

# Understanding Food Allergy

## A Primer for Dietitians



It is estimated that three to four percent of adults and six to eight percent of children under four years of age in the United States have a food allergy (NIAID, 2006; Sicherer and Sampson, 2006), a problem that pediatricians and scientists say is increasing.

Many dietitians face the challenge of assisting patients who suffer from ailments and illnesses caused by food. It is important to understand what constitutes a food *allergy* versus other adverse food reactions (intolerance, aversion, etc.). While the course of treatment may be the same – avoid the problem food – the difference between the two can literally be a matter of life and death.

The dietitian is uniquely positioned to understand these issues and help the patient manage his or her diet while preserving quality of life.

## Learning Objectives

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- ❑ Distinguish food allergy from other adverse food reactions.
- ❑ List “The Big Eight” food allergens.
- ❑ Understand medical diagnosis and management of food allergy (including symptoms and tests) in order to communicate effectively with the patient and attending physician.
- ❑ Understand the appropriate dietary management of food allergy, including allergen avoidance and ensuring nutritional adequacy.
- ❑ List high-risk situations for allergic individuals.
- ❑ List strategies for avoiding allergenic proteins in foods.



This self-study module will provide one-hour of Level I continuing professional education. After completing this module, the dietetic professional will be able to:

- Distinguish food allergy from other adverse food reactions.
- List “The Big Eight” food allergens.
- Understand medical diagnosis and management of food allergy (including symptoms and tests) in order to communicate effectively with the patient and attending physician.
- Understand the appropriate dietary management of food allergy, including allergen avoidance and ensuring nutritional adequacy.
- List high-risk situations for allergic individuals.
- List strategies for avoiding allergenic proteins in foods.

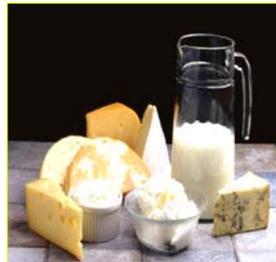
**NOTE: The full text of this module appears in the notes pages. The slides are intended to support the full text. Therefore, please refer to the text on the notes pages for the full content of this module.**

Resources for additional information, references for the module, and a glossary of terms are provided at the end of the module.

## Adverse Food Reactions: Distinguishing Food Allergy

### ❑ Adverse Food Reaction

- Toxic reaction to:
  - ❑ Foodborne pathogen
  - ❑ Pharmacologically active food component
- Non-toxic reaction:
  - ❑ Host-specific metabolic disorder (e.g., lactose intolerance)
  - ❑ **Food allergy** is an abnormal immunologic response to a dietary protein
    - IgE-mediated
    - Cell-mediated



Food allergy will be the focus of this module. It is important, however, to distinguish food allergy from other adverse food reactions, because they are often confused.

There are many different ways of classifying adverse food reactions, with some variation among world regions. Broadly speaking, adverse food reactions may be toxic, in the case of a reaction to a food borne pathogen (e.g., scombroid fish poisoning, in which ingestion of toxin produced by bacteria in certain contaminated, undercooked fish may cause a histaminelike reaction in sensitive individuals) or a pharmacologically active food component (e.g., tyramine in aged cheeses or alcohol) (Sampson, 2004; Sicherer and Sampson, 2006). Reactions may also be nontoxic, including host-specific metabolic disorders (e.g., lactose intolerance) and immunologic, or allergic, reactions.

Food allergy is an abnormal immunologic response to a dietary protein (Sicherer and Sampson, 2006). Food allergies are most often immunoglobulin E (IgE)-mediated, but may also be non-IgE, or cell-mediated. Both of these classes of food allergy will be addressed in this module.

## Prevalence of Food Allergy

- 4% of all Americans (approximately 12 million)
  - 3.7% of adults
  - 6% of children under 3 years of age
    - Most food allergies resolve in first 10 years of life
    - Cow milk allergy in 2.5%
    - Egg allergy in 1.3%
    - Peanut allergy in 0.8%



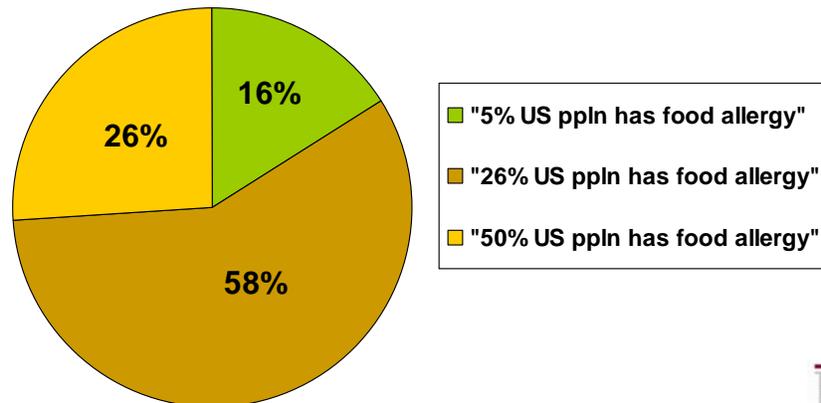
Nearly four percent of Americans (approximately 12 million) are affected by food allergies, including 3.7 percent of adults, and six percent of children younger than three years of age (Sicherer and Sampson 2006). Prevalence statistics vary according to methodology, including the assessment of food allergy via confirmed diagnosis, versus self-report (Rona, et al, 2007). Still, food allergy is a problem that pediatricians and scientists say is increasing among children (NIAID, 2006; Sicherer and Sampson, 2006).

Most food allergies, particularly allergies to milk, eggs, soy, and wheat, are usually outgrown within the first ten years of life (Sampson, 2004). For example, nearly all infants with milk allergy experience *clinical reactivity* in the first year of life, with tolerance developing in about 80 percent by the time they are five years old. About 60 percent of infants with cow's milk allergy experience IgE-mediated reactions, and about twenty-five percent of them remain sensitive past age ten, with 35 percent of those retaining sensitivity having other food allergies. **In contrast, peanut, tree nut, fish, and shellfish allergies are often lifelong allergies, with only twenty percent outgrowing peanut allergy, for example.**

In young children, milk allergy is estimated to be present in 2.5 percent; egg allergy in 1.3 percent; and peanut allergy in 0.8%. Studies assessing self-reported food allergy indicate that the percentage of young children with peanut allergy has doubled from 1997 to 2002 (Sicherer, et al, 2003).

