Making Sense of Food Allergies in Canada

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CONTRIBUTORS

Who we are...

Authors
Dr. Susan J. Elliott, PhD, Professor, Department of Geography & Environmental Management, University of Waterloo
Emily Shantz, PhD(c), Research Assistant, Department of Geography & Environmental Management, University of Waterloo

Scientific Advisory Committee
Dr. Alan Becker, MD, FRCPC, Professor, Section of Allergy & Clinical Immunology, Department of Pediatrics & Child Health, University of Manitoba
Dr. Edmond Chan, MD, FRCPC, Clinical Associate Professor, Division of Allergy & Immunology, Department of Pediatrics, University of British Columbia
Dr. Ann E. Clarke, MD, MSc, Professor, Division of Rheumatology, University of Calgary
Dr. Audrey Dunn-Galvin, PhD, Lecturer, Department of Pediatrics & Child Health, University College Cork, Ireland
Dr. Jean Marshall, PhD, Professor, Department of Microbiology & Immunology, Dalhousie University

Steering Committee
Debbie Bruce, Canadian Anaphylaxis Initiative, http://cai-allergies.ca/
Christine Hampson, The Sandbox Project, http://sandboxproject.ca/
Adele Iannantuono, Adjunct Professor, Department of Geography, University of Waterloo
Deirdre Laframboise, Federation of Canadian Municipalities – Green Municipal Fund
Sharon Lee, Asthma Allergy Information Association
Beatrice Povolo, Food Allergy Canada, http://foodallergycanada.ca/
Michelle Vine, Adjunct Professor, School of Public Health & Health Systems, University of Waterloo

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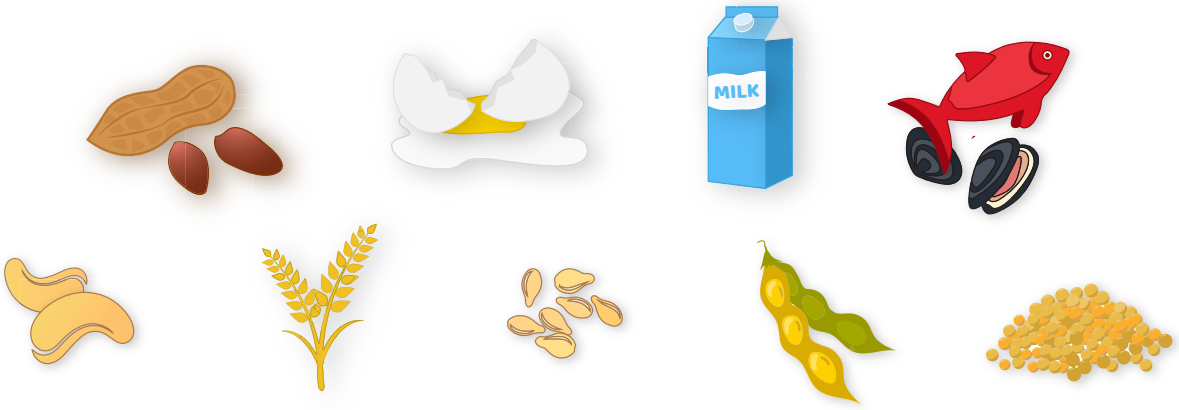


An **allergen** is defined as a substance that produces an **allergic reaction**. Common food allergens include proteins found in peanuts, tree nuts, milk, eggs, fish, shellfish, sesame, mustard, wheat and soy. Usually, when you eat food, your body learns not to respond to it. This is called **tolerance**. If you don't develop tolerance to a food, your body does not learn the difference between the food and threats such as bacteria or viruses, and mounts an immune response to protect against it. The process by which your immune system learns to react to a substance such as a particular food is called **sensitization.**

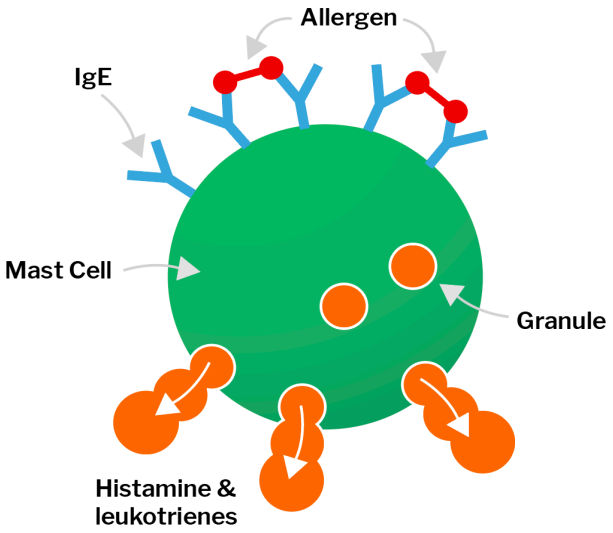
So how does the body decide whether tolerance or sensitization to a substance should occur? This remains unclear, although research has provided us with a few clues. Scientists believe that the development of food allergy requires a disturbance to the body such as an injury or infection of the skin or digestive tract[2]. If the food allergen is introduced at the site of this disturbance, the immune system reacts as if the allergen is dangerous and initiates an **allergic immune response.**

The science of food allergies

The human immune system has developed many mechanisms for protecting us against physical, chemical and biological threats. When faced with foreign invaders such as bacteria or viruses, the immune system normally mounts an attack called an **immune response**.

