

A case of severe anaphylaxis to kidney bean: phaseolin (vicilin) and PHA (lectin) identified as putative allergens

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Keywords: kidney bean anaphylaxis; lectin; PHA; phaseolin; vicilin.

Rather infrequent systemic reactions have been reported upon consumption of white kidney bean (*Phaseolus vulgaris*) seeds, but the responsible allergen(s) has not been identified so far [1]. In addition to the Pha v 3 lipid transfer protein

[<http://www.Allergome.org>], protein bodies of kidney bean seeds concentrate diverse storage proteins, e.g. phaseolin (vicilin), the PHA lectin, arcelin, α -amylase inhibitor and class I chitinase, susceptible to display potential allergenic properties. We present a documented case report identifying phaseolin and PHA as putative allergens. Ingestion of cooked kidney beans by a 23-year-old female having no atopic history caused a systemic reaction up to an anaphylactic shock 30 min later, which requested epinephrine and steroid treatment. The patient further experienced less severe systemic reactions always related to previous kidney bean ingestion. Skin prick test with crushed cooked kidney bean resulted in a wheal of 15 mm associated to pseudopodes with an erythema of 25 mm. Skin prick tests for other related food (peanut, soybean) were all negative.

The kidney bean allergen(s) was identified from a protein extract prepared from crude or previously boiled kidney beans crushed in 20 mM Tris-buffered saline (pH 7.5). Upon

transfer of the protein fractions separated by SDS-PAGE [2] to a nitrocellulose membrane, a Western blotting performed in the presence of 1 : 10 diluted patient serum revealed five main IgE-reacting protein fractions (Fig. 1 A,B). Western blot was performed in the presence of the PHA inhibitory sugars (fetuin, galactose) to prevent non-specific interaction of the lectin with CCD of both bean and serum glycoproteins. A trypsin digestion of the IgE-reactive fractions, followed by mass mapping by MALDI-TOF analysis using the NCBI nonredundant database [3] for identifying the peptides, unambiguously identified phaseolin (bands 1–4) and PHA (band 5) corresponding to the main a–d protein fractions, as the putative allergens (Fig. 1A,B). Both phaseolin (> 150 kDa) and PHA (120 kDa) consist of oligomeric proteins resistant to heat denaturation and digestive proteolysis, exhibiting an extended surface susceptible to display IgE-binding epitopic regions that most probably account for their allergenic propensity (Fig. 1C,D). Phaseolin and PHA are closely related to the Ara h 1 vicilin

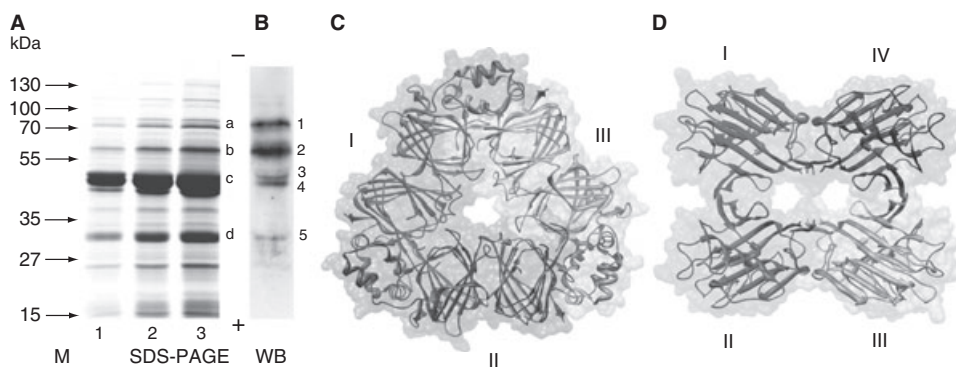


Figure 1 (A) SDS-PAGE of a kidney bean extract at three increasing protein concentrations (lanes 1–3). Main protein fractions consist of phaseolin subunits (a–c) and PHA (d). (B) Western blot showing the IgE-reactive fractions corresponding to phaseolin (1–4) and PHA (5). (C,D) Ribbon diagram of phaseolin (C) and PHA (D), made of β sheet-containing protomers (I–IV) organized in homotrimer (phaseolin) and homotetramer (PHA).

allergen and the Ara h agglutinin (PNA) allergen from peanut. In addition to the cupin allergens, lectins thus appear as potentially allergenic proteins of edible legume seeds.

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Accepted for publication 9 July 2010
Allergy 2010
© 2010 John Wiley & Sons A/S
DOI: 10.1111/j.1398-9995.2010.02466.x

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