

fat. In addition, there was a significant dose-response association between the number of positive SPT results and prevalence of short sleep duration (lowest tertile) ($P_{\text{trend}} = 1 \times 10^{-3}$).

CONCLUSIONS. In this sample of relatively lean rural Chinese adolescents, short sleep duration was associated with increasing risk of sensitization to food allergens and aeroallergens independent of percentage body fat.

REVIEWER COMMENTS. A methodologic concern for this study regards the possibility that allergic disease was interrupting sleep, but the authors felt that the allergic sensitization was unlikely to be explained by this confounder because the majority of them were clinically asymptomatic, and the effect persisted even when those with allergic or sleep disorders were excluded from the analysis. This intriguing and previously unreported finding provides further evidence to suggest that immune function is affected by sleep deprivation, which is already known to increase susceptibility to infection. Sleep duration is far more modifiable than many other risk factors for allergic disease and also has other undisputed benefits for overall health, and so this finding has substantial clinical and public health importance. Longitudinal studies are needed to further determine the temporal and causal relationships. In the meantime, get a good night's sleep!

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ALLERGENS AND ENVIRONMENTAL EXPOSURES

Opposing Effects of Cat and Dog Ownership and Allergic Sensitization on Eczema in an Atopic Birth Cohort

Epstein TG, Bernstein DI, Levin L, et al. *J Pediatr.* 2011;158(2):265-271

PURPOSE OF THE STUDY. To evaluate the effect of environmental exposures and allergic sensitization on the risk of developing eczema at 4 years of age.

STUDY POPULATION. This was a birth-cohort study that enrolled newborns in the Cincinnati metropolitan area born between 2001 and 2003. Enrolled infants had at least 1 parent with symptoms of asthma, allergic rhinitis, or eczema.

METHODS. On a yearly basis from the ages of 1 to 4 years, children underwent a physical examination, a clinician's assessment, and a skin-prick test (SPT) to 15 aeroallergens plus cow's milk and hen's egg. Parents completed an in-person validated survey at these times to assess environmental exposures and the parent's perception of

their child's eczema. A home environmental assessment and collection of house dust samples were performed before 1 year of age.

RESULTS. Of the 636 children analyzed, 14% had eczema. The most significant predictors of eczema at age 4 were having a parent with eczema ($P = .03$), a positive SPT result to egg at 1 year of age ($P < .001$), and a positive SPT result to elm tree pollen at ages 1, 2, or 3 years ($P = .03$). Those who owned a dog before the age of 1 and were SPT-positive to dog at age 1, 2, or 3 did not have an increased risk for eczema at age 4, whereas those who did not own a dog before age 1 and were SPT-positive to dog at age 1, 2, or 3 had an almost fourfold increased risk of eczema at age 4 ($P = .002$). In contrast, children who lived with cats before age 1 and were SPT-positive to cat at ages 1, 2, and 3 years were 13 times more likely to have eczema at age 4 than those who were SPT-negative to cat ($P < .001$).

CONCLUSIONS. A history of parental eczema, SPT positivity to egg at 1 year of age, and SPT positivity to elm tree pollen at ages 1, 2, or 3 years were all found to significantly increase the risk of development of eczema at age 4 years. Dog ownership before 1 year of age significantly reduced the risk of eczema at age 4 years among children sensitized to dog. In contrast, cat ownership before 1 year of age significantly increased the risk of eczema at age 4 among cat-sensitized children.

REVIEWER COMMENTS. The prospective design of the study is a strength; however, recall bias and the relatively small total number of children with eczema and either cat or dog ownership are limitations. The protective influence of dog ownership on the development of eczema has been reported previously and deserves further investigation into the exact effects of dog antigens on the immune system. Conflicting data regarding the effects of cat ownership on the development of atopy have been reported in other study reports, and larger studies need to be performed before advice regarding pet ownership is given to parents on a routine clinical basis.

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Cockroach Exposure Independent of Sensitization Status and Association With Hospitalization for Asthma in Inner-City Children

Rabito FA, Carlson J, Holt EW, Iqbal S, James MA. *Ann Allergy Asthma Immunol.* 2011;106(2):103-109

PURPOSE OF THE STUDY. To examine the relationship between house dust mite, cockroach exposures and sensitization,

and asthma morbidity in children in an inner-city environment.

