Interaction between DOPC/DOPG supported lipid bilayers and a helix peptide

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Abstract

In our previous studies, we have demonstrated that short designed peptides such as G4 are effective at killing Gram-positive and Gram-negative bacteria and inhibiting cancer cell growth. In contrast, they display little hemolytic activities against human red blood cells (hRBCs). Under co-culturing conditions, they can selectively recognize and attack bacteria whilst showing no affinity to mammalian cell hosts. Such high selective responses are attributed to the delicate structural design of the peptide molecular structures that could recognize different membrane types and facilitate different interactions.[1]

In this work supported lipid bilayers are used as simple models of cell membranes to help understand these membrane-peptide interactions. DOPC/DOPG bilayers are built on optically flat silicon oxide surface by unilamellar liposome deposition. By controlling the percentage composition of DOPG, different negative charge densities of the bilayers can be gained to observe the effects from electrostatic properties on the interactions. Neutron reflection can give information about the thickness and composition of the layers before and after peptide interaction. The thickness and mass changes can also be observed in real time during the bilayer-peptide interaction by QCM-D (Quartz Crystal Microbalance with Dissipation Monitoring) and DPI (Dual Polarisation Interferometry). In addition, DPI technology is able to measure the birefringence of the bilayers in real time which can characterise the changes in the order of the lipid molecules associated with interactions. This poster reports the early stage of this study that demonstrates the feasibility using these techniques.

1 Jing Hu, Cuixia Chen, Shengzhong Zhang, Xichen Zhao, Hai Xu, Xiubo Zhao, and Jian R. Lu, Biomacromolecules 2011, 12, 3839−3843