

THE EFFECT METALLIC IONS AND pH ON THE DYNAMIC PROPERTIES OF LIPID MEMBRANES

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The effect of the inorganic metal ions K^+ , Ca^{2+} , Sn^{2+} , Hg^{2+} and buffer solution pH on the dynamic properties of egg yolk lecithine (EYL) liposome membranes was studied using the ESR spin probe method. The probe applied was 2,2,6,6-tetramethylpiperidine-1-oxyl (TEMPO). It was dissolved both in the hydrophobic part of the membranes and in an aqueous medium. On the basis of ESR spectra, the probe partition parameter between the membranes and the medium was calculated. The partition parameter is defined as a ratio of the high-field spectrum line amplitude of the probe placed in a lipid medium (the membranes) to the amplitude of the high-field spectrum line of the probe placed in an aqueous medium. The parameter value is connected with membrane fluidity. An increase in the membrane lipid mobility increases the partition parameter. The results obtained indicate that light metal ions (K^+ and Ca^{2+}) slightly increased lipid bilayer mobility, while heavy metal ions (Sn^{2+} and Hg^{2+}) showed a tendency to rigidify them. The effect is somewhat modified by changes in pH. In the case of K^+ ions, a change of pH from 3 to 9 intensified the increase in bilayer mobility, but this effect practically did not appear in the case of Ca^{2+} ions. In the case of Sn^{2+} and Hg^{2+} ions the rigidification of the lipid bilayers was stronger at pH 3 than at pH 9. The studies also indicate that in the presence of Sn^{2+} ions, the TEMPO ESR signal disappeared very quickly. This effect can be due to Sn^{2+} and probe unpaired electron interaction (or even bonding), leading to the disappearance of the probe's paramagnetic properties.