

تم تحميل هذا الملف من موقع المناهج الإماراتية



ملخص الدرس الأول structure of the nervous system من الوحدة الثانية

موقع المناهج ← المناهج الإماراتية ← الصف التاسع المتقدم ← علوم ← الفصل الثاني ← ملخصات وتقارير ← الملف

تاريخ إضافة الملف على موقع المناهج: 2025-01-16 10:56:21

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المزيد من مادة علوم:

التواصل الاجتماعي بحسب الصف التاسع المتقدم



صفحة المناهج الإماراتية على فيسبوك

الرياضيات

اللغة الانجليزية

اللغة العربية

التربية الاسلامية

المواد على تلغرام

المزيد من الملفات بحسب الصف التاسع المتقدم والمادة علوم في الفصل الثاني

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مؤسسة الإمارات للتعليم المدرسي
EMIRATES SCHOOLS ESTABLISHMENT



Unit 2: Human Body

Module: Nervous Systems

Lesson 1: Structure of the Nervous system

Focus Question: What are structures and functions of neuron?

Textbook Page No: 132

Learning Outcomes

By the end of this lesson, you will be able to,

- **Identify the neuron as the functional unit of the nervous system, including its major parts and their function**
- **Identify the direction in that impulses travel through a neuron**
- **Demonstrate how a nerve impulse is relayed via a performance**
- **Describe the three types of neurons (sensory, motor, and interneurons) and their involvement in the reflex arc**

Vocabulary

Neuron

الخلية العصبية

Dendrite

الزوائد الشجرية

Cell body

جسم الخلية

Axon

المحور

Reflex arc

القوس الانعكاسي

Node

العقدة

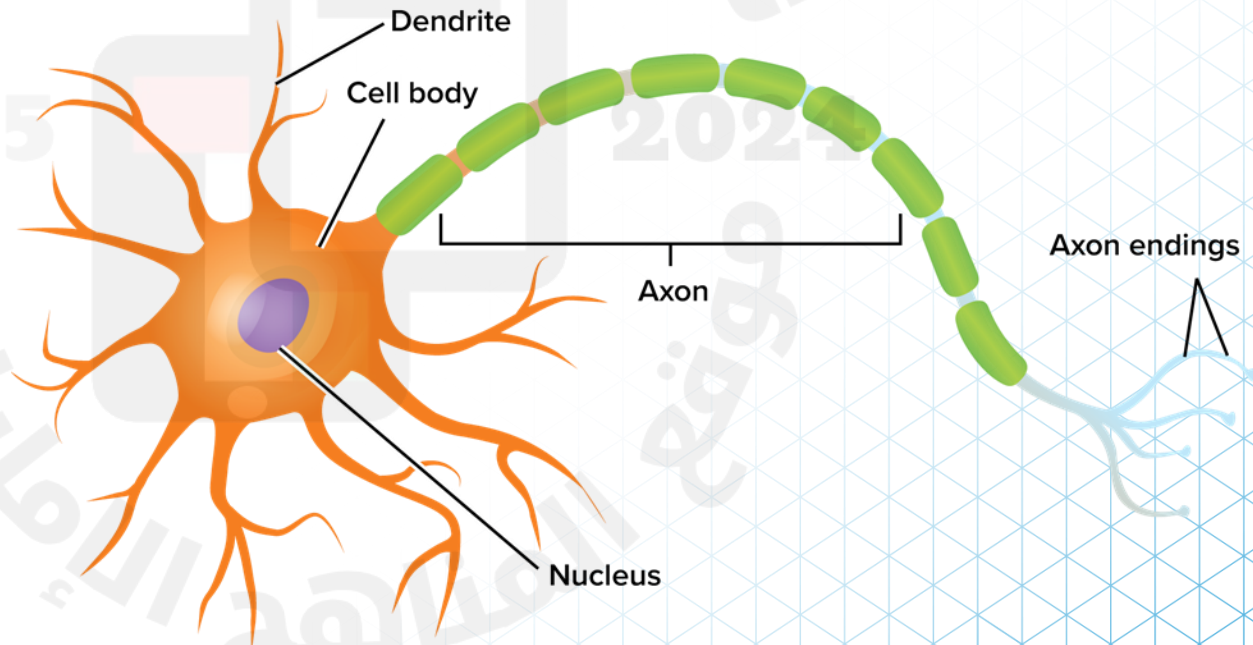
Synapse

التشابك العصبي



Neurons

- **Neurons** are specialized nerve cells that help you gather information about your environment, interpret the information, and react to it.
- Neurons consist of three main regions:
 - The dendrites
 - A cell body
 - An axon



Neurons are specialized cells which help to gather, interpret and react to the information of our environment.

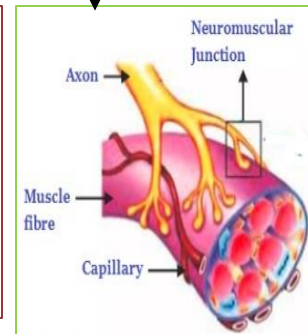
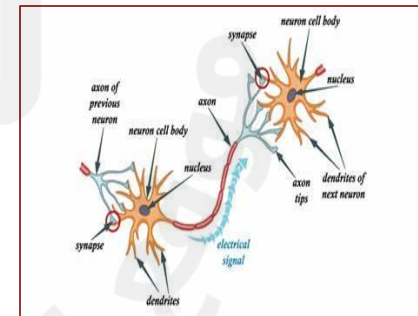
- They are the communication network of our body.

Cell body is the portion of neuron which contain cell organelles including nucleus



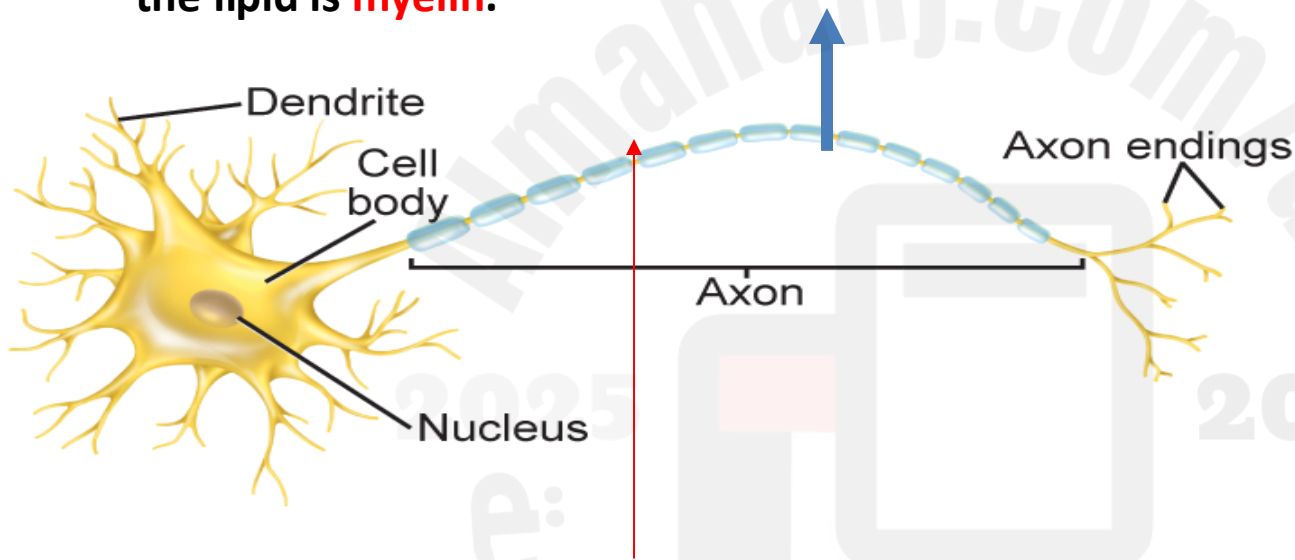
Dendrites receive signals (impulses) from other neuron and conduct to the cell body

