



# Eczema and Atopic Dermatitis

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## Defining Atopic Dermatitis

Atopic dermatitis is a chronic (long-lasting) disease that affects the skin. The word “dermatitis” means inflammation of the skin. “Atopic” refers to a group of diseases that are hereditary (that is, run in families) and often occur together, including asthma, allergies such as hay fever, and atopic dermatitis. In atopic dermatitis, the skin becomes extremely itchy and inflamed, causing redness, swelling, cracking, weeping, crusting, and scaling. Atopic dermatitis most often affects infants and young children, but it can continue into adulthood or first show up later in life. In most cases, there are periods of time when the disease is worse, called exacerbations or flares, followed by periods when the skin improves or clears up entirely, called remissions. Many children with atopic dermatitis will experience a permanent remission of the disease when they get older, although their skin often remains dry and easily irritated. Environmental factors can bring on symptoms of atopic dermatitis at any time in the lives of individuals who have inherited the atopic disease trait.

Atopic dermatitis is often referred to as “eczema,” which is a general term for the many types of dermatitis. Atopic dermatitis is the most common of the many types of eczema. Several have very similar symptoms. Types of eczema are described below.

Atopic dermatitis is very common. It affects males and females equally and accounts for 10 to 20 percent of all referrals to dermatologists (doctors who specialize in the care and treatment of skin diseases). Atopic dermatitis occurs most often in infants and children and its onset decreases substantially with age. Scientists estimate that 65 percent of patients develop symptoms in the first year of life, and 90 percent develop symptoms before the age of 5. Onset after age 30 is less common and often occurs after exposure of skin to harsh conditions. People who live in urban areas and in climates with low humidity seem to be at an increased risk for developing atopic dermatitis.

Although it is difficult to identify exactly how many people are affected by atopic dermatitis, an estimated 10 percent of infants and young children experience symptoms of the disease. Roughly 60 percent of these infants continue to have one or more symptoms of atopic dermatitis into adulthood. This means that more than 15 million people in the United States have symptoms of the disease.

The cause of atopic dermatitis is not known, but the disease seems to result from a combination of genetic (hereditary) and environmental factors. Evidence suggests the disease is associated with other so-called atopic disorders such as hay fever and asthma, which many people with atopic dermatitis also have. In addition, many children who outgrow the symptoms of atopic dermatitis go on to develop hay fever or

asthma. Although one disorder does not cause another, they may be related, thereby giving researchers clues to understanding atopic dermatitis.

In the past, doctors thought that atopic dermatitis was caused by an emotional disorder. We now know that emotional factors, such as stress, can make the condition worse, but they do not cause the disease. Also, atopic dermatitis is not contagious; it cannot be passed from one person to another.

## **Types of Eczema (Dermatitis)**

**Atopic dermatitis:** a chronic skin disease characterized by itchy, inflamed skin

**Contact eczema:** a localized reaction that includes redness, itching, and burning where the skin has come into contact with an allergen (an allergy-causing substance) or with an irritant such as an acid, a cleaning agent, or other chemical

**Allergic contact eczema (dermatitis):** a red, itchy, weepy reaction where the skin has come into contact with a substance that the immune system recognizes as foreign, such as poison ivy or certain preservatives in creams and lotions

**Seborrheic eczema:** yellowish, oily, scaly patches of skin on the scalp, face, and occasionally other parts of the body

**Nummular eczema:** coin-shaped patches of irritated skin—most common on the arms, back, buttocks, and lower legs—that may be crusted, scaling, and extremely itchy

**Neurodermatitis:** scaly patches of skin on the head, lower legs, wrists, or forearms caused by a localized itch (such as an insect bite) that becomes intensely irritated when scratched

**Stasis dermatitis:** a skin irritation on the lower legs, generally related to circulatory problems

**Dyshidrotic eczema:** irritation of the skin on the palms of hands and soles of the feet characterized by clear, deep blisters that itch and burn

