

# PARIETARIA POLLEN ALLERGENS

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## INTRODUCTION

In the last 20 years, a great boost of information has been achieved about the composition of the allergenic extracts by means of the cloning of recombinant allergens. This kind of analysis has shown that natural allergen extracts are a heterogeneous mixture of proteins where only a few components are responsible for the allergenic activity.

*Parietaria* is a family of dicotyledonous weeds of the Urticaceae family including several genera growing in urban and rural areas. Among them, *Parietaria officinalis* and *Parietaria judaica* represent the most relevant allergenic source in countries around the Mediterranean basin (1). The relevance of this weed as a major cause of allergic disease in the Mediterranean countries underlines the importance of the identification and analysis of the allergen extracts. This will allow us to design test systems for the diagnosis and for a correct formulation of vaccines useful to cure *Parietaria* allergic patients.

## MAJOR ALLERGENS

Molecular biology techniques and immunological studies have demonstrated that two components of the non-specific Lipid Transfer Proteins (npLTPs) family, named Parj1 and Parj2, are the two major allergenic components of this pollen. LTPs belong to the family of the pathogenesis-related (PR-14) proteins from plant usually expressed in response to infections by pathogens. LTPs are very stable allergens, as shown by their extreme resistance to pepsin digestion and heat treatment. Their distribution among plant foods suggest a potential role of these proteins as plant panallergens (2). In particular, Parj1 and Parj2 allergens are low molecular weight polypeptides of 14.726 and 11.344 Daltons respectively (3-5) capable of inducing an IgE response in 85% of the Pj allergic patients

with high levels of Parj1- and Parj2-specific IgE in their sera (3-6). 3D modelling by homology (7) and enzymatic digestion (8) have shown that both allergens attain a three-dimensional structure consistent with that of the ns-LTP stabilized by four disulphide bridges. The integrity of this pattern is essential for the three-dimensional structure (7) and for the IgE antibody recognition (9). In addition, IgE measurement performed by the purified rParj2 allergen, showed that this allergen is a specie-specific marker gene able to predict a primary sensitisation towards the Pj pollen (6). For these reasons, a genuine sensitisation against the *Parietaria judaica* pollen can be monitored in vitro looking for Parj1 and/or Parj2 specific IgE antibodies.

## MINOR ALLERGENS

By means of immuno-absorption studies, we were also able to demonstrate that this pollen contains highly cross-reactive allergens (i.e. Ca<sup>2+</sup> binding proteins, profilin) present in other pollen grains (6).

Profilin, a ubiquitous protein involved in eukaryotic cytoskeleton, has been described in the *Parietaria* pollen (Parj3). By means of molecular cloning and isoelectrofocusing it has been shown the presence of two isoforms of 131 AA and 132 AA respectively with a m.w. of about 14000 Daltons with different immunological relevance. Epidemiological studies performed with the two recombinant isoforms (Parj3.0101 and Parj3.0102) demonstrated that 18% and 6% of sera from Pj allergic patients presented IgE specific to these proteins. Sequence alignment showed a high level of amino acids identity with other allergenic profilins (10).

Many calcium-binding proteins (CBPs) belong to the same evolutionary family and share a type of calcium-binding domain known as the EF-hand. Molecular and structural relationship between different families have shown that pollens contain CBPs from 2 to 4 EF hands domains which have been described as highly cross-reactive allergens. *Parietaria* CBP has been isolated from a cDNA library as a 84 AA protein belong-

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ging to the 2 EF-hands family and a m.w. of about 9000 Daltons. Inhibition studies have shown a high degree of cross-reactivity with other pollen species (Bonura et al. manuscript in preparation).

## CONCLUDING REMARKS

The diagnosis of allergic reactions is based on both clinical history and presence of specific IgE in the serum and/or on skin mast cells.

The use of extract-based tests for the diagnosis of allergic disease is not enough to identify the specific molecules inducing the allergic response and, in some cases, is not able to distinguish between co-sensitisation to different allergenic molecules and cross-reactivity between allergens. Therefore, the use of purified allergens represents a powerful tool for a more precise diagnosis.

The data reported herein demonstrated the importance of both Parj1 and Parj2 for the diagnosis (6) and future therapeutical options (9) of the allergic reaction towards the *Parietaria* species.

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