



**Testimony**  
**Subcommittee on Children and Families**  
**Committee on Health, Education, Labor,**  
**and Pensions**  
**United States Senate**

**The Role of NIH Biomedical  
Research in Addressing Food  
Allergy**

*Statement of*

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Mr. Chairman and members of the Subcommittee, thank you for the opportunity to discuss with you today food allergy and the research being conducted and supported by the National Institutes of Health (NIH) to address this public health problem. Within NIH, the National Institute of Allergy and Infectious Diseases (NIAID) is the lead institute for research in this area, although other NIH Institutes and Centers support basic research relevant to food allergy. I am particularly pleased to be here with you as we recognize the 11<sup>th</sup> Annual Food Allergy Awareness Week and commend your efforts to bring attention to this important issue.

### **Overview of Food Allergy**

Food allergy is much more than an inconvenience; the effects of food allergy can be devastating and sometimes deadly for those afflicted. During an allergic response to food, the immune system overreacts to certain components of foods, setting off a cascade of immunological events that leads to symptoms ranging from itchy hives to anaphylaxis. Anaphylaxis is a severe and life-threatening systemic allergic reaction characterized by fall of blood pressure, upper airway obstruction, and difficulty breathing. Food allergy causes an estimated 30,000 episodes of anaphylaxis each year, accounting for approximately one-third to one-half of all anaphylaxis-related emergency room visits. Food allergy also causes an estimated 100 to 200 deaths per year in the United States. It is truly sobering to consider that, as a consequence of food allergies, two or three otherwise healthy Americans – usually adolescents or young adults – may lose their lives this week. Even with diligent avoidance of known food allergens, it is estimated that each year, one of every four food-allergic individuals will have an accidental exposure that leads to a food-induced allergic reaction.

Food allergies affect approximately 6 to 8 percent of children under four years of age and about 4 percent of adults in the United States. Evidence suggests that the prevalence of food allergy is increasing, especially peanut allergies, which

tend to persist throughout life. Severe, life-threatening reactions occur mostly in adolescents and young adults, and peanuts and tree nuts are the most common causes of such reactions. Currently, the only proven interventions for food allergy are allergen avoidance and treatment with antihistamines, and intravenous fluids and epinephrine for more severe reactions.

Food allergy affects the health, nutrition, development, and quality of life of children and adults. Because a history of mild reactions does not preclude the occurrence of future life-threatening reactions, food allergies can also have disconcerting psychological effects related to fears of serious reactions and the stigma related to avoidance of common foods and social gatherings. As you are undoubtedly aware, this is a particular problem for children in school lunchrooms and other social settings where others may minimize or fail to understand the seriousness of the allergy. The increasing prevalence of certain food allergies, their persistence throughout life, the potential for fatal allergic reactions, and the lack of preventive approaches other than food avoidance have all contributed to the emergence of food allergy as an important public health problem.

### **Current NIAID Research on Food Allergy**

NIAID is the principal sponsor of food allergy research within the U.S. Government. This support has increased significantly over the last five years, from \$1.2 million in fiscal year (FY) 2003 to an estimated \$13.4 million in FY 2008, a greater than ten-fold increase. NIAID-supported food allergy research includes basic and preclinical research on the immune mechanisms involved in food allergy, research to understand the epidemiology and genetics of food allergy, and clinical studies to treat and prevent food allergy. Like all of NIH, NIAID awards grants to researchers whose investigator-initiated proposals are judged in peer review to be of high quality. NIAID also solicits research proposals through special initiatives that target particular areas of inquiry and foster collaboration within the field. These initiatives and networks include the

NIAID Consortium of Food Allergy Research, the Asthma and Allergic Diseases Cooperative Research Centers, the Immune Tolerance Network, and the Inner City Asthma Consortium. NIAID also supports intramural investigators on our Bethesda, Maryland, campus who work on allergic diseases and anaphylaxis, including a new program focused specifically on food allergy.

