

SOLUTION KINETIC STUDY OF MYOSIN MOLECULAR MOTORS

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Myosin motors utilize ATP hydrolysis energy to generate mechanical force. Among different classes of myosins, some motors are involved in vesicle trafficking. Vesicle trafficking motors have special features such as they can move along actin tracks continuously. Zymogen granules (ZGs) are about 1 μm diameter enzymatic vesicles found in the exocrine pancreas and act as inactive precursors of digestive enzymes. Gel electrophoresis and mass spectroscopy have shown the presence of myosin motors like myosin 1C, 5C, 6, and 7B at the surface of the ZGs and contribute to ZGs transportation in cells. In this study, we measured the key steps of the ATPase cycle of purified ZGs. The duty ratio for ZG was found to be more than that of a single myosin 5C molecule. Myosin16A (Myo16A) is a single-headed motor. It has function during early neonatal brain development. One of the interesting features of aves and mammalian Myo16A is the presence of cysteine (C) residue at switch 1 of the ATP binding pocket instead of arginine (R). This residue has demonstrated the evolutionary change in the vertebrate Myo16A. My work demonstrated the key rates of actin-activated ATPase cycle. Also, this result directly explained that the arginine in the switch 1 plays a crucial role for the Phosphate release as well as in the duty ratio of myosin. This role is called the “back door” phosphate release mechanism.