ANNEX 4: FOOD ALLERGY

Differentiating food allergy from other food related problems

Exposure to typical food? (Hover box1)

Table with most common foods (and products thereof) causing allergies or intolerances.

Food	Namely	Allergy	Intolerance
Cereals	Wheat, rye, barley, oats, spelt, kamut	X	X (gluten/coeliac)
Eggs		x	
Seafoods	Fish Crustaceans Mollusc	x	
Peanuts		x	
Soybeans		x	
Milk		x	X (lactose)
Nuts	Almonds, hazelnuts, walnuts, cashews, pecan nuts, Brazil nuts, pistachio nuts, macadamia or Queensland nuts.	x	
Celery		x	
Seeds	Sesame, mustard	x	
Sulphites			X
Lupine		x	

Based on the Regulation (EU) No 1169/2011 on the provision of food information to consumers[1].

Exposure

Food allergies occur when the food has been eaten. That may sound obvious but patients or parents of patients may believe that other contacts with food, such as being in the same room, can cause an allergic reaction. Other exposures that occasionally will trigger a food allergy include handling raw food, being kissed by a person who has just eaten, or when in proximity to frying food where aerosolised food allergen may be formed.

Based on[2]

Typical symptoms? (Hover box2)

Table with most common symptoms caused by allergy.

Tract	Symptoms
Oral cavity	itchiness or swelling of the mouth, face, lip, tongue and throat
Skin	urticaria angio-edema atopic eczema/dermatitis erythema itching
Gastro-intestinal	vomiting colic abdominal pain diarrhea (rapid, explosive) constipation
Respiratory	rhinorrhea sneezing wheezing coughing dyspnea
Cardio-vascular	cardiovascular collaps (dizziness, loss of consciousness, palpitations)

Based on [3,4]

Systemic reaction? (Hover box3)

Systemic reactions	
Grade 2	Grade 3
Allergic reactions that involve skin away from the site of allergen contact, upper airway, and/or gastrointestinal tract.	Severe, potentially life-threatening allergic reactions involving cardiovascular, neurological, bronchial, and/or laryngeal symptoms and signs.

Grade 2 and Grade 3 concern systemic reactions, Grade 3 includes anaphylaxis
Grade 1 includes local reactions/pollen-food allergy

Based on[5]

Maybe food allergy (Hover box4)

If you click on this button, you go to flow diagram “1.2 Likelihood of food allergy”.

Less likely food allergy (Hover box5)

If food allergy is less likely, the symptoms may be caused by a food intolerance. See the following website for more information about food intolerance:
www.nhs.uk/conditions/food-intolerance

Pollen-food allergy (Hover box6)

- Definition
    - Oral allergy syndrome, or pollen-food allergy syndrome is common in patients with allergic rhinitis to pollen. It is caused by the presence of labile proteins (profilins) within these foods that are cross reactive with allergenic pollen proteins.
- Epidemiology
    - Symptoms associated with raw fruits are normally caused by cross-reactivity to birch pollen in the UK and Northern Europe[1]. Symptoms associated with peach are most commonly seen in the southern op Europe.
- Symptoms and severity.
    - Symptoms are confined almost exclusively to the oropharynx and include the immediate onset of pruritus, irritation, and mild swelling of the lips, tongue, palate, and throat upon ingestion of fresh, uncooked fruits and vegetables. Symptoms usually subside within minutes after ingestion ceases. Symptoms may be more noticeable during the associated pollen season. As examples, a birch-allergic patient may develop itching of the lips or mouth upon eating apple, pear, cherry, carrot, celery, peach and potato, while a ragweed-allergic patient may react to melons and banana, and a mugwort-allergic patient may react to celery or mustard.
- Severity
    - In most cases there is no progression to anaphylaxis and patients don’t need to be referred. However, patients with reactions to tree nuts sometimes need to be referred for a risk assessment as in some cases there may be progression to anaphylaxis.
- Diagnose
    - There are three elements needed to make a diagnosis: symptoms with raw fruit, tolerance to cooked fruit and signs of birch pollen allergy[1].

Based on [4,6]

Likelihood of food allergy

Time between ingestion of the food and start of the reaction (Hover box 7)

IgE-mediated reactions occur rapidly after ingestion of the culprit food (ie, within seconds to minutes). Uncommonly, reactions up to two hours and beyond can also occur.

