When food becomes the enemy

Catherine Watkins

AOCS member Dave Brooks will never forget his 21st birthday: It was almost his last. “The cake is safe,” his mother said as she served him a piece. After all, she had baked it herself to be sure it was free of soy protein. Who could have imagined the candy decorations would send her son to the emergency room with an anaphylactic reaction?

For most of his 43 years, Brooks, who is chief research scientist for new product development at Oil-Dri Corp. of America in Vernon Hills, Illinois, has lived with a life-threatening soy allergy. A mere 25 parts per billion of soy protein in Brooks’ bloodstream produces allergic arrest. His throat swells closed. His pulse rate races two to three times normal as his blood pressure skyrockets. Hives cover his body. (The agony is indescribable, he says; his wife sometimes has to hold his hands to keep him from scratching.) His stomach and bowels purge their contents in a desperate attempt to remove the offending substance.

A trip to the grocery store—which most of us take for granted—requires him to analyze every ingredient list in detail, because with each bite of processed food, Dave Brooks risks death.

The scope of the problem

An estimated 2% of adults and 5–8% of children have true food allergies, the bulk of which are not life threatening. Although about a third of all adults believe they have food allergies, most actually suffer from food intolerance rather than full immune system-mediated reactions.

The good news is that most children who exhibit food allergies as babies outgrow them, usually by about age 5. Food allergies that develop after age 3 are more likely to last for life. Milk and egg allergies are the leading allergies in young children; soy and wheat are next.

More than 90% of all allergic reactions to food are caused by eight foods: milk; chicken eggs; peanuts; tree nuts such as walnuts, almonds, and pecans; wheat; soy; fish; and shellfish. Other less frequent allergies that are noteworthy because they can result in severe reactions include sensitivity to moluscan shellfish (clams, oysters, etc.), sesame seeds, poppy seeds, sunflower seeds, cottonseed, and certain other legumes. A food allergy reaction can range from a tingling sensation in the mouth, swelling of the tongue and the throat, difficulty breathing, hives, vomiting, abdominal cramps, diarrhea, drop in blood pressure, loss of consciousness, to death. Symptoms typically appear within minutes to two hours after the person has eaten the food to which he or she is allergic.

Because virtually all food allergens are proteins, highly refined vegetable oils—which contain no detectable protein residues—are safe for individuals with allergies to oils or legumes. However, oils that have not been refined, bleached, and deodorized may not always be protein-free. Then, too, oils used for frying foods may become contaminated with allergens from these foods, illustrating again how life for the food-allergic person involves a constant search for “hidden” allergens.

Food allergies remain a medical mystery

Simply put, a food allergy is the immune system’s reaction to a food that it mistakenly thinks is a harmful substance. As a result, antibodies are released to attack the presumed invader, resulting in an allergic reaction.

There are three components to all allergic reactions: food allergens, immunoglobulin E (IgE), and mast cells and basophils. People with food allergies produce increased levels of IgE, which is one of five classes of antibodies. The immune system creates millions of different antibodies in the bloodstream, each sensitive to a specific antigen. When an allergic person eats a food to which he or she is allergic, the immune system is stimulated by the food allergens to make IgE specific to that food. Countless IgE antibodies speed through the blood, binding to white blood cells called basophils and entering body tissues, where they bind to mast cells. (Mast cells line the nasal passages, throat, lungs, and skin—a vigilant and protective phalanx ever alert for trespassers.) It is the basophils and mast cells that release histamine and other chemicals that result in the allergic reaction.

As for why the allergic response exists in the first place, the answer remains a mystery. “A hypothesis is that the allergic response became important during evolution at a time when parasites, most of which are not controlled by less vigorous immune responses, were a significant survival threat,” says Chris Cordle, a research fellow and food allergy specialist with Ross Products Division of Abbott Laboratories in Columbus, Ohio. “Today, really nasty parasites seem to be gone or are controlled by other means. Now strong allergic reactions to foods and other non-parasite allergens do not benefit health. At this point, we might be better off without IgE antibodies and the damage they cause.”

To date, the only recourse for those with food allergies has been to use epinephrine (adrenaline) or other drugs to suppress the allergic reaction after accidental ingestion of an allergen. Gene therapy may be a possibility in the future; animal trials have been promising. In addition, several pharmacological interventions for peanut allergies are in development. Two drugs—Xolair and Tanox-901—have completed Phase II trials, but joint developers Genentech Inc., South San Francisco, California; Novartis International AG, Basel, Switzerland, and Tanox Inc., Houston, Texas, have not yet decided which drug will undergo Phase III trials specifically for peanut allergies.

In any event, a commercial product is years away from introduction, a Tanox spokesperson said.

“What is food to one, is to others bitter poison.”

—Lucretius (96–55 B.C.E.)

Labeling regulations

Until then, those suffering from food allergies are left with strict avoidance as the only way to steer clear of an allergic reaction, which means the labeling of allergens in foods is key.
Epinephrine is the medication of choice for controlling a severe allergic reaction. It is available by prescription in EpiPen® auto-injectors, such as the ones shown here.

