Clinical Utility

Cup a 1 is a specific marker for primary sensitization to Cupressaceae pollen, e.g., cypresses, cedars and junipers.

Cupressaceae trees belong to the winter flowering species and allergic symptoms due to these pollen allergies are easily misdiagnosed. In areas where cypresses, cedars and junipers are abundant a confirmation of primary pollen sensitization by testing for IgE antibodies to nCup a 1 (t226) is of clinical value in the following situations:

- Patients with respiratory symptoms during the winter season when flu and common colds are common.
- Patients with perennial symptoms – pollen allergy could be difficult to distinguish from other allergies, e.g., house dust mite allergy.
- Aiding in selection of appropriate immunotherapy.

Allergen Description

Cup a 1 is a 43 kDa pectate lyase which has been shown to be a major allergen in C. arizonica pollen and has been described as a specific allergen marker for sensitization to cypress pollen (1). Cup a 1 is one of at least six allergen components that have been isolated and characterized from C. arizonica (2, 3).

Cypress pollens in general have two important characteristics; a low protein concentration and high carbohydrate content (3-5). The presence of the carbohydrates seems to be important for reactivity to specific IgE (6, 7).

Cross-Reactivity

Cup a 1 shows 96% amino acid similarity with Cup s 1 from C. sempervirens. High homology (75–90%) is also seen with Cha o 1, the major allergen of Chamaecyparis obtusa (Japanese cypress) and Jun a 1, the major allergen of Juniperus ashei (Mountain cedar). Moreover, Jun a 1 displays a high level of amino acid sequence homology with Cry j 1, the major allergen of Cryptomeria japonica, (Japanese cedar tree) (7-9). Thus, a high degree of cross-reactivity is expected between all these Cupressaceae proteins.

Clinical Experience

Cupressaceae species are important causes of allergy in several geographical areas, particularly in the Mediterranean countries, Japan and North America. C. arizonica and C. sempervirens are commonly and increasingly used as ornaments as well as wind and noise barriers in gardens and parks.

A recent Spanish molecular epidemiological study reported prevalence of allergy to cypress measured by specific IgE sensitization to Cup s 1 varying from very low (0 – 25%) to high (21 – 50%) in geographic regions with different exposure of cypress pollens (10). As for many other allergens the prevalence of sensitization to Cupressaceae pollen is increasing, e.g., in Italy, from 7.2% in 1995 to 22% in 1998 (11).

Cypress pollen is an important source of allergens, causing winter respiratory allergies and commonly inducing symptoms of asthma, hay fever and allergic conjunctivitis in sensitized individuals (7, 11, 12).

C. arizonica pollinates in January and February and partially overlaps with the very highly cross-reacting C. sempervirens, which pollinates from February to late March (11). Both trees are today abundant and coexisting in the Mediterranean area. Symptoms from these winter flowering trees may create confusion with symptoms from perennial allergens such as house dust mite (13).

Furthermore, information on IgE antibody levels to specific, e.g., Cup a 1, and cross-reactive allergen components can be used to aid in selection of appropriate allergen specific immunotherapy (SIT) (14). According to this concept, the following combination of tests could be suggested for patients with suspicion of cypress allergy:

- ImmunoCAP® Allergen component Cup a 1 (t226) to confirm primary sensitization to cypress which indicates suitability for cypress SIT.
- ImmunoCAP® Bet v 2 Profilin (t216) and ImmunoCAP® Bet v 4, Ca-binding protein (t220), to assess the patient’s sensitization to cross-reacting allergens present in plants and various fruits.

Specific immunotherapy has been evaluated in patients with allergy to Cupressaceae pollen, and with significant improvements (11).

Figure 1. Comparative analysis of IgE antibody binding to purified Cup a 1 and Cup s 1. Serum samples from Cupressaceae pollen sensitized subjects from Japan, Europe and USA were analyzed (n=42).
References


For further reading, see: www.immunocapinvitrosight.com