

Chapter 7

Skin Infections

SKIN INFECTIONS: Many skin infections are primarily a result of irritation, allergy, hypersensitivity, or a reflection of systemic disorders. Nonetheless, there are a considerable number of primary skin infections which are commonly encountered, and bacterial and fungal superinfection is common. Patient history is essential for meaningful investigation.

LOCALISED SKIN LESIONS

Agents: *simplexvirus*, *human papillomavirus*, molluscum contagiosum (2% of male sexually transmitted disease, 0.6% of female), cowpox (from cattle), orf (contagious pustular dermatitis; from sheep; rare in man), paravaccinia (milker's nodes, milker's nodules, pseudocowpox; from cattle), *human echovirus 25* and *32* (hemangioma-like lesions), *Streptococcus pyogenes*, *Neisseria meningitidis*, *Neisseria gonorrhoeae*, *Francisella tularensis*, *Clostridium botulinum*, *Listeria monocytogenes* (rare), Gram negative bacilli (*Aeromonas hydrophila* (often fatal), *Vibrio parahaemolyticus*, *Escherichia coli*, *Pseudomonas aeruginosa* (ecthyma gangrenosum), *Serratia marcescens*, *Proteus*, *Klebsiella*), *Staphylococcus aureus*, *Corynebacterium jeikeium*, *Rickettsia*, *Blastomyces dermatitidis*, *Candida*, *Drechslera* (in neutropenia), *Rhizopus*, *Aspergillus*, *Mucor*, *Leishmania tropica* (anthropnotic cutaneous leishmaniasis, dry cutaneous leishmaniasis, urban cutaneous leishmaniasis), *Leishmania major* (rural cutaneous leishmaniasis, wet cutaneous leishmaniasis, zoonotic cutaneous leishmaniasis), *Leishmania aethiopia* (Cuncir, diffuse cutaneous leishmaniasis, Ghisua, leishmaniasis diffusa, lepromatous leishmaniasis), *Leishmania mexicana* (New World cutaneous leishmaniasis), *Leishmania braziliensis* complex, *Leishmania donovani* (rare), *Prototheca*; also painless vesicles in Mucha-Haberman disease

Diagnosis: viral culture of vesicle fluid; direct fluorescent antibody staining or cytological examination of scraping from base of vesicle or other cellular material (herpes: Tzanck smear using Paragon Multiple stain rapid, simple, inexpensive and easy to interpret but sensitivity only 50%), vesicle fluid or pus (cowpox: virions and cytoplasmic inclusions), aspirate, puncture, biopsy (tularemia, leishmaniasis); immunofluorescence; electron microscopy (warts); bacterial and fungal culture of swab of lesions; histology of biopsy; blood cultures; serology

Simplexvirus: creams, ointments, lotions, ice, alcohol, vaginal sprays and sitz baths may reduce viral yield significantly and should be avoided; vesicular lesions should be sampled if possible, a swab for culture and scrapings from the base of the lesion for microscopy being collected, after opening with a sterile hypodermic needle; with ulcerative lesions, any pus should first be removed with a sterile swab; crusts from dried lesions may be lifted with a sterile needle and the same procedure followed; eczema herpeticum potentially life-threatening (hepatitis, disseminated intravascular coagulation) herpetic superinfection of preexisting skin disease

Molluscum Contagiosum: chronic, proliferative epithelial lesions

Cowpox: self-limited, localised vesicular lesions

Orf (Contagious Ecthyma): small, firm, reddish blue papule enlarging to form hemorrhagic pustule or bulla 2-5 cm in diameter, with central crust surrounded by greyish white or violaceous ring, surrounded in turn by zone of erythema; on hand (95%), face or eyelids; history of exposure to sheep or goats; electron microscopy of material from crust or biopsy; rise in antibody by ELISA or Western blot

Paravaccinia: smooth or warty painless lesions and mild systemic complaints

Streptococcus pyogenes: vesicles, forming crusts, especially in children

Neisseria meningitidis: purpuric, petechial or maculopapular lesions containing bacteria

Francisella tularensis: papules resembling insect bites becoming necrotic, ulcerating

Clostridium botulinum: small subcutaneous, non-erythematous, non-tender cyst

Gram Negative Bacilli: cutaneous bullae, erythema multiforme and peripheral lesions in septicemia and endocarditis

