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Food Allergies: Dietary Management

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Food allergies are a serious public health concern now estimated to affect more than 12 million Americans. The cornerstone of food allergy management is avoidance of the identified allergen. Allergen elimination diets can significantly affect quality of life and are not without nutritional risk. Patients must learn how to identify their allergen(s) in our vast food supply and meet their nutritional needs within the context of the elimination diet. The National Institute of Allergy and Infectious Diseases Guidelines for the Diagnosis and Management of Food Allergy in the United States recommend nutrition counseling and close growth monitoring for all children with food allergies. Practitioners should be prepared to provide expert guidance to families to decrease risk of allergen exposure and to ensure nutritional adequacy of the elimination diet.

INTRODUCTION

Food allergy (FA) is a serious and potentially life threatening condition, which appears to be increasing in prevalence.[1, 2] Although more than 170 different foods have been reported as allergens, 8 foods (milk, egg, wheat, soy, peanut, tree nuts, fish and shellfish) are responsible for the vast majority of food allergic reactions in the United States.[3]

FA is defined as, "an adverse health affect arising from a specific immune response that occurs reproducibly on exposure to a given food".[3] Food allergies can be categorized as immunoglobulin E (IgE) or non-immunoglobulin E mediated. Symptoms of IgE mediated allergy typically present soon after contact with the food (within minutes to several hours) and can affect the skin, gastrointestinal tract, respiratory tract or cardiovascular system. Symptoms may be mild or severe. Symptoms that impact the respiratory tract, cardiovascular system or have multiple organ system involvement are typically more severe and are an important indicator of anaphylaxis. Anaphylaxis is a serious, IgE mediated allergic reaction that is rapid in onset and may cause death.[3]

A smaller representation of food allergies is non-IgE mediated. Non-IgE mediated food allergic disorders tend to affect the skin and gastrointestinal tract and

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Table 1. Food Allergen Labeling Consumer Protection Act (FALCPA)

"Major" Allergens	Ingredients Not Covered by FALCPA	Products that Must Comply with FALCPA	Products Not Covered by FALCPA
• Milk • Egg • Wheat • Soy • Peanut • Tree nuts • Fish • Crustacean shellfish	• Other gluten containing grains (e.g., rye, barley) • Mollusks (e.g. clams, mussels, oyster, scallops) • All other potential allergens including sesame	• Food products • Dietary supplements • Infant formulas • Medical foods	• Raw agricultural commodities such as meats, fruits and vegetables • Spirits • Medications • Cosmetics, soaps, lotions, shampoos, etc.

are typically delayed in onset. Anaphylaxis is not a feature of non-IgE mediated FA. Food protein-induced enterocolitis syndrome (FPIES) (for more information visit: www.iaffpe.org) and allergic proctocolitis (AP) are non-IgE mediated food allergic disorders while eosinophilic gastrointestinal disorders (EGID) (for more information visit: www.apfed.org) and atopic dermatitis (AD) may be of mixed IgE and non-IgE mediated mechanisms. Dietary treatments may vary slightly from one type of food allergic disorder to another, even when the same allergen is identified.

In 2010, the National Institute of Allergy and Infectious Diseases (NIAID) convened an expert panel to develop guidelines outlining practices for the diagnosis and management of all types of FA. Summaries of these guidelines have been published for pediatricians, dietitians and nurses and are an excellent clinical tool for practitioners.[4] (ww.niaid.nih.gov/topics/foodAllergy/clinical/Documents/FAGuidelinesExecSummary.pdf)

Is it Allergy?

Research has shown that perceived FA is much higher than what can be confirmed by validated testing methods.[5] Food elimination diets are clearly needed for the treatment of a diagnosed FA; however, they are not without consequences. Food elimination diets have been shown to impart financial and nutritional burdens, limit social activity and decrease quality of life.[6] Patients suspected of having a FA should be referred to an allergist for appropriate diagnosis and management. (Visit: www.aaaai.org and click on "find an allergist")

Elimination Diets

The NIAID guidelines suggest all patients with FA receive education and training on how to interpret ingredient lists on food labels.[7] The Food Allergen Labeling and Consumer Protection Act (FALCPA), identifies the "major" allergens (See Table 1.) and regulates how they can be listed on package labels in the United States (U.S.). FALCPA mandates clear labeling of major allergens using *plain English language*. This requires the presence of a major food allergen to be listed on the product label using its common name (e.g., milk) as opposed to a scientific name (casein, whey, lactalbumin). Additionally, a major food allergen must

