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# Indoor-outdoor allergens: Exposure and avoidance

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## INFLUENCE OF HOUSING FACTORS ON HOUSE DUST MITE DER P1 LEVELS

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We determined the influence of housing factors on Der p1 levels in Southampton houses. Dust was collected from 63 living rooms and 235 mattress' in the house by standardized methods. Der p1 content of the dust was measured by ELISA.

**Results:** The weight of dust collected was unrelated to the level of Der p1 ( $p=0.32$ ). Mean household mattress der p1 level was significantly correlated with living room Der p1 level ( $r=0.512$ ,  $p<0.0001$ ). Mean mattress Der p1 level was significantly negatively correlated with age of the house ( $r=-0.343$ ,  $p=0.011$ ), and Der p1 levels were significantly lower in houses built post 1970 (mean 6.70 v 17.22  $\mu\text{g/g}$ ,  $p<0.0001$ ). Mean mattress or living room Der p1 levels were unaffected by social class, the number of rooms in the house, the crowding index or householder reported dampness in the house. Neither double glazing nor central heating significantly affected mean der p1 levels. Mattress Der p1 levels were significantly correlated with the age of mattress ( $r=0.286$ ,  $p<0.0001$ ), but were unaffected by frequency or type of cleaning of mattress or linen. Mean mattress Der p1 levels were significantly lower if the occupants always slept with the window open (9.54 v 15.05  $\mu\text{g/g}$ ,  $p=0.008$ ).

**Conclusion:** Within house factors significantly affect the level of Der p1 in the whole house. New houses do not have increased levels of Der p1, indeed Der p1 levels were highest in older houses. The simplest stratagem to decrease mattress Der p1 levels is to sleep with the bedroom window open all year round.

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## DOES VACUUMING OR A PLACEBO MATTRESS-COVER EFFECT THE DER-P-1 LEVEL IN MATTRESSES?

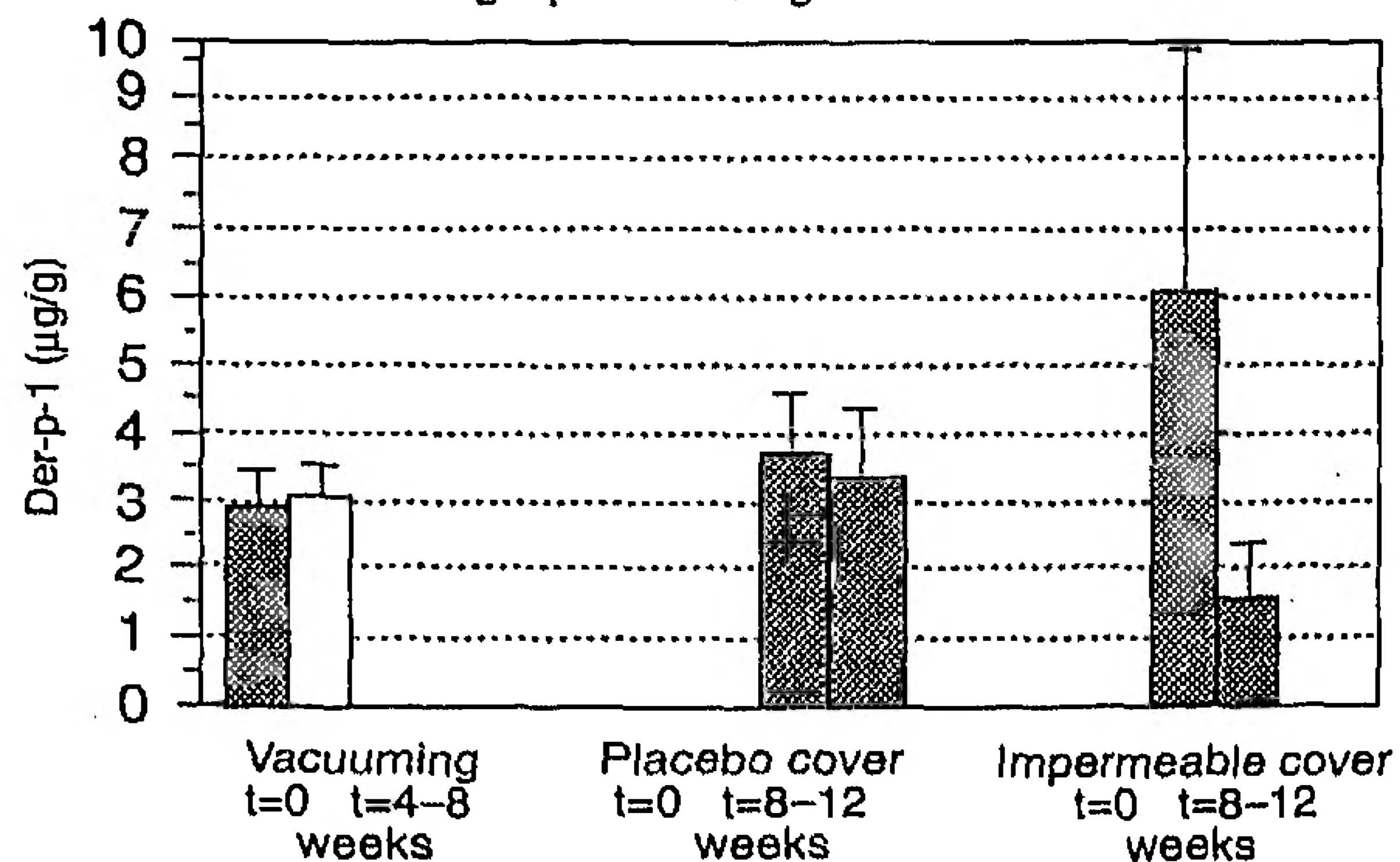
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**Introduction:** The question of this study is whether in house dust mite allergen studies the sampling of dust using a vacuum-cleaner or placebo mattress-covers used in the control group have a decreasing effect on the amount of Der-p-1.

