

# House dust mite avoidance facts and fiction

### Authors:

**Guy B. Marks, Senior Lecturer,  
Institute of Respiratory Medicine, University of Sydney**

**Michael J. Abramson, Associate Professor and Deputy Head,  
Department of Epidemiology and Preventive Medicine,  
Monash Medical School, The Alfred Hospital, Victoria.**

Asthma is largely an allergic disease. Thirty to forty percent of the general population are allergic to dust mites, animal danders, pollens and/or moulds, but it is allergy to house dust mites which seems to be particularly closely linked to asthma in coastal Australia.

Children who are allergic to house dust mites are up to twenty times more likely to have asthma, compared with non-allergic children<sup>1</sup>. House dust mite allergy is more common in humid, coastal regions, and it is in these regions that it carries the greatest risk for asthma<sup>1</sup>. This strong association between allergy to house dust mites and the presence of asthma has led many to believe that reducing exposure to these mites would have beneficial effects: both in preventing the onset of asthma and reducing the severity of asthma.

A wide range of physical and chemical methods have been used to try to remove house dust mites and their allergens, from the domestic environment. In some cases, these methods entail the use of existing or evolving commercial products, for example vacuum cleaners, other cleaning products, beds and bedding, and laundry products. In the competitive marketplace for domestic durables and consumables, the rather complex issues about the relation between house dust mite allergen avoidance and benefit for people with asthma (or potential asthma) are often blurred.

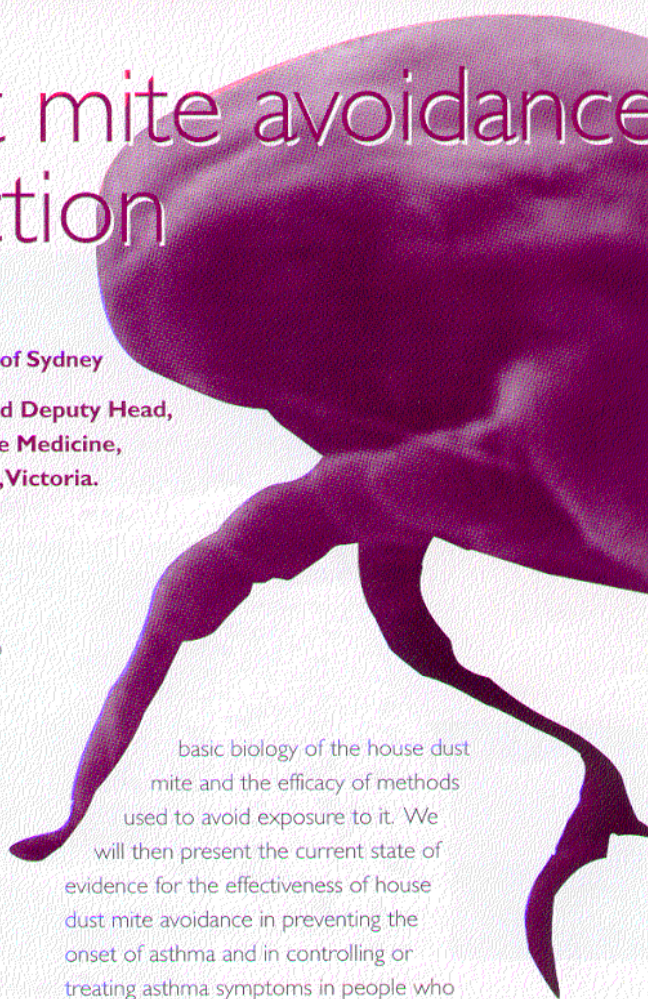
In this article, *Asthma Update* aims to empower consumers to assess the claims made for house dust mite avoidance products. We will describe the

basic biology of the house dust mite and the efficacy of methods used to avoid exposure to it. We will then present the current state of evidence for the effectiveness of house dust mite avoidance in preventing the onset of asthma and in controlling or treating asthma symptoms in people who already have the disease.

