Disorders of Phenylalanine and Tyrosine Catabolism Drastically Affect
*Rhodnius prolixus* Physiology

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**INTRODUCTION:** The control of Chagas disease has been achieved in the last years by the use of pyrethroids insecticides. However, recent reports indicate the rise of resistant populations, and in consequence, new strategies need to be devised. Tyrosine is a semi-essential aromatic amino acid that can be obtained from hydroxylation of phenylalanine or food consumption. Tyrosine is metabolized by five enzymatic reactions resulting in acetoacetate and fumaric acid as final products. This pathway exists universally, in prokaryotes and eukaryotes, and three hereditary diseases of tyrosine catabolism were identified in humans: tyrosinemia type I, II and III. However, no studies of this pathway were performed in insects. In this work we evaluated the importance of phenylalanine and tyrosine catabolism in *Rhodnius prolixus* by knocking down the expression of the enzymes involved, and determined their expression pattern in insect’s tissues. **MATERIAL AND METHODS:** *R. prolixus* were infected with 2.5 µg dsRNA for the target gen, fed on rabbits and different physiological parameters were measured. RNA from different tissues was extracted and expression of the different enzymes of the pathway was assessed by RT-PCR. **RESULTS AND DISCUSSION:** Transcriptomic data show that all enzymes of this pathway are overexpressed in digestive apparatus in relation to whole body homogenate. Tissue expression profile was confirmed by RT-PCR. RNAi silencing of the enzymes drastically alter insect’s physiology, except for maleylacetoacetate isomerase. The phenotypes obtained for each enzyme knock-down are distinct, which suggests that different metabolites are accumulated. Of particularly interest is the phenotype observed for 4-hydroxyphenylpyruvate dioxygenase (HPPD) knock-down, which delay digestion, prevents ovary development and blocks oviposition. When L4 nymphs is silenced, molting is inhibited. **CONCLUSION:** Because HPPD inhibitors are widely used as herbicides and in human health for the treatment of tyrosinemia type I, our results suggest that HPPD may be a target for new insecticides.

Keywords: *Rhodnius prolixus*, Tyrosine catabolism, Phenylalanine catabolism 4-hydroxyphenylpyruvate dioxygenase.

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