

Dermatological drugs (topical)

Antifungal drugs

RINGWORM

Benzoic acid and **methyrosanilinium chloride** (gentian violet) solution are inexpensive and effective fungistatic compounds for the treatment of dermatophyte infections such as ringworm. Minor skin lesions due to ringworm can be cleared with repeated applications of **compound benzoic acid** ointment (Whitfield ointment), which combines the fungistatic action of benzoic acid with the keratolytic action of salicylic acid. However, the most effective topical treatment for dermatophyte infections is a cream containing an imidazole such as **miconazole**, which is effective for long-established lesions but is more expensive than compound benzoic acid ointment. Extensive and generalized infections of the skin, nails and scalp should be treated systemically for several weeks with **griseofulvin** or **fluconazole** (see section 6.3).

Scalp ringworm (tinea capitis) typically appears as a patch of scaling alopecia, or a swollen inflammatory area (tinea kerion). Mild forms may remit spontaneously at puberty. Inflamed lesions should be treated systemically with **griseofulvin**. Application of **miconazole** cream may accelerate healing of scaly lesions.

Ringworm on the body (tinea corporis) can also be cleared with **compound benzoic acid** ointment or a topical imidazole such as **miconazole**. In resistant cases a 4-week course of oral **griseofulvin** is required.

Foot ringworm (tinea pedis or athlete's foot) is usually treated topically. **Compound benzoic acid** ointment should be applied twice daily to all infected areas and all toe clefts for at least 4 weeks. Systemic therapy with **griseofulvin** or **fluconazole** may be required if the foot is extensively infected. Tinea pedis commonly recurs and may be treated with miconazole cream. Severe weeping lesions respond to frequent soaking in solutions of 1:10 000 **potassium permanganate**, and systemic antifungals may also be needed.

Nail infections (onychomycosis, tinea unguium) are difficult to treat; fingernails may require 6 months treatment with oral **griseofulvin** and toenails may require 12 months or more of this treatment. Approximately 60% of nail infections either do not respond or relapse after treatment with griseofulvin.

Ringworm of the groin (tinea cruris) is usually limited to the skin of the inner thigh in contact with the scrotum. Flexural eczema, often superinfected with candida or bacteria, occurs in the same site. The latter is frequently treated with combined antifungal/corticosteroid preparations, but must not be treated with a corticosteroid alone, which will worsen the condition. An imidazole cream such as **miconazole** applied daily for 2 weeks is usually effective. Lesions unresponsive to topical preparations can usually be cleared with a 4-week course of **griseofulvin**.

CANDIDOSIS

Candida can infect the oral cavity, the vagina or the skin. Cutaneous lesions tend to occur in patients with diabetes mellitus and some chronic debilitating conditions, including hypoparathyroidism and various congenital disorders of the immune system. The most severe infections of candida are now seen in patients with HIV infection.

Cutaneous candidosis usually responds to **miconazole** cream as a twice daily application. Chronic candida paronychia, which can result ultimately in nail dystrophy, is more difficult to treat. Treatment should be based on determination of the underlying cause and its reduction or elimination; hands and folds of the nail must be kept dry and daily application of an imidazole cream for several months may be required, ensuring penetration of the cleft between the nail plate and the swollen skin around the nail.

PITYRIASIS VERSICOLOR

Pityriasis (tinea) versicolor is caused by a commensal yeast. Application of **sodium thiosulfate** twice daily for 4 weeks is usually effective although areas of depigmentation on darker skins remain after completion of treatment. Relapses can be frequent, however, probably because much of the infected area may appear normal and be left untreated. Better results have been reported with topical applications of **miconazole** or **selenium sulfide** .