AXON carries impulses from the cell body to the other neurons and muscles

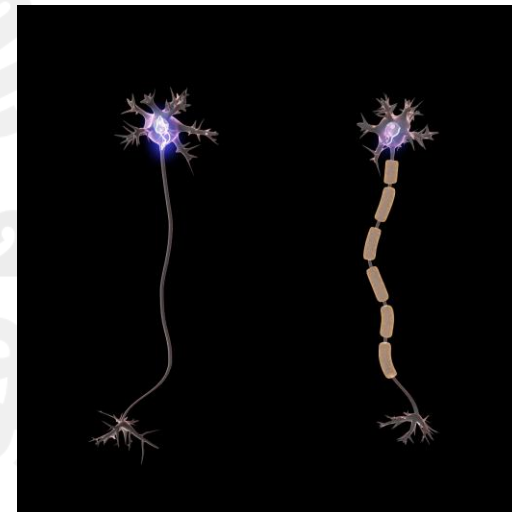


Myelin sheath

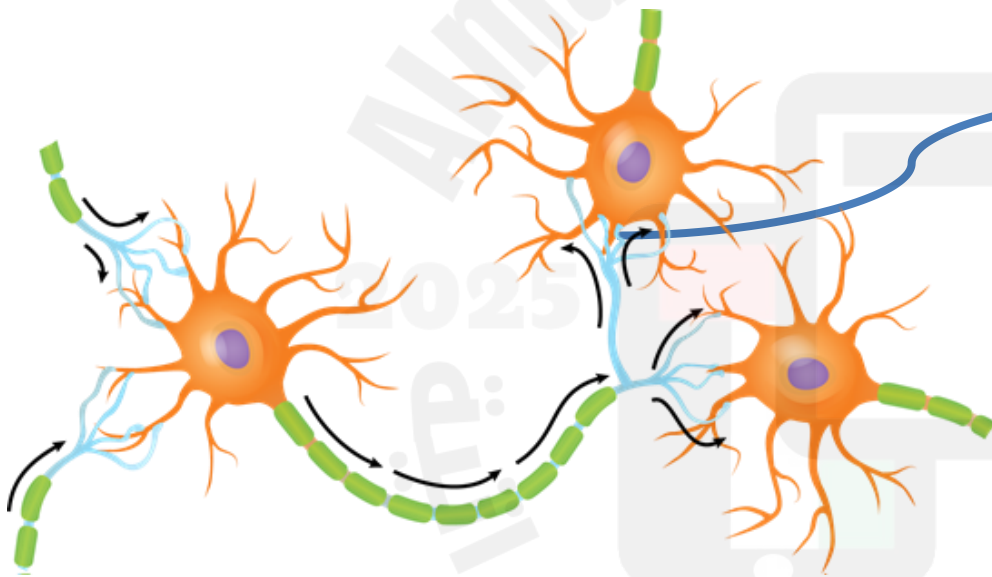
It is a **lipid covering** on axon which forms an insulating layer. Name of the lipid is **myelin**.



Nodes: gaps in myelin sheath



Synapse



Synapse: A small gap between axon of one neuron and dendrite of another neuron



Assessment

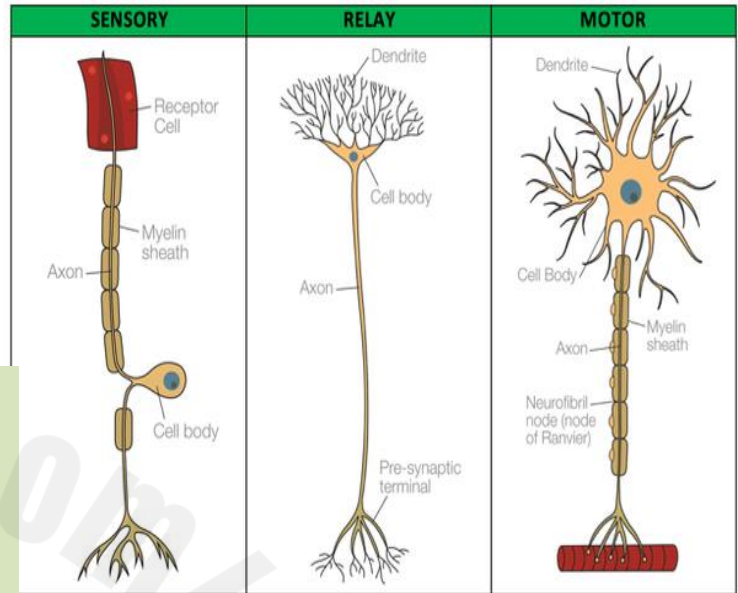
1. Cells which are considered as body communication network
2.is the part of neuron which contain cell organelles including nucleus

1. Name of the lipid seen in neuron?

2. Longest part of neuron?

3. gap between axon of one neuron and dendrite of another neuron is called.....

Types of neurons



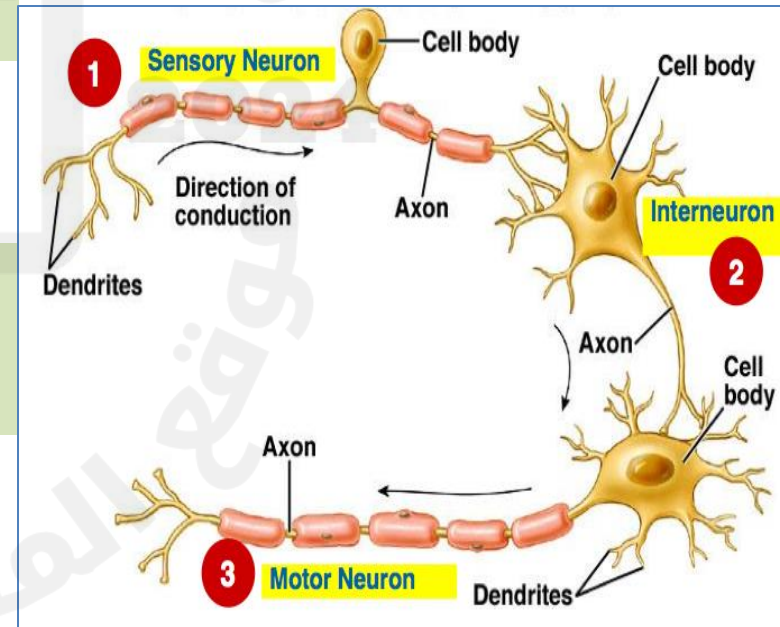
Sensory neurons- Sensory neurons send impulses from receptors in the skin and sense organs to the brain and spinal cord.



