

# Food Allergies<sup>1</sup>

Keith R. Schneider, Renée Goodrich-Schneider, Soohyoun Ahn, Susie Richardson, Ploy Kurdmongkoltham, and Bruna Bertoldi<sup>2</sup>

## What is a food allergy?

A food allergy is a specific immune system reaction that happens after a person consumes what is normally considered a safe food. Food allergies occur more often in children than in adults. Approximately 5–8% of children (aged 4 or under) and about 2% of adults have food allergies (FDA 2016). Allergic reactions to food lead to over 30,000 emergency room visits and 2,000 hospitalizations per year (FDA 2016b; Radke et al. 2016). There are approximately 150 fatalities associated with food allergic reactions in the US annually (FDA 2016).

While most food allergies in adults are caused by a small group of foods or food products, adverse reactions in young children can be caused by a wider variety of food. Generally, most food allergies emerge at an early age, but can disappear after a few months (Taylor and Hefle 2011a). Dairy, eggs, and soy allergies are commonly outgrown, whereas peanut, tree nut, and seafood allergies rarely are (Wood 2003; Joshi and Frith 2017; Taylor and Hefle 201a). The following major food allergens (also known as the “Big Eight”) and products made with them account for 90% of food allergies in the US:

1. Wheat

2. Shellfish (e.g., crab, lobster, shrimp, and crayfish)

3. Egg

4. Fish (all species of finfish)

5. Peanuts

6. Milk

7. Tree nuts (walnuts, almonds, cashews, pistachios, pecans, and hazelnuts)

8. Soy

## What causes food allergies?

A true allergy is caused by a person’s immune system reacting to a protein(s) in a particular food. The process begins when the food is first eaten; the body “remembers” the specific protein(s) in the food. When the same food is eaten again, the immune system overreacts in an excessive and (in the case of a severe allergy) potentially life-threatening way.

True food allergies are caused by the rapid release of immunoglobulin E (IgE) antibodies after a person ingests the

1. This document is FSHN05-13, one of a series of the Food Science and Human Nutrition Department, UF/IFAS Extension. Original publication date August 2005. Revised October 2017. Reviewed February 2021. Visit the EDIS Web Site at <https://edis.ifas.ufl.edu>.

2. Keith R. Schneider, professor, Food Science and Human Nutrition Department; Renee Goodrich-Schneider, professor; Soohyoun Ahn, assistant professor; Susie Richardson, laboratory technician; Ploy Kurdmongkoltham, laboratory technician, Doctor of Plant Medicine Program; and Bruna Bertoldi, grad student, Food Science and Human Nutrition Department; UF/IFAS Extension, Gainesville, FL 32611.

If you have allergies, think you do, or have any specific questions about any medical decision, always consult your doctor or healthcare provider for any specific recommendation or treatment.

problematic food. This over-production of IgE is triggered by the food allergen and causes either a local or systemic (affecting the whole body) effect, such as inflammation, severe swelling, or hypersensitivity reactions.

A survey by Cianferoni and Spergel (2009) suggested that up to 25% of adult Americans believe that they have a food allergy. However, the actual confirmed percentage of adults in the US population with at least one food allergy is less than 2%. Proper medical authorities should be consulted for confirmation and guidance.

## What are the symptoms associated with food allergies?

The reaction to an allergen is related to the overproduction of IgE after consuming the problematic food. The IgE then attaches to mast cells that stimulate the release of chemicals such as histamine after exposure (Joshi and Frith 2017). Such reactions may cause symptoms within seconds of consumption, or may take several hours to develop. Symptoms can occur locally, in multiple locations, or can be spread over the entire body. Redness, itching, and swelling (inflammation) are the most recognizable and common symptoms, although several other types of symptoms are possible (Table 1) (FDA 2017b; FARE 2017). Symptoms associated with the digestive tract may include any one or more of the following (AAAAI 2017):

- Itching/tingling of the lips, palate, tongue, or throat
- Hoarseness and sensation of tightness in throat
- Swelling of the lips or tongue
- Abdominal pain or cramps
- Nausea and/or vomiting
- Diarrhea

## Who is at risk?

Generally, food allergies are developed at an early age, but some may appear at any time. People who had previous allergic reactions to foods or non-food items (insect bites, latex, etc.), or who have a family history of allergies, are most susceptible to developing allergies. In a survey of approx. 38,000 children in the US, 8.0% were found to have food allergies. However, among children who had allergies, 38.7% had a history of severe reactions, and 30.4% were allergic to multiple foods (Gupta et al. 2011).

Table 1. Symptoms associated with food allergies and the affected area of the body.