An immune response involves a variety of players including **white blood cells** and **antibodies**. When white blood cells detect a threat, they produce **molecules** and **proteins** that help fight the potential invader, such as **antibodies**. Antibodies are also called **immunoglobulins (Ig)**. There are different types of white blood cells and antibodies, but the main players in food allergies are **mast cells** and **IgE**.

Mast cells are the "allergic cells" that reside in places like our skin, lungs, and digestive tract – all of the places where our tissues come into contact with the outside environment and potential allergens might enter the body. Mast cells are unique immune cells because they store large amounts of molecules such as **histamine** in sacks called **granules**. When mast cells detect a threat, they release these molecules in a process called **degranulation.**



Immunoglobulin E (IgE) is a type of antibody that is also found in the skin, lungs, and digestive tract. Typically, IgE protects against foreign substances

such as parasites. When IgE encounters a perceived threat, it sounds the alarm by binding to the surface of mast cells. This binding action tells mast cells to degranulate, which in turn sends a message to the body to mount an immune response.

What happens during an allergic reaction?

During an allergic reaction, white blood cells react to food allergens as if they are an invader and release the antibody IgE. IgE then binds to the surface of mast cells, instructing them to release large amounts of molecules such as histamine into the bloodstream. These molecules in the blood sound the alarm to the immune system that something dangerous has been encountered. This immune response to the food allergen results in **outward allergic symptoms** in the skin (rash, redness, hives), airway (throat tightness/swelling, difficulty breathing) and/or digestive tract (nausea, vomiting, diarrhea). A person experiencing a severe reaction may enter a state of **anaphylaxis**, which is a life-threatening condition that is rapid in onset and requires immediate treatment with **epinephrine**, the first-line drug treatment for allergic reactions.

How do food allergies persist over time?

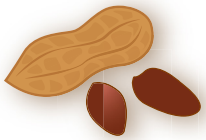
Our immune system becomes trained to "remember" threats that have been encountered before, so an immune response can be mounted quickly to fight the invader if it is encountered again. This is important in protecting us from infectious diseases caused by bacteria and viruses.

A special type of white blood cell called a **memory B-cell** does the job of "remembering". For people with food allergies, these memory cells "remember" the food allergen as a threat, so each time the allergen enters the body, an immune response is triggered.

Common food allergies

People can be allergic to any food, but some allergies are more common

than others. The following foods are listed as priority allergens by Health Canada as they are most frequently associated with allergic reactions[3]:



Peanuts: Peanuts are a legume, so people who are allergic to peanuts may not necessarily be allergic to other nuts such as tree nuts (for example, almonds, walnuts, cashews, etc.)

Tree nuts: Includes almonds, Brazil nuts, cashews, hazelnuts, macadamia nuts, pecans, pine nuts, pistachio nuts and walnuts.

Fish, crustaceans and molluscs: Fish, crustaceans and molluscs are sometimes collectively referred to as "seafood", while crustaceans and molluscs are often called "shellfish". People with allergies to one type of seafood such as fish, crustaceans (lobster, crab, etc.), or molluscs (clams, oysters, etc.) may be able to safely eat other seafood.

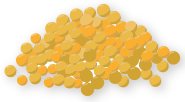
Eggs: Individuals may be allergic to the egg yolk and/or the egg white.

Milk: Individuals who are allergic to milk experience a reaction to one of the proteins found in cow's milk.

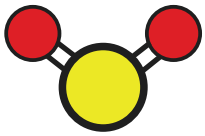
Wheat: A wheat allergy is different from a wheat intolerance. People with a wheat allergy experience IgE-mediated reactions to wheat which should be treated with epinephrine.

Sesame seeds: May be white or black in colour, or processed into sesame oil.

Soy: Soy comes from soybeans, which can be made into flour, milk, tofu, oil and other products found in both food and non-food sources.



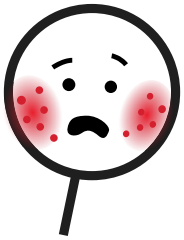
Mustard: Mustard is a plant used in many cuisines. People with a mustard allergy must avoid products such as mustard seeds, mustard powder, prepared mustard or mustard greens.



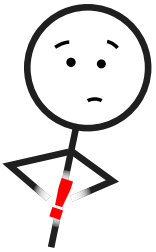
Sulphites: Sulphites are a food additive and are also found naturally in some foods. Sulphites do not cause IgE-mediated allergic reactions, but are included with the other priority allergens as sulphite sensitivity can cause allergy-like symptoms. There is currently no allergy testing available for sulphites. People with asthma are at particular risk of having a sulphite sensitivity.

Reacting to food allergens

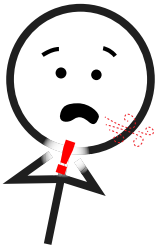
An allergic reaction typically happens within minutes of consuming a food allergen, but can occur up to hours later. An allergic reaction is defined as the presence of one or more of the following symptoms:



Skin: hives, rash, redness, swelling, itching

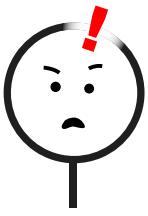


Gastrointestinal: nausea, pain, cramps, vomiting, diarrhea



Respiratory: difficulty breathing, shortness of breath, wheezing, coughing, tightness of the throat, difficulty swallowing, runny nose and watery eyes

Cardiovascular: shock, fainting, weak pulse, feeling dizzy or lightheaded



Other: anxiety, headache, uterine cramps, metallic taste in the mouth

Allergic reactions to food are different for each individual. Symptoms can vary from person to person. If a person experiences more than one reaction to the same food, the symptoms may be different each time. A person may experience different symptoms when they react to different foods.

