ALLERGENS AND ENVIRONMENTAL EXPOSURES

Early Exposure and Sensitization to Cat and Dog: Different Effects on Asthma Risk After Wheezing in Infancy


PURPOSE OF THE STUDY. Birth cohort studies have suggested that early exposure to furred pets protects from later asthma and allergy. The aim of this study was to evaluate the association between exposure or sensitization to cat or dog in infancy and later asthma and allergy assessed at the median ages of 4.0, 7.2, and 12.3 years.

STUDY POPULATION. Children 1 to 23 months of age who had wheezing and respiratory distress that required hospital care during an acute respiratory tract infection were enrolled.

METHODS. Exposure to cat and dog in infancy was assessed by interviewing the parents. The child was considered to be sensitized if the allergen-specific immunoglobulin E level to cat or dog was ≥0.35 kU/L or if there was a positive skin-test response.

RESULTS. When the 20 children with persistent childhood asthma (doctor-diagnosed asthma at all 3 control visits) were compared with the other 61 children, early exposure to dog (odds ratio [OR]: 0.14; *P* = .034) decreased the asthma risk, and early sensitization to cat (OR: 5.92; *P* = .008) and dog (OR: 9.33; *P* = .001) increased the asthma risk. There was less cat- and dog-keeping in atopic families, and the effect of sensitization was, but the effect of exposure was not, robust to adjustments in multivariate analyses.

CONCLUSIONS. This study demonstrates that, in long-term follow-up evaluation after early wheezing, early sensitization to cat and dog increases the risk of later asthma but early exposure to cat or dog has no such effect. Dog-keeping was less frequent in atopic families, which may explain why the protective effect of early exposure to dog was lost in multivariate analyses.

REVIEWER COMMENTS. Studies have shown that early high-dose exposure to allergens may be protective for the development of allergy, and children who do not develop early allergic sensitization to environmental allergens are at lower risk for having persistent wheezing symptoms. This study’s results are consistent with those of previous studies; although early sensitization to cat and dog increases the risk for later asthma in children at high risk, early high-dose exposure to furred animals does not seem to be a risk factor. It should be noted that

at local study centers, and cell-free supernatants were obtained by centrifugation for cytokine detection. Interleukin 5, interleukin 10, interferon γ (IFN-γ), and tumor necrosis factor α levels were measured with enzyme-linked immunosorbent assay techniques.

RESULTS. Allergen-specific IgE antibodies were detectable in 23.9% of the newborns. Paired IgE values from CB plus maternal blood and CB plus paternal blood were available for 922 and 835 children, respectively. Contamination with maternal serum was excluded by several means of analysis, including the absence of IgA antibodies. Concordance between CB IgE and maternal IgE against the same allergen was very low for inhalant allergens; in contrast, the concordance for various food allergens was considerably higher, particularly for hen’s egg, cow’s milk, and soybean. The percentages of IgE-negative mothers and fathers were equal for children who were sensitized to seasonal allergens (both 47%) but differed strongly for children who were sensitized to food allergens (21.9 [mothers] vs 65.7 [fathers]). There was an inverse association between CB IgE and the amount of CB IFN-γ (odds ratio: 0.69 [95% confidence interval: 0.58–0.83]).

CONCLUSIONS. Allergen-specific IgE antibodies, most probably of fetal origin, are detectable in CB and correlate with decreased CB IFN-γ production. This study revealed concordant IgE results between mother and child only for a few allergens; in IgE-positive mother-child pairs, the positive correlation was restricted to food allergens. If maternal contamination represented an important bias in the study, then such concordance would be expected throughout the entire spectrum of allergens tested.

REVIEWERS COMMENTS. The underlying mechanism and effect of IgE production in utero are still unclear. This study is important because it reports the presence of allergen-specific IgE antibodies in a considerably larger number of newborn infants than reported for previous studies. The results suggest that the capacity to produce IgE antibodies at this stage in life more likely depends on the suppression of the T-helper 1 compartment rather than an increase within the T-helper 2 cell effector subset. Of much interest would be the authors’ follow-up studies of this cohort, especially in terms of whether detection of allergen-specific IgE antibodies at birth is a transient phenomenon or is related to the development of allergic phenotypes.

