

Roundtable Discussion: Current Controversies and Advances in Food Allergy

Moderator: Stuart L. Abramson, M.D., Ph.D.¹

Participants: J. Andrew Bird, M.D.,² Carla M. Davis, M.D.,³
and Scott H. Sicherer, M.D.⁴

Dr. Abramson: *Our participants in today's roundtable are experts in the diagnosis and management of food allergies. I look forward to their insight into what we know and where we are headed in this field. I would like to begin by asking the panelists for their general perceptions about morbidity related to food allergies in terms of the prevalence and severity of these conditions. Dr. Sicherer, would you give us your thoughts on this?*

Dr. Sicherer: There is some controversy over the prevalence of food allergy. A lot of the confusion stems from the definition of what constitutes a food allergy. We generally define food allergy as an adverse immunologic response. Although there is essentially no way to develop a comprehensive population-based study to ascertain its prevalence, quite a few studies appear to show that, like other atopic diseases, it is common and probably increasing in prevalence. The U.S. Centers for Disease Control and Prevention (CDC) has reported that almost 1 in 25 children have a food allergy.¹

Our group at the Jaffe Food Allergy Institute recently published a study in which we used a self-report technique, with responses gathered by random telephone calling across the United States to assess the prevalence of peanut and tree nut allergy in children. We collected three sets of responses using this same methodology, in 1997, again in 2002, and again in 2008, and over that time, we found a steady increase in peanut allergy, from 1 in 250 the first time, to 1 in 125 the second time, and 1 in 70 the third time.² In other studies, done in Canada, the United Kingdom, and Australia, peanut allergy has been reported in over 1% of children, and is therefore a widespread problem.

Dr. Davis: I agree that the studies clearly seem to support an increase in the prevalence of food allergies, but as Dr. Sicherer said, we also have to keep in mind that the definition of food allergy differs among studies, and we know that, in terms of overall prevalence, the self-reported symptoms of its presence in children and adults exceed its prevalence as determined in diagnostic studies, such as with skin tests or immunologic tests for specific IgE antibodies, as well as in studies done with

food challenges. In some studies, the overall prevalence of self-reported food allergy ranges to as high as 13%, whereas this number drops to 3% when skin testing or serum IgE testing, as well as food challenges, are included. Thus, even though the prevalence of food allergies in the patients that we see in our institution has increased by approximately 250% over the past 10 years, we must keep in mind that food allergies are still over-diagnosed and that the methods used in testing for it are very important in its diagnosis.

Dr. Bird: An article published earlier this year in the *Journal of the American Medical Association (JAMA)* highlighted the inconsistency among the studies of food allergy now being done and has brought more attention to its prevalence over the past decade.³ But certainly there is an increased community and physician awareness of food allergies, and I think that, anecdotally, most physicians would say that they have noticed an increase in the prevalence of food allergy. The data that Dr. Sicherer mentioned clearly suggest an increased prevalence of food allergy in the present compared with the past. However, more studies, using more refined methods, need to be done to define a more accurate way of diagnosing and identifying patients with food allergies.

Dr. Sicherer: I'd like to contribute what might be called a summary statement. The article in *JAMA* with the comprehensive literature review of food allergy basically concluded that it affects between 1 to 2% and 10% of the U.S. population.³ But no matter how you slice it, we are talking about millions of people in the United States alone who have food allergies. Dr. Abramson had asked about the morbidity from such allergies, and it is a significant issue because it means that someone cannot eat a particular food. That has to have a significant impact on quality of life in terms of an effort to carefully avoid, every day, the food to which they are allergic.

Dr. Abramson: *Given that there is a clear difference between what people perceive or report as food allergy and food allergy in the way an allergist might define it, a number of patients have been placed on extremely restrictive diets,*

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based on blood or skin-test results, who probably do not need such restriction. In light of this, what are some of the common misconceptions about food allergy?

Dr. Sicherer: One of the biggest problems that I see as an allergist is over-testing of patients. We would all probably agree, without necessarily blaming the primary-care sector, that we see individuals in whom the presentation of a complaint such as atopic dermatitis or something even unrelated to food allergy, like chronic urticaria, has led to the performance of a panel of tests. And in this situation, it is possible for a patient to have been sensitized to a particular antigen in the environment or in a food and be making IgE antibody to it, leading to a positive test and to the assumption by the physician, the patient, or both that the positive test signifies that the antigen is something to which the patient is clinically allergic, which is a huge misconception and a huge source of misdiagnoses.