Table 2. Substitute Formulas for Cow's Milk Protein Allergy

Food Allergy Symptoms	First Choice Formula Recommendation	Second Choice Formula Recommendation
Low risk of anaphylaxis	Extensively hydrolyzed casein	Amino acid based
High risk of anaphylaxis	Amino acid based	Extensively hydrolyzed casein
Allergic proctolitis or Food protein–induced enterocolitis syndrome	Extensively hydrolyzed casein	Amino acid based
Eosinophilic esophagitis	Amino acid based	---------

be fully disclosed even if the ingredient is only a minor ingredient such as in a spice, flavoring, coloring, additive, or if used merely as a processing aid. Major allergens may be listed in the ingredient list or in a "contains" statement immediately below the ingredient list; therefore, patients should be advised to avoid looking only for "contains" statements, as only one of these methods is required. These regulations have simplified food product label reading, as one no longer needs to know all of the scientific terms that may represent "hidden" allergenic ingredients. Consumers should be aware that FALCPA applies only to ingredients derived from the major allergens. An individual with allergy to an ingredient not covered under these laws would still need to call the manufacturer to ascertain if these ingredients were included as part of a vague ingredient term such as "spice" or "natural flavoring" of a product.

Highly refined vegetable oils derived from major food allergens are not considered allergens since highly refined oils have almost complete removal of allergenic protein and have not been shown to pose a risk to human health.[8,9] Although exempt from *allergen* labeling, the source of all vegetable oils present in foods must be identified according to the U.S. *standard* food labeling laws. In the U.S., soy oil is almost always highly refined and therefore, safe for patients with soy allergy.[10] Peanut oil may be highly refined, but can also be present as a crude oil, which may contain enough peanut protein to cause an allergic reaction.[11,12] This presents an allergen-labeling loophole because the ingredient list of a finished food will not tell a consumer the nature of the ingredient or how the ingredient was processed. Therefore, it is not possible to tell from a product label if the peanut oil listed is a highly refined or crude oil. The fact that the label will already say the word "peanut" in the term "peanut oil" means peanut is identified if it contains allergenic protein. Calling the manufacturer may provide more specific information. However, as peanut oil is not frequently used in manufactured products and the labeling of the oil is not sufficient to determine the safety of the ingredient, avoidance of peanut oil is frequently recommended. Tree nut oils and sesame oil are typically not highly refined and should also be avoided by those allergic to tree nuts and sesame.

There are other ingredients derived from major allergens that are unlikely to cause a reaction in allergic individuals, although variability in thresholds makes it difficult to establish guidelines on these ingredients. For instance, soy lecithin has a very low relative allergenicity and is an ingredient that is tolerated by most patients with soy allergy. Soy lecithin however is not exempt from FALCPA and must be fully disclosed on product labels. Corn syrup is a corn ingredient that is typically tolerated by those with corn allergy. Another

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ingredient with very low allergenicity for the patient with fish allergies is kosher gelatin, which is derived from fish. In the U.S., gelatin, derived from fish must be fully disclosed as fish (more specifically, as the fish species) on product labels. While one can have a primary allergy to all gelatin, gelatin derived from fish is not commonly problematic for those who are allergic to fish.[13]

Another area of nuance is the issue of unintended allergenic ingredients, which may be voluntarily addressed by manufacturers with precautionary statements such as "may contain (allergen)" or "produced in a facility that also produces (allergen)." Because these precautionary statements are voluntary, the absence of a precautionary statement does not necessarily mean there is no risk of allergen cross-contact. Precautionary statements are not only voluntary, but they are also unregulated. There are numerous types of statements with meanings that are often difficult to interpret. In a recent U.S. study, precautionary labels that stated, "Good Manufacturing Processes were used to segregate ingredients in a facility that also processes peanut, tree nuts, milk, shellfish, fish and soy ingredients," were interpreted to mean that the product was safe. However, milk or egg were detected in some baking mixes with this type of statement that otherwise contained no milk or egg ingredients.[14] Consumers should be aware that it is not possible to assess the degree of risk based on the type of precautionary label used. The NIAID Food Allergy Guidelines suggest advising our patients to avoid products that carry a precautionary statement for their allergen.[7] Regarding products without precautionary labeling, advising the patient to call the manufacturer to discuss cross-contact risk may be prudent depending on the allergen and the patient's sensitivity. Lastly, the use of terms such as "free from" and "does not contain" in relation to food allergens are not regulated and should not be used to determine the safety of a product. The ingredient list and contains statements should *always* be read.[15]