Benzoic acid with salicylic acid

Ointment , benzoic acid 6%, salicylic acid 3%

Uses:

mild dermatophyte infections, particularly tinea pedis and tinea corporis

Administration:

Fungal skin infections, *apply* twice daily until the infected skin is shed (usually at least 4 weeks)

Adverse effects:

occasionally localized, mild inflammatory reaction

Miconazole nitrate

Miconazole is a representative topical antifungal. Various drugs can serve as alternatives

Cream , miconazole nitrate 2%

Ointment , miconazole nitrate 2%

Uses:

superficial fungal infections due to dermatophytes and yeasts, and secondary infections caused by Gram-positive cocci, including ringworm, intertrigo, candida napkin rash, paronychia, and pityriasis versicolor

Administration:

Skin infections, *apply* twice daily to clean dry lesions, continuing for at least 10 days after the condition has cleared

Nail infections, *apply* 1–2 times daily

Adverse effects:

occasional local irritation and burning, also contact dermatitis; discontinue if sensitization occurs

Selenium sulfide

Selenium sulfide is a complementary drug for use in rare disorders or in exceptional circumstances

Lotion , selenium sulfide 2.5% [not included on WHO Model List]

Detergent-based suspension (Shampoo), selenium sulfide 2.5%

Uses:

pityriasis versicolor (lotion), seborrhoeic dermatitis (detergent-based suspension)

Contraindications:

children under 5 years

Precautions:

do not apply to damaged skin (risk of systemic toxicity); avoid contact with eyes; do not use within 48 hours of applying preparations for hair colouring, straightening, or permanent waving

Administration:

Pityriasis versicolor, *apply* lotion with a small amount of water to the entire affected area and rinse off after 10 minutes, repeat once daily for 7–14 days; *or apply* undiluted lotion at bedtime and rinse off the following morning, repeat after 3 and 6 days

Seborrhoeic dermatitis, *massage* 5–10 ml of shampoo into wet hair and leave for 2–3 minutes before rinsing thoroughly; repeat twice weekly for 2 weeks, then once weekly for 2 weeks, thereafter only when needed

Note. To minimize absorption, rinse hair thoroughly after use and remove all traces from skin (including nails)

Adverse effects:

local irritation, hair discoloration or loss; absorption may result in systemic toxicity including tremors, weakness, lethargy, pain in lower abdomen, occasional vomiting (symptoms usually resolve within 10 days)

Sodium thiosulfate

Cutaneous solution, sodium thiosulfate 15%

Uses:

pityriasis versicolor; cyanide poisoning (section 4.2.7)

Administration:

Pityriasis versicolor, *apply* twice daily for 4 weeks

Anti-infective (antibacterial) drugs

Staphylococcal infections of the skin such as impetigo, folliculitis, and furunculi and streptococcal infections such as cellulitis and erysipelas are very common where the climate is hot and humid, where standards of hygiene are compromised, and in immunodeficient patients.

In all skin infections, an important part of treatment is cleansing and thorough drying. Washing with soap and water will often help to prevent infection. Light localized infections can often be treated effectively with an antiseptic solution such as **chlorhexidine** (section 15.1). Superficial crusts should be gently washed with soap and water or a weak solution of **aluminium acetate** (section 13.4) or a 0.01% solution of **potassium permanganate**. Infected burns should be treated with **silver sulfadiazine**, which is bactericidal against both Gram-positive and Gram-negative organisms.

An ointment containing 2% mupirocin, which is active against Gram-positive bacteria, is of value, particularly in impetigo. To prevent the development of resistance, mupirocin should not be used for more than 10 days. Topical preparations containing **neomycin** and **bacitracin** are also widely used but these carry a risk of sensitization particularly with continued or repeated use.

Topical use of preparations containing antimicrobials which are widely used systemically should be avoided. These include penicillins, sulfonamides, streptomycin and gentamicin, which should be reserved for the systemic treatment of infections because of the possibility of inducing sensitivity and favouring the emergence of resistant organisms. Only widespread superficial or deep-seated infections associated with fever require treatment with a systemic antibiotic (sections 6.2.1 and 6.2.2).

Whenever possible, the choice of an antimicrobial should be based on the results of sensitivity tests.

