

Allergies



Allergies are increasing globally.

Worldwide, the prevalence of **allergies** is rising, with certain forms affecting up to 30% of the global population. The greatest allergy burden falls on children (causing approximately 2 million missed school days per year in the U.S. alone) and those of lower socio-economic status, both

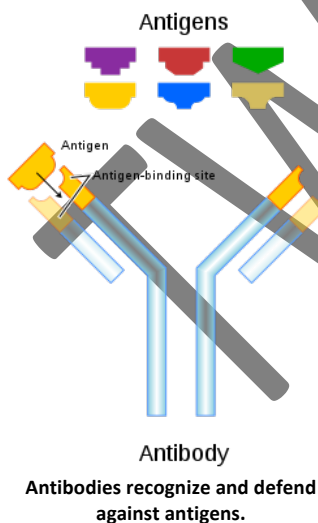
in low- and high-income countries. We all probably know at least one person who suffers from allergies. So, what are they exactly?

What are Allergies?

Allergies are the **immune system's** defensive response to a harmless **foreign material (antigen)** like pollen, dust, or animal dander. Such antigens, which are called **allergens**, cause the immune system to overreact, resulting in **symptoms** that can be mild to life-threatening. While some substances are commonly allergens (affecting large numbers of people), anything that causes the immune system to react defensively can be an allergen.



Allergies are a mistaken immune response.



What Causes Allergies?

Allergies are caused by the body mounting an immune defense. It first recognizes the substance as foreign by reading its surface molecules, which are different from those naturally-occurring in the body. The immune system then releases **antibodies**, also called **immunoglobulins**. Antibodies are proteins that protect the body from dangerous substances. In the case of allergies, the body makes a mistake, and tries to protect you from something that isn't dangerous. The immune response can be immediate or delayed,

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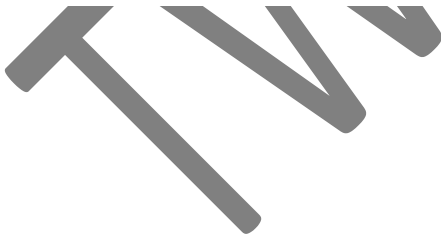
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activation phase, the person is again exposed to the allergen. In this phase, the allergen binds to the immunoglobulin E, and the antibodies trigger the mast cells to release their contents (i.e., histamines and other molecules). This release brings about the final **effector** phase, in which the histamines act and symptoms are displayed.

Type I hypersensitivity is often brought about by food, insect bites, pet dander, dust/dust mites, or pollen (seasonal **hay fever** is a form of type I hypersensitivity) and can manifest as hives (itchy red welts, also called **urticaria**) or asthma, among other histamine-related symptoms.



Seasonal hay fever is a type I hypersensitivity.

In another type of reaction, **Type II hypersensitivity**, free antibodies bind to antigens on cells. The antibodies, **immunoglobulin M** or **immunoglobulin G**, cause damage or destruction to the cell carrying the antigen. They accomplish this either by activating the complement system (a group of enzymes that attack and destroy the cell) or by drawing **macrophages** and **neutrophils** (immune cells) to destroy the allergen-carrying cell. Some drug allergies manifest as type II hypersensitivity.



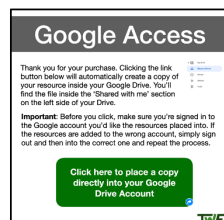
Type II hypersensitivity is responsible for some drug allergies.

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cells themselves react with the antigen. T cells must make their way to the site of allergen presence, which takes time. The time between exposure and reaction can be up to 18-24 hours. Similar to a Type I reaction, the response typically doesn't occur at first exposure. When activated, the T cells release substances that then activate other cells to attack the allergens. Metal allergies and other reactions due to skin contact (e.g., cosmetics, hair dye, poison ivy) fall under the category of type IV hypersensitivity.

What are the Symptoms of Allergies?

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Allergy Diagnosis

Allergies are often diagnosed using skin or blood tests. A skin test is performed either by placing a drop of purified liquid allergen on the skin and scratching the exposure site or by injecting the allergen under the skin. The site is monitored and if a red welt develops, the patient is allergic to that substance.

Allergy Treatments

While allergies cannot be cured, they can be treated. Treatment is limited to symptom management. The most effective treatment is avoidance of allergens. Most people learn quickly what they are allergic to. In many cases, individuals can simply stay away from them. However, some allergens are unavoidable. Such substances as pollen, dust, and dust mites are all around us, especially in certain seasons. While it's best for people with an allergy to certain insect venoms to avoid some bugs, it's not always possible. Stepping outside brings the risk of a bee sting or an ant bite. For those who can't avoid their allergens, there are medications, such as antihistamines, nasal sprays, eye drops, inhalers, and allergy shots.



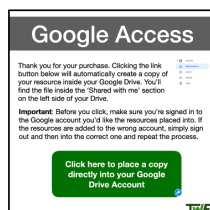
Inhalers are one form of allergy treatment.

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Reading Comprehension Questions:

1. What are allergies?
2. What
3. What are
4. Which type of immune cells are triggered when the allergic response is immediate?
Which when it is delayed?
5. What
6. List 3
7. Briefly describe the four types of allergic reactions and give one example of each.
8. List
9. What
10. How are allergies diagnosed?
11. How are allergies treated?

Extension Questions:

12. What, if any,
13. Research how to
14. Choose one type

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