I have patients who come in bringing a paper showing that different tests were done and were positive, and who were eating eggs or peas or peanuts on the day the tests were done. I have to ask the patient, "Why did they test you for eggs? Why did they test for peas? Why did they test for peanuts?" and undo the idea that just because a test is positive you might not be able to eat that food. In a study by Arbes et al. of skin-test results from the second and third National Health and Nutrition Examination Surveys (NHANES II and III),⁴ 8.6% of the general population tested positively for allergy to peanuts. But obviously, 8% of the population is not allergic to peanuts. The upshot is that a lot of people who test positively for allergies to certain foods have no clinical consequences from eating those foods.

Dr. Abramson: *Some tests are now available for non-IgE-mediated reactions, including patch tests. Dr. Davis, would you comment on that?*

Dr. Davis: Yes. Dr. Sicherer was talking about the testing for serum-specific IgE, which is typically done either in IgE-mediated diseases or those in which a combination of immunologic mechanisms are involved, including mechanisms mediated by IgE and non-IgE antibodies. But for diseases such as eosinophilic esophagitis, which are known to be non-IgE-mediated, the patch test for atopy can be used in conjunction with the skin-prick test or with serum-specific IgE tests and with dietary elimination methods and food challenges to try to identify foods that trigger reactions.

But I would say that patch tests for atopy are best used in diseases such as eosinophilic esophagitis, in which they have been utilized most frequently. They have not proven very useful in eczema, and they really have no role in the diagnosis of food allergy for IgE-mediated disease.

Dr. Sicherer: I don't have great enthusiasm for patch tests. Furuta et al. published a consensus report that questioned their use as a diagnostic method for food allergy.⁵ A problem with patch testing is that it isn't standardized. The results are somewhat subjective, and its clinical utility has not been extensively studied. Patch testing has been fairly well studied for atopic dermatitis, but its addition to such other diagnostic techniques as skin testing and serum testing provides very little additional benefit,⁶ and I'm therefore not sure that it should be

a part of routine clinical practice at this point. In terms of eosinophilic esophagitis, I think that some of the other procedures that you mentioned, such as trial elimination diets with the stepwise restoration of foods, followed by biopsies interspersed between each trial restoration, are probably the most definitive way to see whether any particular food is playing a role in a patient's allergy, which often is the case, with an effort being made to identify the causal food or foods.

Dr. Davis: I agree that patch testing is not routine in clinical practice, but in studies at the Children's Hospital of Philadelphia, Spergel has reported apparent improvement in at least some patients with eosinophilic esophagitis as reflected by the eosinophil count in the peak eosinophil count per high-power field (HPF) in esophageal biopsies after elimination diets based on positive results of skin-prick tests and patch tests.⁷

Dr. Sicherer: The studies done at the Children's Hospital of Philadelphia imply that you can get some additional diagnostic information from the patch tests, used in addition to skin tests. However, I think there is the need for additional studies at other centers, because so far the data are primarily from one center, and relatively few patients in those studies had biopsies before and after single food manipulations that allow correlation of results to the diagnostic tests.

Dr. Bird: I am not aware of any studies that have directly compared the six-food elimination diet with patch testing. So there is certainly more research to be done in both areas just to identify a preferred approach.

Dr. Davis: In the studies at Northwestern University at Children's Memorial Hospital, the six-food elimination diet led to a 74% resolution of symptoms on the basis of biopsy eosinophil counts versus 88% resolution of symptoms with an elemental diet.⁸ The test-based restriction led to resolution of symptoms and eosinophil counts in 76% of patients versus 97% improvement with an elemental diet at the Children's Hospital of Philadelphia. There was a direct comparison of these different methods at Children's Hospital of Philadelphia.⁹ So in the case of eosinophilic esophagitis, there was a direct comparison of those different methods (elemental diet vs. six-food elimination diet or test-based restriction) in two clinical centers, and it would seem to suggest that the combination of the skin-prick test and patch test is at least as good as the six-food elimination diet.^{10,11}

Dr. Sicherer: I think you're showing that, in eosinophilic esophagitis, the percentage differences with the addition of these diagnostic methods to the food-elimination diet are not very large. So I think that for most people with this condition, most experts are using combinations of medical treatments and dietary elimination trials as the primary modalities for determining what people with food allergies should or should not be eating.