Methylrosanilinium chloride

Gentian violet; Crystal violet

Methylrosanilinium chloride is a representative topical anti-infective drug. Various drugs can serve as alternatives

Cutaneous solution, methylrosanilinium chloride 0.5%

Tincture, methylrosanilinium chloride 0.5%

Uses:

superficial fungal and bacterial infections

Contraindications:

excoriated or ulcerated lesions, broken skin, mucous membranes

Administration:

Skin infections, *apply* 2 or 3 times daily for 2–3 days

Adverse effects:

severe irritation (discontinue treatment); temporary staining of skin, permanent staining of fabrics; *animal* carcinogenicity (restricted use in some countries)

Potassium permanganate

Cutaneous solution, potassium permanganate 1:10 000 (0.01% solution)

Note. Potassium permanganate is sometimes supplied as an aqueous stock solution of 1 in 1000 (0.1%) for dilution before use

Uses:

wet dressings to assist healing of suppurating superficial wounds, tropical ulcers, tinea pedis, pemphigus, impetigo

Contraindications:

avoid occlusive dressings

Precautions:

irritant to mucous membranes

Administration:

Suppurating superficial wounds and tropical ulcers, wet dressings of 1:10 000 (0.01%) solution, changed 2 or 3 times daily; tropical ulcers also require treatment for 2–4 weeks with procaine benzylpenicillin (section 6.2.1.1)

Tinea pedis, soak severe weeping lesions in 1:10 000 (0.01%) solution every 8 hours

Pemphigus, soak compresses in 1:10 000 (0.01%) solution and apply every 4 hours

Impetigo, superficial crusts should be gently separated with a 1:10 000 (0.01%) solution

Adverse effects:

local irritation; skin and fabrics stained brown

Neomycin with bacitracin

Bacitracin is a representative topical antibacterial. Various drugs can serve as alternatives

Ointment, neomycin sulfate 5 mg, bacitracin zinc 500 units/g

Uses:

superficial bacterial infections of the skin due to staphylococci and streptococci

Precautions:

avoid application to substantial areas of skin or to broken skin (risk of significant systemic absorption); overgrowth of resistant organisms on prolonged use

Administration:

Bacterial skin infections, **adult** and **child** over 2 years *apply* thin layer 3 times daily

Adverse effects:

sensitization, especially to neomycin, causing reddening and scaling; anaphylaxis reported rarely; systemic absorption leading to irreversible ototoxicity, particularly in children, the elderly, and in renal impairment

Silver sulfadiazine

Cream, silver sulfadiazine 1%

Uses:

prophylaxis and treatment of infection in burns

Contraindications:

hypersensitivity to sulfonamides; pregnancy (Appendix 2); neonates

Precautions:

renal or hepatic impairment; G6PD deficiency; breastfeeding (Appendix 3)

Administration:

Infection in burns, *apply* using aseptic technique daily (more frequently if volume of exudate is large) whilst there is a possibility of infection, or until healing is complete

Adverse effects:

allergic reactions include rashes, burning and itching; argyria and sulfonamide-induced systemic toxicity, including blood disorders following application to large areas or prolonged use; transient leukopenia reported

Anti-inflammatory and antipruritic drugs**CONTACT DERMATITIS**

Contact dermatitis can result from an allergic or irritant skin reaction. Removal of the substance provoking the reaction is the first step in treating this condition. Mild cases of contact dermatitis can be treated with topical **hydrocortisone** which suppresses inflammation. A short course of oral prednisolone or a topical corticosteroid such as **betamethasone** should be considered for more severe cases and for suppression of severe acute reactions associated with blistering, exudation and oedema. Soaking in clean water or mild saline solution is recommended in the acute stages of severe dermatitis.

PRURITUS

Pruritus or itching is a common symptom of many skin diseases. However, contact with certain substances, conditions that dry the skin, stress, and extremes of temperature may also be a cause. Thus, an important part of treatment is to eliminate or minimize the reason for the irritation.

Corticosteroids, such as hydrocortisone or betamethasone applied topically, can give relief. Soothing baths or the application of an emollient cream may also be helpful; the value of calamine lotion is uncertain. Systemic antihistamines, such as oral chlorphenamine (section 3.1), may relieve generalized pruritus.

