

Modulation by ATP and ammonium plus potassium ions of gill (Na⁺,K⁺)-ATPase activity in the red mangrove crab *Goniopsis cruentata* (Decapoda, Grapsidae)

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INTRODUCTION: The membrane-bound (Na⁺, K⁺)-ATPase is responsible for actively pumping Na⁺ and K⁺ across the plasma membrane, generating an electrochemical gradient. The enzyme is also important in the active excretion of ammonium ions across the gills of crabs and shrimps. **OBJECTIVES:** To characterize the effect of ATP and ammonium plus potassium ions on the (Na⁺, K⁺)-ATPase activity of gill microsomal fractions. **MATERIAL AND METHODS:** ATPase activity was estimated continuously at 25°C in a final volume of 1 mL, using the PK/LDH and PGK/GAPDH linked systems. Standard conditions were: Hepes 50 mmol L⁻¹, pH 7.5, containing ATP 1 mmol L⁻¹, MgCl₂ 2 mmol L⁻¹, KCl 5 mmol L⁻¹, NADH 0,15 mg L⁻¹, PEP 0,85 mg L⁻¹, PK 49U e LDH 94U, and 50 mmol L⁻¹ TEA, pH 7.5, ATP 1 mmol L⁻¹, MgCl₂ 2 mmol L⁻¹, NaCl 50 mmol L⁻¹, KCl 5 mmol L⁻¹, NAD⁺ 1 mmol L⁻¹ or 2.86 mg L⁻¹, sodium phosphate 0.5 or 1 mmol L⁻¹, G3P 1 or 2 mmol L⁻¹, 150 µg GAPDH (12 U), 20 µg PGK (9 U), for PK/LDH and PGK/GAPDH coupled assay systems, respectively. **RESULTS AND DISCUSSION:** Maximum ATPase activity was 287.70 U mg⁻¹ (K_{0,5} = 0.512 mmol L⁻¹). The enzyme was stimulated by Mg²⁺ (K_{0,5} = 0.470 mmol L⁻¹), Na⁺ (K_{0,5} = 6.63 mmol L⁻¹), K⁺ (K_{0,5} = 2.07 mol L⁻¹) and NH₄⁺ (K_{0,5} = 1,22 mmol L⁻¹). At a fixed concentration of 50 mmol L⁻¹ NH₄⁺, increasing K⁺ concentration synergistically stimulated (Na⁺, K⁺)-ATPase activity to 530.3 U mg⁻¹. Similarly, at a fixed concentration of 20 mmol L⁻¹ K⁺, increasing NH₄⁺ concentrations synergistically stimulated (Na⁺, K⁺)-ATPase activity to 524.71 U mg⁻¹. **CONCLUSION:** The synergistic stimulation of (Na⁺, K⁺)-ATPase activity by NH₄⁺ plus K⁺ indicates that both ions bind to different sites in the enzyme.

Key words: mangrove crab, *Goniopsis cruentata*, (Na⁺,K⁺)-ATPase

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