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

**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 to several aeroallergens, current medications, and clinical symptoms (nighttime awakenings, physical exercise symptoms, breathing limitations, and nasal stuffiness) were assessed. 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.

**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 (\( r_s = 0.85; P < .001 \)) 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.
(median: 6.6 kU/L; P < .05) and adults with asthma (median: 3.0 kU/L; P < .01). There was a threefold increased risk of asthma for one half of the children with the highest IgE levels (odds ratio: 3.23 [95% confidence interval: 1.19–8.79]) by the enzyme-linked immunosorbent assay. Children with asthma also displayed significantly higher IgG₄ levels than did adults with asthma.

CONCLUSIONS. Recombinant major cat allergen (rFel d 1) seems to be at least equally sensitive for in vitro diagnosis of cat allergy, compared with the current extract-based test. Elevated specific IgE antibody levels to rFel d 1 are suggested to be a risk factor for asthma in cat-allergic children.

REVIEWERS COMMENTS. In vitro diagnosis of allergic sensitization is currently confirmed by using allergen extracts derived from natural source materials. The authors previously described creation of this recombinant major cat allergen, rFel d 1. Investigation with such purified recombinant proteins is a current area of intense interest within the field of allergy and immunology, because these engineered proteins may offer improved diagnostic specificity and theoretically may offer superior therapy for type 1 hypersensitivity. Previous research showed that allergen-specific IgE levels are predictive for the likelihood of allergic disease including asthma; however, some allergen-avoidance studies failed to show significant evidence of improvement or protection. This study gives further support to cat allergy causing asthma.

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TOBACCO AND AIR POLLUTION

Atopic Diseases, Allergic Sensitization, and Exposure to Traffic-Related Air Pollution in Children

OBJECTIVE. To assess the relationship between exposure to traffic-related air pollutants and allergic disease outcomes in a prospective birth cohort during the first 6 years of life.

METHODS. A birth cohort of 3061 children in the Munich, Germany, metropolitan area were followed with serial questionnaires of their parents inquiring about asthma, hay fever, and eczema. Specific immunoglobulin E against common allergens was determined at the age of 6 years. Air pollution measurements were made for particulate matter ≤2.5 μm in diameter and nitrogen dioxide. Distances between the children’s street address and the nearest main road were noted. Outcomes of atopic disease and allergic sensitization were compared with the children’s exposure to the pollutants.

RESULTS. Positive associations were found between the distance to the nearest main road and asthma, hay fever, eczema, and sensitization, with the highest odds ratios (ORs) for children living <50 m from busy streets. For particulate matter ≤2.5 μm in diameter, statistically significant effects were found for asthma (OR: 1.56 [95% confidence interval [CI]: 1.03–2.37]), hay fever (OR: 1.59 [95% CI: 1.11–2.27]), and allergic sensitization to pollen (OR: 1.40 [95% CI: 1.20–1.64]). Nitrogen dioxide exposure was associated with eczema, whereas no association was found for allergic sensitization.

CONCLUSIONS. The results provide strong evidence for the adverse effects of traffic-related air pollutants on atopic diseases and allergic sensitization.

REVIEWER COMMENTS. Several previous studies suggested an association between exposure to air pollution and the development of atopic sensitization and disease. This study supports that connection, even adding a “dose-response” element in which the closer you live to a busy street, the more likely you are to develop allergic disease.

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Changes in Environmental Tobacco Smoke Exposure and Asthma Morbidity Among Urban School Children

PURPOSE OF THE STUDY. Using data from a large randomized trial of supervised asthma therapy in urban elementary schools, the authors of this study sought to document the relationship between changes in environmental tobacco smoke (ETS) exposure and childhood asthma morbidity.

STUDY POPULATION. There were 290 children with physician-diagnosed persistent asthma that required daily controller medication who were enrolled in 1 of 36 participating schools.

METHODS. By using data from a randomized, clinical trial of supervised asthma therapy versus usual care, asthma morbidity and ETS exposure data were collected from caregivers via telephone interviews at baseline and at a 1-year follow-up time. No smoking cessation counseling...
Higher Immunoglobulin E Antibody Levels to Recombinant Fel D 1 in Cat-Allergic Children With Asthma Compared With Rhinoconjunctivitis

Stephen E. Scranton and Karla L. Davis

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