Neuron Action Potential Initiation

Neuron action potential initiation describes how action potentials are generated in a neuron cell. It begins with summation of signals, which occurs because neurons receive input that is either excitatory or inhibitory. The signals are summed and determine whether depolarization or hyperpolarization occurs. The threshold value of depolarization is -50 millivolts, and when it is reached voltage-gated sodium channels open causing sodium influx into the cell. This results in local depolarization in the region near those voltage-gated sodium channels. Once the electric potential reaches a certain positive value, voltage-gated potassium channels open, which cause potassium efflux out of the cell. This results in repolarization past the threshold value.



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Characteristics

Summation of Signals
Sun Signals
Neurons have inputs from many different cells that can be excitatory or inhibitory. Before action potentials are initiated, neurons sum these multiple inputs which either cause depolarization or hyperpolarization.

-50 mV Threshold Value Reached
Alarm Clock ringing at -50
The typical threshold value to trigger an action potential is -50 millivolts.

Voltage-Gated Sodium Channels Open
Salt-shaker's Voltage Gate Opens
Once the threshold value is reached, voltage-gated sodium channels open.

Local Depolarization
Loco-eyed D-polar-bear
Local depolarization occurs at the spot in which the voltage-gated sodium channels open, which causes the potential of the cell to rise to positive values.

Na+ Influx
Salt-shakers collect in bag
The opening of voltage-gated sodium channels causes sodium influx into the cell and depolarization.

Potassium Channels open
Open Banana channel
Voltage-gated potassium channels open at positive potential values triggering an efflux of potassium.

Repolarization
Red-polar-bear dropping bananas
The efflux of potassium results in repolarization of the cell, where the cell electric potential decreases to negative values again.

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