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Treatment of Skin Disorders

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Topical drugs (drugs applied directly to the skin) are a mainstay of treating skin disorders. Systemic drugs are taken by mouth or given by injection and are distributed throughout the body. Rarely, when a high concentration of a drug is needed at the affected area, a doctor injects the drug just under the skin (intradermal injection).
For certain topical treatments, successful therapy may also depend on

- The vehicle (the inactive ingredient in which the drug is delivered to the skin)
- The type of dressing used

Topical Preparations

The active ingredient, or drug, in a topical preparation is mixed with an inactive ingredient (called the vehicle). The vehicle determines the consistency of the product (for example, thick and greasy or light and watery) and whether the active ingredient remains on the surface or penetrates the skin. Depending on the vehicle used, the same drug can be placed in

- Ointments
- Creams
- Lotions
- Baths and soaks
- Foams
- Solutions
- Powders
- Gels

In addition, many preparations are available in different strengths (concentrations). Choice of vehicle depends on where the drug will be applied, how it will look, and how convenient it is to apply and leave on.
Ointments (such as petroleum jelly) are oily and contain very little water. They can be messy, greasy, and difficult to wash off. Ointments are most appropriate when the skin needs lubrication or moisture. Ointments are usually better than creams at delivering active ingredients into the skin. A given concentration of a drug is more potent in an ointment than in a cream. Ointments are less irritating than creams and much less irritating than gels, lotions, and solutions for open wounds such as erosions or ulcers. Ointments work best when applied after bathing or after dampening the skin with water.
Creams, the most commonly used preparations, are emulsions of oil in water, meaning they are primarily water with an oil component. (An ointment is the opposite, some water mixed mostly with oil.) Creams are easy to apply and appear to vanish when rubbed into the skin. They are relatively nonirritating.
Lotions are similar to creams but contain more water. They are actually suspensions of finely dispersed, powdered material in a base of water or oil and water. They are less effective than ointments, creams, and gels at delivering drugs and are considered of lower potency for a given drug concentration. However, lotions have a number of beneficial effects. They are easy to apply to hairy skin, and they are particularly useful for cooling or drying inflamed or oozing lesions, such as those caused by contact dermatitis, athlete's foot (tinea pedis), or jock itch (tinea cruris).
Baths and soaks are used when treatment must be applied to large areas of the body. This technique is often used in the form of sitz baths for over-the-counter (OTC) treatments of mild skin problems such as hemorrhoids. Baths are not often used to apply potent prescription drugs because of difficulties controlling the amount of drug delivered.
Foams are aerosol preparations (liquids stored under pressure with a propellant so that the mixture can be dispensed) that use a base of alcohol or something soothing to the skin (called an emollient). They are rapidly absorbed into the skin

and are often used in hair-covered areas of the body.

Solutions are liquids in which a drug is dissolved. The most commonly used liquids are alcohol, propylene glycol, polyethylene glycol, and plain water. Solutions are convenient to apply, especially for scalp disorders such as psoriasis or seborrheic dermatitis. Solutions tend to dry rather than moisturize the skin, but this drying effect is useful for wet, oozing (weeping) skin disorders. Depending on the vehicle used, solutions can be irritating to the skin, particularly when those containing alcohol and propylene glycol are applied to open wounds. Two common solutions are Burow solution and Domeboro® solution, which are often used as soaks.

Powders are dried forms of substances that are used to protect areas where skin rubs against skin—for instance, between the toes or buttocks, in the armpits or groin, or under the breasts. Powders are used on skin that has been softened and damaged by moisture (macerated). They may be mixed with active drugs such as antifungals.

Gels are water-based or alcohol-based substances thickened without oil or fat. The skin does not absorb gels as well as it absorbs preparations containing oil or fat. Thus, they are often most effective for conditions that require slow absorption, such as acne, rosacea, and psoriasis of the scalp. Gels tend to be quite irritating on open wounds and diseased skin.

Did You Know...

If doctors need to increase the effect of a topical drug, they prescribe an ointment rather than a cream.

Types of Topical Drugs

Topical drugs can be divided into several overlapping categories:

- Cleansing agents
- Protective agents
- Moisturizing agents (emollients)
- Drying agents
- Anti-itch agents
- Anti-inflammatory agents
- Anti-infective agents
- Keratolytics

Cleansing agents

The principal cleansing agents are soaps, detergents, and solvents (a liquid substance capable of dissolving other substances). Soap is the most popular cleanser, but detergents are used as well. Soaps are cleansing and emulsifying agents containing some type of fat or lye, while detergents are made from petroleum products. Certain soaps dry the skin, but others have a creamy base that is less drying.