Based on[7]

Eliciting amount (Hover box 8)

IgE-mediated reactions can be triggered by minute amounts of food proteins. However, threshold doses required to trigger a reaction vary. Some individuals are less sensitive, and larger amounts of allergen must be ingested before a reaction occurs. Other disorders (eg, lactose intolerance) more typically require larger portions to induce symptoms. Attention should be paid to the fact that reactions can be triggered by food ingestion, inhalation, and skin contact.

Based on[2]

Reproducibility (Hover box 9)

IgE-mediated allergies cause symptoms with every ingestion, although there may be a threshold amount that is required. Was the food prepared in a different manner or consumed in much larger amounts? As examples, a patient may react to raw salmon in sushi but not to canned salmon or to scrambled egg but not egg in baked goods.

Based on[2]

Environment (Hover box 10)

The environment where the reaction took place is also important as there are some typical scenarios related to food allergy.

The introduction of solid foods in infancy (also known as weaning) is by far the most common scenario for food allergic reactions, as many new foods are introduced to the infant. Most infants react at the first serving of a new food; this is because a child has been sensitised by a non-oral route (skin most likely), leading to a reaction at the first serving.

Outside of weaning, food allergic reactions tend to happen when eating away from home in restaurants, in child care or nursery, on holiday, or at parties, where new foods may be tried.

Based on[2]

Specific IgE for suspected food (Hover box 11)

In a systematic review, reasonable sensitivity (70–100%), although less for most plant food allergies, but moderate specificity (40–70%) was found for specific IgE (sIgE). Sensitivity and specificity of serum IgE varied depending on the food being tested and due to the heterogeneity of studies with respect to inclusion criteria for patients, their geographic background, and their age and ethnicity, as well as recruitment processes. Specific IgE can be used to confirm or rule out the involvement of IgE when food allergy is suspected. However, IgE is often unable to differentiate between clinically relevant allergy and tolerance and oral challenges may therefore be required.

Specific IgE is measured in primary care, only if available and only if one is confident in interpreting the test results. Skin prick tests should be performed by referral. In some countries, GPs with a special interest in allergy are trained to perform skin prick tests in primary care. Total IgE or IgE food mixes are not recommended for use in primary care. Patients with atopic dermatitis usually have high levels of total IgE, which are not clinically relevant in the context of food allergy.

Based on[3]

High likely food allergy (Hover box 12)

The more “green factors” are present, the higher the likelihood of a food allergy.
Note: The presence of atopic diseases, such as eczema (atopic dermatitis), allergic rhinitis, and asthma, and/or whether these atopic diseases are present in first-degree family members, is not a risk factor for food allergy at the individual level. The absence of an atopic (family) history, does not imply a lower likelihood of food allergy. Of notice, testing for food allergy in siblings without a history of clinical reactivity appears to be unjustified.

Based on[8]

Prescribe epinephrine auto-injector (EAI) (Hover box 13)

Prescribe an epinephrine auto-injector to patients who are highly likely to have a food allergy in order to protect these patients in the period prior to seeing an allergy specialist.

The epinephrine auto-injector device is designed to be used by a nonmedical person to give a predefined dose of intramuscular adrenaline. Adrenaline (epinephrine) is a drug with combined a- and b-agonist actions which result in (i) peripheral vasoconstriction, thereby reversing hypotension and mucosal oedema; (ii) increased rate and force of cardiac contractions, thereby reversing hypotension; and (iii) reversal of bronchoconstriction and reduction in the release of inflammatory mediators. In some countries, two adrenaline auto-injectors are recommended.

Note: Adrenaline is not dangerous to a person for whom it is prescribed even if taken unnecessarily (i.e. patient thought that were having anaphylaxis but in fact they were not) and is administered correctly (i.e. intra muscularly)

Based on[9,10]

Provide user instructions EAI (Hover box 14)

When to use?
Give specific instructions about when to inject epinephrine ("action plan")
A person who is having an allergic reaction should use his/her Epinephrine Auto-Injector **immediately** if he/she:

-Is having trouble breathing.
-Feels tightness in the throat.
-Feels lightheaded or thinks that he/she might pass out.

