Rhodobacter capsulatus 由来 Photoactive Yellow Protein の相互作用部位の解明

Analysis of interaction sites on the Photoactive Yellow Protein of Rhodobacter capsulatus

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Photoactive Yellow Protein (PYP) is a photoreceptor protein that absorbs blue light with p-coumaric acid as a chromophore. We identified the light dependent interaction protein of PYP named PBP from Rhodobacter capsulatus (Rc). This is the only target protein of PYP homologues revealed so far. In order to clarify the mechanism of light dependent interaction of PBP with Re-PYP, we aimed to identify the interaction sites on Re-PYP by using chimeric mutants of Rc-PYP and Hh-PYP and Ala mutations on Re-PYP. As a result of verification of binding ability in each mutant, Lysine 72 is assigned as an interaction key role residue. K72A mutant decreased its binding affinity to PBP, but K72Q was not. This indicates that the side chain length is important to interaction with PBP.

Rhodobacter capsulatus 由来 Photoactive Yellow Protein の X 線結晶構造解析

X-ray crystal structure analysis of the Photoactive Yellow Protein of Rhodobacter capsulatus

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Photoactive Yellow Protein (PYP) is a water-soluble photoreceptor protein that absorbs blue light with p-coumaric acid as a chromophore. Rhodobacter capsulatus PYP (Re-PYP) has several different properties in its absorption spectrum and photocycle from that of well-known PYP from Halorhodospira halophila. Especially, a target protein of PYP has been identified only for Re-PYP. So far, crystal structure of Re-PYP was not solved. In order to clarify the origin of the difference of the spectroscopic properties and the molecular mechanism of light signal transduction, we attempted the crystal structure analysis of Re-PYP. We succeeded to crystallize Re-PYP, which gives diffraction to 3Å resolution. Preliminary analysis is under way.

二種類のＰＹＰを用いたキメラタンパク質の中間体の平衡状態の解析

Analysis of Equilibrium of intermediate states of PYP by use of chimera proteins

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Despite that the key residues around the chromophore are common for Halorhodospira halophilaPYP (Hh-PYP) and Rhodobacter capsulatus PYP (Re-PYP), they show different intermediate states in their photocycles. To clarify the molecular basis of the origin of the differences, we created chimera proteins between Hh-PYP and Re-PYP. The PYP amino acid sequence was divided into four blocks and one of four Hh-PYP blocks was replaced with the corresponding block of Re-PYP. The chimera with the second block of Re-PYP caused different spectral properties of intermediate from the other chimera PYPs and Hh-PYP, suggesting the shift of equilibrium between two intermediates. We assume that this block is a determinant of equilibrium of intermediate states.