

Date:

17 / 10 / 2023



لجان الدفعات



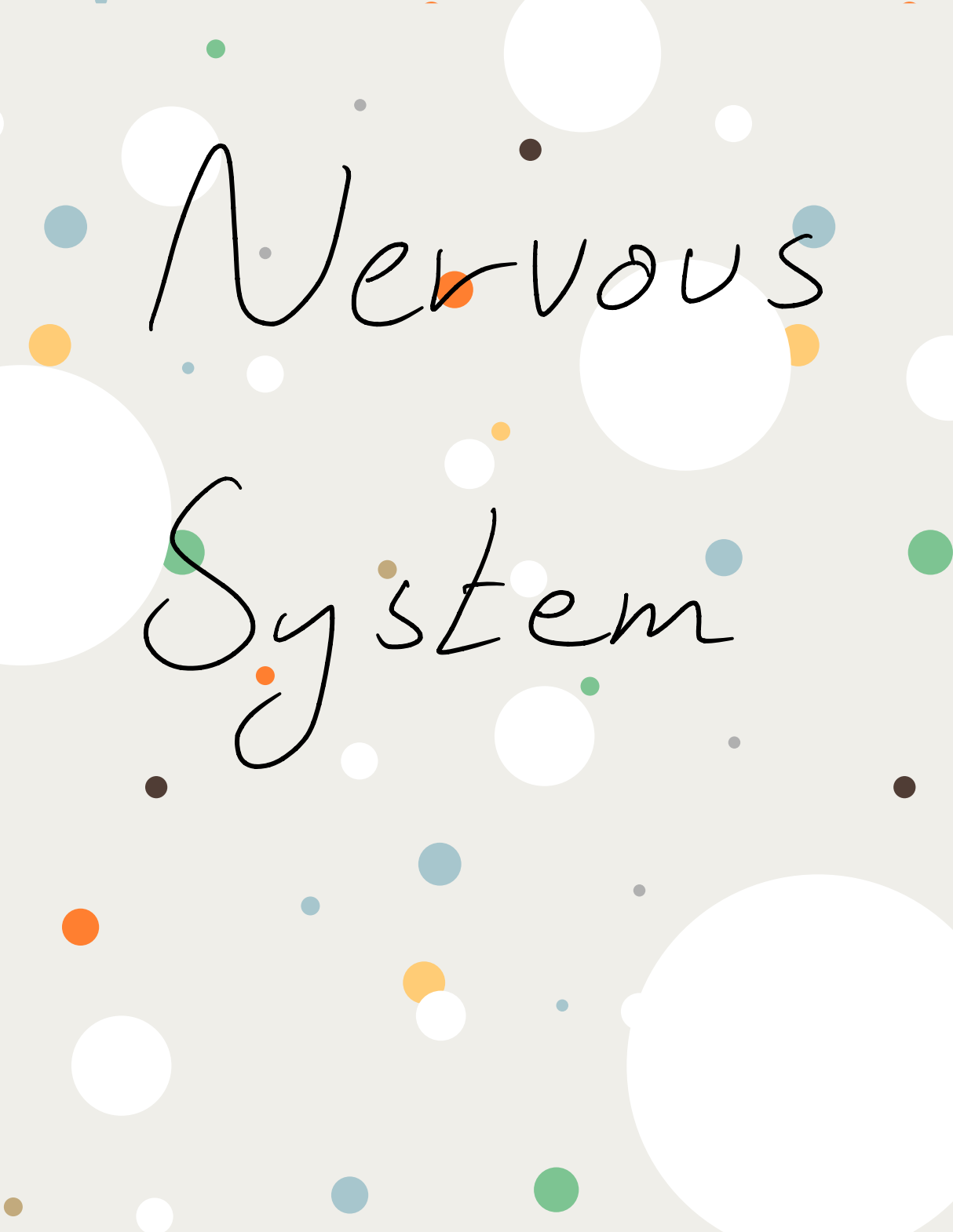
تفريخ فسيولوجي



Nervous system : موضوع المحاضرة

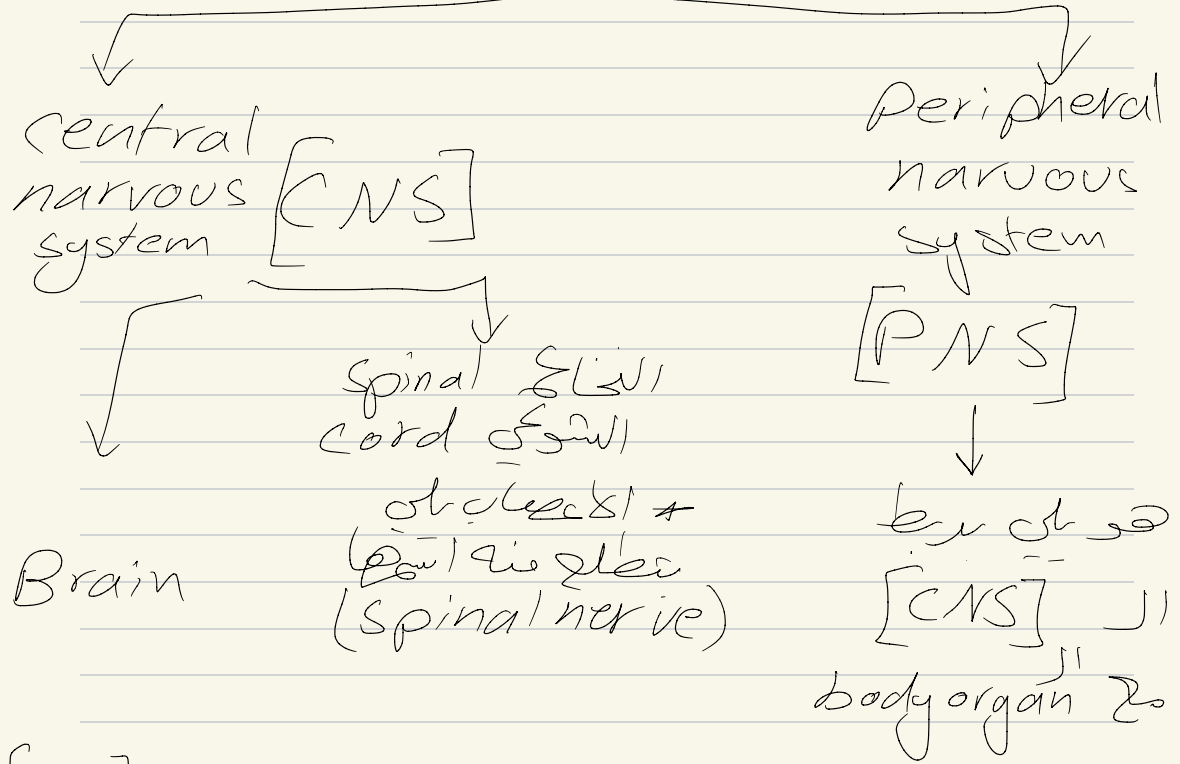
4 : رقم المحاضرة

ملالك مراد : إعداد الصيدلانية



Nervous System

Nervous System



* & spinal nerves & [CNS]

Cranial nerve

منه يوصل الى

organ

[PNS] من

optic nerve

من Brain الى eye

[PNS] من

①

Spinal Nerves

- 31 Pairs of spinal nerves
- Named & numbered by the cord level of their origin
- 8 pairs of cervical nerves (C1 to C8) *Neck, arm, head*
- 12 pairs of thoracic nerves (T1 to T12) *lungs*
- 5 pairs of lumbar nerves (L1 to L5) *legs*
- 5 pairs of sacral nerves (S1 to S5) *feet*
- 1 pair of coccygeal nerves
- Mixed sensory & motor nerves



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nerves = neurons

العصبان

ganglia: collection of nervous

body cell outside the [CNS].