Dr. Davis: I think it varies from one center to another, and is very center-based but is not currently the standard of care.

Dr. Abramson: *In terms of interventions, I think that we would ideally like to have one that could adequately treat or*

even cure food allergy. What recent advances do you think are most promising for the management of food allergy, and what do you consider the most difficult challenges in managing such allergy?

Dr. Bird: Over the past few years, there has been quite an increase in knowledge about newer therapies for desensitization in food allergy. In particular, substantial attention has been paid to oral immunotherapy through giving initially small but gradually increasing amounts of food in the hope of inducing both desensitization and ultimately tolerance to allergenic foods.

Only a relatively small number of children with food allergies have gone through this procedure successfully, and it is considered experimental by the experts in the field who have investigated it. But I find it promising that there is something that suggests the development of tolerance as a potential form of treatment for food allergy.

Several studies are also being done on sublingual immunotherapy (SLIT). A few studies of this have been reported in the United States, with some other work in Europe looking mainly at SLIT for patients with oral allergy syndromes rather than the class I food allergies that we more often see, which tend to be IgE-mediated food allergies and can lead to anaphylaxis.

Ongoing studies at Duke University are investigating the use of SLIT for peanut allergy; a poster presentation at the 2010 annual meeting of the American Academy of Allergy, Asthma & Immunology reported work done at Johns Hopkins and Duke University showing preliminary results with SLIT for milk allergy, suggesting that it may be effective in inducing desensitization.¹²

Among other approaches, the Chinese herbal therapy that Xiu-Min Li has investigated in mice at the Mount Sinai Center for Chinese Herbal Therapy for Allergy and Asthma, and which is now in phase II studies, seems promising.¹³ Also undergoing investigation at Mount Sinai over the past few years, and potentially nearer to clinical use, have been studies of heated milk and heated egg for inducing the development of tolerance. It is still too early to determine the long-term effects of this approach, but at 3 months, the immunologic findings in these studies suggest that it can induce desensitization and possibly tolerance.

Potentially more relevant on a global basis would be the Learning Early About Peanut Allergy (LEAP) study of infants aged 4 to 11 months, and now being conducted in Europe by the Immune Tolerance Network, to determine whether timing in the introduction of foods into the diet plays a role in the development of food allergy in patients.

Dr. Abramson: *What is being done in studying anti-IgE antibodies in food allergy?*

Dr. Bird: The major study of that was the study done at several centers early in this decade and reported in *The New England Journal of Medicine* of treatment with TNX-901 as a monoclonal anti-IgE antibody for increasing the threshold of reactivity in peanut allergy.¹⁴

The study found an increased threshold of such reactivity among patients receiving the largest amount of this monoclonal antibody, although it did not benefit all of the patients in the study.

Some ongoing studies are looking at the combined use of omalizumab, another monoclonal anti-IgE antibody with oral immunotherapy in patients with food allergy, but those are in their early stages.

Dr. Sicherer: I think you've covered much of what is going on in the world of treatment for food allergy. On another frontier, the NIAID-sponsored CoFAR is conducting an observational study of food allergy in an effort to determine the mechanistic reasons for its occurrence in some children and not in others, as well as why some people develop peanut or other food-specific allergies, and of how such allergies may resolve or persist.

Another series of clinical studies are examining the safety of a modified peanut protein. This was initially attempted many years ago in the form of subcutaneous immunotherapy with ordinary peanut protein, resembling what is done for pollen allergies, but was stopped because of allergic reactions to the immunotherapy itself. The newer strategy has been to modify the epitopes of the peanut proteins that bind IgE in persons who are peanut allergic so that the modified epitope can continue to trigger T-cell responses but in a more tolerogenic manner, without prompting an immediate allergic response.

In animal models, the best potential route for administering the modified protein, which is generated in *Escherichia coli* and kept in the *E. coli* in which it is generated, a form of encapsulation that reduces the immediate exposure of the proteins to the mucosa and may act as an adjuvant, is to administer it rectally. We are currently looking at this in clinical safety studies in humans as a rectally administered form of immunotherapy.

