

## ALLERGY AND TYPES OF ALLERGENS

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### Summary

Allergies are an abnormal response of the immune system. People who have allergies have an immune system that reacts to a usually harmless substance in the environment. This substance (pollen, mold, animal dander, etc.) is called an allergen. Allergies are a very common problem, affecting at least two out of every 10 Americans. Allergy is defined as an hyper-sensitivity reaction and is of different types as Type 1, Type 2 and Type 3 which occurs due to the exposure of the person to the different type of allergens. There are different type of allergens as general allergens e.g., apple, garlic, beef, beet, vegetarian allergens as apple, almond, blue berry, banana, Herb & Spices allergens as – Aloe vera, licorice, mustard & clove. To avoid these allergic reactions patient must have knowledge about allergens. There are certain methods to detect allergy such as Skin test, Blood test and Vega test.

**Keywords:** - Allergy, allergens, fatal, asthma.

### **Introduction**

Allergy is defined as hypersensitivity or immunologic reaction to an immunogen. According to von pirquet allergy is defined as changed or altered reaction in an individual body, in response to a substance or agent which is harmless to others. Sneezing is an example of allergic/hypersensitivity reaction. As per the availability of the reports around 30% of population suffers from some type of allergic syndrome. Occurrence of hypersensitivity/allergic disease is determined by (1) individual characteristic (2) condition of exposure.

An allergy refers to an exaggerated reaction by our immune system in response to bodily contact with certain foreign substances. It is exaggerated because these foreign substances are usually seen by the body as harmless and no response occurs in non- allergic people [1]. When person suffering from allergy expose to certain allergens, allergens are treated as an invader by immune system and mobilizes to attack. This is done by immune system by generating a type of antibody in anormous amount which is a disease fighting protein known as immunoglobulin E or IgE [2].

### **Types of allergy**

Mostly the allergy produced by environmental allergens is type 1 allergies. Type2 and type 3 are produced by auto immune diseases. Immunoglobulin E acts by attaching with mast cells. Condition when body subjected to the allergen firstly known as primary exposure cause no formation of antibodies previously so there is no symptom of allergy during primary exposure, however on regular exposure the specific IgE attach with allergens and antigen antibody reaction occurs; by liberating inflammatory chemicals as cytokines, histamine, leukotrienes or SRS known as slow- reacting substance. These chemicals act on respiratory system and causes allergy. Asthma also develop due to allergy, symptoms of asthma are coughing, wheezing and breath shortness occurs due to narrowing of bronchial passages in lungs. It can be dangerous and requires medical attention.

### Causes

Genetics and environmental factors play significant role in allergies. The immune system normally protects the body against harmful substances, such as bacteria, viruses and also provides defence against foreign substances called allergens, which are generally harmless and in most people do not cause a problem. In allergic persons, the immune response is more sensitive. When it recognizes an allergen, it releases chemicals such as histamines which fight off allergens. This causes itching swelling mucus production, muscle spasms, hives, rashes, and other symptoms, which vary from person to person.

Common allergens include pollen, mold, pet dander, and dust [3]. Food allergies are common. Allergic reactions can also be caused by insect bites jewelry, cosmetics, spices, and other substances. Some people have allergy-like reactions to hot or cold temperatures, sunlight, or other environmental triggers. Sometimes, friction (rubbing or roughly stroking the skin) will cause symptoms. A specific allergy is not usually passed down through families (inherited). However, if both your parents have allergies, you are likely to have allergies. The chance is greater if your mother has allergies. Allergies may make certain medical conditions such as sinus problems, eczema, and asthma worse.

#### **Allergy symptoms vary, but may include:**

- Breathing problems, Burning, tearing, or itching
- Coughing
- Diarrhoea
- Headache
- Hives
- Itching of the nose, mouth, throat, skin, or any other area
- Runny nose
- Skin rashes
- Stomach cramps
- Vomiting
- Wheezing

### **Immunology of allergy**

The first time the allergy-prone  
Person runs across an allergen  
Such as ragweed



Then these IgE antibody attach  
Themselves to mast cells



The second time that person has  
A brush with ragweed,  
The IgE primed mast cell will  
Release its powerful chemicals,  
(histamine, serotonin, proteoglycans)



**And the person will suffer** with  
Wheezing and /or sneezing,  
Runny nose, watery nose, and  
itching of allergy [4].