Interneurons- Interneurons carry impulses to motor neurons. They found in brain and spinal cord



Motor neurons- Motor neurons carry impulses away from the brain and spinal cord to a gland or muscles, resulting in a secretion or movement



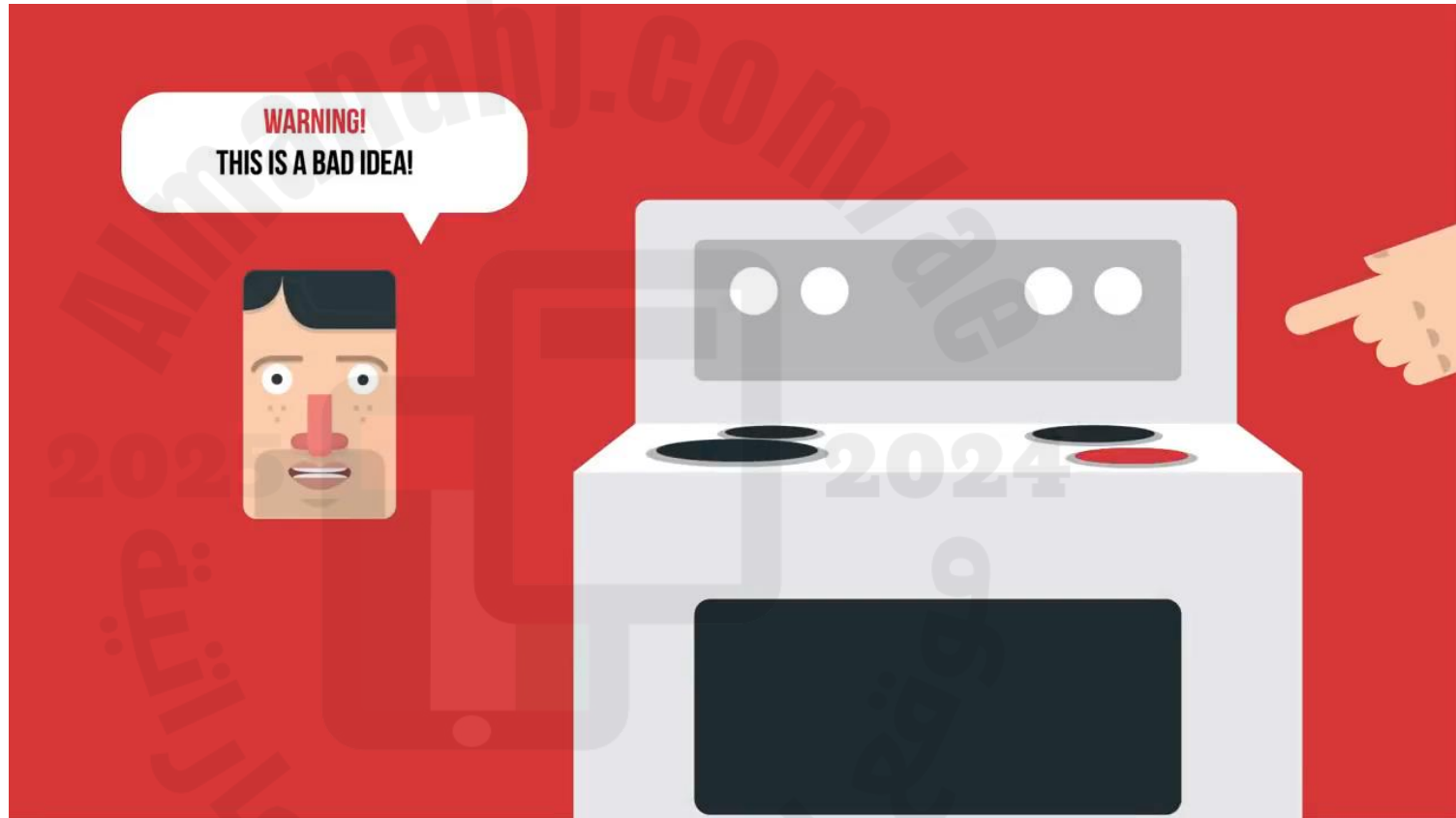
Reflex Arc: a nerve pathway of sensory neuron → interneuron → motor neuron

Brain is NOT involved

Spinal cord is involved

Fast response

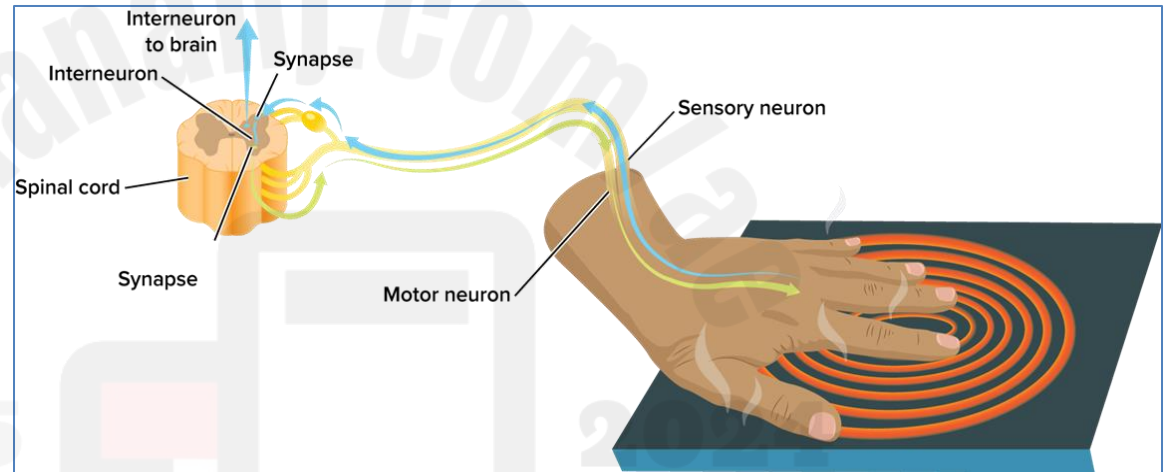
involuntary



Reflex arc

How do you respond when you touch a hot object?

- It is the basic structure of nervous system
- It is a nerve pathway consisting of **a sensory neuron, an interneuron and a motor neuron**
- **Brain is not involved** in the reflex arc





What would be a possible consequence if you had to wait for the brain to interpret the stimulus and signal an appropriate response?


In this short amount of time, a severe burn could occur.


Quiz

3. Which is the correct path that a nerve impulse will follow in a reflex arc?

 motor neuron →
interneuron → sensory
neuron

 motor neuron →
sensory neuron →
interneuron

 interneuron → motor
neuron → sensory
neuron

 **D** sensory neuron →
interneuron → motor
neuron

CORRECT

Learning Outcomes

- Explain how a nerve impulse is transmitted through the neuron and through the synapse between the three types of neurons
- Interpret the effect of the myelin sheath on the speed of an action potential, to include an explanation of ion diffusion
- Identify other factors that affect action potential speed to include, including neuron diameter and temperature

Vocabulary

- Nerve impulse نبض العصب
- Action potential جهد الفعل
- Threshold عتبة التنبيه
- Neurotransmitter الناقل العصبي