A further approach, which Dr. Bird mentioned, involves using a monoclonal anti-IgE antibody essentially as a "cover" for preventing excessive reactivity during immunotherapy. Very recently, we also are seeing reports of using a topically applied allergen on the skin as a potential mode of immunotherapy, which seems to contradict the finding in some other studies that the skin is a sensitizing site of antigen exposure. Beyond this, and as Dr. Bird mentioned, we're looking at Chinese herbal remedies, which appear to be very good for the nonspecific treatment of food allergies, and which, in animal models, have been found to ease peanut allergies. We are also looking at the 70% or 80% of people with milk or egg allergy who can tolerate milk or egg when it is baked into a food, such as a cookie or muffin, and who sometimes even tolerate dairy products like cheese when it is baked as part of a recipe.

Perhaps the least remote of all these approaches in terms of clinical applicability is oral immunotherapy, hopefully for the gradual induction of tolerance. We have seen that many children can be temporarily desensitized, but a big question is whether we can induce permanent tolerance lasting without a daily treatment. Most experts in the field feel that oral immunotherapy is still an area of research and not ready for clinical use. We have seen allergic reactions in patients who are receiving maintenance therapy with this, and reactions in others during the incremental buildup of tolerance. We're not even sure that we aren't inducing eosinophilic esophagitis in some people undergoing such therapy. Oral immunotherapy therefore has problems that have to be worked out, and needs further research.

Dr. Davis: I think that Dr. Bird and Dr. Sicherer covered the most exciting advances in treating food allergy. I am most excited about the potential use of the Chinese herbal remedy, since this therapy is not food specific. Also, concerning the combination of topical therapy and modulation of dietary therapy, as Dr. Sicherer had mentioned earlier, in patients with eosinophilic esophagitis, oral fluticasone is very important, and for smaller children, it has more recently been shown that oral budesonide can significantly decrease the eosinophil count in esophageal biopsies. A combination of such medical treatment plus the avoidance of dietary antigens is therefore very important for preventing allergic reactions.

Beyond this, a monoclonal anti-interleukin-5 (IL-5) antibody named mepolizumab has shown some promise in clinical trials for decreasing eosinophil counts in eosinophilic esophagitis, but the accompanying clinical improvement has unfortunately been less robust. However, similar results have been seen in pediatric studies, and mepolizumab may therefore be an important future agent for treating eosinophilic esophagitis or other eosinophilic diseases.

Dr. Abramson: *I'd like to visit the quality-of-life issues for patients with food allergies. These issues certainly affect families that have a member with a food allergy. In fact, some studies¹⁵⁻¹⁸ using standardized quality-of-life measures have shown lower quality-of-life scores for some such patients than for patients with diabetes. What do our panelists feel are some of the most difficult challenges they face in managing food allergy?*

Dr. Sicherer: Our group was the one that conducted the study that you just mentioned about quality of life in food allergy and diabetes, and we followed up with some other studies of quality of life in food allergy, including a study of bullying of children with food allergies.¹⁹ But I think that the major point in living with a food allergy is that it is similar to living in a minefield, because you need constant diligence to avoid making a mistake, and if you're not careful, the results can be very damaging.

A large part of our job as allergists, immunologists, and other physicians is to try to help patients' families to differentiate what they need to be concerned about from what they may not need to be overly concerned about. In terms of trying to improve patients' quality of life, some of the major areas affected by food allergies are vacations and eating in restaurants and at school. It should be emphasized to children with food allergies that they can do everything that other children can do except eat the foods to which they are allergic. I know that that sounds like a simple statement, but it is really something that we as clinicians need to take the time to discuss with patients and their families in the office setting.

Many families may put themselves in a box and be unwilling to take anything they perceive as a risk for a family member with a food allergy, while, as physicians, we wouldn't perceive many of these as strong taboos. Some families worry about casual exposure to foods causing reactions, and that if a child even touches something or is in a room with something or smells something to which the child is allergic, it will have a horrible reaction, when in fact studies show that skin contact or air contact is very unlikely to cause a severe reaction to a food allergen.^{20,21} Even that bit of

knowledge sometimes goes a very long way in helping families to feel less threatened by a child's allergy.

Dr. Bird: I completely agree. The challenge now, with a lot of families, is to take the time and provide the education they need by talking to them about food allergy and its realities and myths. Certainly there is a lot of anxiety associated with that, but we have found in patients who come back regularly or are involved in our research studies that just the simple process of spending more time with them and their families, educating them about food allergy, and promoting the understanding that in most cases it requires ingestion of the causative allergen to cause a severe reaction is very helpful both practically and psychologically. There are also options such as support groups and even cooking classes that we're beginning to investigate to see whether they're effective for helping to communicate with families and improve the quality of their lives.

