Midgut epithelia from *Rhodnius prolixus* shift to anaerobic metabolism in response to blood feeding

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Blood feeding in arthropods, due to the toxic effects from the heme molecule, induces several defense mechanisms, as heme crystallization, antioxidant enzymes, heme-binding proteins, low molecular mass antioxidants and heme degradation. As the heme toxicity is related to the production of reactive oxygen species (ROS), we hypothesized if there is any change in the midgut aerobic metabolism after blood ingestion, potentially reducing ROS production and this oxidative stress. As metabolic markers we measured the activities of two enzymes, D-Lactate dehydrogenase (LDH, E.C.1.1.1.28) and Succinate dehydrogenase (SDH, E.C.1.3.99.1), and considered the ratio SDH/LDH as an indicator of aerobic (high SDH/LHD ratio) or anaerobic metabolism (low SDH/LDH ratio). These activities were detected in *R. prolixus* 5th instar nymphs in homogenates from the anterior midgut epithelia or posterior midgut (with contents), before and 30, 60, 120, 180, 240 minutes after blood ingestion. In the anterior midgut, LDH activity was stable around its initial value (0.12±0.04Abs/min.mg), but SDH shows a sharp decrease (from 0.09±0.01Abs/min.mg to 0.011±0.008Abs/min.mg) immediately after blood ingestion. This results in a nine times reduction of the SDH/LDH ratio, from 0.9±0.1 to 0.11±0.08 in 120 minutes. In the posterior midgut, LDH oscilates (from 0.03±0.01Abs/min.mg to 0.16±0.04Abs/min.mg), but SDH shows a sharp decrease in activity (from 0.07±0.01Abs/min.mg to <0.015Abs/min.mg) after 120 minutes, resulting in drastic decrease in the SDH/LDH ratio from 1.9±0.3 to <0.04 60 minutes after feeding. These results suggest that energy metabolism in *R. prolixus* midgut shifts towards anaerobic pathways after blood feeding and would be related to mitochondrial rearrangement, representing an important adaptation to avoid ROS amplification from blood-derived pro-oxidant molecules.

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