2P199 Raman Micro-spectroscopy of the Dynamics of Cellular Chemical State upon Stimulation with Growth Factors

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Cell fate changes stimulated by external factors, often show large cell-to-cell variation in a clonal population. Such variation should reflect differences in the internal chemical states of cells. By defining and tracking the chemical state of individual cells, it would be possible to find a pathway of cell fate determination. Raman microspectroscopy is a powerful method to obtain information about the comprehensive cellular states. In this study, we tracked the cellular chemical states in the principal components plane defined from the time-course Raman spectra of the single living cells upon stimulation with growth factors. Results of the analysis indicated that differentiation process is affected by the initial chemical states. While proliferation looked stochastic.

2P200 単層上皮細胞シートの複素弾性率の空間分布：原子間力顕微鏡測定

Spatial distribution of complex shear modulus in confluent epithelial cell sheet : Atomic Force Microscopy measurements

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It is commonly recognized that mechanical properties of cell strongly influence various biological functions. To elucidate detailed relationship between mechanical properties and functions in soft cell systems, we investigate the viscoelastic behaviors of cell population. To do this, we developed a newly designed atomic force microscopy (AFM), which allows us to measure the local complex shear modulus of cell monolayer in a wide spatial range. The measurements of epithelial Madin-Darby canine kidney (MDCK) cells showed a longer spatial correlation in both the storage and loss moduli. We found that the spatial correlation was significantly affected by cytoskeletal structure as well as cell-cell contacts. The detailed results about those mentioned will be reported.

2P201 心筋細胞ネットワークにおける時空間的ゆらぎ計測を用いた心毒性評価のための Quasi-*in vivo* 前臨床モデル

Quasi-*in vivo* pre-clinical model for cardiac toxicity using spatiotemporal fluctuation measurement on human cardiomyocyte cell-network

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To overcome the limitations of conventional prediction of arrhythmic cardiotoxicity, we have developed a quasi-*in vivo* pre-clinical model employing the two step measurement of spatiotemporal fluctuation (short-term variability; STV) of (1) cell's repolarization and (2) cell-to-cell conduction, representing two origins of lethal arrhythmia. Temporal STV of field potential duration showed a potential to predict the risks of lethal arrhythmia originated from repolarization dispersion, even for false negative compounds. Spatial STV of conduction time also unveiled the proarrhythmic risk of asynchronous propagation in cell networks. The results indicate the importance of the two spatiotemporal fluctuation viewpoint of *in vitro* cell networks to reach clinical assessment.

2P202 Probing the sphingomyelin clusters in pure and mix lipid bilayer by the Raman spectroscopy: A theoretical study

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Recent experimental evidence have suggested that sphingomyelin (SM) forms clusters in SM/DOPC liposomes to which GFP-lysenin proteins can bind specifically, while these phenomenons are not observed in the SM/DPPC liposomes. Moreover, the Raman spectra of SM, SM/DOPC and SM/DPPC liposomes show significant difference in the intensity of the amide I band, indicating that the environment of the amide group of SM is different in these liposomes. However, the structure of the SM in these liposomes remains elusive. Here, we propose a simulation procedure to predict the Raman spectrum (amide I band) for these three bilayers. This study provides insight into the changes in Raman intensity of the amide I band caused by the distinct SM cluster structure in the three liposomes.

2P203 スズガエルの皮膚分泌物由来のペプチド Bombinin H2 および H4 により誘起される相乗的な抗菌活性および細胞膜の揺らぎ

Synergistic antimicrobial activity and membrane disturbance induced by Bombinin H2 and H4 peptides from *Bombina variegata* skin secretion

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Bombinin H2 and H4 are antimicrobial peptides varying at the 2nd position with L-Ile in H2 and D-allo-Ile in H4. The previous study showed H4 has stronger antimicrobial and hemolytic activities than H2. In antimicrobial activity measurements, we found the mixture of H2 and H4 was stronger than each peptide components. CD results indicate the mixture mainly formed α -helix in DMPC. Line width lipid bilayers determined by ³¹P static NMR showed the strong interaction of mixed peptides with lipid head groups and the reduction of the order of lipids compared with each peptide in DMPC. To summarize, the mixture synergistically enhanced antimicrobial activity and disturbed the membrane order. The structural difference of N-terminus may be crucial to exhibit strong activity.

2P204 蛍光一分子追跡に基づいた支持脂質膜内における部分フッ素化リン脂質の熱力学的性質の評価

Evaluation of thermodynamic property of partially fluorinated phospholipid in supported lipid bilayer based on single molecule tracking

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Fluorinated amphiphiles are expensively studied in biotechnological and biomedical fields because of the biological inertness of fluorocarbons by weakly intermolecular interaction of carbon-fluorine bonds. Partially fluorinated phospholipid (F-PL) substituted with fluorocarbon on its hydrophobic chain is expected to the application for drug delivery system, protein extraction, and protein crystallization. We performed the single molecule tracking of the F-PL bilayer on a SiO₂/Si substrate, and evaluated the diffusion coefficient calculated from the mean square displacement analysis. Based on the thermal dependence of molecular diffusion, we evaluated the thermodynamic property of the F-PL bilayer.