f417 rApi g 1.01

rApi g 1.01 from celery (*Apium graveolens*)

Possible Clinical Utility

Allergen components have a wide variety of uses, from the diagnosis and management of allergic patients to the development of immunotherapy to the standardisation of allergenic test products as tools in molecular allergology. Allergen components are particularly useful for investigations of allergies manifesting wide cross-reactivity.

Allergen Description

Celery is an herbaceous edible biennial plant in the family Apiaceae, native to the coasts of western and northern Europe, and to the Middle East.

The edible celery stalk is not a plant stem but a petiole, which is part of a leaf. They are not only consumed raw as fresh salad but also as a cooked vegetable and as a constituent of sauces and soups. The seeds of celery can be dried and used as a spice. When it is combined with salt, the resulting blend is called celery salt.

Celeriac (*Apium graveolens rapaceum*) is a species variety, forming a greatly enlarged, solid, globular body just below the soil surface. It is not used raw, but is especially suited for soups and stews.

Api g 1 is a major celery allergen and a Bet v 1-homologous protein (1). It has been shown to be a heat-labile protein, but stable upon exposure to high voltage, high pressure, gamma rays, drying and powdering, and therefore having allergenicity potential as a spice (2).

Api g 1 has had two isoforms characterised, Api g 1.0101 and Api g 1.0201, which share only a 50-70 % sequence identity between each other and have approximately 40% identity with Bet v 1 (1). In general Api g 1.0201 displays a weaker IgE-binding capacity than Api g 1.0101 as concluded from immunoblotting experiments (3-4).

Potential Cross-Reactivity

Celery Api g 1 has a 40% identity with (60% similarity to) the major allergen of birch pollen, Bet v 1 (5), and birch pollen-allergic individuals frequently develop IgE-mediated reactions to celery (6). A number of studies have demonstrated that cross-reactions among birch pollen, celery, carrot, and various fruits and vegetables are based on allergens related to Bet v 1 and Art v 1, the major allergens of birch and mugwort pollen, respectively (7-11).

Considering that Api g 1 is a Bet v 1-homologue cross-reactivity with homologous proteins in apples, stone fruits, carrot, nuts, soybean and pollens of several tree species can be expected to varying degrees (10, 12). Approximately 70% of patients who are allergic to birch pollen may experience symptoms after consumption of foods from these groups (13).

Research has focused on the T cell response and epitope involvement influencing cross-reactivity between birch pollen and celery. In a study evaluating the T cell response to Api g 1 in celery, along with the cellular cross-reactivity with Bet v 1 in birch pollen, the latter allergen was identified as the most important T cell epitope for cross-reactivity with Api g 1. The study concluded that the activation of Bet v 1-specific Th2 cells by Api g 1, in particular outside the pollen season, may have consequences for birch pollen-allergic individuals (14).

The influence of stronger IgE binding and of the dissimilar sequence identity of rApi g 1.0101 compared to rApi g 1.0201, on clinical expression and cross-reactivity, may be clarified in future studies using the 2 recombinant allergens.

Clinical Experience

Several studies have examined the prevalence of specific IgE antibodies to Api g 1. The results varied from 59% of 22 patients who had positive DBPCFC to celery (15) to 80% of 30 patients with pollen allergy reporting immediate allergy after ingestion of raw celery (16). In a third study 74% of a group of 23 patients with celery allergy were found to have specific IgE to Api g 1 (12).

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