

common skin disorders

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There are over 1,000 different ailments of the skin. The most common skin disorders result from allergies and from bacterial, viral, and fungal infections. Less common, but more serious, skin problems include burns and cancers.

Allergies

An allergy, or hypersensitivity, occurs when a normally harmless substance, called an allergen, evokes an inappropriate immune response. It is the reaction of the immune system that causes tissue damage or other symptoms. There are two main types of allergic responses, which are distinguished by how quickly they occur and also by the specific immune response.

An immediate hypersensitivity describes a response (anaphylaxis) that occurs within seconds or minutes after contacting an allergen, such as the allergic response to bee venom, dust, pollen, or certain food items. The primary immune culprits for many immediate hypersensitivities are mast cells and basophils, white blood cells that release histamine and other inflammatory chemicals when specific antibodies on their surface bind to an allergen. Although these chemicals play a beneficial role during an acute inflammation caused by an infection, they are inappropriately released during an immediate hypersensitivity. Histamine causes small blood vessels in the area of exposure to dilate (widen) and become leaky. As a result, the affected region becomes red and swollen in response to increased blood flow and to fluid accumulation in the extracellular matrix. In addition, histamine may make the affected area feel itchy. Thus, histamine is largely responsible for the typical symptoms of anaphylaxis: a runny nose, hives, and watery eyes. Treatment usually includes administration of an antihistamine agent, which blocks histamine production or release.

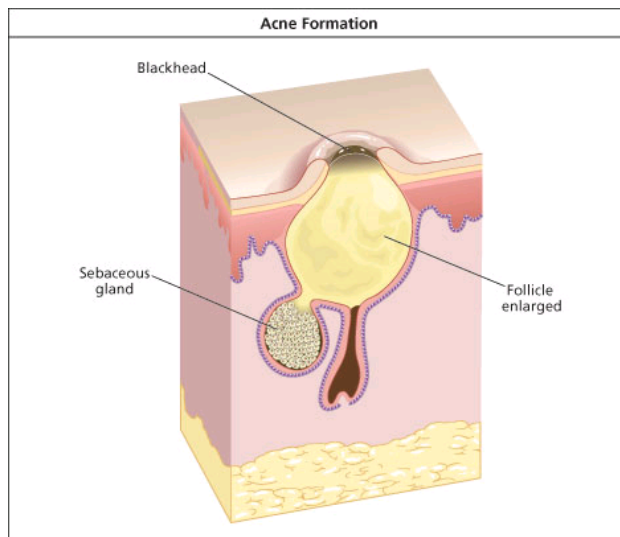
Infections

Skin infections can be caused by bacteria, viruses, and fungi. A fairly common bacterial infection is impetigo, which is characterized by pink, water-filled, raised lesions that develop a yellow crust and eventually rupture. Impetigo is highly contagious and relatively common in young, school-aged children. A bacterial infection of a hair follicle and/or sebaceous glands can cause a boil. The infection can spread to the underlying hypodermis and cause a fair amount of discomfort. Two common fungal skin infections are athlete's foot and ringworm. Both are characterized by an itchy, red, peeling condition and are treated with antifungal agents.

Cold sores, or fever blisters, are small, fluid-filled blisters that itch and sting. They are caused by a *Herpes simplex* viral infection. The virus localizes in a cutaneous nerve, where it remains dormant until activated by emotional upset, fever, or ultraviolet radiation. Cold sores usually occur around the lips and in the soft, moist lining of the mouth. A related *Herpes simplex* virus causes genital herpes, a sexually transmitted disease that can also be spread to the mouth. (Note that measles and mononucleosis are both caused by different types of *Herpes simplex* viruses). Human papilloma viruses stimulate rapid cell division in the stratum basale, which leads to the formation of a wart.

Acne

About four out of five teenagers are afflicted with acne, a skin condition that affects hair follicles and sebaceous glands (see figure below).



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For this reason, acne occurs on areas of the body where oil glands are largest and most numerous: the face, chest, upper back, and shoulders. Adolescents are most prone to acne because sebaceous glands increase both in size and in production of sebum in response to increasing levels of androgens (male sex hormones). Androgens are secreted by endocrine cells in the testes, ovaries, and adrenal glands. Because males generally have higher levels of circulating androgens than females, their acne is typically more severe. However, acne can flare up in women around the time of menstruation, when levels of the hormone progesterone have increased following ovulation.

Acne is essentially an inflammation that results when sebum and dead cells clog the duct of a sebaceous gland in a hair follicle. A follicle obstructed in this manner forms a whitehead. Sometimes, the sebum in plugged follicles oxidizes and mixes with melanin, causing a blackhead to form. The next stage of acne is typically a red, raised bump, often with a white dot of pus in the center. The bump appears when obstructed follicles rupture and spew their contents into the surrounding epidermis. This small infection (a pimple) usually heals in a week or two. However, in severe cases of acne, the rupture of plugged follicles can produce large cysts that extend into the dermis, which may leave a scar when healed.

