S27-2 The structure and function of sodium pump

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Na/K-ATPase exists in the plasma membrane of nearly all animal cells in order to maintain electrochemical gradients of Na^+ and K^+ across the plasma membrane. This pump consists of α- and β-subunits. The α-subunit has the sites for binding Na^+ ,K^+ and ATP, but the roles of β-subunit in ATP hydrolysis and ion transport are unclear. Though the crystal structure of pig kidney sodium pump was reported in 2007, precise structure of β-subunit has remained to be solved except its transmembrane domain. We found the Na/K-ATPase-like molecules that lack β-subunits, in *Hetrosigma akashiwo* and *Euglena gracilis*. Marine alga *H. akashiwo* is unicellular biflagellate living in seashores of Japan. This alga has Na^+/K^+-activated P-type ATPase and formed phosphorylated proteins of 140 KDa. The reconstituted liposomes containing purified *H.akashiwo* ATPase showed ATP-dependent Na transport activity. Therefore, β-subunit might be not necessary for sodium ion transport. Using cRNA expression system in oocytes, Noguchi found that β-subunit is obligatory for proper folding of α-subunit in membrane. Our results on expression of truncated forms of α-subunits in animal cells also suggested α/β association occurs at the early stage of biosynthesis of α-subunit. The roles of β-subunit are discussed.