

Introduction

Adverse reactions to food are arguably some of the most confusing and misunderstood conditions in medical practice. Physicians, registered dietitians, other health care professionals, and patients alike are often unsure about what symptoms are caused by food allergy, food intolerance, and other adverse reactions to foods, as well as the diverse methods of diagnosis and the best way to manage them.

There is a heightened interest in food allergies, but no clear consensus exists regarding their prevalence or the most effective diagnostic and management approaches to them. IgE-mediated food allergy is estimated to affect more than 1% to 2% but less than 10% of the population. Although the perception is that the incidence of food allergy is increasing, it is unclear whether this is a real increase or if it is due to a greater awareness of the condition and an escalation in the number and range of tests available for diagnosis.

The evidence for the prevalence and management of food allergy is significantly limited by a lack of uniformity for criteria for making a diagnosis.¹ Food allergy does not fit into the medical paradigm of “one cause, one disease,” and the definitive tests required to confirm a diagnosis are not available. Consequently, constant questions and controversy surround definitions of each of the different ways in which the body responds to diverse components of foods.² Consensus documents and professional guidelines are published regularly as new evidence-based data dictate changes in clinical practice.³ Furthermore, the definition of the most severe reaction to food, anaphylaxis, is also open to frequent debate.⁴

The greatest obstacle in understanding the problems involved in food sensitivity diagnosis, prevention, and management is the misconception that “food allergy” is a distinct disease. In medicine, the typical scenario is the appearance of specific symptoms, which are diagnosed as a disease by well-authenticated tests. Based on the diagnosis, the cause is understood and a specific treatment plan is put in place, which usually controls the disease. Unlike a specific medical disease, the food that causes food allergy in one person may not trigger the same symptoms in others who eat it; in fact, most people eating the food will have no adverse response at all.

Food does not cause allergy. The symptoms are caused by the allergic person’s unique response to the food, not by the food itself. Furthermore, to complicate the situation, many adverse reactions to foods are not caused by an allergic reaction, but by *food intolerances*. Food intolerance reactions are quite different from food

allergy both in the way the body responds to the food and the management of the condition. The term *food sensitivity* describes when eating a food results in distressing symptoms. This term covers both food allergy and food intolerances. Both of these topics will be covered more fully in the first section of this book.

Food Allergy

The term *food allergy* is reserved for an immune system response that is triggered when a food is eaten by a person who has been sensitized to it. The key event in food allergy is recognition of the food by components of the immune system, which cause the release of chemicals (inflammatory mediators) that act on body tissues and result in a specific set of symptoms. In the 1960s, Professors Philip Gell and Robin Coombs⁵ used the term *hypersensitivity reactions* for all immune system reactions that are not involved in protection against diseases caused by viruses, bacteria, and other threats to the body. They classified these reactions into four distinct types: type I, II, III, and IV. Such reactions include allergy. Therefore, another term for an allergic reaction is a *hypersensitivity reaction*, which often is used in medical texts in place of *allergy*.

However, with the broadening of the definition of allergy to encompass any immunological reaction to a component of food that results in symptoms, several diseases not previously considered as “allergies” are now included in this term. Previously, only reactions that resulted from production of IgE in response to consuming the food that elicited the initial reaction were defined as “allergies.” Now many conditions that cause immunologically mediated reactions to foods but that do not involve IgE are included under the umbrella of “allergy.” Consequently, tests designed to diagnose IgE-mediated reactions are of no value in these situations.

Under the current definitions, for convenience we may classify the different types of immunologically mediated reactions into the following broad categories:

- Reactions resulting from ingestion of food that elicits production of food-specific IgE. Anaphylactic reactions typify this type of response, but symptoms can occur in every organ system as a result of the release of inflammatory mediators from granulocytes, principally mast cells. Tests for food-specific IgE may determine the foods responsible in up to 50% of cases.
- Reactions that result from release of inflammatory mediators in response to IgE produced against nonfood material such as inhaled pollens or inhaled latex. In sensitive individuals, food antigens that are structurally identical to those of the pollen or latex respectively will result in symptoms. These are termed *oral allergy syndrome* (OAS) and *latex-food syndrome*, respectively. Tests for allergen-specific IgE will identify the pollen or latex, but usually not the food responsible for the reaction.
- Reactions that result from inflammatory mediators released from granulocytes such as eosinophils in the digestive tract, without any evidence that

antigen-specific antibody is involved. In these cases, foods are clearly involved in the reaction, but because the mechanism responsible for the infiltration of the areas by eosinophils is unknown, there are no tests that will reveal the identity of the foods involved.