The autoinjector should also be used promptly after an allergen exposure if the person has symptoms that could progress to the life-threatening ones listed above. These may include wheezing, repetitive coughing, swelling of the lips, tongue or throat, many hives, repetitive vomiting (especially with other symptoms), having a "feeling of doom," or a combination of these symptoms. For milder symptoms like a few hives, mild abdominal discomfort, or itching, your allergist may tell you to give another medication (eg, an antihistamine) first.
If treating a child with an allergic reaction, **also** use the autoinjector if the child:

-Is not responding, seems groggy, or passes out during an allergic reaction.
-Has food allergies and is vomiting repeatedly shortly after eating, especially if these symptoms are accompanied by flushing or hives.
-Is coughing repeatedly during an allergic reaction.
-Had previous anaphylaxis and develops widespread hives after possibly eating a trigger food.
-Has definitely eaten a trigger food that previously caused very severe anaphylaxis and has any symptoms at all, even very mild symptoms.

Based on[11]

How to use?
Demonstrate to the patient how the epinephrine autoinjector should be used.
Link to instructions of manufactures:
- EpiPen
http://www.epipen.co.uk/demonstrationvideo/
- Emerade
https://www.emerade.com/hcp/instruction-video
- Jext
https://adults.jext.co.uk/about-jext/how-to-use/

Refer to allergy specialist (Hover box 15)

- Refer patient to an allergy specialist for a risk-assessment.
- In some countries, GPs with a special interest in allergy are trained to perform the risk-assessment in primary care.

Less likely food allergy (Hover box 16)

The more “red factors” are present, the lower the likelihood of a food allergy.

Consider differential diagnoses and treat accordingly (Hover box 17)

If food allergy is less likely, the symptoms may have other causes. Most commonly symptoms are caused by food intolerance. See the following website for more information about food intolerance.
www.nhs.uk/conditions/food-intolerance

Consider referral to community dietician (Hover box 18)

If food allergy is less likely and other gastro-intestinal diseases which require specific treatment are ruled out, referral to a community dietician can be considered in order to relieve symptoms and to retain a sufficient diet.

Background behind underlined words in the Information

Allergies / Allergy: A food allergy:

is a reaction from your immune system (your body's defence against infection) – your immune system mistakenly treats proteins found in food as a threat
can trigger typical allergy symptoms, such as a rash, wheezing and itching, after eating just a small amount of the food (these symptoms usually come on rapidly)
is often to particular foods – common food allergies in adults are to fish and shellfish and nuts, and in children to milk and eggs as well as to peanuts, other nuts and fish
can be serious
w.nhs.uk/conditions/food-intolerance

Intolerances / Intolerance: A food intolerance:
doesn't involve your immune system – there is no allergic reaction, and it is never life-threatening
causes symptoms that come on more slowly, often many hours after eating the problem food
only results in symptoms if you eat reasonable amounts of the food (unlike an allergy, where just traces can trigger a reaction)
can be caused by many different foods
w.nhs.uk/conditions/food-intolerance

Cross-reactions: Some food allergies may be caused by cross-reactions. Usually the primary allergy is an inhalant allergy. (See Table 1[12] and Cross-reactivity Patterns Table[13]). These cross-reactions cause usually mild symptoms (pollen-food allergy/ oral allergy).

Of notice, some foods may cause (severe) systematic symptoms OR mild oral allergy symptoms, for example peanut, hazelnut, peach, soybeans and celery.

Of notice, being allergic to one of the pollen-food allergens, does not mean that someone is allergic to / has to avoid all pollen-foods in a certain pollen-food group.

Anaphylaxis
Severe, potentially life-threatening systemic hypersensitivity reaction. This is characterized by being rapid in onset with life-threatening airway, breathing, or circulatory problems and is usually, although not always, associated with skin and mucosal changes. In infants and children impaired consciousness (being floppy or exhibiting signs) is also a clinical sign of anaphylaxis.

To view the anaphylaxis logogram click here.

