Symposium: Pediatric Food Allergy

Scott H. Sicherer, MD§; Anne Muñoz-Furlong, BA*; Ramon Murphy, MD‡; Robert A. Wood, MD||; and Hugh A. Sampson, MD§

ABSTRACT. Food allergy seems to be increasing in prevalence,1 significantly decreases the quality of life for patients and their families,2 and has become a common diagnostic and management issue for the pediatrician.3 Studies now a decade old showed that 6% to 8% of children younger than 3 years experience documented adverse reactions to foods. Several studies have defined the prevalence of allergy to specific foods in childhood. Population-based studies document a prevalence of cow milk allergy in 1.9% to 3.2% of infants and young children,4 egg allergy5–7 in 2.6% of children by age 2.5 years,8 and peanut allergy in 0.4% to 0.6% of those younger than 18 years.9,10 Overall, the typical allergens of infancy and early childhood are egg, milk, peanut, wheat, and soy, whereas allergens that are responsible for severe reactions in older children and adults are primarily caused by peanut, tree nuts, and seafood. Allergy to fruits and vegetables are prominent but usually not severe.11–13 For diagnostic purposes, it is instructive to consider the prevalence of food allergy as a cause of specific disorders. For example, food allergy accounts for 20% of acute urticaria14,15 is present in 37% of children with moderate to severe atopic dermatitis16,17 and approximately 5% with atopic asthma,18 and is the most frequent cause of anaphylaxis outside the hospital setting.19–22 Pediatrics 2003; 111:1591–1594; food allergy, food hypersensitivity, allergic gastroenteropathy, anaphylaxis.

ABBREVIATIONS. IgE, immunoglobulin E; RAST, radioallergosorbent test.

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n April 20th, 2002, a symposium was held among food allergy specialists and a group of pediatricians, a pediatric gastroenterologist, and an allergist (Appendix 1) for the purpose of identifying specific issues of concern to pediatricians regarding food allergy. Lectures and question-and-answer sessions were held to formulate responses to particular concerns so as to generate a set of manuscripts that were clinically relevant for the pediatrician who is faced with the front-line recognition of food-allergic disorders. A selection of specific questions that were posed by pediatricians and addressed by the group are shown in Table 1.

TOPICS ADDRESSED IN THE SYMPOSIUM

During the past decade, there has been an increased understanding of the immunopathogenesis of food-allergic disorders that carries crucial lessons for an improved diagnostic approach to these disorders. Food allergy is defined as an adverse immunologic response to food protein.23 This is in contrast to toxic reactions exemplified by food poisoning or to a number of disorders that are considered food intolerance. Food intolerance is host specific but does not involve immune mechanisms and is exemplified by lactose intolerance. Food allergy (hypersensitivity) therefore represents an aberration of the normal immune responses to food proteins (oral tolerance). In immunoglobulin E (IgE) antibody-mediated allergy, T cells direct B cells to produce food-specific IgE antibodies that arm tissue mast cells (sensitization). Reexposure to the food is detected by these IgE antibodies on the surface of mast cells and results in the immediate release of mediators such as histamine that cause the observed reaction (clinical allergy). This mechanism underlies most of the acute reactions to food proteins resulting in symptoms such as hives, wheezing, and hypotension. The second mechanism, non–IgE-mediated, or cell-mediated, food allergy, results from the generation of T cells that respond directly to the protein with the elaboration of mediators that direct allergic inflammation (eosinophilic inflammation, increased vascular permeability), leading to a variety of subacute and chronic responses primarily affecting the gastrointestinal tract. In some cases, patients with phenotypically identical disorders may have a mixed pathology with both IgE antibody and cellular causes. Table 2 lists specific named disorders according to the recognized immunopathological basis.