Affected Area	Symptom
Skin	Hives Flushing Itching
Airways	Chest tightness Wheezing Shortness of breath
Throat (pharynx)	Difficulty speaking Tongue swelling Vocal cord swelling
Nose	Nasal congestion Itching Runny nose Sneezing
Eyes	Itching Tearing
Systemic	Decreased blood pressure Loss of consciousness

Source: Food Allergy Research & Education (FARE) 2017. <https://www.foodallergy.org/symptoms>

## What is anaphylaxis?

Anaphylaxis is a severe allergic reaction that rapidly affects the entire body and, if not treated, can be fatal. The symptoms are caused by the body's tissue releasing histamines and other substances. This results in tightening of airways, which makes the reaction more severe than a normal allergic reaction. Along with the risk for suffocation, patients can go into shock or lose consciousness due to decreased blood flow, which can be life-threatening (Dugdale 2012). The manifestation of anaphylaxis reaction can also result in cardiac arrhythmias and cardiac arrest (Triggiani et al. 2008). Anaphylaxis is commonly seen in children and young adults, but can affect anyone.

## Managing Food Allergies

If a person has an allergy to a particular food, any meal containing that food, even as a flavoring, may cause an allergic response. For example, if a person is allergic to peanuts, they will be sensitive to any food that contains peanuts or peanut products (e.g., peanut butter, unrefined peanut oil, chopped or diced peanuts, etc.) as an ingredient. Treatment or processing of a food does not necessarily affect its ability to cause an allergic response. **It is important to carefully read food labels and ingredient lists if a person has a known food allergy.**

Almost any food that contains protein has the potential to cause an allergy or a hypersensitivity reaction in a susceptible person. Food allergies are only triggered by

proteins; sugars and fats do not cause food allergies. Highly refined oils, such as peanut and soy, typically don't contain allergens (Taylor and Hefle 2001b) and are unlikely to elicit an allergic response. If a person is not sure whether or not an oil is highly refined, and/or that individual is extremely sensitive to a particular allergen, then it is best to avoid these products.

## How can a person deal with a severe allergic reaction?

Most individuals, once diagnosed, may have to contend with their condition for life. In some cases, young children may 'outgrow' certain allergies as their immune system develops over time (Fleischer et al. 2005; Skolnick et al. 2001; Spergel 2013; Savage et al. 2010). **If a person has an allergy to a particular food, the only proven therapy is strict avoidance of the food or its products.** If a person has a minor allergic reaction to a food, oral antihistamines can be taken, but in the case of severe reactions, the medication of choice is an injection of epinephrine. A person with severe food allergies should always carry a dose of epinephrine in case of an emergency. **A person suffering from anaphylaxis should be taken to a hospital immediately.** Even if epinephrine is administered, anaphylactic symptoms may reappear within minutes to several hours after treatment. Observation by trained medical personnel is important during this period. The use of inhaled medications, such as those used for asthma attacks, has not been shown to be safe or effective in combating anaphylaxis due to food allergies.

While there is no 'cure' for food allergies, there are some promising studies of new treatments. These include oral subcutaneous, sublingual, and epicutaneous immunotherapies. These treatments can possibly result in desensitization after gradual exposure to food allergens (Wang and Sampson 2009). Oral immunotherapy (OIT) has shown positive results for desensitizing persons to food allergens (Wood 2017; Freeland et al. 2016).

## What is being done to help prevent food allergy reactions?

In 2008, the US Food and Drug Administration (FDA) held a public hearing to determine the best course of action to help food processors identify the potential manufacturing areas that could lead to an allergic reaction (FDA 2015). This initiative bolstered the labeling campaign signed into law in 2006. Currently, food manufacturers are required to declare all major food allergens (the "Big Eight") found in

the final food product (FDA 2009). Guidelines and regulations are updated as more research is conducted. With every new finding, the most accurate information is passed on to the consumers, thus minimizing the risk of adverse allergic reactions.

In September 2015, FDA finalized the Preventive Controls for Human Food (PCHF) rule promulgated under the new food safety regulation, the Food Safety Modernization Act (FSMA) (FDA 2017a). The PCHF rule applies hazard analysis and risk-based preventive controls for major food allergens, elevating their status as a potential hazard to be considered and controlled. Furthermore, the regulation has updated Current Good Manufacturing Practices (CGMPs), which emphasize allergens as a specific area of concern. Ultimately, any food processing facility covered under the PCHF rule must have a written food safety plan that identifies preventive controls for probable hazards, including major food allergens.

## Resources

CDC (Centers for Disease Control and Prevention) <http://www.cdc.gov/healthyyouth/foodallergies/>

National Institute of Allergy and Infectious Diseases <https://www.niaid.nih.gov/diseases-conditions/food-allergy>

FDA (Food and Drug Administration) <http://www.fda.gov/ForConsumers/ConsumerUpdates/ucm089307.htm>

FARE (Food Allergy Research and Education)/ FAAN (Food Allergy and Anaphylaxis Network) <http://www.foodallergy.org/>

Children's Hospital of Philadelphia. (<http://www.chop.edu/service/allergy/allergy-and-asthma-information/oral-allergy-syndrome.html#cross>)

## References

- American Academy of Allergy, Asthma & Immunology (AAAAI). 2017. "Food Allergy Symptoms & Diagnosis." Accessed July 20, 2017. <http://www.aaaai.org/conditions-and-treatments/allergies/food-allergies>
- Cianferonia, A. and J.M. Spergel. 2009. "Food Allergy: Review Classification and Diagnosis." *Allerology International*. 58(4):457–466.
- Dugdale, III, D. C., S.I. Henochowicz, and D. Zieve. 2012. "Anaphylaxis: MedlinePlus Medical Encyclopedia." U.S.

