Airborne Allergies

What causes Allergies – What can you do about them – What are researches doing to help people who suffer from these Allergies

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Introduction

Sneezing is not always the symptom of a cold. Sometimes, it is an allergic reaction to something in the air. Health experts estimate that 50 million Americans suffer from upper respiratory tract symptoms that are allergic reactions to airborne allergens. Pollen allergy, commonly called hay fever, is one of the most common chronic diseases in the United States. Worldwide, airborne allergens cause the most problems for people with allergies. The respiratory symptoms of asthma, which affect approximately 11 million Americans, are often provoked by airborne allergens.

Overall, allergic diseases are among the major causes of illness and disability in the United States.

The National Institute of Allergy and Infectious Diseases (NIAID) of the National Institutes of Health (an agency of the U.S. Department of Health and Human Services) supports and conducts research on allergic diseases. The goals of this research are to provide a better understanding of the causes of allergy, to improve methods for diagnosing and treating allergic reactions, and eventually to prevent allergies.

This ebook summarizes what health experts know about the causes and symptoms of allergic reactions to airborne allergens, how health care providers diagnose and treat these reactions, and what medical researchers are doing to help people who suffer from these allergies.

What is an allergy?

An allergy is a specific reaction of the body's immune system to a normally harmless substance, one that does not bother most people. People who have allergies often are sensitive to more than one substance. Types of allergens that cause allergic reactions include:

1. Pollens
2. House dust mites
3. Mold spores
4. Food
5. Latex rubber
6. Insect venom

Medicines

Why are some people allergic?

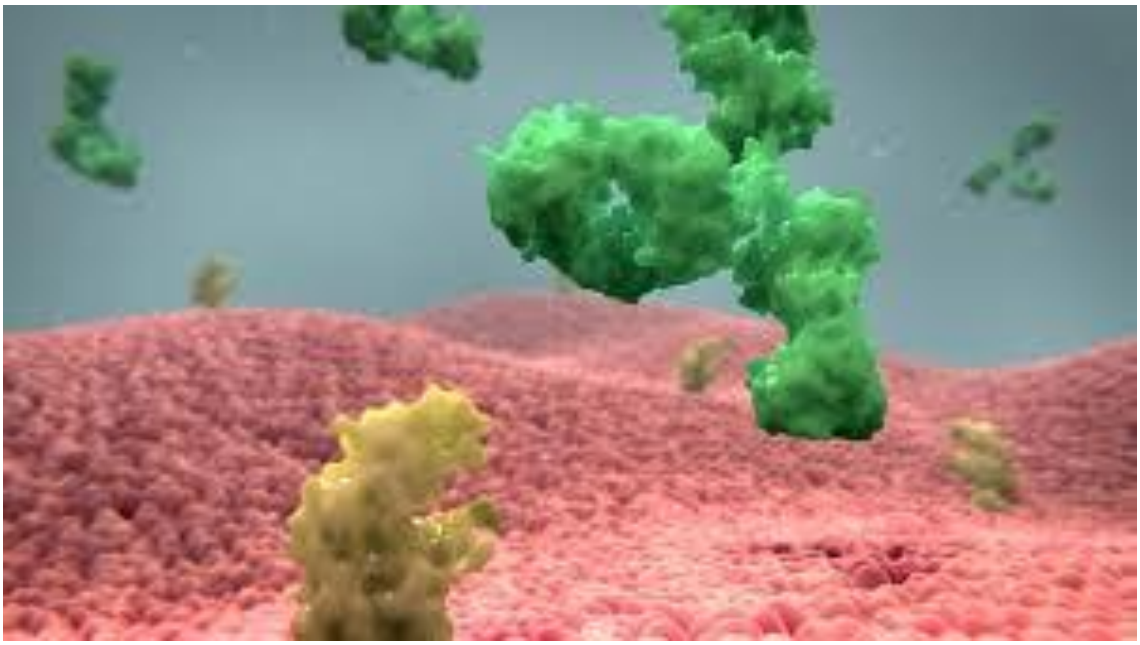
Scientists think that some people inherit a tendency to be allergic from one or both parents. This means they are more likely to have allergies. They probably, however, do not inherit a tendency to be allergic to any specific allergen. Children are more likely to develop allergies if one or both parents have allergies. In addition, exposure to allergens at times when the body's defenses are lowered or weakened, such as after a viral infection or during pregnancy, seems to contribute to developing allergies.

What is an allergic reaction?

Normally, the immune system functions as the body's defense against invading germs such as bacteria and viruses. In most allergic reactions, however, the immune system is responding to a false alarm. When an allergic person first comes into contact with an allergen, the immune system treats the allergen as an invader and gets ready to attack.