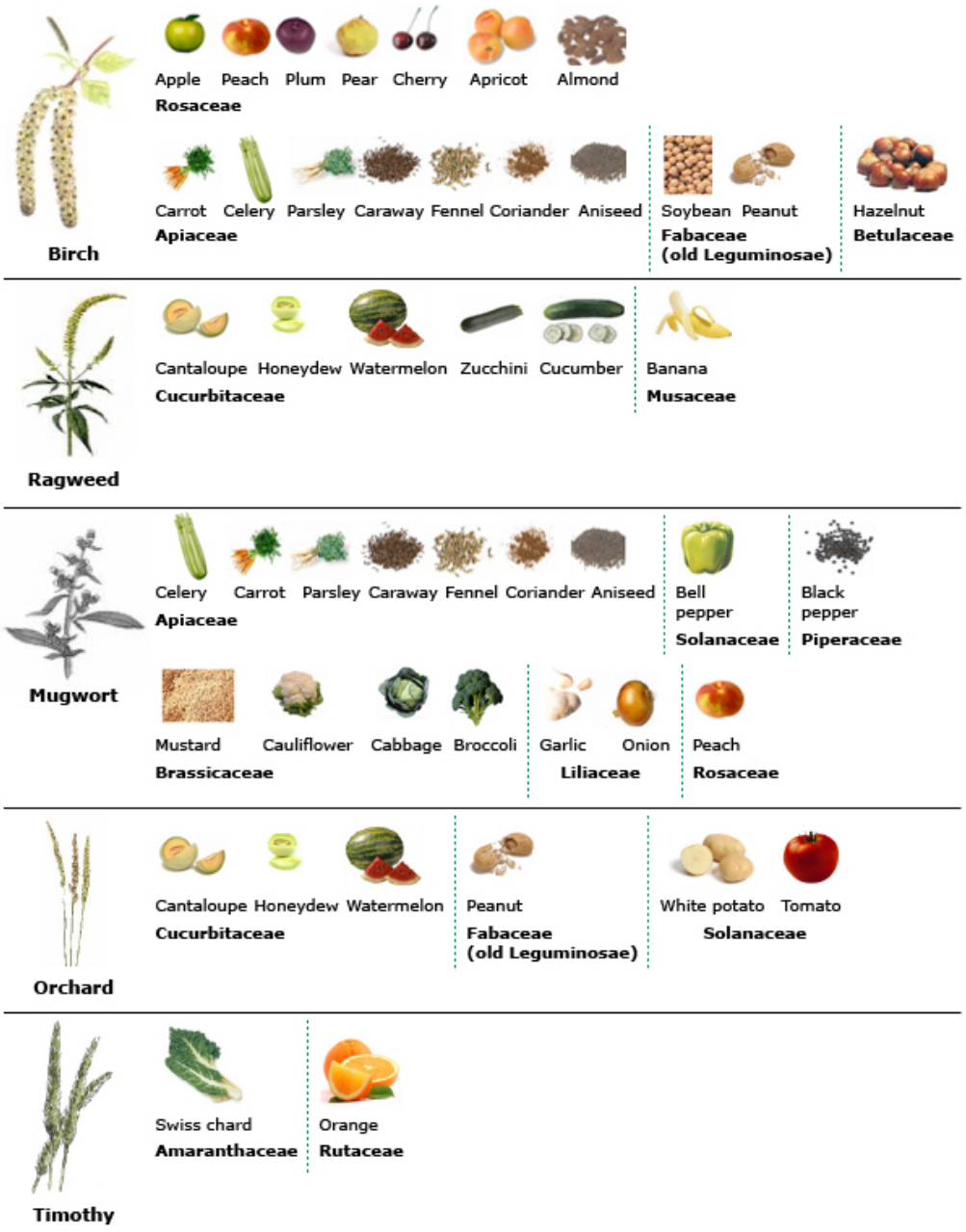
Table 1 Common and uncommon food allergies due to cross-reactions

Inhalant allergen	Food allergen
Common cross-reactions to foods	
Tree pollen	Apple, cherry, nectarine, peach, hazelnut, carrot, celeriac, soybean, peanut, potato, kiwifruit, sharon fruit, jackfruit
Less Common cross-reactions to foods	
Mugwort pollen	Spices, carrot, celeriac, lychee, mango, sunflower seeds, grapes, peach
Natural latex	Pineapple, avocado, banana, potato, tomato, kiwifruit, chestnut
Uncommon cross-reactions to foods	
Ficus benjamina	Fig
Bird allergens	Poultry, egg, innards
House dust mites	Shellfish and molluscs
Sycamore/peach*	Apricot, plum, apple, lettuce
Animal epidermis	Cow's milk, meat, innards
Unproven cross-reactions to foods	
Artemisia and Ambrosia pollen	Melon, zucchini, cucumber, banana
Grass and grain pollen†	Flour, bran, tomato, legumes

*Primary sensitization to non-specific lipid transfer proteins (nsLTPs) not yet fully understood, possibly gastrointestinal to peach as the 'main allergen.' nsLTP-related allergies are clinically 'aggressive' and common in Spain and other Mediterranean countries.
†Considering the frequency of grass and grain allergy, cross-reactions with food are extremely rare.

From[12]

Cross-reactivity patterns in oral allergy syndrome (pollen-food allergy syndrome)



Typical patterns of cross-reactivity between pollens and fruits and vegetables. Individual foods are grouped by their taxonomical families.