Review Vocabulary

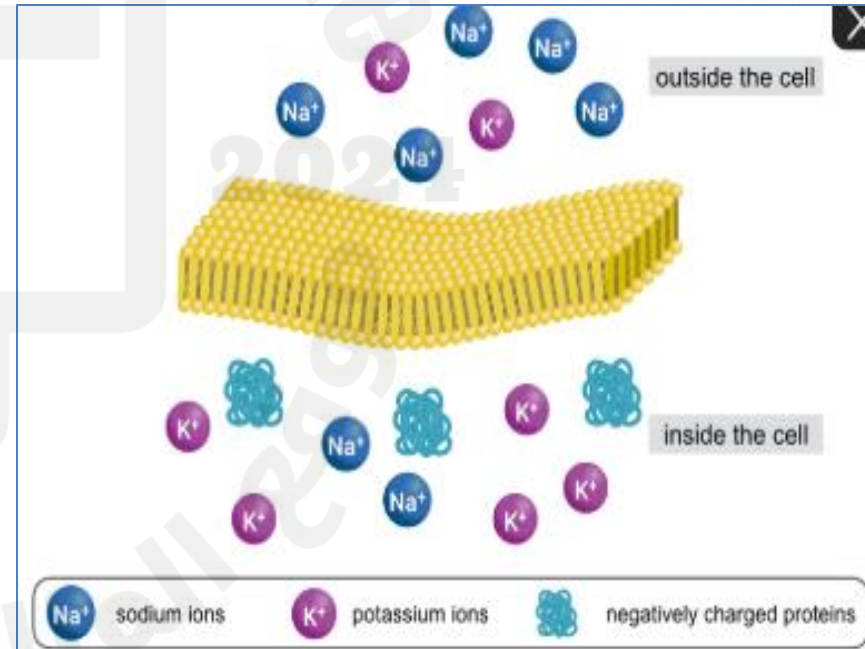
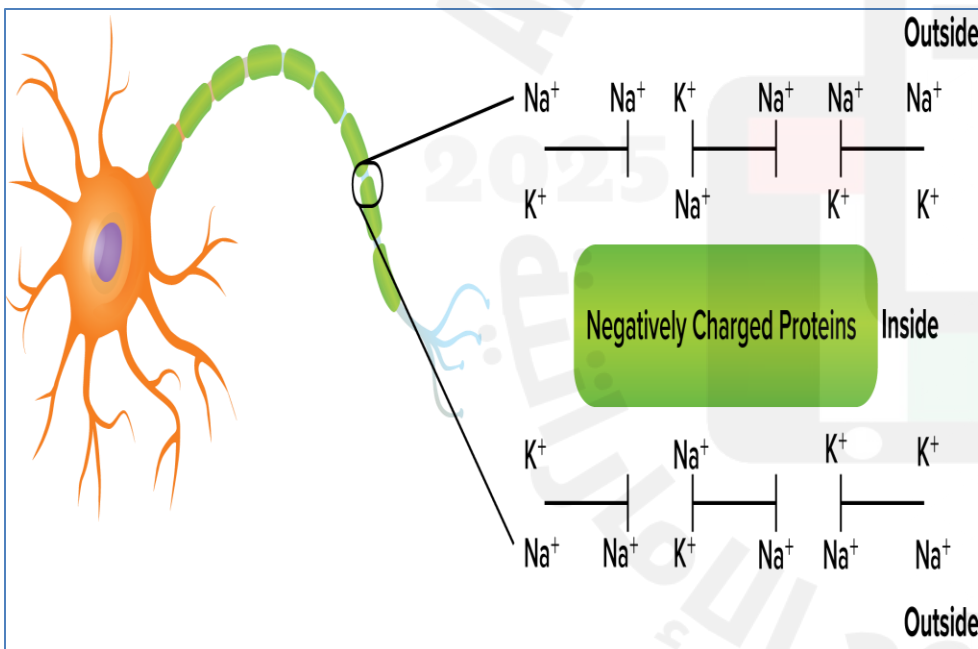
diffusion: the random movement of particles from an area of higher concentration to an area of lower concentration, resulting in even distribution

A Nerve Impulse



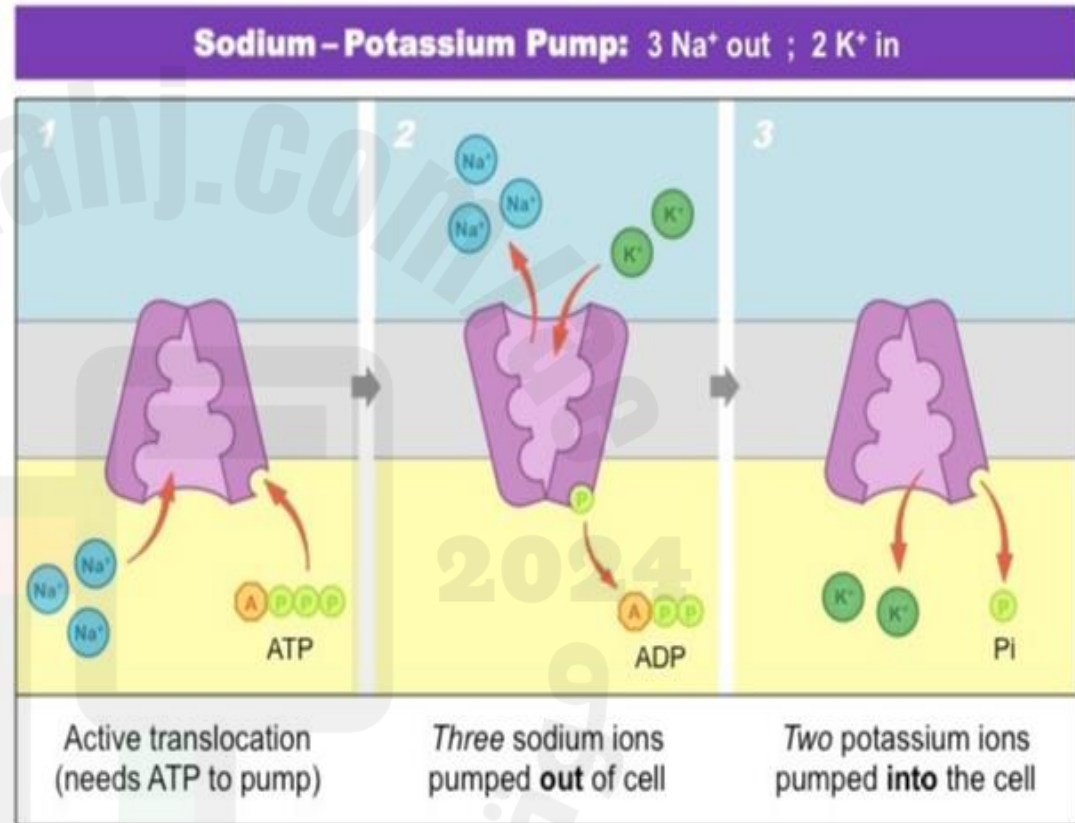
A Neuron at Rest

- Neurons at rest do not conduct impulses.
- Sodium ions (Na^+) collect on the outside of the cell membrane.
- Potassium ions (K^+) collect on the inside of the cell membrane.
- Negatively charged proteins actively transport sodium ions out of the cell and potassium ions into the cell.



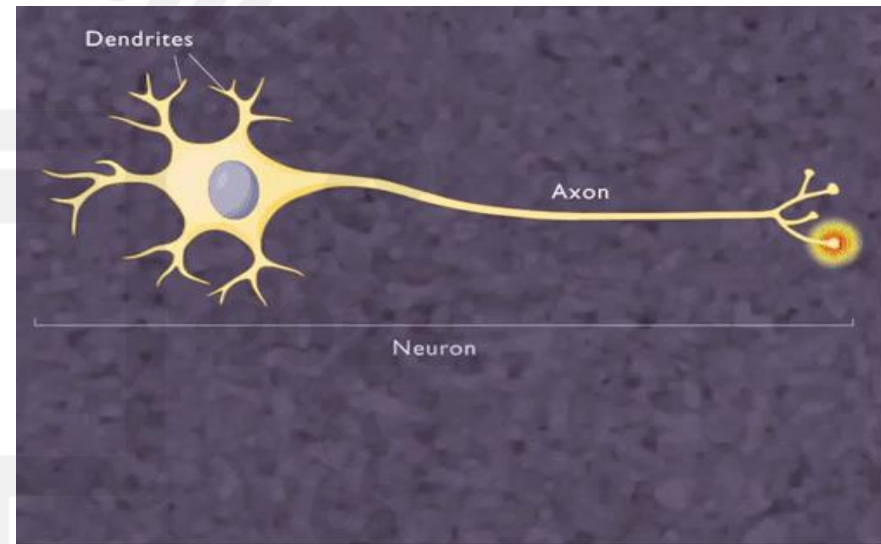
Importance of Na-K pump

- Sodium –potassium (Na-K pump) **actively transport** sodium ions out of the cell and potassium inside the cell.
- For **every 2 K ions pumped into neuron, 3 Na pumped out**
- This maintain an unequal distribution of positively charged ions resulting in **positive charge outside and negative charge inside of neuron**



Nerve impulse/ Action potential

- **Electrical charge (signal) that travels along the neuron**
- **A nerve impulse results from a stimulus(touch/smell/sound)**
- A nerve impulse is also known as an **action potential**.
- The minimum stimulus to cause an action potential to be produced is called a **threshold**.
- When a stimulus reaches the threshold, channels open in the plasma membrane.



