Potassium channel

Potassium channels are the most widely distributed type of ion channel and are found in virtually all living organisms.

They form potassium-selective pores that span cell membranes. Furthermore potassium channels are found in most cell types and control a wide variety of cell functions.

Potassium channels function to conduct potassium ions down their electrochemical gradient, doing so both rapidly (up to the diffusion rate of K+ ions in bulk water) and selectively (excluding, most notably, sodium despite the sub-angstrom difference in ionic radius).[4] Biologically, these channels act to set or reset the resting potential in many cells. In excitable cells, such as neurons, the delayed counterflow of potassium ions shapes the action potential.

By contributing to the regulation of the action potential duration in cardiac muscle, malfunction of potassium channels may cause life-threatening arrhythmias. Potassium channels may also be involved in maintaining vascular tone.

They also regulate cellular processes such as the secretion of hormones (e.g., insulin release from beta-cells in the pancreas) so their malfunction can lead to diseases (such as diabetes).

There are four major classes of potassium channels:

Calcium-activated potassium channel - open in response to the presence of calcium ions or other signalling molecules.

Inwardly rectifying potassium channel - passes current (positive charge) more easily in the inward direction (into the cell).

Tandem pore domain potassium channel - are constitutively open or possess high basal activation, such as the “resting potassium channels” or “leak channels” that set the negative membrane potential of neurons.

Voltage-gated potassium channel - are voltage-gated ion channels that open or close in response to changes in the transmembrane voltage.