The immune system does this by generating large amounts of a type of antibody called immunoglobulin E, or IgE. Each IgE antibody is specific for one particular substance. In the case of pollen allergy, each antibody is specific for one type of pollen. For example, the immune system may produce one type of antibody to react against oak pollen and another against ragweed pollen.

The IgE molecules are special because IgE is the only type of antibody that attaches tightly to the body's mast cells, which are tissue cells, and to basophils, which are blood cells. When the allergen next encounters its specific IgE, it attaches to the antibody like a key fitting into a lock. This action signals the cell to which the IgE is attached to release (and, in some cases, to produce) powerful chemicals like histamine, which cause inflammation. These chemicals act on tissues in various parts of the body, such as the respiratory system, and cause the symptoms of allergy.



IgE molecule

Symptoms

The signs and symptoms of airborne allergies are familiar to many.

- Sneezing, often with a runny or clogged nose
- Coughing and postnasal drip
- Itching eyes, nose, and throat
- Watering eyes
- Conjunctivitis
- “Allergic shiners” (dark circles under the eyes caused by increased blood flow near the sinuses)
- “Allergic salute” (in a child, persistent upward rubbing of the nose that causes a crease mark on the nose)

In people who are not allergic, the mucus in the nasal passages simply moves foreign particles to the throat, where they are swallowed or coughed out.

But something different happens in a person who is sensitive to airborne allergens. In sensitive people, as soon as the allergen lands on the lining inside the nose, a chain reaction occurs that leads the mast cells in these tissues to release histamine and other chemicals. The powerful chemicals contract certain cells that line some small blood vessels in the nose. This allows fluids to escape, which causes the nasal passages to swell—resulting in nasal congestion. Histamine also can cause sneezing, itching, irritation, and excess mucus production, which can result in allergic rhinitis.

Other chemicals released by mast cells, including cytokines and leukotrienes, also contribute to allergic symptoms.

Some people with allergy develop asthma, which can be a very serious condition. The symptoms of asthma include:

- Coughing
- Wheezing
- Shortness of breath

The shortness of breath is due to a narrowing of the airways in the lungs and to excess mucus production and inflammation. Asthma can be disabling and sometimes fatal. If wheezing and shortness of breath accompany allergy symptoms, it is a signal that the airways also have become involved.

Is it an allergy or a cold?

There is no good way to tell the difference between allergy symptoms of runny nose, coughing, and sneezing and cold symptoms. Allergy symptoms, however, may last longer than cold symptoms. Anyone who has any respiratory illness that lasts longer than a week or two should consult a health care provider.

Pollen Allergy

Each spring, summer, and fall, tiny pollen grains are released from trees, weeds, and grasses. These grains hitch rides on currents of air. Although the mission of pollen is to fertilize parts of other plants, many never reach their targets. Instead, pollen enters human noses and throats, triggering a type of seasonal allergic rhinitis called pollen allergy. Many people know this as hay fever.

Of all the things that can cause an allergy, pollen is one of the most common. Many of the foods, medicines, or animals that cause allergies can be avoided to a great extent. Even insects and household dust are escapable. But short of staying indoors, with the windows closed, when the pollen count is high—and even that may not help—there is no easy way to avoid airborne pollen.

What is pollen?

Plants produce tiny—too tiny to see with the naked eye—round or oval pollen grains to reproduce. In some species, the plant uses the pollen from its own flowers to fertilize itself. Other types must be cross-pollinated. Cross-pollination means that for fertilization to take place and seeds to form, pollen must be transferred from the flower of one plant to that of another of the same species. Insects do this job for certain flowering plants, while other plants rely on wind for transport.

The types of pollen that most commonly cause allergic reactions are produced by the plain-looking plants (trees, grasses, and weeds) that do not have showy flowers. These plants make small, light, dry pollen grains that are custom-made for wind transport.

Amazingly, scientists have collected samples of ragweed pollen 400 miles out at sea and 2 miles high in the air. Because airborne pollen can drift for many miles, it does little good to rid an area of an offending plant. In addition, most allergenic pollen comes from plants that produce it in huge quantities. For example, a single ragweed plant can generate a million grains of pollen a day.

The type of allergens in the pollen is the main factor that determines whether the pollen is likely to cause hay fever. For example, pine tree pollen is produced in large amounts by a common tree, which would make it a good candidate for causing allergy. It is, however, a relatively rare cause of allergy because the type of allergens in pine pollen appear to make it less allergenic.