Ecthyma Gangrenosum: may be first manifestation of systemic infection (often, bacteremia and sepsis); initial localised edema, rapidly developing to erythematous, usually painless or slightly tender macules 2-3 cm diameter, which progress to indurated subcutaneous nodules over 12-18 h and then vesiculate, with the vesicular fluid often hemorrhagic, slough the vesicle roof to form a deep ulcer with dark central necrosis and violaceous rim expanding into surrounding tissue, and finally may coalesce to form lesions up to 5 cm diameter and covered by a black eschar; histology and culture of skin biopsy; blood cultures

Corynebacterium jeikeium: hemorrhagic or erythematous papular rash, often tissue abscess, necrotic soft tissue lesion

Rickettsia: multiple purpuric lesions in seriously ill patients

Ajelloomyces dermatitidis: papule or pustule developing into granuloma; lesions contain organisms

Candida: macropapular lesions in disseminated candidiasis

Rhizopus: vesiculo-pustular eruptions

Leishmaniasis: examination of smears of tissue or aspirate from lesion or biopsy of ulcer to reveal amastigote; culture of tissue or exudate; erythrocyte count and hemoglobin may be decreased

***Leishmania tropica* Complex**: small raised papules, usually ulcerating to form crusted sores; infectious; Middle East, India, Mediterranean, North Africa; gerbil, dog and human reservoirs; sandfly (*Phlebotomus*) vector

Leishmania tropica: dry ulcer

Leishmania major: faster-growing wet ulcer

Leishmania aethiopica: usually multiple lesions (simple or diffuse)

Leishmania mexicana: Mexico, British Honduras, Amazon River Basin; forest rodent reservoir; sandfly (*Lutzomyia*) vector; similar to leishmaniasis due to *Leishmania tropica* complex but infection with *Leishmania mexicana* often results in destruction of ear cartilage (bahia ulcer, bay sore, chiclero sore, chicle ulcer, ulcera de los chicleros)

***Leishmania braziliensis* Complex**: forest rodent reservoir in Central and South America, dog reservoir in Peru

Leishmania braziliensis: single or multiple ulcers that seldom heal spontaneously

***Leishmania braziliensis guayanensis* (Forest Yaws, Pian Bois)**: single lesion or many crateriform ulcers over body, lymphadenitis as result of metastasis along lymphatics

Leishmania panamensis: single crateriform ulcer or a few such ulcers; metastasis may occur along lymphatics

***Leishmania peruviana* (Uta)**: single lesion or a limited number of lesions, which usually heal spontaneously; occurs mainly in children; not associated with forest areas

Leishmania donovani: primary cutaneous lesions rare; in 'post-kala-azar leishmaniasis' (leishmanoid, PKDL, post-kala-azar dermal leishmaniasis), nodular, macular or maculopapular lesions may occur on body 1-2 y after treatment of visceral disease

Prototheca: non-tender, pyoderma-like or infiltrating lesions

Treatment:

Simplexvirus:

Cold Sores:

Minor: aciclovir 5% cream every 4 h while awake for 5 d, commencing at first signs of onset

Severe Primary or Recurrent or Complicated by Erythema Multiforme: famciclovir 125 mg orally 12 hourly for 5 d, valaciclovir 500 mg orally 12 hourly for 5 d, aciclovir 10 mg/kg to 400 mg orally 8 hourly for 5 d (preferred for children and pregnant)

Unable to Swallow: aciclovir 5 mg/kg i.v. 8 hourly for 5 d (adjust dose for renal function)

Frequent Disabling Recurrences, Frequent Recurrences Complicated by Erythema Multiforme, HIV-infected Patients with Chronic Lesions: valaciclovir 500 mg orally daily for up to 6 mo, aciclovir 5 mg/kg to 200 mg orally 12 hourly for up to 6 mo (preferred for children or pregnant)

Mucocutaneous simplexvirus in Immunocompromised: aciclovir (preferred in children and pregnant) 5 mg/kg i.v. (adjust dose for renal function) or 10 mg/kg to 400 mg orally 5 times daily 8 hourly for 7-10 d, valaciclovir 1 g orally 12 hourly for 7 d, famciclovir 250 mg orally 8 hourly for 7 d (500 mg orally 8 hourly for 10 d in immunocompromised)