* تحسب جزء من [PNS] تكون موجودة

في بداية آخر عصب قبل ال effector مستقبل

الحواس من ال Brain الى شكل action potential

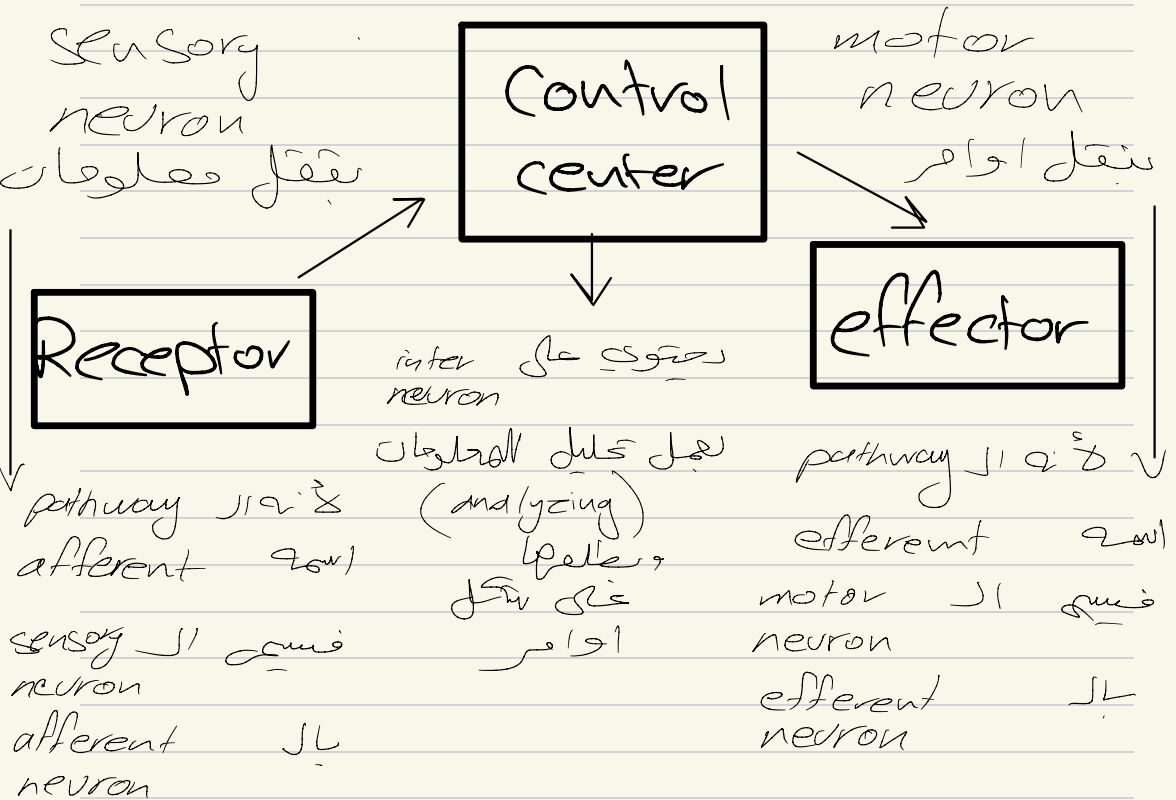
ونقله الى آخر عصب الى مستقبله ال

. effector

(2)

Types of neurons according to functionality :-

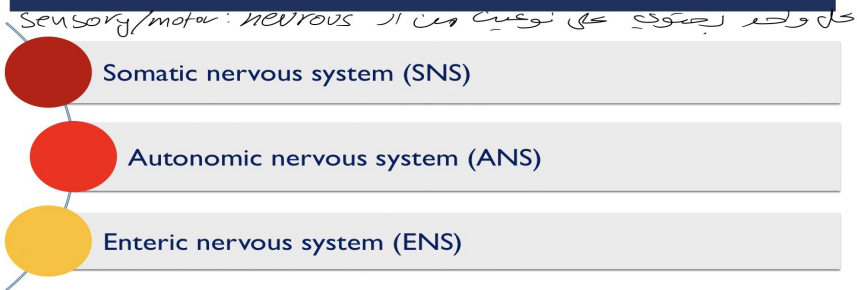
- ① sensory neuron
- ② inter neuron
- ③ motor neuron