## Perception of Proportion of U.S. Population with Food Allergies

*What percentage of the entire US population (that is, adults and children) do you think have food allergies? (n=1000)*



Although food allergy is a serious problem, American consumers largely overestimate the actual prevalence of food allergy. Only 16 percent correctly state that about five percent of the population have food allergies (IFIC Foundation, 2007). 58 percent state that food allergies are suffered by a quarter of the population, and 26 percent state that half of consumers have food allergies.

Examples of perceived food intolerances cited by consumers include lactose, strawberries, mushrooms, chocolate, and raspberries (IFIC Foundation, 2007).

The implication of these misperceptions for the individual may include a negative impact on quality of life, nutrition risk, and poor growth (in children) (Chapman, et al, 2006). Diagnostic evaluation by the patient's primary care physician (PCP) and/or a board certified allergist should be carried out before extensive restrictions are placed on an individual's diet. Conversely, any adverse food reaction should be evaluated, given the potentially fatal nature of food allergy.

## Allergenic Foods

- The “Big 8” food allergens cause more than 90% of all food allergies. They are:
  - Milk
  - Eggs
  - Peanuts
  - Tree nuts (such as almonds, macadamia nuts, pecans, etc.)
  - Soy
  - Wheat
  - Fish
  - Crustacean shellfish (such as shrimp, crab, etc.)
- Can be raw or cooked
- Oils: Proceed with caution
  - Protein is largely removed from highly refined oils
  - Cold-pressed oils may contain allergenic proteins
  - Processing/preparation info not always available



The “Big 8” food allergens cause more than 90 percent of all food allergies (ADA 2000). They include: milk, eggs, peanuts, tree nuts (such as almonds, Brazil nuts, cashews, hazelnuts, macadamia nuts, pecans, pine nuts, pistacio nuts, and walnuts), soy, wheat, fish, and crustacean shellfish (such as lobster, crab, shrimp, etc.).

Overall, the typical allergens of infancy and early childhood are eggs, milk, peanuts, fish, tree nuts, wheat, and soy, while allergens in older children and adults are caused primarily by peanuts, tree nuts, fish and crustacean shellfish (Sampson, 2004; Sicherer and Sampson, 2006).

It is a myth that cooking a food will reduce its allergenicity. This perception may be related to confusion with oral allergy syndrome, described in a separate slide. In fact, roasted peanuts may be more highly allergenic than boiled or fried peanuts (Sicherer, 2002).

The oils derived from peanuts, soy, and certain other foods that are most commonly used in commercial food preparation are usually highly refined (heat processed), which leaves negligible levels of residual protein from the product. Research has shown that food allergic individuals do not typically react to these heat processed oils (Bush, et al, 1985). “Gourmet” – cold-pressed, or expeller-pressed – oils, however, are more likely to contain allergenic proteins, which provide the flavor to the oil. **It is important to note that the processing method used to produce an oil is not always available to an individual purchasing a prepared food. Additionally, oil that is used to fry different types of food may be problematic, as proteins from allergenic foods, such as fish, may remain in the oil after cooking, contributing to cross contact. Or residual protein may remain, even after heat processing.**

## Cross-Reactivity

- ❑ Foods that share similar proteins
- ❑ Oral or Pollen-Food Allergy Syndrome
  - ❑ Localized to mouth and throat
  - ❑ OK to eat when cooked
- ❑ Multiple foods may be involved, highlighting importance of:
  - Diagnosis by board-certified allergist and/or PCP
  - RD/MD communication
  - RD assistance to ensure nutritional adequacy of the diet



Many foods share similar proteins, often because they are from related families. However, true clinical cross reactivity varies. For example, if an individual is allergic to shrimp, he or she is likely (>75%) to be allergic to crab, lobster, and crayfish. However, a person allergic to peanut, a legume, usually (>95%) can tolerate most other beans.

Another type of cross-reactivity is *oral allergy syndrome (pollen-food allergy syndrome)*. When a person who is allergic to a certain type of pollen consumes a raw fruit or vegetable with related proteins, he or she may experience an allergic reaction to the pollen. For example, a person allergic to birch tree pollen may have symptoms with peach, apple, or other Rosaceae family foods. The syndrome varies because a person with birch pollen allergy may react to one, none, or several of the related foods. Also, unlike some types of food allergies, symptoms are usually localized only to the mouth and throat and resolve rapidly. Additionally, cooked forms of the same foods will typically not cause a reaction. (JADA, 2000; Sicherer, 1999)

**Multiple foods may be involved in cross-reactivity, highlighting the importance of diagnosis by a board-certified allergist and/or primary care physician; effective communication between the dietitian and physician; and the care of a registered dietitian in helping the patient to ensure nutritional adequacy of the diet.**

## Controversies: Food Additives

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- Monosodium glutamate (MSG) – not allergenic
- Food color/additive reactions (non-IgE):
  - FD&C Yellow No. 5 (tartrazine) - rare cause of hives
  - Sulfites – confirmed reaction (asthmatics)



The relationship of food allergy to certain food additives remains controversial. Although most Americans safely consume a wide variety of food additives every day, a small number have been associated with rare adverse reactions in susceptible individuals. For example:

- **FD&C Yellow No. 5** (tartrazine)– Used to color beverages, candy and other foods, this additive has been shown to cause hives in fewer than one in 10,000 people. There have been unsubstantiated claims that FD&C Yellow No. 5 provokes asthma attacks and that some people who react to aspirin have a cross-sensitivity to it. It is listed as “FD&C Yellow No. 5” on food labels of products containing it.
- **Monosodium glutamate** (MSG) – Used as a flavor enhancer and listed on the food label as “monosodium glutamate,” MSG is the sodium salt of glutamic acid, an amino acid found naturally in the human body and all protein-containing foods. The FDA has determined that MSG is safe for general consumption, is not allergenic, and does not cause or exacerbate asthma.
- **Sulfites** – A small segment of the population has been shown to develop shortness of breath, and sometimes even fatal shock, shortly after exposure to sulfites, which are used to preserve the color of foods and inhibit the growth of microorganisms in fermented foods. Food sources include dried fruits or vegetables, potatoes (some packaged and prepared), wine, beer, bottled lemon or lime juice, shrimp (fresh, frozen, or prepared), pickled foods (pickles, relishes, peppers, sauerkraut). Sulfites can provoke severe asthma attacks in some asthmatics, and, as a result, the FDA banned the use of sulfites in 1986 for fresh fruits and vegetables (except potatoes) intended to be sold and eaten raw. Sulfites added to all packaged and processed foods must be listed on the product label.

