

Allergy Clinic



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Hannibal Regional
Hospital

Allergy/Immunology

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An allergy is an abnormal acquired sensitivity to a given substance, including pollens, drugs, or numerous environmental triggers. The term was coined by Viennese pediatrician Clemens Von Pirquet in 1906 after noting that some of his patients were hypersensitive to normally innocuous entities such as dust, pollen or certain foods. Pirquet called this phenomenon “Allergy,” from the Greek words allos meaning “other” and ergon meaning “work.”

Overview

We, the humans, are immersed in an extremely hostile environment, the magnitude of which can only be realized when the **immune system** fails. The **immune system** is a remarkably adaptive defense system that has evolved in the vertebrates to protect them from external threats (pathogenic microorganisms & parasites) and from internal threats (cancers and auto-immune diseases like lupus).

This system is able to generate an enormous variety of cells and molecules, capable of specifically recognizing and eliminating an apparently limitless number of foreign invaders. These cells and molecules act together in an exquisitely adaptable dynamic network, whose complexity rivals that of the nervous system.

Normally, the immune system learns the defense mechanism through experience by encountering, recognizing, battling, and remembering enemies one after another. This tedious process of defending oneself is called **immunity**.

For decades, medical science has taken advantage of this unique process by using **vaccination** to impart immunity. Vaccination

teaches the immune system an “**elaborate defense plan**” against any offending invader.

What is Allergy?

In 1902, two French scientists injected dogs with a small amount of extract from sea-anemone. Nothing happened. Two weeks later they repeated the procedure in exactly the same way. But this time, to their amazement, they noticed the dog developing severe reactions. The dog had somehow become sensitive to a formerly harmless substance. Thus they discovered allergy.

Allergic reaction occurs when the immune system mistakenly learns to remember innocent foreign substances as potentially harmful. Such substances are called allergens. Pollens, mold spores, house dust mites, animal dander and foods are the allergens that most frequently cause problems.

An antibody is a component of the immune system that plays a key role in the development of allergy. This small molecule acts as a scout that identifies the foreign invaders so that the body’s powerful weapon system can be deployed with speed and precision. Immunoglobulin E (IgE) is a specific type of antibody that is pivotal to the initiation of the common types of allergic reactions.

Example:

Encounter

Suppose there is a perfectly normal little child. And suppose he is susceptible to development of allergy due to some defects in immune regulation. When he is exposed to allergenic pollen (e.g., ragweed pollen in autumn), his immune system identifies it as potentially harmful and begins to fight it by making large

quantities of IgE antibody.

Sensitization

Once produced, these IgE antibodies are strategically placed on “**body’s frontiers**” (skin, nose, lung, gastrointestinal tract), because that’s where the enemy is coming from. This is the reason why allergy usually involves eyes/nose (hay fever), lung (asthma) and skin (eczema).

The IgE antibody just can’t stay alone. It attaches itself to a special kind of cell (**mast cell**) which peppers our body’s surface (eyes, nose, lungs, skin, etc). The antibody (IgE) behaves like a scout and identifies and captures the invading enemies (allergens). The mast cell acts like a soldier. It contains strong chemical weapons that are released in an effort to eliminate and/or contain the enemy by releasing those chemical weapons. The symptoms of allergies are mediated by those chemical. Once this mechanism is established, the child is considered to be sensitized to the ragweed pollen.

Reaction

On a later occasion, when this sensitized child gets exposed to ragweed pollen, the allergen molecule will bind to the antibody (IgE) sitting on the mast cell. The mast cell explodes, the chemical weapons (mediators) burst out, and set off a chain of events leading to an allergic reaction.

In a nutshell, an allergic reaction is a situation where our body’s defense mechanism is working on overdrive against an enemy that is not an enemy at all. It is like a “friendly fire” in a battlefield.

It is important to note that Allergy is NOT an immune deficiency nor a sign of a weak immune system.

Common Allergic Reactions

Hay fever (allergic rhinitis)

Asthma

Eczema (atopic dermatitis)

Hives (urticaria)

Anaphylaxis

Hay Fever

Hay fever involves neither hay nor a fever. This is the most common allergic ailment affecting 10-30% of adults and up to 40% of children. Physicians prefer to call it **allergic rhinitis**. Primarily, the nose and the eyes are involved in this process.

