

regular diet of patients eating wheat products and would thus not have become evident under the picture of wheat allergy. Although predominantly evident in WDEIA, it is probable that all food allergies may be exacerbated by cofactors, but only little is presently known.

Konstantinou raises an interesting question regarding lipid transfer protein (LTP) relation to wheat and WDEIA in the form of Tri a 14. First, LTP is rare in Northern Europe but of greater concern in the Mediterranean area.⁸ Secondly, as mentioned, Tri a 14 has been reported as the major allergen related to Baker's asthma and to date not evidently related to oral wheat allergy. It would be of interest to investigate a potential association between LTP and WDEIA, but to obtain reliable data, patients with WDEIA from the Mediterranean area should be included in such a study.

Lastly, Konstantinou raises a controversial question, suggesting that fasting before a food challenge would decrease threshold. None of the challenges were performed on empty stomachs. The participants were instructed only to avoid ingestion of any cereals (wheat, rye, and barley) 24 hours preceding the challenges.

In conclusion, this study was conducted to improve the diagnostic method and sensitivity for WDEIA and hereby improve recommendations for prophylaxis in patients in the daily life setting.

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Two ideas to improve mite allergen avoidance



To the Editor:

The recent article by Wilson and Platts-Mills¹ provides an insightful review of the current rationale and practice of mite interventions. However, the clinical benefits remain debated and are often elusive.

There are a couple of ideas worth considering that may improve the practice.

The first is to better understand the sites of exposure. As the authors note,¹ the bed is often chosen as the primary focus of interventions because of the time spent there and the ease of applying interventions at this site. However, the only data on the time-geography of personal mite aeroallergen exposure over 24-hour periods, from our group,²⁻⁴ suggest, on average, that about half the total exposure occurs within the house but not at night in bed. A further quarter occurs outside the house during transport, occupational, or social situations, probably from clothing. Thus, measurement challenges the established dogma. Although there are limitations to our observations, if they are substantially correct then they indicate new opportunities to develop more effective interventions.

The second is to better understand the role of aeroallergen particle size in clinical outcomes. The authors¹ hypothesize about the effects of "large-particle" exposure. We additionally hypothesize that small, "respirable" (<5 µm) mite particles may be important.

The original description of mite aeroallergens⁵ showed the ubiquitous distribution of reservoirs in houses: that aeroallergens were both difficult to detect unless reservoirs were disturbed and most were associated with large particles that settled rapidly, leaving small particles aloft. This is consistent with our recent observations.⁴ As illustrated schematically in Figure 1, large-particle exposure occurs as multiple transitory spikes during the day and evening. During sleep, people seldom move and most exposure is generated on getting in and out of bed and during brief arousals between sleep cycles.

Small-particle exposure is different in several ways. Once generated, such particles can remain airborne for long periods. However, exposure may be low and transitory in well-ventilated spaces or initially on moving into an unoccupied space. In an unventilated space that is also rich in disturbed reservoirs, such as an occupied bedroom, small-particle exposure could be relatively high and prolonged. Whether small particles are also aerosolized by micro-events such as body thermals is not known.

Although the total quantity of inhaled allergen-associated small-particle exposure is probably a small fraction of the 24-hour total (this has never been determined), we suggest that it may be atypically clinically potent. This is indicated by relatively benign exposure to "large-particle" pollen, which when fragmented during thunderstorms, can provoke epidemic, devastating asthma.⁶ In addition, low-level cat exposure, involving small particles, increases airway hyperresponsiveness in the absence of symptoms.⁷ Perhaps the importance of size trumps quantity.

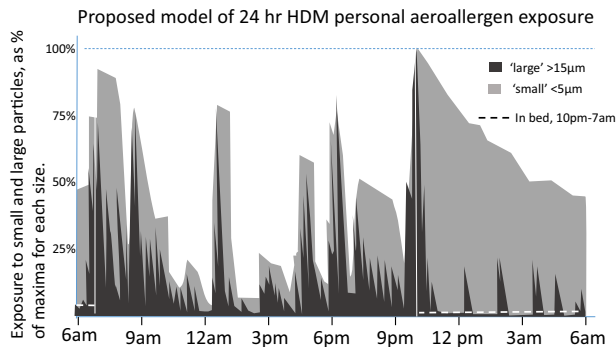


FIGURE 1. Schematic, hypothetical, representation of exposure to mite aeroallergens carried on large (>10 μm) and small (<5 μm) particles over a 24-hour period. Exposure is shown as a percentage of the maxima for each size. Large-particle exposure occurs as transitory spikes associated with disturbance of reservoirs (see Tovey et al⁴). Small-particle exposure is transitory and low in well-ventilated spaces and high and prolonged in unventilated locations. Both may contribute differently to clinical outcomes. *HDM*, House dust mite.

Again this model, if valid, indicates new directions for improving domestic avoidance.

Ultra-low mite allergen environments such as in mountain sanatoria and allergen-free chambers provide impressive clinical benefits and lessons in the role of environmental exposures. A better understanding of the timing and nature of domestic mite exposure may help us replicate these outcomes in the home.

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Reply

To the Editor:

In his response¹ to our recent review² on dust mite allergen avoidance, Tovey raises some important issues. These concern

both the need to consider exposure over the full 24 hours and the relative importance of different sizes of particles carrying allergens. We do not disagree with his overall position that naturally occurring exposure is more complex than we presented. However, we suspect that the relevance of the answers to these questions may be limited by the lack of practical approaches to control exposures, especially those that occur outside the home. An important element of the primary observations about airborne allergens was the dramatic differences between natural exposure to cat and dust mite.³ Central to those studies was the use of measurements in absolute units, that is, nanograms or micrograms of allergen proteins. In those studies, including those of Tovey et al, particles less than 5 μm accounted for only a minor fraction of the total IgE-binding fraction to dust mite.³⁻⁵ In the hypothetical model proposed by Tovey, values for exposure are given as "% of maximal for each size." Given that small particles represent only a minor fraction of total (dust mite) allergen-containing particles, this presentation has the effect of inflating the relative contribution of small particles. Although it is possible that small particles play a greater role in promoting inflammatory responses to dust mite allergen in the lungs relevant to asthma, existing data do not support this position. For example, in the studies reported by de Blay et al in France, they found that larger particles carrying mite allergen would produce an early effect on lung function with a smaller quantity of mite allergen.⁶ Although subjects who were challenged with small particles required more frequent and higher doses of oral corticosteroids, those subjects also received a much higher total dose of dust mite allergen given that they did not mount early-phase reactions. Thus, the study was not designed to study the effect of particle size on late-phase responses. The analogy with pollen allergy and thunderstorm asthma regarding particle size is interesting, but there is currently insufficient data to support the view that small particles are more clinically potent sources of dust mite allergen. We would like to highlight one aspect of Tovey et al's^{7,8} recent work that strongly supports one of the messages of our article. Primary prevention to dust mite sensitization is unlikely to be fruitful in areas where dust mite prevalence is high because of the extent of exposure that occurs outside the home. In contrast, home interventions can be beneficial for those with established sensitization and allergic disease (ie, tertiary prevention) as shown recently by Murray et al.⁹

Overall we would maintain our conclusion that the techniques for reducing exposure in the home are well established and can be achieved without major disruption or expense. Thus, the practical approach is to recommend that mite-allergic subjects take measures to decrease exposure in the home, starting with the bedroom. In conjunction with modern forms of treatment (ie, immunotherapy, inhaled corticosteroids, leukotriene antagonists, etc), this approach can achieve asthma control in most of our patients who adopt the recommendations.

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