## IgE-Mediated Allergic Response

### □ Sensitization

- In individuals predisposed to allergy to a particular protein, consumption will stimulate production of IgE antibodies specific to that allergenic protein.

### □ Clinical reactivity

- Subsequent consumption of the food allergen and contact with the IgE antibodies causes release of histamine, prostaglandins, and leukotrienes, leading to clinical symptoms.
- Sensitization can be present without clinical reactivity



In an immunoglobulin E (IgE) antibody-mediated allergic response, consumption of an allergenic protein by an individual who is predisposed to develop food allergy stimulates production of IgE antibodies specific to that food (Sicherer and Sampson, 2006; Sampson, 2004). IgE antibodies may bind to blood cells, called *basophils*, or to mast cells in body tissues, including the skin, lung, and gastrointestinal (GI) tract (tissues that come into contact with the environment). The measurable presence of IgE antibodies is called *sensitization*.

When IgE antibodies on the surfaces of basophils and mast cells come into subsequent contact with food allergens, the cells release histamine, prostaglandins, and leukotrienes, which cause allergic symptoms (*clinical reactivity*), such as rash, hives, difficulty breathing, wheezing, etc. It is notable that sensitization can be present without clinical reactivity (Sicherer and Teuber, 2004).

Infants are particularly vulnerable to the IgE-mediated immune response, in part due to the developmental immaturity of various components of the gastrointestinal mucosal barrier (Sicherer and Sampson, 2006). The gut flora is influenced in the early days of life by maternal flora, genetics, and environment, and is the subject of ongoing mucosal immunology research (Sampson, 2004).

## Symptoms of Food Allergy

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May occur in one system:

- ▣ Gastrointestinal (GI) tract
- ▣ Skin
- ▣ Respiratory system

Or in combination:

- ▣ ANAPHYLAXIS – life threatening allergic reaction



Typically, symptoms of food allergic reactions are manifested on the skin, in the gastrointestinal (GI) tract, or in the respiratory system, either individually or in combination, sometimes causing generalized anaphylaxis (life-threatening allergic reaction). In fact, food allergies are the leading cause of anaphylaxis treated in emergency rooms in many countries. (Sampson, 2004; Sicherer, et al, 2003; ADA, 2000).

The following outline of symptoms of food allergy is intended to familiarize the dietitian with clinical disorders associated with food allergy for the purpose of facilitating effective communication with the attending physician.

## Symptoms: GI Tract

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- ❑ Swelling or itching of the lips, mouth and/or throat
- ❑ Nausea, vomiting, cramping and/or diarrhea
- ❑ Eosinophilic esophagitis/gastroenteritis may be associated with food allergic responses
  - Critical nutrition management role for dietitian



Food allergy symptoms may involve the gastrointestinal (GI) tract with symptoms such as swelling or itching of the lips, mouth and/or throat (Sampson, 2004; Sicherer and Sampson, 2006). Additionally, nausea, vomiting, cramping and/or diarrhea may occur.

The GI tract may also be affected in diseases that are isolated to the gut and represent a chronic response to causal food allergens. Particularly in infants and children, chronic vomiting or diarrhea, often leading to poor growth and other malnutrition-related effects, may occur.

Eosinophilic esophagitis and gastroenteritis are disorders in which a white blood cell, the eosinophil, collects in gut tissues leading to symptoms such as pain with eating, possible obstruction, malabsorption, and poor growth. The disorders may be associated with IgE- and/or cell-mediated food allergic responses. (Sicherer and Sampson, 2006).

Eosinophilic gastrointestinal disease often require trial elimination diets. The registered dietitian can play a critical role in working with the physician and/or allergist to develop an elimination diet and counsel patients and families on adherence to the elimination diet, as well as nutritional adequacy of the diet.

## Symptoms: Skin

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- ❑ Itching, swelling, hives, eczema and/or redness
- ❑ Up to 20% of *acute* hives are caused by food allergy; hives lasting more than six weeks are rarely caused by food allergy
- ❑ 37% of children with moderate to severe atopic dermatitis also have food allergy



The most common food allergy symptoms involve the skin, in the form of itching, swelling, hives, eczema and/or redness (Sampson, 2004; Sicherer and Sampson, 2006).

Types of skin ailments seen in food allergic patients include:

- Hives or Urticaria
- Atopic Dermatitis

## Symptoms: Respiratory Tract

- ❑ Congested, runny, and/or itchy nose, sneezing, raspy cough, and/or wheezing
- ❑ Nasal symptoms occur in 25-80% of food allergic patients; in isolation, *usually not food-related*
- ❑ Asthma is food-related in only 5.7% of asthmatic children
- ❑ Heiner Syndrome
  - Rare adverse pulmonary response to cow's milk
  - Can occur in a very small percentage of infants



The upper and lower respiratory tract can be a target of IgE-mediated food allergy, with symptoms including congested, runny, and/or itchy nose (rhinitis), sneezing, raspy cough, and/or wheezing.

- Nasal symptoms occur in 25-80% of food allergic patients. However, nasal symptoms in isolation *usually are not food-related*.
- Asthma is food-related in only 5.7% of asthmatic children
- Heiner Syndrome is a rare adverse pulmonary response to cow's milk that occurs in a very small percentage of infants. It is characterized by repeated pneumonia, and may result in iron-deficiency anemia and even failure to thrive.

*(See Glossary of Terms)*

(Sampson, 2004; Sicherer, 1999)

## Symptoms: Anaphylaxis

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- ❑ "Anaphylaxis is a serious allergic reaction that is rapid in onset and may cause death." *NIAID/FAAN Panel, 2005*
- ❑ Hives, swelling of throat, difficulty breathing, and/or loss of consciousness
- ❑ Causes 150-200 deaths/year in the US
- ❑ Treatment: Epinephrine (adrenaline) shot



A panel convened by the National Institute of Allergy and Infectious Diseases (NIAID) and the Food Allergy and Anaphylaxis Network (FAAN) in 2005 defined anaphylaxis as "...a serious allergic reaction that is rapid in onset and may cause death" (Sampson, et al, 2006). Anaphylaxis causes hives, swelling of the throat, difficulty breathing, and/or loss of consciousness. According to the FAAN Web site, it results in 150-200 deaths per year in the U.S. ([www.foodallergy.org](http://www.foodallergy.org))

The primary treatment is an epinephrine (adrenaline) shot, which must be administered promptly in order to be effective.

