



Figure 1.

Keywords: urea channel pH gating drug discovery

MS6-O3 Membrane-bound pyrophosphatase: A primary proton pump

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Membrane-embedded pyrophosphatases (M-PPases) couple the generation and utilization of membrane potentials to catalyze the hydrolysis of pyrophosphate (PPi) and pump ion across the membranes. M-PPases, the proton/sodium ion pumps occur in all three domains of life, including H⁺-PPases in prokaryotes, bacteria, and plant, Na⁺-PPases in prokaryotes and H⁺/Na⁺-PPases in bacteria. The *Vigna radiata* H⁺-PPase (*VrH⁺*-PPase) was isolated as a homodimeric form with 16 transmembrane helices each monomer. The crystal structure of *VrH⁺*-PPase in complex with a substrate analogue, imidodiphosphate (IDP), was determined by MAD and MIRAS methods. *VrH⁺*-PPase has a novel fold and pumping mechanism, different to the other primary pumps. The structural information of *VrH⁺*-PPase provides the basis for understanding a unique proton translocation pathway as well as the ion selection among various M-PPases.

Keywords: pyrophosphatases, proton/sodium ion pump, *Vigna radiata*,