Dr. Abramson: *The Food Allergy and Anaphylaxis Network (FAAN) has been a strong affiliate of the American Academy of Allergy, Asthma & Immunology. Have FAAN and other organizations been beneficial?*

Dr. Bird: Very much so. We have worked closely with FAAN and also with the Food Allergy Initiative, a group that supports research into food allergies and education about them, and which has worked chiefly in the northeastern United States but is beginning to expand into other regions of the country. Both of those organizations have Web sites that provide excellent information that has been validated for accuracy by Dr. Sicherer and other experts in allergy and immunology, and are helpful sites on which families can obtain education, guidance, and resources such as food-allergy action plans or recommendations for school care for an allergic child.

A challenge that we continue to face in managing food allergy are "may-contain" products, in which an allergen may be present, and how we should counsel parents of patients in that regard, especially since specific labeling for the potentially offending allergen is not required of food companies.

Dr. Davis: That remains a huge issue for families and patients because they can't tell, on the basis of the labeling, what may be contained in foods themselves or the components of processed foods. Even parents who look at labels and know what they are looking for do not always recognize what is in a food or what foods they need to avoid, which increases the anxiety of both parents and patients. We can therefore still do a lot in advocating for changes in food labeling, and FAAN is involved in this effort.

Dr. Sicherer: Consumers should be familiar with food-labeling laws, which differ in different countries. In the United States, the Food Allergen Labeling and Consumer Protection Act requires that the specific major food allergens, consisting of milk, egg, wheat, soy, peanuts, tree nuts, fish, and crustacean shellfish, be specifically included in plain English terms on the labels of foods that contain them. The label cannot say "casein," for example, rather than specifying the food or food product that contains it; it has to say "milk," if that is what carries the casein. But the law does not cover other possibly allergenic

foods, such as sesame or garlic, and does not cover precautionary or advisory labeling such as the "may contain" labeling that we've been discussing for peanut or milk products.

We conducted a study of supermarket products in which we found that the percentage with advisory labels, all of which were voluntarily applied on the part of the manufacturers, was astonishingly high.²² We also found out that the kinds of words chosen for such labeling vary widely, ranging from "may contain peanuts" to the seemingly less alarmist "made in a facility that also processes peanuts," thus emphasizing our need to educate our patients about the primary necessity of avoiding such products if they pose the risk of causing an allergic reaction.

Dr. Abramson: *The National Institutes of Health (NIH), along with other organizations, has developed guidelines for the diagnosis and management of food allergy. Dr. Sicherer served on the panel involved in developing these guidelines, and I wondered whether he might share some of their salient features.*

Dr. Sicherer: Certainly. This project was initiated in a triumvirate of the NIH, National Institute of Allergy and Infectious Diseases (NIAID), and FAAN, and was an initiative led by Dr. Hugh Sampson when he was president of the AAAAI. The project began with a literature review that was published in *JAMA*³ and grew to include experts in food allergy, dermatology, gastroenterology, and a variety of other areas, even extending to health literacy, with a coordinating committee that included many different organizations involved in various aspects of health, all to develop guidelines through evidence and expert opinion.

The areas covered in drawing up the guidelines comprise just about everything that food allergy may entail, including epidemiology, prevention, vaccination with vaccines that may contain egg or other food protein, the diagnosis and management of food allergy, the management of food-induced anaphylaxis, and a wide range of other areas. Because the guidelines have input from so many diverse specialties, subspecialties, and general medicine, they provide something for everyone in terms of helping the diagnosis and management of food allergy, including explaining the different types of food-allergic diseases, the difference between food allergy and intolerance, and much other vital information about food allergy.

The guidelines are similar to the National Heart, Lung, and Blood Institute (NHLBI) guidelines for asthma, but have less definitive advice because the literature base for food allergy remains sparser than that for asthma, with more areas that do not yet have a strong evidence base. However, we think that they will still be very helpful.

