

## **Allergies and Autoimmune Inner Ear Disease**

Allergy is the term used to describe an over-reaction of the body to a substance that is normally harmless to most people. This substance is called an allergen, and one can be exposed to it in several ways. It may be *breathed* into the respiratory system, *eaten*, or *touched* by the skin to cause symptoms. Often, people inherit a tendency to develop allergies.

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### **SYMPTOMS OF ALLERGY**

A stuffy nose, runny nose, polyps (growths) in the nose, itching and puffy eyes, frequent sore throats, asthma, skin rashes, and behavioral problems such as hyperactivity in children may be symptoms of allergy. Symptoms may occur in almost all systems of the body, including ears.

### **Allergy and the Ears**

### ***Outer Ear***

Chronic itching or frequent infections of the ear canal may be due to allergy.

### ***Middle Ear***

Repeated ear infections and long-standing fluid behind the eardrum are often due to allergy. Both of these are more common in children.

### ***Inner Ear***

Dizziness, ear fullness and pressure, tinnitus or head noise, and sensorineural (nerve) hearing loss may be due to allergy - especially food allergy. **Meniere's** disease in one or both ears may sometimes be aggravated by allergies.

## **TYPES OF ALLERGIES**

Reactions of the immune system (autoimmune disease) may also cause symptoms.

### ***Inhalant Allergy***

Symptoms of inhalant allergy are caused by reactions to allergens that enter the body via the respiratory tract. They may develop with recurrent or prolonged exposure to the allergen. These can be pollens, dust, molds, animal dander, or other substances breathed in through the nose.

Symptoms of inhalant allergy may be year round or seasonal. Hay fever is a form of inhalant allergy due to weed pollen released in the fall.

When the nose or lungs come in repeated contact with allergens, the immune system of allergic patients makes a high level of a blood protein, or antibody called **Immunoglobulin E (IgE)**. The IgE attaches to special allergic cells, called **mast cells**, found throughout the body. When the allergen enters the respiratory tract, a change occurs in the mast cell's outer membrane causing the cell to release inflammatory substances called **mediators** which produce allergic symptoms. One of the best known mediators is called **histamine**; it causes itching, mucous secretion, and some congestion of tissue. This is why an **antihistamine** is frequently prescribed for allergy symptoms.

### ***Food Allergies***

Often, common foods that are eaten frequently are the ones that cause symptoms of food allergy. Allergens taken into the digestive tract such as wheat, fruit, shellfish and dairy products can cause allergic symptoms such as nasal congestion, hives, or ear infections.

Non-food substances may cause inflammation resulting in similar symptoms. These would include medicines such as penicillin or sulfa, or chemicals such as food preservatives.

### ***Contact Dermatitis (Skin Rash)***

Contact dermatitis is a rash or swelling caused by direct contact of an allergen with the skin. Poison ivy, nickel earrings, wool shirts or certain ear drops may stimulate a cell called the T-lymphocyte to release allergic mediators which affect the skin. The resulting rash may last many weeks or months after exposure.

### ***Autoimmune Inner Ear Disease (AIED)***

AIED is believed to be caused by the body's immune system attacking the inner ear and damaging the hearing and sometimes the balance nerve. Autoimmune disease occurs when the body produces an immunological or allergic reaction to itself, instead of reacting to an external substance. In most cases, we

don't know why this occurs. Some patients with AIED have signs of other diseases caused by an overly-active immune system - arthritis, skin rash, allergy, etc. AIED is characterized by the rapid progression of hearing loss - often over a period of several weeks to a few months. About 30% of people with AIED will present with symptoms of Meniere's disease - fluctuating sensorineural hearing loss, episodic spinning vertigo, tinnitus (head noise), and fullness in the involved ear(s). The hearing loss in these individuals will progress at a much more rapid rate than we see with "typical" Meniere's disease. At other times, AIED will present with a sudden hearing loss in one or both ears. Usually AIED produces hearing loss in both ears, although it may present initially in one ear and months to years later develop in the second ear.

## **DIAGNOSIS OF SPECIFIC ALLERGENS**

Specific allergens may be diagnosed by skin testing, blood tests, or a challenge test. Blood tests are also used to aid the diagnosis of AIED.

### ***Skin Testing for Inhalant Allergies***

To identify inhalant allergies, small amounts of allergens are injected in rows on the arm.

Little bumps called **wheals** will form on the skin at the injection sites. After 10-15 minutes, these wheals are measured. Certain larger wheals indicate an allergy to the substance that was injected at that area. The wheal's size help your doctor determine how sensitive you are and at what strength your allergy injections should start.

### ***In Vitro Test (Blood Test)***

An In Vitro test (sometimes called a RAST test) is a blood test sometimes used to diagnose food and inhalant allergies. It measures antibodies (such as IgE) to specific allergens, and may be used to determine your sensitivity to inhalants and some forms of food allergy.

### ***Challenge Test for Food Allergies***

Skin testing may help diagnose food allergies. Many patients crave foods to which they are allergic, and your doctor may take a food history from you to identify some of these. An In Vitro test may be ordered, or a challenge test may be necessary to determine what foods may cause symptoms after they have been eaten. Foods to be tested may be either eaten or injected in a purified form. When the food has been absorbed, the allergic patient may develop common symptoms of allergy such as nasal stuffiness, a change in hearing, or ringing in the ears.

