Current Topics in Biophysics (Zagadnienia Biofizyki Współczesnej) vol. 20 (2), 1996, 121-127

## Charge distribution in excitable membranes – some relations to the interpretations of membrane permeability and conductance

Stanisław Miękisz, Michał Bartoszkiewicz, Andrzej Hendrich

Electric charge distribution around and inside biological membranes is discussed with special emphasis put on voltage-dependent channel proteins. Specific spatial distribution of electric charges as well as its dependence on electric field create the molecular basis of excitability (selective and voltage-dependent gating). In the literature two macroscopic parameters – the ionic permeability  $P_i$  and the ionic chord conductance  $g_i$  – are alternatively used to describe the voltage-dependent behavior of excitable membranes. While the voltage dependence of the parameter  $P_i$  cannot be explained, in usual terms, by any microscopic properties of single channel proteins (and is therefore purely formal), the relationship  $g_i(V)$  may easily be interpreted and modeled via the voltage dependence of gating charge distribution in the channel protein. Thus, the user of the latter parameter seems to be much more suitable for presenting the phenomenon of excitability in a coherent form.