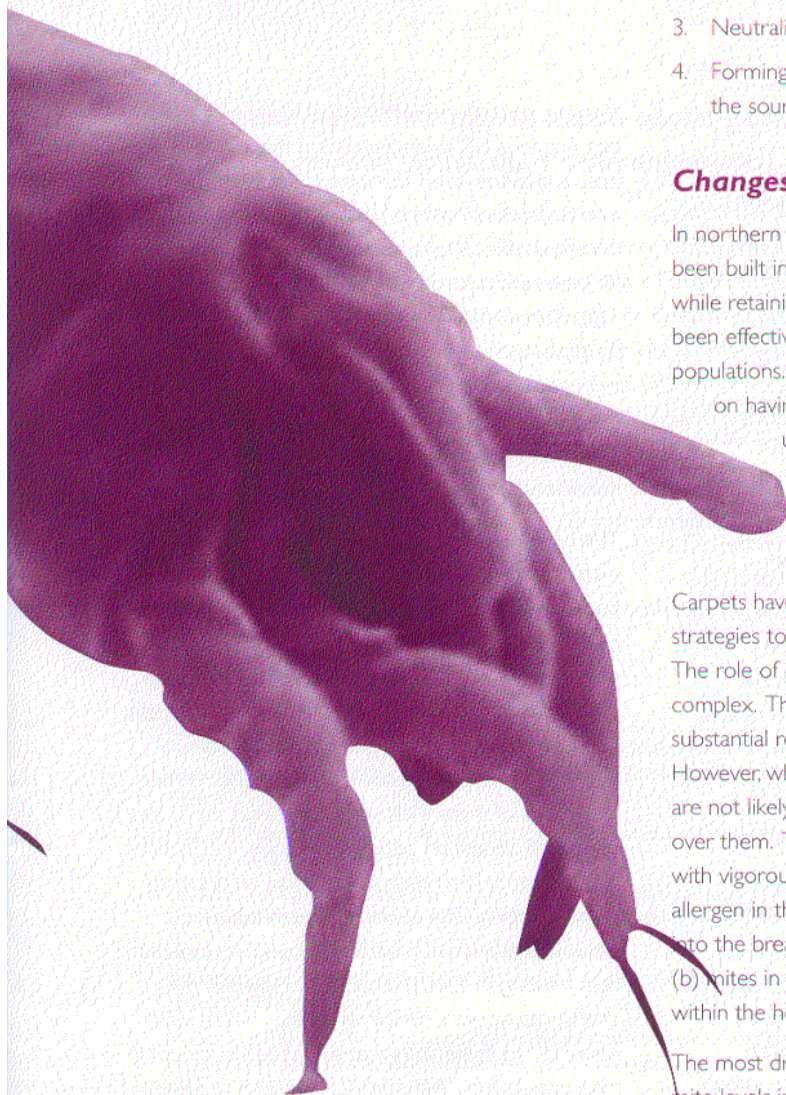
House dust mites (see picture) are just small enough to evade detection by the naked eye. They live in various reservoirs of household dust and require moisture, warmth and nutrients to survive. Favoured nutrients include human skin scales and various moulds. These requirements mean that house dust mites are most abundant in warm, humid climates, such as coastal Australia.

Beds provide an ideal local environment for the proliferation of mites but high levels are also found in carpets, soft furnishings and even in clothing. For unknown reasons they tend to inhabit domestic residences in much higher numbers than commercial buildings such as theatres, hospitals or child care centres<sup>2</sup>.

It is the allergens produced by house dust mites that cause problems for allergic people.







These allergens are secreted as enzymes in the mite's digestive tract and are actually found in mite faecal particles. These tiny allergen-containing particles, when inhaled into the nose and lower airways, cause inflammation and potentially worsening asthma.

### **Reducing exposure to house dust mite**

Strategies to reduce exposure to house dust mite allergen fall into four categories:

1. Making the environment less favourable to mite proliferation and growth
2. Killing and/or removing house dust mites

3. Neutralising and/or removing the allergen
4. Forming a barrier between the individual and the source of allergen.

### **Changes to air in the home**

In northern Europe, heat-exchange devices have been built into houses to make the homes drier while retaining warmth during winter. These have been effective in reducing house dust mite populations. However, their effectiveness depends on having a low outdoor humidity. They are unlikely to be effective in humid climates like most of coastal Australia.

### **Carpets**

Carpets have been the focus of much attention in strategies to reduce house dust mite populations. The role of carpets in house dust mite exposure is complex. There is no doubt that they are a substantial reservoir of mites and mite allergen. However, while the mites remain in the carpet they are not likely to cause problems for people walking over them. The main potential problems are: (a) with vigorous disturbance, such as vacuum cleaning, allergen in the carpet reservoir may be released into the breathing zone of household occupants and (b) mites in the carpet may spread to other sites within the house, such as furniture and beds.

