

# The Allergy Detective



Recognize the Warning Symbol on products for possible **Allergens**



Written by: **Cynthia Kanagaratham** and **Marianna Newkirk**

Illustrations and layout by: **Jean-Simon Fortin**

Translated into French by: **Laïla-Aïcha Hanafi**, **Isabelle Meunier**  
and **Marie-Eve Lebel**



*Immunology Montreal, 2013*

*Made possible by an educational grant from*



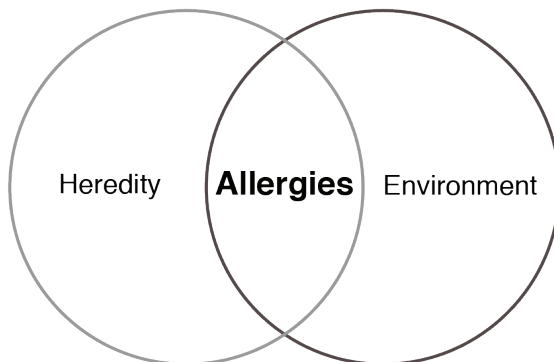
To help celebrate the International  
Day of Immunology

**April 29th, 2013**

## THE ALLERGY DETECTIVE... WHO?

Our **immune system** is designed to fight against pathogens that can cause diseases. To be healthy, you want your immune system to be balanced, not too strong and not too weak. If your immune system is too weak, then it won't be able to defend you from bacteria and viruses that can make you sick. On the other hand, if your immune system is too strong, then it can be overly sensitive and ready to fight even against substances that are not dangerous to you and that are part of your normal environment.

**Allergens** are harmless substances that are part of everyday life that can be seen as dangerous by some people's immune system. Do you know of any allergens? When the body's immune system reacts to an allergen it is called a **hypersensitivity reaction**. There are many different types of hypersensitivity reactions, but the most common type is **ALLERGY**.

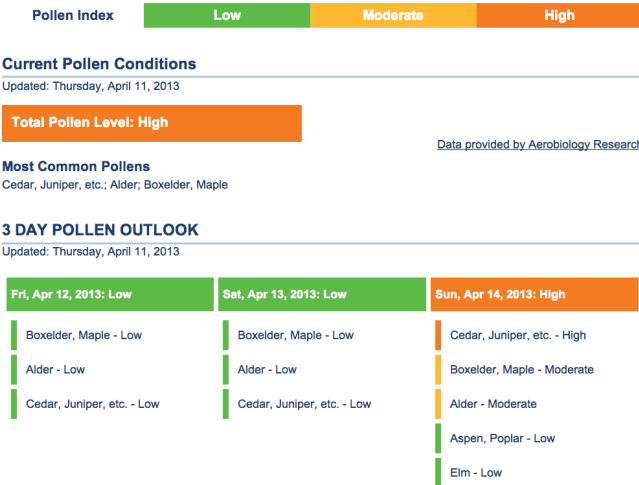


Have you ever wondered why some people have allergies while others do not? There are two main factors that determine if a person will develop allergies: **HEREDITY** and **ENVIRONMENT**. Heredity means that children will have a greater chance of developing allergies if their parents have allergies as well. The risk for developing allergies is passed down through genes. But not all people with allergies have parents or family members with allergies; in these instances the environment plays a stronger role. Environment refers to the surroundings a person was raised in and is living in. Children who are often exposed to allergens and early in life have a greater chance of developing allergies. Children and adults living in conditions where they are exposed to allergens such as pollution are also at risk of developing allergies. Both genes and environment interact to determine if a person will develop allergies.

Fortunately, most people are allergic to only one allergen. People who have allergies should avoid their allergen if at all possible so as to prevent an allergic reaction. If you are allergic to certain foods, you should avoid eating them; and if you are allergic to some synthetic materials like latex you should avoid coming in contact with it.

Unfortunately, in some cases avoiding the allergen is really difficult. Some allergens, such as pollen, are found in the air we breathe and can cause **allergic rhinitis**

in some people. Since the level of pollen in the air varies with the seasons of the year and is more prevalent during spring and summer seasons, allergic rhinitis is known as a seasonal allergen. Have you ever heard of the pollen forecast? Just like how the strength of UV from the sun is measured, the level of pollen in the air can also be measured. Pollen counts tend to be high early in warm and breezy days and to decrease by the end of the day. People suffering from allergic rhinitis can consult the pollen forecast to determine how adverse their allergies will be and to plan their activities for the day. Many medications are also available to prevent the allergic reaction to pollen. You may have heard of some of them, like Reactine<sup>®</sup>, Allegra<sup>®</sup>, and Claritin<sup>®</sup>.