ATOPIC DERMATITIS

Atopic dermatitis (or eczema) is a common skin disorder, which mainly occurs in infants and children; it is associated with intense itching, with areas of red skin. Pruritus may be partially relieved by applying astringent **aluminium acetate** (section 13.4) lotion to exudative lesions and emollients to lichenified plaques. Topical **hydrocortisone** should be applied in short courses of 1–2 weeks to treat even mild areas of involvement. The use of **betamethasone** should be considered in the treatment of persistent localized dermatitis in adults. Topical antihistamines are not effective and should be avoided because of the risk of sensitization. However, a sedative antihistamine can be given at night to calm pruritus and facilitate sleep (section 3.1). A secondary infection, often involving *Staphylococcus aureus*, may be responsible for exacerbations; in such cases, an oral antibiotic such as erythromycin can be given for 7–10 days (section 6.2.2.4).

SEBORRHOEIC DERMATITIS

Use of a keratolytic shampoo and exposure to ultraviolet light reduce both the inflammation and the scaling resulting from seborrhoeic dermatitis of the scalp (dandruff). The shampoo should be massaged into the scalp, immediately rinsed off and then reapplied until a foam is produced, leaving the second application in contact with the scalp for at least 5 minutes. **Selenium sulfide**, which has both antifungal and keratolytic properties, is widely used in many proprietary shampoos. A combination of sulfur and salicylic acid, which has an additional antimicrobial action, is also effective.

ICHTHYOSIS

In ichthyosis, emollients such as aqueous creams and emulsifying creams should be applied daily (or more frequently in severe cases) to affected skin. The addition of a keratolytic, such as **salicylic acid 5%** can be helpful.

LICHEN PLANUS

Lichen planus is a chronic, papular, pruritic skin eruption that occurs typically in middle age and later life; the condition is often mild and may need no treatment. In more severe cases, when the underlying cause cannot be identified, a topical corticosteroid offers the only prospect of remission.

PITYRIASIS ROSEA

In pityriasis rosea, a common self-limiting dermatosis that is probably of infective origin, **calamine lotion** helps to relieve pruritus in most cases. If it does not, topical application of **hydrocortisone** in a concentration not exceeding 1% is worth trying.

Calamine

Calamine is a representative topical antipruritic. Various drugs can serve as alternatives

Lotion (Cutaneous suspension), calamine 8% (USP), 15% (BP)

Uses:

mild pruritus

Administration:

Mild pruritus, *apply* liberally 3–4 times daily

Corticosteroids**Betamethasone**

Betamethasone (as valerate) 0.1% is a representative potent topical corticosteroid. Various drugs can serve as alternatives

Cream , betamethasone (as valerate) 0.1%

Ointment , betamethasone (as valerate) 0.1%

Uses:

severe inflammatory skin conditions including contact dermatitis, atopic dermatitis (eczema), seborrhoeic dermatitis, lichen planus, psoriasis of the scalp, hands and feet, intractable pruritus

Contraindications:

untreated skin infections or broken skin, rosacea, acne, perioral dermatitis

Precautions:

children (avoid prolonged use); adrenal suppression if used on a large area of the body or for a long time, particularly with an occlusive dressing or on broken skin; avoid use on the face for more than 7 days; secondary infection requires treatment with an appropriate antimicrobial

Administration:

Inflammatory skin conditions, **ADULT** and **CHILD** over 2 years of age, *apply* small quantity to the affected area 1–2 times daily until improvement occurs, then less frequently

Adverse effects:

exacerbation of local infection; local atrophic changes particularly on the face and in skinfolds, characterized by thinning of the dermis, depigmentation, dilatation of superficial blood vessels and formation of striae; perioral dermatitis; acne at site of application; suppression of the hypothalamic-pituitary-adrenal axis with prolonged or widespread use (particularly under occlusion)

Hydrocortisone acetate

Hydrocortisone acetate is a representative mild topical corticosteroid. Various drugs can serve as alternatives