### **Allergens**

Allergens act as insiteful agents of allergy means the agents or substances having capability of sensitizing the body in a way that an unexpected response occurs, in hypersensitive person. The origin of allergen is chemical, biologic or synthetic origin. Some of the allergens shown in table no.1

**Table No. 1 Origin of allergen: [5]**

<b>Origin of allergen</b>	<b>Names</b>
Biologic	Molds, mildew , bacteria, viruses
Chemical	Wool    alcohol,    potassium dichromate, neomycin sulphate, paraben mix
Synthetic	Penicillin

Even though the chemical identity of allergen is not known but most known allergens are protein or glycoprotein and such type of allergens not have much difference with other immunogen. Mostly allergens are low molecular weight and induce allergies by forming covalent bonding with the protein carrier.

### **Types of allergens**

**Inhalant allergens:** - These allergens are chemicals causing respiratory disease (as- nose & lungs inflammation). Inflammation in nose is characterise by running nose or clogged nose, itching and swelling of nose and eyes inflammation known as watering eyes conjunctivitis, hay fever or sinusitis etc [6].

**Injectant allergens** such type of allergens having similar symptoms as antibiotics as cephalosporin and semi-synthetic penicillin etc. some of the natural source of allergens are produced by sting of bees [7].

**Ingestant allergens** as name defined get ingested through food stuff. It is an immune system response to a food. e.g. - of food allergens ingested by patients are: walnut, cashewnut, fish soy, orange juice, egg, peanut.

**Contactant allergens** causes of contact allergies are number of plants and their products. E.g. an ancardiaceae family plant which is responsible for contact dermatitis found in North America [8].

**Infectant allergens** such type of allergy caused due to metabolic product of living micro organism in human body.

**General Allergens**

Corn	Almond	Pecan	Apple	Apricot
Asparagus	Barley	Garlic	Banana	Beaf
Beat	Blueberry	Carrot	Casein	Cauliflower
Cucumber	Egg (chicken)	white Egg (chicken)	yolk Honey	Lamb
Lemon	Milk(goat)	Olive(black)	Oat	Orange
Rye	Walnut	Sugarcane	Sunflower	Papaya
Peach	Coconut	Peach	Whey	Strawberry
Sole	Lentil	Milk	Broccoli	Oat

**Vegetative**

Apple	Almond	Apricot	Asparagus
Blueberry	Brown rice	Bean sprouts	Banana
Cantaloupe	Cashew	Cherry	Chili pepper
Lemon	Honey	Grapefruit	Garlic
Milk	Pumpkin	Plum	Pine apple
Oat	Orange	Peach	Pear

**Herbs and spices**

Aloevera	Ashwagandha	Biberry
Licorice	Greentea	Dongqui
Fennel	Ginger	Clove
Mustard	Nutmeg	Cinnamon
Seg	Vanilla	Paprica

**Allergy due to drugs**

An allergic reaction arise due to the body's immune system overreacting to the drug, which is viewed as antigen. Commonly this overreaction is called as hypersensitivity reaction.

- Antibiotics such as penicillin, sulfa drugs, and tetracycline.
- Antiseizure medicines as phenytoin (Dilantin) or carbamazepine (Tegretol)

- Body produces antibodies to the antigen and then stores the antibodies on special cells.
  - Certain food allergies such as to eggs, soybeans, or shellfish
- Common triggers of drug allergies are the following:
  - Drug given by injection rather than pill
  - Due to these mediator organs and other cells produces the symptoms of the reaction.
  - Family tendency to develop allergies and asthma.
  - Frequent exposure to the drug
  - IgE is known as those antibody which are in an allergic reaction.
  - Large doses of the drug  
On second exposure of body to the drug, cells release chemicals called "mediators." Histamine is an example of a mediator.
  - Painkillers (called analgesics) as codein, morphine (NSAIDs, such as ibuprofen orindomethacin), and aspirin [9].

### **Detection of allergy**

#### **Skin test**

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 [10].

### **Blood test**

Another method for the detection of allergy is blood test . Blood tests for allergies are sometimes performed to find out what triggers an allergic reaction and are often used if a patient has a skin condition or is taking medications, such as antihistamines. Such drugs can interfere with an allergy skin test, which is a common test used to identify allergy triggers, but in general do not interfere with allergy blood tests.