Because baby shampoos are excellent cleansing agents and are usually gentle to the skin, they are good for cleansing wounds, cuts, abrasions, and areas around the eyes. Also, people who have psoriasis, eczema, and other scaling diseases can use baby shampoos to wash away dead scaly skin. Oozing lesions, however, should generally be cleansed only with water or gentle soaps because detergents and harsher soaps can irritate the area.

Many chemicals are added to cleansing agents. For example, some soaps have antibacterial substances added to them. In general, antibacterial soap does not improve hygiene or prevent disease, and routine use may disrupt the normal balance of bacteria on the skin. Antidandruff shampoos and lotions may contain zinc pyrithione, selenium sulfide, or tar extracts to help treat flaking skin, eczema, and psoriasis of the scalp.

Water is the main solvent for cleansing. Other solvents include petroleum jelly, which can cleanse the skin of material that cannot be dissolved with soap and water, such as tar. Small amounts of alcohol can safely be used to cleanse the skin before injections or blood drawing. Alcohol gels are useful for routine hand hygiene when handwashing is not possible. Other solvents, such as acetone (nail polish remover), gasoline, and paint thinner, are rarely used for skin cleansing. These solvents dissolve the skin's natural oils, causing significant drying and irritation. They may also be absorbed through the skin, resulting in poisoning.

Protective agents

Many different kinds of preparations help protect the skin. Oils and ointments supply an oil-based barrier that can help protect scraped or irritated skin and retain moisture. Powders may protect skin that rubs against skin or clothing. Synthetic hydrocolloid dressings protect pressure sores (bedsores, decubitus ulcers) and other areas of raw skin. Sunscreens and sunblocks reflect, absorb, or filter out harmful ultraviolet light.

Moisturizing agents (emollients)

Moisturizers restore and help maintain water and oils in the skin. The best time to apply a moisturizer is when the skin is already moistened—immediately after a bath or shower, for instance. Moisturizers typically contain glycerin, mineral oil, or petrolatum and are available as lotions, creams, ointments, and bath oils. Some stronger moisturizers contain compounds such as urea, lactic acid, and glycolic acid. Cold creams are over-the-counter (OTC) emulsions of fats (for example, beeswax) and water.

Drying agents

Excessive moisture in areas where skin rubs against skin can cause irritation and skin breakdown (maceration), particularly in body folds where the environment tends to be warmer and moister. The areas most commonly affected are between the toes or buttocks, in the armpits or groin, and under the breasts and abdominal skin folds. These warm moist areas also provide fertile breeding grounds for infections, especially with fungi and bacteria.

Cornstarch and talcum powder are the most commonly used drying agents. These powders absorb moisture from the skin surface. Most of the many talcum preparations vary only in their scents and packaging. Talcum powder is more effective than cornstarch but is no longer used in baby powders, because it can cause granulomas (a type of chronic inflammation) when inhaled. Using talcum powder in the female genital area is not recommended because of concerns of possible risk of cancer. Cornstarch is a good drying agent but can sometimes lead to fungal infections. Superabsorbent powders (extremely absorbent powders) are occasionally required to dry very moist areas, such as in the groin or armpits.

Solutions containing aluminum salts are drying agents commonly found in OTC antiperspirants. Prescription doses of aluminum salts are available to treat excessive sweating.

Astringents are liquid drying agents that shrink and contract the skin. The most commonly used astringent solutions contain aluminum acetate (Burow solution or Domeboro® solution). Usually applied with dressings or as soaks, astringents are used to treat infectious eczema, oozing skin lesions, and pressure sores. Witch hazel is also a popular OTC astringent.

Anti-itch agents

Skin disease is often accompanied by itching. Itching and mild pain can sometimes be controlled with OTC agents such as camphor, menthol, pramoxine, zinc oxide, or (by prescription in the United States) a lidocaine and prilocaine mixture. Calamine is soothing but may not be effective against itching.

Antihistamines, which block certain types of allergic reactions, are sometimes included in topical preparations to relieve the itching associated with allergic reactions. Doxepin is an effective topical antihistamine for many conditions. Because the antihistamine diphenhydramine (common in many nonprescription topical preparations) can trigger an allergic reaction when applied to the skin, doctors do not usually recommend it. Taking antihistamines by mouth (orally) does not seem to produce this type of skin reaction, so oral rather than topical antihistamines are preferred to relieve itching. Benzocaine, an anesthetic that had been used to relieve itching, can also trigger allergic reactions and so is not recommended.