Cream , hydrocortisone acetate 1%

Ointment , hydrocortisone acetate 1%

Uses:

contact dermatitis, atopic dermatitis (eczema), lichen planus; intractable pruritus and phototoxic reactions, including polymorphic light eruptions and actinic prurigo; short-term treatment of psoriasis of the face and flexures

Contraindications:

untreated skin infections or broken skin; rosacea, acne, perioral dermatitis

Precautions:

children (avoid prolonged use); occlusive dressings increase penetration into keratinized lesions (use occlusive dressings only at night and for no longer than 2 days; avoid use on weeping lesions); secondary infection requires treatment with an appropriate antimicrobial

Administration:

Inflammatory skin conditions, *apply* a small quantity to the affected area 1–2 times daily until improvement occurs, then less frequently

Adverse effects:

exacerbation of local infection; atrophic changes (see under Betamethasone) less likely with mild corticosteroids, but infants and children particularly susceptible

Astringents

Aluminum acetate is a topical astringent used as an antiseptic for various skin conditions including suppurating superficial wounds and tropical ulcers, and the lesions produced by pemphigus and impetigo. **Potassium permanganate** (section 13.2) may be used in the same way.

Aluminium acetate

Solution for dilution (Concentrate for cutaneous solution), aluminium acetate 13%

Uses:

wet dressings to assist healing of suppurating superficial wounds, tropical ulcers and eczematous skin lesions; removal of adherent crusts

Precautions:

avoid use of plastic or rubber occlusive dressings

Administration:

Suppurating superficial wounds and tropical ulcers, *apply dressings* soaked in 0.65% solution for 30–120 minutes daily, changing dressings every 5–15 minutes; tropical ulcers also require treatment with procaine benzylpenicillin for 2–4 weeks (section 6.2.1.1)

Pemphigus, *apply dressings* soaked in 5% solution every 4 hours

Impetigo, *apply dressings* soaked in 0.65% solution until superficial crusts can be separated

DILUTION OF ALUMINIUM ACETATE SOLUTION 13%. Dilute 1 in 20 with water for 0.65% solution; dilute 1 in 2.6 with water for 5%

Drugs affecting skin differentiation and proliferation

Acne vulgaris

Acne is a disorder of the pilosebaceous follicles and typically first appears during puberty when androgenic stimulation triggers excessive production of sebum. *Mild acne* is characterized by comedones and a few pustules which heal without scarring, and usually responds to topical therapy alone. In *moderate acne*, where there are more extensive pustules causing mild scarring, oral antibiotics such as a tetracycline or erythromycin (section 6.2.2.4) are commonly used. In *severe acne*, widespread pustules are accompanied by nodular abscesses and cysts, requiring treatment with estrogens, antiandrogens, or retinoids. Since scarring of the skin resulting from severe nodular acne causes major distress, acne should always be treated as soon as possible. Exposure to substances suspected of causing or aggravating the condition should be avoided. Systemic treatment must be continued for several months before a response can be anticipated. During this time, topical preparations should be applied to the affected areas to prevent the development of new lesions.

Benzoyl peroxide is a keratolytic drug with bacteriostatic activity against *Propionibacterium acnes*; treatment is usually started at a lower strength and increased as tolerance develops to the initial irritant reaction.

Preparations containing **sulfur**, which is bactericidal and promotes desquamation, are often used, and may be combined with salicylic acid, which is a keratolytic agent.

Topical antibiotics such as clindamycin are widely used in inflammatory acne. However, treatment must be maintained for 2 to 3 months before any benefit is seen

and this prolonged course carries the risk of selection and spread of antibiotic-resistant organisms.