Symptoms of allergic rhinitis include: sneezing, sniffing, stuffy nose, sinus congestion and red water eyes.

If not controlled properly, allergic rhinitis can predispose individuals to develop recurrent sinus infection, sometimes leading to unnecessary sinus operations. It also can make individuals predisposed to recurrent stopped up ears and popping (Eustachian tube dysfunction). Uncontrolled allergic rhinitis can also make the air tubes in the lungs more irritable and prone to asthma symptoms.

In addition to the above symptoms, hay fever also has a profound affect on patient’s quality of life by adversely influencing emotional well-being and social functioning.

Asthma

Asthma is an affliction of the lung in which the air tubes become irritable and hyper responsive to normally innocuous minor irritants (smoke, dust, strong smells, etc)

The common symptoms include: chest tightness, wheezing, cough and shortness of breath.

Most, but not all, asthma cases are allergic in nature. Asthma developed during early childhood or young adulthood is primarily allergic in nature.

Important note:

It is becoming increasingly clear that allergic rhinitis and asthma are closely related and effective treatment of allergic rhinitis helps, and sometimes prevents, the onset of asthma.

Eczema

Eczema, also known as **Atopic Dermatitis**, is a condition where skin becomes dry and scaly, leading to itching. The skin can crack and bleed or become infected. The natural course of this disease process is variable. Symptoms can last for months, clear up, and then return.

Hives

Hives, or **Urticaria**, is also a very common allergic skin manifestation. Hives are itchy, red, raised, evanescent swollen areas in skin. An individual hive usually resolves in less than 24 hours without leaving any scar or residual pigmentation in the skin.

Anaphylaxis

Although rare, anaphylaxis is the most serious kind of allergic reaction. Luckily, only a few types of allergens (such as venom from stinging insects, drugs, and some foods) tend to

bring on anaphylaxis.

Anaphylaxis is potentially fatal. Immediate and proper treatment is a must in this condition.

Others

Allergies can also cause nausea, abdominal cramps, vomiting, and diarrhea. These symptoms are more common with food allergies, but can occur with other types of allergies as well.

Triggers of Allergy

Although we are constantly immersed in an ocean of foreign substances, in reality, most allergic reactions are caused by a limited number of well-known allergens. They can be subdivided into four broad categories:

1. Inhalants
2. Ingestants
3. Injectants
4. Contactants

Inhalants

Pollens: We inhale 10-12 cubic meters of air every day. Depending on the season and location, each cubic meter of air can contain thousands of pollen grain and tens of thousands of mold spores.

Trees, grasses and weeds are the main sources of pollens in the air. Tree pollens predominate in the spring season while grass and weed (primarily ragweed) pollens are predominate in the summer and autumn respectively. Seasonal allergies are primarily

caused by pollen sensitivity.

Ragweed is one of the most important allergic pollen that becomes airborne around mid-August and remains a source of immense misery until the first frost. It is estimated that a single ragweed plant can produce up to a billion pollen grains. And the ragweed pollen grains are so light weight that they can travel for as many as four hundred miles.

It is important to note that insect-pollinated flowers like roses do not cause significant allergy problems since their pollens are sticky and not airborne.

Mold Spores: Mold spores outnumber the pollens almost always. They can be found in any environment. Unlike pollens, they do not have any strict season. Their growth is enhanced by warmth and moisture. Some indoor varieties, however, can grow on surfaces where moisture is as low as 15%.

Activities like moving earth, raking leaves, etc., can lead to excessive exposure to mold spores.

Others: Other important airborne allergens are animal dander (especially from cats and dogs) and debris from house dust mites and cockroaches. These indoor allergens pose enormous year round problems contributing heavily to most cases of childhood asthma in this country.

House dust mites are the most important of indoor allergens. They are too small to be seen by the naked eye. They live in our mattresses, pillows, carpets and upholstered furniture. They feed on human skin that has been shed and thus cannot live without human presence. Waste product particles of the dust mites (~20/day) contain protein molecules to which we develop

allergy.

Ingestants

About 40% of the population claims to have allergy to one or more foods. Though scientifically not yet validated, there are claims that food allergy is a cause of disease processes like chronic fatigue and attention deficit. However, in the parlance allergy practice, allergy is strictly defined as a specific reaction mediated through a specific antibody (IgE) as discussed in the previous chapter “What is Allergy.”