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atopic families tended to have pets less frequently, which might have introduced confounding effects.

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Can the Use of HEPA Cleaners in Homes of Asthmatic Children and Adolescents Sensitized to Cat and Dog Allergens Decrease Bronchial Hyperresponsiveness and Allergen Contents in Solid Dust?


PURPOSE OF THE STUDY. Because pet allergies are associated with asthma, the authors investigated whether high-efficiency particulate-arresting (HEPA) filtration had any effect on reducing indoor allergens and bronchial hyperreactivity in children with asthma who were sensitized to cat and dog.

STUDY POPULATION. A total of 30 children with asthma (age: 6–17 years) who were sensitized and exposed to cat and/or dog allergen(s) at home completed the study. The children did not have dust mite or mold sensitivities, and those being treated for asthma stayed on treatment throughout this time.

METHODS. This was a randomized, controlled trial in which the children were assigned to 1 of 2 groups. For 12 months, 1 group was exposed to HEPA air cleaners that were placed in the living room and bedroom, and the other group was exposed to paper sham filters. Filters were on for >50% of the time. Pulmonary function testing and cold-air challenges were performed at baseline, 6 months, and 12 months into the study. Serum eosinophil cationic protein, specific immunoglobulin E (IgE) and the amounts of cat (Fel d 1) and dog (Can f 1) allergens in the filters and bulk dust samples were also collected.

RESULTS. Forced expiratory volume in 1 second at baseline lung function improved in the entire study population (median: 90% at initial visit, 98% at 6 months, and 95% at 12 months; P < .01). However, there was no significant change in eosinophil cationic protein, use of medication, or quality of life for the 2 groups. Although after 12 months there seemed to be a trend for a decrease in change in forced expiratory volume in 1 second after cold-air challenge in the active group (8.1%–5.4%) versus the sham group (4.3%–8.2%), the difference was not statistically significant (P = .336). Active filters retained higher amounts of cat and dog allergens in their main filter devices, compared with sham filters.

CONCLUSIONS. Although HEPA air cleaners were able to retain airborne pet allergens, they had no significant effect on bronchial hyperreactivity.

REVIEWER COMMENTS. High-efficiency air filtration is often recommended to patients with asthma with known allergenic sensitivities, to reduce exposure to indoor pet allergens (which are ~5 μm in size). HEPA filtration can filter out particles as small as 0.3 μm with up to 99.97% efficiency. This study did not find a significant effect of HEPA filtration on bronchial hyperreactivity after 1 year of use, but there seemed to be a trend toward improvement in bronchial hyperreactivity. Although this study revealed a very limited role for HEPA use in asthma therapy, future studies should evaluate whether HEPA filtration may help prevent or delay the development of asthma in younger children with atopy who are at increased risk of developing asthma.

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Higher Immunoglobulin E Antibody Levels to Recombinant Fel D 1 in Cat-Allergic Children With Asthma Compared With Rhinoconjunctivitis


PURPOSE OF THE STUDY. To measure immunoglobulin E (IgE) and IgG4 antibodies to an engineered recombinant major cat allergen, rFel d 1, among sera from cat-allergic children and adults.

STUDY POPULATION. One hundred forty cat-allergic children and adults with rhinoconjunctivitis and/or asthma were selected; all had positive skin-prick test results to cat dander extract (CDE). Seventy-five healthy, age-matched, CDE-skin-test-negative children and adults were selected as control subjects.

METHODS. Sera from the 140 patients were tested for IgE and IgG4 antibodies to CDE and rFel d 1 by ImmunoCAP (Phadia, AB Uppsala, Sweden) and for IgE to rFel d 1 by enzyme-linked immunosorbent assay.

RESULTS. Ninety-eight percent of patients (all but 1) and none of the control subjects had evidence of specific IgE to rFel d 1. Specific IgE results to rFel d 1 and CDE correlated strongly (r = 0.85; P < .001) among the 140 patients; however, results to rFel d 1 were, on average, 30% higher (P < .0001). IgE responses to rFel d 1 among children with asthma were higher (median: 19.4 kU/L), compared with children with rhinoconjunctivitis only
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