Food Allergens

Cow's Milk Protein Allergy

Cow's milk protein allergy (CMA) typically begins in infancy. Studies on the natural history of CMA have indicated that the vast majority of children typically develop tolerance in childhood (with the possible exception of children with eosinophilic gastrointestinal disorders and CMA).[16] The World Allergy Organization Diagnosis and Rationale for Action against Cow's Milk Allergy (DRACMA), provides international guidance and management tools for practitioners working with patients with CMA.[17]

Infancy

Breast Feeding

The breast-fed infant with CMA may benefit from maternal avoidance of milk protein from the diet, since immunologically recognizable proteins from the maternal diet can be found in breast milk.[18] An exception is the infant with food protein-induced enterocolitis syndrome (FPIES) as it has only been rarely reported that infants with FPIES are symptomatic on an unrestricted maternal diet.[19] If the infant is asymptomatic on an unrestricted maternal diet, maternal avoidance is not necessary. If the mother is avoiding milk, dietary substitutes for maternal calcium and vitamin D or milk-free supplementation may be warranted. (For more information of calcium and vitamin D visit: http://ods.od.nih.gov/factsheets/VitaminD-QuickFacts/ and http://ods.od.nih.gov/factsheets/Calcium-QuickFacts/)

Formula Feeding

Formula-fed infants will require hypoallergenic infant formula. Different food allergic disorders or allergic symptoms may warrant different infant formula recommendations. (See Table 2) Over 90% of infants with IgE mediated CMA tolerate extensively hydrolyzed milk protein-based formulas (e.g., Nutramigen, Alimentum, or Pregestimil) and for those who continue to exhibit symptoms, an amino acid formula (e.g., Elecare or Neocate lines or PurAmino) may be warranted.[18] Partially hydrolyzed cow's milk formulas are not considered hypoallergenic and are not a suitable option for infants with cow's milk allergy.

Soy formula may be an alternative to cow's milk formula for infants > 6 months of age, although it is not hypoallergenic. For infants > 6 months of age, many (85–90%) with IgE-mediated CMA may tolerate soy formula.[17] For infants with non-IgE-mediated CMA such as proctocolitis or FPIES, the prevalence of hypersensitivity to both soy and milk

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may be greater in the U.S. and hypoallergenic formula is recommended.[17,19]

Older Children and Adults

Numerous studies indicate children with CMA are at increased risk of inadequate nutrient intake and poor growth.[20-23] Growth in this population should be closely monitored.[7] Christie et al. showed that the risk of consuming inadequate intakes of calcium and vitamin D among children with CMA was decreased if a safe fortified soymilk or infant/toddler formula was provided, suggesting that children with CMA should continue to include an adequate, nutrient-dense milk substitute in the diet.[20] Other than fortified soy beverage, alternative fortified beverages (e.g., rice, almond, potato, fruit juice) do not provide sufficient protein and are too low in fat for young toddlers. Protein requirements will need to be met entirely through solid foods in the diet before switching to these beverages. Fat intake will also need to be assessed and additional fat in the form of vegetable oils may be required. Alternative mammalian milks, such as goat or sheep milk, are also not suitable, due to homologous proteins structure and the high risk of cross reactivity.[17, 18] DRACMA guidelines recommend children with CMA remain on a milk substitute (either substitute formula or breast milk) until 2 years of age to meet nutritional needs.[17]

Baked Milk

While strict cow's milk elimination is often required, approximately 75 percent of patients with CMA may tolerate extensively baked milk ingredients.[24-26] This is also true of egg allergy.[27] The introduction of extensively heated milk and egg protein in the diet should only be done after a physician-supervised oral food challenge as those who do not tolerate baked milk or egg may be at risk of a severe reaction. For those who tolerate the baked form, inclusion of these ingredients in the diet can improve nutrient intake, make following the elimination diet much easier and also represents an approach to oral immunomodulation.[25]

