(Na^+, K^+)- ATPase Activity in Gills of the Mangrove Crab *Ucides cordatus*: a Kinetic Study During Hyposmotic Stress

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INTRODUCTION: (Na^+, K^+)-ATPase couples ATP hydrolysis to the transport of Na^+ and K^+ across the plasma membrane against their electrochemical gradients. Osmotic and ionic regulation in the Crustacea is accomplished by the multi-functional gills, together with the excretory organs. **OBJECTIVE:** To examine the kinetic properties of a gill microsomal (Na^+, K^+)-ATPase from the mangrove crab, *Ucides cordatus*, acclimated to 35‰ S for 10 days. **MATERIAL AND METHODS:** Gill (Na^+, K^+)-ATPase activity was assayed spectrophotometrically at 340 nm and 25 °C using a PK/LDH linked system in which ATP hydrolysis was coupled to NADH oxidation. **RESULTS AND DISCUSSION:** (Na^+, K^+)-ATPase activity decreased 13-fold in crabs acclimated to 35‰ S (46 nmol min^{-1} mg^{-1}) compared to 26‰ S (650 nmol min^{-1} mg^{-1}). A high- (V_M= 6.5±0.32 nmol min^{-1} mg^{-1}; $K_{0.5}$= 25.5±0.9 nmol L^{-1}) and a low-affinity ATP binding site (V_M= 39.4±1.97 nmol min^{-1} mg^{-1}; $K_{0.5}$= 0.04±0.005 mmol L^{-1}), both obeying cooperative kinetics, were disclosed. Stimulation of (Na^+, K^+)-ATPase activity by Mg^{2+} ($K_{0.5}$= 0.37±0.02 mmol L^{-1}), Na^+ ($K_{0.5}$= 5.87±0.25 mmol L^{-1}), K^+ ($K_{0.5}$= 0.50±0.02 mmol L^{-1}), and NH_4^+ ($K_{0.5}$= 1.90±0.11 mmol L^{-1}) also exhibits site-site interactions. K^+ plus NH_4^+ does not synergistically stimulate (Na^+, K^+)-ATPase activity. Ouabain (K_I= 87.79±3.95 µmol L^{-1}) inhibited total ATPase activity by 75%, suggesting that ATPases other than (Na^+, K^+)-ATPase are present. Ouabain inhibition increases about 83% in the presence of NH_4^+ with a 50% higher K_I. **CONCLUSION:** These findings suggest the differential participation of gill (Na^+, K^+)-ATPase activity in the osmoregulatory mechanisms of *U. cordatus*.

Keywords: mangrove crab, *Ucides cordatus*, (Na^+, K^+)-ATPase

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