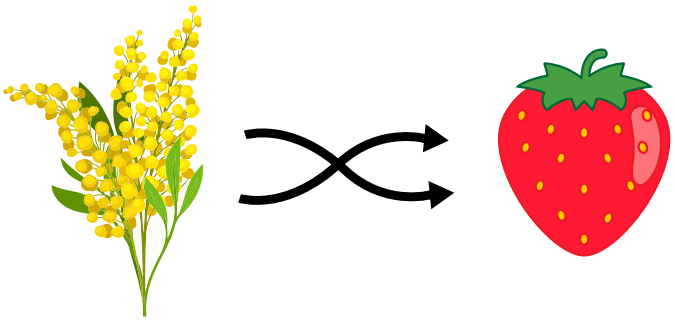
An allergic reaction can be mild, moderate or severe. **Mild or moderate** reactions may be characterized by symptoms of the skin (hives, tingling, swelling of the face), gastrointestinal tract (nausea, vomiting, cramps), respiratory tract (coughing, wheezing, difficulty breathing) or cardiovascular system (dizziness or fainting due to a drop in blood pressure). **More severe reactions including anaphylaxis generally include symptoms from two or more of the body systems listed above**. Symptoms of an allergic reaction may initially be mild, but **can quickly progress to become dangerous and life-threatening**. For this reason, it's important to take all allergic reactions seriously and seek treatment immediately. **If someone around you is having an allergic reaction and you aren't sure whether the symptoms warrant epinephrine, use it right away.** The benefits of using epinephrine far outweigh the risks of not giving it.

How severe will the reaction be?

In most cases, **it's impossible to predict how severe a reaction will be**. Even very small doses of a food allergen can trigger anaphylaxis in some individuals. Scientists believe that the severity of an allergic reaction depends on a number of factors specific to the individual (age, medications, levels of exercise, presence of asthma) and the food consumed (what the allergen is, how much was consumed, route of exposure).

Cross-reactive allergies

Cross-reactivity occurs when the body cannot distinguish between food proteins. **A person with an allergy to one food protein might experience a reaction to another food protein or even an environmental allergen** – this is because the immune system sees them as the same. Cross-reactivity is different for each individual. **In some cases, cross-reactions can be serious and result in anaphylaxis.**



Examples of cross-reactive food allergies:

- Cow's milk and milk from other mammals such as goats and sheep
- Peanuts and other legumes such as lupin, soy beans, and other beans
- Peanuts and tree nuts
- Different species of fish, including fresh water fish and salt water fish
- Crustacean shellfish (shrimp, lobster, crab) and molluscs (clams, oyster, scallops, mussels)
- Latex and fruits such as banana, avocado, kiwi and chestnut

Some people with pollen allergies (allergic rhinitis or hay fever) may develop symptoms such as itching or tingling in the mouth and throat immediately after eating some fresh raw fruits, vegetables, nuts or seeds. This is because these foods contain proteins that are cross-reactive to pollen. This is called **oral allergy syndrome** or **pollen-food syndrome**. In these cases, cooked foods are usually tolerated and anaphylaxis is rare.

Cross-reactivity poses some challenges for food allergy testing and diagnosis. In some cases, a person may have a positive skin test or blood test to a particular allergen, but may be able to eat the food without experiencing a reaction. This could be because they are actually allergic to a protein that is cross-reactive to that food. This is important to note because many people stop eating a food they did not previously react to due to a positive test, which places unnecessary restrictions on their diet. Anyone who thinks they might have a cross-reactivity should visit their doctor or allergist.

Food allergy or food intolerance?

Not everyone who experiences a reaction to a food has a food allergy – it is possible that they may have a **food intolerance**. Although these terms are often used interchangeably, a food allergy is distinct from a food intolerance.

The biggest difference is that a food allergy involves the immune system, while a food intolerance involves the digestive system. **A food intolerance arises when the body cannot digest a particular food.** The symptoms of a food intolerance may come on over time, or might only happen when large amounts of the food are consumed. Small amounts of the food do not generally cause symptoms. Although some symptoms may be similar, **food intolerance is not life-threatening and does not result in anaphylaxis.** Similar to a food allergy, the best way to avoid a reaction to food intolerance is to avoid the food(s) that result in symptoms.

Common examples of food intolerance:

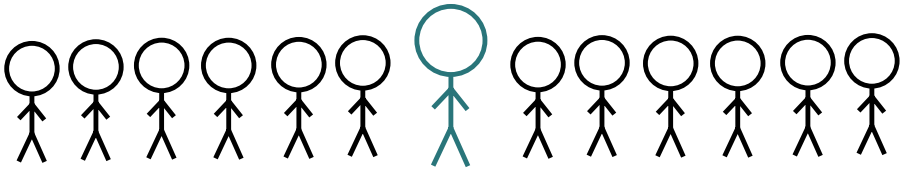
- **Lactose intolerance:** the body cannot digest lactose, a type of sugar found in milk and milk products.

- **Gluten intolerance:** the body cannot digest gluten, a protein found in wheat, barley and rye.

