β-chain of ATP synthase and its function in the transfer of lipids from lipophorin to target tissues in the hematophagous insect vector Panstrongylus megistus (Hemiptera: Reduviidae).

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Lipophorin, a high-density lipoprotein, is the main lipid carrier in the hemolymph of the insects. Lipophorin plays a role as a “reusable shuttle”, cycling among the tissues by loading and unloading its lipid cargo without synthesis or degradation of its apolipoprotein matrix. In order to exchange lipids, the lipophorin must interact with specific binding sites located at the plasma membrane of the target cells. Currently, there are few characterized candidates supporting the functioning of the docking mechanism of lipophorin-mediated lipid transfer. In this work, we employed a combination of ligand blotting and tandem mass spectrometry to characterize proteins with the property to bind lipophorin at the midgut membrane of the blood sucking insect Panstrongylus megistus, an important Chagas’ disease vector in South America. This hematophagous species can take large blood meals containing a substantial amount of lipids. The β chain of ATP synthase complex (β- ATPase) was identified as a lipophorin binding protein and its role in lipid transfer was further assessed at a biochemical and cellular level in different organs. After subcellular fractionation, β-ATPase was detected by western blot in enriched membrane preparations free of mitochondria of midgut, fat body and ovarian tissue. By immunofluorescence assays, β-ATPase was found at the surface of enterocytes, trophocytes, oocytes and the follicular epithelium, partially co-localizing with lipophorin. In vivo functional studies injecting an anti-β-ATPase antibody demonstrated that blocking of β-ATPase partially impaired lipophorin binding to midgut, fat body and ovarian tissue. The blocking of β-ATPase also diminished lipophorin-mediated lipid transfer to tissues. Taken together, the findings strongly suggest that β-ATPase is a docking receptor that mediates lipophorin lipid transfer to the major lipid target tissues in P. megistus.

Key words: β-chain of ATP synthase, lipophorin, Chagas’ disease vector.