

# Food Allergy & Intolerance

McKenzie Pediatrics 2010

Food “allergy” is often used, at least by the general public, in reference to undesirable symptoms that develop following eating. Children frequently are labeled as “food allergic” by parents when they are not. Other children have food allergies that don’t cause immediate symptoms, and therefore go unrecognized. This handout aims to help parents to understand the difference between food allergy and intolerance, and understand how healthcare providers go about diagnosing and managing both.

Misdiagnosis of food allergy can result in negative consequences. Over-diagnosis leads not only to unnecessary dietary eliminations that might cause under-nutrition or malnutrition, but also to overlooking the real cause of a child’s symptoms. On the other hand, under-diagnosis might lead to prescription of ineffective medications, subjecting the child to unnecessary diagnostic procedures, perpetuation of symptoms, family frustrations, and financial burden. Read on.

## What Is The Difference Between Food Intolerance and Food Allergy?

Adverse food reactions include any abnormal reaction caused by the ingestion of a food, and can be either due to food intolerance (non-allergic reactions) or food allergy (immune based reactions).

Food intolerances are often confused with food allergy. Food intolerances are responsible for MOST adverse reactions to food. At least 75 percent of reactions thought by parents to be food allergies are, in fact, food intolerances.

Food intolerance is the result of an abnormal physiologic response to an ingested food, but is not immunologic in nature (i.e. is not caused by an immune system reaction). This includes adverse reactions such as bloating, abdominal pain and diarrhea with dairy products (lactose intolerance due to a deficiency in the gut enzyme lactase), abdominal pain with fat ingestion due to gallbladder disease, and malabsorption due to disease of the pancreas, and skin irritation around the mouth and face due to acids in such foods as orange juice or tomato products.

Toxic and pharmacologic reactions to food can also cause food intolerances. For example, bacterial food poisoning may cause vomiting and diarrhea, tyramine in aged cheese may cause headaches, and caffeine in coffee and chocolate may cause increased heart rate, nervousness, and irritable bowel symptoms.

In contrast, food allergy is an immunologic reaction that occurs after the ingestion of food. The reaction may occur even when a very small amount of the offending food is ingested, or even touched. Food allergy can be classified into three categories that we will further discuss: IgE-mediated, mixed-IgE and non-IgE-mediated, and non-IgE-mediated reactions. Such distinctions are important as they direct the appropriate testing and treatment.

Children with true food allergy(ies) are 4 times more likely to also develop asthma and/or respiratory allergies (“hayfever”, or allergic rhinitis), and more than twice as likely to suffer from eczema. Often a biological parent or sibling has a history of allergic rhinitis, asthma, eczema, or food allergy.

## What Are Examples Of IgE-Mediated Food Allergy Reactions?

First off, what is IgE? It is Immunoglobulin E, one of the four main types of antibodies found in the human body. IgE-mediated food allergy occurs when a child fails to develop immune tolerance to a food. Although any food can cause an IgE-mediated reaction, milk, egg, peanut, soy, and wheat account for 90% of reactions in young children, and peanut, fish, shellfish, and tree nut account for 85% of reactions in adolescents and adults.

When the food is ingested, a chain reaction of immune system events is set off, causing symptoms that may be immediate, or late-phase (usually 2-8 hours later). Virtually any organ system can be affected in an IgE-mediated food allergy.

Examples of IgE-mediated food allergy reactions include:

1. Oral Allergy Syndrome: In OAS, the child develops itching, tingling, and swelling of the lips, palate, and tongue after ingesting certain fresh fruits or vegetables. The child may also report a metallic taste in the mouth. Symptoms are immediate, and usually affect only the mouth area, but 1 in 10 children will also experience swelling of the throat and

larynx (voice box), and 1 in 50 will develop anaphylaxis (more on this later). Most children with OAS also have a history of allergic rhinitis ("seasonal allergies"). Children allergic to birch trees may experience OAS with raw carrots, celery, and apples; children allergic to ragweed pollen may have symptoms with watermelon, cantaloupe, honeydew, and/or banana. The allergens responsible for OAS are heat-labile, so symptoms occur with the fresh fruit or vegetable, but not in cooked or processed form. Thus, a child with OAS to fresh apples can usually tolerate applesauce and apple pie.