STUDY POPULATION. The subjects were patients from an allergy clinic ($n = 86$, mostly black, aged 4–17 years) with physician-diagnosed asthma and positive skin-test results to an indoor allergen and living in urban New Orleans, Louisiana. Most of the children were taking daily asthma medications, more than half had had an emergency department visit, almost 75% had had an urgent physician visit, and nearly 25% had had a hospitalization in the previous 4 months.

METHODS. This was a cross-sectional study. Sociodemographic factors and home characteristics were queried by using a structured questionnaire and by visual observation of the home at study entry. A revised Childhood Respiratory Health Questionnaire was used to measure frequency of health care utilization, asthma symptoms, activity limitation, and medication use during the previous 4 months. Indoor dust samples were collected and analyzed for the presence of dust mite and cockroach content. In vitro-specific immunoglobulin E to dust mites, cat, dog, and cockroach was measured.

RESULTS. Both dust mite and cockroach exposure were associated with sensitivity, but only cockroach showed a strong linear relationship between degree of exposure and sensitization (even low levels of exposure to dust mite were associated with sensitization). Multivariable regression analyses controlling for exposure, sensitization, oral steroid use, and ICU admission revealed that the only variable associated with multiple exposure variables was hospital admission. The odds of reporting a hospitalization in the previous 4 months, using 2 different statistical models, were 4.2- to 5.4-fold higher for children exposed to >2.0 U/g than for those exposed to <2.0 U/g Blag1. There was no increase in odds for hospitalization related to dust mite exposure.

CONCLUSIONS. Exposure to cockroach allergens is strongly associated with hospital admissions for asthmatic children living in the inner city regardless of sensitization.

REVIEWER COMMENTS. This study's results reaffirm the association between cockroach exposure and severe asthma morbidity and that this association is, to some degree, independent of sensitivity. The failure to show the same relationship for house dust mite might be a result of sample size and the lack of a relationship between exposure and sensitization in this group. It remains to be shown that remediation efforts directed toward cockroach infestation are helpful in decreasing this morbidity.

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Allergen-Specific IgE as a Biomarker of Exposure Plus Sensitization in Inner-City Adolescents With Asthma

Matsui EC, Sampson HA, Bahnson HT, et al; Inner-City Asthma Consortium. *Allergy*. 2010;65(11):1414–1422

PURPOSE OF THE STUDY. These researchers sought to understand the relationship between allergen-specific immunoglobulin E (IgE) levels, exposure to indoor allergens, and asthma severity.

STUDY POPULATION. There were 546 subjects, aged 12 to 20 years, with physician-diagnosed moderate-to-severe asthma enrolled at 10 centers around the United States as part of the Asthma Control Evaluation (ACE) study.

METHODS. Subjects underwent a 3-week run-in period in which asthma symptoms, medication use, pulmonary-function testing, and adherence data were collected. Skin testing was performed to a panel of 14 aeroallergens, and allergen-specific IgE levels to common indoor allergens were measured. A home visit was conducted to collect dust samples from the bed and bedroom floor. Subjects were then assigned to either a pharmacotherapy titrated according to National Asthma Education and Prevention Program (NAEPP) guidelines or pharmacotherapy titrated according to NAEPP guidelines and fractional exhaled nitric oxide (FeNO). Subjects were followed for 1 year, and data on exacerbations, health care utilization, and pulmonary function were collected at each visit.

RESULTS. Black subjects comprised 65% of the participants; 48% had an annual household income of less than \$15 000. The majority (88%) were skin-test-positive to at least 1 aeroallergen including cockroach (61%), cat (58%), mold (52%), and dust mite (47%). There were statistically significant correlations between allergen-specific IgE levels and settled dust allergen concentrations for dust mite, cockroach, and mouse. Those with higher allergen-specific IgE levels to cockroach, mouse, cat, and dust mite had higher FeNO concentrations and peripheral blood eosinophils. Higher allergen-specific IgE levels were associated with lower lung function for all allergens, although not all were statistically significant.

CONCLUSIONS. In atopic asthmatic adolescents from the inner city, allergen-specific IgE levels were positively correlated with bedroom allergen exposure for dust mite, cockroach, and mouse allergens. Higher allergen-specific IgE levels were also associated with worse clinical and biomarker outcomes.

REVIEWER COMMENTS. Indoor allergen burden has been proposed to be the reason for the increased asthma morbidity in inner-city populations. There have also been many attempts to find specific biomarkers that might better

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