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MECHANISMS OF POLYPHENOL REGULATION OF AMYLOID-INDUCED PERMEABILITY OF PLANAR LIPID MEMBRANE

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The work is devoted to the study of the processes of formation and functioning of ion channels induced by amyloidogenic peptides. The effect of plant polyphenols, phloretin, butein, resveratrol, isoliquiritigenin, 4'-hydroxychalcone and cardamonin, on the pore-forming activity of fragment 25-35 of amyloid β-peptide ($A\beta_{25-35}$) in the palmitooleoylphosphocholine bilayers was studied. It has been shown that an addition of phloretin, butein or isoliquiritigenin in the membrane-bathing solution up to 20 μM led to significant increase in the macroscopic transmembrane current induced by the peptide. Cardamonin, 4'-hydroxychalcone and resveratrol, did not affect the membrane activity of the $A\beta_{25-35}$. A comparison of the effects of polyphenols on the electrical and elastical properties of the mem-

branes and on the pore-forming ability of the $A\beta_{25-35}$ demonstrated that the observed effects is not related to the changes in the physical parameters of lipid bilayers. The results obtained using confocal fluorescence microscopy indicated the role of the domain structure of the lipid bilayer in the membrane activity of amyloidogenic peptides. The results of electrophysiological measurements with α-synuclein, another protein that forms ion-permeable β-sheets structures in lipid bilayers, do not contradict the assumption that polyphenols hydroxylated in the 7-position of A-cycle and 4'-position of B-cycle with open propane fragments between the rings specifically interacts with the β-structures of amyloid proteins and peptides.

Keywords: fragment 25–35 of β-amyloid peptide, ion channels, butein, phloretin, resveratrol, lipid bilayers, liposomes, permeability, lipid phase separation