The actual prevalence of food allergy is probably in the range of 0.1% to 5%, depending on the age group. Food allergies are common in children, but most youngsters outgrow food allergies by the age of 3-5 years.

Almost any food can trigger an allergic reaction, but the most common food allergens are:

- Wheat
- Nuts
- Milk
- Sea food
- Soy
- Peanuts (peanuts are legumes, not nuts)

Important Note: Unfortunately, most people with peanut and sea food allergies do not outgrow them and their reactions tend to be severe.

In some individuals, it appears that two or more factors must combine to produce the symptoms of food allergy. For example, consumption of certain food (like celery) can cause anaphylaxis only in the setting of subsequent strenuous exercise. Neither food nor exercise alone causes any symptoms in such patients.

testing and laboratory evaluation).

Injectants

Injectant allergens include venom of stinging insects (such as honey bee, wasp, hornet, yellow jacket and fire ant), antibiotics (such as penicillin) and certain vaccines, anti-toxins, and human blood products. Reactions to injectant allergens are less common, but have the greatest potential for causing anaphylaxis in an allergic individual.

Contactants

The contactants cause allergic reaction upon contact with the skin. Latex gloves can cause significant problems in some people, particularly those in the health care industry. Ingredients found in cosmetics, perfumes, and dyes pose problems to many. Antibiotics applied to the skin can also cause allergic reaction. Poison ivy and poison oak are well-known examples of troublesome plants.

Diagnosis of Allergy

History

Diagnosis of allergy begins with a detailed and careful questioning to compile a body of information (**case history**). A good history is the single most important tool for understanding the symptoms and its temporal relationship with the environmental factors. A good history also helps an allergist narrow down the number of suspected allergens and to reduce the number of tests needed to a manageable level. In addition, a good history also provides an allergist with the right context for proper interpretation of further testing (such as skin

Skin Tests

Skin tests are the best and most reliable method of testing for allergies. These tests are IgE-dependent and produce immediate results that the patient can feel and observe. They are simple and less expensive. Skin tests are done in two ways:

Skin Prick Test (SPT) is the most common type of skin test. Skin is punctured superficially by a disposable device already loaded with a small amount of allergy extract. If the patient has IgE antibody to the allergen, a hive will appear at the site of the puncture within about 15 minutes. This test is usually placed across the back. This method is safe, very specific, and causes little discomfort.

Intra-dermal (ID) Test is done when SPT does not show positive reaction to clinically suspicious allergens. A syringe is used to inject allergen extract into the top layer of skin, enough to raise a small bubble. Expected result is similar to the skin prick test (SPT). A hive will appear at the site if an IgE antibody against the specific allergen is present. This test is several times more sensitive in identifying allergies than the skin prick test (SPT). This heightened sensitivity poses a significant risk of over-interpretation.

It is important to note that the ID test may show positive reaction to allergens that may not be clinically significant for the patient under real-life circumstances. Such clinically insignificant positive reaction can happen to SPT also, but not as often.

Blood Tests

In certain circumstances, blood testing can be done to measure the specific IgE antibody in patient's serum. There are more than one reliable method (RAST and Immunocap) for such measurement. They are no more accurate than skin testing, but can be more expensive.

VERY IMPORTANT: Positive skin tests or blood tests help to narrow the list of suspected allergens, but does not establish a clear casual relationship to the symptoms. A good history is pivotal in determining which of the positive test results really make any clinical sense.

Treatment for Allergies

Allergy treatments fall under three broad categories:

1. Avoidance to allergens and environmental control.
2. Use of appropriate medicines.
3. Immunotherapy or "Allergy Shots"
4. A combination of two or more modalities

Because of space constraints, we will not discuss different modalities of treatment except for a brief mention of immunotherapy or allergy shots.

When avoidance, environmental control measures and medicines fail to attain optimal control of symptoms, the physician may consider immunotherapy. Repeated injections of the allergen extract at certain intervals tend to down-regulate the IgE-mediated immune reactions and improve symptoms greatly. When properly administered with adequate concentrations,

immunotherapy can be very cost effective and convenient. Risk of an anaphylactic reaction, although rare, is always a possibility.

About the Physician

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Experience: Practicing allergy since 1995

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Training:

- Fellowship in Allergy & Immunology-ECU School of Medicine, Greenville, NC
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- Research Day McNeil Award, Department of Medicine, ECU School of Medicine, 1993