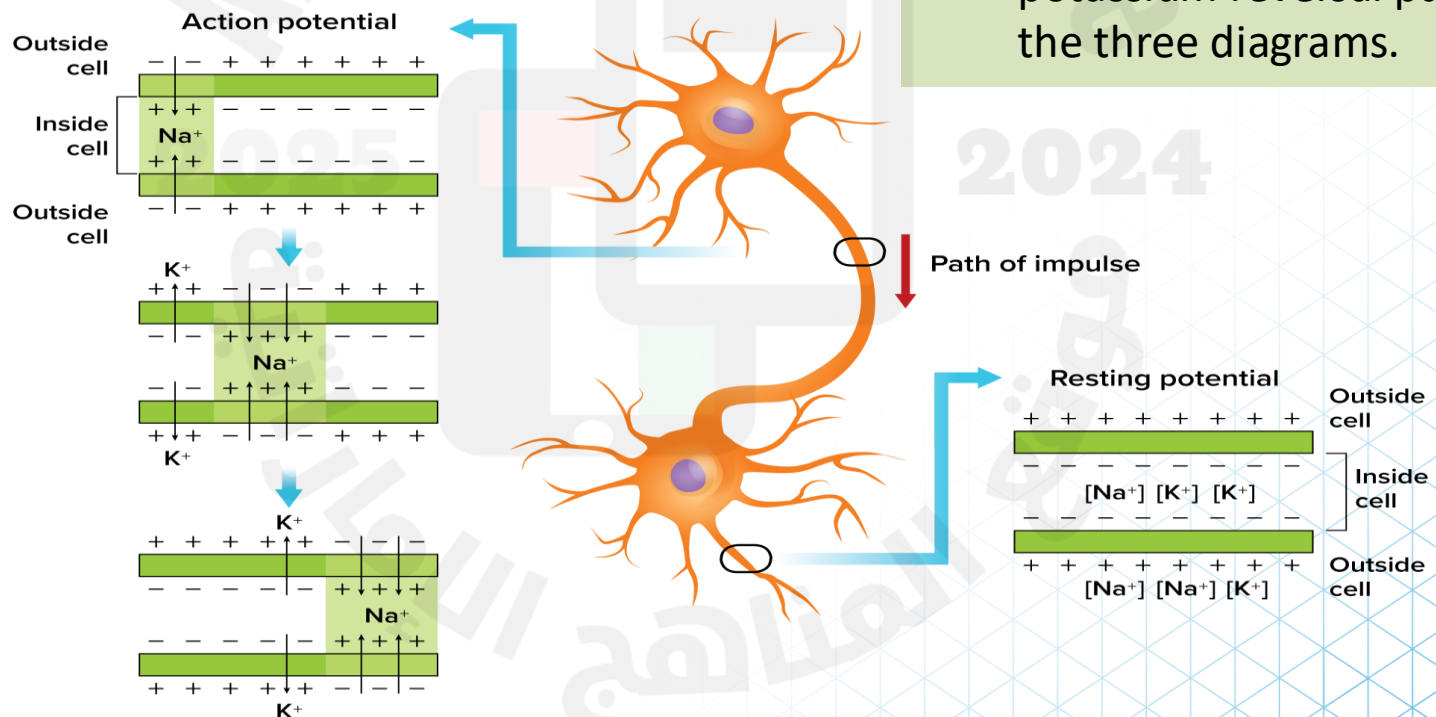
Action potential are described as **“ALL or NOTHING”** (a stronger stimulus does not generate a stronger action potential).



An Action Potential

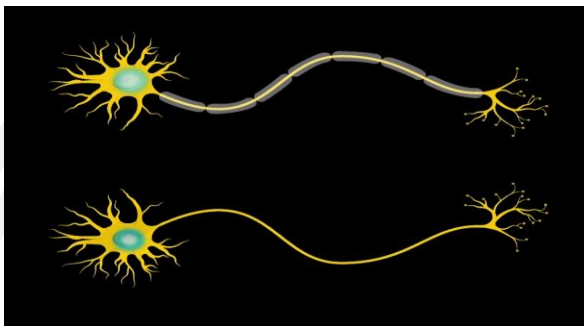
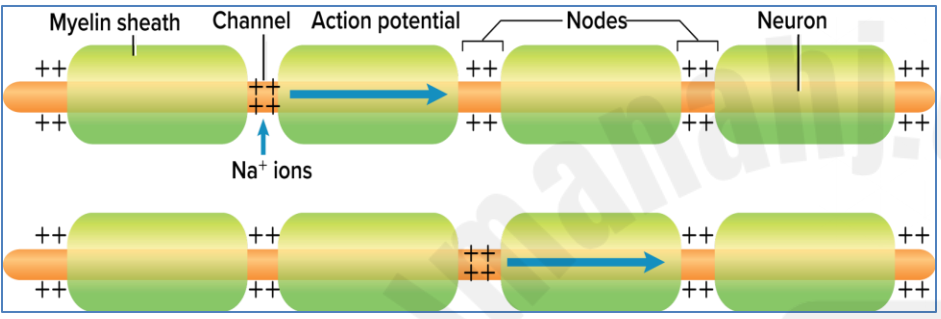
- Sodium ions are rapidly pumped through these channels, causing a temporary change in the electrical charges.
- More positive charges are now inside the membrane.
- The now positive charge inside the membrane causes other channels to open, and the potassium is quickly pumped out of the cell.

- The potassium restores the positive charge outside the cell.
- This rapid positive to negative to positive charge reversal moves along the axon like a wave.
- The movement can be seen by finding the sodium-potassium reversal pattern in the three diagrams.

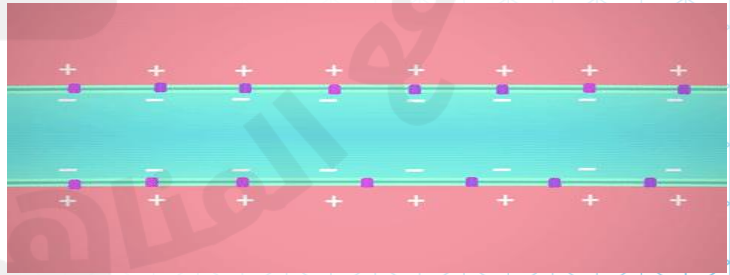
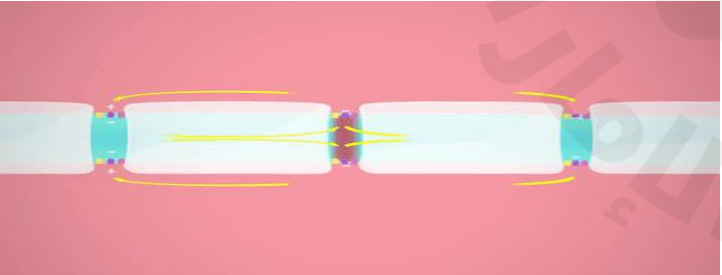


Speed of an Action Potential

- **Nodes** along the axon allow ions to pass through the myelin layer to the plasma membrane.
- The ions jump from node to node and increase the speed of the impulse.



Myelinated neuron	Unmyelinated neuron
Have myelin sheath	Doesn't have myelin sheath
Fast action potential (more speed)	Slow action potential (less speed)
Associated sharp pain	Associated with dull pain




Quiz

1. Which happens first after the threshold is reached for an action potential?

 K⁺ ions enter the neuron.

 Negatively charged proteins leave the neuron.

 Na⁺ ions enter the neuron. **CORRECT**


 The myelin coat breaks down, allowing ions to freely cross the plasma membrane.


Quiz

2. Which is true about action potentials?

A They move faster on neurons that have myelin. **CORRECT**

 They move at one speed on all neurons.

 They move only on neurons that do not have myelin.

 They cannot move between nodes on neurons.