**Methods:** Dust samples were taken from 82 uncovered mattresses, using a Philips 1400 W vacuum-cleaner. In order to study the effect of vacuuming, 4-8 weeks later a second sample of each uncovered mattress was taken.

During 8 to 12 weeks 31 of them were covered with a placebo mattress-cover (Gore) and 24 with a mattress-cover which is impermeable to the house dust mite. Then dust samples were taken again.

**Results:** The mean values of Der-p-1 ( $\mu\text{g/g}$ ) of the samples vacuumed on the uncovered mattresses at  $t=0$  and  $t=4-8$  weeks are shown in the left part of the figure, including the standard error of the mean. The mean values of Der-p-1 ( $\mu\text{g/g}$ ) of the samples before and after covering the mattresses for 8-12 weeks are shown in the right part of the figure.



A paired t-test over the  $10^{\log}$  transformed data showed no significant difference in the level of Der-p-1 ( $\mu\text{g/g}$ ) or Der-p-1 ( $\mu\text{g}/\text{m}^2$ ) between the first and second vacuuming samples on the uncovered mattresses. The correlation was high ( $r=0.9$ ). The amount of dust (g) however decreased significantly.

A significant decrease in both Der-p-1 ( $\mu\text{g/g}$ ) and in Der-p-1/ $\text{m}^2$  was found in the mattresses covered with impermeable mattress-covers. In the placebo mattress-covers the level of Der-p-1 did not decrease significantly. Both groups had a significant decrease in the amount of dust after covering.

**Conclusion:** Vacuuming and placebo mattress-covers do not significantly effect the Der-p-1 level in samples which are taken several weeks later.

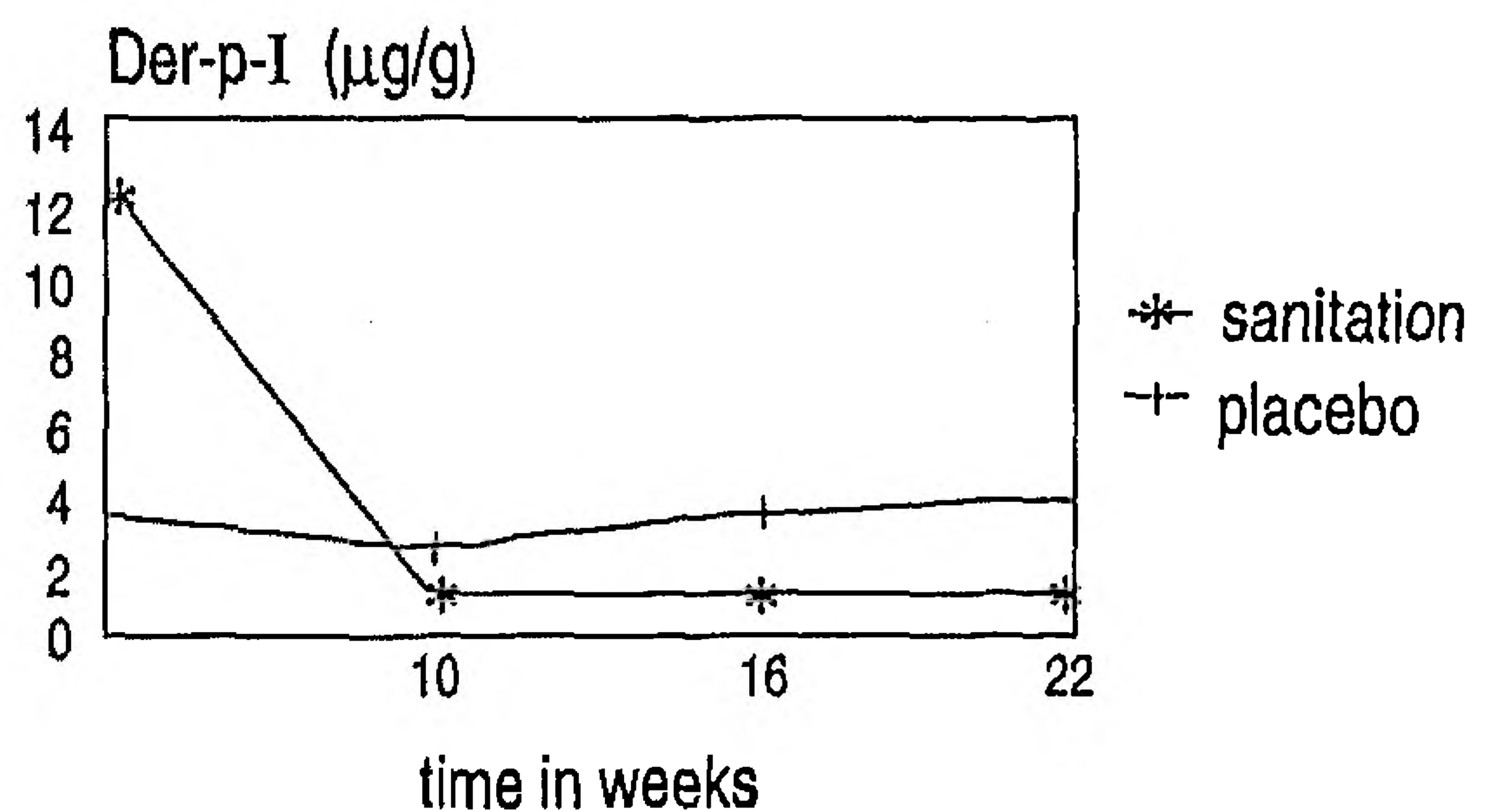
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## LONG-TERM EFFECTS OF MATTRESS-COVERS ON HOUSE DUST MITE (DER-P-1)

