

## Food Intolerance versus Food Allergy

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### Abstract

Adverse reactions related to foods are a common problem reported by up to 20% of the general population. These can be divided into allergic (immunologic) and non allergic (non immunologic) food reactions. The majority of food reactions are non allergic and are mostly related to food intolerances such as lactose intolerance. Other non allergic food reactions include gastroesophageal reflux disease, nonceliac gluten sensitivity, irritable bowel syndrome, metabolic diseases, gastrointestinal infections, gastrointestinal diseases that result from neurological or anatomic disorders and toxin mediated such as scromboid poisoning and fungal toxins. It is important to differentiate between food intolerance and food allergy as food allergy may lead to severe life threatening reactions and even death. In this article, we explore the differences between food intolerance and food allergy, their diagnosis and management.

**Keywords:** Food intolerance, Food allergy, Immunologic reactions, Non immunologic reactions, Epinephrine, Autoinjector

### Introduction

Up to 20% of the population complain about reactions related to food [1]. Reactions to food can be divided into allergic (immunologic) reactions and non-allergic (non-immunologic) reactions. The allergic reactions can be further subdivided into immediate (Immunoglobulin E (IgE)-mediated) reactions and delayed (non-IgE mediated) reactions. The non-immunologic reactions account for the majority of food reactions. Food intolerance is by far the most common type of food reaction in this group. It is characterized by difficulty in digesting or metabolizing a particular food and is more common in people with functional gastrointestinal disease such as irritable bowel syndrome where they present with symptoms such as bloating, abdominal pain, alternating bowel habits and/or diarrhea. Food allergy on the other hand is an immunologic reaction to food due to an abnormal immunologic response following exposure [2].

IgE mediated reactions are the most serious and can lead to life threatening reactions and death if not avoided even in minute amounts. In case of anaphylaxis, the only lifesaving first line treatment is epinephrine. Therefore, it is essential to differentiate between the two conditions as they differ in prognosis, as well as management.

### Food Intolerance versus Food Allergy

The difference between food intolerance and food allergy is summarized in table 1. The symptoms of food intolerance are confined to the gastrointestinal tract. These are benign, non-fatal reactions and are directly related to the amount of food ingested. The symptoms will be similar with each exposure. Food allergy (especially the immediate, IgE- mediated reactions) on the other hand may pose a risk to the individual if not avoided. The symptoms are unpredictable as even tiny amounts can lead to serious life threatening reactions such as anaphylaxis. Signs and symptoms involve the skin and mucus membrane (flushing, itching, urticaria and or angioedema of the lips, face or throat), respiratory system (chest tightness, difficulty in breathing, wheeze and stridor); gastrointestinal system such as abdominal pain, diarrhea and vomiting and cardiovascular system including tachycardia and hypotension.

### Food Intolerance

Examples of food intolerance include: lactase deficiency (intolerance to lactose present in dairy products), fructose intolerance (present in fruits), intolerance to short-

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| Food reactions    | Food intolerance  | Food Allergy: Immediate IgE reactions   | Food Allergy: Non IgE reactions        |
|-------------------|---|---|--|
| Allergic          | No  | Yes   | Yes                                    |
| Mechanism         | Difficulty in digesting or metabolizing a particular food | Food specific IgE antibodies releasing histamine  | T lymphocyte cell mediated             |
| Onset of Symptoms | Hours   | Seconds to minutes and rarely upto 2 hours  | Often within 2 hours or more           |
| Symptoms          | Not serious   | Maybe serious leading to anaphylaxis  | Confined to the gastrointestinal tract |
|                   | Confined to the gastrointestinal tract                    | Unpredictable. May involve skin and mucus membranes, respiratory, cardiovascular and gastrointestinal symptoms. |  |
| Examples          | Lactose, fructose, alcohol, Flavourings and preservatives | Seafood allergy, peanut allergy   | Protein induced enterocolitis          |

**Table 1:** Comparison between food intolerance, IgE mediated food allergy and non IgE mediated food allergy.

chain fermentable carbohydrates (FODMAPs: fermentable oligosaccharides, disaccharides, monosaccharides, and polyols) more common in patients with irritable bowel syndrome and Sulfite sensitivity due to ingestion of sulfite (present in some foods such as dried fruits and wine). Symptoms are usually confined to the gastrointestinal system such as bloating, abdominal pain and diarrhea. Treatment is through avoidance of the culprit food.

## Food Allergy

Food allergy affects approximately 2- 5 % of adults and 8% of children [3-5]. Food allergy is divided into immediate (IgE)-mediated reactions and non-IgE-mediated reactions (such as food protein-induced enterocolitis). Some gastrointestinal disorders have characteristics of both such as eosinophilic gastroenteritis.

## Immediate IgE- Mediated Reactions

In immediate (IgE)-mediated reactions, symptoms develop rapidly within seconds or minutes and rarely up to 2 hours after ingestion of the culprit food. Food specific IgE forms upon exposure to that food and causes mast cells and basophils to release vasoactive mediators that are responsible for the development of the signs and symptoms involving the skin and mucus membrane (flushing, itching, urticaria and or angioedema of the lips, face or throat), respiratory system (chest tightness, difficulty in breathing, wheeze and stridor); gastrointestinal system such as abdominal pain, diarrhea and vomiting and cardiovascular system including tachycardia and hypotension. IgE mediated reactions can be fatal if not treated promptly. The symptoms are usually unpredictable as it may present with only itching or swelling of the lip to full blown life-threatening anaphylaxis. Certain factors that may lead to more severe allergic reactions include concomitant asthma, exercise, certain medications that either increase intestinal permeability such as aspirin and alcohol or impair the body's compensatory response to hypotension such as Angiotensin-Converting Enzyme (ACE) inhibitors and beta-blockers.