Table 3. Resources

ORGANIZATION	WEBSITE
American Academy of Allergy, Asthma and Immunology (AAAAI)	www.aaaai.org
American College of Allergy, Asthma and Immunology	www.acaai.org
Food Allergy Research and Education	www.foodallergy.org
Kids with Food Allergy Foundation	www.kidswithfoodallergies.org
International Association for Food Protein Enterocolitis	www.iaffpe.org
American Partnership for Eosinophilic Disorders	www.apfed.org
Consortium of Food Allergy Research	www.cofargroup.org

Source: Diagnosis and Rationale for Action Against Cow's Milk Allergy (DRACMA)

There are additional nuances to avoidance of unbaked milk and egg ingredients.[6] For instance, a cake may contain baked milk in the cake and unbaked milk in the frosting. Quiche may be fully baked, but the amount of egg in the product may be greater than the patient can tolerate. A flavored cracker may have a baked milk ingredient or it may have a milk ingredient in the flavoring that is topically applied (sprayed on) after the cracker is baked. It is not always obvious from a product label how an ingredient was processed, hence, additional and specific label reading guidance is required.[6]

Wheat Allergy

Wheat is the most common grain allergy and presents unique nutritional challenges. When wheat is eliminated, nutrient dense alternative grains should be provided to substitute for the nutrients (complex carbohydrates, B vitamins, iron, fiber) normally provided by wheat in the diet. The major allergens in wheat are contained in the gluten fraction (although some wheat allergic patients tolerate other gluten containing grains). In addition to wheat, gluten is found in rye, barley, spelt and their hybridized varieties. There are many gluten-free items now available that are wheat-free and may be safe for those with wheat allergy. Wheat allergy is also different from celiac disease in that patients with wheat allergy are at risk of clinical reactivity to other grains, including the gluten-free grains. So while amaranth, quinoa, millet, buckwheat, corn, sorghum, rice, gluten-free oats, and others may be safe, there is a 20% chance of clinical reactivity.[28] When evaluating the patient with wheat allergies, it is helpful to review the gluten-free products the patient uses and tolerates so an individualized list of tolerated grains can be created. Contacting the patient's allergist prior to recommending grains outside this list is prudent.

Soy, Egg, Peanut, Tree Nut, Fish and Shell Fish Allergies

Although these other commonly allergenic foods are all nutrient dense, they typically do not supply a large percentage of daily energy intakes and the nutrients in these foods can be provided by other foods in a diverse diet without difficulty. Allergy to any of these foods with other dietary constraints however, such as a vegetarian diet, a picky eater, a multiple food elimination diet or a diet restricted for religious reasons may present greater challenges to meeting nutrient needs.

CONCLUSION

All elimination diets are challenging and families require expert guidance. The Consortium of Food Allergy Research (www.cofargroup.org and click on Food Allergy Education Program link) has developed a validated FA education program with downloadable, free materials.[29] These include patient hand-outs on various FA topics such as cooking, nutrition, label reading, eating in restaurants, going to school and camp, avoidance sheets for the major allergens (plus sesame) and many more. See Table 3 for additional resources. The nutritional impact of the elimination diet is dependent on many factors including the food(s) eliminated, the type of food allergic disorder, the length of time the elimination diet is required and other associated nutritional risk factors such as feeding difficulties, poor growth, or the presence of symptoms that may impact food intake. Poor weight gain and even severe malnutrition requiring hospitalization have been reported.[30] The NIAID food allergy guidelines recommend nutrition counseling for all children with food allergies.[7] ■

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AUTHOR ADDENDUM/CORRECTION

We regret the following oversight in our article, "**Gluten Content of Selected Labeled Gluten-Free Foods Sold in the US**" by Ms. Tricia Thompson and Mr. Thomas Grace, which appeared in our October 2013 issue (Vol. XXXVII No. 10, p. 15). Specifically, the sentence on page 15 read: "Ninety-five percent of extractions tested below 20 ppm gluten."

This should have read: "97.5 percent of extractions tested below 20 ppm gluten."

The Editors

This article has been updated on our website: practicalgastro.com