Poster Presentations

[MS7-P05] Pyrophosphatase, a Primary Proton Pump Yuh-Ju Sun[a], Kun-Mou Li, Chia-En Hsu, Shih-Ming Lin, Jia- Yin Tsai, Rong-Long Pan,

[a]*Department of Life Science and Institute of Bioinformatics and Structural Biology, College of Life Science, National Tsing Hua University, Hsin Chu 300, Taiwan*
E-mail: yjsun@life.nthu.edu.tw

H^+-pyrophosphatase (H^+-PPase) (EC 3.6.1.1) is a primary proton pump that hydrolyzes PPi to transport protons across biological membranes against the electrochemical gradient. H^+-PPase is found as a homodimer in the vacuolar membrane of plants and the plasma membrane of protozoa and prokaryotes. The crystal structure of H^+-PPase from *Vigna radiata* (*Vr*H^+-PPase) in complex with a non-hydrolyzable substrate analogue, imidodiphosphate (IDP), was determined at 2.35Å resolution. *Vr*H^+-PPase monomer comprises an integral membrane domain formed by 16 transmembrane helices. Six core TMs (M5, M6, M11, M12, M15 and M16) bundle together to form an inner wall and it is surrounded by ten additional TMs that constitute the outer wall IDP is bound in the cytosolic region of core TMs and trapped by numerous charged residues and Mg^{2+} ions. The unique proton translocation pathway is formed by inner wall through key residues Arg 242, Asp 294, Lys 742 and Glu 30. Proton pumping was initialized by PP_i hydrolysis and then proton to transport into the vacuolar lumen. The proton pumping and PPi hydrolysis of *Vr*H^+-PPase are coupled together.

[1] Lin, S.-M. Tsai, J.-Y., Hsiao, C.-D., Huang, Y.-T., Chiu, C.-L., Liu, M.-H. Tung, J.-Y., Liu, T.-H., Pan, R.-L. & Sun Y.-J. (2012) *Nature* 484, 399-403.

Keywords: primary proton pump; Vigna radiata pyrophosphatease; X-ray diffraction