Adapted and extended from: Sicherer SH. Clinical implications of cross-reactive food allergens. J Allergy Clin Immunol 2001; 108:881.

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Cereal grains

- Definition[14]
    - The term cereals includes wheat, rye, barley, oats, spelt, kamut.
    - The variety of adverse immune responses to wheat include acute IgE-mediated reactions, and non IgE mediated reactions.
    - Allergy to cereals does not include other adverse reactions to cereals, such as gluten intolerance (coeliac).
- Epidemiology/ tolerance[15]
    - Wheat allergy is the most common of the cereal grain allergies. IgE-mediated allergic reactions to cereals are most commonly seen in children and usually resolve in the preschool years, except for exercise-associated reactions. Inhalation reactions are seen more often in adults, especially those with occupational exposures.
- Cross reactivity
    - Cereal grains share homologous proteins with grass pollens and each other. This may account for the high rate of sensitization to these foods. However, rates of clinical reactivity are much lower.

Gluten intolerance

Many people cut gluten from their diet thinking that they are intolerant to it, because they have symptoms that come on after eating wheat. In reality very few people need to cut out gluten from their diet, although it's important to do so if you have coeliac disease (which is neither an intolerance nor an allergy)

www.nhs.uk/conditions/food-intolerance

Egg

- Epidemiology/tolerance
    - Egg allergy affects up to 2-3 percent of infants/young children and is reported by 0.8 percent of adults. Tolerance is usually achieved by age five years. However, the rate of resolution of egg allergy may be slowing.
- Allergenicity
    - The major allergenic proteins are found in the egg white. Sensitization to hen's egg in infancy is associated with an increased risk of sensitization to respiratory allergens later in life. Many children with egg allergy tolerate egg in baked products.
- Symptoms and severity
    - Allergic responses to egg can be severe, and death from egg-induced anaphylaxis has been reported. Others develop urticaria from skin contact with egg and yet ingest it without symptoms.
- Cross reactivity
    - Cross-reactive proteins among various avian egg proteins are common.

Based on[16]

Seafoods

- Definition
    - The term seafood includes
        - Vertebrate finned fish, such as salmon, tuna, and cod
        - Crustaceans, such as shrimp, prawn, crab, lobster, and crawfish.
        - Mollusks, such as squid, snails, and bivalves (scallops, clams, oysters, mussels, and others).
    - The term shellfish includes crustaceans and mollusks.
- Epidemiology/tolerance
    - Seafood allergy is the most common food allergy in adults and among the six most prevalent food allergy in young children. Allergy developed in adulthood for 40 (fish) and 60 percent (shellfish). Seafood allergy is considered to be persistent in most cases.
- Symptoms and severity
    - Allergy to shellfish is among the leading causes of food allergy food-allergic emergency department visits in adults. IgE-mediated allergic reactions are the most commonly described type of allergic reactions to seafood ingestion and are rapid in onset (usually within minutes to one hour after ingestion), and extra-gastrointestinal manifestations, such as urticaria, angioedema, respiratory symptoms, and laryngeal edema, are common. These reactions can range in severity from mild to life-threatening anaphylaxis.
- Cross reactivity
    - There is a high rate of clinical cross-reactivity among fish and among shellfish because of homologous proteins.

Based on [17,18,19]

Peanut

- Epidemiology/tolerance
    - Peanut Allergy affects approximately 0.8 percent of the general population, but differs per country. Peanut allergy established in childhood appears to be long lived, although some children with a peanut allergy eventually tolerate peanut.
- Symptoms/ severity
    - Peanut allergy is potentially severe. Peanut-allergic reactions are generally the most common cause of fatal food-induced anaphylaxis. The highest-risk group is adolescents with asthma.
- Allergenicity
    - Highly refined peanut oil is usually tolerated by people with peanut allergy.
- Cross reactivity
    - The majority of peanut-allergic individuals react to non-pollen-related stable proteins that result in systemic and potentially severe reactions. However, peanut also contains birch pollen-related proteins and may cause oral allergy syndrome in a subset of birch pollen-allergic individuals. Additionally, hazelnut, almond, and several seeds, and mugwort pollen cross-reacts with mustard and other seeds. In addition, almond and peanut contain proteins homologous to peach allergens. These reactions tend to occur in older children and adults.

