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by R D

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Physiology

Synapse (the interaction point of two neurons) is the region where ligand-gated sodium together with calcium channels reside in neurons. When an adjacent neuron releases acetylcholine, that binds to its receptor and the sodium channels open, leading to an influx of sodium from the exterior to the cell body. The resting potential of cells is -60mV; when the influx of sodium is increased, the sodium reaches to axon hillock and makes its potential increase to -35mV (Depolarization). Hence, a change in voltage happens in that area. The voltage-gated sodium channel opens (Marban et al., 1998), leading to an influx of sodium, leading to a cascade of Depolarization change in voltage, the opening of adjacent channel all through the axon. A sudden influx of amount of sodium, generating a threshold that leads to an action potential. A cationic gradient through the neuron is generated, leading to membrane potential to +60mV. Due to that, voltage-gated potassium channel opens up, leading to the efflux of potassium to decrease to resting potential, leading to repolarization, due to excessive efflux of potassium reaches-80mV hyperpolarization (Noam & Baram, 2010). Towards resting potential, an open potassium channel starts releasing potassium, restoring resting potential.

If the sodium channel is inhibited, there will be binding of acetylcholine. Still, no influx of sodium, so Depolarization would not be started, the threshold for reaching action potential will not be reached (Medbullets, 2012). The sodium channel queue reaches the terminal of an axon; the voltage is sensed by voltage-gated calcium channels, in fluxing calcium, leading to acetylcholine vesicle fusion to the membrane, helping to transfer the signal to adjacent neurons. An action potential is essential as it mediates the neuronal signal to adjacent neurons. It helps to transfer the data; if it is not that, then the calcium channels leading to activating adjacent cell's acetylcholine receptor would not be activated, so action potential is needed to pass on the signal.

References

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