COMPLEXES OF ANIONIC LIPOSOMES WITH CATIONIC COLLOIDS: FORMATION, STRUCTURE AND PROPERTIES

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Spherical lipid bilayer vesicles (liposomes) are widely used for delivery of biological active substances. Hydrophilic compounds can be encapsulated into the inner water cavity of liposomes while the hydrophobic can be embedded into the liposomal membrane. Modyfication of liposomes with macromolecules can improve physic-chemical properties of vesicles, impart additional properties to liposomal containers or glue several liposomes for creation multi-functional systems.

Small unilamellar liposomes, prepared from mixtures of anionic and zwitterionic lipids, were complexed with polycations – linear polyelectrolytes, polycationc stars and spherical polycationic brushes. To control the complexation and properties of the resulting complexes, the multi-method approach was used including fluorescence spectroscopy, dynamic light scattering, laser microelectrophoresis, cryogenic transmission electron microscopy (cryo-TEM); differential scanning calorimetry, conductometry, etc.

It was demonstrated that the fraction of anionic lipid in liposomes and polycation architecture are the key parameteres to the resulted complex structure. Changing of one or both parameters allows one to controllable create of either individual polymer-modyfied liposome or multiliposomal ansemble with desirable composition and colloid stability.

The aggregation stability of liposome/polyelectrolyte complexes, the reversibility of complexation, the integrity of polymer-bound liposomes and to structural rearrangements in the liposomal membrane induced by the polycation chains were shown to depend not only on charge ration of interacting particles but also on polycation structure. The difference in structures of interfacial complexes formed by macromolecules of different architecture were demonstrated and the complexes were visualised by cryo-TEM. The role of complexation with anionic liposomes on polycations' cytotoxicity was discussed.

Complexation of polycations with liposomes allowed us to obtain structures with cytotoxicity close to toxicity of initial biocompatible liposomal vesicles.

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