## **Symptoms of Atopic Dermatitis**

Symptoms vary from person to person. The most common symptoms are dry, itchy skin; cracks behind the ears; and rashes on the cheeks, arms, and legs. The itchy feeling is an important factor in atopic dermatitis, because scratching and rubbing in response to itching worsen the skin inflammation characteristic of this disease. People with atopic dermatitis seem to be more sensitive to itching and feel the need to scratch longer in response. They develop what is referred to as “the itch-scratch cycle”: The extreme itchiness of the skin causes the person to scratch, which in turn worsens the itch, and so on. Itching is particularly a problem during sleep, when conscious control of scratching decreases and the absence of other outside stimuli makes the itchiness more noticeable.

The way the skin is affected by atopic dermatitis can be changed by patterns of scratching and resulting skin infections. Some people with the disease develop red, scaling skin where the immune system in the skin is becoming very activated. Others develop thick and leathery skin as a result of constant scratching and rubbing. This condition is called lichenification. Still others develop papules, or small raised bumps, on their skin. When the papules are scratched, they may open (excoriations) and become crusty and infected. Below is list of common skin features of the disease. These conditions can also be found in people without atopic dermatitis or with other types of skin disorders.

Atopic dermatitis may also affect the skin around the eyes, the eyelids, and the eyebrows and lashes. Scratching and rubbing the eye area can cause the skin to change in appearance. Some people with atopic dermatitis develop an extra fold of skin under their eyes, called an atopic pleat or Dennie-Morgan fold. Other people may have hyperpigmented eyelids, meaning that the skin on their eyelids darkens from inflammation or hay fever (allergic shiners). Patchy eyebrows and eyelashes may also result from scratching or rubbing.

Researchers have noted differences in the skin of people with atopic dermatitis that may contribute to the symptoms of the disease. The epidermis, which is the outermost layer of skin, is divided into two parts: The inner part contains moist, living cells, and the outer part, known as the horny layer or stratum corneum, contains dry, flattened, dead cells. Under normal conditions the stratum corneum acts as a barrier, keeping the rest of the skin from drying out and protecting other layers of skin from damage caused by irritants and infections. When this barrier is damaged, irritants act more intensely on the skin.

The skin of a person with atopic dermatitis loses too much moisture from the epidermal layer, allowing the skin to become very dry and reducing its protective abilities. In addition, the patient's skin is very susceptible to recurring infections, such as staphylococcal and streptococcal bacterial skin infections and warts, herpes simplex, and molluscum contagiosum (skin disorders caused by a virus).

## **Skin Features of Atopic Dermatitis**

**Lichenification:** thick, leathery skin resulting from constant scratching and rubbing

**Papules:** small raised bumps that may open when scratched, becoming crusty and infected

**Ichthyosis:** dry, rectangular scales on the skin

**Keratosis pilaris:** small, rough bumps, generally on the face, upper arms, and thighs

**Hyperlinear palms:** increased number of skin creases on the palms

**Urticaria:** hives (red, raised bumps), often after exposure to an allergen, at the beginning of flares, or after exercise or a hot bath

**Cheilitis:** inflammation of the skin on and around the lips

**Atopic pleat (Dennie-Morgan fold):** an extra fold of skin that develops under the eye

**Hyperpigmented eyelids:** eyelids that have become darker in color from inflammation or hay fever

## **Stages of Atopic Dermatitis**

Atopic dermatitis is more common in infancy and childhood. It affects each child differently, in terms of both onset and severity of symptoms. In infants, atopic dermatitis typically begins around 6 to 12 weeks of age. It may first appear around the cheeks and chin as a patchy facial rash, which can progress to red, scaling, oozing skin. The skin may become infected. Once the infant becomes more mobile and begins crawling, exposed areas such as knees and elbows may also be affected. An infant with atopic dermatitis may be restless and irritable because of the itching and discomfort of the disease. Many infants get better by 18 months of age, although they remain at greater than normal risk for dry skin or hand eczema later in life.

