Influence of Inorganic Polyphosphate in the Energy Metabolism of the Red Flour Beetle (*Tribolium castaneum*)

Bianca Mirra[1], Bianca Curitiba[1], Keity Vilela[1], Jorge Moraes[1], José Roberto da Silva[1], Evenilton P. Costa[2], Carlos Logullo[2], Rodrigo Nunes da Fonseca[1] and Eldo Campos[1]

[1]Laboratório Integrado de Bioquímica—Hatisaburo Masuda, UFRJ/NUPEM, [2]Laboratório de Química e Função de Proteínas e Peptídeos and Unidade de Experimentação Animal–CBB–UENF.

Inorganic polyphosphates (poly P) are long chains of a few to several hundred phosphate residues linked by phosphoanhydride bonds. Poly P metabolism can be specific in different cellular compartments. Regarding mitochondrial metabolism, mammalian mitochondria poly P production is directly linked to their energetic state, as the level of poly P regulates the level of cellular ATP and Ca^{2+} accumulation. Polyphosphate hydrolysis is catalyzed by exo an endo – polyphosphatases. Exopolyphosphatases (PPX) splits P_i off the end of a poly P chain and are considered as the central regulatory enzymes in poly P metabolism. Here, we investigated the mitochondrial polyphosphate metabolism in the red flour beetle, *Tribolium castaneum*, which is a common pest that has emerged as an excellent model system for studying development and metabolism in insects. Mitochondria were isolated by differential centrifugation and PPX activity was analyzed during mitochondrial respiration. The increased of activity was observed when pyruvate and ADP were added. This increase did not occur without ADP addition, indicating that PPX is stimulated during state 3. Indeed, the stimulatory effect was antagonized by KCN (decreased electron flux) addition and increased by FCCP (increased electron flux), suggesting that mitochondrial PPX could be modulated by electron flux. The influence of poly P_3 and poly P_{15} in F-ATPse activity were analyzed.The F-ATPase activity was stimulated by a factor of four by poly P_3, while polyP_{15} barely changed this activity. The obtained results will help us to better understand the mitochondrial polyphosphate metabolism in *T castaneum*.

Keyword: Inorganic polyphosphate, Mitochondria, Insect
Research Support grants: FAPERJ, CNPq and CAPES

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