**THE EFFECT OF ANTIFIBROTIC AND ANTIBACTERIAL DRUGS ON THE PHYSICOCHEMICAL PROPERTIES OF LIPOSOMES: A SPECTRAL STUDY**

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**Introduction**

Actual task of biomedical chemistry is to fight against a new coronavirus infection and overcome severe complications, including pulmonary fibrosis and bacterial infections. Liposomes are a promising inhalation delivery system with a high affinity for lung tissues. However, the inclusion of active molecules in liposomes can significantly affect the physicochemical properties of the container, which must be taken into account when designing delivery systems. The aim of this work is to identify the main binding sites of moxifloxacin, levofloxacin, pirfenidone, nintendanib, and rifampicin with the lipid bilayer and to detect the effect of these drugs on the phase transition of liposomes of different composition.

**Methods**

Drugs were obtained from Sigma Aldrich; DPPC, cardiolipin, cholesterol - Avanti Polar Lipids. Sodium phosphate buffer tablets for solution preparation Pan-Eco.

Liposomes were prepared by thin layer hydration technique with lipid composition: DPPC, DPPC:CL 80:20, DPPC:Cholesterol 90:10. The same procedure was used to prepare liposomal preparations, but a thin lipid film was dispersed with a buffer solution containing the active molecule. The resulting liposomes were purified from the non-incorporated drug by dialysis.

Spectroscopy studies were conducted with UV-vis spectrometer AmerSharm UltraSpec2100pro and ATR-FTIR Bruker Tensor 27.

**Results**

Depending on the nature of the active molecule, it was possible to achieve an efficiency of passive loading into liposomes from 25 to 80%. The loading proceeded best for liposomes containing cardiolipin, while the addition of cholesterol reduced this parameter. It has been established that the lipophilicity of the drug and the presence of ionogenic groups in its structure play a decisive role in the loading efficiency. For fluoroquinolones, the key binding mechanism is electrostatic, while for antifibrotics and rifampicin, stacking interactions with cholesterol also play an important role, as evidenced by characteristic spectral changes in the IR spectra.

**Conclusions**

The main binding sites of drugs are usually carbonyl and phosphate groups of lipids, and stacking interactions are also important. Depending on the lipophilicity of the drug, they can either accelerate the phase transition of liposomes (rifampicin, pirfenidone) or slow it down (levofloxacin).

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