In childhood, the rash tends to occur behind the knees and inside the elbows; on the sides of the neck; and on the wrists, ankles, and hands. Often, the rash begins with papules that become hard and scaly when scratched. The skin around the lips may be inflamed, and constant licking of the area may lead to small, painful cracks in the skin around the mouth. Severe cases of atopic dermatitis may affect growth, and the child may be shorter than average.

The disease may go into remission. The length of a remission varies, and it may last months or even years. In some children, the disease gets better for a long time only to come back at the onset of puberty when hormones, stress, and the use of irritating skin care products or cosmetics may cause the disease to flare.

Although a number of people who developed atopic dermatitis as children also experience symptoms as adults, it is unusual (but possible) for the disease to show up first in adulthood. The pattern in adults is similar to that seen in children; that is, the disease may be widespread or limited to a more restricted form. In some adults, only the hands or feet may be affected and become dry, itchy, red, and cracked. Sleep patterns and work performance may be affected, and long-term use of medications to treat the atopic dermatitis may cause complications. Adults with atopic dermatitis also have a predisposition toward irritant contact dermatitis, especially if they are in occupations involving frequent hand wetting or hand washing or exposure to chemicals. Some people develop a rash around their nipples. These localized symptoms are difficult to treat, and people often do not tell their doctor because of modesty or embarrassment.

## **Diagnosing Atopic Dermatitis**

Currently, there is no test to diagnose atopic dermatitis and no single symptom or feature used to identify the disease. Each patient experiences a unique combination of symptoms, and the symptoms and severity of the disease may vary over time. The doctor will base his or her diagnosis on the symptoms the patient experiences and may need to see the patient several times to make an accurate diagnosis. It is important for the doctor to rule out other diseases and conditions that might cause skin irritation.

Several tools help the doctor better understand a patient's symptoms and their possible causes. The most valuable diagnostic tool is a thorough medical history, which provides important clues. The doctor may ask about family history of allergic disease; whether the patient also has diseases such as hay fever or asthma; and about exposure to irritants, sleep disturbances, any foods that seem to be related to skin flares, previous treatments for skin-related symptoms, use of steroids, and the effect of symptoms on schoolwork, career, or social life. Sometimes it is necessary to do a biopsy of the skin or patch testing to see if the skin immune system overreacts to certain chemicals or preservatives in skin creams. A preliminary diagnosis of atopic dermatitis can be made if the patient has three or more features from each of two categories: major features and minor features. Some of these features are listed below.

Skin scratch/prick tests (scratching or pricking the skin with a needle that contains a small amount of a suspected allergen) and blood tests for airborne allergens generally are not as useful in the diagnosis of atopic dermatitis as a medical history and careful observation of symptoms. However, they may occasionally help the doctor rule out or confirm a specific allergen that might be considered important in diagnosis. Although negative results on skin tests are reliable and may help rule out the possibility that certain substances cause skin inflammation in the patient, positive skin scratch/prick test results are difficult to interpret in people with atopic dermatitis and are often inaccurate. Blood tests, including measurements of certain antibodies to allergens, are not recommended in most cases because they have a high rate of false positives and are expensive. In some cases, where the type of dermatitis is unclear, blood tests to check the level of eosinophils (a type of white blood cell) or IgE (an antibody whose levels are often high in atopic dermatitis) are helpful.

## **Major and Minor Features of Atopic Dermatitis**

### Major Features

Intense itching

Characteristic rash in locations typical of the disease

Chronic or repeatedly occurring symptoms

Personal or family history of atopic disorders (eczema, hay fever, asthma)

### Some Minor Features

Early age of onset

Dry, rough skin

High levels of immunoglobulin E (IgE), an antibody, in the blood

Ichthyosis

Hyperlinear palms

Keratosis pilaris

Hand or foot dermatitis

Cheilitis

Nipple eczema

Susceptibility to skin infection

Positive allergy skin tests

## **Exacerbating Factors**

Many factors or conditions can make symptoms of atopic dermatitis worse, further triggering the already overactive immune system in the skin, aggravating the itch-scratch cycle, and increasing damage to the skin. These exacerbating factors can be broken down into two main categories: irritants and allergens. Emotional factors and some infections can also influence atopic dermatitis.