Although any food can cause IgE-mediated reactions, the most common ones are fish, seafood, peanuts and tree nuts. Most food allergens are proteins. Recently, carbohydrate allergens have been described in allergic reactions to red meat such as beef, pork, and lamb causing delayed symptoms from 3 to 6 hours after ingestion. This is due to sensitization to the allergen galactose-alpha-1,3 galactose (alpha-gal) present in the meat of most mammals through tick bites. Diagnosis is made through patient's history of meat ingestion. A blood test that detects specific IgE to

alpha gal can aid in the diagnosis. Treatment is by strict avoidance of meats and all substances containing alpha gal.

A rare entity where anaphylaxis occurs as a result of ingesting the culprit food followed within a few hours by exercise or exertion. It does not happen when eating that particular food at rest nor when exercising without eating it. This is called food dependent exercise induced anaphylaxis. The most common food culprit is wheat; however, other foods have been described such as shrimps and chicken. In wheat dependent exercise- induced anaphylaxis (WDEIA), omega 5-gliadin (a protein component in gluten) is the major allergen causing anaphylaxis [6]. Although the mechanism is not fully understood, a possible explanation is that omega-5 gliadin-derived peptides are cross-linked with tissue transglutaminase (tTG), which leads to an increase in IgE antibody binding both in vitro and in vivo. In patients with WDEIA, activation of tTG in the intestinal mucosa during exercise may lead to the formation of large allergen complexes capable of eliciting anaphylactic reactions [7]. Diagnosis is mainly by history aided with the demonstration of specific IgE to omega 5-gliadin. When the diagnosis is still unclear a careful challenge test (food/exercise) test is performed by an allergist in a hospital setting and a positive result is when the patient demonstrates allergic symptoms or even anaphylaxis. What complicates the diagnosis is that anaphylaxis does not necessarily occur each time the individual ingests the food then exercises and therefore a negative food/exercise challenge test dose not rule it out. Treatment is through proper dietary avoidance at least 4 to 6 hours prior to exercising. An epinephrine autoinjector is a sensible precaution measure and requires proper counselling as regards to when and how to use it.

## Diagnosis and Management of IgE Mediated Food Allergy

The evaluation of food allergy starts with a detailed history of the reaction and culprit food. In some cases the history may not be clear and further testing using skin testing or blood test to detect the presence of IgE specific antibodies to the food in question. Skin testing is more sensitive and has a high negative predictive value and is therefore the preferred method. It should be performed by allergy specialists. If skin testing or the blood test is inconclusive, a graded challenge may be performed where incremental portions of the food in question is given to the patient every 30 minutes and observe for any reaction. This again should be performed by an allergist in a setting where not with there is proper resuscitation facilities.

Appropriate dietary avoidance of the culprit foods and potentially cross-reactive foods is the key management. Such

patients should have access to appropriate dietetic counselling, ideally by a dietician experienced in food allergy. Referral to an allergist is crucial unless the culprit is known to a single food with no cross reactivity with other foods and the patient is content to avoid it. In all cases the need for an epinephrine autoinjector needs to be assessed. Patients with a previous history of anaphylaxis, multiple food allergies, nuts allergy or is at risk of severe reactions (such as asthma) will require an epinephrine autoinjector. The patient and family members should be taught when and how to use it and what to do in case of anaphylaxis. When the reaction is mild or moderate, symptomatic treatment with antihistamines and steroids may be given. Anaphylaxis is a medical emergency and the first line treatment is the early administration of epinephrine intramuscularly.

### Non (IgE)-Mediated Food Allergy

Examples of non IgE- mediated food allergy are Eosinophilic esophagitis and Food protein-induced enterocolitis. In Eosinophilic esophagitis, patients usually report signs and symptoms related to the upper gastrointestinal system such as dysphagia, acid reflux, food impaction, and chest pain that does not respond to medical therapy. Diagnosis is by endoscopy where histology reveals findings of eosinophils in the squamous epithelium of the esophagus [8].

Treatment involves symptomatic therapy such as anti-reflux medications and avoidance of the food culprit. The most common culprits are milk, egg, soy, wheat, grains, meats, peanuts/tree nuts, fish/ shellfish. Eliminating the six foods commonly associated with food allergies (Milk, wheat, soy, egg, nuts and fish) from the diet for at least 6 weeks is an effective treatment for the majority of patients. Symptoms are then reviewed and an endoscopy performed with a biopsy. If this is normal, the foods are then brought back into the diet, one at a time at 2 week intervals with assessment of symptoms and endoscopy after each food introduced.

### Protein-Induced Enterocolitis

Presents in infancy and resolves by the age of five years. It

rarely presents in adults in which case mollusks and shellfish are culprit allergens [9,10]. Symptoms usually begin two to four hours after ingestion and are limited to the gastrointestinal tract such as nausea, vomiting and non-bloody diarrhea. Episodes usually resolve in a matter of hours. Treatment is by avoidance of the culprit food.

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