Current Topics in Biophysics (Zagadnienia Biofizyki Współczesnej) vol. 20 (1), 1996, 86-92

Spin-label study on gramicidin-phosphatidylcholine interface: fluidity, hydrophobicity and ion penetration

Anna Wiśniewska, Witold K.Subczyński

A series of stearic acid spin labels (SASLs) with the nitroxide moiety attached to various positions along the alkyl chain, and tempocholine dipalmitoylphosphatidic acid ester (T-PC) were used to examine the depth-dependent changes in alkyl chains motion, local hydrophobicity, and ion penetration induced by gramicidin A (GA) in phosphatidylcholine (PC) bilayer membranes. The results are as follows: (1) The effect of GA on the motional freedom of alkyl chains (SASLs) in saturated PC membranes is significantly larger than the effect in unsaturated PC membranes, (2) The alkyl chains motional freedom at the GA-PC interface decreases with the depth in the lipid bilayer, (3) Incorporation of GA decreases hydrophobicity (increases polarity) in both the polar headgroup region and the hydrocarbon region of the PC bilayer, (4) At the GA-PC interface the hydrophobicity profiles become very flat and almost identical in saturated and unsaturated PC membrane, even though they differ significantly in pure lipid bilayer, (5) Presence of GA increases the ion penetration into the PC bilayer. These data were obtained in the fluid phase and correlate well with the hydrophobicity profiles obtained in frozen membranes.