

EDITORIAL

Allergens of storage mites

Allergies due to mites, particularly the most common species of house dust mites, are a major health problem world-wide. However, several studies conducted during the past few years have demonstrated that storage mites, in contrast to allergens such as animal danders and pollens [1] are major sensitizers among farmers [2-6]. Storage mites, like other common inhalant allergens, provoke asthma and rhinoconjunctivitis. Allergy to storage mites has above all been associated with occupational exposure but people living in damp housing conditions can also become sensitized [7]. The occupations reported so far are, besides farming, baking, and grain handling [8,9]. *Lepidoglyphus destructor* has been identified by both RAST and bronchial challenge as a significant cause of occupational asthma in rural environments [10,11].

During the Second International Workshop on 'Dust Mite Allergens and Asthma' in 1990, it was proposed that the term 'domestic mites' should be used to include both pyroglyphid and other mite species, for instance storage mites, which are found in house dust and elicit an IgE response. However, an even better term would be 'dust mites', since they exist in dust related to both indoor and agricultural environments. Nevertheless, since these mite species are found in both temperate and subtropical climates a large number of individuals are exposed.

The allergens belonging to the storage mites Tyrophagus and Lepidoglyphus have been identified and characterized with the use of CRIE [12] and SDS-PAGE [13]. In addition, the production of monoclonal antibodies to 39 kD [14] and 14 kD [15] allergen components in *L. destructor* has recently been described. The paper by Ventas *et al.* in this issue reports on the purification and characterization of a major allergen of *L. destructor* located at 14 kD [16]. The authors purified the 14 kD allergen component by affinity chromatography using a monoclonal antibody and designated the allergen *Lep d I*. The MW was determined by SDS-PAGE under non-reducing conditions. Reducing conditions changed the MW to 16 kD. Earlier studies reported that a major allergen of *L. destructor* is located at 15 kD when electrophoresed under non-reducing conditions [17]. However, the two allergens might be the same since there are differences in the methods employed in the two papers. In the paper by Ventas *et al.* [16] 21 of 24 sera tested in RAST had specific IgE to the 14 kD *Lep d I*, which indicates that this is a major allergen. However, *Lep d I* is not the only major allergen since Johansson *et al.* have shown that 50% of 20 examined sera detect an allergen component at 53 kD in *L. destructor* [17]. Thus,

there are at least two major allergen components in *L. destructor*.

Because of the dual occupational and domestic exposure in some populations, the allergenic cross-reactivity between storage mites and house dust mites is of great interest. RAST correlation and RAST inhibition studies [18] have shown that *L. destructor* and the house dust mite *D. pteronyssinus* possess distinct allergenic determinants. However, immunological cross-reactivity between storage mites and Dermatophagoides spp. has been demonstrated by means of CRIE [19] and RAST inhibition and affinity-absorption experiments [20]. Luczynska and co-workers reported a more extensive cross-reactivity between non-pyroglyphid and pyroglyphid mites, although there was only a limited cross-reactivity between *D. pteronyssinus* and *L. destructor* [21]. Differences in allergenic cross-reactivity patterns can be obtained when sera from different populations are used [22].

Using an immunoblot-inhibition technique we recently demonstrated that *L. destructor* shares at least one allergenic determinant with *D. pteronyssinus*. The IgE antibodies to the 25 kD allergen component in *D. pteronyssinus* were inhibited to the same degree by extracts of *D. pteronyssinus* and of *L. destructor*. Another major allergen component in *D. pteronyssinus* (*Der p II*) was also inhibited, but to a lesser degree, by *L. destructor* [17]. Ventas *et al.* [16] report that the *Lep d I* was unable to inhibit significantly the *D. pteronyssinus* RAST, and conclude that *Lep d I* could not be responsible for the allergenic cross-reactivity occurring between these two mite species. This result is in agreement with the findings of Johansson *et al.*, who showed that the allergen component at 15 kD in *L. destructor* only cross-reacted to a very low degree with *D. pteronyssinus*, which indicates that the majority of allergenic determinants are unique [17].

The major allergens of Dermatophagoides spp. have been studied in detail with both physicochemical and recombinant DNA technology. The Group I allergens show sequence homology to cysteine proteases and possess functional enzymatic activity [23,24]. The function of the Group II allergens is still unknown. These allergens do not show homology to other proteins. *Der p III* and *Der f III* are proteins belonging to the serine group of proteases [24,25]. The amino acid composition of *Lep d I* reported by Ventas *et al.* [16] neither showed any remarkable features, nor displayed homology to other reported compositions of mite allergens. However, the amino acid sequence and the function of this allergen is

still unknown. Recently, Lake and co-workers described a third mite allergen, mite amylase, to reveal enzymatic activity. This protein belongs to the *Dermatophagoides* genus and has a MW of 56 kD [26]. Bowman [27] has shown that storage mites contain enzymes such as amylase. Whether the *Lepidoglyphus* allergen at 53 kD [17] could be mite amylase needs to be ascertained. However, immunohistochemical studies of *L. destructor*, in which sections of *L. destructor* were probed with either a MoAb directed against the 39 kD allergen component or with RAST positive *L. destructor* sera, indicated that at least one *L. destructor* allergen is associated with digestion, since the gastrointestinal tract and the fecal pellets were labelled [28]. To understand better the complexity of dust mite epitopes and allergens, future studies need to focus on the molecular biology of the different *L. destructor* mite allergens. Such studies are essential to obtain extracts of high quality for medical treatment.

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