Badania FTIR-ATR i fluorescencyjne układów białkowo-lipidowych = FTIR-ATR and fluorescence studies of protein-lipid systems.

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Streszczenie

Lipid-protein systems paly curtail roles in living systems [49]. Hence, a deter-mination of their structure at different levels of organization is still one of the most important tasks in many research projects. A study of lipid-protein systems is based on many physicochemical techniques, such as spectroscopy of FTIR, Raman, fluo-rescence, NMR, EPR, as well as DLS, DSC and TEM methods. In the presented paper tow of the most frequently used methods, that is FTIR and fluorescence spectroscopy, will be discussed in details. They are characterized by a relatively low cost of sample preparation, a short measuring time, and they give a huge number of structural and physicochemical information about lipid-protein systems. In the FTIR-ATR spectroscopy many of vibrational bands are commonly used as very pre-cise vibrational indicators of structural changes in lipids and proteins (Fig. 1) [1–6]. They allows to characterize lipid and protein components separately in mixed sys-tems. Additionally, structural changes in lipid membranes can be monitored in one FTIR-ATR experiment simultaneously in a region of hydrophilic lipid head-groups (Fig. 5) [17, 18], in a hydrophobic part composed of hydrocarbon lipid chains (see Figures 2 and 3) [7–9], and in a lipid membrane interface represented by ester lipid groups (Fig. 4) [4, 6, 11, 12]. A secondary structure of proteins and peptides in diffe-rent experimental conditions can be defined in the FTIR-ATR spectroscopy on the base of amide I bands (Fig. 6 and Tabs 1, 2 and 3) [20–22]. A fluorescence spectro-scopy is a complementary methods to FTIR spectroscopy in a study of lipid-protein systems. It competes information about time-dependent and very fast (in a scale of femtoseconds) structural processes in both lipids [41–45] and proteins [23, 27, 48]. The folding, denaturation, and aggregation of proteins and lipid membranes accompanied by changes in an order, packing and hydration of the system under study [23, 27, 41–45, 48].