

هذا الملف مجرد اجتهاد منا وليس مرجعاً للمذاكرة
" ليس شاملاً "
وإنما لترسيخ المفاهيم الأساسية المتعلقة بالمحاضرة
وفقنا الله وإياكم

Physiology team 435

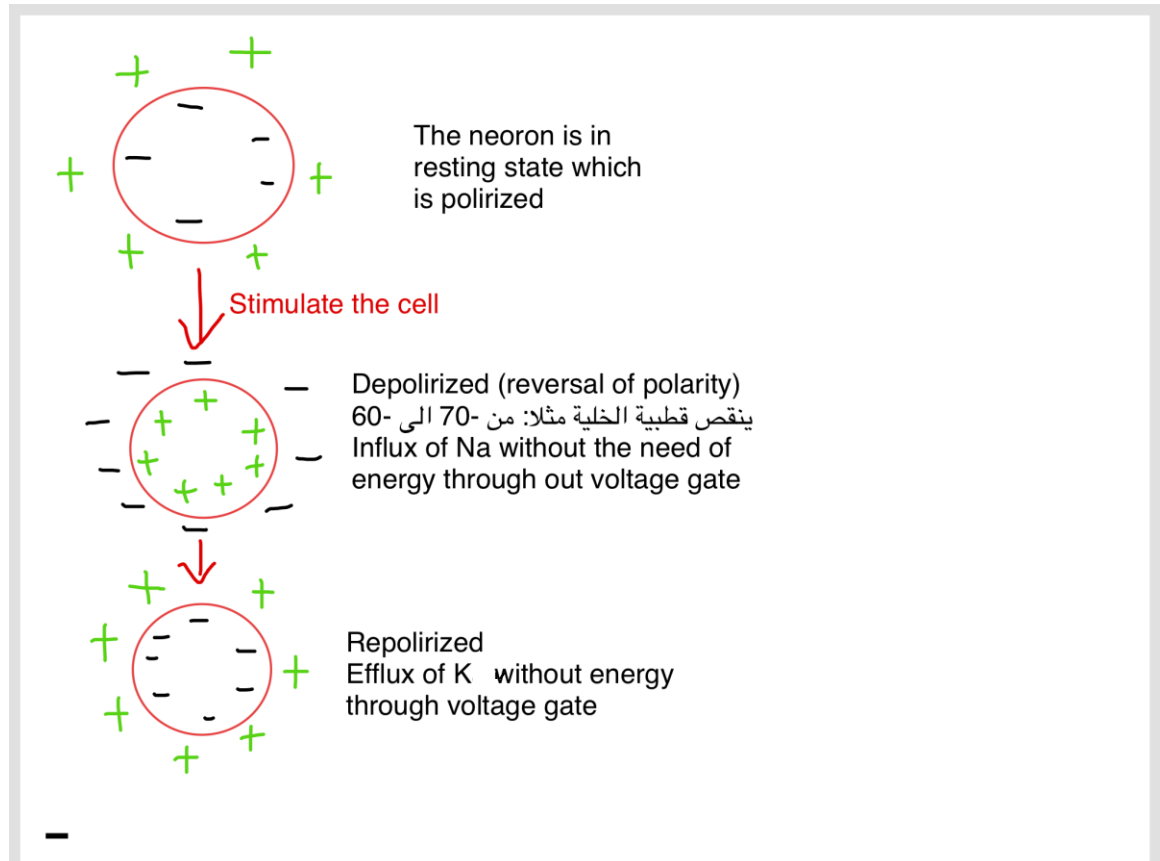
- The myelin sheath is deposited around the axon by Schwann cells.
 - Myelin sheath Conserve energy for axon
 - Node of Ranvier : the gaps between stretches of myelin sheath generated by neuron “unmyelinated / non-insulator”.
 - Axon hillock > the start point of action potential because it has the most “voltage gated Na channels”
 - The story of action potential reaction from the beginning tell the end:
- 1- Inside the cell : negative comparing with the outside in the rest state.
 - 2- The cell is bag full of K⁺
 - 3- There's phosphate & protein inside the cell which is carry negative charge which increase the negativity of the cell.
 - 4- The main cause of cell negativity in the rest state is K⁺ goes “leak” outside the cell.
 - 5- K⁺ pass through K⁺ leak channels.
 - 6- K⁺ does not need "energy" to pass through K⁺ leak channels.
 - 7- The cell membrane has a HIGH permeability for (K⁺) , and LOW permeability for(Na⁺).
 - 8- So the causes of the RMP > K⁺ leak channels ”the main reason” + large molecules (protein phosphate) + Na&K pump.
 - 9- The cell membrane separates the ve+ & -ve charges , at rest state (RMP)
 - 10- Resting state this is the resting membrane potential before the action potential begins. The membrane is said to be “polarized” during this state because of the -70 or -90 mv negative membrane potential that is present.