Contrary to popular belief, acne is not caused by eating certain foods, such as chocolate, pizza, and potato chips (although there are other legitimate health concerns with a diet high in saturated fat and low in fruits and vegetables). In addition, because follicles plug from below, dirt or oil on the skin surface is not responsible for causing acne. Nonetheless, washing the face with warm water will help open plugged follicles. It also turns out that acne has a genetic link. In other words, individuals are more likely to develop acne if their parents had this problem. Finally, acne is more likely to flare up during times of stress, presumably due to stress-induced changes in hormone levels.

Treatment for acne includes some topical agents, which are applied directly to the skin. For example, benzoyl peroxide is commonly used because it is a powerful antibacterial agent that kills bacteria living in hair follicles. Severe cases of acne may require oral medication, such as an antibiotic agent that inhibits bacteria that inhabit follicles.

Skin Cancer

Skin cancer is the most common type of cancer. An important risk factor in developing this disease is overexposure to ultraviolet rays in sunlight. This form of radiation can suppress the immune system, making it more difficult for the body to fight the formation of cancer cells. Ultraviolet radiation also has sufficient energy to alter the structure of DNA, thereby causing mutations. In addition, some cases of chronic irritation of the skin by infections, chemicals, or physical trauma may be risk factors for skin cancer.

Cancer arising in epithelial tissue is called a carcinoma, and it accounts for over 90% of all cancers. These cancers occur most frequently in light-skinned people over the age of forty, especially in those who have been exposed to sunlight on a regular basis, such as farmers, construction workers, and sunbathers. In addition, episodes of severe sunburn during childhood appear to predispose individuals to develop skin cancer many years later. That is why it is important to practice cancer prevention at an early age.

The least malignant and most common form of skin cancer is basal cell carcinoma. In fact, over 30% of Caucasians develop this type of cancer. Basal cell carcinoma originates in the actively dividing cells of the stratum basale, usually in sun-exposed areas of the face. Although it can invade the dermis and hypodermis, it is a slow-growing cancer. Surgical removal is prescribed, and usually provides a full cure if caught before the cancer has spread. Squamous cell carcinoma arises from the keratinocytes of the stratum spinosum, usually on the scalp, ears, lower lip, and hands. It tends to grow rapidly and will metastasize if not removed. However, if caught early and surgically removed, the chance of a complete cure is good.

Cancer of melanocytes is called melanoma. This is the most dangerous form of skin cancer. Melanomas can appear spontaneously or develop from a preexisting mole. They form most

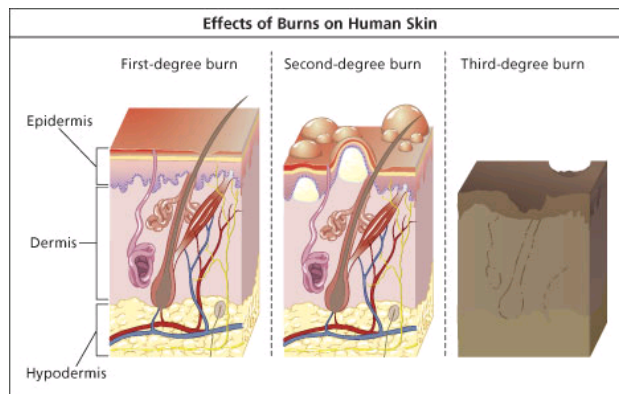
often in light-skinned people who tend to burn rather than tan. In addition, short, intermittent exposure to high-intensity sunlight appears to initiate these growths. For instance, melanomas are less common in people who stay indoors most of the time, but more common in those who occasionally sustain blistering sunburns. This form of cancer metastasizes quickly into lymph and blood vessels. Therefore, the key to survival is early detection. The usual treatment is surgical removal and chemotherapy.

To reduce the chances of developing skin cancer, avoid excessive exposure to ultraviolet light, especially during the midday hours when the sun's rays are at their strongest. Wearing a wide-brimmed hat will help keep sunlight off your face and neck. In addition, use sunscreens that have a sun protection factor (SPF) of at least 15. Keep in mind that ultraviolet rays can pass through clouds, penetrate water up to about 3 feet (about 1 m), and reflect off surfaces such as sand and a patio deck. Further, tanning salons also expose individuals to ultraviolet light, especially to a form of ultraviolet light called UV-A, which has been shown to suppress the immune system. Finally, examine skin regularly for abnormal growths, particularly those that change color, shape, or surface texture.

Burns

A burn refers to tissue damage caused by intense heat, electricity, radiation, or certain chemicals, all of which denature proteins, thereby leading to cell death. The activity of a protein, such as an enzyme, depends on its three-dimensional shape, which is typically held in place by hydrogen bonds. However, these bonds are relatively weak and easily broken by excessive heat. In denaturation, the hydrogen bonds are broken, causing the protein to unfold and lose its ability to function. A protein is said to be denatured when this occurs.