The most drastic approach to reducing house dust mite levels in the carpet is to remove it altogether. Many experts have recommended this. However, it must be said that even this drastic measure has not been demonstrated to reduce overall house dust mite allergen exposure in the home. There is no evidence that normal, dry vacuum cleaning has any beneficial effect of mite allergen levels in carpets. Wet vacuuming or steam cleaning may have some beneficial effect but it is probably only short-lived. So far, chemical treatments of carpets have not been shown to have any beneficial effect either.

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# Asthma Management

## Beds

Beds are the most important site for house dust mite allergen exposure. For reasons described above, beds provide an ideal environment for mites to proliferate. Furthermore, since we all spend many hours each day with our noses and mouths in close proximity to the bed, there is ample opportunity for mite allergen to be inhaled from the bed. The application of an impermeable barrier around the mattress and pillow, combined with washing all other bedding with a laundry additive which kills house dust mites, is efficacious in reducing, but not eliminating, house dust mite exposure from the bed<sup>3</sup>. Washing the bedding in hot water (at 55°C or more) is probably an effective alternative to the laundry additive<sup>4,5</sup>. However, just using the impermeable covers without dealing with the remaining bedding will not be sufficient to reduce the allergen exposure levels.

## Air Filters

High efficiency particulate (HEPA) filters and air ionisers have both been used to try to reduce exposure to airborne mite allergen particles. Although this is a theoretically attractive proposition, there is no evidence that they are effective in reducing actual exposure. In fact ionisers may even be associated with worsening night time cough<sup>6</sup>.

In summary, the tools for effective house dust mite avoidance are rather limited. What evidence is there that, when house dust mite avoidance is achieved, it has beneficial effects for people with potential or actual asthma?

## Role of house dust mite avoidance in prevention and treatment of asthma

The role of house dust mite avoidance in preventing the onset of asthma is being actively investigated in clinical trials currently underway in UK, Canada and Australia. The results of these trials will become

available over the next few years. In the meantime, one previous UK study has shown that house dust mite avoidance, when combined with food allergen avoidance, does have some limited and temporary beneficial effect in preventing the onset of allergy in children with a family history of allergic disease<sup>7,9</sup>. The relative importance of house dust mite and food allergen avoidance in achieving this outcome is not known. At present, the role of house dust mite allergen avoidance in preventing the emergence of allergy and asthma in children at risk of these conditions, is not well established.

The best evidence for any intervention comes from a systematic review of randomised controlled trials. Such a review of house dust mite control measures in allergic asthma was conducted by Gotzsche and colleagues a few years ago<sup>10</sup>. They included a total of 23 trials, of which 6 had used chemical methods, 13 physical methods and 4 a combination of methods to reduce exposure to dust mites. When the results of these trials were combined, there was no overall benefit on asthma symptoms, medication usage, lung function such as peak flow or bronchial hyper-reactivity. The review has been criticised because it combined trials that successfully reduced dust mites with trials that did not. However the overall results were similar when the analysis was restricted to those trials that succeeded in reducing mite populations. Although further trials of newer methods have been published since this review, the results have not yet been overturned.

Whilst there is some evidence that rather extreme measures such as confining asthma patients with house dust mite allergy to a hospital ward or an alpine sanatorium can be of short term benefit, evidence of ongoing clinical effectiveness is generally lacking for the currently available methods to reduce dust mites in carpets and bedding.



### ***How should I evaluate claims made about particular products to reduce house dust mite exposure?***

We suggest that the 'caveat emptor' or 'buyer beware' approach should apply – as for all other consumer products. Demand evidence that the product not only reduces house dust mite exposure, but is actually of benefit to people with asthma. This will require not laboratory tests with dust mites, but clinical trials with patients. Ideally we would want to see not just an improvement in peak flow rates, but also an improvement in quality of life. We believe that effective house dust mite avoidance does have the potential to benefit some patients with asthma. However, until more effective methods have been developed that produce a sustained reduction in house dust mites, we think that families with asthma should avoid drastic life style modifications and defer expensive purchases of unproven products.

*Photomicrograph courtesy of Dr Euan Tovey, Institute of Respiratory Medicine, University of Sydney.*

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