2P187 シクロフィリン D がミトコンドリアに及ぼす影響**Effects of cyclophilin D on mitochondria**

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Cyclophilin D (CypD) is a peptidyl-prolyl cis-trans isomerase (PPIase) in the mitochondrial matrix.

Many studies have shown that CypD is involved in necrosis and various diseases. However, the physiological role of CypD is unknown. To investigate the physiological role of CypD, we prepared C6 glioma cell line with overexpressed wild-type or PPIase-deficient mutants (R97A) of cyclophilin D and control cells transfected with the corresponding empty vector.

In the present study, we investigated energy metabolism, quantity of mitochondrial protein, and uptake of the fluorescent dye to mitochondria among these cells. As a result, we found that CypD significantly affected pyruvate metabolism and translocation of calcein-AM into mitochondria.

2P188 細胞分裂時におけるエネルギー状態のモニタリング**Monitoring of energy state of cells during cell division**

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Cell division is a dynamic process, and consists of many ATP-dependent reactions. In the present study, to examine the energy state of cells during cell division, we monitored changes in mitochondrial membrane potential and ATP concentration in C6 glioma cell. Mitochondrial membrane potential was examined with TMRE, a membrane potential sensitive dye, and cytosolic ATP concentration was measured with Go-ATeam. Go-ATeam is a fluorescence resonance energy transfer (FRET) based ATP indicator. We found that TMRE intensity was once decreased in the beginning of M-phase and increased again in the end of M-phase. By contrast, TMRE intensity was constant in interphase. Unlike TMRE fluorescence, ATP concentration at the cytosol was constant in both phases.

2P189 細胞性粘菌 (*Dictyostelium discoideum* Ax-2) の増殖におけるエネルギーをめぐる細胞内葛藤**Intracellular conflict on energy in the growing cellular slime mold, *Dictyostelium discoideum* Ax-2**

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Thermogenesis of *D. discoideum* Ax-2 in growing phase was measured at various temperatures by using high-precision isothermal calorimetry. Total energy consumption of a cell during doubling time shows a minimum in the vicinity of the optimal temperature, $T = 295$ K. The magnitude of thermogenesis indicates the activity of mitochondria. Temperature jump from the optimal temperature induces significant changes of magnitude and growth rate of thermogenesis, which can be attributed to temperature adaptation and conflict of mitochondria against the other organelles. Calorimetry provides a prominent non-invasive method to evaluate the state of mitochondria in living cells.

2P190 ES 細胞の分化初期段階における状態遷移**Transitions among cell states in the early stage of differentiation from embryonic stem cells**

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Embryonic stem (ES) cells can differentiate into all three germ layers. This capability is called pluripotency, and it has been shown that Sox2, Oct4, and Nanog (SON) are the important genes for pluripotency. We built a model of the network of core genes, and performed the stochastic simulation. The model takes into account of processes to regulate the gene expression in the model; binding/unbinding of transcription factors (TF), formation/dissolution of transcription apparatus (TA), and modification of histone code. The results show that the slow formation/dissolution of TA at Nanog locus explains the observed phenotypic heterogeneity of ES cells. By using the epigenetic landscape picture, we will discuss the role of the heterogeneity in the differentiation process.

2P191 巨大化大腸菌の細胞形態変化、細胞分裂の観察**Morphological change and cell division of Giant E.coli**

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Large spherical E.coli cells (giant E.coli) with 5 to 10 μm in diameter that were prepared under inhibitory condition for cell wall synthesis are expected as a model cell system to be integrated with artificial micro reactors. In this study, we report morphological change of giant E.coli cells after depletion of the cell-wall synthesis inhibitor. While many cells grew keeping spherical shape until cell lysis, some cells changed their shape and others showed protrusion from the cell and a few cells showed node-formation at end of the protrusion like cell division. We will also report the recovery process of cell wall and the intracellular distribution of FtsZ.

2P192 細菌べん毛タンパク質輸送装置の in vitro 再構成系の構築**Construction of an in vitro assay system for the bacterial flagellar protein export**

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The bacterial flagellum is a long filamentous organelle to locomote in a wet environment. Most of its component proteins are translocated across the cell membrane through the flagellar export apparatus. In spite of many in vivo studies, the molecular mechanism of secretion is still obscure, due to complex intra-cellular regulatory networks that affect the protein secretion. Thus, an in vitro assay system is required for further understanding of the protein export. Here we report an inverted-membrane-vesicle based export assay system. We examined that the system exports flagellar proteins depending on proton motive force. This system will allow us to precise and accurate measurements of the protein export under various well-controlled conditions.