PERIPHERAL NERVOUS SYSTEM

1. **Nerve** is a bundle of hundreds to thousands of axons plus associated connective tissue and blood vessels that lies outside the brain and spinal cord (i.e., **cranial nerves** emerge from the brain and **spinal nerves** emerge from the spinal cord).
2. **Ganglia** are small masses of nervous tissue, that are located outside of the brain and spinal cord.
3. **Enteric plexuses** are extensive networks of neurons located in the walls of organs of the gastrointestinal tract (regulating the digestive system).
4. **Sensory receptor** refers to a structure of the nervous system that monitors changes in the external or internal environment.

PERIPHERAL NERVOUS SYSTEM



SOMATIC NERVOUS SYSTEM (SNS) (CONSCIOUSLY CONTROLLED)

1. **Sensory neurons** that convey information to CNS from somatic receptors in the head, body wall, and limbs and from receptors for the special senses of vision, hearing, taste, and smell.
2. **Motor neurons** that conduct impulses from the CNS to skeletal muscles only.

AUTONOMIC NERVOUS SYSTEM (ANS) (INVOLUNTARY)

1. **Sensory neurons** that convey information to CNS from autonomic sensory receptors, located primarily in visceral organs such as the stomach and lungs.
2. **Motor neurons** that conduct nerve impulses from the CNS to smooth muscle, cardiac muscle, and glands.

Note: The motor part of the ANS consists of two branches, the **sympathetic division** and the **parasympathetic division**.

motor neuron in Autonomic Nervous is

sympathetic :
بسرعة في حركة الكبد
stress / ضغط

para sympathetic
في حركة الكبد
الطبيعية

ENTERIC NERVOUS SYSTEM (ENS) (THE BRAIN OF THE GUT) (INVOLUNTARY)

1. **Sensory neurons** of the ENS monitor chemical changes within the GI tract as well as the stretching of its walls.
2. **Motor neurons** govern contractions of GI tract smooth muscle to propel food through the GI tract, secretions of GI tract organs (such as acid from the stomach and hormones from GI tract endocrine cells).

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FUNCTIONS OF THE NERVOUS SYSTEM

Sensory function (detecting internal stimuli or external stimuli through cranial and spinal nerves).

Integrative function (analyzing sensory information and making decisions for appropriate responses).

Motor function (eliciting an appropriate motor response by activating effectors (muscles and glands) through cranial and spinal nerves).

NERVOUS TISSUE

لا يتجدد / لا ينقسم / عديم القدرة / ينتج السائل العصبي

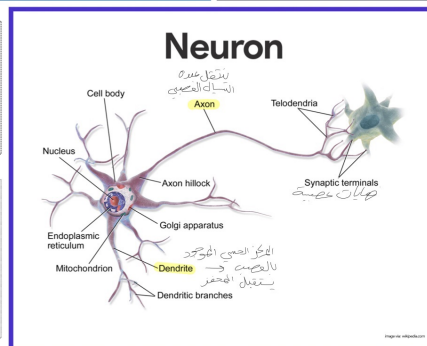
Neurons (provide most of the unique functions of the nervous system, such as sensing as they connect all regions of the body to the brain and spinal cord). No ability to undergo dividing throughout an individual's lifetime.

ينقسم ويتجدد اعطاهم تناسل

Neuroglia (support and protect neurons, and maintain the interstitial fluid that bathes them) (they outnumber neurons). It has a continuous ability to divide throughout an individual's lifetime. سرعة انتقال السائل العصبي ونحن لا يتجدد

The neuron has the ability to respond to a stimulus and convert it into an action potential (nerve impulses).

The cell body contains free ribosomes and rough endoplasmic reticulum for synthesizing new proteins. .