Among North American plants, weeds are the most prolific producers of allergenic pollen. Ragweed is the major culprit, but other important sources are sagebrush, redroot pigweed, lamb’s quarters, Russian thistle (tumbleweed), and English plantain.

Grasses and trees, too, are important sources of allergenic pollens. Although more than 1,000 species of grass grow in North America, only a few produce highly allergenic pollen.

It is common to hear people say they are allergic to colorful or scented flowers like roses. In fact, only florists, gardeners, and others who have prolonged, close contact with flowers are likely to be sensitive to pollen from these plants. Most people have little contact with the large, heavy, waxy pollen grains of such flowering plants because this type of pollen is not carried by wind but by insects such as butterflies and bees.

Some grasses that produce pollen:

- Timothy grass
- Kentucky bluegrass
- Johnson grass
- Bermuda grass
- Redtop grass
- Orchard grass
- Sweet vernal grass

Some trees that produce pollen:

- Oak
- Ash
- Elm
- Hickory
- Pecan
- Box elder
- Mountain cedar

When do plants make pollen?

One of the most obvious features of pollen allergy is its seasonal nature—people have symptoms only when the pollen grains to which they are allergic are in the air. Each plant has a pollinating period that is more or less the same from year to year. Exactly when a plant starts to pollinate seems to depend on the relative length of night and day—and therefore on geographical location— rather than on the weather. On the other hand, weather conditions during pollination can affect the amount of pollen produced and distributed in a specific year. Thus, in the Northern Hemisphere, the farther north you go, the later the start of the pollinating period and the later the start of the allergy season.

A pollen count, familiar to many people from local weather reports, is a measure of how much pollen is in the air. This count represents the concentration of all the pollen (or of one particular type, like ragweed) in the air in a certain area at a specific time. It is shown in grains of pollen per square meter of air collected over 24 hours. Pollen counts tend to be the highest early in the morning on warm, dry, breezy days and lowest during chilly, wet periods. Although the pollen count is an approximate measure that changes, it is useful as a general guide for when it may be wise to stay indoors and avoid contact with the pollen.

Mold Allergy

What is mold?

There are thousands of types of molds and yeasts in the fungus family. Yeasts are single cells that divide to form clusters. Molds are made of many cells that grow as branching threads called hyphae. Although both can probably cause allergic reactions, only a small number of molds are widely recognized offenders.

The seeds or reproductive pieces of fungi are called spores. Spores differ in size, shape, and color among types of mold. Each spore that germinates can give rise to new mold growth, which in turn can produce millions of spores.

What is mold allergy?

When inhaled, tiny fungal spores, or sometimes pieces of fungi, may cause allergic rhinitis. Because they are so small, mold spores also can reach the lungs.

In a small number of people, symptoms of mold allergy may be brought on or worsened by eating certain foods such as cheeses processed with fungi. Occasionally, mushrooms, dried fruits, and foods containing yeast, soy sauce, or vinegar will produce allergy symptoms.

Where do molds grow?

Molds can be found wherever there is moisture, oxygen, and a source of the few other chemicals they need. In the fall, they grow on rotting logs and fallen leaves, especially in moist, shady areas. In gardens they can be found in compost piles and on certain grasses and weeds. Some molds attach to grains such as wheat, oats, barley, and corn, which makes farms, grain bins, and silos likely places to find mold.

Hot spots of mold growth in the home include damp basements and closets, bathrooms (especially shower stalls), places where fresh food is stored, refrigerator drip trays, house plants, air conditioners, humidifiers, garbage pails, mattresses, upholstered furniture, and old foam rubber pillows.