Learning Outcomes

- Evaluate how neurotransmitters move across synapses via exocytosis, ion channels, and endocytosis (recycling)
- Identify how neurotransmitters are eliminated from the synapse
- Predict the effects of nonfunctional motor or sensory nerves within the nervous system

Keywords

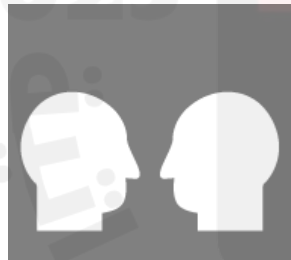
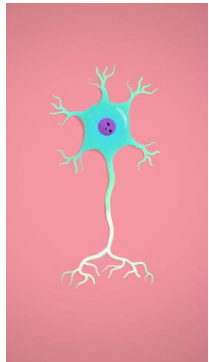
Synapse

التشابك العصبي

Neurotransmitter

الناقل العصبي

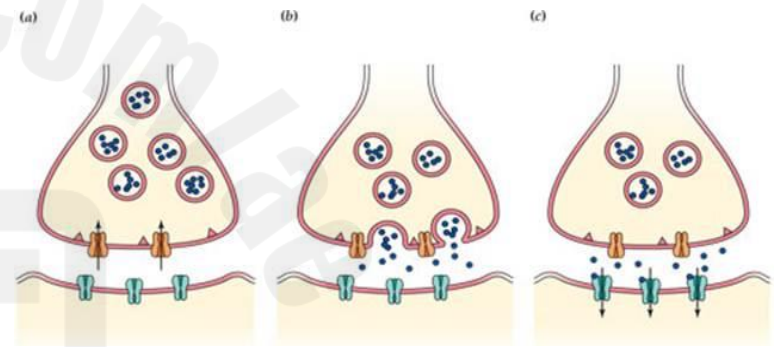
Neurotransmitter



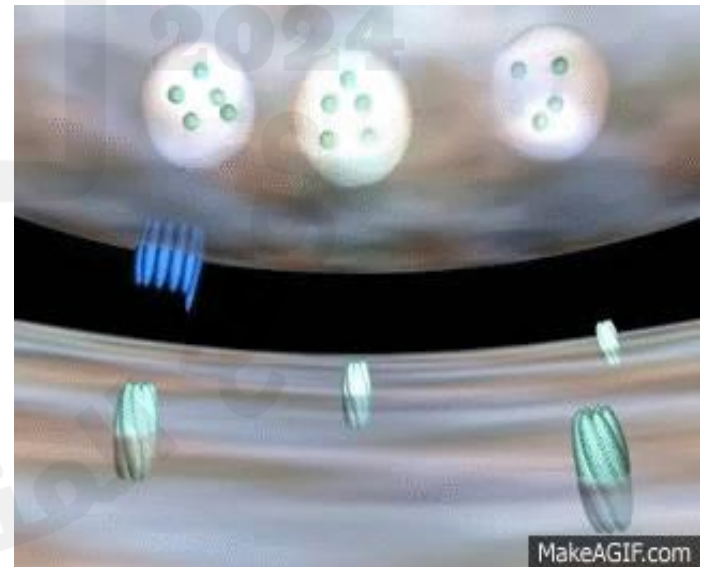
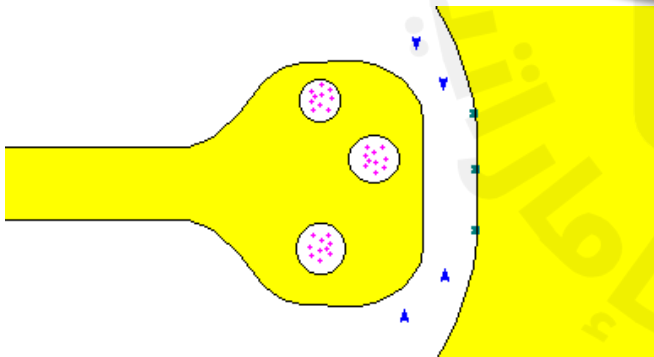
Transmit = Pass on/
send out

Neurotransmitters

- **Neurotransmitters** are chemicals that diffuse across a synapse and bind to receptors on the dendrite of a neighboring neuron.
- When an action potential reaches the end of axon, small sacs called **vesicles** carrying neurotransmitters fuse with the plasma membrane and release neurotransmitter by **exocytosis**.