Burns are classified according to the depth to which the tissue damage penetrates (see figure below). First-degree burns are confined to the upper layers of epidermis. The affected area becomes red and swollen. These burns are generally not serious and heal in a few days. A mild sunburn is an example of a first-degree burn.



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Damage from a second-degree burn extends through the epidermis into the upper region of the dermis. As a result, blisters appear. Because sufficient epithelium remains intact, regeneration of skin can occur, and no permanent scars will result if care is taken to prevent infection. Third-degree burns, on the other hand, extend all the way through the epidermis and dermis into underlying subcutaneous tissues. The burned area appears blanched or blackened. Strangely enough, third-degree burns do not hurt initially because nerve endings in the dermis are destroyed. Unfortunately, regeneration of skin is not possible. Therefore, skin grafting is necessary to cover the underlying exposed tissues.

Severe burns, particularly those covering large portions of the body, are life threatening. The immediate concern is loss of body fluids containing proteins and electrolytes (salts), resulting from the loss of an effective waterproof barrier. Sufficient dehydration and electrolyte imbalance may lead to shutdown of the kidneys and also to circulatory shock from inadequate circulation of blood due to a low fluid volume. In this case, fluids must be replaced immediately. In addition, many calories are needed to replace those lost as proteins. Consequently, severe burn patients are given supplementary nutrients through gastric tubes and intravenous lines.

Once fluid volumes have been restored, infection becomes the most important threat. In fact, infection is the leading cause of death in burn victims. Burned skin is sterile for about 24 hours. However, soon thereafter, opportunistic bacteria and fungi easily invade areas where skin has been destroyed. The situation is exacerbated by depression of the immune system, which usually occurs within one or two days after a severe burn.

Birthmarks

It is not uncommon for people to be born with red birthmarks called port wine stains. Their cause is not known; however, they contain an abnormally dense collection of dermal blood vessels, usually on the face or neck. As the body grows, so does the birthmark. In some cases, the mark darkens with age, and it may also develop a bumpy texture due to nodules of blood vessels. Although there is no known health risk associated with birthmarks, there may be a psychological aspect. Laser therapy is often used to remove these blemishes.

Rosacea

Rosacea is characterized by engorgement of blood vessels, especially of the cheeks and nose. The disorder causes persistent flushing of facial skin, which appears red and inflamed and is also marked with whitehead-like bumps and spidery blood vessels. It tends to strike most often in people between the ages of 30 and 50. Although it is more common in women, its symptoms are more acute in men. Untreated, rosacea gradually and painlessly disfigures the skin with patches of swollen veins and clusters of pustules. Those afflicted with rosacea are often given antibiotics. These individuals may also seek laser treatment to destroy swollen blood vessels.

The exact cause of rosacea is unknown. Alcohol consumption and poor hygiene are no longer believed to cause rosacea; however, drinking alcohol, eating spicy foods, emotional stress, and exposure to sunlight may trigger facial flushing, thereby causing symptoms to become worse. Tiny mites (*Demodex folliculorum*) that normally live on the skin may play a role in this disease because people with rosacea tend to have more of these mites on their faces than those who do not have the disease. There may also be a link between rosacea and skin infection with *Helicobacter pylori*, a bacterium that causes stomach ulcers.

Bedsores

Long-term restriction of blood flow to the skin will result in death of cells. If the restriction is severe enough, skin ulcers, or bedsores, will form. This problem is most common in bedridden individuals who are not turned regularly or who are repeatedly dragged across a bed. The weight of body parts puts pressure on the skin, especially over bony projections. Because this restricts blood supply, the skin becomes blanched (pale) at these locations. If the situation is not corrected, cells will eventually die, leading to breaks in the skin at compressed sites. Permanent damage to the superficial blood flow eventually results in degeneration and ulceration of skin.

Connections

The most common skin disorders result from bacterial (impetigo, acne, boils), viral (cold sore, wart), and fungal (ringworm) infections and from allergies. An allergy occurs when a normally harmless substance, an allergen, evokes an inappropriate immune response. An immediate hypersensitivity refers to a response within minutes after contacting an allergen and is caused by inappropriate release of histamine from mast cells. Contact dermatitis, such as from poison ivy, results from release of lymphokines from lymphocytes.

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A burn refers to tissue damage caused by intense heat, electricity, radiation, or certain chemicals, all of which denature proteins, thereby leading to cell death. First-degree burns are confined to the upper layers of epidermis, whereas second-degree burns extend through the epidermis into the upper region of the dermis. Third-degree burns extend all the way through the epidermis and dermis, into underlying subcutaneous tissues. Severe burns can be life threatening because of resulting fluid loss and infection.

Citation Information

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