Benzoyl peroxide

Cream , benzoyl peroxide 5%

Lotion (Cutaneous suspension), benzoyl peroxide 5%

Uses:

mild to moderate acne and as an adjunct to oral therapy in more severe cases

Precautions:

avoid contact with eyes, mouth, and mucous membranes; avoid use of occlusive dressings; avoid excessive exposure to sunlight

Administration:

Acne, initially *apply* to clean skin on alternate days, increasing frequency to 1–2 times daily as tolerance to irritant effect develops

Adverse effects:

initial irritation common but subsides with continued use; rarely, contact sensitivity occurs, occasionally even 1 application can cause severe irritation; may bleach fabrics, hair and skin

Psoriasis

Psoriasis, which affects people of all ages in all countries, is one of the most common chronic dermatoses in industrialized countries, and is characterized by epidermal thickening and scaling. Considerable local variations in its prevalence have been variously attributed to genetic, climatic, nutritional and ecological factors. Various biological events may trigger psoriasis, such as streptococcal or viral infection, an emotional crisis or pregnancy. Occasionally psoriasis may be provoked or exacerbated by drugs such as ACE inhibitors, beta-adrenoceptor antagonists (beta-blockers), chloroquine, lithium, and non-steroidal anti-inflammatory drugs.

Psoriasis vulgaris (chronic plaque psoriasis) is the most common form of the condition, usually affecting extensor surfaces of the limbs and the scalp. Guttate psoriasis, commonly seen in children, is often caused by a streptococcal infection; lesions may disappear following antimicrobial treatment. The condition is also known to resolve spontaneously but more commonly transforms into chronic plaque psoriasis. No treatment is known to assure remission, although sunlight often clears lesions.

Dithranol restores the normal rate of epidermal cell proliferation and keratinization, and localized psoriasis vulgaris can frequently be cleared by daily applications for a

period of 2 to 4 weeks. A short contact method of application causes little, if any, irritation or staining of normal skin, and is particularly useful for outpatient management. There is a risk of severe conjunctivitis if dithranol enters the eye.

Crude coal tar is also effective in the treatment of psoriasis. Some preparations additionally contain salicylic acid as a keratolytic. Good results are often obtained when daily applications or baths are combined with exposure to ultraviolet light or sunlight.

Emollients containing low concentrations of **salicylic acid** (1–2%) are a useful adjunct to treatment, particularly where there is thick scaling. A preparation containing **urea** 10%, which has moisturizing, keratolytic and antimetabolic properties, may prove more effective than an emollient.

Topical corticosteroids have a limited role in psoriasis. A mild corticosteroid such as hydrocortisone may be used on the face and flexures, whereas a potent corticosteroid such as betamethasone is most appropriate for the scalp, hands and feet. However, when extensive areas of the body surface are involved or when there is erythrodermic psoriasis, sufficient may be absorbed to cause adrenal suppression; also rebound often occurs after stopping treatment, resulting in a more unstable form of psoriasis.

Coal tar

Solution (Cutaneous solution), coal tar 5%

Uses:

chronic psoriasis, either alone or in combination with exposure to ultraviolet light

Contraindications:

inflamed, broken or infected skin

Precautions:

skin protection possibly required to reduce photosensitivity reactions

Administration:

Psoriasis, *apply* 1–4 times daily, preferably starting with lower strength preparation

Coal tar bath, use 100 ml in bath of tepid water and soak for 10–20 minutes; use once daily to once every 3 days for at least 10 baths; often alternated with ultraviolet (UVB) rays, allowing at least 24 hours between exposure and treatment with coal tar

Adverse effects:

irritation, photosensitivity reactions; rarely hypersensitivity; skin, hair and fabrics discoloured

Dithranol

Ointment, dithranol 0.1–2%

Uses:

moderately severe psoriasis

Contraindications:

hypersensitivity; avoid use on face, acute eruptions, excessively inflamed areas

Precautions:

irritant—avoid contact with eyes and healthy skin

Administration:

Psoriasis, initiate under medical supervision: starting with 0.1%, carefully *apply* to lesions only, leave in contact for 30 minutes, then wash off thoroughly; repeat application daily, gradually increasing strength to 2% and contact time to 60 minutes at weekly intervals; wash hands thoroughly after use

Adverse effects:

local irritation; discontinue use if excessive erythema or spread of lesions; conjunctivitis following contact with eyes; staining of skin, hair, and fabrics

