Abstract

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Title of the thesis: *Preparation and growth of solid supported phospholipid membrane: effect of cholesterol and nanoparticle*

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Lipid bilayer is the basic building block of all biological membranes. Solid lipid bilayer and unilamellar vesicles are excellent model lipid membranes to study various bio molecular interactions at the cell surface.In the present work,I have studied the formation of single and multipleDOPC bilayer onthe hydrophilic mica surfacewith simple methodology of self organisation and physisorption of large unilamellar vesicles (LUV). Solid supported bilayer has been characterized byatomic force microscopy(AFM) in liquid mode. Random isolated bilayer patcheswere observed when much diluted DOPC LUV was deposited on freshly cleaved mica surface. The sequential deposition of DOPC LUVon the same surface leads to the formation of second and third bilayer due to adsorption and rupture of vesicles at the edges of previously formed bilayer patches. The effects of cholesterol and silver nano-particle on the solid lipid bilayer and nanomechanical properties have been investigated using Peak-Force Quantitative Nanomechanicalmapping (PF-QNM). It is revealed that cholesterol influences the formation of cholesterol rich domaineven in purely unsaturated lipid bilayer. The interaction of anionic citrate coated silver nanoparticle with solid lipid bilayer reveals that cholesterol mediated bilayer bears less effect than pure bilayer.A preliminary zeta potential study on large unilamellar vesicles made from DOPC-DOPE and DOPC-DOPG have been done in view of understanding electrostatic properties of membrane, as these compositions mimic the bacterial membrane. The giant unilamellar vesicles have been prepared with DOPC and DOPG mixture and observed under phase contrast microscope. Interestingly, when GUV were prepared with an antimicrobial peptide NK-2, the halo region of phase contrast micrograph disappears, indicating leakage and exchange of fluid between interior and exterior of vesicles.

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