Frequent, Severe Recurrences: famciclovir 500 mg orally 12 hourly, valaciclovir 500 mg orally 12 hourly, aciclovir 200 mg orally 8 hourly or 400 mg orally 12 hourly

Eczema Herpeticum: valaciclovir 500 mg orally 12 hourly until healed, famciclovir 250 mg orally 12 hourly until healed, aciclovir 5 mg/kg to 200 mg orally 5 times daily until healed

More Severe: aciclovir 5 mg/kg i.v. 8 hourly then as above

Orf: typically resolve spontaneously in 4-6 w; liquid nitrogen cryosurgery speeds resolution; razor blade shaving effective when lesions persist; 35% idoxuridine in dimethylsulfoxide on eyelids; 0.5% idoxuridine ointment in conjunctival infection

Other Viruses: non-specific

***Streptococcus pyogenes*, *Neisseria*:** penicillin, erythromycin

***Francisella tularensis*:** streptomycin

Other Gram Negative Bacilli: gentamicin

***Staphylococcus aureus*:** penicillin (if isolate susceptible), penicillinase-resistant penicillin, clindamycin, erythromycin, cephalosporin, tetracycline

***Corynebacterium jeikeium*:** vancomycin

***Listeria monocytogenes*:** erythromycin 500 mg orally 6 hourly (child: 30 mg/kg daily in 4 divided doses) for

5 d

***Clostridium botulinum*:** penicillin + antitoxin

***Rickettsia*:** tetracycline, chloramphenicol

***Candida*:** topical nystatin, clotrimazole, miconazole ± oral ketoconazole, fluconazole

***Ajellomyces dermatitidis*:** amphotericin B

***Drechslera*:** excision biopsy + amphotericin B

***Rhizopus*:** debridement + topical povidone iodine

***Aspergillus*:** high dose amphotericin B + flucytosine

***Leishmania*:**

***Leishmania braziliensis* and *Leishmania mexicana*:** sodium stibogluconate 200 mg Sb/kg/d i.m. or i.v. daily for 20 d or until decided improvement, amphotericin B 0.25-1 mg/kg daily on alternate days i.v. for up to 8 w, metronidazole 200 mg (child: 7.5 mg/kg) orally 3 times daily for 10 d, ketoconazole, pentamidine isethionate, allopurinol; intranodular injection of recombinant interleukin 2; lesions due to *Leishmania mexicana mexicana*, *Leishmania amazonensis* and *Leishmania pifanoi* may be incurable

***Leishmania aethiopica*:** sodium stibogluconate 18-20 mg/kg i.v. twice daily for 30 d

***Leishmania tropica*:** sodium stibogluconate 10mg/kg daily i.m. or i.v. for 6 d; paromomycin 15% or methylbenzethonium 12% ointment applied twice daily; oral fluconazole 200 mg daily for 6 w

Prophylaxis (Cutaneous Leishmaniasis): 100% successful frozen vaccine trialled in Brazil

WARTS (VERRUCA): common (verruca vulgaris: solid, circumscribed, elevated tumour with multiple horny projections), flat (verruca plana juvenilis: smooth, slightly raised, occurring in large numbers), plantar (verruca plantaris: conical, bulging from skin surface on sole of foot), venereal (condyloma acuminatum: clusters of soft, fleshy lesions), laryngeal papillomas; 0.6% of new episodes of illness in UK; 0.4% of ambulatory care visits in USA

Agent: *human papillomavirus*

Diagnosis: cytology; cytoplasmic fluorescence (smooth muscle)

Treatment:

Oral, Cervical, Rectal, Anorectal, Pregnancy: cryotherapy, electrocautery, surgical removal, bichloroacetic acid, trichloroacetic acid, intralesional interferon- α

Urethral: 5-fluorouracil, thiotepa

Others: podophyllin, podofilox, imiquimod, cryosurgery, surgical removal, duct tape occlusion

PINTA (CARATE, AZUL, BOUSSAROLE, MEPEINES, LOTA, MAL DE LOS PINTOS, MAL DEL PINTO, PAINTED SICKNESS, TIAN): acute and chronic; transmission by direct contact

Agent: '*Treponema carateum*' (invalid name)

