

## Allergen avoidance strategies. Dust mites

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Patients with asthma may benefit from a high altitude environment free from dust mites.<sup>1,2</sup> It is however a matter of debate whether asthma and rhinitis control in subjects sensitized to house dust mites can be effectively achieved with dust mite avoidance in daily life.<sup>3</sup> It has been shown that single measure interventions are not effective in rhinitis and asthma due to house dust mite allergy in adults<sup>4,5</sup>, whereas children with asthma might benefit from the use of mattress covers.<sup>6</sup> Multifaceted measures may be effective. Evidence for this has been proven only in children.<sup>7</sup> Recent meta-analyses did not find evidence for the efficacy of house dust mite control in asthma,<sup>8</sup> although the conclusions of these analyses have been challenged.<sup>9</sup> Another Cochrane review studied the efficacy of house dust mite avoidance in perennial rhinitis.<sup>10</sup> It was concluded that isolated use of house dust mite impermeable bedding is unlikely to prove effective, whereas on the whole studies were small and of poor methodological quality, making it difficult to offer any definitive recommendations. It was suggested that the use of acaracides might be promising as well as the implementation of extensive bedroom environmental control programs.

Reviewing the recent literature does not lead to many observations that might solve the debate. Few studies have been published recently. One study comprised a broad approach showing that an allergen and trigger avoidance advice in asthma in a primary care setting leads to better asthma control.<sup>11</sup> One problem might be that with such programs it is not easy to identify the effective components of the program. This is also true for other published approaches.<sup>7</sup>

In addition, there is an interesting shift to studies focusing on building characteristics, low energy building and ventilation. Wright e.a. tested the hypothesis that a domestic mechanical heat recovery ventilation system can improve asthma control. Indeed, peak flow improved after 12 month although house dust mite levels remained unchanged.<sup>12</sup> A comprehensive rostrum on air filters and air cleaners elaborates on the effects of these devices on progression of disease and disease control.<sup>13</sup> An innovative approach is the use of temperature regulated laminar airflow with a very low particle concentration directed to the breathing zone. In a pilot study among beneficial effects were seen on the miniAQLQ and on feNO levels.<sup>14</sup> However, larger studies are needed to evaluate the efficacy and practicality of this device. Housing conditions are important as Wilson e.a. established the factors that might influence allergen levels of house dust mites, cockroach, cat, dog and mouse,<sup>15</sup> whereas it has also been demonstrated that Der f1 levels are reduced in buildings with improved energy performance.<sup>16</sup>

The current lack of efficacious strategies to control disease by allergen avoidance warrants for a rethinking of this topic.<sup>17</sup> Tovey and Marks propose several explanations for the failure of the interventions. First, it is possible that failure to adequately reduce mite allergen levels is a major cause of the lack of success. Second, change in exposure is measured as change in allergen concentration in reservoir. It is the question if these measures are good proxies for acute exposure and for airborne allergen. Finally, many interventions are based on the assumption that mite exposure occurs predominantly in beds. This might be wrong.

In conclusion, at this time house dust mite avoidance does not seem to be a promising strategy to manage patients with rhinitis and asthma. However, more knowledge and understanding of the dynamics of allergen exposure may lead to better ways to reduce exposure and help patients.

#### Literature

1. Grootendorst DC, Dahlen SE, Van Den Bos JW, Duiverman EJ, Veselic-Charvat M, Vrijlandt EJ, et al. Benefits of high altitude allergen avoidance in atopic adolescents with moderate to severe asthma, over and above treatment with high dose inhaled steroids. *Clin Exp Allergy* 2001; 31:400-8.
2. Rijssenbeek-Nouwens LH, Bel EH. High-altitude treatment: a therapeutic option for patients with severe, refractory asthma? *Clin Exp Allergy* 2011; 41:775-82.
3. Custovic A, Wijk RG. The effectiveness of measures to change the indoor environment in the treatment of allergic rhinitis and asthma: ARIA update (in collaboration with GA(2)LEN). *Allergy* 2005; 60:1112-5.
4. Terreehorst I, Hak E, Oosting AJ, Tempels-Pavlica Z, de Monchy JG, Bruijnzeel-Koomen CA, et al. Evaluation of impermeable covers for bedding in patients with allergic rhinitis. *N Engl J Med* 2003; 349:237-46.
5. Woodcock A, Forster L, Matthews E, Martin J, Letley L, Vickers M, et al. Control of exposure to mite allergen and allergen-impermeable bed covers for adults with asthma. *N Engl J Med* 2003; 349:225-36.
6. Halcken S, Host A, Niklassen U, Hansen LG, Nielsen F, Pedersen S, et al. Effect of mattress and pillow encasings on children with asthma and house dust mite allergy. *J Allergy Clin Immunol* 2003; 111:169-76.
7. Morgan WJ, Crain EF, Gruchalla RS, O'Connor GT, Kattan M, Evans R, 3rd, et al. Results of a home-based environmental intervention among urban children with asthma. *N Engl J Med* 2004; 351:1068-80.
8. Gotzsche PC, Johansen HK. House dust mite control measures for asthma: systematic review. *Allergy* 2008; 63:646-59.
9. Platts-Mills TA. Allergen avoidance in the treatment of asthma: problems with the meta-analyses. *J Allergy Clin Immunol* 2008; 122:694-6.
10. Sheikh A, Hurwitz B, Nurmatov U, van Schayck CP. House dust mite avoidance measures for perennial allergic rhinitis. *Cochrane Database of Systematic Reviews* 2010.
11. Bobb C, Ritz T, Rowlands G, Griffiths C. Effects of allergen and trigger factor avoidance advice in primary care on asthma control: a randomized-controlled trial. *Clin Exp Allergy*; 40:143-52.
12. Wright GR, Howieson S, McSharry C, McMahon AD, Chaudhuri R, Thompson J, et al. Effect of improved home ventilation on asthma control and house dust mite allergen levels. *Allergy* 2009; 64:1671-80.
13. Sublett JL, Seltzer J, Burkhead R, Williams PB, Wedner HJ, Phipatanakul W. Air filters and air cleaners: rostrum by the American Academy of Allergy, Asthma & Immunology Indoor Allergen Committee. *J Allergy Clin Immunol*; 125:32-8.
14. Pedroletti C, Millinger E, Dahlen B, Soderman P, Zetterstrom O. Clinical effects of purified air administered to the breathing zone in allergic asthma: A double-blind randomized cross-over trial. *Respir Med* 2009; 103:1313-9.
15. Wilson J, Dixon SL, Breyse P, Jacobs D, Adamkiewicz G, Chew GL, et al. Housing and allergens: a pooled analysis of nine US studies. *Environ Res*; 110:189-98.
16. Spertini F, Berney M, Foradini F, Roulet CA. Major mite allergen Der f 1 concentration is reduced in buildings with improved energy performance. *Allergy*; 65:623-9.
17. Tovey ER, Marks GB. It's time to rethink mite allergen avoidance. *J Allergy Clin Immunol*; 128:723-7 e6.