- Food protein enteropathies, such as milk protein enteropathy or soy protein enteropathy, where the mechanism of response has not been determined.
- Food-associated diseases such as a gluten-sensitive enteropathy (celiac disease) in which food is implicated as the trigger, but the IgA antibodies are produced against body tissues, not the food. Celiac disease is not usually considered to be an allergy; it is more correctly designated an autoimmune disease. However, because it involves an immunological response to a food component, it is often included under the umbrella of allergy for convenience.

Food Intolerances

In addition to the increasing list of immunologically mediated adverse reactions to foods, we have the diverse conditions loosely classified as food intolerances, which are considered to encompass any adverse reaction to a food or food additive that is not caused by an immune system response. This term covers a large number of different biochemical and physiological processes, many of which are poorly understood; therefore, very few definitive tests are available to effect a diagnosis. The subject of food intolerances is discussed in more detail in Chapter 3.

Sensitization and Tolerance in Food Allergy

One of the significant advances in the approach to food allergy prevention and management in recent years has resulted from the increased understanding about the mechanisms involved in the immunological response in food allergy. Our immune systems are designed to prevent disease from external agents such as viruses, bacteria, and toxins and from internal agents such as cancer cells by recognizing the “invader” as foreign to the body and mounting a powerful defense against it. All food is foreign to the body. It is derived from plants, fungi, fish, poultry, and animals unrelated to humans, yet in most cases such foreign material is absorbed and incorporated into the human body without difficulty.

In order for this to happen, a complex series of events takes place that suppresses the natural immunological rejection and results in a state we call *tolerance*. Immunological tolerance is achieved after an initial active response orchestrated by T helper cells, followed by suppression of the response by activation of suppressor cells (sometimes called *T regulatory cells* [T_{reg}]) and production of suppressive cytokines. In order for tolerance to food to occur, the immune cells must encounter food molecules in an environment that will promote the process of recognition, activation, and suppression.

This all takes place in the gut-associated lymphoid tissue (GALT) of the digestive tract; the process is called *oral tolerance*. In most cases we first encounter food early in life, often from our mother's breastmilk, which contains molecules of food from her diet. We then develop tolerance during the process of low-dose, continuous exposure that is optimal for the development of immunological tolerance. As we continue to encounter an increasing number of foods, develop early tolerance, and continue to eat the foods throughout life, such tolerance is maintained and allows us to eat all foods with impunity.

Food allergy presents a different immunological profile. Instead of developing immunological tolerance, the immune system in individuals with allergies mounts a nonprotective resistance, resulting in disease. This process is called *immunological* (or allergic) *sensitization*. Following sensitization, whenever the same food molecules are encountered, the immune system mounts an allergic defense and symptoms develop. This is designated *atopy* and the individual as *atopic*. (Details of this process are provided in Chapter 1.)

Previously it was thought that sensitization and the allergic response to food developed early in life as a result of exposure to foods during the period in which an infant's immune system was immature—predominantly the first year of life. It was argued that if the infant could be protected from encountering the highly allergenic foods during this early period, the more mature immune system of the 2-year-old or even 3-year-old would be better equipped to deal with the food components and thus avoid sensitization. However, after several years of parents being given strict directives to avoid exposing their children to highly allergenic foods such as peanuts, tree nuts, fish, shellfish, and other “high allergenicity” foods in the early months and even years, the enormous increase in allergic children in the population suggested that the approach was somehow not working.

Recent research now indicates that oral tolerance develops early in life and that there may be specific “windows of opportunity” in which exposure to allergenic foods leads to tolerance rather than sensitization. If these opportunities are bypassed as a result of avoiding the food, allergy may result. Exactly what the process of oral tolerance entails, the optimal circumstances in which it takes place, and the best time for exposing the infant to highly allergenic foods still remain to be determined. Nevertheless, current research indicates that early exposure in a “safe environment” rather than complete avoidance of the food is likely to promote tolerance and that, in fact, early avoidance may lead to later sensitization—a complete reversal of the teaching from learned societies just a few years ago (this topic is discussed in detail in Chapter 44).

