

Allergen Sold Separately? All Early Allergen Introduction Foods Are Not Equivalent



Scott P. Commins, MD, PhD^a Chapel Hill, NC

Although any food has the potential to cause allergy, certain foods are more common triggers of significant acute allergic reactions. The most common food allergens in children in the United States and many other countries include cow's milk, hen's egg, soy, wheat, peanut, tree nuts, and seafood (shellfish and fish). Studies support the existence of a critical window early in infancy during which the genetically predisposed atopic infant is at higher risk for developing allergic sensitization.¹ Thus, dietary interventions in the first years of life have been analyzed for their effects on the prevalence of allergic disease including food allergy.² Both American and European allergy expert committee clinical guidelines have been revised to recommend that peanut and egg be introduced around age 6 months in all infants, but not before 4 months.^{3,4} Data demonstrate that peanut specifically should be introduced early in life to prevent this food allergy.⁵ Because of this, commercial early allergen introduction foods (EIFs) containing single or multiple allergenic foods for infant weaning entered the marketplace and were promoted to consumers and health care providers as aids to prevent food allergy. In some instances, these products may lead to questions regarding the form of food to feed infants and at what dose. A recent clinical commentary review discusses the practical aspects of guiding parents in these decisions with specific attention to whole foods, commercial EIFs, and homemade EIFs, including dose and nutritional concerns.⁶

In this issue of *The Journal of Allergy and Clinical Immunology: In Practice*, Filep and Chapman⁷ demonstrate that the concentration and doses of major food allergens in EIF varied greatly. In fact, some commercial products did not have detectable allergen. The authors analyzed 32 EIF products promoted for allergen introduction for 17 allergens using fluorescent multiplex array (except Ara h 2, which was measured by ELISA). The multiplex array uses Luminex xMAP technology, in which uniquely labeled bead surfaces are covalently coupled to specific monoclonal antibodies to capture food allergens in solution. The

bead-bound allergens are then incubated with biotinylated antibodies for detection.

Most EIFs in the survey contained peanut, milk, and egg proteins. Overall, the mixed-food blend powders, puffs, crackers, and fruit sauces had lower allergen levels. In their report, the survey of EIFs contained three brands of peanut snack puffs and a 14-food blend puff (Table I). Of those, Bamba contained the highest level of total peanut allergen and Ara h 3 was the most abundant peanut allergen detected. Large variation in total peanut allergen was found. Importantly, their Table I showed that peanut allergen levels in one of the blended food puffs were below the limit of detection.

Limitations of the study included characteristics of the assay and inherent issues with allergen extraction from food. For milk, egg, and peanut allergens, two to four major allergens were measured. However, for other foods, only a single major allergen was measured. This is a limitation of the current array and potentially of particular importance for foods that contain multiple allergens, such as tree nuts, seeds, and soy. The development of additional antibodies for allergen detection will make the multiplex array approach more robust. Optimal extraction of allergen from food can be a highly allergen-dependent process. To address this, the authors compared different extraction conditions in their Figure E1, but it remains possible that a particular allergen may not be efficiently extracted using the chosen approach. Absence of an allergen from an EIF, however, is unlikely to be explained by inefficient extraction, especially when it is found in adequate levels in comparable products.

In the current setting in which allergen avoidance has been replaced by early introduction of allergenic foods as a primary prevention option, the significant variability in allergen composition, concentration, and dose per serving should serve as a call to establish guidelines for EIFs. Doses of allergens consumed by infants who are potentially at risk during weaning were EIF-dependent, and consumers are increasingly relying on such target-marketed products. Moreover, health care providers are tasked with providing expert guidance to parents, yet the allergen levels in EIFs appear to vary so greatly that a truly informed decision is impossible at this time. Practical, real-world evidence highlighting this issue is the recent report of 12 infants who experienced food-allergic reactions despite being started on EIFs.⁸ Thus, the study by Filep and Chapman⁷ is much needed and provides the first data of its kind regarding allergen levels in EIFs. This important insight must be used to improve the formulation and standardization of EIFs to prevent food allergy.

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^aDivision of Allergy, Immunology, and Rheumatology, University of North Carolina School of Medicine, Chapel Hill, NC

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Corresponding author: Scott P. Commins, MD, PhD, UNC Food Allergy Initiative, Thurston Research Center, University of North Carolina at Chapel Hill, 3300 Thurston Bldg, CB# 7280, Chapel Hill, NC 27599-7280. E-mail: scommins@email.unc.edu.

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