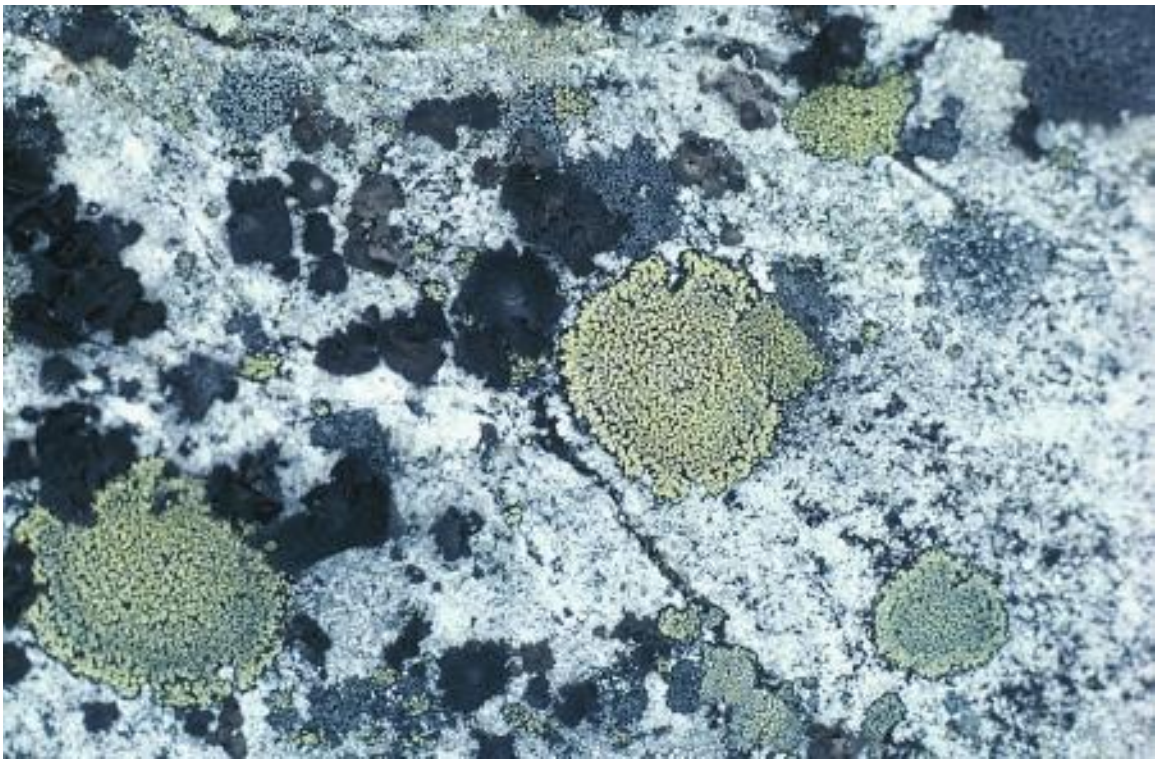
Molds also like bakeries, breweries, barns, dairies, and greenhouses. Loggers, mill workers, carpenters, furniture repairers, and upholsterers often work in moldy environments.

What molds are allergenic?

Like pollens, mold spores are important airborne allergens only if they are abundant, easily carried by air currents, and allergenic in their chemical makeup. Found almost everywhere, mold spores in some areas are so numerous they often outnumber the pollens in the air. Fortunately, however, only a few dozen different types are significant allergens.

In general, Alternaria and Cladosporium (Hormodendrum) are the molds most commonly found both indoors and outdoors in the United States. Aspergillus, Penicillium, Helminthosporium, Epicoccum, Fusarium, Mucor, Rhizopus, and Aureobasidium (Pullularia) are common as well.

There is no relationship, however, between a respiratory allergy to the mold Penicillium and an allergy to the drug penicillin, which is made from mold.



Are mold counts helpful?

Similar to pollen counts, mold counts may suggest the types and number of fungi present at a certain time and place. For several reasons, however, these counts probably cannot be used as a constant guide for daily activities.

One reason is that the number and types of spores actually present in the mold count may have changed considerably in 24 hours because weather and spore distribution are directly related. Many common allergenic molds are of the dry spore type—they release their spores during dry, windy weather. Other fungi need high humidity, fog, or dew to release their spores. Although rain washes many larger spores out of the air, it also causes some smaller spores to be propelled into the air.

In addition to the effect of weather changes during 24-hour periods on mold counts, spore populations may also differ between day and night. Dry spore types are usually released during daytime, and wet spore types are usually released at night.

Are there other mold-related disorders?

Fungi or organisms related to them may cause other health problems similar to allergic diseases. Some kinds of Aspergillus may cause several different illnesses, including both infections and allergies. These fungi may lodge in the airways or a distant part of the lung and grow until they form a compact sphere known as a “fungus ball.” In people with lung damage or serious underlying illnesses, Aspergillus may grasp the opportunity to invade the lungs or the whole body.

In some people, exposure to these fungi also can lead to asthma or to a lung disease resembling severe inflammatory asthma called allergic bronchopulmonary aspergillosis. This latter condition, which occurs only in a small number of people with asthma, causes wheezing, low-grade fever, and coughing up of brown-flecked masses or mucus plugs. Skin testing, blood tests, X Rays, and examination of the sputum for fungi can help establish the diagnosis. Corticosteroid drugs usually treat this reaction effectively. Immunotherapy (allergy shots) is not helpful.