## Symptoms: Anaphylaxis (continued)

- ❑ Food is most common cause of outpatient anaphylaxis
- ❑ Factors associated with *fatal* food-induced anaphylaxis include:
  - Allergy to peanuts or tree nuts
  - Teen or young adult age
  - Coexistent asthma
  - Failure to promptly administer epinephrine



As food is the most common cause of anaphylaxis in the outpatient population (Sicherer and Sampson, 2006), counseling patients to effectively avoid food allergens is critical. The factors associated with fatal food-induced anaphylaxis include:

- allergy to Peanuts or tree nuts,
- teen or young adult age (less likely to carry epinephrine or tell their friends about their allergy),
- coexistent asthma, and/or
- failure to promptly administer epinephrine (lack of preparedness and/or education).

## Cell-Mediated Allergic Response

- Pathogenesis is not as clearly defined as for IgE-mediated allergic response
  - T-cells, macrophages, and other cells are believed to play a role.
  - Causes inflammation in the GI tract and skin
- Celiac Disease/ Celiac Sprue/ gluten-sensitive enteropathy
  - Hypersensitivity to gluten (found in wheat, barley, rye, and certain other grains)
  - Chronic inflammatory disorder of small intestine
  - May also include dermatitis herpetiformis, a chronic skin disorder caused by an IgA-mediated hypersensitivity to gluten



Allergic reactions to foods may also be cell-mediated. While the pathogenesis of such reactions is not as clearly defined as IgE-mediated reactions, it is thought that T cells respond directly to the allergenic protein, acting with macrophages and other inflammatory cells to cause inflammation in the GI tract and skin (Sampson, 2004).

The most well-known example of a cell-mediated allergic reaction is *Celiac Disease*, also known as *Celiac Sprue* or *gluten-sensitive enteropathy*. Celiac Disease is a hypersensitivity to gluten – a protein found in wheat, barley, rye, and certain other grains – in which the immune system damages the villi of the small intestine and causes chronic inflammation. It is therefore both an autoimmune disorder and a disease of malabsorption (NIDDK 2005). *Dermatitis herpetiformis* is a chronic skin disorder that may occur simultaneously with Celiac Disease or alone (Sampson, 2004; Sicherer, 1999). It is associated with a specific IgA-mediated immune sensitivity to gluten.

## Symptoms: Celiac Disease

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- ❑ Celiac is often confused with other ailments
  - E.g., irritable bowel syndrome, Chron's disease, etc
- ❑ GI symptoms: gas, abdominal bloating and pain, diarrhea, *steatorrhea*, mouth sores
- ❑ Skin symptoms: *dermatitis herpetiformis*
- ❑ Potentially asymptomatic, increasing risk for malnutrition-related symptoms and complications



Celiac Disease symptoms are similar to and often confused with irritable bowel syndrome (IBS), iron-deficiency anemia, Crohn's disease, diverticulitis, intestinal infection, and chronic fatigue syndrome. Celiac Disease can produce GI (gas, abdominal bloating and pain, diarrhea, steatorrhea, and mouth sores) and/or skin (dermatitis herpetiformis) symptoms (NIDDK, 2005).

An individual with Celiac Disease may also be asymptomatic, therefore increasing the risk for malnutrition-related complications. Malnutrition as a result of Celiac Disease may cause weight changes, dental problems, fatigue, anemia, osteopenia/osteoporosis, behavioral changes, nerve damage, muscle cramps, seizures, ammenorhea, miscarriage, infertility, delayed growth, and/or failure to thrive in infants (Lee & Newman, 2003).

## Controversies: Symptoms

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- Symptoms falsely attributed to food allergy:
  - Migraines
  - Behavioral disorders



Another area of controversy is the relationship of food allergy to a number of clinical ailments.

For example, food sensitivity may play a role in a minority of patients with migraine headaches, although pharmacologic activity of chemicals found naturally in some foods, such as tyramine in aged cheeses, are often responsible.

Allergic responses to proteins in foods may be disruptive (e.g., skin itch, etc), but have not been determined to be a cause of behavioral disorders.

## Diagnosis of a Food Allergy

- ❑ Managed by primary care physician or board-certified allergist
- ❑ Includes complete medical history and physical exam
- ❑ May include food diary, completed by patient
- ❑ Screening Tools
  - Skin Prick Test
  - Blood Tests



Diagnosing a food allergy may be straightforward if symptoms are consistent (Chapman, et al, 2006). For example, the diagnosis of peanut allergy may be obvious in a young child who vomits and suffers from hives after eating peanuts on different occasions. However, since there can be many different components at work in food related illnesses, it is advisable that the patient see their primary care physician or a board-certified allergist to determine whether the symptoms are related to food allergy or another medical issue.

The first step in diagnosing a food allergy is a thorough examination of the patient's medical history (Sicherer and Teuber, 2004). A complete physical examination and selected laboratory tests (described on the next slide) may be conducted.

The patient may be asked to keep a detailed food diary and record of symptoms, which may help to identify potential culprits. The dietitian can guide the patient in recording a useful food diary, detailing the amount of food that is eaten; the amount of time between food consumption and symptom development; how often the reaction occurs; and any other relevant information (Chapman, et al, 2006).

*Sensitization* (the presence of food-specific IgE antibodies) is detected by a blood and/or skin prick test. The skin prick test involves introducing a small amount of allergen extract into the skin by making a small puncture. The specific allergens to which a patient is allergic will cause a reaction at the site of the test. Both of these tests are utilized to support a diagnosis of food allergy. It is also important to note that skin prick and blood tests are "screening" tools with high false positive rates and should be used in combination with medical history, elimination diet, and/or food challenge tests.

