The Absorbance and CD Effects of Lipids on the Study of Secondary Structure Analysis of Cardiotoxin by Using Synchrotron Radiation Circular Dichroism Spectroscopy

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It has been well studied from NMR and from molecular dynamicscalculations that intermolecular interactions within the bilayer ofliposomes lead to a restriction of all the possible conformations of phosphotidylcholine (PC), in particular, the glycerol backbone and therelative head group orientation seem to be rather rigid. It is therefore though that the chiroptical properties of PC are sensitive to such conformational restrictions and that circular dichroism (CD) measurements can reflect electronic transitions of the intrinsic ester chromophores localized near the chiral center of the phospholipids. These conformational changes are more significant at lower temperature, showing a significant increase in CD intensity around 220 nm below the main phase transition temperature Tc. However, in the study of protein-lipid interaction such as pore forming proteins as well as membrane proteins, CD spectroscopy in vesicle system can be difficult to interpret because of differential light scattering effects present due to the lipid vesicles. Moreover, the lipid:protein rations that makes detection and interpretation of small changes difficult because of the absorption flattening artifacts.

However, synchrotron radiation circular dichroism (SRCD) spectroscopy with its virtues of higher sensitivity and high light throughput has now been recognized to overcome these problems by utilizing a detector geometry that reduces apparent light scattering. In addition, the ability to acquire data down to lower wavelengths (~175 nm) provides more accurate secondary structure information. Therefore, it is worth to address the question whether chiral phosphotidylcholine molecules in micelles and liposomes that show neglect CD signal while small amount of lipids are used but do have significant absorbance in the far UV region of the spectrum, do not degrade the quality of the spectrum particularly under the temperature dependence experiments. In the present work we have first report on the SRCD properties of micelle and liposomes made of L-lysoPC, L-DPPC respectively under the temperature around the transition temperature. Following these results, we'll further to investigate the secondary structure analysis of membrane proteins that interact with these lipid molecules. And finally, to establish the SRCD spectra data bank and analysis.

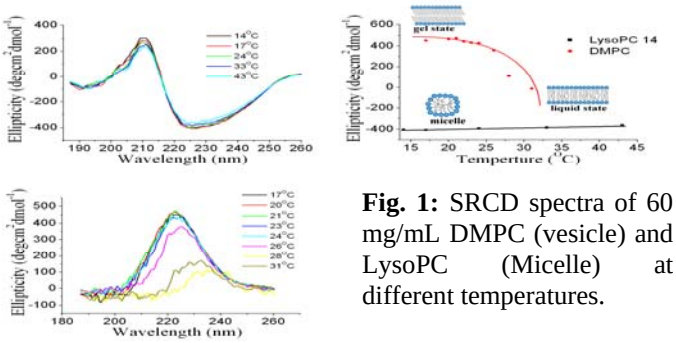

Fig. 1: SRCD spectra of 60 mg/mL DMPC (vesicle) and LysoPC (Micelle) at different temperatures.

References

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