

f422 rAra h 1

rAra h 1 from peanut (*Arachis hypogaea*)

Possible Clinical Utility

Allergen components have a wide variety of uses, from the diagnosis and management of allergic disease to the development of immunotherapy, standardisation of diagnostic tests and as tools in molecular allergology.

Recombinant Ara h 1 serves as a marker for sensitization to peanut vicilin, with potential cross-reactivity to vicilins from other leguminous foods which may elicit clinical food reactions.

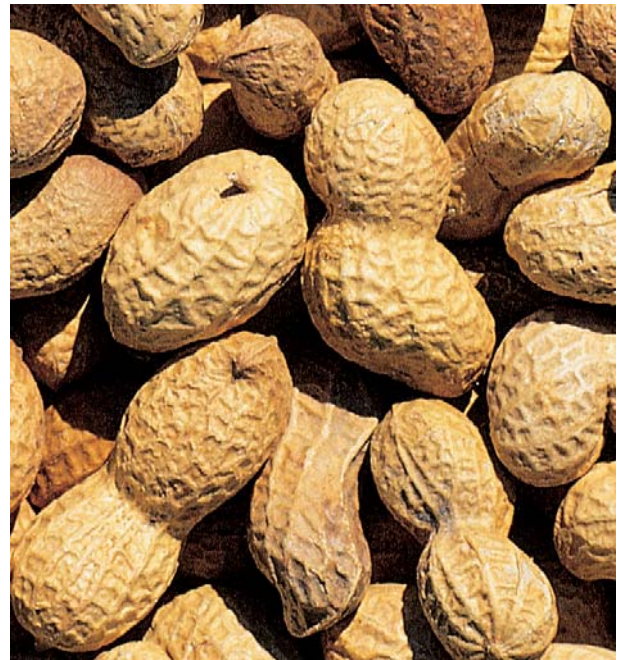
Allergen Description

Peanut is an annual plant belonging to the *Fabaceae* or legume family. It grows close to the ground and produces its fruit, the actual peanut, below the soil surface. A characteristic feature of leguminous seeds, such as peanuts, is that the nutrient storage tissue is formed by the enlarged cotyledons which have the biological role of supporting the germination and initial growth of the seedling. This is in contrast to the so-called tree nuts, including walnut, brazil nut and hazelnut, which are botanically unrelated to peanut.

Peanuts contain three major types of seed storage protein: vicilin, conglutin and glycinin (1). Members of these protein families have traditionally been characterized and named with respect to their sedimentation rate in ultracentrifugation and their solubility in different salt conditions. By these criteria, vicilin belongs to the 7S globulin family, conglutin to the 2S albumin family and glycinin to the 11S globulin family (2-5).

Vicilin, conglutin and glycinin comprise three major allergens of peanut, designated Ara h 1, Ara h 2 and Ara h 3, respectively. Other described peanut allergens include Ara h 4, which is closely related to Ara h 3; Ara h 5 (profilin); Ara h 6 and Ara h 7, which are both closely related to Ara h 2; Ara h 8, which belongs to the PR-10 protein family, typified by the major birch pollen allergen Bet v 1; and Ara h 9, a lipid transfer protein related to the major peach allergen Pru p 3.

Assessment of IgE sensitization using natural peanut extract is affected by cross-reactivity with a range of other plant-derived allergen sources. For example, IgE reactivity to Ara h 8 is likely to result from cross-reactive birch pollen (Bet v 1) sensitization while IgE reactivity to Ara h 9 may be caused by primary sensitization to peach LTP (Pru p 3) or some pollen LTP. In contrast, IgE antibody reactivity to



rAra h 1, rAra h 2 or rAra h 3 is likely to indicate primary sensitization to peanut which makes them useful as more specific markers in the investigation of suspected peanut allergy.

Ara h 1 is a 65 kDa protein that comprises 12% to 16% of the total protein content of peanut extracts (2) and has been reported to cause sensitization in 35% to 95% of different populations of peanut allergic patients studied (4, 6-13).

Potential Cross-Reactivity

While total peanut extract contains a variety of potentially cross-reactive IgE-binding determinants, Ara h 1 shares significant similarity and possible cross-reactivity only with other members of the vicilin protein family (14-15), originating from other edible legume seeds such as lentil (Len c 1) and pea (Pis s 1) (16). A study of severe food allergic reactions to pea demonstrated a clinically relevant cross-reactivity between pea and peanut occurs as a result of sensitization to vicilin homologues in those foods (17).

Clinical Experience

Sensitization to peanut occurs with a high degree of heterogeneity to a number of peanut allergens. Mono-sensitization to a single peanut allergen is relatively rare (18).

In an evaluation of recombinant allergens, Ara h 1, Ara h 2, and Ara h 3, using sera of 77 American peanut-allergic patients, seven different patterns of sensitization were identified. The majority of patients (97%) had specific IgE to at least one of the recombinant allergens (Ara h 1, Ara h 2, and Ara h 3), and 77%, 75% and 77% recognized rAra h1, rAra h 2 and rAra h 3 respectively. High epitope diversity was found in patients with a history of more severe allergic reactions (18).

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