Pyrophosphatase And ATPase Activities From Bull Frog (Lithobates catesbeianus) Tadpoles’ Tail During Development And Metamorphosis


Introduction: In spite of its swimming function, during anurans metamorphosis the tail releases nutrients to support morphophysiological changes of aquatic larval phase to terrestrial adults, as the animals do not eat during this period. The pyrophosphate is an inhibitor of precipitation and dissolution of certain salts, in this way, the pyrophosphatase activity can be related to the prevention of calcium salts deposition in various tissues. ATPase is an essential enzyme for the animals’ energetic metabolism, muscle contraction and its activity is related to the ion transport system in the animal’s skin. Thus, the aim of this study was to determine the activity of pyrophosphatase and ATPase obtained from the tail of bull frog tadpoles (Lithobates catesbeianus), to provide information about their role during development and metamorphosis. Material and methods: The animals were kept in aquaria, at 27 °C and separated by stages of development. Samples were taken from a pool of tails from 5 animals in each stage. The tails were homogenized in 5 mM Tris-HCl buffer, pH 7.5, containing 2 mM MgCl₂ and 1 µM ZnCl₂, centrifuged at 10,000 g for 10 minutes, at 4°C, frozen in liquid nitrogen and stored at -70 °C to be used in subsequent assays. Pyrophosphatase and ATPase activities were measured using sodium pyrophosphate and ATP as substrate, respectively. Results and discussion: The activity of both studied enzymes, pyrophosphatase and ATPase, was present since the first evaluated stage, showing variation until the complete absorption of the tail, the activity variation was from 18,66 (U/mg) at stage 32 to 54,06 (U/mg) at stage 44/1, for pyrophosphatase and 38,52 (U/mg) at stage 32 and 68,40 (U/mg) at stage 40. Conclusion: Therefore, the enzymes activity behavior suggests their importance in preventing calcium deposition at the tail and maintaining the energetic balance during development and metamorphosis, respectively.

Keywords: 1. metamorphosis; 2. ATPase; 3. pyrophosphatase; 4. tadpoles