Extended Abstract International Research Journal of Biochemistry and Bioinformatics 2021 Vol.11 No.3

Time-resolved diffraction experiments at an X-ray free electron laser reveals structural changes in bacteriorhodopsin - Richard Neutze - Public university in Gothenburg, Sweden

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Abstract

X-ray free electron lasers (XFEL) provide a billion-fold jump in the peak X-ray brilliance when compared with synchrotron radiation. One area where XFEL radiation has an impact is time-resolved structural studies of protein conformational changes. This presentation will describe how we used time resolved serial femtosecond crystallography at an XFEL to probe light-driven structural changes in bacteriorhodopsin.

Bacteriorhodopsin is a light-driven proton pump which has long been used as a model system in biophysics. The mechanism by which light-driven isomerization of a retinal chromophore is coupled to the transport of protons â€œup-hillâ€• against a transmembrane proton concentration gradient involves protein structural changes.

Collaborative studies performed at SACLA (the Japanese XFEL) have probed structural changes in microcrystals on a time-scale from nanoseconds to milliseconds.

Structural results from these studies enabled a complete picture of structural changes occurring during proton pumping by bacteriorhodopsin to be recovered