Dr. Bird: The guidelines will prove an excellent resource for everyone involved in food allergy, its causation, and its management. They will provide a quick and thorough reference that summarizes the relevant literature and expert opinion and justifies each statement with the evidence for it. And in terms of the major issues and things that we have discussed today, the guidelines include a summary statement on the utility of food-specific IgE testing for diseases such as allergic rhinitis or eczema.

Dr. Davis: The guidelines document is really excellent as an overview of food allergy and in terms of clearly defining the areas that Dr. Sicherer discussed. I do want to mention, however, that it does not necessarily cover specific details of the management of food allergies, most likely because of an outstanding lack of evidence in many such situations. The guidelines document uses the Grading of Recommendation Assessment, Development and Evaluation (GRADE) approach with a grading of recommendations based on the evidence for them.

I'd also like to mention the availability of other resources such as Dr. Sicherer's work-group report in the June 2009 issue of *Journal of Allergy and Clinical Immunology* on oral food-challenge testing.²³

The couple of areas in the NIH/NIAID/FAAN guidelines document that I thought were very good concerned management issues after acute food-allergic reactions. I often find that patients who have had anaphylactic reactions are not observed for a sufficient period afterward, and the document helpfully recommends that this be done for 4 to 6 hours or longer, based on the severity of the reaction. The guidance for primary-care providers is also very helpful, using the SAFE outline, in which S stands for "seek support," A for "allergen identification and avoidance," F for "follow-up with specialty care," and E for "epinephrine." The guidelines also contain a food-allergy anaphylaxis plan for providers who do not already have one in their offices.

Dr. Abramson: *Every school should address the issue of food allergies, since schools are the occupational environment for children. I'd like to discuss the problems we may have encountered with schools' approaches to food allergies and how schools can best handle them.*

Dr. Sicherer: I think that the best way in which we can approach this is to view it as a partnership among schools, parents, and physicians, and never a question of the parents versus the schools. To keep the child safe and to make sure that the child, and not just the child's food allergy, is the priority, that partnership should involve all three parties. It is important to make sure that the parents have the responsibility to provide the school with information; the physicians have the responsibility to provide a plan of emergency action and any necessary prescriptions, and to make sure that the family understands the emergency-care plan; and that the school will support the plan and participate as needed in the child's well-being. If the school has a nurse, fine. If not, it needs to have other adults who will be responsible for the child's treatment if necessary, recognizing and treating reactions and doing what is needed to avoid ingestion in the first place.

Beyond this, the child with a food allergy needs to understand that he or she should not share foods, and the school has to understand that it needs to have clear-cut no-bullying policies.

A clinical report from the Section on Allergy and Immunology of the American Academy of Pediatrics summarizes issues that physicians should know about the in-school management of food allergies.²⁴ See also Young et al.²⁵ In a study we did a number of years ago in which we looked at food-allergic reactions in schools, we found that most occurred because kids were having reactions to peanut butter as part of a bird-feeder project and the like, or simply from

sharing foods.²⁶ I think a lot of that has changed with increasing awareness, and that the safety from allergic reactions in schools has increased substantially.

There is some controversy about whether school cafeterias should have an allergen-free table or schools should have peanut-free classrooms or such, but ultimately, proper education about allergen avoidance and the recognition of allergic reactions goes a long way toward making a school both safe and reasonable for everyone.

Dr. Davis: I think I agree with Dr. Sicherer that the awareness of food allergies has increased as times have changed. In Houston, we have implemented guidelines for the management of food-allergic reactions, and I have also found that most school nurses, administrators, and teachers are willing to abide by action plans for anaphylactic crises. But I still find gaps in knowledge in our area of the country, and still have patients who react to foods that are brought into the classrooms because of a lack of education about food allergies. And I still often encounter, through parents' reports, schools' lack of understanding of the danger of food allergies and an unwillingness to eliminate allergens from the surroundings of children with food allergies. Because of this, I would like to point out for school districts that lack guidelines about food allergies that such guidelines are available on the Food Allergy and Anaphylaxis Network Web site.

Dr. Sicherer: A number of states now have programs for the awareness and management of food allergy, and the Centers for Disease Control and Prevention (CDC) is currently working on national guidelines for this, which will add to the available resources.

Dr. Bird: My experience in Dallas, where I have been for only a year, has been that the schools have been very cooperative and have allowed us to come in and provide both education for school nurses and food-allergy action plans. But there has been quite a bit of inconsistency among the schools in their awareness and responses to food allergy, probably in large part because Texas, unlike some other states, does not have standard guidelines for this.

