

(NONE OR ALL PRINCIPLE)

The stimulus reached to threshold, so sudden increase in Na⁺ influx will happen.

(The ions are getting inside the membrane)

The Na⁺ gated channels is : Open

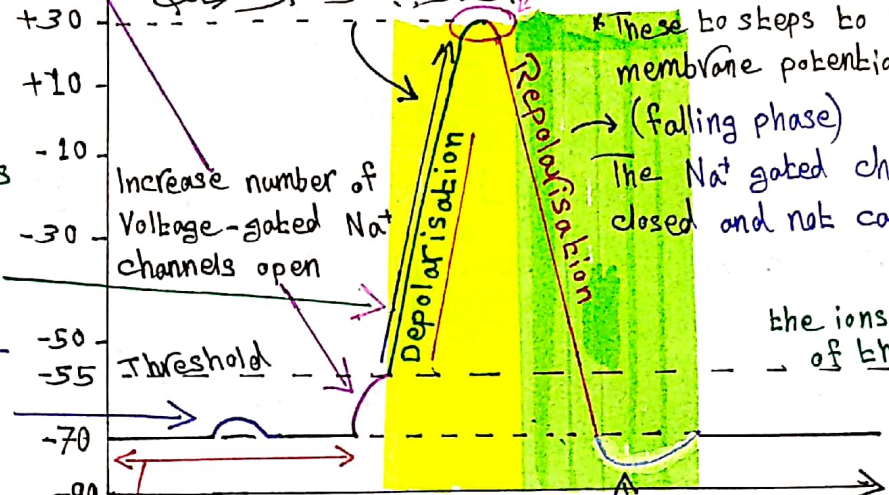
overshot (rising phase) firing stage

عندما يصير الـ membrane جوا موجب ووت بـا بالـ

① Closing the Na⁺ Voltage gated channels (when the membrane potential becomes close to Na⁺ equilibrium potential).

② Opening the K⁺ Voltage gated channels.

Peak of action potential: (maximum changes in membrane potential)



The membrane is less negative than the resting membrane potential.

*Subthreshold/graded:- The stimulus didn't reach to threshold so the membrane potential return to its normal shape.

(NONE OR ALL PRINCIPLE)

Positive (after potential)

because the first action potential was recorded as changes outside with regard to inside.

Resting potential The Na⁺ gated channels is : closed but capable for opening

Hyperpolarisation (excess in K⁺ efflux)

(The membrane is more negative than the resting membrane potential.)

(after hyperpolarization phase)

*The sodium channels are activated very fast but potassium channels are activated slowly
 *Overshot occurs by positive feedback.
 (Threshold) بلسوا يفتوا مع بفتح عن عند الـ
 بالبداء يكون في (chemical gated Na⁺ channels) ولما يزيد الـ activation ويوجد لفتح معي الـ
 يصير في (Na⁺ Voltage gated channels) activating for

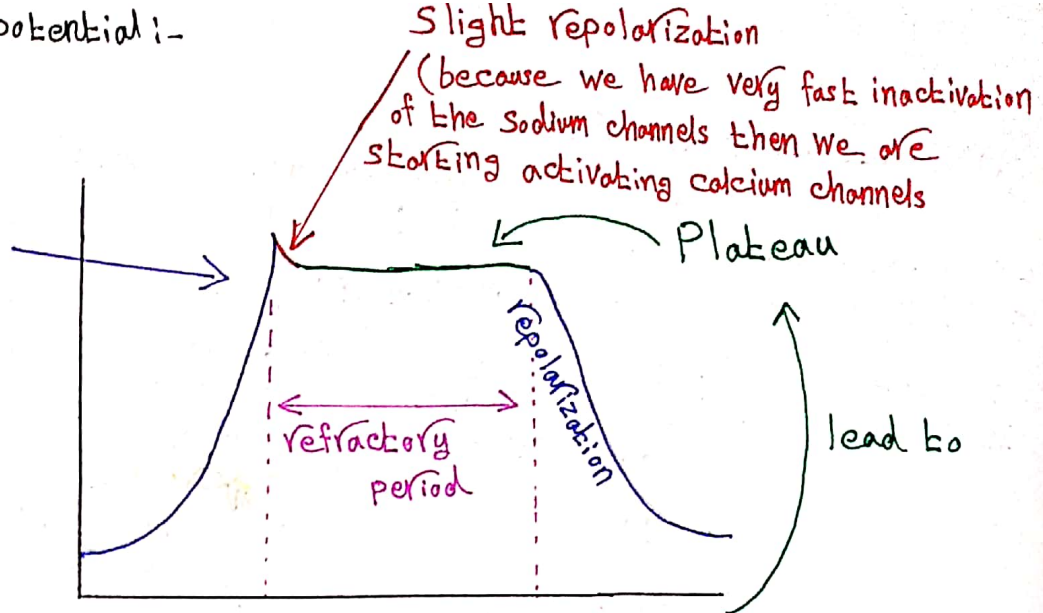
*The refractory period: is a period when the cell is not able to respond to another stimulus.

1) Absolute refractory period: (باللف الأخرى السلك) Threshold الـ تعرف إنه بلسا عن الـ
 From the firing stage to the end of first third of falling phase.
 - The cell will not respond at all, even by a strong stimulus because the Na⁺ channels in this period either all of them are (opened) during rising phase or (closed and not capable of opening).

2) Relative refractory period: (باللف الأخرى السلك)
 - Strong stimulus (suprathreshold) can change the membrane potential.
 - At the potential get closer to the resting membrane potential the channels that are (closed but not capable for opening) start to turn into (closed and capable of opening) but not capable of opening by normal stimulation.

Cardiac muscle action potential:-

Higher permeability for sodium ions
(fast depolarization)



In cardiac muscle, cells are equipped with slow Na^+ - Ca^{++} channels. The presence of plateau is important in prolonging the time of an action potential; giving more time for the cell to be able to respond to another stimulus, because the cell remains longer time in refractory period.