Irritants are substances that directly affect the skin and, when used in high enough concentrations with long enough contact, cause the skin to become red and itchy or to burn. Specific irritants affect people with atopic dermatitis to different degrees. Over time, many patients and their families learn to identify the irritants most troublesome to them. For example, wool or synthetic fibers may affect some patients. Also, rough or poorly fitting clothing can rub the skin, trigger inflammation, and cause the itch-scratch cycle to begin. Soaps and detergents may have a drying effect and worsen itching, and some perfumes and cosmetics may irritate the skin. Exposure to certain substances, such as chlorine, mineral oil, or solvents, or to irritants, such as dust or sand, may also make the condition worse. Cigarette smoke may irritate the

eyelids. Because irritants vary from one person to another, each person has to determine for himself or herself what substances or circumstances cause the disease to flare.

#### Common Irritants

Wool or synthetic fibers

Soaps and detergents

Some perfumes and cosmetics

Substances such as chlorine, mineral oil, or solvents

Dust or sand

Cigarette smoke

Allergens are substances from foods, plants, or animals that inflame the skin because the immune system overreacts to the substance. Inflammation occurs even when the person is exposed to small amounts of the substance for a limited time. Some examples of allergens are pollen and dog or cat dander (tiny particles from the animal's skin or hair). When people with atopic dermatitis come into contact with an irritant or allergen they are sensitive to, inflammation-producing cells come into the skin from elsewhere in the body. These cells release chemicals that cause itching and redness. As the person scratches and rubs the skin in response, further damage occurs.

Some doctors and scientists believe that certain foods act as allergens and may trigger atopic dermatitis or cause it to become worse. Other researchers think that food allergens play a role in only a limited number of cases of atopic dermatitis, primarily in infants and children. An allergic reaction to food can cause skin inflammation (generally hives), gastrointestinal symptoms (vomiting, diarrhea), upper respiratory tract symptoms (congestion, sneezing), and wheezing. The most common allergenic (allergy-causing) foods are eggs, peanuts, milk, fish, soy products, and wheat. Although the data remain inconclusive, some studies suggest that mothers of children with a family history of atopic diseases should avoid eating commonly allergenic foods themselves during late pregnancy and (if breast feeding) while they are breast feeding the baby. Although not all researchers agree, some think that breast feeding the infant for at least 4 months may have a protective effect for the child.

Currently, no reliable laboratory test identifies a food allergy, including skin or blood tests. If a food allergy is suspected, it may be helpful to keep a careful diary of everything the patient eats, noting any reactions. Identifying the food allergen may be difficult if the patient is also being exposed to other allergens, and may require supervision by an allergist. One helpful way to explore the possibility of a food allergy is to eliminate the suspected food and then, if improvement is noticed, reintroduce it into the diet under carefully controlled conditions. If this causes no symptoms or if there has been no improvement in 2 weeks of eliminating that food, other foods may be eliminated in turn.

Changing the diet of a person who has atopic dermatitis may not always relieve symptoms. A change may be helpful, however, when a patient's medical history and specific symptoms strongly suggest a food allergy. It is up to the patient and his or her family and physician to judge whether the dietary restrictions outweigh the impact of the disease itself. Restricted diets often are emotionally and financially difficult for patients and their families to follow. Unless properly monitored, diets with many restrictions can also contribute to nutritional problems in children.

Other types of allergens called aeroallergens (because they are present in the air) may also play a role in atopic dermatitis. Common aeroallergens are dust mites, pollens, molds, and dander from animal hair or skin. These aeroallergens, particularly the house dust mite, may worsen the symptoms of atopic dermatitis

in some people. Although some researchers think that aeroallergens are an important contributing factor to atopic dermatitis, others do not think that they are significant. Scientists also don't understand the way aeroallergens affect the skin—whether the aeroallergen is inhaled by the patient or the aeroallergen actually penetrates the patient's skin.