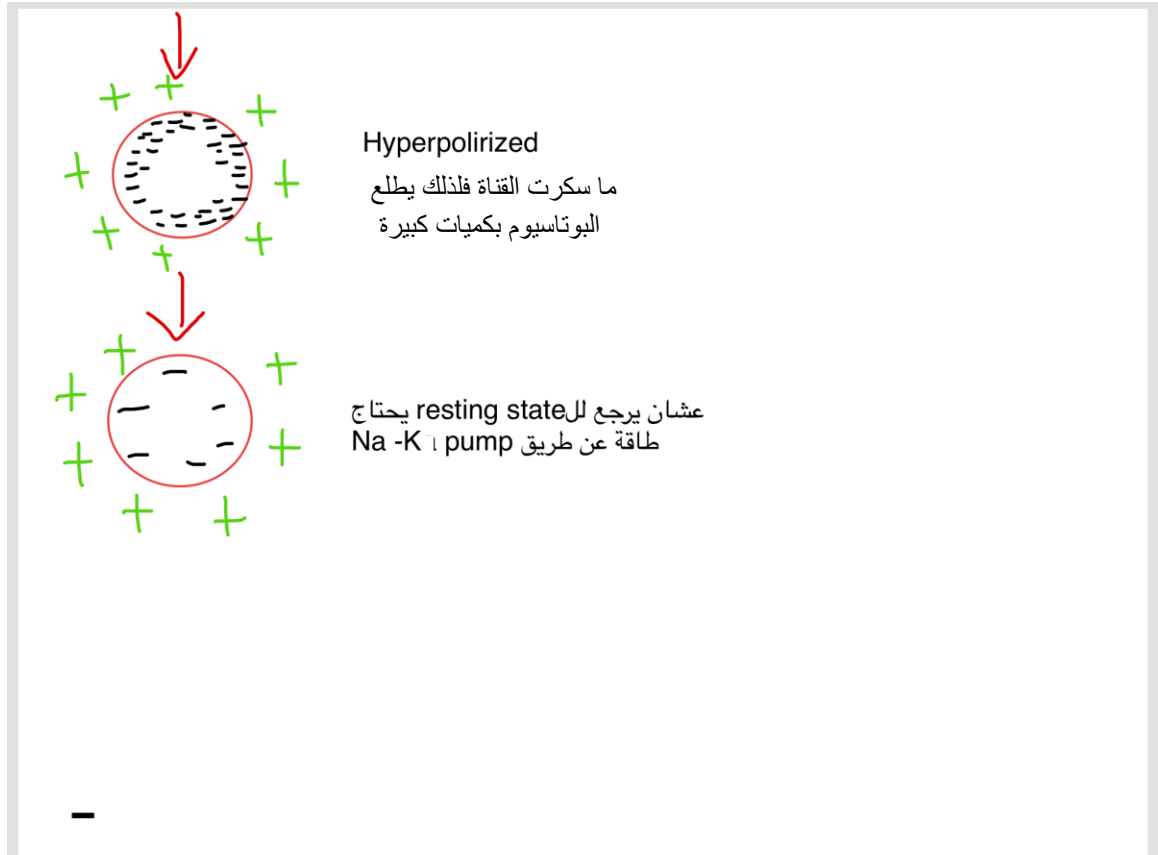
Now, there is an electrical stimulation :

- 11- Threshold stimulus open voltage gated Na channels and Na influx rises resting potential from -90 towards zero (gradual depolarization).
 - 12- As membrane potential raises, open more Na channels & more Na influx (+ve feedback) until all voltage gated Na channels open.
 - 13- What opens the voltage gated channels ? Opened by a stimulus strong enough to depolarize them to threshold.
 - 14- Depolarized state : Occurs when membrane potential reach zero value to reach + 35 mv +ve charges (IN) -ve charges (OUT).
 - 15- At + 35 mv all Na channels begin to close suddenly (Depolarization ends).
 - 16- Repolarization Due to high K conductance(flow) to outside (K outflux) by opening of all voltage gated K channels (causes negativity inside).
-ve charges (IN) +ve charges (OUT).
 - 17- Hyperpolarized : Why? Because K channel did not close.
- (Increasing the number of charges inside and outside the cell, it may occur and may not).

18 - To come back to the rest state we need the Na&K pump.

19- The whole process occurs in milliseconds.





- if the threshold was (50) then when you give 50 or more both will make the same action potential , but when you give less than 50 it will not make any action potential So:
 - Supra threshold : action potential
 - Threshold : action potential
 - Sub threshold : no action potential

- All or nothing principle : Once threshold value for excitation is reached a full action potential produced, its intensity cannot increase by increasing stimulus intensity.
- Absolute refractory period : No new action potential possible
- Relative refractory period : Can trigger new action potential if stimulus is very strong.