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

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**INTRODUCTION:** The (Na\(^+\), K\(^+\))-ATPase is a ubiquitous integral protein of the plasma membrane of all animal cells. The functional macromolecule consists of two dimers composed of noncovalently-interacting \(\alpha\) and \(\beta\)-subunits, and a smaller \(\gamma\) subunit. Euryhaline crustaceans can survive wide variations in ambient salinity by maintaining stable hemolymph osmolality and ion concentrations, compared to those in their external medium. **OBJECTIVES:** We characterize the (Na\(^+\), K\(^+\))-ATPase activity in a microsomal fraction from the posterior gills of the mangrove crab *Ucides cordatus* acclimated for ten days to 2\(\%\) salinity. **Material and Methods:** Gill (Na\(^+\), K\(^+\))-ATPase activity was assayed spectrophotometrically at 340 nm and 25 \(^\circ\)C using a PK/LDH linked system in which ATP hydrolysis was coupled to NADH oxidation. **RESULTS AND DISCUSSION:** ATP was hydrolyzed at a maximum rate of 301.6\(\pm\)15.08 nmol min\(^{-1}\) mg\(^{-1}\) with K\(_{M}\) = 90 \(\mu\)mol L\(^{-1}\). Stimulation by magnesium (K\(_{0.5}\)=1.05\(\pm\)0.05 mmol L\(^{-1}\)) and ammonium ions (K\(_{0.5}\)=3.02\(\pm\)0.09 mmol L\(^{-1}\)) exhibited site-site interactions, while that by sodium (K\(_{M}\)=5.00\(\pm\)0.16 mmol L\(^{-1}\)) and potassium (K\(_{M}\)=1.96\(\pm\)0.08 mmol L\(^{-1}\)) ions obeyed Michaelis-Menten kinetics. Ouabain inhibited \(\approx\)65\% of total ATPase activity (K\(_{I}\)= 10.48\(\pm\)0.5 \(\mu\)mol L\(^{-1}\)), suggesting that ATPases other than (Na\(^+\), K\(^+\))-ATPase are present. (Na\(^+\), K\(^+\))-ATPase activity decreased 2-fold in crabs acclimated to 2\(\%\) salinity (\(\approx\)301 nmol min\(^{-1}\) mg\(^{-1}\)) compared to 26\(\%\) salinity-acclimated crabs (\(\approx\)650 nmol min\(^{-1}\) mg\(^{-1}\)). Enzyme affinity for ATP decreased 5-fold in 2\(\%\)-acclimated crabs. **CONCLUSION:** We demonstrate changes in (Na\(^+\), K\(^+\))-ATPase activity during acclimation to low salinity. These may be due to regulation of the pre-existing enzyme or to increased gene transcription and mRNA translation, or to post-translational modifications.

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

**Financial support:** FAPESP, CNPq, FAPEAM/INCT-ADAPTA.