* الـ neurons لـ مات الـ

con synapse و اض

الـ neurotransmitters الـ
الـ قالت العصبية

* الـ neuron في قبل الـ synapse

• pre-synaptic neuron ق

* الـ neuron في الـ synapse

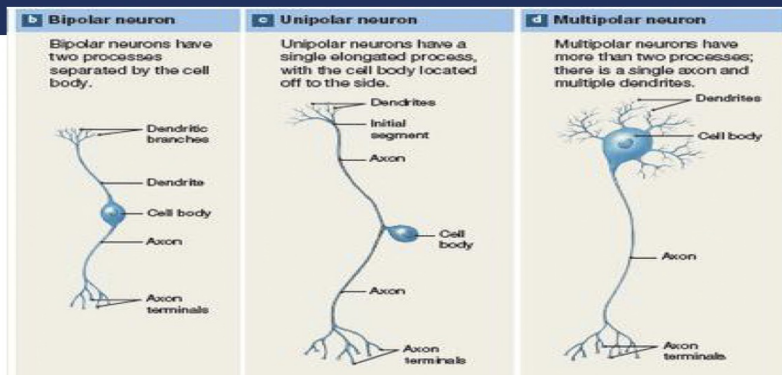
• post-synaptic neuron ق

⑦

CLASSIFICATION OF NEURONS

1. **Structural Classification** (according to the number of processes extending from the cell body).
2. **Functional Classification** (according to the direction in which the nerve impulse (action potential) is conveyed with respect to the CNS).

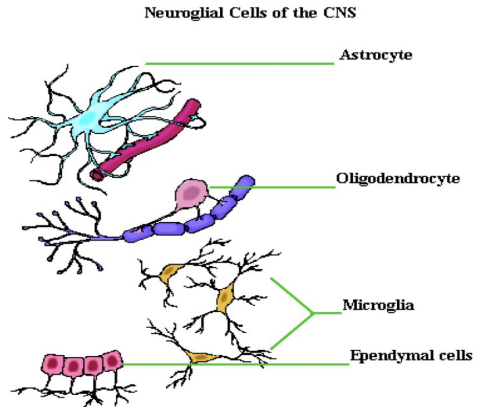
STRUCTURAL CLASSIFICATION



Multipolar ← أغلب ال inter neurons *
 Unipolar ← أغلب ال sensory neurons *
 Bipolar ← inter neurons / sensory neurons *
 multipolar ← motor neurons *

NEUROGLIA

- In contrast to neurons, neuroglia **do not generate** or propagate **action potentials**, and they **can multiply and divide** in the mature nervous system.
- Neuroglia of the CNS can be classified into four types: **astrocytes, oligodendrocytes, microglial cells, and ependymal cells.**



ASTROCYTES

support: shape
structure and
function.

1. **Support neurons.**
2. **Isolate neurons** of the CNS from various potentially **harmful substances** in blood.
3. **Regulate** the growth, migration, and interconnection among **neurons** in the brain.
4. **Maintain** the appropriate chemical environment for the generation of **nerve impulses**.
5. Play a role in **learning and memory** by influencing the formation of neural synapses.

OLIGODENDROCYTES

- They are forming and maintaining the **myelin sheath** which increases the speed of nerve impulse conduction around CNS axons. (containing interneurons)

MICROGLIA

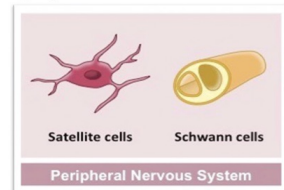
- They remove cellular debris formed during normal development of the nervous system and phagocytize microbes and damaged nervous tissue.

EPENDYMAL CELLS

- They produce and assist in the circulation of **cerebrospinal fluid**.

سائل الدماغية اجزاء الدماغ

NEUROGLIA OF THE PNS



- The two types of glial cells in the PNS are **Schwann cells and Satellite cells**.

myeline سون
sheath
axons الى



SCHWANN CELLS

- They form the myelin sheath around axons and participate in axon regeneration. (containing sensory and motor neurons).

SATELLITE CELLS

- They provide structural support and regulate the exchanges of materials between neuronal cell bodies and interstitial fluid.