DUST MITES

Dust Mite Allergy

Dust mite allergy is an allergy to a microscopic organism that lives in the dust found in all dwellings and workplaces. House dust, as well as some house furnishings, contains microscopic mites. Dust mites are perhaps the most common cause of perennial allergic rhinitis. House dust mite allergy usually produces symptoms similar to pollen allergy and also can produce symptoms of asthma.

House dust mites, which live in bedding, upholstered furniture, and carpets, thrive in summer and die in winter. In a warm, humid house, however, they continue to thrive even in the coldest months. The particles seen floating in a shaft of sunlight Illustration of a dust mite, include dead dust mites and their waste products. These waste products, which are proteins, actually provoke the allergic reaction.

What is house dust?

Rather than a single substance, so-called house dust is a varied mixture of potentially allergenic materials. It may contain fibers from different types of fabrics and materials such as:

- Cotton lint, feathers, and other stuffing materials
- Dander from cats, dogs, and other animals
- Bacteria
- Mold and fungus spores (especially in damp areas)
- Food particles
- Bits of plants and insects
- Other allergens peculiar to an individual house or building

Cockroaches are commonly found in crowded cities and in the southern United States. Certain proteins in cockroach feces and saliva also can be found in house dust. These proteins can cause allergic reactions or trigger asthma symptoms in some people, especially children. Cockroach allergens likely play a significant role in causing asthma in many inner-city populations.

Animal Allergy

Household pets are the most common source of allergic reactions to animals.

Many people think that pet allergy is provoked by the fur of cats and dogs. Researchers have found, however, that the major allergens are proteins in the saliva. These proteins stick to the fur when the animal licks itself.

Urine is also a source of allergy-causing proteins, as is the skin. When the substance carrying the proteins dries, the proteins can then float into the air. Cats may be more likely than dogs to cause allergic reactions because they lick themselves more, may be held more, and spend more time in the house, close to humans.

Some rodents, such as guinea pigs and gerbils, have become increasingly popular as household pets. They, too, can cause allergic reactions in some people, as can mice and rats. Urine is the major source of allergens from these animals.

Allergies to animals can take 2 years or more to develop and may not decrease until 6 months or more after ending contact with the animal. Carpet and furniture are a reservoir for pet allergens, and the allergens can remain in them for 4 to 6 weeks. In addition, these allergens can stay in household air for months after the animal has been removed. Therefore, it is wise for people with an animal allergy to check with the landlord or previous owner to find out if furry pets lived on the premises.

Chemical Sensitivity

Some people report that they react to chemicals in their environments and that these allergy-like reactions seem to result from exposure to a wide variety of synthetic and natural substances. Such substances can include those found in:

- Paints
- Carpeting
- Plastics
- Perfumes
- Cigarette smoke
- Plants

Although the symptoms may resemble those of allergies, sensitivity to chemicals does not represent a true allergic reaction involving IgE and the release of histamine or other chemicals. Rather than a reaction to an allergen, it is a reaction to a chemical irritant, which may affect people with allergies more than others.

Diagnosis

People with allergy symptoms—such as the runny nose of allergic rhinitis—may at first suspect they have a cold, but the “cold” lingers on. Testing for allergies is the best way to find out if a person is allergic.

Skin tests

Allergists (doctors who specialize in allergic diseases) use skin tests to determine whether a person has IgE antibodies in the skin that react to a specific allergen. The allergist will use weakened extracts from allergens such as dust mites, pollens, or molds commonly found in the local area. The extract of each kind of allergen is injected under a person’s skin or is applied to a tiny scratch or puncture made on the arm or back.

Skin tests are one way of measuring the level of IgE antibody in a person. With a positive reaction, a small, raised, reddened area, called a wheal (hive), with a surrounding flush, called a flare, will appear at the test site. The size of the wheal can give the doctor an important diagnostic clue, but a positive reaction does not prove that a particular allergen is the cause of symptoms. Although such a reaction indicates that IgE antibody to a specific allergen is present, respiratory symptoms do not necessarily result.

Blood tests

Skin testing is the most sensitive and least costly way to identify allergies. People with widespread skin conditions like eczema, however, should not be tested using this method.

There are other diagnostic tests that use a blood sample to detect levels of IgE antibody to a particular allergen. One such blood test is called the radioallergosorbent test (RAST), which can be performed when eczema is present or if a person has taken medicines that interfere with skin testing.

Prevention

Some ways to handle airborne allergies:

1. Avoid the allergen
2. Take medicine
3. Get allergy shots
4. Prevention
5. Avoidance

Pollen and Molds

Complete avoidance of allergenic pollen or mold means moving to a place where the offending substance does not grow and where it is not present in the air. Even this extreme solution may offer only temporary relief because a person sensitive to a specific pollen or mold may develop allergies to new allergens after repeated exposure to them.