Urea

Cream, urea 10%

Ointment, urea 10%

Uses:

hydrating agent and keratolytic for dry, scaling and itching skin conditions

Precautions:

avoid application to face or broken skin; avoid contact with eyes

Administration:

Dry, scaling skin disorders, *apply* twice daily, preferably to damp skin

Adverse effects:

transient stinging and local irritation

Actinic keratosis

The lesions of actinic keratosis are distributed primarily over sun-exposed areas. Horny growths, which are often covered by light brown scales, are usually asymptomatic but can be disfiguring. They respond to light cauterization and cryosurgery or topical application of **fluorouracil** over a three-week period. Simple emollients may be satisfactory for people with many lesions.

Fluorouracil

Cream, fluorouracil 5%

Uses:

actinic keratosis; genital warts unresponsive to podophyllum resin; malignant disease (section 8.2)

Contraindications:

haemorrhagic ulcerated tissue

Precautions:

avoid mucous membranes and eyes; since UV light intensifies the inflammatory reaction, avoid prolonged exposure to sunlight

Administration:

Actinic keratosis, genital warts, *apply* thinly 1–2 times daily until marked inflammatory response occurs (usually 3–4 weeks); healing may require further 2 months after completion of treatment

Note. Avoid use of metal applicator

Adverse effects:

local inflammatory and allergic reactions; rarely erythema multiforme; photosensitivity reactions during and for up to 2 months after treatment

Warts

Warts most commonly affect the hands, feet (plantar warts, verrucas), and anogenital region (condylomata acuminata); all are caused by the human papilloma virus. They may regress spontaneously at any time within months or years of their first appearance; however, particularly in immunosuppressed patients, they may spread and be difficult to cure. Many common, plane and plantar warts can reasonably be left untreated, but painful or unsightly lesions generally respond to application of preparations containing **salicylic acid**. Where available, cryotherapy using liquid nitrogen applied with a cotton-tip or a spray is highly effective; however, freezing the

skin can produce temporary or permanent depigmentation (particularly on dark skin), and should be used with caution.

Anogenital warts are usually transmitted by sexual contact; they should always be treated, although they frequently recur, because of the increased risk of cervical cancer. **Podophyllum resin**, a caustic antimitotic agent, may be applied to small external lesions. The risk of extensive local necrosis and of systemic toxicity exclude the use of podophyllum resin on larger surfaces. When available podophyllotoxin is a less toxic alternative. Where podophyllum is contraindicated or ineffective surgical removal, electrocautery, cryosurgery and laser therapy are possible options. Topical application of **fluorouracil** has been reported to be of value in resistant cases but the treatment is expensive and efficacy is still under investigation.

Podophyllum resin

An example of an application to treat warts. Various drugs can serve as alternatives

Solution (Cutaneous solution), podophyllum resin 10–25%

Uses:

external anogenital warts; plantar warts

Contraindications:

pregnancy (Appendix 2); breastfeeding; children

Precautions:

avoid use on large areas, mucous membranes; irritant to eyes; avoid contact with normal skin

Administration:

NOTE. Medical supervision required

Warts, **adult** *apply* carefully to warts, avoiding contact with normal tissue; rinse off after 1–4 hours; may be repeated at weekly intervals but no more than 4 times in all; only few warts to be treated at any one time

Adverse effects:

systemic effects resulting from cutaneous absorption include nausea, vomiting, abdominal pain and diarrhoea; also transient leukopenia and thrombocytopenia; renal failure; delayed neurotoxicity including visual and auditory hallucinations, delusions, disorientation, confusion and delirium following excessive application

Salicylic acid

Topical solution (Cutaneous solution), salicylic acid 5%

Ointment , salicylic acid 1–6% [not included on WHO Model List]

Uses:

hyperkeratotic conditions

Contraindications:

broken or inflamed skin; children under 2 years

Precautions:

diabetes mellitus or if peripheral blood circulation impaired; avoid contact with eyes, mouth, and mucous membranes; avoid application to large areas

Administration:

Hyperkeratotic skin disorders, *apply* once daily, starting with lower strength preparations; gradually increase strength until satisfactory response obtained

Adverse effects:

local irritation, dermatitis; salicylism on excessive application or treatment of large areas, particularly in children

Scabicides and pediculicides

SCABIES

Scabies is caused by a mite, *Sarcoptes scabiei*, that burrows into the skin. It is readily transmitted from person to person, therefore the entire household must be treated at the same time to prevent reinfection. It is not necessary to take a bath before treatment with an acaricide, but all clothing and bedding should be washed to prevent reinfection.