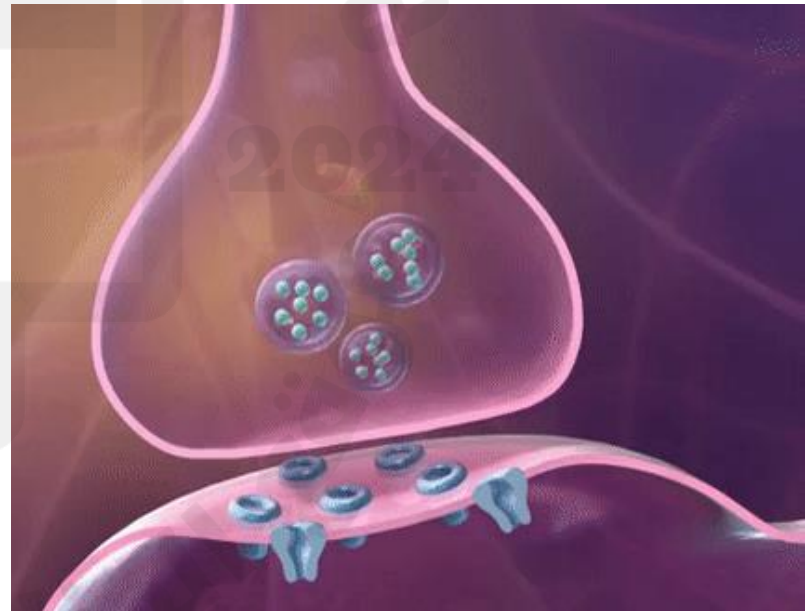


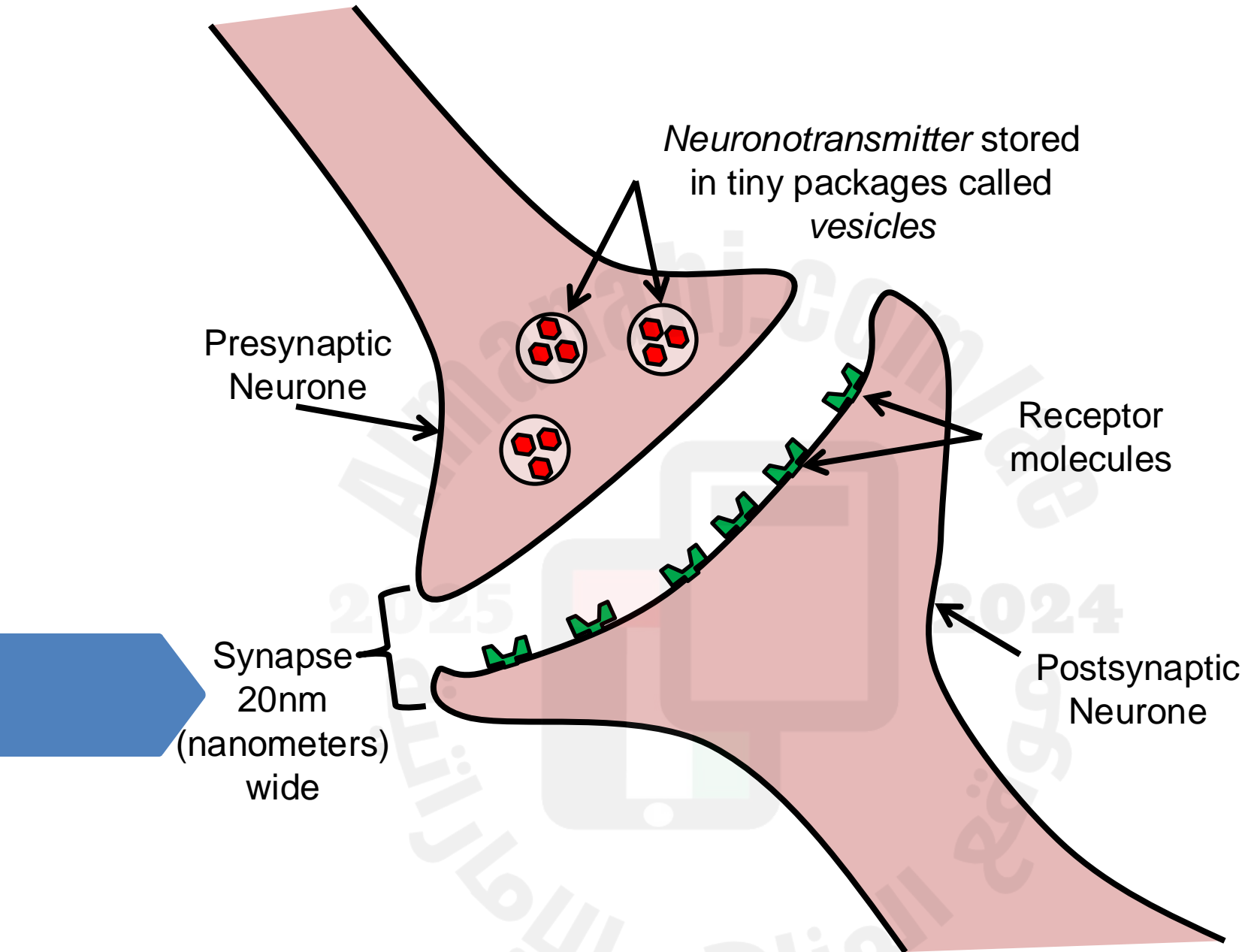
Example:
**Acetylcholine
(ACh)**

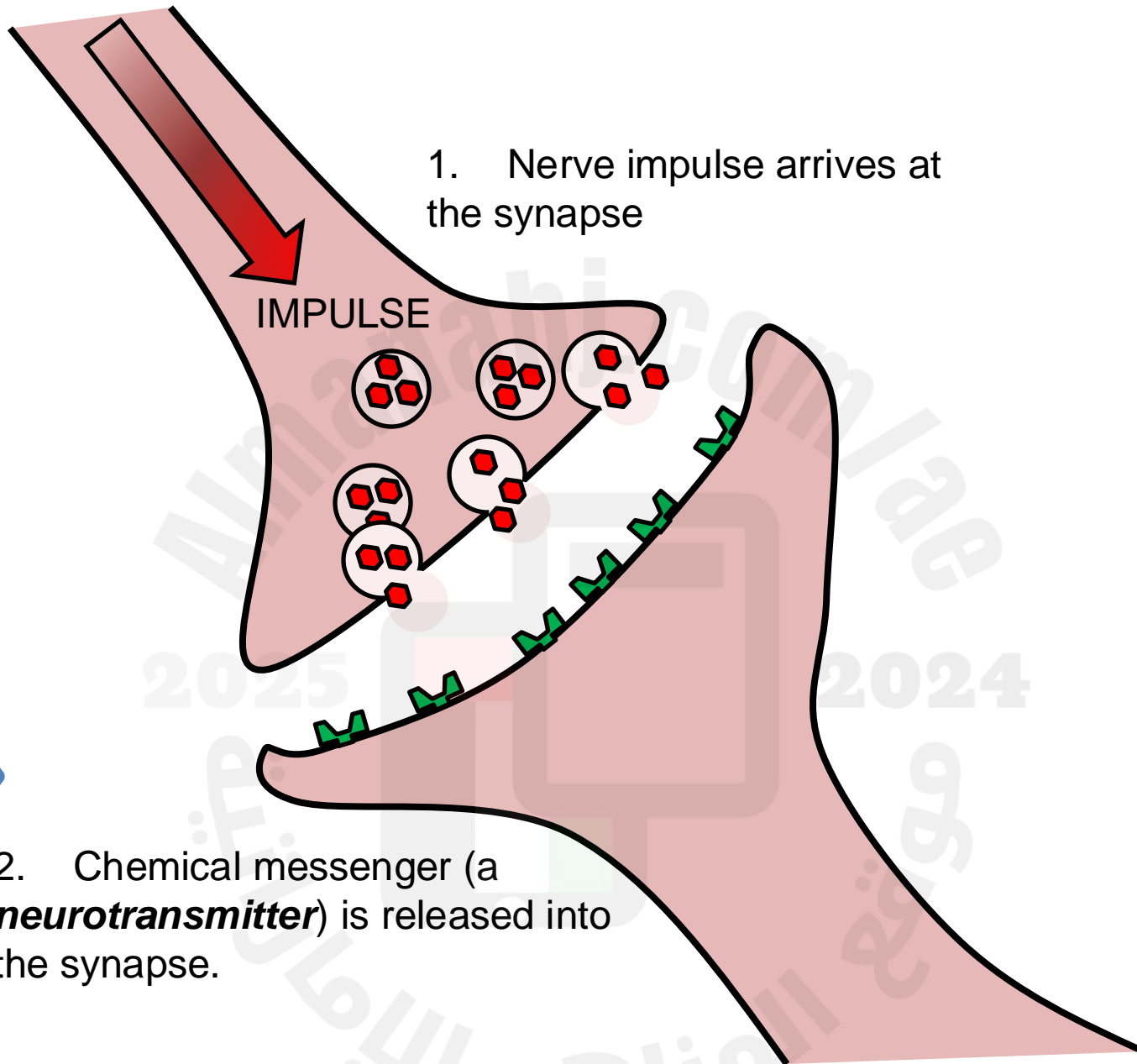


Facts about Neurotransmitter

- There are **25 known** neurotransmitters
- Once the neurotransmitters have done their work, they are either:
 1. **destroyed** enzymatically,
 2. **taken back** into the terminal from which it came
 3. **recycled and reused**.