- National Library of Medicine NIH National Institutes of Health. <https://medlineplus.gov/ency/article/000844.htm>
- Fleischer, D. M., M.K. Conover-Walker, E.C. Matsui, and R.A. Wood. 2005. "The Natural History of Tree Nut Allergy." *J Allergy Clin Immunol.* 116(5):1087–1093.
- Freeland, D. H., H Fan-Minogue, J.M. Spergel, T.A. Chatila, K.C. Nadeau. 2016. "Advances in Food Allergy Oral Immunotherapy: Toward Tolerance." *Current Opinion in Immunology.* 42:119–123.
- Food Allergy Research & Education (FARE). 2017. "Symptoms." Accessed July 20, 2017. <https://www.foodallergy.org/symptoms>
- Food and Drug Administration (FDA). 2017a. "FSMA Final Rule for Preventive Controls for Human Food." Accessed July 3, 2017. <https://www.fda.gov/food/guidanceregulation/fsma/ucm334115.htm>
- Food and Drug Administration (FDA). 2017b. "Food Allergies: What you Need to Know." Accessed July 20, 2017. <https://www.fda.gov/downloads/Food/ResourcesForYou/Consumers/UCM220117.pdf>
- Food and Drug Administration (FDA). 2016. "Allergens: Food Allergen Labeling and Consumer Protection Act of 2004 (FALCPA)." Accessed June 13, 2017. <https://www.fda.gov/Food/GuidanceRegulation/GuidanceDocumentsRegulatoryInformation/Allergens/ucm106187.htm>
- Food and Drug Administration (FDA). 2016b. "Food Allergies: What You Need to Know." Accessed June 15, 2017. <https://www.fda.gov/Food/IngredientsPackagingLabeling/FoodAllergens/ucm079311.htm>
- Gupta, R.S., E.E. Springston, M.R. Warrier, B. Smith, R. Kumar, J. Pongratic, and J.L. Holl. 2011. "The Prevalence, Severity, and Distribution of Childhood Food Allergy in the United States." *Pediatrics.* 28(1):e9–e17.
- Joshi, P. and K. Frith. 2017. "Assessing and Managing IgE-Mediated Food Allergies in Children." *Medicine Today.* 18(3):37–43.
- National Institute of Allergy and Infectious Diseases (NIAID). 2016. "Characterizing Food Allergy & Addressing Related Disorders." Accessed July 20, 2017. <https://www.niaid.nih.gov/diseases-conditions/food-allergy-characterizing>.
- Radke, T.J., L.G. Brown, E.R. Hoover, B.V. Faw, D. Reimann, M.R. Wong, D. Nicholas, J. Barkley, and D. Ripley. 2016. "Food Allergy Knowledge and Attitudes of Restaurant Managers and Staff: An EHS-Net Study." *Journal of Food Protection.* 79 (9):1588–1598.
- Ross, M.P., M. Ferguson, D. Street, K. Klontz, T. Schroder, and S. Luccioli. 2008. "Analysis of food-allergic and anaphylactic events I the National Electronic Injury Surveillance System." *J Allergy Clin Immunol.* 121(1):166–171.
- Royal, C. and M. Levin. 2016. "Reactions to Food Additives." *Current Allergy & Clinical Immunology.* 29(4):226–230.
- Savage, J.H., A. J. Kaeding, E.C. Matsui, and R.A. Wood. 2010. "The natural history of soy allergy." *J Allergy Clin Immunol.* 125(3):683–686.
- Skolnick, H.S., M.K. Conover-Walker, C.B. Koerner, H.A. Sampson, W. Burks, and R.A. Wood. 2001. "The natural history of peanut allergy." *J Allergy Clin Immunol.* 107(2):367–374.
- Spergel, J.M. 2013. "Natural history of cow's milk allergy." *J Allergy Clin Immunol.* 131:813–814.
- Taylor, S.L., and Hefle S.L. 2001a. "Food Allergies and Other Food Sensitivities." *Food Technology.* 55 (9):68–83.
- Taylor, S.L., and Hefle SL. 2001b. "Ingredients and Labeling Issues Associated with Allergenic Foods." *European Journal of Allergy and Clinical Immunology.* 56 (67):64–69.
- Wang, J. and H.A. Sampson. 2009. "Food Allergy: Recent Advances in Pathophysiology and Treatment." *Allergy Asthma Immunol Res.* 1(1):19–29.
- Wood, A.R. 2017. "Oral Immunotherapy for Food Allergy." *J Investig Allergol Clin Immunol.* 27(3):151–159.
- Wood, A.R. 2003. "The Natural History of Food Allergy." *Pediatrics.* 111(6):1631–1637.
- Yazdanbakhsh, M., P.G. Kremsner, and R. van Ree. 2002. "Allergy, Parasites, and the Hygiene Hypothesis." *Science.* 296:490–494.