

Ask the Doc

What's the difference between food allergy and food intolerance?

Defining terms when discussing the different types of unpleasant reactions to foods improves communication and lays the framework for deciding whether symptoms are triggered by food allergy, food intolerance or some other cause unrelated to food ingestion. An adverse reaction to a food is the general term used to refer to any unpleasant reaction occurring as a result of food ingestion. Adverse reactions to foods are either caused by immune-mediated (immune system response) or non-immune mediated reactions depending upon whether the immune system is primarily involved in causing the reaction.

Food Intolerances

Reactions to foods that are not immune system responses are generally considered *food intolerances*. Types of food intolerance include toxins (poisons), metabolic, pharmacologic or other undefined reactions. In toxic reactions a toxin made by the food or by an organism or something contaminating the food causes the symptoms. For example, people who eat fish such as snapper, grouper, barracuda or sea bass contaminated with a toxin called ciguatoxin produced by a marine organism known as *Gambierdiscus toxicus* develop nausea, vomiting and diarrhea within minutes to hours afterward followed by symptoms that can last for months. Although individuals respond differently to different toxins, one characteristic of toxic reactions is that they occur in virtually every person ingesting enough of the food containing the toxin.

Individuals who are malnourished, ill, on certain medications or have abnormal metabolism are more likely to experience metabolic reactions to foods. *Lactose (milk sugar) intolerance* is one of the most commonly encountered examples of metabolic food intolerance. This is not the same as a milk allergy. In lactose intolerance the affected person doesn't make enough lactase, which is the enzyme that digests the milk sugar, lactose. Because of the inability to metabolize lactose, a person with lactose intolerance develops nausea, abdominal cramping and diarrhea soon after the ingestion of lactose-rich dairy products.

Pharmacologic food reactions occur after the ingestion of foods containing ingredients that act like medications or drugs. For example, the ingestion of foods or beverages containing caffeine (coffee) or theobromine (chocolate) can cause central nervous system stimulation, headache and abdominal pain when eaten in large amounts or by overly sensitive individuals.

Undefined reactions are abnormal responses to a food or food additive that resemble allergic reactions to foods but are not caused by the immune system and the mechanisms causing these reactions remain unclear. Examples of these reactions are those attributed to preservatives such as sulfites or other food additives such as artificial

colors. Sulfite sensitive individuals develop itching with hives and/or difficulty breathing after the ingestion of foods such as wines, guacamole, lemonade or other foods that contain sulfites as a preservative.

Food Allergy

Food allergy is the term used to refer to reactions to foods that are primarily caused by the immune system. In the recently published guidelines for the diagnosis and management of food allergy in the United States, a food allergy was defined as “an adverse health effect arising from a specific immune response that occurs reproducibly on exposure to a given food.” Allergic reactions to foods are categorized based on the part of the immune system involved as immunoglobulin E (IgE)-mediated (common type of allergic response), non-IgE-mediated, mixed IgE- and non-IgE mediated or cell mediated.

IgE-mediated Food Allergy

A classic example of IgE-mediated food allergy is the peanut allergic person who has an allergic reaction within minutes of eating a small amount of peanut. In IgE-mediated food allergy, the allergic person makes an IgE antibody that recognizes a portion of a specific food allergen. The allergen needs to be large enough for the immune system to “see it”. Some molecules are too small to be “allergens” and thus cannot trigger a food allergy. Examples include sugars (such as the milk sugar lactose) and amino acids (the building blocks of protein).

Once made, the allergen-specific IgE antibody is released and binds to a specific receptor on the surface of mast cells (a type of blood cell) in the tissues throughout the body and basophils (another type of white blood cell) in the blood stream, sensitizing them to the food allergen. Mast cells and basophils are cells where histamine is stored along with other chemicals (irritating and harmful to invaders and body tissues) that trigger allergic reactions. On subsequent exposure to the food, the food allergen binds to allergen-specific IgE antibodies on the surface of the mast cells and basophils. This binding activates these cells, resulting in the explosive release of histamine and a number of other biological mediators. The effect of these mediators on surrounding tissues occurs over minutes to hours causing itching, flushing, and swelling. The symptoms classically attributed to IgE-mediated reactions include itching and swelling of the throat and eyes, nasal congestion, runny nose, sneezing, coughing, wheezing, nausea, vomiting, diarrhea, generalized itching, hives and occasionally a drop in blood pressure.

Non-IgE-Mediated Food Allergy

In contrast to IgE-mediated reactions, non-IgE-mediated reactions are caused by immunologic mechanisms not involving IgE and are typically slower in onset, developing over hours to days after food allergen exposure, and often, but not always, resulting in symptoms localized to the gastrointestinal system. Non-IgE mediated food allergy is diagnosed when reactions occur reproducibly after exposure to a specific food without

evidence of IgE involvement and resolve when the food is removed from the diet. This delay in the onset of symptoms following food allergen exposure occasionally makes it more difficult to identify the offending foods in non-IgE mediated food allergy. Celiac disease, characterized by bloating, abdominal pain, diarrhea, decreased appetite and failure to thrive resulting from sensitivity to gliadin (“gluten”) found in grains such as wheat, rye and barley, is an example of a non-IgE mediated gastrointestinal reaction to a food.

Mixed IgE- and Non-IgE-Mediated Food Allergy

Eosinophilic esophagitis (EoE) is an example of a mixed disorder where both IgE and non-IgE immune mechanisms are involved. Skin testing and blood tests to measure serum food allergen-specific IgE levels are useful in identifying potential causative foods in IgE-mediated food allergy, *but will not detect those foods causing symptoms through a non-IgE mediated mechanism*. To identify foods causing symptoms through a non-IgE-mediated mechanism in patients with EoE, patch testing to foods has been used. Patch testing to foods involves applying food allergen extracts to the skin on the back.

Cell-mediated Food Allergy

Cell-mediated allergic reactions to foods are exemplified by allergic contact dermatitis, which is a delayed eczema-like response involving itching, redness, small bumps and blisters that occur when a sensitized person is exposed to certain additives or naturally occurring substances in foods such as garlic, onion and mango.

In summary, ***when the immune system is involved in causing the reaction to a food, it is accurately referred to as a food allergy***. Some ingredients cannot cause an allergic reaction, but can cause a different type of problem when ingested, due to food intolerance. When the immune system is ***not*** the cause of a reaction to a food, it is primarily referred to as ***food intolerance***. As noted above, different categories of food intolerance and food allergy have been identified and defined.

As a result, when symptoms are triggered by food ingestion, **accurately determining the type of food reaction is important** because of differences regarding the mechanism involved, the timing of onset of reactions, the likelihood of reproducibility, appropriate treatment, and the prognosis.

Reference:

1. Boyce JA, et al. Guidelines for the diagnosis and management of food allergy in the United States: report of the NIAID-Sponsored expert panel. J Allergy Clin Immunol 2010;126:S1-S58.

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