Celiac disease is neither a food allergy nor a food intolerance. Celiac disease is an autoimmune condition that occurs in people that carry certain genes called HLA-DQ2 or DQ84. In people with celiac disease, **eating gluten causes the immune system to attack the small intestine, resulting in severe digestive symptoms**. Celiac disease is diagnosed by way of a blood test or an endoscopy procedure that is performed by medical professionals. The only current treatment is for people with celiac disease to completely avoid any form of gluten in their diet.

WHO IS AFFECTED BY FOOD ALLERGIES?

Prevalence of food allergies in Canada



At time of writing, approximately **1 in 13 Canadians or 2.6 million people across the country are affected by food allergies**. According to a nation-

wide survey, approximately 7.7% of adults and 6.9% children under the age of 18 reported living with one or more allergies to foods[5]. The proportion of the population who are affected by food allergies is called the **prevalence**. The prevalence of food allergies in Canada has been found to be similar in other countries such as Australia and the US.

The number of people living with food allergies also varies by place. For example, one study showed that people in Western Canada were most likely to report having a food allergy, followed by Ontario, Atlantic Canada and Quebec[6]. People who live in urban as opposed to rural areas are also more likely to report a food allergy[7].

Are food allergies becoming more common?

Many people wonder if food allergies are becoming more common. A 2020 Canadian study indicates that **the number of people with food allergies has not significantly changed over the past several years**[6]. People may think food allergies are increasing in number because of increased awareness, reports in the (social) media, as well as the fact that there remains some confusion about what constitutes a food allergy, as opposed to a food intolerance or other autoimmune conditions related to foods. This recent study supports the fact that **food allergy rates in Canada are stabilizing.**

Food allergies in New Canadians

Food allergies appear to be **less common in New Canadians** than those born in Canada, with about 3.2% reporting having one or more[8]. However, these groups may face unique challenges as many newcomers are unfamiliar with food allergies, their diagnosis and management. Newcomers who develop a food allergy might encounter unfamiliar foods and language barriers that make managing their allergy difficult, while those who are not directly affected by food allergies may be unfamiliar with policies in schools and other settings[1,9].

Why do we get food allergies?

The truth is, **we don't know why some people develop food allergies and others don't**. Research has shown that the development of food allergies is complex, with genetics, environment and lifestyle all playing important roles.

Hygiene hypothesis

The **hygiene hypothesis** proposes that **a child's exposure to germs in early life is linked to their risk of developing allergies**. This idea was first introduced in 1989, when it was found that children with older siblings and larger households were less likely to develop allergies[10]. Further studies showed that this is also true for children who grow up with pets[11]. Scientists proposed that being surrounded by people and pets would result in more germs being shared, thereby allowing children to build a stronger immune system.

The Old Friends Hypothesis (Microbiome)

More recently, the **Old Friends Hypothesis** has been proposed. This hypothesis suggests that our **likelihood of developing allergies is linked to our microbiome**, which is the population of millions of microbes that live in and on our bodies. This is supported by evidence that infants with food allergies had different types of microbes in their gut than infants without food allergy[12]. **Interactions with a diverse variety of non-harmful microbes and parasites in early life help us to develop a healthy, well-regulated immune system** that recognizes harmful invaders but does not overreact to normally harmless allergens.

Exposure

In recent decades, changes in the way we live have affected our relationship with our "Old Friends". Less breastfeeding, more Caesarean sections, smaller family sizes, urban versus rural living and increased use of

antibiotics have all decreased our exposure to a variety of microbes. Likewise, clean water, sanitation and improved hygiene practices have greatly reduced illness and deaths from infectious diseases, however, they have also **reduced our interactions with microbes** that "train" our immune systems to respond appropriately.

A number of scientific studies have shown that **exposure to microbes in early life and in the womb is linked to a reduced risk of developing food allergies**. For example, several studies conducted in different countries have shown that children who grow up on farms have lower rates of allergies and related diseases such as asthma and hay fever[13]. The prevailing idea is that the more microbes we interact with, the better our immune system learns tolerance to harmless substances. Therefore, we reduce the risk of the immune system "overreacting".

This doesn't mean that we should stop regular hygiene practices such as food safety or washing our hands – these are important in preventing the spread of diseases. Rather, current research suggests that to build their immune systems, it might be beneficial for children to get outside and play in the dirt[14].

Genetic predisposition

Although environment plays a significant role, we also know that **some people have a genetic predisposition to developing food allergies**. This means that some people carry genes, which have been passed down through families in their DNA, that make them more likely to have a food allergy or other allergic disease – this is called **atopy**. Atopic diseases tend to run in families, although family members may have different types of allergies or related diseases such as asthma or eczema. Identical twins, who share the same genes, are more likely to have the same allergies[15].

There isn't one known "allergy" gene, although research has identified some genes that might be involved. By looking at the DNA of people with food allergies, researchers have discovered that genes called **filaggrin16-17**, which is important in maintaining the skin barrier, and **EMSY18**, which modifies the expression of genes, may be important. Certain forms of these genes are found at higher rates in the food allergic population compared

to those without food allergies. Therefore, these genes are thought to be "associated" or linked to the development of food allergy.

Although we know our genes are involved in food allergy, we still can't predict who will develop a food allergy. It's likely that **many individual factors, including genetics, environment, and lifestyle all influence if and when food allergies appear**. In Canada, significant research investments have been made to try and unravel the causes of food allergies and other atopic diseases through the **CHILD** (Canadian Healthy Infant Longitudinal Developmental) study. This study follows a cohort of nearly 3,500 Canadian children and tracks their health and development from mid-pregnancy into adolescence. Using this prospective (looking ahead) study design, CHILD researchers hope to gain insight into how different exposures in early life relate to health and disease outcomes including the development of food allergies.