In addition, NIAID supports a much larger portfolio of basic research on immunologic and allergic mechanisms that is relevant to the problem of food allergies. In FY 2007, support for this broader research portfolio totaled more than \$500 million. The Institute's broad support of basic research in allergy and immunology provides a critical foundation that is advancing the field of food allergy, providing scientists with a better understanding of how the healthy immune system averts the development of allergy and of the mechanisms that contribute to allergy. Food allergy is frequently accompanied by other allergic diseases including atopic dermatitis (eczema) and asthma. The latter is an important risk factor for severe allergic reactions to food. Thus, research findings in the broader areas of immunology, including asthma and allergic diseases, likely will move the field of food allergy forward.

In the area of basic research in food allergy, researchers are studying the molecular structure of food allergens and their interactions with the immune system, including the immunoglobulin E (IgE) antibodies that mediate allergic reactions to food. For example, scientists are analyzing the specific structures, called epitopes, in food allergens that are recognized by IgE antibodies. These structures — and how they are recognized by the immune system — may determine the severity of a person's allergic responses and the persistence of allergy throughout his or her life. NIAID-supported scientists also are conducting basic research on the components of the immune system that play a role in anaphylaxis, studying the molecular events that precipitate and characterize anaphylactic reactions, and conducting long-term studies of patients with food allergies.

Preclinical studies include the development and characterization of animal models of food allergy. Improved mouse models, which have been developed in recent years by NIAID-supported researchers, mimic many of the important characteristics of human food allergy. Potential approaches to treating and preventing food allergy are being evaluated in such animal models, as a prelude to human studies. Some experimental approaches are relying on the use of allergenic foods as immunotherapeutics, capable of eliciting immunological tolerance with repeated, controlled administration. Other investigators are treating patients with structurally modified foods that are less likely to cause serious allergic reactions, but which may still elicit a state of tolerance. The safety of one such experimental treatment, the use of bacteria engineered to produce modified peanut proteins, may eventually be tested in non-allergic adult volunteers and, if proven safe, in allergic individuals.

Very little is known about why only certain people develop food allergies. Research on the epidemiology and genetics of food allergy may provide insight into the genesis of food allergy and suggest approaches that may preempt children from developing allergies to certain foods. For example, the NIAID-supported Consortium of Food Allergy Research is conducting an observational study in which more than 400 infants who have allergies to milk or eggs have been enrolled, most of whom will lose their allergies to milk and eggs within a few years. Some of these children will develop allergy to peanuts. The study will follow the children for at least five years and study immunologic changes that accompany either the loss of allergy to foods or the development of allergy to peanut. Another study, the Urban Environmental Factors and Childhood Asthma Study, a project of the Inner City Asthma Consortium, is an observational study monitoring a cohort of children from birth for a number of factors, including the appearance of specific IgE antibodies to foods. This study will provide epidemiological data to address the relationship between asthma and food allergy.

The results of basic, preclinical, and epidemiological research have suggested a number of approaches for the prevention and treatment of food allergy. These approaches are being evaluated in several current and planned clinical trials. For example, in the United States, until earlier this year, the pediatric medicine community generally recommended avoidance of exposure to peanuts and other common food allergens during early life. However, epidemiological studies have raised the possibility that early life exposure to peanuts may lower the rate of peanut allergy. More than 90 percent of Israeli children eat a popular peanut snack called Bamba starting before their first birthday, yet the prevalence of peanut allergy in Israel is 10- to 20-fold lower than in the United States. To test the hypothesis that early exposure may prevent food allergies, the NIAID-sponsored Immune Tolerance Network is conducting a trial to determine whether feeding a peanut-containing snack to young children at risk of developing peanut allergy will prevent its development.

With regard to treatment of established food allergies, a number of trials are ongoing or in the planning stages. The Consortium of Food Allergy Research is conducting or planning several pilot trials of oral and sublingual (under the tongue) immunotherapy in egg- and peanut-allergic subjects to study safety and the ability of these approaches to desensitize subjects with allergies and induce immunological tolerance to the test allergens. In addition, the NIAID Asthma and Allergic Diseases Cooperative Research Centers are developing a clinical trial to evaluate whether, in combination with oral milk, a currently licensed drug for allergic asthma can reduce the incidence and severity of adverse effects of milk immunotherapy and facilitate the development of tolerance in patients with milk allergy.

