1P205 膜の変形による BAR ドメインの凝集
Assembly of BAR domains induced by membrane shape deformation

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It is known that BAR family proteins modify local curvature of biomembranes and often assembles into a tubular structure on the membrane. However, the assembly mechanism is not well understood. We have studied membrane-curvature mediated interactions between BAR domains using coarse-grained meshless membrane simulations. The BAR domain is assumed permanently adsorbed on the membrane and modeled as a rod curved in the normal direction of the membrane. We found that membrane shape deformation induces a two-step and three-step assemblies of the rods on a tubular membrane and vesicle, respectively, as the rod curvature is increased.

1P206 コレステロールによるホスファチジルコリン膜へのクロルゾキサゾン（筋弛緩剤）の結合阻害
Cholesterol inhibits the binding of chlorzoxazone (muscle relaxant agent) to phosphatidylcholine membranes

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Many sorts of drugs are metabolized by cytochrome P450 (CYP) family in endoplasmic reticulum(ER) membranes. In this process, the following things have been proposed; before binding to CYP, drugs bind to the lipid membrane regions. However, if the drugs bind all types of biomembranes including containing no CYP, the metabolism would not work smoothly. Thus, we assume that the bonds of drugs are controlled by the content of cholesterol, from the fact that the cholesterol content of ER significantly lower than the other types of biomembranes. In this study, we examined the interaction to model membranes of chlorzoxazone using various techniques. As a result, we have found that the presence of cholesterol inhibits the penetration into phosphatidylcholine of the drug.

1P207 イノシトールリン脂質が誘起する支持脂質二重膜内のドメイン構造とタンパク質反応活性との関連
Relation between phosphatidylinositol-induced domain structure and protein reaction activity in supported lipid bilayer

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In plasma membranes, phosphatidylinositol (PI) is an anchorage for membrane-protein reactions relating to cellular signals, but the distribution of PI and the details on the reactions remain to be elucidated. Supported lipid bilayers (SLBs) are valuable system for the molecular-level approach with atomic force microscopy and single molecule tracking. The association between the structure of PI-containing SLB and the reaction activity of the membrane tubulation of BAR domain proteins (FBP-17) was investigated. The observation of the PI-SLB on mica revealed that sub-micron depletion domains were formed and worked as the barrier for molecular diffusion at sub-second regime. We revealed that the domains worked as the nucleating site for the protein assembly on the PI-SLB.

1P208 細胞毒性を有する酸化コレステロールと酸性リン脂質 (DMPG) の相互作用の構造学的研究
Structural studies of the interaction between cytotoxic oxysterols and acidic phospholipid (DMPG) bilayer membranes

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Many kinds of oxysterols are cytotoxic. For example, 7 β -hydroxycholesterol (7 β -OH) and 25-hydroxycholesterol (25-OH) have been reported to be associated with some diseases. At the last meeting, we reported the possible locations of these oxysterols in neutral phosphatidylcholine (POPC) bilayers, on the basis of the X-ray diffraction data. In this study, small angle X-ray scattering method was used to investigate the effects of these oxysterols on the structure of acidic phospholipid (DMPG) bilayers. The preliminary analysis suggested that 25-OH exhibits a similar thickness increasing effect of normal cholesterol, but 7 β -OH does not. The detailed analysis on the locations of these sterols in the DMPG bilayers is now under progress.

1P209 脂質膜ナノチューブのダイナミクス
Dynamics of a single nano-tube hollow of phospholipid membrane

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We investigated the dynamics of a single soft nanotube hollow of phospholipids to extract nanoscale information such as the size of the tube hollow, which were several tens to hundreds of nanometers thick. The dynamic properties of the tubes obtained from direct observation by fluorescent microscopy, such as their persistence length, enable us to access the nanoscale characteristics through a simple elastic model of the membrane. The present methodology should be applicable to the nanosized membrane structure in living cells.

1P210 長鎖リン脂質と短鎖リン脂質で構成される脂質多成分系の相挙動と構造変化に関する研究
Study on the phase behavior and the structural changes of lipid multi-component system consisting of long- and short-chain phospholipids

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The binary mixtures of long- and short-chain phospholipids show a complicated phase behavior depending on the lipid composition, concentration in water and temperature. For example, DMPC/DHPC mixtures are transparent or turbid, and have high viscosity at intermediate temperatures. The structure at this range is not yet clear although some models such as worm-like or disk-like aggregates had been proposed. In this study, we observed the mixtures using a high-sensitivity different scanning calorimetry to elucidate the mechanism of structural changes in terms of thermodynamics.

The results show that there are complicated peaks caused by the melting of the hydrocarbon depending on the concentration and a peak caused by any change other than the melting at high temperature.