Source: The Weather Channel

## WHERE, WHEN?

The degree of an allergic reaction depends on the nature of the allergen and varies from person to person. Allergens can be foods, animal products, airborne products, drugs, synthetic materials and metals and, insect bites and stings.

Here are some examples of common allergens of each type and the more common symptoms associated with the allergic reactions they can cause:

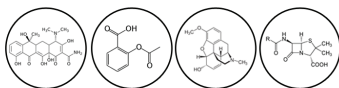
### FOODS

- Eggs
- Soy
- Strawberries
- Milk
- Seafood
- Shellfish
- Nuts (Peanuts, Almonds, Pinenuts)



### DRUGS

- Penicillin
- Tetracycline
- Codeine
- Aspirin



**Food allergens** often cause itchiness in the mouth and swelling of the lips and tongue. Walls of the throat can swell and close, making breathing difficult. Shellfish and nut allergies can cause hives (urticaria) where the skin is raised into bumps that can burn and be itchy. Some people with food and drug allergies also experience stomach aches, vomiting, and diarrhea.

## ANIMAL PRODUCTS

- Pet dander
- Cockroach
- Dust mite feces



## AIRBORNE PRODUCTS

- Mold spores
- Pollen from trees, grass and weeds



**Animal and airborne products** often cause itchy and watery eyes, sneezing and coughing, runny nose, and nasal congestion.



## SYNTHETIC MATERIALS AND METALS

- Soap
- Bleach
- Laundry detergent
- Cosmetics
- Fragrances
- Latex
- Nickel



Allergy to **synthetic materials and metals** often causes skin abnormalities, such as rashes, eczema, dermatitis, blistering of the skin and hives.

## INSECT BITES AND STINGS

- Bees
- Mosquitos
- Wasps
- Ticks
- Ants



**Insect stings or bites** often cause a localized allergic response where the skin swells at the site of the bite or sting. The swelling is often associated with pain, redness, itching and warmth. In some cases the symptoms can be more severe, where a greater region than just the site of bite or sting swells up. For example, an insect bite on your finger can cause your entire hand and arm to swell.

In all cases of allergic reactions the symptoms can become more severe with each exposure. If you know or suspect that you are allergic to something the best thing to do is to avoid the allergen. Constant exposure to an allergen can eventually lead to an anaphylactic shock. An anaphylactic shock is a severe reaction to an allergen where the circulatory system collapses causing a multi-organ reaction. A combination of symptoms can occur at the same time and can vary between persons.

## Examples of symptoms during an anaphylactic shock

### **DERMAL SYMPTOMS**

Severe rash and swelling all over the body.

### **GASTROINTESTINAL SYMPTOMS**

Abdominal cramps, vomiting, diarrhea, difficulty swallowing.

### **RESPIRATORY SYMPTOMS**

Swelling of the trachea, causing choking and difficulty breathing (bronchospasm) and potentially respiratory arrest.

### **CARDIOVASCULAR SYMPTOMS**

Arrhythmia – severe bradycardia (low heart rate) or severe tachycardia (high heart rate), hypo or hypertension (low or high blood pressure), lightheadedness, and sometimes cardiac arrest.

### **NEUROLOGICAL AND PSYCHOLOGICAL SYMPTOMS**

Metal taste in mouth, loss of consciousness, anxiety, panic, fear, irritability, and future emotional distress due to traumatic event.

People who are a risk of anaphylactic shock often carry with them **epinephrine injections**. During an anaphylactic shock by injecting epinephrine into a large muscle like in the muscles in the thigh, the epinephrine can diffuse into the blood and counter the effects of anaphylactic shock. Epinephrine injections are often labeled by their commercial names, such as Twinject®, Adrenaclick®, Allerject®, and the most common one, EpiPen®.



Source: Companies' websites

## WHY?

Most allergens are proteins composed of amino acids that do not present any threat to our body. Why certain proteins are seen as allergens by a susceptible person's immune system is not clearly understood and is being studied by researchers around the world. The immune systems of these individuals see the allergens as harmful proteins and rage a violent response to get rid of them.

### What is happening in our immune system during an allergic response?

You may not even be aware of the first time you were exposed to an allergen. It could have been when you were a child, touching, tasting and playing with everything in sight. Or it could have been soon after you were born, or even when you were still inside your mother. Regardless, the first time you were exposed to the allergen your immune system got activated and readied itself to fight against the allergen the next time it encountered it. What does this mean?

