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TITLE

LIPID METABOLISM: INSIGHTS INTO THE PARASITE-INTERMEDIATE HOST INTERACTION IN SCHISTOSOMIASIS

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ABSTRACT

Schistosomiasis is a neglected tropical disease that affects over 200 million people worldwide, caused by the trematode parasite Schistosoma mansoni, which develops part of its life cycle in the intermediate host, the snail Biomphalaria glabrata. During its life cycle, the parasite acquires and utilizes molecules from its hosts, such as lipids, due to its inability to synthesize them. Therefore, the main objective of this study was to characterize the transport and metabolism of lipids in the intermediate host during the development of S. mansoni cercariae.The incorporation and transport profile of fatty acids via hemolymph was analyzed through the injection of radioactive fatty acid, ^{3}H-palmitic acid, into the hemolymph of control and infected animals, followed by tissue collection. Communication was observed between the transport of fatty acids in the hemolymph, the digestive gland, and the albumen gland, with a reduction in this transport noted in animals on the 28th day of infection. The capacity for incorporation and synthesis of lipids by newly released cercariae from the snail or during their development was studied through incubation in the presence of radioactive palmitic acid or injection of the acid into the hemolymph of infected animals. Lipid extraction, separation via high-performance thin-layer chromatography (HPTLC), and counting of the radiation associated with lipid species were subsequently performed. As a result, cercariae exhibit a high capacity for lipid synthesis, both in the environment and during their development. The profile of neutral lipids in the digestive gland of snails was evaluated through lipid extraction and separation by thin-layer chromatography (TLC), revealing an increase in the content of fatty acids, triacylglycerol, and phospholipids on the 28th day of infection. The main lipid metabolism enzymes were studied on the 28th and 35th days of infection in the digestive glands of B. glabrata using western blotting. Here, we describe for the first time the presence and phosphorylation of the central metabolic enzyme AMPK, as well as an increase in the levels of key enzymes in the lipid synthesis pathway, ACC and FAS, at critical points of infection.Digestive glands from snails infected with S. mansoni were analyzed using real-time PCR and western blotting with serum from rabbits immunized against Sm 14, a fatty acid-binding protein from S. mansoni. For the first time, the gene and protein expression of Sm 14, the target of the schistosomiasis vaccine, is demonstrated during the intramolluscan phase of S. mansoni. These findings are crucial, as there are currently no data in the literature showing how the dynamics of lipid transport and metabolism function in the intermediate host of schistosomiasis. This study provides insights into the parasite-host interaction, offering valuable information on molecular targets for developing control strategies for the world's most prevalent helminthic disease.

KEYWORDS

Schistosomiasis; Biomphalaria glabrata; Schistosoma mansoni; Lipid Metabolism; Cercariae

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