Anti-inflammatory agents

Corticosteroids are the main topical drugs used to relieve inflammation (swelling, itching, and redness) of the skin. Corticosteroids are most effective for rashes caused by allergic or inflammatory reactions to things such as poison ivy, metals, cloth, drugs, eczema, and many others. Because they lower resistance to bacterial and fungal infections and inhibit wound healing, corticosteroids usually should not be used on infected areas or wounds. For acne-like disorders, topical corticosteroids tend to not work very well and sometimes instead induce an acne-like eruption. Corticosteroids are sometimes mixed with antifungal drugs to help reduce redness and itching while simultaneously eradicating the fungus. Topical corticosteroids are sold as lotions, creams, ointments, solutions, foams, oils, gels, and tape products. Creams are most effective if rubbed in gently until they vanish. In general, ointments have the most potent effect. The type and concentration of corticosteroid in the preparation determines the overall effect. Hydrocortisone is available in concentrations of up to 1% without a prescription (however, concentrations of 0.5% or less offer little benefit). Stronger corticosteroid preparations require a prescription. Doctors usually prescribe potent corticosteroids first, then less potent corticosteroids as the disorder improves. Generally, topical corticosteroids are applied 2 to 3 times a day in a thin layer, but high-potency formulations may be applied only once a day.

Corticosteroids should be used with caution on areas where the skin is thin, such as the face, armpits, and genitals, and on areas of natural skin-to-skin contact, such as the armpits and groin. Doctors usually use low-potency corticosteroids on these sensitive areas for no more than a few days to a week. Prolonged use (more than 1 month) in any area can cause skin breakdown, stretch marks, acne-like eruptions, and sometimes an allergic skin reaction (contact dermatitis) to the corticosteroid itself. Perioral dermatitis (a red, bumpy rash around the mouth and chin) and sometimes periorbital dermatitis (a rash around the eyes) occurs as a side effect more commonly with mid-potency or high-potency formulations used on the face and less commonly with mild formulations. High-potency formulations may inhibit adrenal gland functions when used in children, when used over large areas of skin, or when used for long periods of time, especially if used under occlusive (airtight and watertight) dressings.

When a stronger dose of topical corticosteroid is needed for one spot or a small area that does not respond to treatment, a doctor may inject the corticosteroid just under the skin or occasionally apply plastic tape infused with the corticosteroid flurandrenolide.

Another way to deliver a strong dose is to apply a thin plastic film, such as household plastic wrap, over the topical corticosteroid (occlusive dressing). The plastic film increases the drug's absorption and effectiveness and is usually left on overnight. Such dressings are usually reserved for disorders such as severe psoriasis and eczema. Risks of using corticosteroids under an occlusive dressing include development of prickly heat (miliaria), skin thinning (atrophy), stretch marks (striae), dilated red blood vessels on the surface of the skin (telangiectasias), acne-like eruption, and bacterial or fungal infections.

Several allegedly anti-inflammatory herbal products—among the most popular are chamomile and calendula—are commonly used in commercial products, although their effectiveness has not been well established. Herbal and "natural" products are often not standardized and commonly cause allergic and irritant reactions of the skin.

Tar preparations

These are noncorticosteroid anti-inflammatory agents, which are byproducts of coal manufacturing. They slow skin cell division and are useful in treating disorders that cause excessive skin production (scaling) such as psoriasis. Side effects include irritation, inflammation of follicles (folliculitis), staining of clothes and furniture, and sensitivity to sunlight (photosensitization). They should not be used on infected skin.

Anti-infective agents

Viruses, bacteria, fungi, and parasites can all infect the skin. By far, the best way to prevent such infections is by carefully washing the skin with soap and water. Stronger disinfecting agents are commonly used by nurses and doctors to disinfect their hands to prevent spreading infections to patients. Antibacterial preparations or "preps" are used on the skin before surgery to lower the number of bacteria on the skin and thereby prevent postoperative infections.

Once a skin infection has occurred, it may be treated with topical or systemic drugs depending on the severity and type of infection diagnosed or suspected. Topical anti-infective agents include antibiotics, antifungals, and insecticides.

