

Tissue polyunsaturated fatty acids and a digestive phospholipase A₂ in the primary screwworm, *Cochliomyia hominivorax*

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Abstract

We report on the presence of arachidonic acid in larval and adult tissues of the primary screwworm, *Cochliomyia hominivorax* and of the secondary screwworm, *C. macellaria*. Arachidonic acid is present in the phospholipids of whole animal extracts of both species. This fatty acid appears to be accumulated during the larval stages, because proportions of arachidonic acid were higher in adults than in larvae. These insects probably obtain the arachidonic acid from dietary phospholipids. We also report on a phospholipase A₂ activity in midgut preparations from third instars of the primary screwworm. Phospholipase A₂ is responsible for hydrolyzing fatty acids from the *sn*-2 position of dietary phospholipids to release essential fatty acids. The screwworm enzyme is similar to mammalian digestive phospholipase A₂s because it depends on calcium for high catalytic activity, it is sensitive to the site-specific inhibitor oleyloxyethylphosphorylcholine, and it interacts with heparin. We further characterized the screwworm midgut phospholipase A₂ by altering the reaction conditions, including reaction time, radioactive substrate concentration, protein concentration, pH and temperature. We speculate that the biological significance of this enzyme relates to acquiring essential fatty acids, including arachidonic acid, from dietary phospholipids.

Keywords: Screwworm; *Cochliomyia hominivorax*; Polyunsaturated fatty acids; Phospholipids; Phospholipase A₂; Insect digestion