

Table 1. Egg reactivity

	Positive	Negative	P
N (%)	16 (27%)	44 (73%)	
Age (year)	6.9	5.9	0.23
Number of other food allergies	3.9	2.5	0.04
SPT (mm)			
Total egg	9.7	6.8	0.03
White	10.1	6.4	0.001
Yolk	9.5	6.0	0.07

SPT: skin prick test; t-test analysis

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Accepted for publication 12 March 2006
Allergy 2006; 61:900–901
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DOI: 10.1111/j.1398-9995.2006.01134.x

References

1. Cooke SK, Sampson HA. Allergenic properties of ovomucoid in man. *J Immunol* 1997;**159**:2026–2032.
2. Perackis K, Staden U, Mehl A, Niggemann B. Skin prick test with hen's egg: whole egg or egg white? *Allergy* 2004;**59**:1236–1237.
3. Monti G. High incidence of adverse reactions to egg challenge on first known exposure in young atopic dermatitis children: predictive value of SPT and radioallergosorbent test to egg proteins. *Clin Exp Allergy* 2002;**32**:1515–1519.

β -(1,3)-glucan on pillows

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Key words: β -(1,3)-glucan; feather; pillows; synthetic.

Pillows are a recognized source of exposure to indoor allergens. Specifically, synthetic pillows are known to contain higher amounts of house dust mite aller-

gen (1) and animal allergens (2) compared with feather pillows. These higher levels of allergens may explain the association between synthetic pillows use and asthma symptoms (3).

Recently, Woodcock et al. (4) demonstrated that pillows are a substantial source of fungi. They found that synthetic pillows contained a greater variety of fungal species and more colony forming units than feather pillows. The authors concluded that fungal contamination of pillows could have important implications for asthmatic patients.

A major component of the fungal cell wall is β -(1,3)-glucan, which in itself is nonallergenic but is proinflammatory and shows some associations with airway inflammation and respiratory symptoms (5). In light of the previous finding of fungal contamination of pillows we determined the β -(1,3)-glucan content of synthetic and feather pillows.

Five pairs of synthetic and feather pillows, each pair having been on the same mattress for at least 3 months, were collected and dust samples obtained by vacuuming each side of the pillow for 1 min. The dust samples were extracted with 0.3 N NaOH and β -(1,3)-glucan content of the supernatants were estimated by a modified *Limulus* amoebocyte lysate kinetic assay specific for β -(1,3)-glucan (Glucatell; Cape Cod Inc., Falmouth, MA). Results were log transformed and results expressed as geometric means (95% confidence interval), both as ng/g dust and total ng/pillow. Differences between types of pillow were assessed by Student's *t*-test with statistical significance set at the $P < 0.05$ level.

Synthetic pillows contain about fourfold higher total amounts of β -(1,3)-glucan than feather pillows.

Expressed per gram of dust β -(1,3)-glucan levels were similar between the two types of pillows but when expressed as total amount of β -(1,3)-glucan recovered, synthetic pillows contained about fourfold higher levels compared with feather pillows (Table 1). In all five pairs total β -(1,3)-glucan was higher from the synthetic pillow than the feather pillow (data not shown).

We have recovered about fourfold higher total amounts of β -(1,3)-glucan from synthetic pillows than from feather pillows. Various cross-sectional studies have consistently shown that synthetic bedding is associated with reported asthma symptoms (4). It has been suggested that these findings are due to the higher levels of indoor allergens on synthetic bedding. β -(1,3)-glucan could also explain these findings as β -(1,3)-glucan apparently increases peak expiratory flow variability in asthmatic children (5). Thus given our findings of higher β -(1,3)-glucan content of synthetic pillows and the recent finding of significant fungal contamination of pillows (4), this may also be relevant for the reported associations of synthetic bedding with asthma symptoms, such as wheeze (6).

A limitation of our study is that we only studied five pairs of pillows. However, in all five pairs total β -(1,3)-glucan content was higher from synthetic pillows. Similarly, the previous finding of higher Der p 1 levels from synthetic pillows was evident on eight pillow pairs (1) and more *A. fumigatus* on synthetic pillows was evident from five pillow pairs (4).

As we spend about a third of our lives in bed further studies are warranted on β -(1,3)-glucan content of individual bedding items. It has been shown, for instance, that synthetic duvets also have much higher levels of Der p 1 than feather duvets (7). Given the close proximity of bedding to the airways, poten-

Table 1. Geometric mean (95% CI) β -(1,3)-glucan from synthetic and feather pillows

Pillow type	ng/g	Ratio*	Total ng/pillow	Ratio*
Synthetic	71449 (42893–119016)	1.2 (0.5–2.8)	31987 (16783–60965)	3.9 (1.6–10.0)
Feather	59980 (27177–132376)		8115 (4249–15497)	
P	0.30		0.0074	

*Ratio synthetic : feather.

tially higher levels of β -(1,3)-glucan from other synthetic bedding items could be of relevance for asthmatics.

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Accepted for publication 9 February 2006
Allergy 2006; 61:901–902
© 2006 The Authors
Journal compilation © 2006 Blackwell
Munksgaard
DOI: 10.1111/j.1398-9995.2006.01111.x

References

1. Kemp TJ, Siebers RW, O'Grady GB, Fishwick D, Fitzharris P, Crane J. House dust mite allergen in pillows. *Br Med J* 1996;**313**:916.
2. Custovic A, Hallam C, Woodcock H, Simpson B, Houghton N, Simpson A et al. Synthetic pillows contain higher levels of cat and dog allergen than feather pillows. *Pediatr Allergy Immunol*, 2000;**11**:71–73.
3. Siebers R, Fitzharris P, Crane J. Feather bedding and allergic disease in children: a cover story? *Clin Exp Allergy* 2002;**32**:1119–1123.
4. Woodcock AA, Steel N, Moore CB, Howard SJ, Custovic A, Denning DW. Fungal contamination of bedding. *Allergy* 2006;**61**:140–142.
5. Douwes J, Zuidhof H, Doekes G, van der Zee SC, Wouters I, Boezen MH et al. (1→3)-beta-D-glucan and endotoxin in house dust and peak flow variability in children. *Am J Respir Crit Care Med* 2000;**162**:1348–1354.
6. Butland BK, Strachan DP, Anderson HR. The home environment and asthma symptoms in childhood: two population based case-control studies 13 years apart. *Thorax* 1997;**52**:618–624.
7. Mills S, Siebers R, Wickens K, Crane J, Purdie G, Fitzharris P. House dust mite allergen in individual bedding components in New Zealand. *N Z Med J* 2002;**115**:151–153.