“Mandatory labeling of food allergens is a recognizable international regulatory trend,” says Peggy Rochette, senior director of international policy for the National Food Processors Association, a trade group based in Washington, D.C., “with several countries adopting new requirements in the past two years.”

In addition, the Codex Alimentarius Commission, a subsidiary body of the United Nations’ Food and Agriculture Organization and the World Health Organization, is the lead international organization for harmonizing food labeling and standards requirements. Codex has adopted standards that mandate labeling for ingredients known to elicit hypersensitivity, including cereals with gluten, crustaceans, eggs, fish, peanuts, soybeans, milk, tree nuts, and sulfite in concentrations of 120 mg/kg or more, according to Rochette. (Technically, sulfite-induced asthma—a potentially life-threatening reaction to a chemical used to preserve the color of foods and inhibit microbial growth—is a food idiosyncrasy and not a food allergy.)

Differences in food labeling rules in various countries continue to confound attempts to create a universal label, and the labeling of allergens is no exception.

“Each country’s regulation is slightly different, with a different list of allergens that have to be labeled specifically,” Rochette notes. For example, a pending Korean regulation proposes labeling of pork, poultry, and tomatoes, she says. Based on the scientific literature, none of these items would seem to merit universal identification of possible allergenicity, according to Rochette.

Among the nations that mandate the labeling of food allergens are Australia and New Zealand, Japan, and Canada. South Africa and Korea both have regulations pending. The European Union will implement mandatory measures in 2004. China apparently has not addressed the issue but, as Rochette points out, the country is in the process of rewriting many of its standards and “some we see and some we don’t.” South America generally follows Codex standards, she says, adding that although she has not seen a specific regulatory proposal from any South American country, “that doesn’t mean there isn’t something on the books or under consideration.”

The labeling of food allergens is not mandated in the United States per se. But because the U.S. Food and Drug Administration (FDA) requires a full listing of nutrients in packaged foods, most allergens do appear on food labels.

How they appear is another matter. Consumers—particularly those who depend on caregivers and school systems for the safety of their food-allergic children—have complained that only a scientist can understand food labels.

In an effort to simplify the search for hidden allergens, a consortium of food trade associations and consumer groups called the Food Allergy Issues Alliance developed voluntary industry guidelines in 2001 for the labeling of foods that contain known allergens. One guideline is to use readily understandable words such as “milk” instead of “whey” or “casein.” Thus, the guidelines encourage the placement of supplemental statements of allergen-related information in close proximity to the nutrition facts panel on food labels. Statements are to be written using common terms for food substances and may also warn of possible cross-contamination during processing.

The guidelines, which are still being revised, were presented in preliminary form to the FDA in August 2001. “The FDA continues to work on developing a proposed rule for the labeling of the most common food allergens,” an FDA spokesperson said, noting that issues related to the detection of allergens, surveillance, and labeling have been on the agency’s published priority list for several years.

Even though food ingredient labeling in the United States is extensive, several collective terms are allowed, including “flavor,” “spices,” “starch,” and “lecithin.” Flavors occasionally contain protein residues. Spices rarely cause allergic reactions. Starch is most often made from corn, which is not highly allergenic, although starch sometimes is made from wheat, which can be a potent allergen. Lecithin may be made from either soybean or egg and can contain protein residues. Few reactions to lecithin, however, have been reported.

Until food allergen labeling is standardized—and probably even after—most people with food allergies will continue to follow Dave Brooks’ advice: “Don’t eat anything without reading every label at least twice.”

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Netlinks:
American Academy of Allergy, Asthma & Immunology — www.aaaai.org
Food Allergy & Anaphylaxis Alliance — www.foodallergyalliance.org
Food Allergy & Anaphylaxis Network — www.foodallergy.org
National Institutes of Allergy and Infectious Diseases — www.niaid.nih.gov/factsheets/food.htm

Interesting facts from the back of the stacks
- The first descriptive reference to food allergy is attributed to Roman philosopher and scientist Lucretius (96–55 B.C.E.): “What is food to one, is to others bitter poison.”
- The genesis of the term “allergy” is somewhat more recent, having been coined in 1906 by an Austrian physician named Clemens Freiherr von Pirquet, according to Nick Bennett of Bennett Nutritional Services, a consultancy based in Little Hereford, Ludlow, United Kingdom.
  “The term meant ‘altered reaction,’” Bennett explains. “Thus, any pathological response to a normally benign substance was referred to as an allergy. A few decades later, allergists in Europe decided to narrow this definition to describe only such a reaction as occurs in rapid response to exposure to an allergen, such as the appearance of hives immediately following ingestion of shellfish.”
- The very peanut proteins blamed for allergies are believed to give roasted peanuts their rich flavor. In addition, the roasting process itself appears to increase the allergen content. Scientists at the U.S. Department of Agriculture’s Southern Regional Research Center in New Orleans, Louisiana, are working to develop a modified roasting process that will minimize the allergenicity of peanuts while keeping most of the taste.