Superoxide involvement on blood digestion in *Rhodnius prolixus*

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**Introduction:** NADPH-oxidase 5 (NOX5) and xanthine dehydrogenase (XDH) are superoxide enzymes very studied in mammals because their involvement in control of pathogens. Because of their importance in physiology and there is any data about these enzymes in the midgut of *Rhodnius prolixus*, we decided to study them. **Materials and methods:** survival curve, blastp, RT-PCR, enzyme activity, urate, heme and hemoglobin quantification, fluorescence and transmission microscopy, microbiota culture. **Results and discussion:** The physiological role of these enzymes was studied using RNAi. Two transcripts of superoxide-producing enzymes, NADPH-oxidase 5 (NOX5) and xanthine dehydrogenase (XDH) were found in the genome of *Rhodnius prolixus* and these genes are expressed in all the tissues of this insect. NOX5 activity is augmented in the midgut of blood-fed compared to starved insects. NOX5 and XDH silenced adult females showed almost identical phenotype with marked inhibition of blood digestion and egg development moreover midgut also showed reduced peristaltism. Between 4 and 7 days after blood meal (ABM) insects died and transmission electron microscopy showed cellular disorganization in both dsRNA genes-injected animals. Besides, urate, the end-product of XDH activity, is greatly diminished in the hemolymph of insects that were silenced either with dsRNA for XDH or NOX5. dsNOX5-injected animals but not dsXDH, showed an augmented microbiota at the midgut. Surprisingly, silencing with either dsNOX5 or dsXDH resulted in increased levels of ROS, evaluated by dihydroethidine fluorescence. **Conclusion:** These results suggest that superoxide function as a signaling molecule, through a signaling pathway that includes XDH downstream to NOX5. All together, these data reveal a novel role of redox equilibrium as a major regulator of intestinal homeostasis, including regulation of digestion and microbial growth.

Keywords: superoxide, rhodnius, digestion, nadph-oxidase, xanthine dehydrogenase

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