Quantitative evaluation of GUV fusion and destruction with fluorescence activated cell sorter


We have focused on fusion and division of cell and revealed the mechanism of spontaneous division triggered by macromolecules using giant unilamellar vesicle (GUV) composed of phospholipid bilayer. In this study, we aimed to reveal correlation between various parameters such as lipid compositions of GUV and GUV fusion and destruction ratio with fluorescence activated cell sorter (FACS). FACS can quantify the properties of many GUVs in a short time. So we can get each ratio using FACS more easily and correctly than using microscope. As a result, we constructed the detection system of GUV fusion and destruction using FACS. Then, we revealed that charged lipid contained in GUV and AC pulse applied during fusion process affected on GUV fusion and destruction.

Influence of chemical compounds on model cell membranes


Interaction between local anesthetics such as lidocaine and cell membranes that have ion channels has been considered to play an important role in the anesthetic function. Therefore, the effect of local anesthetic molecules on cell membranes has been studied for several years. However, detailed mechanism of functional expression is still unclear. In this study, we investigated the effect of anesthetic molecules on lateral phase separation in liposomes which are model systems of cell membranes. We measured the miscibility transition temperature of the liposomes composed of dioleoylphosphatidylcholine, dipalmitoylphosphatidylcholine, and cholesterol with and without the anesthetic molecules using a fluorescence microscope. The result of the measurement will be discussed.

Preferential Perturbation of Positively Curved Membranes by Adenovirus-derived Amphiphilic Peptide

Tomo Murayama, Silvia Pujals, Shiroh Futaki (Institute for Chemical Research, Kyoto Univ.)

The N-terminus segment of Adenovirus internal protein VI (AdVpVI) is known as a potentially amphipathic helical structure and is essential for the membrane interaction of AdVpVI. The peptide corresponding to AdVpVI (positions 33-55, ori) and derivatives were prepared by Fmoc-solid-phase synthesis. The studies on their modes of interaction differential calorimetry suggested that ori increased the fluidity of membrane hydrophobic core. The membrane perturbation activities of peptides were assessed by the dye-leakage from the different sized large unilamellar vesicles possessing different degree of curvature. We report the peptide-membrane binding to increase membrane fluidity should be critical for the curvature sensitivity of the membrane perturbation by AdVpVI (33-55).

Structural evaluation of phospholipid vesicles by dynamic and static light scattering techniques

Nobutake Tamai, Takeshi Nobuoka, Masaki Goto, Hitoshi Matsuki (Inst. Technol. & Sci., The Univ. of Tokushima, Lab. for Neutron Scattering, ETHZ & PSI)

A large number of structural studies on various phospholipid aggregates have so far been extensively carried out by means of the wide- and small-angle X-ray scattering techniques to establish their detailed microscopic structure (e.g., bilayer thickness and molecular packing state). On the other hand, structural features of phospholipid vesicles at a mesoscopic scale (e.g., the shape of the vesicle and the distribution of the vesicle size) have been less focused despite the fact that they are more directly relevant to the bulk properties of the phospholipid vesicle system. In this study, we attempted to evaluate structural features of the phospholipid vesicle, including the lamellarity, by exploiting the general dynamic and static light scattering techniques.