## Diagnosis of a Food Allergy (continued)

- ❑ Elimination diet
- ❑ Food challenge
- ❑ Diagnosis involves both science and clinical judgment!
- ❑ Periodic re-evaluation



An **elimination diet**, with respect to diagnosis, involves eliminating suspected foods from the diet for a period of time that varies according to the particular clinical manifestations that are present (Sicherer and Teuber, 2004). If improvement is seen, then suspected foods may be reintroduced one at a time, possibly under direct medical supervision (e.g., a medically-supervised oral food challenge) if a risk of anaphylaxis or acute allergic reaction is possible, to disclose the problematic food(s).

The **double-blind, placebo-controlled oral food challenge** is the “gold standard” diagnostic tool for food allergy (Sicherer and Teuber, 2004). The food challenge involves physician-supervised consumption of increasing doses of the suspected food until the individual develops symptoms or tolerates a normal portion. A food challenge is not always necessary, such as when a severe reaction has clearly followed consumption of the suspected food.

As with most health conditions, diagnosis involves both science and clinical judgment by the attending physician.

Clinical *tolerance* develops to most food allergens over time, although less frequently for peanuts, nuts, fish, and shellfish. Under the care of a board-certified allergist, children may be periodically re-evaluated to determine if they have outgrown their allergy.

## Diagnosis: The Dietitian's Role

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- Refer a patient to their primary care physician or a board-certified allergist (find an allergist at [www.aaaai.org](http://www.aaaai.org))
- Support physician/allergist during diagnosis by assisting with:
  - Food Diary
  - Food Challenge
  - Elimination Diet



The Registered Dietitian can play a role in caring for the food allergic individual (ADA, 2000).

S/he can refer a patient to an allergist for evaluation. The dietitian may suspect food allergy in a patient, or receive a new patient who perceives that they have a food allergy. In either case, involving the allergist or primary care physician is critical for an appropriate diagnosis and treatment.

S/he can also play an important role in supporting the physician/allergist during the diagnostic process by :

- helping the patient to complete a food diary,
- assisting with a physician-supervised food challenge,
- developing an elimination diet, and/or
- helping the patient to adhere to the elimination diet.

## Managing Food Allergy

- ❑ **Avoid the allergen-containing food(s)!**
- ❑ **Develop a Food Allergy Action Plan**
  - Inform and involve family, friends, and caretakers
  - Early symptom recognition
  - Emergency therapy: Epinephrine (adrenaline) shot
  - Medical identification necklaces/bracelets



Once a food allergy diagnosis is made by the physician, effective management of food allergies consists of:

- 1) Avoiding allergen containing foods and high risk situations (discussed in greater detail in the following slides)
- 2) Developing a Food Allergy Action Plan

The Food Allergy Action Plan is designed to recognize and treat potentially severe food allergic reactions. Food allergic patients should have a written emergency plan for treatment in the event of accidental ingestion of an allergen. Those judged to be at increased risk of anaphylaxis (for example those with asthma or a history of peanut, tree nut, or seafood allergies) should carry self-injectable epinephrine (adrenaline). Syringes with pre-measured doses of epinephrine are available by prescription. Oral antihistamines may be helpful in treating mild reactions, but early administration of epinephrine can be life-saving.

Medical-alert bracelets or necklaces can also be worn to quickly alert EMS, medical personnel, or other caretakers if the food allergic person is found unconscious. Another idea for food allergic patients to help emergency personnel is to enter their food allergy information (in the Notes area) and “in case of emergency” (ICE) contact into their cell phones. Some EMS personnel now check cell phones for this information.

Family, friends, coworkers, teachers, and school food service professionals and administrators should be informed of a child’s food allergies and be provided with their Food Allergy Action Plan.

## Managing Food Allergy

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Cell-Mediated allergies:

- ❑ **Avoid the allergen-containing food(s)!**
  - Normalize intestinal histology - may take up to 12 weeks
- ❑ Periodic reintroduction of food allergens?
  - MD supervision
  - Celiac Disease requires *life-long* avoidance of gluten-containing foods



In cell-mediated food allergies, allergen avoidance is also the best treatment. It may be necessary to eliminate responsible allergens for up to 12 weeks to bring about normalization of intestinal histology. Periodic reintroduction of food allergens under physician supervision is warranted to determine if tolerance has developed to certain allergens. However, Celiac Disease requires *life-long* avoidance of foods containing gluten.

(Sampson, 2004; Sicherer, 1999)

# Managing Food Allergy

## □ Infants

- Formula feeding
  - Hypoallergenic milk- or soy-based formula, may be indicated
- Breastfeeding
  - Maternal dietary restrictions may be needed

## □ Communication

## □ Education

- Foods & ingredients
- Reading labels



The registered dietitian can play a crucial role in helping the allergic patient to successfully avoid food allergens while maintaining both nutritional adequacy and quality of life.

For infants, pinpointing offending proteins is a much simpler proposition. If the baby is fed with infant formula, the pediatrician may recommend a hypoallergenic formula. If the baby is breastfed, the mother may eliminate peanuts, tree nuts, milk, fish, and eggs from her diet as a proactive strategy. This action could have significant nutritional implications that can be managed with the help of the RD.

The most important skill for an allergic child and his or her family is communication. Avoiding allergenic foods involves not only seeking information, but also sharing it with others who provide and prepare food. Common food allergens have previously been identified in this module. The physician's diagnosis will identify the specific food protein(s) that must be avoided. The patient will look to the dietitian for assistance regarding less obvious foods and ingredients that may contain that allergen. For example, milk protein is found not only in milk, but also in cheese, yogurt, cream, ice cream, butter, pudding, and particular sauces and other preparations.

Reading food labels is challenging for some consumers, as the names of some ingredients that contain allergenic proteins may be unfamiliar to the average person. Some examples of ingredients derived from, and alternative names for, common food allergens are:

- Milk:** casein, caseinates (ammonium, calcium, magnesium, potassium, sodium), cream, hydrolysates, lactose, nougat, pudding, sour cream, whey, yogurt
- Egg:** albumin, lysozyme, mayonnaise, meringue, surimi
- Peanut/Tree nut:** cold pressed, expelled, or extruded nut oils, ground nuts, mixed nuts, peanut butter, peanut flour
- Soybean:** hydrolyzed soy protein, soy sauce, tamari, tempeh, textured vegetable protein, tofu
- Wheat:** bran, bread crumbs, cracker meal, flour, gluten, semolina, whole wheat berries, whole wheat flour
- Shellfish/Fish:** abalone, cockle, crab, shrimp/prawns, scallops, lobster

