Can We Prevent Food Allergy by Manipulating the Timing of Food Exposure?

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KEYWORDS

• Peanut allergy • Cow's milk allergy • Egg allergy
• Food-specific IgE • Skin-prick test • Food introduction
• Food allergy • Diagnosis

Food allergy is defined as an adverse health effect arising from a specific immune response that is reproducible on exposure to a given food, and thus is an example of a defect in the development or a breakdown in the maintenance of oral tolerance. Little is known regarding which variables are important for the induction or failure of oral tolerance in the neonatal period. Investigations into the underlying mechanisms of neonatal oral tolerance in rodents have demonstrated that antigen administration directly after birth or within 5 to 7 days does not lead to suppression of systemic immunity but primes for subsequent humoral and delayed hypersensitivity responses.[1,2] Antigen transfer from breast milk induces tolerance in the young, although the antigen dose required for tolerance induction is 2 to 3 log steps lower.[3]

Clinically, the prevalence of food allergy has increased. Peanut allergy has dramatically increased in children within the last decade, with more than 1% of school children in the United States, United Kingdom, Canada, and Australia affected.[4–7] The previous advice by the American Academy of Pediatrics (AAP)[8] in 2000 was for breastfeeding mothers of high-risk infants to strictly avoid peanut and tree nuts and to consider elimination of cow's milk, egg, fish, and possibly other foods during lactation. The AAP went on to recommend that solid foods should not be started until 6 months of age, with dairy products not introduced until age 1 year, eggs until 2 years, and peanut, tree nuts, and fish until 3 years of age. These feeding guidelines were revised

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in 2008 to avoid the strong recommendations on whether foods of high allergenic potential should be ingested during pregnancy, lactation, and infancy (**Table 1**).[9] The revision resulted from the controversy in the literature regarding the impact of maternal avoidance diets on food allergy prevention and the lack of information on what is the correct age to introduce foods of high allergenic potential to infants and toddlers.[10–13] This review provides a careful evaluation of the rationale and existing data on whether the manipulation of the timing of specific food exposures in the diet during pregnancy, lactation, and early childhood affects the development of food allergies in high-risk children.

BIOLOGICAL RATIONALE FOR TOLERANCE DEVELOPMENT ANTENATALLY AND POSTNATALLY

The normal development of immunologic tolerance is poorly understood. Most children become tolerant to common allergens, and a normal response to exposure is

Table 1
Summary of effects of nutritional interventions during pregnancy, lactation, and infancy on the development of atopy

Intervention	Evidence
Restriction diet during pregnancy	No evidence in prevention of atopic diseases
Restriction diet during lactation	No evidence in prevention of atopic diseases with the possible exception of atopic eczema
Length of exclusive breastfeeding	Exclusive breastfeeding for at least 4 months decreases the cumulative incidence of atopic dermatitis and cow's milk allergy in the first 2 years of life in infants at high risk of developing atopic disease Exclusive breastfeeding for at least 3 months protects against wheezing in early life
Use of hydrolyzed formulas	Modest evidence that atopic dermatitis may be delayed or prevented by the use of hydrolyzed formulas in early childhood in infants at high risk of developing atopic disease. Extensively hydrolyzed formulas may be more effective than partially hydrolyzed formulas in the prevention of atopic disease
Use of soy-based formulas	No evidence in allergy prevention
Timing of introduction of solid foods	No current convincing evidence that delaying introduction of solid food, including highly allergic foods such as fish, eggs, and foods containing peanut protein, beyond 4–6 months has a significant protective effect on the development of atopic disease. In infants after 4–6 months of age, there are insufficient data to support a protective effect of any dietary intervention for the development of atopic disease

Modified from Greer FR, Sicherer SH, Burks AW. American Academy of Pediatrics Committee on Nutrition, American Academy of Pediatrics Section on Allergy and Immunology. Effects of early nutritional interventions on the development of atopic disease in infants and children: the role of maternal dietary restriction, breastfeeding, timing of introduction of complementary foods, and hydrolyzed formulas. Pediatrics 2008;121(1):183–91.