

CNIDARIA SHARE HOMOLOGOUS SECRETED PHOSPHOLIPASES A₂ WITH BACTERIA AND FUNGI

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Abstract

Secreted phospholipases A₂ (sPLA₂) containing conserved domain pfam09056 Phospholip_A2_3: Prokaryotic PLA₂ are present in bacteria and fungi. In the current study, prokaryote-type sPLA₂s were identified also in eumetazoans of the Phylum Cnidaria, such as sea anemone *Nematostella vectensis*, hydroid *Hydra magnipapillata* and hard coral *Acropora millepora*. The functions of cnidarian prokaryote-type sPLA₂s are unknown.

Keywords: *Bacteria, Cnidaria, Enzymes, Symbiosis*

Introduction

Phospholipases A₂ comprise a large family of intracellular and secreted enzymes. Secreted PLA₂s participate in important physiological and pathological functions, such as digestion of dietary phospholipids, inflammatory reaction and antimicrobial defence against bacteria and other pathogens. Conserved domain pfam09056 Phospholip_A2_3: Prokaryotic PLA₂ [1] is characteristic of a number of sPLA₂s of both Gram positive and Gram negative bacteria. The catalytic site motif of prokaryote-type PLA₂ (XCXXHDXX) contains the conserved histidine and aspartic acid residues typical of sPLA₂s. In addition to bacteria, prokaryote-type sPLA₂s have been identified in fungi. The observations reported here indicate that prokaryote-type sPLA₂ is present also in eumetazoan organisms of the Phylum Cnidaria.

Material and methods

Conserved domain pfam09056 was identified at web site <http://www.ncbi.nlm.nih.gov/Structure/cdd/wrpsb.cgi> in PLA₂ sequences retrieved at NCBI and Swiss-Prot databases at web sites <http://blast.ncbi.nlm.nih.gov/Blast.cgi> and <http://www.expasy.ch/sprot/>, respectively. Multiple sequence alignment was done by the program CLUSTAL W2 at <http://www.ebi.ac.uk/Tools/clustalw2/index.html>.

Results and discussion

The genome of starlet sea anemone *Nematostella vectensis* (Cnidaria, Anthozoa) [2] contains a rich selection of PLA₂s [3] including prokaryote-type sPLA₂s. In addition to fungi, cnidaria are the only eukaryotes that contain prokaryote-type sPLA₂s. The current observations show that there are in *Nematostella vectensis* distinct sPLA₂s that contain the conserved domain pfam09056 Phospholip_A2_3: prokaryotic PLA₂. In other cnidaria including hydroid *Hydra magnipapillata* and hard coral *Acropora millepora* there are sPLA₂s homologous to prokaryote-type sPLA₂. The presence of prokaryote-type PLA₂s in cnidaria seems to be unique; PLA₂s containing the conserved domain pfam09056 Phospholip_A2_3: prokaryotic PLA₂ were not found in any other metazoan (or eukaryote) besides fungi in the current study. The function and evolutionary origin of prokaryote-type PLA₂ in cnidaria is unknown. Besides vertical inheritance, horizontal gene transfer should be considered as a possibility. A further explanation for finding DNA sequences of prokaryote-type PLA₂ in cnidaria would be the presence of bacteria (or fungi) in these marine invertebrates, either as symbionts, commensals, pathogens or inert contaminants. However, the latter alternatives seem unlikely, since measures were taken to exclude contamination of the specimens used for sequencing the genome of *Nematostella vectensis* (Putnam et al. 2007).

References

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