Clinical Utility

rPol d 5 is a marker for primary sensitization to Vespidae venom, and particularly to Polistes. ImmunoCAP® Allergen component i210, rPol d 5 is a valuable diagnostic tool to identify whether or not the culprit insect is a Paper wasp when assessing allergic reactions in stung patients. This is of particular clinical value when immunotherapy is considered.

Allergen Description

Pol d 5, known as antigen 5, is a 23 kDa protein from the species Polistes dominulus. Its biological function is as yet unknown. Antigen 5 is recognised as the major and most potent allergen in venoms of the Vespidae family, i.e. Paper wasp, Common wasp and European hornet (1-4). It is not found in honeybee venom (5-6).

Cross-Reactivity

Homologues of antigen 5 from different wasps, hornets and paper wasps are known (4-5, 7-8). A sequence similarity of approximately 98% occurs within P. dominulus and P. gallicus, which are European species of Polistes (9). This figure falls when comparing Polistes from Europe with those from the US, and even more when antigen 5 is compared between different genera (3-4, 9-13). Antigen 5 displays 69% and 60% sequence identity with the homologue proteins of Dolichovespula maculata and Polistes annularis respectively, for example (4, 8). Note that structural similarity between proteins suggests but does not guarantee clinical cross-reactivity for all patients.

Antigen 5 has also been found in venoms from different ants, and great variation in protein sequence similarity to homologue proteins of different Vespidae species has been demonstrated (6, 14).

Clinical Experience

The most common reactions to stings from different stinging insects are large local reactions and systemic anaphylactic reactions, the latter most often IgE-mediated. Self-reported systemic reactions range from 0.3% to 7.5% (15).

When people stung by bees or wasps experience severe reactions, identifying the culprit insect is very important. This is particularly true if a patient is considered for venom immunotherapy (VIT). Some patients are allergic to more than one stinging insect, whereas others are only allergic to one species. In many cases, this is difficult to establish correctly since patients have difficulty recognising the different species, and also because double-positivity is a quite frequent problem when testing for IgE antibodies to honeybees and/or different wasps (12, 15-18).

Double-positivity is caused by:
- true double-sensitization to honeybee and wasps, or different wasps,
- sensitization to cross-reacting allergen proteins present in venoms of different species,
- sensitization to CCD (carbohydrate determinants) present in venoms of different species.

Within the Vespidae, Vespu ula and Vespa are closely related, whereas Polistes is more distantly related. Accordingly, there is limited cross-reactivity between Polistes venom proteins and the other venom proteins due to differences in the epitopes on the allergens proteins (9).

In the Mediterranean region, multiple-positivity to IgE tests for specific IgE to Vespu ula and Polistes is a diagnostic problem (18-19). One study from Italy investigated the degree of cross-reactivity between Vespu ula and Polistes venoms. By using inhibition studies, the authors concluded that a double sensitization to the venoms was likely a result of cross-reactivity in 31 of 45 patients. All 45 had been prescribed VIT to both Vespu ula and Polistes, and this study showed that immunotherapy with only one venom extract would have been sufficient for 31 of them (18).

The difference in allergenicity of the American Polistes species and the European is also highlighted in studies. It was concluded that the European Polistes (P. dominulus and P. gallicus) venoms have exclusive allergens and that proteins from these venoms are necessary in the diagnosis of European patients (12). The clinical implication of this conclusion was shown in a report on the ineffective treatment with American Polistes venom of an Italian patient allergic to European Polistes (20).

Access to rPol d 5 and other venom-specific allergen markers will thus aid in selecting patients for VIT. Furthermore, it will allow monitoring of the patients’ specific IgE reactivity during the treatment period (21).
References


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