Food allergies over lifetime

Many people are surprised to learn that **even if they don't have a food allergy now, they could develop a food allergy later in life**. Food allergies can develop at any age, and it's also possible for a food allergy to be outgrown. **Approximately one-quarter of food allergic children can be expected to outgrow their food allergies by the age of 5**, although this varies depending on the type of food they are allergic to[19]. Allergies to milk, egg and soy are the most likely to be outgrown, while allergies to shellfish, tree nuts and peanuts tend to be lifelong. There are also patterns with age – for example, children with peanut allergy are most likely to grow out of their allergy by age 6, but are unlikely to develop tolerance to peanuts beyond the age of 10[20]. **Children who show mild food allergy symptoms (e.g. hives, skin rash) are more likely to grow out of their food allergies than children who have had severe reactions (i.e. anaphylaxis)**.

Adults may experience the **sudden onset** of an allergic reaction to foods they've eaten before. The most common foods that cause allergies in adults are peanuts, fish, shellfish and tree nuts. **It isn't clear yet why some people develop food allergies and others grow out of them**, however, researchers are interested in finding out as this information could lead to better ways of treating and even preventing food allergies.

PREVENTING FOOD ALLERGIES

Who is at risk for developing food allergies?

Research shows that **children who have other allergic diseases** (e.g. asthma, eczema, dermatitis) are at **higher risk of developing food allergies**. The same goes for children who have parents or siblings who have a history of food allergies or other allergic diseases. Research shows that food allergies also appear at a **higher rate in males than females.** People who carry certain genes that are associated with food allergies may also be at higher risk.

How to reduce a child's risk of developing food allergies

Maternal diet and breastfeeding

Current guidelines state that **it's not necessary for mothers to avoid commonly allergenic foods during pregnancy or breastfeeding unless they themselves have a food allergy**[21]. Research is ongoing as to whether breastfeeding itself is protective against the development of food allergies in infancy or later in life. Many leading health organizations including the World Health Organization, the Canadian Pediatric Society and Health Canada recommend breastfeeding for six months to keep the mother and baby healthy.

Introduction of common food allergens to infants

Previously, parents were advised to avoid feeding at-risk infants potentially allergenic foods such as peanuts until later in life as it was thought that introduction of these foods too early could cause a baby's developing immune system to overreact, resulting in allergies. More recent research has revealed that, in fact, **delayed introduction of allergenic foods does not reduce the risk of developing food allergies**[22].

Based on the most current evidence, it is advised that infants, especially those at high risk of developing allergies, **are given commonly allergenic foods beginning at 4-6 months of age** or whenever solid foods are

introduced[23]. Allergenic foods should be introduced one at a time, so that if any symptoms arise, it's easier to tell which food might be linked to the reaction.

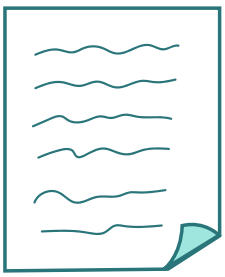
There is **one exception** to the recommendation of introducing allergenic foods early, and **that is in the case of a child with an older sibling with a peanut allergy**. Because studies have shown that children who have a sibling with peanut allergy have a much higher risk of developing a peanut allergy, it's recommended that these children are **evaluated by an allergist** prior to introducing peanuts into their diet.

DIAGNOSING FOOD ALLERGIES

Steps for obtaining a food allergy diagnosis

Food allergies are often misdiagnosed and/or inappropriately treated. Confusion between what is a food allergy versus food intolerance as well as the use of inappropriate or unproven allergy tests cause many people to believe they have a food allergy when they do not. This leads to unnecessary avoidance of foods, which can be a contributing factor to nutritional problems as well as a source of stress. There are three steps to diagnosing a food allergy: a patient history, the skin prick or blood test, and the oral food challenge test.

Patient history



The first step to a food allergy diagnosis is a **patient medical history.** This means that the patient has a record of experiencing allergic symptoms after they have been exposed to a food or potential allergen. This history is reviewed with a doctor who specializes in allergy called an **allergist**. Once the suspected food allergen is identified, the doctor may do a skin prick test, a blood IgE test or both.

Skin prick & Blood testing

A **blood test** for food allergy looks for IgE antibodies in the blood that react to the food allergen. A skin prick test detects the same IgE antibodies but in the skin. During a skin prick test, the doctor uses a device to scratch the skin (usually on the forearm) and places the suspected allergen on top. If the patient has an allergy, a pattern of swelling and redness called a **wheal and flare** will appear at the site.

Usually, a history of reaction and a positive skin prick test or blood test is enough to diagnose an allergy. Both tests are highly sensitive in detecting a food allergy and are similarly reliable. In some cases, the allergist might decide to perform an oral food challenge test.

Oral food challenge

An **oral food challenge test** is not usually performed if a food allergy was confirmed or ruled out during the first two steps. This test is the best way to diagnose a food allergy, but also **poses the highest risk to the patient**. During an oral food challenge, the patient consumes small amounts of the suspected allergen under medical supervision to see if they develop symptoms.

An oral food challenge is considered safe if it is performed by trained professionals in a healthcare setting such as a hospital or doctor's office. However, due to the risk of anaphylaxis, this test is usually only performed if other tests are inconclusive or reintroduction of the food to the patient's diet is being considered.