Topical antibiotics have few uses. Clindamycin and erythromycin are best used as an additional treatment for acne. Topical metronidazole and occasionally topical sulfacetamide, clindamycin, or erythromycin are used for rosacea. Mupirocin and the newer topical antibiotics retapamulin and ozenoxacin can be used to treat impetigo (a staphylococcal infection of the skin).

Nonprescription (over-the-counter) antibiotics such as bacitracin and polymyxin have been replaced by topical petrolatum (for example, Vaseline®) in postoperative care of a skin biopsy site and to prevent infection in scrapes, minor burns, and abrasions. These antibiotics, and especially neomycin, may cause an allergic reaction (contact dermatitis). Petrolatum is as effective as these antibiotics and does not cause such an allergic reaction.

Topical antifungals work quite well for treating a wide variety of fungal infections of the skin (such as ringworm and athlete's foot). However, these topical drugs work poorly for treating fungal infections of the nails. Typically, nail infections are treated with oral antifungals (usually terbinafine), but relapse is very common even when oral drugs are taken.

Insecticides (such as permethrin and malathion) are used to treat lice infestations and scabies.

Nonantibiotic topical antiseptics include iodine solutions (such as povidone iodine and clioquinol), gentian violet, silver preparations (such as silver nitrate and silver sulfadiazine), and zinc pyrithione.

Iodine is used to prepare the skin for surgery. Gentian violet is used when an antiseptic or antimicrobial is needed and must be very inexpensive. Silver preparations (such as silver sulfadiazine) are effective in treating burns and ulcers and have strong antimicrobial properties. Many wound dressings are infused with silver. Zinc pyrithione is an antifungal and a common ingredient in shampoos that treat dandruff caused by psoriasis or seborrheic dermatitis.

Healing wounds should usually not be treated with topical antiseptics other than silver because they are irritating and tend to kill fragile regrowth (granulation tissue).

Keratolytics

Keratolytics are agents that soften and loosen skin cells and ease the flaking and peeling process (exfoliation) of the top layer of skin. Examples include salicylic acid and urea.

Salicylic acid in varying concentrations is used to treat psoriasis, seborrheic dermatitis, acne, and warts. Side effects are common and include burning, irritation, and, if large areas of skin are covered, reactions elsewhere in the body (systemic reactions) caused by absorbing the salicylic acid. Salicylic acid is rarely used in children and infants, who are most susceptible to systemic reactions, except in very low concentrations and for brief periods of time.

Urea can be used to moisturize, soothe itching, and reduce scaling. It is commonly used to treat excessive skin buildup on the soles of the feet (plantar keratodermas and calluses), keratosis pilaris (dry bumps on thighs and back of arms in people with allergies), and severe dry skin (ichthyosis). Side effects are irritation and burning. Urea should not be applied to large areas of skin.

Dressings

Dressings protect open wounds, facilitate healing, increase drug absorption, and protect clothing. There are two kinds of dressings:

Nonocclusive (air can reach the wound)

Occlusive (wounds are covered and sealed from contact with air)

Nonocclusive dressings

The most common nonocclusive dressings are gauze dressings. They allow as much air as possible to reach the wound while the wound is covered, and allow the wound to dry.

Wet-to-dry dressings are nonocclusive dressings wetted with solution, usually saline, that are used to help cleanse and remove (debride) thickened, crusted, or dead tissue. The dressings are applied wet and removed after the solution has dried. The dried materials stick to the dressing.

Occlusive dressings

Occlusive dressings increase the absorption and effectiveness (and side effects) of topical drugs. Transparent impermeable films such as polyethylene (plastic household wrap) or flexible, transparent, semi-permeable dressings are the most common types of occlusive dressings. Zinc oxide gelatin (Unna paste boot) is an effective occlusive dressing for skin inflammation and ulcers of the lower legs (which can occur in stasis dermatitis). Hydrocolloid dressings draw out fluid from the skin and form a gel and are used to speed the healing of skin ulcers.

Occlusive dressings are sometimes applied over corticosteroids for treating severe psoriasis, atopic dermatitis, skin lesions of lupus erythematosus, and chronic hand dermatitis, among other conditions.

Other occlusive dressings are used to protect and help heal burns. Doctors have recently found that other types of open wounds also heal faster and more completely when kept moist and under an occlusive dressing. These dressings help maintain a proper level of moisture and provide a framework on which new skin can regrow. Such dressings include sophisticated commercial products as well as plain petroleum jelly or an antibiotic ointment under a bandage.

Special silicone dressings are sometimes used for keloids.