## Managing Food Allergy

- Reading Labels: Food Allergen Labeling and Consumer Protection Act (FALCPA)
  - Big 8 allergens must be disclosed *in plain English*
    - Common names for the food allergen listed after lesser known names
    - Can be added under Ingredient list with “Contains”
    - Must list specific type of nut (e.g. pecan) or crustacean shellfish (e.g. shrimp)
    - Includes flavorings and other generic listings
  - Gluten-free labeling: Proposal drafted
  - RD can address areas not covered by FALCPA
    - Careful ingredient list reading for allergens other than the Big 8
    - Provide context for voluntary “may contain,” “may be processed in,” and “may be packaged in” statements



A major food labeling law called the Food Allergen Labeling and Consumer Protection Act (FALCPA, 2004) went into effect in January 2006 and has made label reading somewhat easier for food allergy patients. FALCPA mandates that foods containing any of the Big 8 allergens must declare the allergen in *plain English* in one of the following ways:

- List allergen(s) in Ingredient List
- Provide “Contains” statement, separate from Ingredient List
- In Ingredient List, common name in parentheses, e.g. “albumin (egg)”

Ingredients in the “Big 8” must be listed even if they are present in colors, flavors, or spice blends. Additionally, manufacturers must list the specific nut or shellfish used (e.g., almond, walnut, or cashew; shrimp or lobster).

FALCPA also directed the FDA to consult with appropriate experts and stakeholders to define and permit the use of the term “gluten-free” on food packaging for the benefit of those who suffer from Celiac Disease. A proposal has been drafted and is pending comment.

The registered dietitian can address areas not covered by FALCPA. For example, patients who are allergic to proteins other than the Big 8 should be counseled and given tools to read the ingredient list very carefully. It is also important to help patients understand that the wording choices for “contains” statements separate from the ingredient list are voluntary. While a consumer may think that a food labeled, “may contain peanuts,” is more likely to contain peanuts than a food labeled, “packaged in a facility that processes peanuts,” this is not necessarily true. These two statements likely mean the same thing— that cross-contact during processing or packaging was a possibility. Degree of risk is not defined by these statements.

## Managing Food Allergy

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- Education (cont'd.)
  - High-risk situations
  - Cross-contact
  - Nutritional adequacy



**Particular care should be exercised by food allergy patients when eating out in restaurants, ice cream parlors, movie theaters, and other public dining areas, or even at a friend's house. Food allergic patients should communicate clearly with the kitchen and/or serving staff, or other food preparers, about their food allergy.** It is also important to be alert for early signs of an allergic reaction.

Cafeterias and buffets are particularly dangerous for food allergic individuals due to the sometimes poor labeling of the ingredients in prepared foods, and also due to the risk of cross-contact. For these reasons, buffets should be avoided if possible.

Cross-contact is also a serious risk. This happens when residue or other trace amounts of an allergenic food is unintentionally combined with another food during the cooking process. Cross-contact may occur during harvesting, transportation, manufacturing, processing, storage, or serving. For example, if not thoroughly cleaned, utensils used in allergen-containing foods can transfer enough allergenic proteins to other foods to cause an allergic reaction. It can also occur in fryers and blenders, and on chopping surfaces.

Finally, it is important to help the allergic patient to consume a nutritionally adequate diet, as entire food groups may be eliminated due to allergies. The RD is uniquely qualified to provide this type of nutritional counseling.

## Managing Food Allergy

- In School
  - Communication
    - Food Service Director/Manager
    - Nurse
    - Teachers, including Adjunct Staff
    - Cafeteria Manager
    - Other students and their families
  - Education
  - Prevention
    - Allergen-free tables
    - Menu development for substitutions
    - Avoiding cross-contact in production
  - Food Allergy Action Plan



Again, communication is critical for protecting the food allergic child in school. It is important to communicate with key school personnel (food service director/manager, nurses, teachers, cafeteria manager, students and their families) by providing education. Information about what a food allergy is, how to prevent a reaction, and what to do in case an allergic reaction occurs are key to successful management of food allergy in schools. Since most children do not outgrow peanut allergies, this approach will help the child learn techniques for how to cope in everyday situations that will be carried throughout life.

There are many strategies that may be employed to prevent food allergic reactions in schools. It is not uncommon to find peanut-free day care facilities, preschools, and grade schools, given the prevalence and severity of peanut allergy. However, depending on age, bans may create a false sense of security for the allergic child and school staff, which can potentially lead to a life-threatening situation. Therefore it is important to communicate the policy to all school personnel and students, as well as provide education.

Some alternatives to bans include establishing lunch tables that are free of allergenic foods, not allowing the trading of food among students, etc. FAAN has a comprehensive School Food Allergy Program and other resources designed to educate and assist school personnel and parents with the effective management of childrens' food allergies ([www.foodallergy.org](http://www.foodallergy.org)), and the International Food Information Council (IFIC) Foundation has a fact sheet to assist food service personnel with identifying foods containing allergens and responding to allergic reactions (<http://www.ific.org/publications/other/allergysheet.cfm>). Educating food service personnel about allergens, label reading, and avoiding cross-contamination is a critical prevention measure.

A Food Allergy Action Plan should also be in place for the school, which includes recognizing symptoms and communicating with allergic students.

## Preventing/Delaying Allergic Disease

- High-risk: Infants with family history
- Breastfeeding
  - Verdict is still out
  - Some evidence of correlations between breastfeeding and reduced incidence of food allergy and asthma
  - Recommended exclusively for first 6 months



An infant is considered “high risk” by the American Academy of Pediatrics (AAP) if both parents, or one parent plus one sibling, have food allergies (Zeiger, 2003).

Breast milk provides nutritional, immunological, and physiological nourishment for newborns. Some components of breast milk enhance the natural defenses and promote development of the immune system. Breast milk also inhibits the increase in food antigen absorption that occurs after birth in animals. There is still some debate regarding the degree to which breastfeeding prevents, reduces, delays, or increases the development of allergy (Chapman, et al, 2006). In addition, childhood asthma, although not usually caused by food allergies, also seems to benefit from breastfeeding, according to an analysis of 12 studies which showed that exclusive breastfeeding for about three months after birth helped defer the development of asthma by two to five years.

The AAP strongly recommends breastfeeding for the first 12 months of life, with exclusive breastfeeding the first 6 months (AAP, 2005). Although this recommendation is made for all babies and for many reasons, the AAP recognizes sufficient data to suggest a reduction in risk for food allergy in high risk infants (AAP, 2000).