### ***Blood Testing for AIED***

The diagnosis of AIED is made by the history and finding of a rapidly progressive (worsening) or very unstable hearing level, which is usually in both ears. The suspected diagnosis is confirmed by special blood tests to show whether or not the immune system is overly active. Blood testing may also indicate evidence of involvement in other areas of the body, etc., such as the skin or a kidney.

## **MEDICATIONS AND NON-SPECIFIC TREATMENT OF ALLERGIES**

Mild allergic symptoms require no specific test for diagnosis, and can be well controlled with some combination of antihistamines, prescription nasal sprays, decongestants, and avoidance of known allergens.

Side-effects of antihistamines may include dry mouth, urinary retention, and drowsiness. Newer antihistamines often have no significant side effects of drowsiness. They can be effective for the symptoms of dripping nose and itching.

Most of the prescription nasal sprays for allergy are mild topical steroids. They can be very effective for most nasal allergy symptoms, including congestion, dripping and itching. Side effects include occasional nosebleeds, or nasal crusting.

Decongestants shrink swollen (congested) tissue such as the mucus membrane of the nose. They are often combined with antihistamines. Side effects include insomnia, rapid heartbeat, and potential prostatic obstruction in men.

Excellent non-specific measures to avoid contact with allergens may include the use of a central or room-sized air purifier equipped with a high efficiency particulate filter (HEPA) to remove the microscopic sized allergens such as pollen or mold spores. Impermeable mattress and pillow covers to lessen exposure to dust mites are inexpensive and quite useful. Information on other products such as those designed to make animal dander less allergenic and kill molds that grow in living spaces can be obtained from your allergist or through environmental supply manufacturers.

More severe or chronic allergic symptoms and those not controlled by medication - especially those involving the inner ear - may require tests to identify the specific allergen.

## **SPECIFIC TREATMENT OF ALLERGY**

The type of treatment for an allergy depends on the underlying cause. It may involve desensitization (allergy shots), avoidance, or medications. At times the underlying cause can be controlled but it is necessary to perform surgery to eliminate the problem that has resulted from the allergy.

### ***Inhalant Allergy***

If your doctor suggests desensitization therapy for inhalant allergies, you will be given injections once or twice a week. These injections contain the allergens to which you are sensitive. They stimulate the production of a protective substance called **blocking antibody** to help prevent allergic symptoms. You will sometimes need to have these skin tests rechecked to adjust the allergy dose.

### **Sublingual Immunotherapy (SLIT)**

SLIT refers to allergen desensitization given in a drop form underneath the tongue. The drops contain extracts of inhalant allergens, or occasionally food allergens. They are held in the mouth for several seconds to a few minutes, and then swallowed or spit out. While this treatment has been shown in Europe to give improvement in allergy symptoms, it is not approved for routine use in the United States (investigational). Clinical studies are currently being done in the U.S. to assess how useful it is. It does not appear that the results from SLIT will be as long-lasting as those obtained by inhalant allergy shots

### ***Food Allergies***

You will be asked to eliminate, temporarily, the foods to which you are allergic. This will allow your body to lessen its sensitivity to these foods. In a small percentage of patients, the food allergies remain “fixed” and symptoms will always be produced after ingesting the food, even after long periods of elimination from the diet. Fortunately, this type of food allergy is relatively rare.

In addition to dietary elimination, you will also be asked to rotate (vary) the other foods in your diet to prevent new food allergies from developing.

### ***Contact Dermatitis***

Your doctor will try to determine what substances may be causing your symptoms and have you avoid using them. An anti-inflammatory medicine called a **steroid** may also be prescribed in a pill, cream, or drop form to help decrease the inflammation.

## ***AIED***

The most effective treatment of AIED is a potent anti-inflammatory medication called a **steroid**. While short courses of a few days to weeks may be helpful, it is common to require high doses of steroids given for several weeks to months to obtain improvement of very unstable AIED. Side effects of steroids may include insomnia, skin rash, early onset of osteoporosis, and glaucoma.

It may be necessary to use other medications that suppress or change an overly active immune response along with, or in place of, steroids. These medications are often used in other forms of autoimmune disease such as rheumatoid arthritis. Your doctor will discuss with you the particular action and side effects of any other medication (s) he may recommend. Affected patients may have improved hearing and balance after treatment.

## ***Surgery***

Ear symptoms due to allergy, such as fluid in the middle ear space, can be treated by the surgical placement of a ventilation tube in the eardrum. Surgery to control dizziness is necessary at times, even though the underlying problem started as a result of an allergy. Chronic infection in the middle ear space may also develop in some patients as a result of underlying allergy. In some cases, this infection can only be eliminated by a surgical procedure. Following surgery, it may be necessary to treat the underlying allergic problem itself to prevent the symptoms from recurring. In unusually severe cases of AIED, which do not respond to medical treatment, cochlear implant surgery can be performed to restore a useful level of hearing to the affected individual.

## **SUMMARY**

Allergies cause a number of different symptoms, many of which are found in the ear, nose and throat. They are rarely life-threatening, but can cause discomfort and interfere with the quality of life. Most of these symptoms can be controlled by avoiding known allergies, treating with medicine and specific desensitization therapy.

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