But Dr. Davis is correct in pointing to the value of available resources and standard guidelines for locations in which they're lacking.

Dr. Sicherer: In all of this, we should mention that studies appear to indicate that teenagers are at greatest risk for fatal food-allergic reactions, probably because of the risk-taking behaviors of that age group and an unwillingness to use medications when they should through their wishing to avoid any appearance of abnormality and to fit in with peers.^{27,28} In office visits by teenagers, I think it is important for us to discuss issues such as making sure that they're carrying their epinephrine, are willing to inform someone if they have a reaction to something they eat, and similarly vital matters.

In a study of risk-taking behavior among teens with food allergies,²⁷ we found that their major wish was that their peers would understand about food allergy without them having to personally teach their peers about it

themselves. That is another advertisement for ensuring that education about food allergy happens in the schools, so that peer groups understand its nature and protect those of their members who it affects. This is the subject of the FAAN's program called Protect a Life (PAL), in which peer education about food allergy is provided in such a way that kids affected by it feel more comfortable and safe, and not that they're outcasts who need to take risks to be accepted.

Dr. Abramson: *Are there other issues that any of you would like to discuss?*

Dr. Sicherer: From the physician's perspective, the diagnosis of food allergy is probably the biggest issue that we face. The NIH/NIAID/FAAN guidelines are going to give a lot of information about the diagnostic tests available for food allergy, but ultimately it is very important that we as physicians understand that the patient's history is probably the most important diagnostic test for such allergy, since it helps in understanding the pathophysiology of food allergy, understanding some of its epidemiology, and assembling the patient-specific histories and symptoms in terms of food exposures so as to understand the benefits and limitations of the various diagnostic tests. Thus, for example, a lot of studies have shown that the stronger an IgE test and the greater the patient's skin-test reaction, the more likely the patient is to have allergy.²⁹ But in a great many cases, that still has to be put together with the probability of allergy derived from the history and epidemiology to confirm or refute a specific allergy through oral food challenges.

In general, practitioners probably do too few food challenges, and that represents a barrier that needs to be overcome. It is very important for practitioners to increase their use of food-challenge testing because food allergy is a life-changing circumstance.

Dr. Davis: I thank Dr. Sicherer for that contribution, and would simply add that very minimally elevated serum-test results for specific IgE are not diagnostic of food allergy. Using food-challenge tests, as well as the values of serum specific IgE tests, can be very important in determining whether a dietary restriction is appropriate. The unnecessary restriction of a patient's diet on the basis of a very low positive test result, without the correlation of a positive history, is one of the major problems that I see among physicians who diagnose food allergies in children.

Dr. Bird: I agree, and I think it is also important to recognize that specific IgE testing, and particularly testing with the ImmunoCAP method, has been the procedure found to best help predict the likelihood of an allergic reaction in a patient who has a history of reacting to a specific food. That does not tell us anything about the severity of the reaction, nor does it tell us how much of the food is needed to make the child react; it only gives us the likelihood of a reaction. But if there is any question, it can be followed up with a food challenge.

Something else that I think is important both for allergists and generalists to recognize is that, for some allergic patients,

the help of a dietitian may be needed, especially for those children who have very restrictive diets, since these may fail to meet their nutritional needs. There is also a role for psychologists in helping many children with food allergies to deal with anxiety.

In this regard, and to add to what was said earlier, FAAN has a great list of resources that are very helpful for physicians and families. There are also books written by physicians, including Dr. Sicherer, that are family friendly and help to explain food allergies and living with food allergies.

Dr. Abramson: *In all of our workups, the history is recognized as a key component. Identifying the food source of an allergy often requires some detective work, and we occasionally see patients in whom the offending agent may be a food additive and not the food in which the additive is present.*

Dr. Sicherer: Even minor components of foods may trigger a reaction, especially if they're protein based. Thus, for example, annatto, used as a food-coloring agent, is a protein that comes from a seed, and can trigger an allergic reaction. Other chemical coloring agents and preservatives usually fall into the category of uncommon or rare additives, but can still rarely cause reactions, and so it always pays to have an open mind about the source of a problem.

Dr. Abramson: *I thank all of you for participating in today's roundtable and for your contributions to a comprehensive and up-to-date understanding of issues in food allergy.*

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