PLA2 is a Target of Entomopathogenic Bacteria, *Xenorhabdus* and *Photorhabdus*, to Inhibit Cellular Immunity

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Two genera of *Xenorhabdus* and *Photorhabdus* are the symbiotic bacteria to entomopathogenic nematode, *Steinernema* and *Heterorhabditis*, respectively. The host nematode, as an infective juvenile stage, enters target insect hemoceol through natural openings such as mouth, anus or directly through integument. The symbiotic bacteria are released and inhibit insect immune system to protect their nematode host and themselves. The resulting immunodepressive state allows bacterial growth and nematode development. Thus, the nematode pathogenicity depends on the capacity of the bacteria to suppress insect immune capacity.

Previous studies using a model complex, *X. nematophila* - *S carpocapsae*, suggest an eicosanoid inhibitory hypothesis to explain the immunodepression induced by the bacteria. *X. nematophila* inhibits both cellular and humoral immune capacity of *Spodoptera exigua*. Hemocyte nodulation was significantly inhibited by the bacterial infection. Dexamethasone, a specific inhibitor to phospholipase A2 (PLA2), increased the inhibitory effect of *X. nematophila*. However, the addition of arachidonic acid, a catalytic product of PLA2, rescued the cellular immunity. Antibacterial activity was significantly inhibited by the bacterial infection. Especially, gene expression of cecropin (a potent antibacterial peptide against Gram-negative) was inhibited by the bacterial infection. Unlike nodulation, antibacterial activity or cecropin expression was not linked to eicosanoids. *Photorhabdus temperata* subsp. *temperata* also inhibits eicosanoid pathway to induce immunodepressive state.

Immune-related PLA2 of *S exigua* was analyzed by a pharmacological method and showed that it was sensitive to bromophenacyl bromide (a specific inhibitor to secretory PLA2), not to methylarachidonyl fluorophosphates (a specific inhibitor to intracellular PLA2). Vertebrate antibodies against different types of PLA2 were screened and showed that hemocyte extracts had immunoreaction to secretory PLA2 type antibody at both 30 kDa and 20 kDa. This hemocyte-specific PLA2 exhibited pathogen-specific induction. Live or dead *X nematophila* induced the hemocyte PLA2 suggesting that the bacterial product(s) directly inhibit PLA2 after its expression.