudounipolar) Unipolar

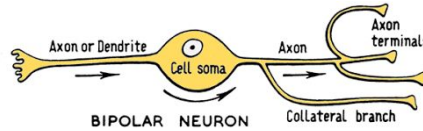
- ▶ Has one process only, that divides into two branches; one acts as a dendrite and the other as an axon.
- ▶ **Example:** Mesencephalic nucleus of trigeminal nerve and dorsal root (spinal) ganglion. (contain neuron Receive impulse)

Unipolar = because the the cell body have one neck but then the single process divide into 2 branches



Bipolar neurons

- ▶ Has two processes (one arising from each pole of the cell body).
- ▶ One of them is the dendrite and the other is the axon.
- ▶ **Example:** retina, olfactory epithelium, inner ear.



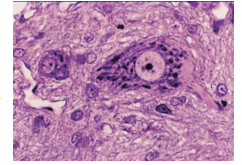
Multipolar neurons

- ▶ Has one axon and multiple dendrites.

Types of multipolar neurons:

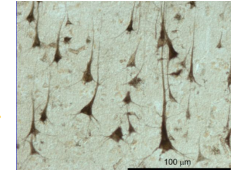
A- Stellate neuron 'like star':

- the common type
 - Distributed in most areas of CNS
- E.g. anterior horn cells of the spinal cord



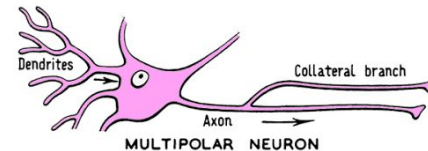
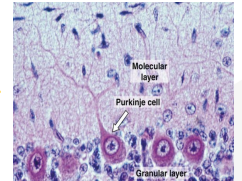
B- Pyramidal neurons:

Distributed in motor area 4 of the cerebral cortex (motor neurone = receive the order from the cortex then to its axone to relay and stimulate)



C- Pyriform neurons 'كمتري الشكل':

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



► Cell body (Perikaryon)

Nucleus

Single, usually central, rounded and vesicular with prominent nucleolus

Note: Visible nucleus cause it consists of abundant Uchromatin and minimal heterochromatin

Cytoplasm

Mitochondria

Are numerous because the neuron is very active so it needs energy. Thanks 438

Neurofilaments

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

Microtubules

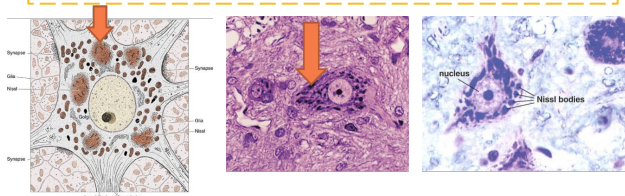
found in the cell body, axon and dendrites.

Golgi apparatus

Surrounds the nucleus all around. (Activate proteins secreted by rER. Thanks 438)

Nissl bodies

Are basophilic patches of rER and free ribosomes in the cell body and bases of wide dendrites no nissl bodies in axoplasm. Thanks 438

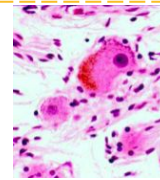


Centriole

Most adult neurons have only one rudimentary centriole, so they cannot divide
That's why nerve cell can't divide (New born have 2 centrioles because of the growth, however, as the baby grows, one of them will undergo atrophy)

Pigments

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



Some fat and glycogen granules

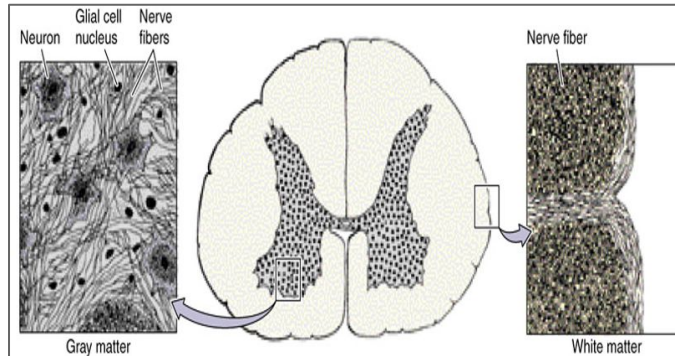
► Types of nerve fibers in CNS

Unmyelinated without neurilemmal sheath (in grey matter).

Myelinated without neurilemmal sheath (in white matter).

