

intake of vitamin D and E during pregnancy was protective for the development of wheezing (OR: 0.56 [95% CI: 0.42–0.73] and 0.68 [95% CI: 0.52–0.88], respectively). Adherence to a Mediterranean diet was protective for persistent wheeze and atopy (OR: 0.22 [95% CI: 0.08–0.58] and 0.55 [95% CI: 0.31–0.97], respectively). The authors of most (17 of 22) fruit and vegetable studies reported beneficial associations with asthma and allergic outcomes.

CONCLUSIONS. The available evidence is supportive with respect to vitamins A, D, and E; zinc; fruits and vegetables; and a Mediterranean diet for the prevention of atopic disease.

REVIEWER COMMENTS. Although the study was observational in nature, its results highlight the importance of dietary exposures in the development of atopic disease. Controlled interventional studies are warranted to determine if it is possible to prevent atopic disease with dietary modification.

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Partial Protein-Hydrolyzed Infant Formula Decreased Food Sensitization but Not Allergic Diseases in a Prospective Birth Cohort Study

Kuo HC, Liu CA, Ou CY, et al. *Int Arch Allergy Immunol.* 2011;154(4):310–317

PURPOSE OF THE STUDY. To determine whether feeding a partially protein-hydrolyzed formula in the first 6 months of life would decrease the incidence of future allergic diseases.

STUDY POPULATION. Taiwanese newborns who had at least 1 first-degree family member with a history of atopy and who were not breastfeeding participated.

METHODS. A total of 679 participants were exclusively fed with partially hydrolyzed whey formula (HF) ($n = 345$) or cow's milk infant formula (CM) ($n = 334$) for at least 6 months via an open-label protocol. They were prospectively assessed at 6, 18, and 36 months of age to determine allergic sensitization (immunoglobulin E [IgE] > 0.7 kU/L) and clinical presence of eczema, food allergy, asthma, or allergic rhinitis.

RESULTS. At 36 months, cow's milk protein sensitization in the HF group was significantly lower than that in the CM group (12.7 vs 23.4%; $P = .048$). There was no difference with sensitization to egg or peanut between the 2 groups. Aeroallergen sensitization and serum total IgE levels were not significantly different. Occurrence of allergic disease was significantly correlated with aero-

allergen sensitization but not to food-allergen sensitization, parental atopy, or feeding types.

CONCLUSIONS. The authors concluded that although HF feeding during the first 6 months of life helped to lower cow's milk protein sensitization, it alone is not enough to decrease the development of allergic disease.

REVIEWER COMMENTS. Can controlling a susceptible infant's diet early in life help to lessen the development of atopic symptoms in later years? These findings suggest that exclusively feeding this HF for the first 6 months of life does not. Other comparative studies have found more favorable outcomes in those infants who were fed extensively hydrolyzed formula. However, more large-scale, controlled studies that follow newborns through childhood are needed to better define the advantages.

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Association Between Short Sleep Duration and the Risk of Sensitization to Food and Aero Allergens in Rural Chinese Adolescents

Zhang S, Liu X, Kim JS, et al. *Clin Exp Allergy.* 2011; 41(4):547–555

PURPOSE OF THE STUDY. To explore the association between sleep duration and sensitization to food allergens and aeroallergens.

STUDY POPULATION. There were 1534 rural Chinese adolescent twins aged 12 to 21 years drawn from an ongoing prospective study on precursors of metabolic syndrome in children in a large Chinese twin cohort. Any participant aged 12 to 21 years at a follow-up visit for the main study with complete information on sleep questionnaires and skin-prick-test (SPT) results was included.

METHODS. Subjects completed standard sleep questionnaires and SPTs to 9 food allergens and 5 aeroallergens. Total sleep time was defined as the interval from bedtime to wake-up time minus sleep latency. Sensitization was defined as having at least 1 positive SPT result. Percentage body fat was calculated, because previous studies have suggested that sleep duration and allergic sensitization are associated with adiposity.

RESULTS. Compared with subjects in the highest tertile of sleep duration, those who slept less were more likely to be sensitized to any food allergen (odds ratio [OR]: 1.9 [95% confidence interval (CI): 1.3–2.7] and 1.4 [95% CI: 1.0–1.9] for the first and second tertiles [trend test $P_{\text{trend}} = 3 \times 10^{-4}$], respectively). The corresponding ORs for sensitization to any aeroallergen were 1.5 (95% CI: 1.1–2.0) and 1.3 (95% CI: 1.0–1.7) ($P_{\text{trend}} = 8 \times 10^{-3}$). These associations were independent of percentage body

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,

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