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Structure–Function Studies on Receptor Activation of Photoactive Yellow Protein SANDIP KALEDHONKAR, SHUO DAI, Department of Physics, Oklahoma State University, Stillwater, OK, 74078, RACHANA RATHOD, WOUTER HOFF, Department of Microbiology and Molecular Genetics, Oklahoma State University, Stillwater, OK, 74078, AIHUA XIE, Department of Physics, Oklahoma State University, Stillwater, OK, 74078, XIE COLLABORATION, HOFF COLLABORATION — Biological signaling in cells starts with detection of stimuli from ever changing environment, results in relay of signal, and finishes with particular cellular response. Photoactive yellow protein (PYP) from a salt loving *Halorhodospira halophila* bacterium is a blue light photoreceptor protein for negative phototaxis and a structural prototype of PAS domain superfamily of signaling and regulatory proteins. Upon absorption of a blue photon by its negatively charged *p*-coumaric acid (*p*CA) chromophore, the receptor state (off-state) undergoes photocyclic process, leading to large amplitude protein quake that results in PYP receptor activation. To understand the structural basis of receptor activation we employ time-resolved FTIR spectroscopic techniques combined with site-specific mutation to search for a key residue involved in protein quake. We will discuss the strategies and experimental results in light of hydrogen bonding network, active site structure and protein quake in PYP. The signaling mechanism leaned from PYP may have implication to understand signal transduction in other proteins.

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