Localization and Function of Soluble Trehalase in Insect Midguts.

Silva M.C.P[a]., Ribeiro A.F[b]., Terra W.R.[a], Ferreira C[a].

[a] Depto. Bioquímica – Instituto de Química – USP
[b] Depto Genética e Biologia Evolutiva – Instituto de Biociências – USP

In insects, trehalose is the major sugar in blood and a trehalase is found in every insect tissue. Our group has been studying the properties, role and distribution of trehalases in insect midgut for years. The Lepidoptera *Spodoptera frugiperda* has a soluble and a membrane-bound trehalase which activities are mainly recovered in the final two thirds of the midgut. RT-PCR analysis shows that soluble trehalase transcripts are specific from the midgut, whereas membrane-bound trehalase is found, besides midgut, in Malpighian tubules and fat body, indicating more general properties and role. Anti -serum was generated in rabbits against recombinant soluble trehalase from *S.frugiperda* midgut. Imunogold labeling followed by inspection in transmition electron microscope showed that the enzyme is found associated with the cell glycocalyx and in secretory vesicles in the apical cytoplasm of anterior and posterior columnar cells. Using imunofluorescence, no significant difference is seen in labeling of control and experimental preparations and fluorescence is detected in goblet cells. With these results we disclosed that trehalase labeling in goblet cells reported in other papers are due to an artifact. The roles proposed for soluble midgut trehalase are digestion and prevention of trehalose loss from haemolymph due to higher trehalose concetration in thehaemolymph. We suppressed the expression of soluble midgut trehalase from the mealworm *Tenebrio molitor* using RNA interference and no changes in weight and mortality were observed in control and experimental groups. These results points to a digestive role for the enzyme.

Key words: midgut, *Spodoptera frugiperda*, *Tenebrio molitor*, trehalase.
Supported by FAPESP and CNPq.