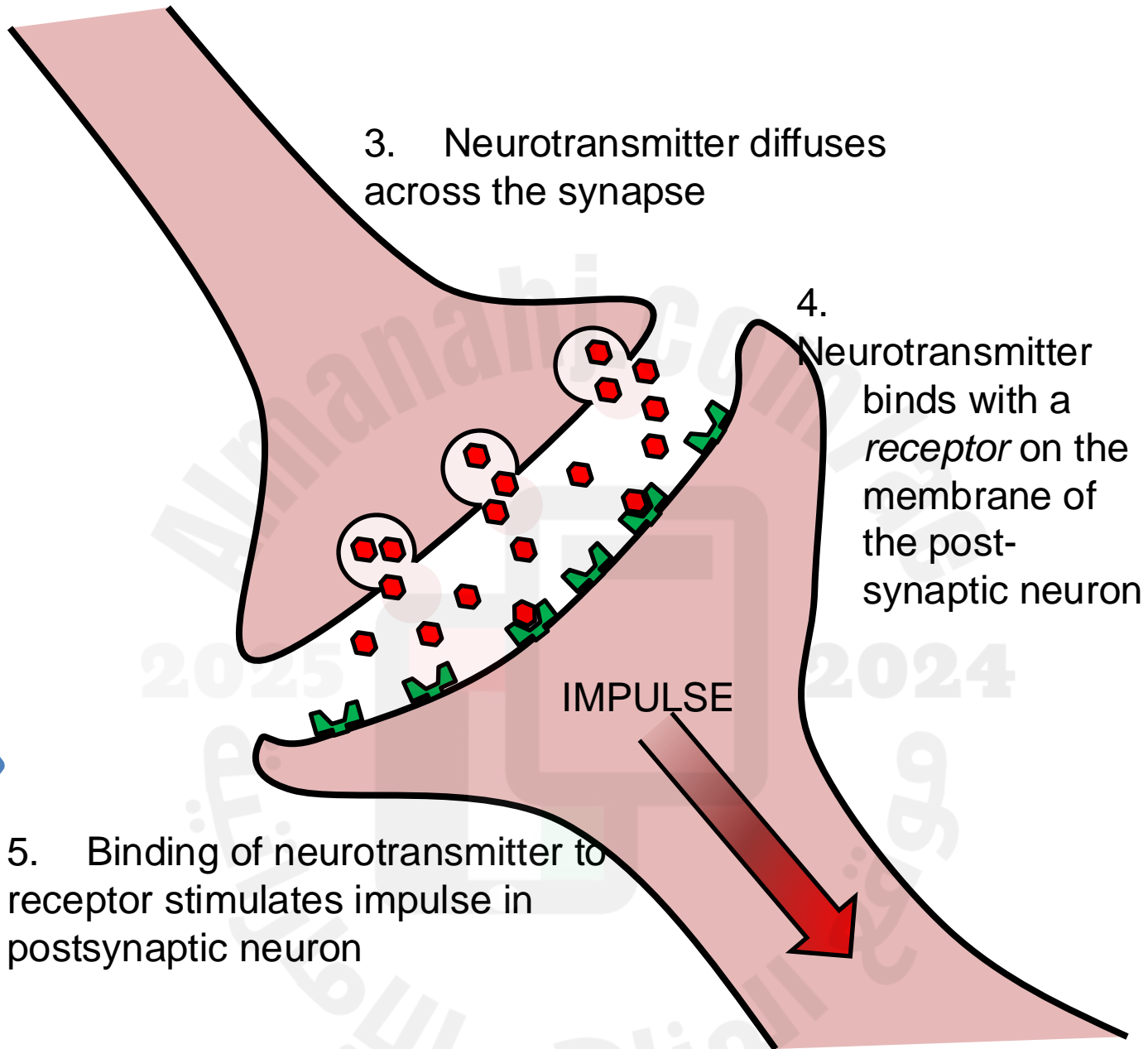


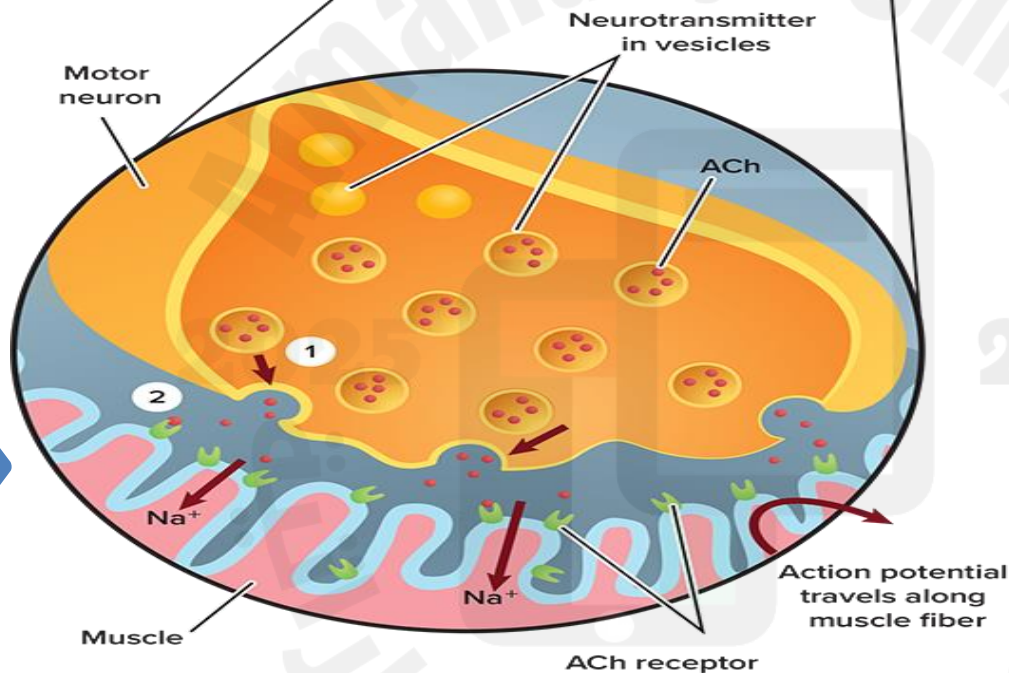
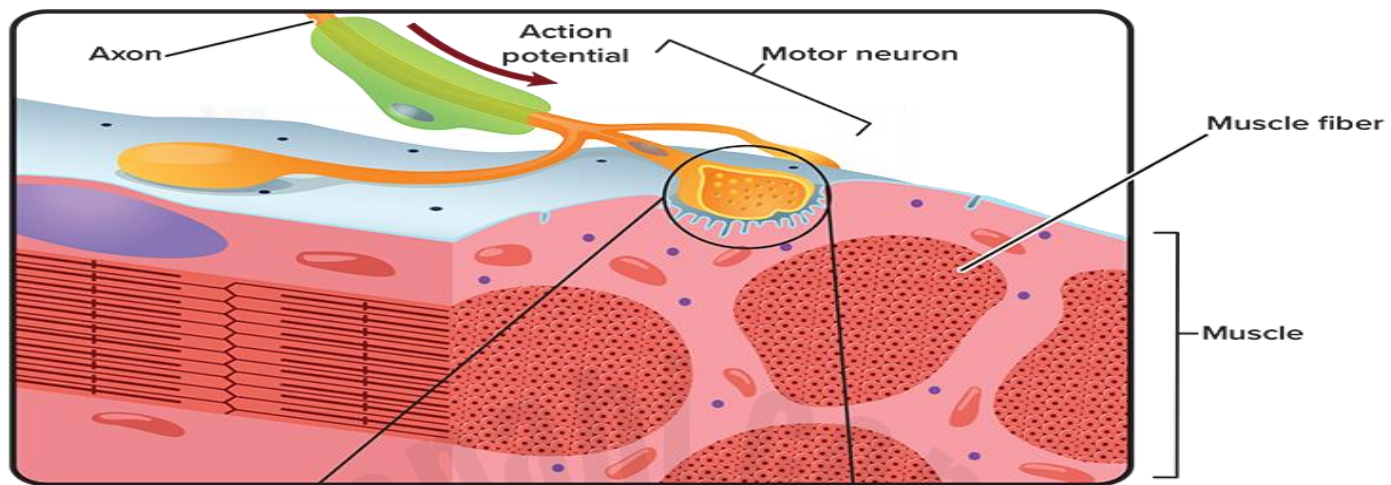


1. Nerve impulse arrives at the synapse

IMPULSE

2. Chemical messenger (a **neurotransmitter**) is released into the synapse.





1. A neurotransmitter called acetylcholine (ACh) is released from the axon of a motor neuron.
2. ACh binds to receptors on a skeletal muscle, which results in sodium ions (Na^+) entering the muscle. This produces an action potential. The action potential travels along the muscle fiber and leads to a series of events that will cause the muscle to contract.

Figure 7 Visualizing An Action Potential


To cause the voluntary contraction of a muscle, a signal from the brain creates an action potential in a motor neuron. This action potential travels along the motor neuron, which leads to the release of a neurotransmitter that signals the fibers of the muscle to contract.


Quiz


5. Which is NOT a step that leads to the voluntary contraction of a muscle?

A A neurotransmitter is released from a sensory neuron.

CORRECT

 An action potential travels along the muscle fiber.

 Sodium ions enter skeletal muscle.

 A neurotransmitter binds to receptors on skeletal muscle.

Quiz

4. Which is a chemical that diffuses across a synapse and binds to receptors on a neighboring neuron?

 dendrite

 node

neurotransmitter

CORRECT

 myelin