

Characterization of Hemozoin Formation Activity by Insect and Non-Insects α -Glucosidases

Monteiro, E.¹, Ferreira, LS.¹, Dansa, M.¹

¹Setor de Bioquímica de Insetos, Laboratório de Química e Função de Proteínas e Peptídeos (LQFPP), Centro de Biociências e Biotecnologia, Universidade Estadual do Norte Fluminense Darcy Ribeiro, Campos dos Goytacazes, RJ, Brazil.

INTRODUCTION. The α -glucosidases are enzymes that hydrolyze terminal, non-reducing (1 $\rightarrow$ 4)-linked α -D-glucose residues. In addition to this canonical hydrolytic activity, α -glucosidases have secondary roles, such as hemozoin (Hz) formation through heme biocrystallization in the midgut of *Rhodnius prolixus*. Hz is a heme crystal that reduces the heme toxicity in hematophagous organisms such as protozoan, worms and insects. The mechanism of the Hz synthesis is poorly known and studies on the blood-sucking insect *Rhodnius prolixus* indicate the involvement of α -glucosidase enzymes in this process. **OBJECTIVES.** In the present work, we verified if Hz formation activity could be associated to α -glucosidase enzymes in several biological materials. **MATERIAL AND METHODS.** Were used protein extract obtained by NP-40 extraction from the insects *R. prolixus*, *Chalcosobruchus maculatus*, *Tribolium castaneum* and the non-insects *Bacillus thuringiensis*, *Saccharomyces cerevisiae*, *Schistosoma mansoni*, *Arabidopsis thaliana*, *Toxoplasma gondii* and Vero cells. Soluble and non-soluble fractions were used to measure the hydrolytic and the heme biocrystallization activities. Inhibitors of hydrolytic (erythritol, DEPC) and Hz formation (chloroquine) activities were used as well. Kinetics parameters for the both α -glucosidases activities will be evaluated in *R. prolixus* extract. **RESULTS AND DISCUSSION.** Ours results indicate that some of these protein extracts, such as *S. mansoni* and *T. castaneum* have the potential to crystallize heme *in vitro*. The Hz formation activity of all materials was sensible to inhibitors of both Hz formation and hydrolytic activities, but the hydrolytic activity of only some of them was sensible to same inhibitors. **CONCLUSIONS.** The heme biocrystallization may be promoted by α -glucosidases, but a kinetic description is essential to confirm this hypothesis and to reveal the true function of this enzyme in the biological organisms. Unveiling the role of α -glucosidase in heme biocrystallization will be fundamental to a better understanding on the evolutionary history of the hematophagy in insects and other taxonomical groups.

Keywords: glycosidases, hemozoin, heme biocrystallization
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