A series of 4 reviews in this supplement address specific food-allergic disorders. The first article addresses food-induced anaphylaxis, an acute IgE antibody-mediated disorder that accounts for >30 000 episodes of anaphylaxis in the United States each year.20 Although anaphylaxis is usually easy to identify, numerous issues regarding the identification of a specific cause, treatment, preparation for, and prevention of accidental exposures can be challenging and are discussed in detail. The variety of clinical manifestations of food allergy that affect the skin, gastrointestinal tract, and respiratory tree are dis-
TABLE 1. Selected Questions Posed by Pediatricians

<table>
<thead>
<tr>
<th>Question</th>
<th>Answer</th>
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<tbody>
<tr>
<td>How often and to what extent might food allergy play a role in common disorders such as atopic dermatitis, asthma, colic, gastroesophageal reflux, constipation, failure to thrive, otitis media, behavioral problems, and others?</td>
<td>What types of complaints regarding foods would warrant an allergy evaluation?</td>
</tr>
<tr>
<td>Under what circumstances should self-injectable epinephrine be prescribed and administered?</td>
<td>At what point should the pediatrician consult an allergist, dermatologist, and/or gastroenterologist?</td>
</tr>
<tr>
<td>How should schools and camps be approached regarding food allergy and anaphylaxis?</td>
<td>Can allergy be prevented, and how should food be introduced to atopic-prone children?</td>
</tr>
<tr>
<td>Who is at risk for severe or fatal food anaphylaxis?</td>
<td>What tests should a pediatrician perform to diagnose food allergy?</td>
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Parents often direct 3 important queries to pediatricians: 1) Will my child outgrow his or her food allergy? 2) Is there any way to prevent food allergy in another child? 3) Is there hope for better diagnosis and treatment in the near future? Recent advances in research have improved our ability to answer these questions. For example, the dogma that peanut allergy is permanent has been revised on the basis of several studies showing that it is outgrown in ~20% of very young children. Conversely, it seems that the number of children who do not outgrow milk and egg allergy may have been generally underestimated. Attention has also turned to prevention of food allergy, and several recommendations were recently espoused by the American Academy of Pediatrics regarding infant feeding practices and concerns about maternal diet during breastfeeding in children at risk for atopic diseases. Last, numerous avenues of research show promise for improved diagnostic and therapeutic strategies. These topics are considered in detail in 3 articles.

Two additional specific concerns were not addressed in detail in the articles but are often initially considered by pediatricians. One concern is the presence of food proteins in vaccines and medications. For vaccines, the Red Book contains the most up-to-date information on components that may trigger additional reactions in children with food allergies.

TABLE 2. Named Food-Allergic Disorders According to Pathophysiology

<table>
<thead>
<tr>
<th>IgE Antibody-Mediated</th>
<th>IgE Antibody-Mediated and/or Cell-Mediated</th>
<th>Cell-Mediated (Non-IgE)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Urticaria/angioedema</td>
<td>Anaphylaxis</td>
<td>Dietary protein, enterocolitis</td>
</tr>
<tr>
<td>Immediate gastrointestinal reactions</td>
<td>Allergic reactions (pollen-related)</td>
<td>Dietary protein proctitis</td>
</tr>
<tr>
<td>Oral allergy syndrome</td>
<td>Rhinitis</td>
<td>Dietary protein enteropathy</td>
</tr>
<tr>
<td>Anaphylaxis</td>
<td>Food-associated, exercise-induced anaphylaxis</td>
<td>Celiac disease</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Dermatitis herpetiforms</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Pulmonary hemosiderosis</td>
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</tbody>
</table>
TABLE 3. Role of the Pediatrician and Specialists in the Management of Pediatric Food Allergy: A Partnership

<table>
<thead>
<tr>
<th>Pediatrics</th>
<th>Specialist</th>
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<tbody>
<tr>
<td>Initial diagnosis</td>
<td>XX</td>
</tr>
<tr>
<td>Definitive diagnosis</td>
<td>XX</td>
</tr>
<tr>
<td>Few food restrictions</td>
<td>X</td>
</tr>
<tr>
<td>Many food restrictions</td>
<td>X</td>
</tr>
<tr>
<td>Provision of measles-mumps-rubella vaccine</td>
<td>XX</td>
</tr>
<tr>
<td>Management of anaphylaxis education</td>
<td>X</td>
</tr>
<tr>
<td>Instruction of school and camp</td>
<td>X</td>
</tr>
<tr>
<td>Reevaluation for tolerance</td>
<td>XX</td>
</tr>
<tr>
<td>Allergy prevention</td>
<td>X</td>
</tr>
</tbody>
</table>

X, indicates important role; XX, primary role.