Diagnosis: first stage (primary pinta) manifested as small erythematous scaly papule (chancre of pinta) at site of inoculation 3-60 d after infection; satellite lesions may appear and coalescence occur; second stage (secondary pinta) manifested by generalised papular eruption appearing 5-12 mo after primary papule; papules (pintids) may show striking colours (pink, red, yellow, brown, blue, violet, black); third stage (late pinta, tertiary pinta) manifested principally by depigmentation (chromia, vitiligo) of lesions, which ultimately become white and atrophy, resulting in disfigurement; may be latent stage; serology

Treatment: penicillin

ACNE VULGARIS (PIMPLES): 0.7% of ambulatory care visits in USA

Agents: primarily physiological, but *Propionibacterium acnes* may considerably aggravate symptoms by stimulating inflammation, and *Staphylococcus aureus* infection may supervene

Diagnosis: pus swab (restricted to *Staphylococcus aureus* superinfection; despite its undoubted role, (anaerobic) culture for *Propionibacterium acnes* is pointless; other organisms that may be isolated are also irrelevant

Treatment:

Mild: face washes with 2% w/w Triclosan liquid soap; adapalene 0.1% or water-based benzoyl peroxide 2.5 % increasing to 10% or isotretinoin 0.05% or tretinoin 0.025% increasing to 0.1% topically at night

Moderate Not Responding to Measures Above: clindamycin 1% lotion or erythromycin 2% gel topically in the morning; if insufficient response, replace with doxycycline 50-100 mg orally daily (not pregnant or breastfeeding), minocycline 50-100 mg orally daily (not pregnant or breastfeeding) or erythromycin 250-500 mg orally 12 hourly reducing to 250-500 mg daily

Severe or Cystic: refer to dermatologist

PYODERMA (PURULENT DERMATITIS), BOIL, CARBUNCLE, FURUNCULOSIS, PUSTULOSIS, STYE, SYCOSIS BARBAE, FOLLICULITIS (BOCKHARDT FOLLICULITIS, BOCKHARDT IMPETIGO, SUPERFICIAL PUSTULOSIS PERIFOLLICULITIS),

HIRADENITIS: boil = furuncle = nodule found in cutaneous and subcutaneous tissues, usually around a hair follicle, characterised by inflammation and having a central core; carbuncle = network of furuncles connected by sinus tracts; folliculitis = papular or pustular inflammation of hair follicles; sycosis barbae = multiple folliculitis of the bearded area of the face; hiradenitis = disease of sweat glands; 0.7% of new episodes of illness in UK; exclude diabetes if recurrent; friction, perspiration, obesity, blood dyscrasias, corticosteroid therapy and defective neutrophils other predisposing factors; also eosinophilic folliculitis in HIV-infected patients on triple therapy

Agents: *Staphylococcus aureus*, occasionally in association with *Streptococcus pyogenes*, *Aeromonas hydrophila*; *Pseudomonas aeruginosa* (pyoderma; folliculitis associated with spas and whirlpools), *Mycobacterium fortuitum* (furunculosis associated with nail salon footbaths); folliculitis also *Malassezia*, dermatophytes and *simplexvirus*

Diagnosis: culture of swab of lesions

Pseudomonas aeruginosa:

Pyoderma: pre-existing lesion (exfoliative skin disease, venous stasis ulcer, eczema) colonised and subsequently invaded (especially when treated with occlusive dressings); characteristic moth-eaten appearance and erythematous border; acute and invasive or chronic indolent (slowly progressive, burrowing inflammation, forming coalescent papulopustular lesions covered with malodorous crust); swab culture, clinical differentiation of true infection from colonisation

Folliculitis: discrete, maculopapular lesions few mm in diameter, developing vesicle or pustule on apex, on trunk or proximal extremities, predominantly axillae and pelvis

Treatment:

Staphylococcus aureus: if extensive lesions, cellulitis or systemic symptoms, di(flucloxacillin 12.5 mg/kg to 500 mg orally 6 hourly for 5 d

Penicillin Hypersensitive (Not Immediate): cephalexin 12.5 mg/kg to 500 mg orally 6 hourly for 5 d

Immediate Penicillin Hypersensitivity: clindamycin 10 mg/kg to 450 mg orally 8 hourly for 5 d