No reliable test is available that determines whether a specific aeroallergen is an exacerbating factor in any given individual. If the doctor suspects that an aeroallergen is contributing to the symptoms a person is experiencing, the doctor may recommend ways to reduce exposure to the aeroallergen. For example, the presence of the house dust mite can be limited by encasing mattresses and pillows in special dust-proof covers, frequently washing bedding in hot water, and removing carpeting. However, there is no way to completely rid the environment of aeroallergens.

In addition to irritants and allergens, other factors—such as emotional issues, temperature and climate, and skin infections—play a role in atopic dermatitis. Although the disease itself is not caused by emotional factors or personality, it can be made worse by stress, anger, and frustration. Interpersonal problems or major life changes, such as divorce, job changes, or the death of a loved one, can also make the disease worse. Often, emotional stress seems to trigger a flare of the disease.

Bathing without proper moisturizing afterward is a common factor that triggers a flare of atopic dermatitis. The low humidity of winter or the dry year-round climate of some geographic areas can make the disease worse, as can overheated indoor areas and long or hot baths and showers. Alternately sweating and chilling can trigger a flare in some people. Bacterial infections can also trigger or increase the severity of atopic dermatitis. If a patient experiences a sudden flare of illness, the doctor may check for a viral infection (such as herpes simplex) or fungal infection (such as ringworm or athlete's foot).

## **Treating Atopic Dermatitis**

Treatment involves a partnership among the patient, family members, and doctor. The doctor will suggest a treatment plan based on the patient's age, symptoms, and general health. The patient and the patient's family play a large role in the success of the treatment plan by carefully following the doctor's instructions. Some of the primary components of treatment programs are described below. Most patients can be successfully treated with proper skin care and lifestyle changes and do not require the more intensive treatments discussed.

The doctor has three main goals in treating atopic dermatitis: healing the skin and keeping it healthy, preventing flares, and treating symptoms when they do occur. Much of caring for the skin and preventing flares has to do with developing skin care routines, identifying exacerbating factors, and avoiding circumstances that trigger the skin's immune system and the itch-scratch cycle. It is important for the patient and his or her family to note any changes in skin condition in response to treatment, and to be persistent in identifying the most effective treatment strategy.

**Skin Care:** Healing the skin and keeping it healthy are of primary importance as part of both preventing further damage and enhancing quality of life. Developing and sticking with a daily skin care routine is critical to preventing flares. Key factors are proper bathing and the application of lubricants, such as creams or ointments, within 3 minutes of bathing. People with atopic dermatitis should avoid hot or long (more than 10 to 15 minutes) baths and showers. A lukewarm bath helps to cleanse and moisturize the skin without drying it excessively. Because soaps can be drying to the skin, the doctor may recommend limited use of a mild bar soap or nonsoap cleanser. Bath oils are not usually helpful.

Once the bath is finished, the patient should air-dry the skin, or pat it dry gently (avoiding rubbing or brisk drying), and apply a lubricant immediately. Lubrication restores the skin's moisture, increases the rate of healing, and establishes a barrier against further drying and irritation. Several kinds of lubricants can be used. Lotions have a high water or alcohol content and evaporate more quickly, so they generally are not

the best choice. Creams and ointments work better at healing the skin. Tar preparations can be very helpful in healing very dry, lichenified areas. Whatever preparation is chosen, it should be as free of fragrances and chemicals as possible.

Another key to protecting and restoring the skin is taking steps to avoid repeated skin infections. Although it may not be possible to avoid infection altogether, the effect of an infection may be minimized if it is identified and treated early. People with atopic dermatitis and their families should learn to recognize signs of skin infections, including tiny pustules (pus-filled bumps) on arms and legs, appearance of oozing areas, or crusty yellow blisters. If symptoms of a skin infection develop, the doctor should be consulted and treatment should begin as soon as possible.

