

INFLUENCE OF SYNTHETIC POLYELECTROLYTES ON THE STRUCTURE OF LIPID MONOLAYER

Panaeva M.A.¹, Bykov A.G.¹

¹Saint Petersburg State University, Saint Petersburg, Russia

Student

st068796@student.spbu.ru

Pulmonary surfactant is complex mixture of lipids and proteins. Solution of pulmonary surfactant covers the inner surface of lungs and maintains low values of surface tension in course of compression and expansion. The lack of these surfactants causes the respiratory distress syndrome, which is a leading reason of premature infant's death. Natural pulmonary surfactants extracted from animal lungs are used to prevent the respiratory system collapse of newborn children. Recently it has been shown that natural pulmonary surfactants improves medical treatment of patients with severe disease of coronavirus infection COVID-19 [1].

Proteins provide accelerations of adsorption and formation of multilayer structure in surface layer of pulmonary surfactant solutions due to their own surface activity and ability to form complexes with lipids. However, the mechanism of their action is unknown so far. Therefore, many studies are devoted to investigation of surface properties of pulmonary surfactant solutions. In this work the dynamic surface properties for spread monolayers of lipids on solutions of different polyelectrolytes was investigated. The dynamic surface elasticity of lipid monolayer was measured in broad range of surface tension using new method, which gives a possibility to investigate dynamic surface properties under near physiological conditions [2]. It was shown, that characteristic time of relaxation processes at deformation of lipid monolayers strongly depends on both electrostatic and hydrophobic interactions between lipids and polyelectrolytes. Presence of hydrophobic side chains and charged group on polyelectrolyte improve formation of complexes, especially if macromolecule is oppositely charged to lipids. Probably, the formation of multilayer structure at the surface of solution is possible only at the optimum ratio of hydrophobic and electrostatic interactions between lipids and polyelectrolytes.

References

[1] Veldhuizen R.A.W., Zuo Y.Y., Petersen N. O., Lewis J.F., Possmayer F. Expert review of respiratory medicine **2021**, 15, 597–608

[2] Ravera F., Miller R., Zuo Y.Y., Noskov B.A., Bykov A.G., Kovalchuk V.I., Loglio G., Javadi A., Liggieri L. Current Opinion in Colloid & Interface Science, **2021**, 101467

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