How to tell if someone has a food allergy

The only way to know if an individual has a food allergy is through a visit with their physician and/or allergist. There are other types of food allergy 'testing' – unfortunately, they are not helpful and, in many cases, can be harmful. See some examples below.

Steer clear of these unproven allergy "tests"

Applied kinesiology

In applied kinesiology, a patient's muscle weakness is assessed while they hold test foods in their hands or mouth. This test should not be used because the results are heavily influenced by the patient's physical state before consuming the food, and muscle weakness is not related to the presence or absence of allergies.

Cytotoxic tests (ALCAT, Bryan's test)

In these tests, blood samples are taken from the patient and exposed to suspected food allergens. White blood cells are measured before and after to see if there are changes after exposure to the allergen. At this time, there is no evidence to show that the changes in white blood cells measured by this test can predict or confirm a food allergy.

Food-specific IgG testing (food intolerance test, YorkTest, Hemocode)

There are several types of antibodies that circulate in the blood, including IgA, IgD, IgG, IgM and IgE. IgE antibodies trigger allergic reactions. These tests look for IgG antibodies against food allergens in the blood. IgG antibodies are an important part of the immune system and have a key role in fighting infections. A properly functioning immune system makes IgG antibodies to any foreign substance we are exposed to, including foods that we consume. Therefore, a healthy adult would be expected to make IgG antibodies against many foods in their diet. Research has shown that increased IgG levels are not associated with food allergies, and furthermore, may actually be markers of tolerance to foods.

Hair testing

In most cases, hair testing involves looking at the electromagnetic properties of a lock of hair. Hair is not involved in allergic reactions so this test does not tell us useful information about whether a person may have food allergies.

Nambudripad's Allergy Elimination Techniques (NAET)

These techniques are based on the idea that food allergies are caused by "energy disturbances" or "energy blockages" that can be detected by muscle testing and cured by chiropractic and acupuncture treatments. There is no credible evidence that these activities are effective for the diagnosis or treatment of food allergies.

Vega test

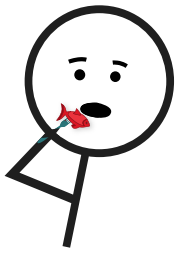
Vega testing is rooted in acupuncture and homeopathy, and involves taking measurements of electronic resistance at different points across the skin. These measurements cannot distinguish between people who have allergies and those who don't, and therefore do not provide useful information about an individual's allergic status.

MANAGING FOOD ALLERGIES

Treatment for food allergies

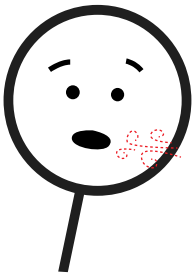
Avoidance

The best way to prevent an allergic reaction is to avoid contact with any foods containing the allergen(s). Contact with the allergen can happen through:



Eating the food (oral ingestion): This causes the most serious reactions, and includes cross-contamination of foods. Cross-contamination is when the allergen is accidentally transferred to a food that would normally be safe to eat.

Touching the food (skin contact): This may cause hives or a reaction where the food has touched the skin. Healthy skin provides a good defense against allergens, but if skin contact occurs, the area should be washed thoroughly to prevent transfer of the allergen to the mouth, nose or eyes.



Breathing in food proteins through the air (inhalation): This type of reaction is rare. Examples of how this might happen include the production of steam while food is being cooked or when food is in a powdered form (e.g. powdered milk). The smell of a food cannot cause an allergic reaction, because smell is caused by volatile organic compounds, not food proteins.

To avoid contact, it is important to read labels carefully, wash your hands while cooking and before eating, and not to share food or eating utensils.

Epinephrine auto-injectors (EpiPen)

In the case of an anaphylactic reaction to food, the first line of treatment is the drug **epinephrine**. During anaphylaxis, epinephrine works by relaxing the muscles of the airway to improve breathing, reduce swelling and raise the drop in blood pressure. In Canada, an epinephrine auto-injector is often called an **EpiPen**™, although other epinephrine auto-injectors such as **AuviQ**™ have recently become available.

A Canadian study showed that epinephrine is widely underused in response to anaphylaxis. Less than 50% of patients with auto-injectors received epinephrine before arriving at a health care facility[24]. Symptoms of anaphylaxis may be mild at first, but can quickly become serious and life-threatening. **Epinephrine should be given immediately at the first signs of an anaphylactic reaction** - it is not safe to wait until the patient makes it to the hospital or to administer other drugs such as anti-histamines instead. For more information, see "**Emergency response**".

Immunotherapy

Recent research has explored **oral immunotherapy (OIT)** as a treatment for food allergy. In OIT, the **patient is fed small amounts of the food to which they are allergic** (for example, peanuts) within a controlled environment such as a doctor's office or hospital. The food is administered regularly (i.e. daily) and the dose increases over time. The goal of OIT is that the patient will become desensitized to the allergen, meaning that eventually they will be able to tolerate the food without the immune system reacting. Following desensitization, the patient should be able to consume larger amounts of the food without an allergic reaction, reducing the risk of an accidental exposure. As OIT is still in the research stages and is not regular practice in Canada, it is not currently covered by provincial health plans.

Another type of immunotherapy that has been studied for treating food allergies is **sublingual immunotherapy (SLIT).** This procedure is similar to OIT, but differs in that **the allergen is held under the tongue for 2-3 minutes before swallowing.**

In **epicutaneous immunotherapy (EPIT)**, a small patch of the allergen is applied to the skin of the back or upper arm and changed at regular intervals.