Soybean

- Epidemiology/tolerance
    - Soy allergy affects primarily infants and young children. Soy allergy is typically transient.
- Symptoms/ severity
    - Deaths from soy allergy are rare
- Allergenicity
    - Processed soybean oil is typically considered safe for patients with soy allergy [5]. Fermentation of soy may reduce the allergenicity. Presumably, allergenicity varies among soy products (eg, soy sauce, miso, tempeh, and natto), and reactions may depend upon the product and the individual's sensitivity.
- Cross reactivity

- Products containing soy protein may trigger allergic reactions, including severe ones, in persons with sensitization to birch pollen. Soy allergy tends to occur in children with pre-existing CMA due to cross-reactivity.

Based on [20,21,22,23]

Milk allergy

- Epidemiology/tolerance
    - Cow's milk allergy is the most common food allergy in young children affecting approximately 2 percent of children under four years of age, but is uncommon in adults. Tolerance is often achieved by age three to five years, although persistence beyond this age is increasingly reported.
- Symptoms/severity
    - This food allergy presents with a wide range of clinical syndromes and can be immunoglobulin E (IgE) mediated and/or non-IgE mediated. Non-IgE-mediated food allergy of infancy resolves more quickly than IgE-mediated allergy. Cows milk allergy does not include other adverse reactions to milk, such as lactose intolerance, which are nonimmune mediated.
    - Clinical findings of cow's milk allergy frequently appear during the first few months of life, often within days or weeks after the introduction of a cow's milk-based formula into the diet, although symptoms may also occur with exclusive breastfeeding if the mother ingests cow's milk. IgE-mediated food-triggered reactions generally occur immediately, within minutes to two hours after ingestion. These reactions can present with skin, oropharyngeal, upper and lower respiratory tract, gastrointestinal tract, and/or cardiovascular signs and symptoms. Reactions can vary from mild to life-threatening anaphylaxis.
    - The non-immunoglobulin E (IgE)-mediated reactions usually have a delayed onset beyond two hours of ingestion.

Based on[24,25,26,27,28]

Lactose intolerance

- Epidemiology
    - Intolerance to lactose-containing foods is common. The prevalence of lactose intolerance varies across the world, with the lowest prevalence in Europeans and European Americans and higher prevalence in African Americans, Hispanics, Asians, Asian Americans, and Native Americans. The prevalence of lactose malabsorption and intolerance are low in children younger than six years and increases with age.
- Symptoms and severity
    - Symptoms of lactose intolerance include cramping abdominal pain (often localized periumbilical area or lower quadrants), flatulence, and diarrhea after ingestion of milk or milk-containing products. In addition, adolescents may have symptoms of vomiting. In children, the stools may be bulky, frothy, and watery. In adults, diarrhea is not a predominant symptom. Lactose intolerance is more likely in patients with mild symptoms that occur within a few hours after significant lactose ingestion (eg, >2 servings of dairy/day or >1 serving in a single dose that is not associated with a meal) and resolve after five to seven days of avoidance of lactose-containing foods.

Based on [29,30,31,32]

Tree nuts

- Epidemiology/tolerance
    - Allergy to nuts from trees (eg, walnut, cashew, Brazil nut, pistachio) may affect up to 4.3 percent of individuals. Tree nut allergy is considered to be long lived, although a small portion of children may outgrow it.
- Symptoms/severity
    - Tree nut-allergic reactions can be severe and account for a relatively high proportion of fatal reactions in several case series [Variation in severity of clinical reactions may be related in part to the particular proteins to which immune responses are directed. These nuts contain stable and labile proteins. Stable proteins are more likely to trigger systemic reactions. Labile proteins lead to localized symptoms (cross reactivity). Certain tree nut allergies appear to coexist more commonly, such as cashew and pistachio or walnut and pecan.
- Cross reactivity
    - Certain nuts (eg, almond, hazelnut) contain labile proteins that are pollen cross-reactive (eg, birch). Exposure to these proteins leads to localized symptoms of oral allergy syndrome (pollen-food allergy syndrome). Cross-reactivity is seen among pistachio, cashew, and mango seed (but NOT the fruit) [Proteins homologous to cashew may also be found in fruit seeds, with rare reports of reactions if the seeds are eaten].

Based on [19,33,34,35,36,37]

Seeds

- Epidemiology
    - The incidence of allergies to seeds (eg, sesame, poppy, mustard, flax, sunflower, and rape) is increasing
- Symptoms/severity
    - Reactions can range from mild symptoms isolated to the oropharynx to severe anaphylaxis.
- Cross reactivity
    - Cross-reactivity with foods (peanut, hazelnut, kiwi, other seeds) has been described.

