

Resting Membrane Potential / Catalog of Methods in Biophysics

The resting membrane potential is created on the cell membranes of excitable tissues under conditions of physiological rest. This potential is due to the uneven distribution of basic physiological ions (potassium, sodium, chloride, calcium ions) on both sides of the cell membrane.

The value of resting membrane potential in muscle or nerve cells varies from **-50 mV to -100 mV** depending on the cell type (inside the cell is negative).

The following phenomena are involved in the generation and maintenance of the resting membrane potential:

1. By active transport, Na^+ ions are continuously pumped out of the cell and K^+ ions are pumped in (the so-called Na^+/K^+ -ATPase acts as a pump).
2. Under resting conditions, the cell membrane is only slightly permeable to Na^+ ions, so that the Na^+ concentration gradient cannot be immediately abolished by passive back diffusion.
3. The cell membrane is extremely impermeable to negatively charged proteins and organic phosphates.
4. The resting cell membrane is relatively permeable to K^+ . Because of the significant concentration difference, ions diffuse from the intracellular space into the extracellular space. Due to the positive charge of K^+ , the diffusion of a small number of K^+ ions already results in a disturbance of the charge on the membrane (diffusion potential). The K^+ diffusion is accompanied by growing potential. Finally, the equilibrium potential for K^+ is established.

Under resting conditions, the cell membrane is permeable, albeit with limitations, e.g. also to sodium and chloride ions. The resting membrane potential is generated by the contribution of all diffusible ions.

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Source

- KYMPLOVÁ, Jaroslava. *Katalog metod v biofyzice* [online]. [cit. 2022-12-14]. <<https://portal.lf1.cuni.cz/clanek-793-katalog-metod-v-biofyzice>>.