1P229 新規な多電極を用いた海馬の神経回路に対する神経ステロイドの作用の解析

Analysis of neurosteroid effects on hippocampal neural circuits using novel multi-electrode probe methods

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By using custom multielectrode probes, suitable for hippocampal neural circuits, we have investigated rapid regulation of synaptic plasticity by neurosteroids in rat hippocampal slices. The long-term potentiation (LTP) is essential in memory encoding processes. Neurosteroids synthesized within the hippocampus. The mechanism of neurosteroids action is still not clear. We blocked the synthesis of pregnenolone, which is a kind of neurosteroids by AG (aminoglutethimide), inhibitor of cytochrome P450scc. AG perfusion also rapidly decreased EPSP (excitatory postsynaptic potentiation). We can rescue the suppression of LTP and EPSP by supplementation of exogenous pregnenolone. These results show the effect of pregnenolone on rapid regulation of neuronal synaptic plasticity.

1P230 滑走細菌 *Flavobacterium johnsoniae* の滑走装置
Gliding machinery of the gliding bacterium *Flavobacterium johnsoniae*

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Cells of *F. johnsoniae* move over surfaces, which is called gliding motility. This motility is unrelated to other well-studied motility mechanisms. In our recent study we proposed a "Helical loop track model", where the SprB adhesion is propelled along left-handed helical loop on the cell surface. Microscopic analysis with fluorescent labeling of non-SprB surface proteins, which are located at fixed position between poles when the cell body moves forward, verified that cells glide on surfaces with rotating CCW. In addition, tracking of SprB signals revealed that an SprB can overtake another SprB, change lanes and move on a different route during pole-pole oscillation. These results suggest the presence of multiple helical lanes for SprB movement on the cell surface.

1P231 トラウマストレスはエンドカンナビノイドシステムを介してオペラント条件付けによる記憶の形成を障害する

Traumatic stress impairs learning and memory formation via an endocannabinoid system in *Lymnaea stagnalis*

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Intense stress can cause impairment of learning and memory. This impairment may be due to activation of the endocannabinoid system. Here we determined in *Lymnaea stagnalis* whether traumatic stress altered both learning and long-term memory (LTM) formation. Snails received traumatic stress and we tested the ability to form LTM 2, 4, and 7 days later. Learning and memory were impaired on day 2 and 4, and was fully recovered by day 7. Next, we examined if the actions of endocannabinoid receptor 1 (CB1R) mediate this deficit. Injection of WIN55, an agonist for CB1R, in the absence of stress, mimicked the stress-induced memory impairment. Conversely, administration of AM251, a CB1R antagonist, prior to the intense stressor significantly mitigated LTM impairment.

1P232 ファラオニス・ハロロドプシンの N 中間体の結晶構造解析
Crystallographic analysis of the N intermediate of pharaonis halorhodopsin

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Halorhodopsin utilizes light energy to transport chloride ions from the extracellular side to the cytoplasmic side. In this study, we investigated light-induced structural changes in pharaonis halorhodopsin (pHR) using the C2 crystal. When the bromide-ion-bound purple form of pHR was exposed to red light, the N intermediate with a bromide ion in the cytoplasmic vicinity of the retinal Schiff base was generated efficiently in one of the three subunits in the asymmetric unit. This subunit has the EF loop facing a free space, so that a profound outward movement of the cytoplasmic half of helix F was induced upon formation of the N state. This structural change was accompanied by a large swing of Phe259 in helix G, creating a water channel in the cytoplasmic half.

1P233 クラックスロドプシンの 3 量体構造と光安定性
Photostability of the trimeric form of cruxrhodopsin

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Cruxrhodopsin-3 (cR3) is a light-driven proton pump found in the cell membrane of *Haloarcula vallismortis*. Our previous crystallographic analysis has shown that cR3 forms a trimeric assembly which is stabilized by direct protein-protein interactions. In this study, we investigated how the photostability of cR3 is dependent strongly on the protein-lipid and/or protein-protein interactions. We will discuss structural factors that affect the stability of the trimeric assembly.

1P234 hCRBP II 及びその変異体の構造とスペクトルに関する QM/MM 理論計算
QM/MM calculation of structure and spectral properties for human cellular retinal binding protein II (hCRBP II) and its mutants

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Structures and spectral properties of water soluble retinal binding proteins, human cellular retinal binding protein II (hCRBP II) and its mutants, were recently reported by Borhan's and co-workers. In their study, molecular engineering created a series of mutants which exhibit photoabsorption with absorption maxima widely distributed from 425 nm to 644 nm. However, the underlying color tuning mechanism remains unclear. In the present study, we calculated the absorption maxima with QM/MM reweighting free energy SCF (RWFE-SCF) method to elucidate how the mutations of several essential residues change the structure of protein and thus alter the spectral properties of the chromophore.