Allergic reactions. For example, the measles-mumps-rubella vaccine is generally safe for egg-allergic patients, but the influenza and yellow fever vaccines may contain relevant amounts of egg protein that could elicit reactions. Gelatin is another food-derived protein found in vaccines that is sometimes problematic. A variety of medications contain food proteins, and so this concern must be considered on an individual basis. The other issue often faced by pediatricians that was not otherwise discussed in detail was the role of food or additive allergy and other adverse reactions on behavior and development. This topic remains controversial, but there is little evidence for a significant impact of food allergy on behavior and no evidence of “sugar allergy.”

Several themes that emerged from the conference were that pediatricians are recognizing an increasing number of patients with food allergy, need to address parental concerns about the relationship of various disorders to foods, and are being called on increasingly for diagnosis and management of a variety of food-allergic disorders. The “division of labor” among pediatricians, allergists, and other subspecialists (gastroenterologist, dietitian, dermatologist, etc) for the care of food-allergic patients was discussed with a variety of opinions given. Although specific roles may vary by disease, severity, availability of specialists, and other factors, a general scheme for the roles of specialists and generalists in the care of food-allergic patients and their families is best viewed as a partnership as shown in Table 3. Educational materials that are helpful for the management of families with food allergy are available from resources listed in Appendix 2. In closing, the organizers, editors, and participants in this symposium hope that these articles serve as a valuable resource for the improved diagnosis and management of food-allergic disorders in infants and children.

APPENDIX 1: PARTICIPANT LIST

Speakers: S. Allan Bock, MD, National Jewish Medical and Research Center, Boulder, CO; A. Wesley Burks, MD, Arkansas Children’s Hospital, Little Rock, AR; John James, MD, Colorado Allergy and Asthma Center, Fort Collins, CO; Lloyd Mayer, MD, Mount Sinai School of Medicine, New York, NY; Shideh Mofidi, MS, RD, CSP, Mount Sinai School of Medicine, New York, NY; Anne Muñoz-Furlong, BA, Food Allergy & Anaphylaxis Network, Fairfax, VA; Ramon J.C. Murphy, MD, Uptown Pediatrics, PC, New York, NY; Anna Nowak-Wegrzyn, MD, Mount Sinai School of Medicine, New York, NY; Hugh A. Sampson, MD, Mount Sinai School of Medicine, New York, NY; Scott Sicherer, MD, Mount Sinai School of Medicine, New York, NY; Robert A. Wood, MD, Johns Hopkins Hospital Lutherville, MD; and Robert Zeiger, MD, Kaiser Permanente, San Diego, CA.

Invited Guests: Joel Forman, MD; Reza Keshavarz, MD; John Larsen, MD; Chris Liacouras, MD; Rosanna Mirante, MD; Laura Popper, MD; Harold Raucher, MD; Kenneth Schuberth, MD; Barry Stein, MD.

APPENDIX 2: RESOURCES FOR PATIENT EDUCATION

Allergy and Asthma Network/Mothers of Asthmatics, 2751 Prosperity Ave, Ste 150, Fairfax, VA 22031, (800) 878-4403, www.aanma.org

American Academy of Allergy, Asthma & Immunology, 611 E. Wells St, Milwaukee, WI 53202, (800) 822-ASMA, www.aai.org


American College of Allergy Asthma & Immunology, 85 W. Algonquin Rd, Ste 550, Arlington Heights, IL 60005, (800) 842-7777, www.allergy.mcg.edu

American Dietetic Association, 216 W. Jackson Blvd, Chicago, IL 60606-6994, (800) 877-1600, www.eatright.org

Asthma & Allergy Foundation of America, 1233 20th St NW, Ste 402, Washington, DC 20036, (800) 7ASTHMA, www.aafa.org


Food Allergy & Anaphylaxis Network, 10400 Eaton Place, Ste 107, Fairfax, VA 22030, 800-929-4040, www.foodallergy.org

Inflammatory Skin Disease Institute, PO Box 1074, Newport News, VA 23601, (757) 223-0795, www.isdionline.org

Medic Alert Foundation, PO Box 1009, Turlock, CA 95381, (800) 344-3226

For information about supporting food allergy research to find a cure, contact the Food Allergy Initiative, 625 Madison Avenue, 4th Floor, New York, NY 10022, (212) 527-5835, www.foodallergyinitiative.org

REFERENCES


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