

Cholesterol Transport into Freestanding Planar Lipid Membranes

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Phase transition in cell membranes is closely associated with fundamental biological processes such as signal transduction, membrane trafficking, protein and lipid sorting, endocytosis, pathogen invasion, etc. To understand the relationship between phase behavior and biological processes, several artificial lipid membranes, especially freestanding planar lipid bilayers, have been developed and utilized. However, precise lipid composition and phase behavior of the model systems have not been fully demonstrated. Moreover, cholesterol, one of the important component in the cell membrane, is difficult to be inserted into the model lipid bilayers. Therefore, we developed a new freestanding planar membrane system using TEM grid for direct visualization of dynamic phase behavior. Using this system, we revealed that phase behavior is scarcely dependent with the cholesterol content in oil and showed limited cholesterol insertion from oil into the lipid bilayers. To insert the cholesterol into the lipid bilayers, we transported the cholesterol from aqueous buffer into the lipid bilayers using methyl- β -cyclodextrin and analyzed gel-liquid phase transition with the cholesterol content.