The radioallergosorbent test (RAST) and the enzyme-linked immunosorbent assay (ELISA) test are two types of blood analyses that can be used to diagnose allergies. In both, a small amount of blood is taken from the allergy sufferer and analyzed for IgE antibodies (allergic antibodies) to specific antigens. High levels of these antibodies in the blood indicate an allergic reaction.

These blood tests may not be as effective as skin testing and tend to be more expensive, but can be useful in some situations [11].

### **Vega Test**

Another method is by performing vega test. This test is performed by using a special instrument known as vegameter. Vegameter is having an electrode which is connected to the acupuncture points of fingers. For completing the circuit electrodes are held by other hand and food samples are introduced to the machine at a time. If the machine dials shows lowered reading this means that the allergy is present.

### **Elimination diet**

To know which foods are producing allergic reactions is done by drastic method which is performed by eliminating all foods except lamb, pears and spring water for one week, and then slowly re-introducing any new food at a time. This leads to mal nutritional problems, especially with pediatrics; chief drawback is that it is a slow method.



### **Preventive measures and strategies**

Prevention Strategies:

Warning labels

Warning symbols (skull/crossbones; Mr. Yuk)

Awareness and education programs [12].

The main aim of allergy treatment is preventing the symptoms from occurring in primary place. This includes study to avoid the allergen from pets, foods, insects or certain chemicals. Prevention from allergy can be done by:-

#### **Avoidance of Indoor Allergens**

Commonly the source of indoor allergens including pets and dust mites, are typically triggers of allergy and asthma symptoms. So avoidance of such triggers is an valuable aspect for the prevention and treatment of allergies [13].

#### **Avoidance of allergy due to food materials**

Treatment of food allergy can be done by avoiding specific food trigger. Unfortunately sometimes it is not possible to avoid certain common foods, as peanuts. Therefore, person suffering from food allergies needs to follow a diet free from the affective food [14].

### **Treatment**

**Medications that can be used to treat allergies include:**

#### **ANTI-HISTAMINE**

Antihistamines are available over-the-counter and by prescription. They are available in many preparations, including:

- Capsules and pills
- Eye drops
- Injection
- Liquid
- Nasal spray [15]

#### CORTICOSTEROIDS

Anti-inflammatory medicines (corticosteroids) are available in many preparations, including:

- Creams and ointment for the skin
- Eye drops
- Nasal spray
- Lung inhaler

Patients with severe allergic symptoms may be prescribed corticosteroid pills or injections for short periods of time [16].

#### DECONGESTANTS

Decongestants can help relieve a stuffy nose. Decongestant nasal spray should not be used for more than several days, because they can cause a "rebound" effect and make the congestion worse. Decongestants in pill form do not cause this problem.

#### OTHER MEDICINES

Leukotriene inhibitors are those medicines which specifically block the substances that cause allergies. Zafirlukast (Accolate) and montelukast (Singulair) are approved drugs for patients suffering from asthma as well as indoor and outdoor allergies. Azelastin act on vagal neuroeffector transmission in human airway system [17].

#### ALLERGY SHOTS

Allergy shots (immunotherapy) are recommended in worst condition as the allergen cannot be avoided and symptoms are uncontrollable. Allergy shots works by keeping the body from over-reacting to allergen. Continous injections of the allergen are administered, with each dose increasing slightly greater than the previous dose until a maximum dose is reached. They do not respond everyone and require frequent doctor's visits [18].

### **Future trends: Use of Allergens**

#### **Allergens used as diagnostic agents**

Allergen quality is main problem in the recent allergy diagnosis and therapy. Such kind of problem can be sort out by using or through the availability of recombinant allergens. In past years allergens were being cloned by fungi, animal ganders, mice insects and from food. Both in *invivo* and *invitro* tests recombinant allergen shows age binding to their natural counterpart.

Allergenic Extracts are generally used for skin test for the assessment of the allergic state in patients suspected with IgE-mediated hypersensitivity. The diagnosis of allergy may be established by the allergy history, clinical evaluation and skin test reactivity of patients. Findings of different study easily predict the fact that allergic reactions dose not depends upon age and sex of patient [19].

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