2. Gastrointestinal Anaphylaxis: In GA, children develop nausea, vomiting, and abdominal pain or cramps usually within minutes, but sometimes up to 1 to 2 hours after ingesting a food allergen. Diarrhea begins within 2 to 6 hours. Typically, other organs, such as the skin or respiratory tract, are involved, but isolated GA can occur. Milk, egg, peanut, soy, wheat, and seafood are the most commonly implicated foods.
3. Cutaneous (Skin) Reactions: These include urticaria (hives), angioedema (swelling), whole-body itchiness, flushing, and possibly a red pinpoint rash. Cutaneous symptoms may be the sole manifestation of a food allergy, or may be part of a constellation of symptoms in generalized anaphylaxis. These symptoms typically begin within minutes to 2 hours after ingestion of the offending food, and tend to occur every time the food is ingested. In children, egg, milk, peanut, and tree nuts are the foods most commonly implicated.
4. Respiratory Symptoms: Allergic rhinoconjunctivitis (itchy watery eyes and nose with sneezing) is rarely the sole manifestation of food allergy. Children with these symptoms should be considered to be reacting to inhalant environmental allergens (tree/grass pollen, mold, dust mites, pet dander) rather than a food. Likewise, airway symptoms such as wheezing, shortness of breath, chest tightness and/or cough are rarely caused by food allergens, except if part of generalized anaphylaxis.
5. Anaphylaxis: Food allergy is the most common non-hospital cause of anaphylaxis. Anaphylaxis is the most severe form of IgE-mediated food allergy, and typically occurs within seconds to hours after ingestion of the offending food. One in sixteen children have a bi-phasic reaction, with both immediate- and late-phase symptoms; the late phase reaction can be less severe, as severe, or more severe than the immediate phase. Anaphylaxis is defined as a "severe, potentially fatal, systemic allergic reaction after contact with an allergen". Four in five children have cutaneous symptoms (see above), and most will have respiratory symptoms. Some will also have gastrointestinal and/or cardiovascular (decreased blood pressure, lightheadedness, fainting, chest pain, increased heart rate) symptoms. Food most likely to cause anaphylaxis include peanuts and tree nuts (especially children age 1 to 5 years), and seafood (especially children age 6 years and up). Anaphylaxis is more common in children with asthma.

Examples of Mixed IgE/non-IgE-Mediated reactions:

1. Atopic Dermatitis: Otherwise known as eczema, approximately 35% of children with atopic dermatitis have food allergy. In general, younger children with eczema are more likely to have one or more food triggers than older children. Egg is the most common cause in non-infants, and dairy products (specifically, the casein protein found in dairy) is the most common cause in infants. Egg, milk, and peanut account for 75% of food allergy in children with eczema. Half of children with food allergen-triggered eczema will also have gastrointestinal symptoms, and nearly half will experience respiratory symptoms.
2. Allergic Eosinophilic Esophagitis: In allergic EE, children often present with chronic symptoms of gastroesophageal reflux ("heartburn"), vomiting, difficulty swallowing, and/or abdominal pain. Half of children have other allergic disorders, such as asthma, allergic rhinitis ("hayfever"), and/or eczema. Children with allergic EE often present with poor growth ("failure to thrive"), or even weight loss, and anemia. Chronic EE can even lead to food aversions or refusal to eat.

Non-IgE-Mediated reactions are uncommon, and include:

1. Food Protein-induced Proctocolitis: This typically appears in the first 2 to 4 months of life with blood-tinged stools. Affected infants appear healthy and lack other symptoms. There is minimal blood loss, and anemia is rare. Symptoms are usually secondary to dairy or soy milk, and occur most often in breast fed infants. With dietary elimination

(removing the offending protein from the mother's diet), resolution of bleeding occurs within 3 to 4 days. After 9 to 12 months of age, most infants can tolerate an unrestricted diet.

2. **Food Protein-induced Enterocolitis Syndrome:** These infants appear ill, and may present with recurrent vomiting, severe bloody diarrhea leading to anemia, abdominal distension, and failure to thrive. Symptoms usually begin in the first month of life, and is most frequently caused by milk and soy protein (50% of infants with FPIES are allergic to both), but rice, oat, other cereal grains, and poultry have also been implicated. Symptoms resolve when the offending food is removed from the diet. However, if the offending food is accidentally ingested there is usually a 2-hour delay before dramatic onset of symptoms of vomiting and diarrhea. Thankfully, this condition is rare.

#### What Are Tree Nuts?

Tree nuts include walnut, cashew, almond, Brazil nut, pistachios, and pecan. Peanuts are NOT tree nuts, but rather are legumes, along with soybeans and green beans.

#### What Is The Difference Between Fish and Shellfish?

Fish that may cause allergic reactions include salmon, tuna, catfish, and cod. Shellfish that may cause reactions include shrimp, clam, crab, and lobster.

#### What Are Examples of Dairy Products?

Dairy products include milk, buttermilk, cream, whipped cream, yogurt, butter, ice cream, and any form of cheese, including cottage cheese.

#### What Kinds of Foods Contain Soy Protein?

Soy protein is found in many foods today. Most commonly, soy is found in soy milk, soy yogurt, tofu, "veggie" meats, and most cereal bars. It is important to note that soy lecithin and soybean oil are usually tolerated by soy-allergic individuals.

#### How Are Food Allergies Diagnosed?

Often simply by suspecting a connection between a food and symptoms, and then eliminating the offending food from the diet. If the symptoms resolve, the diagnosis of a food allergy is likely. When eliminating a potential food from the diet (or from the mother's diet), it is best to remove it for at least ten days to determine whether symptoms resolve.