## Preventing/Delaying Allergic Disease

- Maternal diet during lactation
  - For high-risk infants, maternal elimination of common allergens may be encouraged
- Delay introduction of commonly allergenic foods (for high risk infants)
  - Solid foods: 6 months
  - Cow's Milk: 1 year
  - Eggs: 2 years
  - Peanuts, tree nuts, and fish: 3 years

AAP 2000



Despite the possible benefits of breastfeeding with regard to allergy prevention/delay, maternal dietary proteins are detectable in breast milk and there is a concern about their role in sensitizing an infant at risk for allergic disease. (Vadas, et al, 2001)

For infants “at risk” based upon the family history, the AAP (2000) suggested that mothers may consider avoiding peanut during pregnancy. A benefit of this suggested restriction has not yet been validated.

They also advised (for high risk infants) that a mother who is breastfeeding may “eliminate peanuts and tree nuts, and consider eliminating eggs, cow's milk, fish, and perhaps other foods from [her diet].” (AAP 2000, Zeiger, 2003) It is notable that such restrictions have not been validated as a preventive measure. The decision to restrict potential allergens from the breastfeeding mother’s diet could have significant nutritional implications that may be managed with the help of an RD.

There have been studies showing a benefit of delaying the introduction of solid foods on eczema symptoms. For high risk infants, the AAP recommends introducing solid foods no sooner than 6 months of age.

For those infants at high risk of allergic disease when breast-feeding is not carried out, the AAP suggests a “hypoallergenic” formula (extensive casein hydrolysate) or possibly a partial hydrolysate formula. However, a partial hydrolysate would not be adequate if milk allergy was diagnosed.

## Summary

- Food allergy- abnormal immunologic response to a dietary protein
  - Affects 4% of Americans
    - 3.7% of adults
    - 6% of children
  - Most consumers *believe* that 26-50% have food allergy
- The Culprits:
  - “Big 8” (milk, eggs, peanuts, tree nuts, soy, wheat, fish, and crustacean shellfish) cause more than 90% of all food allergies
  - Many others may cause allergic reactions in small number of individuals
  - Non-allergic food reactions that resemble allergies include food poisoning, food intolerances, and rare reactions to sulfites or FD&C Yellow No. 5
- ***Proper diagnosis essential prior to dietary intervention***



In summary:

- Food allergy is an abnormal immunologic response to a dietary protein.
  - 4% of Americans, including 3.7% of adults and 6% of children, suffer from food allergy.
  - Most consumers believe that 26% to 50% of Americans have food allergy
- The Culprits:
  - “Big 8” (milk, eggs, peanuts, tree nuts, soy, wheat, fish, and crustacean shellfish) cause more than 90% of all food allergies
  - Many others may cause allergic reactions in small number of individuals
  - Non-allergic food reactions that resemble allergies include food poisoning, food intolerances, and rare reactions to sulfites or FD&C Yellow No. 5
- ***Proper diagnosis essential prior to dietary intervention***

## Summary

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- IgE-mediated food allergy:
  - Sensitization: measurable presence of IgE antibodies specific to particular food allergen
  - Clinical reactivity: allergic symptoms evident following consumption of food allergen
    - Positive IgE blood tests may indicate sensitization, but do not predict imminent clinical reactivity
    - Again, ***proper diagnosis is essential.***
  - Symptoms occur most often in skin, also gastrointestinal and respiratory tracts
  - Anaphylaxis: serious allergic reaction, rapid in onset, may cause death.
    - Peanuts and tree nuts
    - ***Education, preparedness, and communication are key!***



### IgE-mediated food allergy:

- Sensitization is the measurable presence of IgE antibodies specific to particular food allergen.
- Clinical reactivity is apparent when allergic symptoms appear following consumption of the relevant food allergen.
  - Positive IgE blood tests may indicate sensitization, but do not predict imminent clinical reactivity
  - Again, ***proper diagnosis is essential.***
- Symptoms occur most often in skin, and also occur in the gastrointestinal tract and respiratory tract.
- Anaphylaxis is a serious allergic reaction that is rapid in onset and may cause death.
  - Peanuts and tree nuts are more often associated with anaphylaxis than other foods.
  - Education, preparedness, and communication are key components of a Food Allergy Action Plan to prevent death from anaphylaxis.***

## Summary

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- Celiac Disease (cell-mediated):
  - Hypersensitivity to gluten
  - Chronic inflammation of the small intestine
  - May include dermatitis herpetiformis
  - ***Potential for severe malnutrition due to malabsorption and dietary restrictions***



Celiac disease is the most well-known cell-mediated food allergy

- Specifically, it is a hypersensitivity to gluten.
- It causes chronic inflammation of the small intestine, and may be associated with the IgA-mediated response in the skin, dermatitis herpetiformis.
- ***There is potential for severe malnutrition with Celiac Disease, due to malabsorption and dietary restrictions of several grains containing gluten.***

## Summary

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- Prevention: Evidence is weak
- AAP guidelines aim to reduce risk in high risk infants and children:
  - Exclusive breastfeeding 1<sup>st</sup> 6 months of life or use of hypoallergenic formula
  - Possible maternal dietary restrictions in lactation
  - Delaying solids until 6 months of age, cow's milk until 1 year, eggs until 2 years, and peanuts, tree nuts, and fish until 3 years.



Evidence for preventive strategies is weak. However, there are strategies recommended by the American Academy of Pediatrics which are thought to reduce risk in high risk infants and children, including:

- Exclusive breastfeeding for the first 6 months of life or use of hypoallergenic formula.
- Possible recommendation for maternal dietary restrictions in lactation.
- Delaying solids until 6 months of age, cow's milk until 1 year, eggs until 2 years, and peanuts, tree nuts, and fish until 3 years.

## Summary

### □ The Dietitian's Role

#### ■ Diagnosis:

- Refer suspected food allergies to the primary care physician (PCP) and/or a board certified allergist.
- Support the PCP/allergist with food diary, oral food challenge, and/or elimination diet.