Based on[38]

Sulfites

- Definition:
    - Most people with sulfite sensitivity do not have positive allergy tests and there is currently no reliable blood or skin allergy test to test for sulfite intolerances. Sulfites have a useful role to play in helping preserve many foods and beverages. The addition of sulfites to some foods like beer and wine is permitted in most countries.
- Symptoms/severity
    - Sulfites most commonly cause asthma symptoms in those with underlying asthma, sometimes allergic rhinitis (hay fever) like reactions, occasionally urticaria (hives) and very rarely, anaphylaxis (severe allergic reaction). Wheezing is the most common reaction.

Based on [39]

Lupin

- Epidemiology
    - There are reports of sensitization and allergy to lupine flour, particularly in Europe. Allergy to lupine is related to peanut allergy in some patients and is a distinct allergy in others.

Celery

- Epidemiology
    - This allergy is especially important in Switzerland, Germany, and France.
- Symptoms
    - Oral allergy syndrome caused by celery can be seen in patients who are sensitized only to birch. Systemic reactions to celery are also reported, especially in highly sensitized patients.
- Cross reactivity

References:

1. Regulation (EU) No 1169/2011 on the provision of food information to consumers.

2. Fifteen-minute consultation: The EATERS method for the diagnosis of food allergies. Erlewyn-Lajeunesse M, Weir T, Brown L, Howells H, Rowley J, Grainger-Allen E, Powell C. Arch Dis Child Educ Pract Ed. 2019 Dec;104(6):286-291. doi: 10.1136/archdischild-2018-316397. Epub 2019 Apr 4.

3. EAACI food allergy and anaphylaxis guidelines: diagnosis and management of food allergy. Allergy. 2014 Aug;69(8):1008-25. doi: 10.1111/all.12429. Epub 2014 Jun 9. Muraro A, Werfel T, Hoffmann-Sommergruber K, et all.

4. Oral allergy syndrome (OAS), or pollen-food allergy syndrome (PFS) https://www.aaaai.org/conditions-and-treatments/library/allergy-library/outdoor-food-allergies-relate

5. The urgent need for a harmonized severity scoring system for acute allergic reactions. A. Muraro. Allergy 2018 Sep;73(9):1792-1800. doi: 10.1111/all.13408. Epub 2018 Jun 17.

6. Werfel T, Asero R, Ballmer-Weber BK, Beyer K, Enrique E, Knulst AC, Mari A, Muraro A, Ollert M, Poulsen LK, Vieths S, Worm M, Hoffmann-Sommergruber K. Position paper of the EAACI: food allergy due to immunological cross-reactions with common inhalant allergens. Allergy 2015; 70:
1079–1090.

7. Sicherer SH, Sampson HA. Food allergy: A review and update on epidemiology, pathogenesis, diagnosis, prevention, and management. J Allergy Clin Immunol. 2018 Jan;141(1):41-58. doi: 10.1016/j.jaci.2017.11.003. Epub 2017 Nov 21. PMID: 29157945.

8. Gupta RS[1], Walkner MM[2], Greenhawt M[3], Lau CH[4], Caruso D[5], Wang X[5], Pongracic JA[4], Smith B[6]. Food Allergy Sensitization and Presentation in Siblings of Food Allergic Children. J Allergy Clin Immunol Pract. 2016 Sep-Oct;4(5):956-62.

9. Muraro A, Roberts G, Worm M, Bilo MB, Brockow K, et al. Anaphylaxis: guidelines from the European Academy of Allergy and Clinical Immunology.Allergy2014;69: 1026–1045.

10. Muraro A, Agache I, Clark A, Sheikh A, Roberts G, et al. EAACI Food Allergy and Anaphylaxis Guidelines: managing patients with food allergy in the community. Allergy2014;69: 1046–1057.

11. Uptodate, Patient education: Use of an epinephrine autoinjector (Beyond the Basics). Author:Scott H Sicherer, MD, FAAAAI

12. Werfel T, Asero R, Ballmer-Weber BK, Beyer K, Enrique E, Knulst AC, et al. Position paper of the EAACI: Food allergy due to immunological cross-reactions with common inhalant allergens. Allergy Eur J Allergy Clin Immunol. 2015;70(9):1079–90.