For example, people allergic to ragweed may leave their ragweed-ridden communities and relocate to areas where ragweed does not grow, only to develop allergies to other weeds or even to grasses or trees in their new surroundings. Because relocating is not a reliable solution, allergy specialists do not encourage this approach.

There are other ways to reduce exposure to offending pollens:

Remain indoors with the windows closed in the morning, for example, when the outdoor pollen levels are highest. Sunny, windy days can be especially troublesome.

Wear a face mask designed to filter pollen out of the air and keep it from reaching nasal passages, if you must work outdoors.

Take your vacation at the height of the expected pollinating period and choose a location where such exposure would be minimal. Vacationing at the seashore or on a cruise, for example, may be effective retreats for avoiding pollen allergies.

House Dust

If you have dust mite allergy, pay careful attention to dust-proofing your bedroom. The worst things to have in the bedroom are:

- Wall-to-wall carpet
- Blinds
- Down-filled blankets
- Feather pillows
- Stuffed animals
- Heating vents with forced hot air
- Dogs and cats
- Closets full of clothing
- Carpets trap dust and make dust control impossible.
- Shag carpets are the worst type of carpet for people who are sensitive to dust mites.
- Vacuuming doesn't get rid of dust mite proteins in furniture and carpeting, but redistributes them back into the room, unless the vacuum has a special HEPA (high-efficiency particulate air) filter.
- Rugs on concrete floors encourage dust mite growth

If possible, replace wall-to-wall carpets with washable throw rugs over hardwood, tile, or linoleum floors, and wash the rugs frequently.

Reducing the amount of dust mites in your home may mean new cleaning techniques as well as some changes in furnishings to eliminate dust collectors. Water is often the secret to effective dust removal.

Clean washable items, including throw rugs, often, using water hotter than 130 degrees Fahrenheit. Lower temperatures will not kill dust mites.

Clean washable items at a commercial establishment that uses high water temperature, if you cannot or do not want to set water temperature in your home at 130 degrees. (There is a danger of getting scalded if the water is more than 120 degrees.)

Dust frequently with a damp cloth or oiled mop.

Pets

If you or your child is allergic to furry pets, especially cats, the best way to avoid allergic reactions is to find them another home. If you are like most people who are attached to their pets, that is usually not a desirable option. There are ways, however, to help lower the levels of animal allergens in the air, which may reduce allergic reactions.

- Bathe your cat weekly and brush it more frequently (ideally, a non-allergic person should do this).
- Keep cats out of your bedroom.
- Remove carpets and soft furnishings, which collect animal allergens.
- Use a vacuum cleaner and room air cleaners with HEPA filters.
- Wear a face mask while house and cat cleaning.

Chemicals

Irritants such as chemicals can worsen airborne allergy symptoms, and you should avoid them as much as possible. For example, if you have pollen allergy, avoid unnecessary exposure to irritants such as insect sprays, tobacco smoke, air pollution, and fresh tar or paint during periods of high pollen levels.

Air Conditioners and Filters

When possible, use air conditioners inside your home or car to help prevent pollen and mold allergens from entering. Various types of air-filtering devices made with fiberglass or electrically charged plates may help reduce allergens produced in the home. You can add these to your present heating and cooling system. In addition, portable devices that can be used in individual rooms are especially helpful in reducing animal allergens.

An allergist can suggest which kind of filter is best for your home. Before buying a filtering device, rent one and use it in a closed room (the bedroom, for instance) for a month or two to see whether your allergy symptoms diminish. The airflow should be sufficient to exchange the air in the room five or six times per hour. Therefore, the size and efficiency of the filtering device should be determined in part by the size of the room.

You should be wary of exaggerated claims for appliances that cannot really clean the air. Very small air cleaners cannot remove dust and pollen. No air purifier can prevent viral or bacterial diseases such as the flu, pneumonia, or tuberculosis.

Before buying an electrostatic precipitator, you should compare the machine's ozone output with Federal standards. Ozone can irritate the noses and airways of people with allergies, especially those with asthma, and can increase their allergy symptoms. Other kinds of air filters, such as HEPA filters, do not release ozone into the air. HEPA filters, however, require adequate air flow to force air through them.

Treatment

Medicines

If you cannot adequately avoid airborne allergens, your symptoms often can be controlled by medicines. You can buy medicines without a prescription that can relieve allergy symptoms. If, however, they don't give you relief or they cause unwanted side effects such as sleepiness, your health care provider can prescribe antihistamines and topical nasal steroids. You can use either medicine alone or together.