There is no schwann cells in the CNS at all

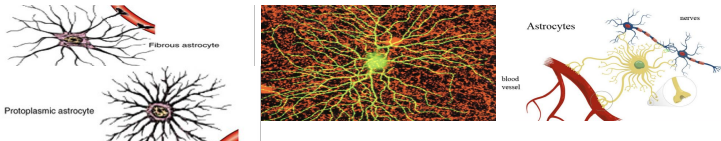
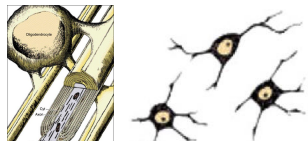
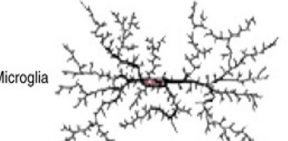
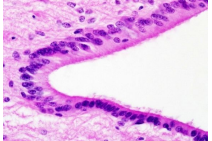
Neurilemmal sheath is the outer layer of schwann cells and it's found only in peripheral nervous system



▶ Neuroglia

Definition

Neuroglia: are group of cells that act as the supportive tissue of CNS.

Types	Astrocytes	Oligodendrocytes	Microglia	Ependyma
Features	<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> <p>1- Protoplasmic astrocytes:</p> <ul style="list-style-type: none"> • Are found in the grey matter of CNS. • Their processes branch extensively. (processes are short) <p>2- Fibrous astrocytes:</p> <ul style="list-style-type: none"> • Are found in white matter of CNS. • Their processes have fewer branches but longer. 	<ul style="list-style-type: none"> • Are branching cells with few, short processes. • They are distributed in the grey and white matter of CNS. 	<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. <p>Derived from monocytes Counter part of macrophages</p>	<p>Are simple columnar epithelial cells (partially ciliated) (But in the area lining the choroid plexus it will be Simple cuboidal epithelium) lining the brain ventricles and the central canal of spinal cord.</p>
Function	<ul style="list-style-type: none"> • Repair of injury of CNS tissue (gliosis = instead of fibrosis). • Supportive and nutritive functions to the neurons. • Participate in the formation of blood-brain barrier. <p>BBB: is formed by three elements 1-endothelial cells 2- well-developed basal lamina surrounding capillaries 3-pedicles of cytoplasmic process of astrocytes</p>	<ul style="list-style-type: none"> • Formation of myelin sheath in the CNS. • Insulation of nerve fibers. in Grey matter 	<p>Main function is <u>phagocytosis</u>.</p>	<p>Participate in the CSF production</p>
Pic				

Summary

Neurons

Types of neurons:

- ▶ Pseudounipolar
- ▶ Bipolar
- ▶ Multipolar :
Stellate, pyramidal, pyriform

Components:

- ▶ Cell body
- ▶ Processes: Axon and dendrites

Types of nerve fibers:

- ▶ Myelinated, Unmyelinated

Neuroglia

- ▶ Astrocytes
- ▶ Oligodendrocyte
- ▶ Microglia
- ▶ Ependyma

MCQ's

Q1) Which of the following cells form the myelin sheath in CNS?

- A- Astrocytes
- B- Microglia
- C- Ependyma
- D- Oligodendrocytes

Q2) Which is the component of neuron in cytoplasm that cannot divide?

- A- Nissl bodies
- B- Microtubules
- C- Centeriols
- D- Golgi apparatus

Q3) Which of the following is found in the retina and olfactory epithelium?

- A- Pseudounipolar neurons
- B- Bipolar neurons
- C- Microglia
- D- Multipolar neurons

Q4) The function of Microglia is:

- A- Repair of injury of CNS tissue
- B- Phagocytosis
- C- Participate in the formation of BBB
- D- Insulation of nerve fibers

Q5) How many processes forming the axon?

- A- One
- B- Two
- C- Three
- D- More than three

Q6) Which of the following is a basophilic structure in the neuron?

- A- Nissl bodies
- B- Neurofilaments
- C- Lysosomes
- D- Centeriols

Q1: D
Q2: C
Q3: B
Q4: B
Q5: A
Q6: A

Team leaders



Mariam Alruhaimi

Mohamed Albabtain

Team members

Abdullah Alburikan

Fayez AlTabbaa

✓ Mohammad Benhji

📝 Nawaf Alshahrani

✓ Yazeed Alomar

Afnan AlMohsen

✓ Joud Alarifi

Maha Alqahtani

✓ Nourah Alklaib

📝 Rania Almutairi

🔍 Sumo Abdulrahman

✉ Histology439team@gmail.com

✓ Member

📝 Organizer

📝 Note taker

🔍 Reviser