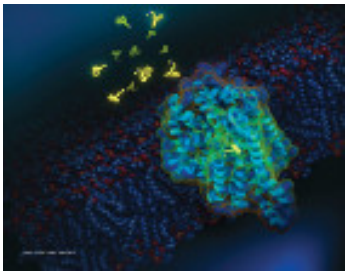

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Biologically relevant lipid multilayers - Lung Surfactant and Tear Film Lipid Layer

Lipid membranes, which are the most biologically relevant lipid aggregates, have a bilayer structure. Still, in a human body, there are two important lipid assemblies, Lung Surfactant (LS) and Tear Film Lipid Layer (TFLL), which have not bi- but rather a multilayer character. Lung surfactant lines the gas-exchange interface in the lung alveoli and reduces the surface tension at the air-liquid boundary to minimize the work of breathing. It consists mainly of phospholipids with a small number of proteins. At the very interface, it forms a lipid monolayer connected to complex multilayer lipid reservoirs in the subphase. Tear Film Lipid Layer is a multilayer lipid assembly covering the aqueous tear film at the cornea surface. It is a highly dynamic and non-equilibrium structure forming the very first environment-eye barrier. It contains polar and nonpolar lipids, forming a complex and dynamic interface.
We investigate models of Lung Surfactant and TFLL employing combined theoretical and experimental approaches. We use molecular dynamics computer simulations to obtain a molecular-level picture of the systems. The simulations are complemented by experiments using Langmuir trough combined with fluorescent microscopy to address macroscopic-level phenomena. In our studies, special emphasis is given to interactions of LS and TFLL with topical drug molecules.

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