Antihistamines

As the name indicates, an antihistamine counters the effects of histamine, which is released by the mast cells in your body's tissues and contributes to your allergy symptoms. For many years, antihistamines have proven useful in relieving itching in the nose and eyes; sneezing; and in reducing nasal swelling and drainage.

Many people who take antihistamines have some distressing side effects such as drowsiness and loss of alertness and coordination. Adults may interpret such reactions in children as behavior problems.

Antihistamines that cause fewer of these side effects are available over-the-counter or by prescription. These non-sedating antihistamines are as effective as other antihistamines in preventing histamine-induced symptoms, but most do so without causing sleepiness.

Topical Nasal Steroids

You should not confuse topical nasal steroids with anabolic steroids, which athletes sometimes use to enlarge muscle mass and which can have serious side effects. The chemicals in nasal steroids are different from those in anabolic steroids.

Topical nasal steroids are anti-inflammatory medicines that stop the allergic reaction. In addition to other helpful actions, they decrease the number of mast cells in the nose and reduce mucus secretion and nasal swelling. The combination of antihistamines and nasal steroids is a very effective way to treat allergic rhinitis, especially if you have moderate or severe allergic rhinitis. Although topical nasal steroids can have side effects, they are safe when used at recommended doses.

Cromolyn Sodium

Cromolyn sodium is a nasal spray that in some people helps prevent allergic rhinitis from starting. When used as a nasal spray, it can safely stop the release of chemicals like histamine from mast cells. It has few side effects when used as directed and significantly helps some people manage their allergies.

Decongestants

Sometimes helping the nasal passages to drain away mucus will help relieve symptoms such as congestion, swelling, excess secretions, and discomfort in the sinus areas that can be caused by nasal allergies. Your doctor may recommend using oral or nasal decongestants to reduce congestion along with an antihistamine to control allergic symptoms.

You should not, however, use over-the-counter or prescription decongestant nose drops and sprays for more than a few days. When used for longer periods, these medicines can lead to even more congestion and swelling of the nasal passages. Because of recent concern about the bad effects of decongestant sprays and drops, some have been removed from store shelves.

Immunotherapy

Immunotherapy, or a series of allergy shots, is the only available treatment that has a chance of reducing your allergy symptoms over a longer period of time. You would receive subcutaneous (under the skin) injections of increasing concentrations of the allergen(s) to which you are sensitive. These injections reduce the level of IgE antibodies in the blood and cause the body to make a protective antibody called IgG.

About 85 percent of people with allergic rhinitis will see their hay fever symptoms and need for medicines drop significantly within 12 months of starting immunotherapy. Those who benefit from allergy shots may continue it for 3 years and then consider stopping. While many are able to stop the injections with good results lasting for several years, others do get worse after the shots are stopped.

One research study shows that children treated for allergic rhinitis with immunotherapy were less likely to develop asthma. Researchers need to study this further, however. As researchers produce better allergens for immunotherapy, this technique will be become an even more effective treatment.

Allergy Research

Research on allergies is focused on understanding what happens to the human body during the allergic process— the sequence of events leading to the allergic response and the factors responsible for allergic diseases.

Scientists supported by NIAID found that, during the first years of their lives, children raised in a house with two or more dogs or cats may be less likely to develop allergic

diseases as compared with children raised without pets. The striking finding here is that high pet exposure early in life appears to protect some children from not only pet allergy but also other types of common allergies, such as allergy to house dust mites, ragweed, and grass. This new finding is changing the way scientists think about pet exposure. Scientists must now figure out how pet exposure causes a general shift of the immune system away from an allergic response.

The results of this and a number of other studies suggest that bacteria carried by pets may be responsible for holding back the immune system's allergic response. These bacteria release molecules called endotoxin. Some researchers think endotoxin is the molecule responsible for shifting the developing immune system away from responding to allergens through a class of lymphocytes called Th-2 cells. (These cells are associated with allergic reactions.) Instead, endotoxin may stimulate the immune system to block allergic reactions.

If scientists can find out exactly what it is about pets or the bacteria they carry that prevents the allergic response, they might be able to develop a new allergy treatment.

Some studies are seeking better ways to diagnose as well as treat people with allergic diseases and to better understand the factors that regulate IgE production to reduce the allergic response. Several research institutions are focusing on ways to influence the cells that participate in the allergic response.