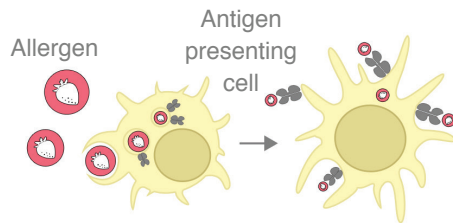
In your blood there are cells known as **antigen presenting cells**, they are at the front line of defense in your immune system. Antigen presenting cells pick up the allergen that is in your system and present them to **B and T cells**. B and T cells are white blood cells that are more specialized and dictate the commands and tactics on how to get rid of any foreign material

from your body. With time, B cells evolve into plasma cells which produce specific antibodies against the allergen. There exist five different types of antibodies: IgA, IgD, IgE, IgG and IgG. Antibodies are like “Lego-shaped magnets”, they can bind perfectly to the allergen protein like Legos and they are attracted to the allergen like magnets. The **IgE antibody** is known as the **allergy antibody**. IgE antibodies dock on the surface of granulocytes and survey the immune your body for allergens. **Granulocytes** are another group of white blood cells. Granulocytes include mast cells, eosinophils and basophils. They are full of granules that contain chemicals and proteins, like **histamine**, **leukotrienes** and **tryptases** that cause the allergic response.

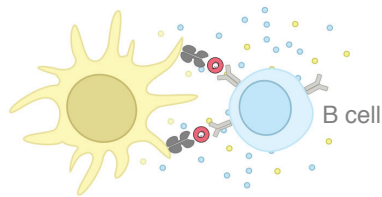
On a normal day when you are not exposed to the allergen, the IgE-granulocyte team circulates in the blood. As soon as the allergen enters your body, it is recognized by the allergen specific IgE antibody on the surface of the granulocytes. Binding of the allergen to the IgE activates the granulocytes and triggers them to release the chemicals in their granules. These chemicals quickly travel through the blood to the site of the allergy and create the allergic response that you experience.

Each time you have an allergic reaction, the number of IgE bound granulocytes and circulating chemicals in your blood increases. This makes it easier for the next allergic response to happen faster and stronger and to be more dangerous.

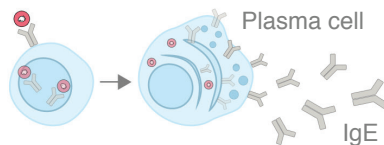
An antigen presenting cell meets and process the ALLERGEN



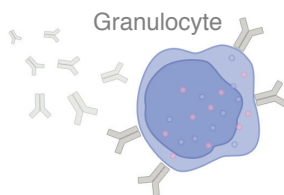
The antigen presenting cell shows the ALLERGEN to a B cell



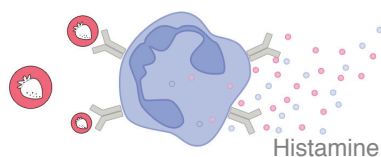
Upon seeing the antigen, the B cell becomes a plasmacyte, producing heaps of IgE



The IgE, produced by the B cell, docks onto granulocytes



Once the ALLERGEN binds the granulocytes' IgE, it activates it and the cell starts shedding granules causing the allergy



## HOW DO YOU KNOW IF YOU ARE ALLERGIC TO SOMETHING?

Most often you won't know that you are allergic to something until you have an allergic reaction to it. If your family has a history of allergies say to some food item, then you can choose to avoid certain foods to protect yourself from potentially having an allergic reaction.

If you are worried that you are allergic to something, the best thing you can do is see your family doctor who can refer you to an **allergist**. Allergists are doctors that are specialized in understanding allergies. Allergists have purified allergens that they can use to do the diagnosis by skin prick or patch tests.

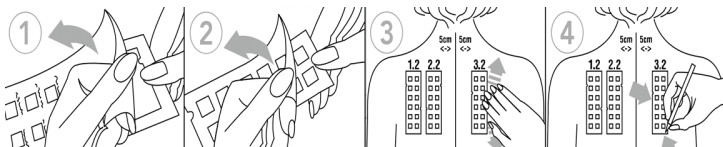


A **skin prick test** is done by pricking the skin with a needle that contains a few drops of an allergen. This is often done on the forearm and more than one allergen can be tested at once. Within minutes you will be able to tell if you are allergic to an allergen because your skin will swell at the site of the prick. Skin prick tests are good for diagnosing allergies to foods, pet dander, pollen and dust mite feces.