The field of food allergy research has benefited greatly from the support and involvement of advocacy groups and philanthropic organizations. Included among these are the Food Allergy and Anaphylaxis Network, the Food Allergy

Initiative, and the Food Allergy Project, each of which supports public awareness efforts, scientific workshops, and/or research projects, either independently or in collaboration with NIH.

## **Future Plans**

In March 2006, as required by the Food Allergen and Consumer Protection Act of 2004 (Pub. L. 108-282), NIAID convened the NIH Expert Panel on Food Allergy Research. The Panel reviewed basic and clinical efforts related to food allergies and made recommendations to the Secretary of Health and Human Services for enhancing and coordinating research activities related to food allergies. The findings and recommendations of the Panel were summarized in a report released in June 2007 and available at <http://www3.niaid.nih.gov/topics/foodAllergy/research/ReportFoodAllergy.htm>.

The Panel discussed the challenges that NIH faces in the area of food allergy research, including the need to expand the relatively small cadre of scientists working in this area. To address this concern, in August 2007, NIAID announced a research initiative, *Exploratory Investigations in Food Allergy*, that will support innovative pilot studies and developmental research on the mechanisms of food allergy, with a goal of attracting additional investigators to the field of food allergy research. We are particularly gratified that almost all of the applicants for this initiative are new to the field of food allergy research and that approximately one-third have not had prior NIH funding. Co-sponsors include the Food Allergy and Anaphylaxis Network, the Food Allergy Project, and the U.S. Environmental Protection Agency. NIAID expects to award grants under this initiative this month.

The Panel also identified a number of impediments, concerns, and challenges to the conduct of clinical trials for the prevention and treatment of food allergy. One such challenge is the difficulty of studying new approaches in pediatric patients,

including infants. Other concerns relate to the potential for severe reactions to foods or food allergens in treatment or prevention trials and the current lack of tools to identify those at the highest risk for such reactions. The Panel recommended that Secretary of Health and Human Services direct the NIH and the Food and Drug Administration (FDA) to resolve impediments to the design and conduct of clinical trials for the prevention and treatment of food allergy. In response to this recommendation, NIH and FDA will convene a workshop next month on the design of food allergy clinical trials.

The Panel also made a number of recommendations regarding the future of food allergy research, including those related to clinical trials, epidemiology and genetics, basic and preclinical studies, and research resources. A number of the research activities described earlier address these recommendations. NIAID is firmly committed to implementing the remaining recommendations.

In addition to its research portfolio in food allergy, NIAID supports other activities to improve the lives of those who are affected by food allergy. For example, NIAID is coordinating the development of comprehensive clinical guidelines for the diagnosis and management of food allergy. This effort will provide guidance to clinicians, families, and patients for diagnosing and managing food allergies. NIAID will convene a Coordinating Committee in the summer of 2008 to oversee the drafting of these guidelines. The guidelines will be prepared through a two-pronged approach, including an independent evidence-based literature review and consensus opinion developed by an expert panel. More than 20 professional societies, advocacy groups, and NIH Institutes and Centers will be involved in this process.

## **Conclusion**

With evidence indicating an increasing prevalence of food allergy in the United States, food allergy and associated anaphylaxis have emerged as important



public health problems, particularly in children. Over the last five years, NIAID has substantially increased its support for basic, clinical and epidemiological research on food allergy and anaphylaxis. While much progress has been made in the scientific understanding of food allergies and in the public's awareness of difficulties in managing them, many challenges remain. NIAID is strongly committed to the goal of reducing the burden of food allergy for the millions of affected children and their families in the United States by continuing and expanding support for research to understand food allergies, by bringing new scientists into this research area, and by developing interventions for treatment and prevention.