Sometimes, especially when connections between food ingestion and symptoms are not clear, or when multiple food allergies are suspected, the healthcare provider will order skin prick testing (which must be done at an allergist's office) or blood sampling to gather more information.

However, it is important to note that establishing the presence of IgE against allergens (also called "sensitization"), whether measure by skin or blood testing, does NOT automatically indicate disease or clinical relevance. In general, such testing has a high "negative predictive value" (i.e. >95% that a negative result is truly negative), but a much lower "positive predictive value" (i.e. 30-65% chance that a positive result truly indicates symptoms to that food).

For example, 8.6% of the U.S. population has positive test response to peanut, but clinical peanut allergy is estimated to only affect 0.4% of the population. In other words, for every 100 Americans with positive skin tests to peanut, fewer than 5 have symptoms of peanut allergy!

#### Does My Child Need An EpiPen?

Thankfully, most food allergies are non-progressive, meaning that the next reaction from exposure to an offending food will be no different or worse than the previous.

However, because of the difficulty in predicting which patients will develop anaphylaxis after allergen exposure, it is generally advised that children with food allergies be prescribed auto-injectable epinephrine. There are several brands available, but only two dosages: 0.15mg for children 22-55 pounds, and 0.30mg for children weighing more than 55 pounds. Special consideration

should be given to those at high-risk of developing fatal food anaphylaxis, specifically to those already known to have asthma and/or peanut or tree nut allergy.

If exposure to an allergen is suspected, epinephrine should be administered into the muscle of the lateral thigh if two or more of the following occur rapidly after exposure (within minutes to several hours):

- Skin or mucosal involvement (e.g. generalized hives, or swelling of the mouth area)
- Respiratory compromise (shortness of breath, pain with breathing, wheezing, stridor/croup)
- Persistent gastrointestinal symptoms (e.g. vomiting)
- Hypotension/Low Blood Pressure (lightheadedness, fainting, decreased body tone)

If symptoms involve only the skin (hives, swelling), an antihistamine (e.g. Benadryl) may be tried initially, and the child should be monitored closely for several hours for development of more concerning symptoms.

#### Will My Child Outgrow His/Her Food Allergy?

Probably, depending on his/her age, and the offending food.

Infants and young children allergic to milk, egg, soy and/or wheat usually (>80%) develop tolerance to the food by as late as the fifth birthday, and often much sooner.

On the other hand, only about 20% of young children develop tolerance to peanut, and less than 10% outgrow allergy to tree nuts. Fish and shellfish allergies also tend to persist lifelong.

#### How Can I Prevent Food Allergies In My Child?

There is a strong genetic component to food allergies. Children with first-degree relatives (siblings, parents) with food allergies are more likely to themselves develop one or more food allergies, usually within the first five years of life. For example, if a first-degree relative has a peanut allergy, the risk of peanut allergy increases seven-fold. Furthermore, single-egg twins have a 2 in 3 chance of having the same food allergies, whereas different-egg twins have only a 6% chance.

The only interventions that can reduce the risk is exclusive breast feeding for at least the first four months of life, and withholding the introduction of solid foods until at least 4 to 6 months of age.

Despite the current vogue recommendation not to start solid feedings until after age 6 months, there is no clear evidence that waiting decreases the risk of eventual food allergies. However, there still remains some evidence (though there remains much debate among experts) that it is best to wait until at least 9 months of age to introduce eggs, and until 12 months to introduce peanut products and shellfish.

There is no evidence to suggest that restricting a mother's diet during pregnancy lends any benefit to reducing food allergies in her child.

#### If My Child Has An Egg-Allergy, Can (S)He Still Receive Vaccinations?

The only common vaccines containing trace amounts of egg protein are the MMR (measles-mumps-rubella) vaccine, and the influenza vaccine. It is safe, even in children with severe egg allergy, to receive the MMR vaccine. On the other hand, for now the safest recommendation is that the child NOT receive the influenza (and also the Yellow Fever) vaccine, though this recommendation is in doubt and under wider study.

#### Where Can I Find Out More?

Far and away the best source of information for parents with children with food allergies is the Food Allergy and Anaphylaxis Network, or FAAN: <http://www.foodallergy.org>

The American Academy of Pediatrics November 2009 Report entitled Food Allergy Among Children in the United States can be found at this link: <http://pediatrics.aappublications.org/cgi/reprint/peds.2009-1210v1>

A terrific article on Nut Allergies (and our societal over-reaction to them) can be found in Time Magazine (March 9, 2009): <http://www.time.com/time/magazine/article/0,9171,1881985,00.html>

On our website ([www.mckenzie-pediatrics.com](http://www.mckenzie-pediatrics.com)) can also be found parent education handouts entitled:

- Eczema: Causes and Care
- Is My Breast Feeding Baby Allergic To Dairy?
- Allergies In Young Children
- Asthma & Allergies: Controlling Allergens
- Asthma and Your Child
- Celiac Disease: Far More Common Than Once Thought
- Hives In Children
- And much, much more!