Benzyl benzoate is an inexpensive scabicide. It must be applied to all skin surfaces, from the scalp to the soles of the feet, avoiding contact with the eyes; it is too irritant for use on children. **Permethrin** is less irritant and more effective than benzyl benzoate, but also more expensive; it may be used on children. Young infants can be treated with a cream containing precipitated **sulfur** 6–10% applied once daily for one week.

PEDICULOSIS

Pediculosis of the head and body is caused by *Pediculus humanus capitis* and *Pediculus humanus corporis* respectively; pubic lice (crab lice) infestations are caused by *Phthirus pubis* , which may also affect the eye lashes and brows. All are transmitted by person to person contact, and may also contaminate clothing and bedding. All members of the affected household (and sexual contacts) must be treated at the same

time, and clothing and bedding should be washed or exposed to the air; in head lice infestations, hair brushes and combs should also be disinfected.

Head and body lice are readily treated with **permethrin** ; **malathion** is effective against pubic lice. **Benzyl benzoate** may be used for all lice infestations.

Benzyl benzoate

Benzyl benzoate is a representative parasiticide. Various drugs can serve as alternatives

Lotion (Cutaneous suspension), benzyl benzoate 25%

Uses:

scabies; head, body and pubic lice

Precautions:

do not use on inflamed or broken skin; avoid contact with eyes and mucous membranes; not recommended for children; breastfeeding (withhold during treatment)

Administration:

Scabies, **ADULT** , *apply* from neck down at night for 2 nights; on each occasion wash off after at least 24 hours

Pediculosis, **ADULT** , *apply* to affected area and wash off 24 hours later; further applications possibly needed after 7 and 14 days

Adverse effects:

local irritation, particularly in children

Permethrin

Cream, permethrin 5%

Lotion (Cutaneous suspension), permethrin 1%

Uses:

scabies; head and body lice

Precautions:

do not use on inflamed or broken skin; avoid contact with eyes; breastfeeding (withhold during treatment)

Administration:

Scabies and body lice, *apply* cream over whole body and wash off after 8–12 hours

Head lice, *apply* lotion to clean damp hair and rinse off after 10 minutes

Adverse effects:

local irritation; rarely rashes and oedema

Ultraviolet blocking agents

Exposure of skin to sunlight is beneficial in moderation since ultraviolet light is vital for the synthesis of vitamin D. Excessive exposure is hazardous, however, particularly in light-skinned persons who tan poorly, and in patients with pathological or drug-induced photosensitivity. Photodamage is first evident as acute sunburn and, in the longer term, as premature ageing of the skin. Excessive exposure to sunlight predisposes to the development of malignant and pre-malignant skin lesions including actinic keratosis, squamous cell carcinoma, basal cell carcinoma and malignant melanoma, and also exacerbates cutaneous porphyrias, systemic lupus erythematosus, rosacea, and possible herpes labialis.

The best protection is to reduce exposure and thereby avoid sunburn either by the use of protective clothing or, when this is not practicable, by regular use of sunscreen products with a sun protection factor (SPF) rating of at least 15.

The major categories of chemical sunscreens include cinnamates, which are UVB absorbers, and dibenzoylmethanes, which are UVA absorbers. Physical sunscreens, such as titanium dioxide, are opaque and reflect ultraviolet light. Many sunscreen products combine sunscreens from different groups in order to widen the range of protection. An example of a broad-spectrum topical sun protection product which protects from both UVA and UVB contains octinoxate 3%, avobenzone 2%, and titanium dioxide 2%, formulated in an acrylate polymer or an oily basis.