In addition to early exposure of the potentially allergic infant to food as a measure to prevent food allergy, inducing tolerance by exposure to allergenic foods later in life is being increasingly explored in the management of established food allergy. Previously, anyone, especially a child, who was allergic to a food was instructed to strictly avoid the food as a measure to prevent symptoms, and, as a result of avoidance, to develop tolerance over time as their immune system became more mature. However, research studies are now indicating that exposure to the allergenic food in

a “safe environment” using the “low-dose continuous exposure” criterion can result in tolerance. This is important research, as it may lead to greater safety for those individuals at risk of a life-threatening anaphylactic reaction to a food, and preclude a lifetime of fear and stress associated with eating. The topic of specific oral tolerance induction (SOTI) is discussed in Chapter 44.

Allergy, Microorganisms, and Probiotics

Another focus of recent research that may promote tolerance to foods is based on the concept that the microorganisms residing in the large intestine can strongly influence the immunological processes taking place in the area. Interactions of the resident microflora with the cells of the surrounding GALT, interactions of the members of the microflora with each other, and the results of the activity of the microorganisms on the materials available in the colon (such as undigested food materials) seem to impact the immunological responses involved in allergy. This topic is discussed in Chapter 47. This is a rapidly evolving field and promises interesting developments in food allergy prevention and management in the future.

Foods That Cause Food Sensitivity Reactions

Any food is capable of triggering allergy in a person sensitized to it. All foods contain molecules that can elicit a response of the immune system. However, for many reasons that include both the structure of the food molecules and peoples’ immunological responses, the foods that cause the majority of allergic reactions tend to be few in number.

Food intolerances, which result from the body’s inability to digest, absorb, or efficiently metabolize a food or a component of food, add another layer of complexity to the problems associated with adverse reactions to foods. In most cases of food intolerances, there are no tests available for their identification because the mechanisms responsible for the development of symptoms are incompletely understood.

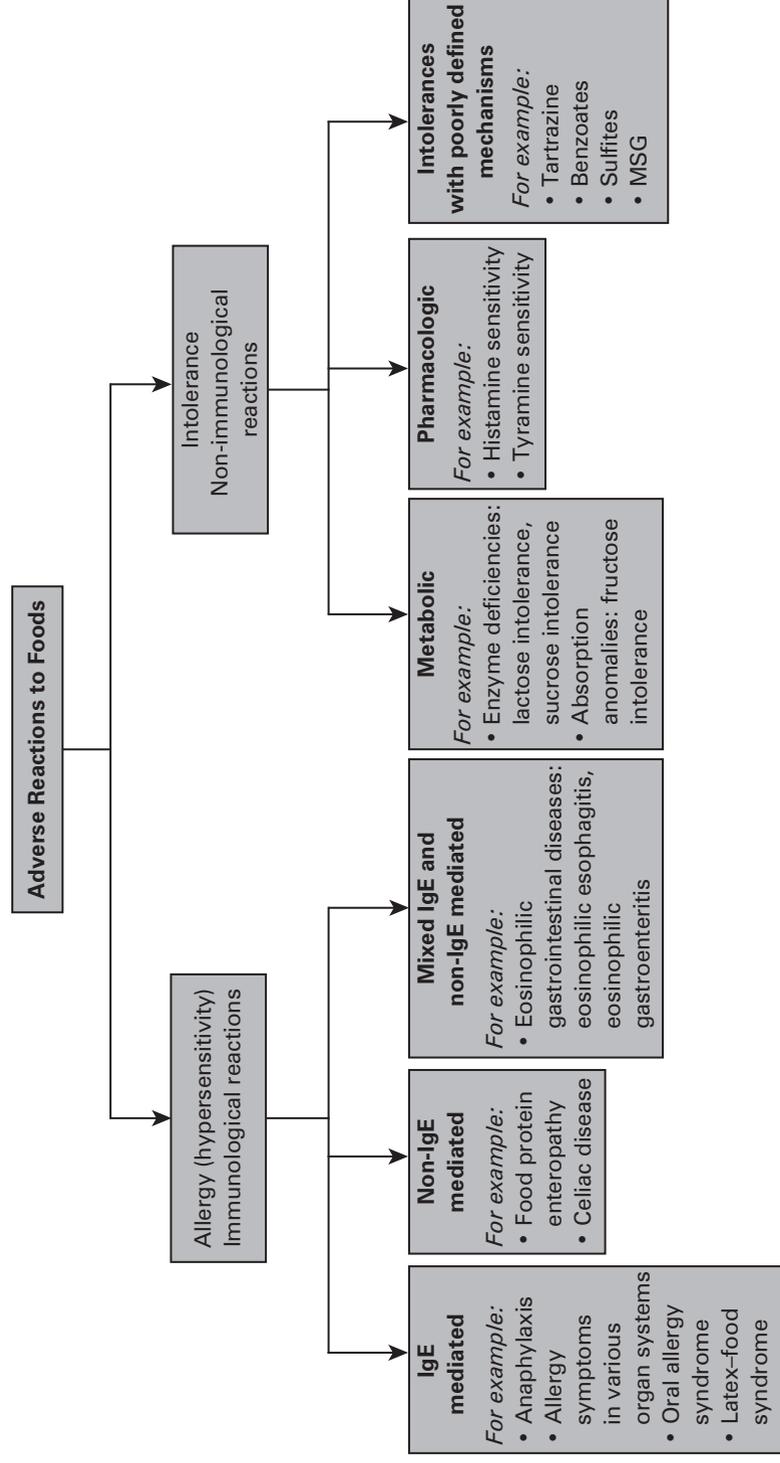
Many attempts have been made to classify adverse reactions to foods, but because of the paucity of information regarding mechanisms in many cases, none are entirely satisfactory. A generalization of the types of reactions involved is represented in Figure 1.

