

Structural and allergenic properties of the Fatty Acid Binding Protein from shrimp *Litopenaeus vannamei*

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Abstract

Background: The shrimp *Litopenaeus vannamei* is an important source of food allergens but its allergenic repertoire is poorly characterized. Cross reactivity between crustacean and mites has been characterized, with tropomyosin, the most relevant allergen involved. The aim of this study was the structural and immunological characterization of an allergen belonging to the Fatty Acid Binding Protein (FABP) family from *L. vannamei* (LvFABP). Methods: ELISA, skin prick test (SPT) and basophil activation assays were performed to determine IgE reactivity and allergenicity of LvFABP. LC-MS/MS and Circular Dichroism experiments were done for structural analysis. B-cell epitope mapping with overlapping peptides, and cross-inhibition studies using human sera were done to identify antigenic regions and cross-reactivity. Results: The recombinant LvFABP showed IgE reactivity in 27% of allergic patients tested and showed allergenic activity when tested for basophil activation and SPT in shrimp sensitized patients. CD-spectroscopy of LvFABP revealed that the protein is folded with a secondary structure composed of mainly β -strands and a smaller fraction of α -helices. This is consistent with molecular modelling results, which exhibit a typical β barrel fold with two α -helices and ten β -strands. Epitope mapping identified two IgE binding antigenic regions and inhibition assays found high cross reactivity between LvFABP and Blo t 13, mediated by the antigenic region involving amino acids 53 to 73. Conclusions: Our results support LvFABP as an allergen with cross reactivity with the allergen Blo t 13. This new allergen could help to understand new mechanisms of sensitization to seafood such as shrimp.

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