#### Treating Atopic Dermatitis in Infants and Children

Give brief, lukewarm baths.

Apply lubricant immediately following the bath.

Keep child's fingernails filed short.

Select soft cotton fabrics when choosing clothing.

Consider using antihistamines to reduce scratching at night.

Keep the child cool; avoid situations where overheating occurs.

Learn to recognize skin infections and seek treatment promptly.

Attempt to distract the child with activities to keep him or her from scratching.

**Medications and Phototherapy:** If a flare of atopic dermatitis does occur, several methods can be used to treat the symptoms. The doctor will select a treatment according to the age of the patient and the severity of the symptoms. With proper treatment, most symptoms can be brought under control within 3 weeks. If symptoms fail to respond, this may be due to a flare that is stronger than the medication can handle, a treatment program that is not fully effective for a particular individual, or the presence of trigger factors that were not addressed in the initial treatment program. These factors can include a reaction to a medication, infection, or emotional stress. Continued symptoms may also occur because the patient is not following the treatment program instructions.

Corticosteroid creams and ointments are the most frequently used treatment. Sometimes over-the-counter preparations are used, but in many cases the doctor will prescribe a stronger corticosteroid cream or ointment. The doctor will take into account the patient's age, location of the skin to be treated, severity of the symptoms, and type of preparation (cream or ointment) when prescribing a medication. Sometimes the base used in certain brands of corticosteroid creams and ointments is irritating for a particular patient. Side effects of repeated or long-term use of topical corticosteroids can include thinning of the skin, infections, growth suppression (in children), and stretch marks on the skin.

Some treatments reduce specific symptoms of the disease. Antibiotics to treat skin infections may be applied directly to the skin in an ointment, but are usually more effective when taken by mouth. Certain antihistamines that cause drowsiness can reduce nighttime scratching and allow more restful sleep when taken at bedtime. This effect can be particularly helpful for patients whose nighttime scratching makes the disease worse. If viral or fungal infections are present, the doctor may also prescribe medications to treat those infections.

Phototherapy (treatment with light) that uses ultraviolet A or B light waves, or both together, can be an effective treatment for mild to moderate dermatitis in older children (over 12 years old) and adults. Photochemotherapy, a combination of ultraviolet light therapy and a drug called psoralen, can also be used in cases that are resistant to phototherapy alone. Possible long-term side effects of this treatment include premature skin aging and skin cancer. If the doctor thinks that phototherapy may be useful to treat the symptoms of atopic dermatitis, he or she will use the minimum exposure necessary and monitor the skin carefully.

When other treatments are not effective, the doctor may prescribe systemic corticosteroids: drugs that are taken by mouth or injected into muscle instead of being applied directly to the skin. An example of a commonly prescribed corticosteroid is prednisone. Typically, these medications are used only in resistant cases and only given for short periods of time. The side effects of systemic corticosteroids can include skin damage, thinned or weakened bones, high blood pressure, high blood sugar, infections, and cataracts. It can be dangerous to suddenly stop taking corticosteroids, so it is very important that the doctor and patient work together in changing the corticosteroid dose.

In adults, immunosuppressive drugs, such as cyclosporine, are also used to treat severe cases of atopic dermatitis that have failed to respond to any other forms of therapy. Immunosuppressive drugs restrain the overactive immune system by blocking the production of some immune cells and curbing the action of others. The side effects of cyclosporine can include high blood pressure, nausea, vomiting, kidney problems, headaches, tingling or numbness, and a possible increased risk of cancer and infections. There is a risk of relapse after the drug is stopped. Because of their toxic side effects, systemic corticosteroids and immunosuppressive drugs are used only in severe cases and then for as short a period of time as possible. Patients requiring systemic corticosteroids should be referred to dermatologists or allergists specializing in the care of atopic dermatitis to help identify trigger factors and alternative therapies.