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House dust mite (HDM) plays an important role in allergic asthma. The use of special mattress-covers might decrease the HDM-concentration in the mattress, but the effects of these covers on HDM-concentrations at the long term are still questionable. It is very important to know whether mattress-covers do decrease Der-p-1-concentrations and if so, whether these effects still exists after several months. Therefore, the aim of this study was to assess, whether mattress-covers decrease Der-p-1-concentrations and if these effects are still present after 5 months. This was done in a single-blind randomized controlled 22-week trial with 23 subjects. Baseline dust-samples were taken of the bare mattress of all 23 subjects. Subjects were then randomly divided in two groups (intervention group (N = 10) and placebo (N = 13) group). In the intervention group, mattress, duvet and pillow covers (Gore®), which were impermeable to the house dust mite were covered to the bedding. In the placebo group mattress covers, which were permeable to the house dust mite were used. The mattresses were covered directly after the baseline dust-sample. During the following 22 weeks 3 dust-samples were taken (at 10, 16 and 22 weeks). Dust samples were collected with a vacuum-cleaner (Philips Turbo Exclusive TC836, 1400 W). Mattresses were vacuumed with an intensity of 5 minutes/ $\text{m}^2$ . The results are shown in the following figure:

Der-p-I -concentrations ( $\mu\text{g/g}$ )



The Der-p-1 was significantly reduced in the sanitation group ( $p<0.05$ ), while it remained the same in the placebo group. We can conclude that mattress-covers are able to achieve a low allergen level in bedding, even after prolonged use. This is not only clinical important for allergic patients, but also for clinical trials, in which low allergen levels are desired.

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## COMPARISON OF PERIPHERAL BLOOD EOSINOPHILS AND SERUM ECP AS A MARKER OF ALLERGEN AVOIDANCE BY ALLERGIC ASTHMATICS IN A HIGH ALTITUDE ENVIRONMENT

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The aim of this study was to evaluate if peripheral blood eosinophils or serum ECP can serve as a marker to document allergen avoidance. 18 asthmatics (10 females and 8 males with an age range of 14 to 41 years, median 22 years) admitted to the Hochgebirgsklinik Davos-Wolfgang were studied. Due to the altitude of 1600 m above sea level and specific climatic conditions Davos has an environment virtually free of house dust mite (HDM). All patients included showed strong sensitization against HDM documented by skin prick test and highly positive RAST (RAST-class  $\geq$  III) to *Dermatophagoides pteronyssinus*. In all patients measurements of peripheral blood eosinophils, serum ECP and peakflow readings were performed on day two and day eight. During this period patients showed a significant spontaneous increase of 73 l/min in morning peakflow rates ( $p<0.2$ ). The eosinophil counts dropped significantly from a median of 412.9/ $\mu\text{l}$  on day two to 286.5/ $\mu\text{l}$  on day eight ( $p<0.01$ ). Serum ECP showed medians of 30.3  $\mu\text{g/l}$  and 30.1  $\mu\text{g/l}$  respectively, which was not significant. We conclude that peripheral blood eosinophils maybe a useful parameter to document the effects of allergen avoidance in highly sensitized asthmatics whereas serum ECP showed no significant change during the observation period.