The Metabolism of Inorganic Polyphosphates During the Embryogenic Development of the Red Flour Beetle *Tribolium castaneum*

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**Introduction:** *Tribolium castaneum* is a low-maintenance beetle that has emerged as an interesting model system for studying arthropods’ development and solving basic biological questions. Inorganic polyphosphates are linear polymers of orthophosphate whose phosphate residues are linked by high-energy phosphoanhydride bonds. Exopolyphosphatases are enzymes that hydrolyze those terminal bonds to yield phosphate. Polyphosphates’ roles during insect embryogenesis have not been well examined so far, despite their wide distribution. Some important functions already described are gene activity control, channel formation, bacterial pathogens virulence factors and blood coagulation modulation. We aim to demonstrate the polyphosphates profile in the main embryogenic development stages of *Tribolium castaneum* to verify whether they act as phosphate reserve or participate in other functions.

**Material and Methods:** Egg Homogenates were collected at specific points of development, in which we analyzed the inorganic phosphate concentration according to Clark et. al. (1986), protein content by the Bradford method, and the exopolyphosphatase activity by Fields et. al. (2007) method. Following, these homogenates underwent fractionation processes, separating mitochondrial, cytoplasm and nuclear portions, in which the same analyzes were performed.

**Results and Discussion:** Polyphosphates and exopolyphosphatase have shown different profiles in the various compartments analyzed and the inorganic phosphate released by polyphosphate hidrolises does not follow the increase in the exopolyphosphatase activity. The nuclear exopolyphosphatase peak activity was found around 48h of development, while nuclear was around 36h. The mitochondrial phosphate concentration showed a peak at 24 hours of development and in the nucleus the peak was around 4h of development.

**Conclusions:** Polyphosphates might perform other functions in *T. Castaneum* embryogenic development in addition to phosphate storage. Polyphosphate and exopolyphosphatase might play different roles in different cell compartments. This is the first investigation of Polyphosphate metabolism during *T. castaneum* embryogenesis and might improve the knowledge on homeostasis and inorganic phosphate storage during this period.

**Word Keys:** polyphosphate, exopoliphsphatase, inorganic phosphate, embryogenesis, Tribolium castaneum.

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