In rare cases, when no other treatments have been successful, the patient may have to be hospitalized. A 5- to 7-day stay in the hospital allows intensive skin care and reduces the patient's exposure to irritants and allergens and the stresses of day-to-day life. Under these conditions, the symptoms usually clear quickly if environmental factors play a role or if the patient is not able to carry out adequate skin care at home.

### **Tips for Working With Your Doctor**

Provide complete, accurate medical information about yourself or your child.

Make a list of your questions and concerns in advance.

Be honest and share your point of view with the doctor.

Ask for clarification or further explanation if you need it.

Talk to other members of the health care team, such as nurses, therapists, or pharmacists.

Don't hesitate to discuss sensitive subjects with your doctor.

Discuss changes to any medical treatment or medications with your doctor before making them.

### **Atopic Dermatitis and Quality of Life**

Despite the symptoms caused by atopic dermatitis, it is possible for people with the disorder to maintain a high quality of life. The key to quality of life lies in education, awareness, and developing a partnership

among patient, family, and doctor. Good communication (see “Tips for Working With Your Doctor”) is essential, both within the family and among the patient, the family, and the doctor. It is important that the doctor provide understandable information about the disease and its symptoms to the patient and family and demonstrate any treatment measures recommended to ensure that they will be properly carried out.

When a child has atopic dermatitis, the entire family may be affected. It is important that families have additional support to help them cope with the stress and frustration associated with the disease. The child may be fussy and difficult, and often is unable to keep from scratching and rubbing the skin. Distracting the child and providing as many activities that keep the hands busy is key, but requires much effort and work on the part of the parents or caregivers. Another issue families face is the social and emotional stress associated with disfigurement caused by atopic dermatitis. The child may face difficulty in school or other social relationships and may need additional support and encouragement from family members.

Adults with atopic dermatitis can enhance their quality of life by caring regularly for their skin and being mindful of other effects of the disease and how to treat them. Adults should develop a skin care regimen as part of their daily routine, which can be adapted as circumstances and skin conditions change. Stress management and relaxation techniques may help decrease the likelihood of flares due to emotional stress. Developing a network of support that includes family, friends, health professionals, and support groups or organizations can be beneficial. Chronic anxiety and depression may be relieved by short-term psychological therapy.

Recognizing the situations when scratching is most likely to occur may also help. For example, many patients find that they scratch more when they are idle, so structured activity that keeps the hands occupied may prevent further damage to the skin. Occupational counseling also may be helpful to identify or change career goals if a job involves contact with irritants or involves frequent hand washing, such as kitchen work or auto mechanics.

### Controlling Atopic Dermatitis

Prevent scratching or rubbing whenever possible.

Protect skin from excessive moisture, irritants, and rough clothing.

Maintain a cool, stable temperature and consistent humidity levels.

Limit exposure to dust, cigarette smoke, pollens, and animal dander.

Recognize and limit emotional stress.

## Current Research

Research on atopic dermatitis is active. Scientists, including some supported by NIAMS and other institutes of NIH, are working to better understand what causes the disease and how it can be managed, treated, and, ultimately, prevented. Some promising avenues of research are described below.

**Genetics:** Although atopic dermatitis runs in families, the role of genetics remains unclear. It does appear that more than one gene is involved in the development of the disease. Researchers suspect that atopic dermatitis may be caused by environmental factors acting in people who are genetically predisposed to the disease.

Research has helped shed light on the patterns of inheritance of atopic dermatitis. Studies show that children are at increased risk for developing the disorder if there is a family history of other atopic disease, such as hay fever or asthma. The risk is significantly higher if both parents have an atopic disease. In

addition, studies of identical twins, who have the exact same genes, show that in an estimated 80 to 90 percent of cases, if one twin has an atopic disease, the other does also. Fraternal (nonidentical) twins, who have only some genes in common, are no more likely than two other people in the general population to both have an atopic disease. These findings suggest that genes play an important role in determining who gets the disease.