Current research on these therapies is promising, but further studies are required to ensure that the treatment is both safe and effective.

Day to day management strategies

Reading food labels

It's important for people with food allergies and those who are preparing food for them to read all food labels carefully and avoid **cross-contamination.**

In Canada, manufacturers are required to **label any products that contain priority food allergens, gluten and added sulphites**. These allergens must appear in the ingredients list in plain language (English and French) or in a separate "contains" statement immediately following the ingredient list. It's

important to remember that manufacturers sometimes change the ingredients used in familiar products, and other sizes or varieties of the same brand may have different ingredients.

Cross-contamination occurs when a food product comes into contact with a food allergen that is not normally contained in that food. If there's a possibility that this could occur during the manufacturing process, these products may be labeled with a precautionary "may contain" statement. **Precautionary labels are not regulated in Canada** and are used at the discretion of the manufacturer. Food can also become cross-contaminated during preparation in a restaurant or at home if the allergen is being used in the vicinity and/or equipment and surfaces are not cleaned properly. Cross-contaminated products are not safe for a person with a food allergy to eat.

Food Allergy Canada, a national food allergy advocacy organization, recommends doing the **"triple check"** when purchasing food for people with allergies. The "triple check" means that you check each food item **(1) at the store when you buy it, (2) at home when you put it away, and (3) before you serve or eat it.**

Schools and child care settings

The laws and guidelines surrounding food allergy management in Canadian schools and child care settings vary provincially. In many provinces and territories, schools are required to have policies and procedures to protect students at risk of anaphylaxis. **A school anaphylaxis plan helps to reduce the risk that students with food allergies will be exposed to the allergen. It's recommended that these plans do not imply zero risk (e.g. peanut-free),** but rather they promote a space that is allergy-safe[25].

In some cases, this may result in the restriction of foods containing certain allergens. Most school communities will also have staff members trained in emergency response and management of anaphylaxis. These measures are put in place to protect children with food allergies from life-threatening reactions. For more information about food allergy management and risk reduction in your area, contact your local school board or child care facility.

Universities & post-secondary settings

There is currently no legislation in Canada regarding policies for anaphylaxis management in universities, colleges and other post-secondary settings. This means that students transitioning to these settings must also bear the responsibility of managing their food allergies. To support young adults managing food allergies in a campus environment, Food Allergy Canada, in conjunction with representatives from post-secondary institutions, allergy organizations and health care professionals, have created a resource called Managing Food Allergies and Anaphylaxis: A Guide for Post-secondary Institutions[26].

FOOD ALLERGY MYTHS

"Eating a little bit won't hurt"

Even very small amounts of a food allergen can cause life-threatening anaphylaxis in some people. **The only way to avoid allergic reactions is to completely avoid the allergenic food** – this includes avoiding cross-contaminated food, which is any food that may have come in contact with the allergen at any point during food production or preparation.

"Each reaction will be worse than the last"

Many people believe that after the initial allergic reaction, every subsequent reaction will be more serious. In fact, **allergic reactions are unpredictable** – there's no telling whether a reaction will be mild, moderate or severe. It's thought that the severity of an allergic reaction may be a result of a variety of individual and environmental factors, but it's recommended that anyone with a food allergy be prepared with their epinephrine auto-injector, just in case.

"You can have an anaphylactic reaction by smelling the food" 

A person with a food allergy cannot have an anaphylactic reaction to the smell of a food. This is because the smell of a food does not contain the proteins in the food that act as allergens. However, the smell of a food can still be uncomfortable or worrisome to a person with an allergy because it alerts them that they are in a potentially dangerous situation and could be facing a reaction if they were to touch the food, accidentally ingest it, or their food was to become cross-contaminated. In some cases, patients have reacted to inhalation of food particles, such as steam generated from cooking fish or open peanut shells on a floor, although this is quite rare and does not typically result in systemic anaphylaxis.

"Vaccines cause allergies" 

Multiple well-controlled scientific studies have shown that **there is no link between vaccines and food allergies**. It was previously thought that immunizations such as the Influenza or measles-mumps-rubella (MMR) vaccines might cause allergic reactions for people with egg allergy because the production of these vaccines involves egg protein. However, numerous studies involving thousands of patients with egg allergy have shown these vaccines to be safe. The Canadian Immunization Guide states that children with egg allergies should continue to receive these vaccinations in an appropriate health care setting to protect against serious illness[27].

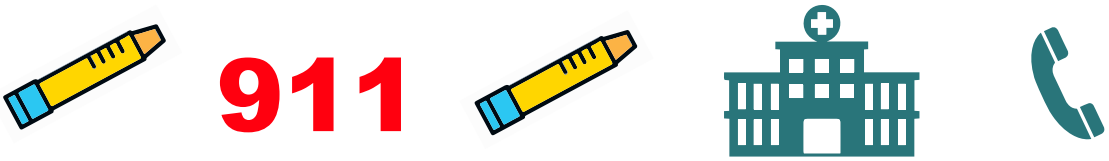
"Natural treatments" for food allergies 

With a quick online search, it's easy to find many "natural treatments" for food allergies. Products such as digestive enzymes and other supplements claim to aid the breakdown of food in the stomach, including food allergens, thereby preventing them from provoking an immune response. Some claim that substances such as activated charcoal can bind to food allergens, allowing them to pass through the body undetected. Others advertise ingredients that claim to be "immune-boosting" such as vitamins, minerals and essential oils. At this time, **there is no scientific evidence to support that these treatments are effective.**

Although a readily available treatment for curing food allergies sounds attractive, many of these natural treatments can be expensive and even dangerous as they can interfere with prescription medications, encourage allergic individuals to disregard their doctor's recommendations or even try consuming the food that they are allergic to. If you're considering beginning a treatment, it's best to discuss it with your doctor or allergist beforehand.