Dietary Management of Adverse Reactions to Foods

Adverse reactions to foods and beverages can appear in many forms and can result in a confusing array of symptoms. Sometimes, the realization that a person’s ill health is caused by their diet is reached only when all other causes have been ruled out, often after many and varied diagnostic tests. At other times, the culprit food is

FIGURE 1

Classification of Adverse Reactions to Foods According to the Pathogenic Mechanisms



instantly recognized, especially when the result is an immediate, frightening, severe anaphylactic reaction.

The ultimate aim in managing and living with food sensitivity is detecting and eliminating the specific antagonistic foods and formulating a nutritionally sound diet to ensure optimum health. This is often a tedious, time-consuming process and requires a tremendous amount of knowledge, skill, commitment, and dedication on the part of both the food-sensitive individual and the clinician who is supervising his or her treatment.

However, when a person has been feeling chronically sick and then suddenly feels well for the first time in many years, as so often happens, the reward more than justifies the time and effort that have gone into the endeavor. The successful management of food sensitivity has four distinct phases:

- Accurate identification of the foods responsible for the symptoms, which ultimately will involve elimination of the suspect foods and challenge (reintroduction of the foods) to identify those that elicit symptoms on ingestion
- Provision of a diet that excludes all the offending foods and supplies complete balanced nutrition from alternative sources
- Recognition of the development of tolerance to the foods that have previously caused adverse reactions
- Regular consumption of the foods to ensure the maintenance of tolerance

Although people often look for the ideal “hypoallergenic diet,” such a thing does not exist. What is “hypoallergenic” for one person could be life-threatening for another. Each person’s inherited tendencies, previous medical history, lifestyle, and response to both food and nonfood factors (such as airborne and environmental allergens) will contribute to the way in which his or her body reacts to the “foreign” foods and chemicals that enter it.

This book is designed to provide the information and tools that are required to identify the specific foods, food additives, and other ingested materials that are responsible for a person’s adverse reactions and to devise nutritionally adequate diets to ensure the best possible health of the food-sensitive individual.

The first part of the book explains exactly what “food allergy” and “food intolerance” mean in terms of how the food-sensitive person’s body responds and copes with food, and what actually causes a person to react in a certain way. The subsequent sections provide detailed instructions for the application of this information in practice.

References

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