**Biochemical Abnormalities:** Scientists suspect that changes in the skin's protective barrier make people with atopic dermatitis more sensitive to irritants. Such people have lower levels of fatty acids (substances that provide moisture and elasticity) in their skin, which causes dryness and reduces the skin's ability to control inflammation.

Other research evidence points to a possible defect in a type of white blood cell called a monocyte. In people with atopic dermatitis, monocytes appear to play a role in the decreased production of an immune system hormone called interferon gamma (IFN-g), which helps regulate allergic reactions. This defect may cause exaggerated immune and inflammatory responses in the blood and tissues of people with atopic dermatitis.

**Faulty Regulation of Immunoglobulin E (IgE):** IgE is a type of antibody that controls the immune system's allergic response. An antibody is a special protein produced by the immune system that recognizes and helps fight and destroy viruses, bacteria, and other foreign substances that invade the body. Normally, IgE is present in very small amounts, but levels are high in 80 to 90 percent of people with atopic dermatitis. Researchers suspect that IgE may play a role in the disease.

In allergic diseases, IgE antibodies are produced in response to different allergens. When an allergen comes into contact with IgE on specialized immune cells, the cells release various chemicals, including histamine. These chemicals cause the symptoms of an allergic reaction, such as wheezing, sneezing, runny eyes, and itching. Scientists originally thought the release of histamine played an important role in the development of atopic dermatitis. However, the release of histamine and other chemicals alone cannot explain the typical longer term symptoms of the disease. Research is underway to identify factors that may explain why too much IgE is produced and how it plays a role in the disease.

**Immune System Imbalance:** Researchers also think that an imbalance in the immune system may contribute to the development of atopic dermatitis. It appears that the part of the immune system responsible for stimulating IgE is overactive, and the part that makes IFN-g and handles skin viral and fungal infections is underactive. Indeed, the skin of people with atopic dermatitis shows increased susceptibility to skin infections. This imbalance appears to result in the skin's inability to prevent dermatitis, or inflammation, even in areas of skin that appear normal.

Hyperactivity of one type of immune cell in the skin, called a Langerhans cell, may be involved in atopic dermatitis. Langerhans cells are responsible for picking up viruses, bacteria, allergens, and other foreign substances that invade the body and delivering them to other cells in the immune defense system. Langerhans cells appear to be hyperactive in the skin of people with atopic diseases. Certain Langerhans cells are particularly potent at activating white blood cells called T cells in atopic skin, which produce proteins that promote allergic response. This function results in an exaggerated response of the skin to tiny amounts of allergens.

**Treatments:** Scientists are also focusing on identifying new treatments for atopic dermatitis, including biologic agents, fatty acid supplements, and new forms of phototherapy. Researchers are working to understand how ultraviolet light affects the skin immune system in healthy and diseased skin. They are also investigating biologic agents, including several aimed at modifying the response of the immune system. A biologic agent is a new type of drug based on molecules that occur naturally in the body. One promising treatment is the use of the proteins IFN- and thymopentin (and similar agents) to reestablish balance in the immune system.

Researchers also continue to look for immunosuppressive drugs that may help treat severe atopic dermatitis. Clinical trials are underway with a drug called FK506, which is applied to the skin rather than

taken orally. Two anti-inflammatory drugs called phosphodiesterase inhibitors, currently in clinical trials, also appear promising as treatments for atopic dermatitis. These drugs affect multiple cells and cell functions and may prove to be an effective alternative to corticosteroids in the treatment of atopic dermatitis. This has resulted in the recent release of two medications in this category of immunomodulators, Protopic and Elidel

### **Hope for the Future**

Although the symptoms of atopic dermatitis can be difficult and uncomfortable, the disease can be successfully managed. People with atopic dermatitis, as well as their families, can lead healthy, normal lives. As scientists learn more about atopic dermatitis and what causes it, they continue to move closer to effective treatments, and perhaps, ultimately, a cure.