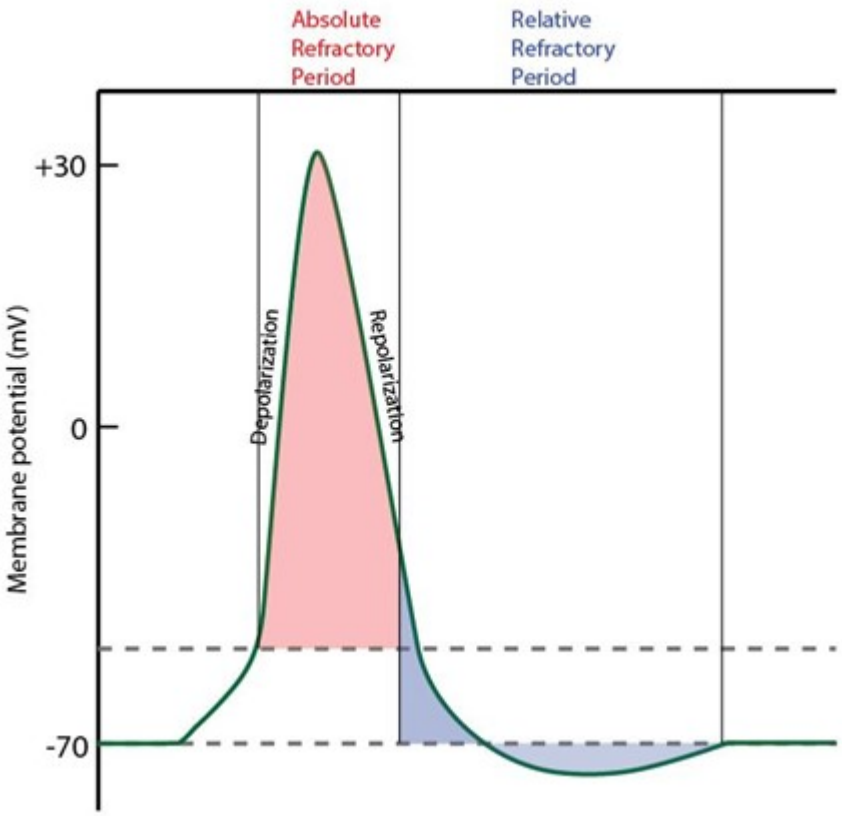
1.3.5

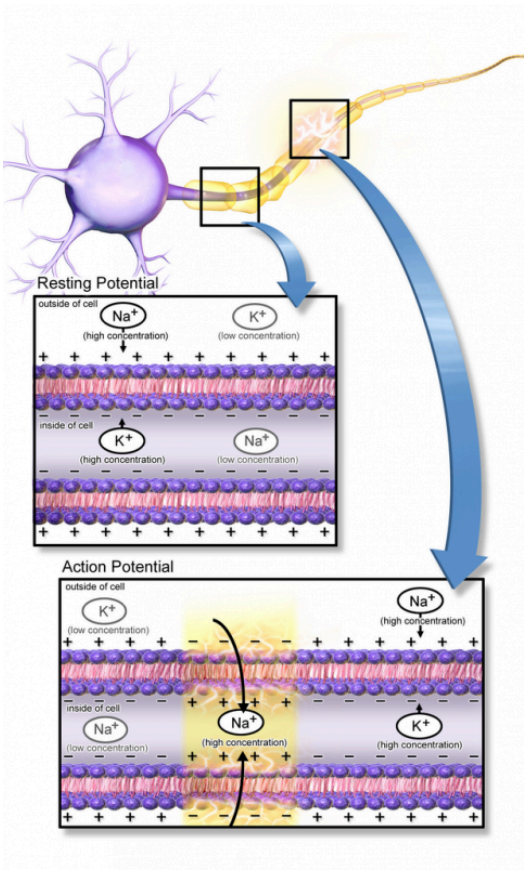
Refractory Periods



Refractory Peroids

Image by BYU-I student Fall, 2015

Another concept to be discussed is the **refractory period**. By definition, the refractory period is a period of time during which a cell is incapable of repeating an action potential. In terms of action potentials, it refers to the amount of time it takes for an excitable membrane to be ready to respond to a second stimulus once it returns to a resting state. There are two types of refractory periods, the **absolute refractory period,** which corresponds to depolarization and repolarization, and the **relative refractory period,** which corresponds to hyperpolarization. Moreover, the absolute refractory period is the interval of time during which a second action potential cannot be initiated, no matter how large a stimulus is repeatedly applied. The relative refractory period is the interval of time during which a second action potential can be initiated, but initiation will require a greater stimulus than before. Refractory periods are caused by the inactivation gate of the Na^+ channel. Once inactivated, the Na^+ channel cannot respond to another stimulus until the gates are re-set.



Propagation of Action Potential Along a Nerve

Title: File: Blausen 0011 ActionPotential Nerve.png; Author: BruceBlaus; Site: https://books.byui.edu/-Mcn; License: This file is licensed under the Creative Commons Attribution 3.0 Unported license.

The image above shows how an action potential might have started near the cell soma, and as it propagates down the axon towards the opposite end, the membrane potential behind the moving action potential has repolarized and returned to resting membrane potential. The axon ahead of the depolarization current has not yet depolarized, and it is also at resting membrane potential. Where the action potential is occurring, we find the membrane potential depolarized, and the outside of the membrane at that spot is negatively charged relative to the inside of the membrane at that spot. As sodium rushes in, it will depolarize the next adjacent spot on the axon in the direction that the action potential is propagating. The reason that the action potential does not depolarize the section of axon behind the depolarization current (or in the direction that the action potential just came from) is that the section of membrane is most likely in refractory periods and does not depolarize.

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