NIAID supports a network of Asthma, Allergic and Immunologic Diseases Cooperative Research Centers throughout the United States. The centers encourage close coordination among scientists studying basic and clinical immunology, genetics, biochemistry, pharmacology, and environmental science. This interdisciplinary approach helps move research knowledge as quickly as possible from the lab into the hands of doctors and their allergy patients.

Educating patients and health care providers is an important tool in controlling allergic diseases. All of these research centers conduct and evaluate education programs focused on methods to control allergic diseases.

Since 1991, researchers participating in NIAID’s Inner-City Asthma Study have been examining ways to treat asthma in minority children living in inner-city environments. Asthma, a major cause of illness and hospitalizations among these children, is provoked by a number of possible factors, including allergies to airborne substances.

The success of NIAID’s model asthma program led the U.S. Centers for Disease Control and Prevention to award grants to help community-based health organizations throughout the United States implement the program.

Based on the success of the first National Cooperative Inner-City Asthma Study, NIAID and the National Institute of Environmental Health Sciences, also part of NIH, started a second cooperative multicenter study in 1996. This study recruited children with asthma, aged 4 to 11, to test the effectiveness of two interventions. One intervention uses a novel communication and doctor education system. Information about the children’s asthma severity is provided to their primary care physicians, with the intent that this information will help the doctors give the children the best care possible.

The other intervention involves educating families about reducing exposure to passive cigarette smoke and to indoor allergens, including cockroach, house dust mite, and mold. Researchers are assessing the effectiveness of both interventions by evaluating their capacity to reduce the severity of asthma in these children.

Early data show that by reducing allergen levels in children's beds by one-third, investigators reduced by nearly one-quarter (22 percent) both the number of days the children wheezed and the number of days the children missed school.

Although several factors provoke allergic responses, scientists know that heredity plays a major role in determining who will develop an allergy. Therefore, scientists are trying to identify and describe the genes that make a person susceptible to allergic diseases.

Because researchers are becoming increasingly aware of the role of environmental factors in allergies, they are evaluating ways to control environmental exposures to allergens and pollutants to prevent allergic disease. These studies offer the promise of improving the treatment and control of allergic diseases and the hope that one day allergic diseases will be preventable.

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Glossary

Allergen—substance that causes an allergic reaction

Allergenic—describes a substance which produces an allergic reaction

Antibody—molecule tailor-made by the immune system to lock onto and destroy specific germs

Basophils—white blood cells that contribute to inflammatory reactions

Conjunctivitis—inflammation of the lining of the eyelid, causing red-rimmed, swollen eyes, and crusting of the eyelids

Genes—units of genetic material that carry the directions a cell uses to perform a specific function

Granules—small particles; in cells the particles typically include enzymes and other chemicals

Immune system—a complex network of specialized cells, tissues, and organs that defends the body against attacks by disease-causing organisms

Inflammation—an immune system process that stops the progression of disease-causing organisms

Lymphocytes—small white blood cells which are important parts of the immune system

Mast Cells—granule-containing cells found in tissue

Molecules—the building blocks of a cell. Some examples are proteins, fats, and carbohydrates organism—an individual living thing perennial—describes something that occurs throughout the year

Rhinitis—inflammation of the nasal passages, which can cause a runny nose sinuses—hollow air spaces located within the bones
of the skull surrounding the nose

Sputum—matter ejected from the lungs and windpipe through the mouth tissues—groups of similar cells joined to perform the
same function upper respiratory tract—area of the body which includes the nasal passages, mouth, and throat

More Information

U.S. Environmental Protection Agency Indoor Air Quality Information Clearinghouse
P.O. Box 37133 Washington, D.C. 20013-7133
1-800-438-4318 or 703-356-4020
www.epa.gov

Allergy and Asthma Network/Mothers of Asthmatics, Inc.
2751 Prosperity Avenue, Suite 150 Fairfax, Virginia 22031
1-800-878-4403
www.aanma.org

American Academy of Allergy, Asthma & Immunology
611 East Wells Street Milwaukee, Wisconsin 53202
1-800-822-ASMA (1-800-822-2762)
www.aaaai.org

American College of Allergy, Asthma & Immunology
85 W. Algonquin Road, Suite 550 Arlington Heights, Illinois 60005
1-800-842-7777
www.acaai.org

Asthma and Allergy Foundation of America
1233 20th Street, NW, Suite 402 Washington, D.C. 20036
1-800-7-ASTHMA (1-800-727-8462) or 202-466-7643
www.aafa.org

National Allergy Bureau (pollen information)
1-800-9-POLLEN (1-800-976-5536)
www.aaaai.org/nab