

Partitioning of Cholesterol in Lipid Rafts

B. Sarangi¹, V. A. Raghunathan¹, and G. Pabst²

¹ Raman Research Institute, Bangalore 560 080, India

² Institute of Biophysics and Nanosystems Research, Austrian Academy of Sciences, A-8042, Graz, Austria

Cholesterol is an essential lipid component of eukaryotic membranes and has been implicated to be responsible for the formation of lipid/protein domains, commonly termed rafts, with a broad spectrum of physiological functionality. However, the lipid composition of these rafts remains controversial. Although, it is commonly believed that rafts are enriched in cholesterol, corresponding to the liquid ordered phase (Lo) of cholesterol/phospholipid mixtures, some recent experimental findings suggest that the complementary liquid disordered phase (Ld) is not depleted in cholesterol.

In order to substantiate the role of cholesterol in controlling the lateral homogeneity of lipid membranes we have performed small-angle x-ray diffraction (SAXD) experiments on multilamellar preparations of phospholipid bilayers composed of mixtures of dioleoyl phosphatidylcholine (DOPC), dipalmitoyl phosphatidylcholine (DPPC), distearoyl phosphatidylcholine (DSPC) and cholesterol. The SAXD data allow us to calculate the partitioning of cholesterol into the coexisting Lo and Ld phases from the corresponding electron density profiles. We find that cholesterol partitions preferentially into the Lo phase, although the Ld phase contains significant amounts of cholesterol.