Source: <http://www.greerlabs.com>



The **patch test** involves placing a patch containing the allergen on the skin, usually on the back. In this case the patch must be left on for 48 hours before a diagnosis can be made. Patch tests are good for allergens like latex, perfumes, dyes, detergents, soaps, and metals.



If you have an allergy or suspect that you have an allergy, the best thing to do is to avoid the allergen as much as you can. Sometimes by avoiding the allergen you can get rid of your allergy or become less sensitive to the allergen. Avoiding the allergen gives your body enough time to get rid of the allergen specific IgE bound to the granulocytes circulating in your blood. However, it can take years for your body to be clear before you can safely be exposed to the allergen. If you'd like to know if you are free from your allergy, then you can visit your allergist for an allergy test!

Source: <http://www.yourentmd.com>  
T.R.U.E. TEST® documentation



## WHAT TO DO?

The #1 thing to do is to avoid the allergen and to minimize your risk of getting a reaction. Inform the people around you, such as your teachers and classmates, about your allergy so that they are careful about what they bring into your environment. Educate yourself and the people around you about the signs of an allergic reaction and what to do when it happens. If the allergic reaction is mild-moderate, then you might be able to take care of yourself, take your medication, and get the help you need. However, in the case of a severe allergic reaction like an anaphylactic shock, you might have to rely on the people around you to help you and to possibly save your life. It is best to inform them about what they can do to help. If you need to use an epinephrine injection then inform the teachers and your friends where you keep it so they have access to it when emergency strikes. Make a presentation on allergies and educate your school! Allergies are becoming increasingly common, so it is most likely that you are not alone in your situation.

# AVOIDING AND/OR GETTING RID OF ALLERGENS

## INDOOR ALLERGENS

### FOOD

Read labels carefully and avoid any suspect items containing the food allergen to be avoided (i.e. peanuts, other tree nuts, preservatives, egg etc.). Allergens are very tiny and can be found in a residue left on utensils, counter tops so it is best to keep food items out of the house.

### DUST (MITES)

Clean thoroughly ...even to vacuuming your mattress regularly!

### ANIMAL DANDER

Avoid having a pet of the type that you or a family member is allergic to. Avoid contact with these animals even in a park setting.

## INTERESTING FACT

Did you know that your cat or dog can also develop allergies...sometimes even to humans!

<http://www.ah.novartis.com/FeatureArticleAllergySeason.shtml>

## **MOLD**

Although this can also be an outdoor allergen, if your bathroom has high humidity it is a great breeding place for mold. Have a ventilation fan, and clean the tiles in the shower regularly. Water leaks (from roof etc.) in walls can also lead to mold. Often damp basements are also a place where mold grows. Having a dehumidifier in your basement is helpful.

## **OTHER**

Latex (in paint, balloons, gloves), some medications (penicillin), hair dyes, fragrances can also be allergens to be avoided by some.

## **OUTDOOR ALLERGENS**

### **POLLEN**

Tree (April/May) and grass or weed (June – August) are the common ones. Stay indoors and use an air conditioner with a HEPA filter. If you must go outside when the pollen count is high wearing a mask can help.

### **MOLD**

Mold spores are abundant in August/September and staying indoors where the humidity is lower (A/C ideal) is helpful. Avoid working with leaf, plant mulches.

### **OTHER**

Venom from Insect stings (bees etc.) can contain allergens. Avoid insect nests, feeding areas and/or wear protective clothing.

## FAQ ABOUT ALLERGIES

### **Allergy Season — It can affect your thinking !!!**

By George Luciuk, MD, FRCPC

### **Does Allergy Protect Against Cancer?**

By Dr. Suzan Waserman, MD, FRCP, Hamilton, Ontario

### **Drug Allergy: How You Can Help Your Allergist Make the Diagnostic**

By Amin S. Kanani, MDCM, FRCPC

### **What are the Common Causes of Hives?**

<http://allergies.about.com/od/faq/f/causeofhives.htm>

By Daniel More, MD

## USEFUL WEBSITES

### **Canada Food Inspection agency:**

<http://www.inspection.gc.ca/english/fssa/labeti/allerg/allerge.shtml>

### **Food Allergen Labeling (in effect since Aug 2012)**

<http://www.hc-sc.gc.ca/fn-an/label-etiquet/allergen/index-eng.php>

### **Food Allergies, Health Canada**

<http://www.hc-sc.gc.ca/fn-an/securit/allerg/fa-aa/index-eng.php>

### **Canadian Allergy Asthma and Immunology Foundation – Brochures**

<http://www.allergyfoundation.ca/index.php?page=13>