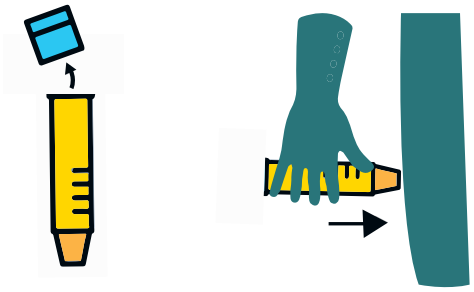
EMERGENCY RESPONSE

If you suspect someone is experiencing an allergic reaction, it's important to act quickly – symptoms may be mild at first but can quickly progress to be life-threatening.



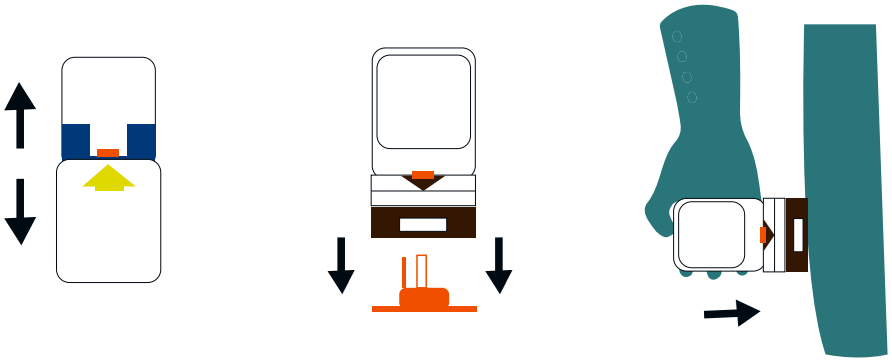
1. Give epinephrine auto-injector (e.g. EpiPen) at the first sign of a reaction. Do not administer anti-histamines or other medications in place of epinephrine.
2. Call 9-1-1 or local emergency services. Tell them someone is having a life-threatening allergic reaction.
3. Give a second dose of epinephrine as soon as 5 minutes after the first dose if symptoms do not improve.
4. Go to the nearest hospital immediately (ideally by ambulance), even if the symptoms are mild or have stopped. The reaction could worsen or come back, even after treatment. Stay in the hospital for an appropriate period of observation as decided by the emergency department physician (usually 4-6 hours).
5. Call emergency contact person (e.g. parent or guardian).

How to use an EpiPen (epinephrine auto-injector): remove the auto-injector from its protective tube and follow the two simple steps.



1. Blue to the sky: Hold firmly with the orange tip pointing downward. Remove blue cap by pulling straight up. Do not bend or twist
2. Orange to the thigh: Swing and push orange tip firmly into mid-outer thigh until you hear a 'click'. Hold on thigh for three seconds (slowly count 1... 2... 3). After injection, the orange cover automatically extends to make sure the needle is never exposed.

How to use an Auvi-Q (epinephrine auto-injector): this device uses an electronic voice system to guide you through its use. If the voice system does not activate, the device can still be used by following these instructions.



1. Remove the device from the outer case: Flip open the top of the case and pull the device out.
2. Pull off the red safety guard: Pull the red guard firmly. Do not touch the black base of the device to avoid accidental injection.
3. Place the black end to the thigh: Press the black base of the device firmly to the mid-outer thigh and hold in place for five seconds. The device should make a click and hiss sound upon injection. After the injection is complete, the needle will retract and the device will beep and blink red.

After using the EpiPen or Auvi-Q, you must go immediately to the hospital or seek medical attention[28].

Individuals with a food allergy should all **carry an epinephrine autoinjector with them at all times**, and should inform those around them (friends, family, food service staff) that they have a food allergy. **Should you suspect someone is having an anaphylactic reaction, check with**: food service personnel if you're in a restaurant; emergency service personnel (they carry EpiPens in some Canadian jurisdictions); or other public service personnel (e.g., teachers or administrators if you're in a school). If you are not directly affected by food allergy, but have concerns for someone you care about, check the environment around you and advocate for others – ask food service personnel at your favourite spots about their practices and preparedness; find out if EMS personnel in your region stock EpiPens; ask about the policies in public spaces you frequent (e.g., schools, malls, sports arenas, airplanes, etc).

It is very good news that food allergy rates appear to be stabilizing in Canada; but almost 3 million people are still directly affected – it takes a community to keep everyone safe.

MORE INFORMATION & RESOURCES

Funding

AllerGen (The Allergy, Genes and Environment Network) National Centre of Excellence
http://allergen-nce.ca/

Partner organizations

Health Canada
https://www.canada.ca/en/health-canada.html

Food Allergy Canada
http://foodallergycanada.ca/

Canadian Society for Allergy & Clinical Immunology
http://csaci.ca/

The Sandbox Project
http://sandboxproject.ca/

Other organizations

Allergies Quebec
http://allergies-alimentaires.org/

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