#### ■ Management

- Communicate with PCP/allergist to understand diagnosis and needed dietary restrictions.
- Provide education and practical strategies for the allergic individual, related to:
  - Foods and ingredients to be avoided
  - Reading labels, including ingredient list and "contains" statements
  - Communicating with restaurants or other food preparers
  - Consuming a nutritionally adequate diet, particularly with needed elimination of an entire food group, and with Celiac disease due to malabsorption
  - Adjusting infant feeding choices as necessary
- Monitor for signs of diet insufficiency or malnutrition
- Dietitians working in schools have a leadership role in guiding school personnel, parents, and students in development of a program to effectively manage food allergies, including reducing risk of exposure, education, and emergency response



The Dietitian plays a critical role in helping patients to manage food allergy, and may play an integral role in supporting the physician during the diagnostic process.

#### •Diagnosis:

- Refer suspected food allergies to the primary care physician (PCP) and/or a board certified allergist.
- Support the PCP/allergist with food diary, oral food challenge, and/or elimination diet.

#### •Management

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## Resources

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- ❑ American Academy of Pediatrics (AAP) ([www.aap.org](http://www.aap.org))
- ❑ American Partnership for Eosinophilic Disorders ([www.apfed.org](http://www.apfed.org))
- ❑ Asthma and Allergy Foundation of America (AAFA) ([www.aafa.org](http://www.aafa.org))
- ❑ American Academy of Allergy, Asthma and Immunology (AAAAI) ([www.aaaai.org](http://www.aaaai.org))
- ❑ American College of Allergy, Asthma and Immunology (ACAAI) ([www.acaai.org](http://www.acaai.org))
- ❑ American Dietetic Association (ADA) ([www.eatright.org](http://www.eatright.org))
- ❑ Food Allergy and Anaphylaxis Network (FAAN) ([www.foodallergy.org](http://www.foodallergy.org))
- ❑ International Food Information Council Foundation (IFIC) ([www.ific.org](http://www.ific.org))
- ❑ U.S. Food and Drug Administration, Center for Food Safety and Applied Nutrition (FDA CFSAN) ([www.cfsan.fda.gov](http://www.cfsan.fda.gov))



The following Web sites can provide additional resources related to food allergy:

American Academy of Pediatrics (AAP) ([www.aap.org](http://www.aap.org))

American Partnership for Eosinophilic Disorders ([www.apfed.org](http://www.apfed.org))

Asthma and Allergy Foundation of America (AAFA) ([www.aafa.org](http://www.aafa.org))

American Academy of Allergy, Asthma and Immunology (AAAAI) ([www.aaaai.org](http://www.aaaai.org))

American College of Allergy, Asthma and Immunology (ACAAI) ([www.acaai.org](http://www.acaai.org))

American Dietetic Association (ADA) ([www.eatright.org](http://www.eatright.org))

Food Allergy and Anaphylaxis Network (FAAN) ([www.foodallergy.org](http://www.foodallergy.org))

International Food Information Council Foundation (IFIC) ([www.ific.org](http://www.ific.org))

U.S. Food and Drug Administration, Center for Food Safety and Applied Nutrition (FDA CFSAN) ([www.cfsan.fda.gov](http://www.cfsan.fda.gov))

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## Glossary of Terms

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- ❑ Anaphylaxis: Anaphylaxis is a serious allergic reaction that is rapid in onset and may cause death. Symptoms include hives, swelling of throat, difficulty breathing, and/or loss of consciousness.
- ❑ Antibody: a protein (also called an immunoglobulin) that is manufactured by plasma cells (a type of white blood cell) to neutralize an allergen.
- ❑ Antigen: a substance, also called an allergen, that can trigger an immune response, resulting in production of an antibody as part of the body's defense against infection and disease.
- ❑ Asthma: chronic medical condition in which allergens, irritants, or other trigger substances cause swelling of the tissues in the air passage of the lungs, making it difficult to breathe. Typical symptoms include wheezing, shortness of breath, and coughing.



## Glossary of Terms (continued)

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- ❑ Atopic Dermatitis: skin condition, also known as eczema, characterized by extreme itching, rash, scaling, and flaking.
- ❑ Celiac Disease: (also Celiac Sprue or gluten-sensitive enteropathy) autoimmune disease that is characterized by hypersensitivity to gluten and impacts the small intestine.
- ❑ Cell-mediated immune response: involves activation of immune cells (macrophages, T-cells, etc) in response to an antigen.
- ❑ Cross-contact: the spread of a contaminant from one place to another through the use of hands, utensils, or containers
- ❑ *Dermatitis herpetiformis*: severe itchy, blistering skin condition found in people with Celiac Disease.



## Glossary of Terms (continued)

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- ❑ *Heiner Syndrome*: cell-mediated adverse pulmonary response to food, usually cow's milk, in infants; characterized by pulmonary bleeding, anemia, recurrent pneumonia, and failure to thrive.
- ❑ Hives: An allergic reaction of the skin or a skin condition also known as *urticaria*, characterized by the development of itchy, raised white bumps surrounded by an area of red inflammation.
- ❑ Immunoglobulin E (IgE): A class of antibody normally present in very low levels in humans but found in larger quantities in people with allergies and certain infections. It is the primary antibody responsible for the typical allergic reaction.



## Glossary of Terms (continued)

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- ❑ Oral or Pollen Allergy Syndrome: cross-reactivity to certain fresh fruits or vegetables that are botanically related to a pollen to which the individual is allergic. Causes itching and swelling of the mouth and throat, resolves quickly.
- ❑ Phagocytic cell: cell that is able to engulf solid particles via the cell membrane (phagocytosis); in allergic response, used by immune system to remove allergenic protein
- ❑ *Rhinitis*: inflammation of the mucous membrane that lines the nose, causing runny, itchy, and/or congested nose
- ❑ *Sensitization*—Repeated exposure to a foreign substance (antigen) that results in IgE production and makes the patient susceptible to an allergic reaction
- ❑ *Steatorrhea*: excess fat in the stool
- ❑ *Urticaria*: allergic reaction of the skin or a skin condition commonly known as hives, characterized by the development of itchy, raised white bumps surrounded by an area of red inflammation



## Next Steps

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- ❑ Complete the learning assessment questionnaire and then check your answers.
- ❑ Print the Certificate of Completion for your files.
- ❑ Complete the evaluation of this learning module online.



In order to receive CPE for this module, please complete the learning assessment questionnaire and then check your answers. Print the Certificate of Completion for your files.

In addition, please share your feedback with IFIC Foundation by completing the evaluation of this learning module online.