14.Up to date, Grain allergy: allergens and grain classification

15. Keet CA, Matsui EC, Dhillon G, et al. The natural history of wheat allergy. Ann Allergy Asthma Immunol 2009; 102:410.

16. Up to date: Egg allergy: clinical features and diagnoses

17. Sicherer SH, Sampson HA. Food allergy: A review and update on epidemiology, pathogenesis, diagnosis, prevention, and management. J Allergy Clin Immunol 2018; 141:41.

18. Savage J, Sicherer S, Wood R. The Natural History of Food Allergy. J Allergy Clin Immunol Pract 2016; 4:196.

19. Gupta RS, Warren CM, Smith BM, et al. Prevalence and Severity of Food Allergies Among US Adults. JAMA Netw Open 2019; 2:e185630.

20. Savage JH, Kaeding AJ, Matsui EC, Wood RA. The natural history of soy allergy. J Allergy Clin Immunol 2010; 125:683.

21. Foucard T, Malmheden Yman I. A study on severe food reactions in Sweden--is soy protein an underestimated cause of food anaphylaxis? Allergy 1999; 54:261.

22. Mittag D, Vieths S, Vogel L, et al. Soybean allergy in patients allergic to birch pollen: clinical investigation and molecular characterization of allergens. J Allergy Clin Immunol 2004; 113:148.

23. Kattan JD, Cocco RR, Järvinen KM. Milk and soy allergy. Pediatr Clin North Am 2011;58:407–26.

24. Rona RJ, Keil T, Summers C, et al. The prevalence of food allergy: a meta-analysis. J Allergy Clin Immunol 2007; 120:638.

25. Høst A. Cow's milk protein allergy and intolerance in infancy. Some clinical, epidemiological and immunological aspects. Pediatr Allergy Immunol 1994; 5:1.

26.Heine RG, Elsayed S, Hosking CS, Hill DJ. Cow's milk allergy in infancy. Curr Opin Allergy Clin Immunol 2002; 2:217.

27. Järvinen KM, Chatchatee P. Mammalian milk allergy: clinical suspicion, cross-reactivities and diagnosis. Curr Opin Allergy Clin Immunol 2009; 9:251.

28. Bahna SL. Cow's milk allergy versus cow milk intolerance. Ann Allergy Asthma Immunol 2002; 89:56.

29. Suchy FJ, Brannon PM, Carpenter TO, et al. National Institutes of Health Consensus Development Conference: lactose intolerance and health. Ann Intern Med 2010; 152:792.

30. Rao DR, Bello H, Warren AP, Brown GE. Prevalence of lactose maldigestion. Influence and interaction of age, race, and sex. Dig Dis Sci 1994; 39:1519.

31. Di Stefano M, Veneto G, Malservisi S, et al. Lactose malabsorption and intolerance in the elderly. Scand J Gastroenterol 2001; 36:1274.

32. Johnson AO, Semenya JG, Buchowski MS, et al. Correlation of lactose maldigestion, lactose intolerance, and milk intolerance. Am J Clin Nutr 1993; 57:399.

33. Bock SA, Muñoz-Furlong A, Sampson HA. Further fatalities caused by anaphylactic reactions to food, 2001-2006. J Allergy Clin Immunol 2007; 119:1016.

34. Beyer K, Grishina G, Bardina L, et al. Identification of an 11S globulin as a major hazelnut food allergen in hazelnut-induced systemic reactions. J Allergy Clin Immunol 2002; 110:517.

35. Smeekens JM, Bagley K, Kulis M. Tree nut allergies: Allergen homology, cross-reactivity, and implications for therapy. Clin Exp Allergy 2018; 48:762.

36. Roux KH, Teuber SS, Sathe SK. Tree nut allergens. Int Arch Allergy Immunol 2003; 131:234.

37. O'Sullivan MD, Somerville C. Cosensitization to orange seed and cashew nut. Ann Allergy Asthma Immunol 2011; 107:282.

38. Patel A, Bahna SL Hypersensitivities to sesame and other common edible **seeds**..Allergy. 2016 Oct;71(10):1405-13. doi: 10.1111/all.12962. Epub 2016 Jul 15.PMID: 27332789 Review.

39. Sulfite allergy, the Australian society of clinical immunology and allergy
https://web.archive.org/web/20120304155909/http://www.allergy.org.au/content/view/128/1/

40. Yagami A, Nakazawa Y, Suzuki K, Matsunaga K. Curry spice allergy associated with pollen-food allergy syndrome and latex fruit-syndrome. J Dermatol 2009; 36:45.