Remote Areas: di/flucloxacillin orally 12 hourly for 5-10 d + probenecid orally 12 hourly for 5-10 d; di/flucloxacillin orally 6 hourly for 5-10 d; erythromycin orally 12 hourly for 5-10 days; roxithromycin orally daily for 5-10 d

Aeromonas hydrophila: gentamicin, ciprofloxacin

Pseudomonas aeruginosa:

Pyoderma: long-term oral ciprofloxacin

Folliculitis: usually self-limiting; topical 0.1% polymyxin B or washing with antibacterial soap followed by alcohol-based drying solution can be used if necessary

Mycobacterium fortuitum: 2 of clarithromycin, doxycycline, ciprofloxacin, cotrimoxazole orally for 6-12 mo

Prophylaxis (Recurrent *Staphylococcus aureus* Infections): sorbolene cream with glycerol 10% before and after showering; mupirocin 2% nasal ointment applied to nostrils 3 times daily for 5 d + triclosan 1% wash or chlorhexidine 2% wash daily as a shampoo and for showering, and wash clothes, towels and sheets in hot water on 2 separate occasions

Continued Recurrence Despite Above Measures: + rifampicin 7.5 mg/kg to 300 mg orally 12 hourly for 7 d + di/flucloxacillin 12.5 mg/kg to 250 mg orally 6 hourly for 7 d or cotrimoxazole 4 + 20 mg/kg to 160 + 800 mg orally 12 hourly for 7 d or fusidate sodium 12 mg/kg to 500 mg orally 12 hourly for 7 d or fusidic acid suspension 18 mg/kg to 750 mg orally 12 hourly for 7 d

IMPETIGO: bullous (Cortell pyosis, impetigo bullosa, impetigo contagiosa bullosa, impetigo neonatorum, impetigo staphylogenes, Manson pyosis, pemphigus contagiosus, pemphigus neonatorum, pyoderma superficialis, staphylococcal impetigo) and non-bullous (Fox impetigo, impetiginous dermatitis, impetigo contagiosum, impetigo vulgaris, school sores) forms; 0.4% of new episodes of illness in UK; especially in children; transmission by contact with lesions, inoculation with person's own indigenous flora; incubation period 1-5 d

Agents: *Staphylococcus aureus* (both forms), *Streptococcus pyogenes* (non-bullous; streptococcal pyoderma—especially US; glomerulonephritis may follow within 8 w), Group C *Streptococcus*

Diagnosis: swab culture

Bullous: superficial skin blebs (bullae), which usually rupture and form yellowish crusts; may spread by autoinoculation, with appearance of satellite lesions in the vicinity; in neonates and young children

Non-bullous: vesicles which become pustular and form honey-coloured crusts, each lesion being surrounded by an erythematous zone

Treatment: remove crusts 8 hourly with saline or soap and water or aluminium acetate solution or potassium permanganate solution

***Streptococcus pyogenes* Primary Pathogen:** phenoxymethylpenicillin 10 mg/kg to 500 mg orally 6 hourly for 5 d, benzathine penicillin 30-45 mg/kg to 900 mg i.m. as single dose

Penicillin Hypersensitive: roxithromycin 300 mg orally daily (child: 4 mg/kg to 150 mg orally 12 hourly) for 10 d

Staphylococcus aureus: mupirocin 2% topically 8 hourly for 7 d

Severe Cases or if Cellulitis Present or if Recurrent: di(flucloxacillin 12.5 mg/kg to 250 mg orally 6 hourly for 10 d; cephalexin 12.5-25 mg/kg to maximum 250 mg orally 6 hourly for 10 d if penicillin hypersensitive (not immediate); roxithromycin 300 mg orally daily (child: 4 mg/kg to 150 mg orally 12 hourly) for 10 d if immediate penicillin hypersensitivity

Prevention and Control: hygiene; in recurrent or resistant cases, nasal and/or perineal swabs of whole family and close contacts and treatment if positive (see **PROPHYLAXIS (RECURRENT *STAPHYLOCOCCUS AUREUS* INFECTIONS)** above **TOXIC EPIDERMAL NEUROLYSIS (ALLERGIC BULLOUS DERMATOSIS, DERMATITIS ERYSIPELATA, DERMATITIS EXFOLIATIVA INFANTUM, DERMATITIS EXFOLIATIVA NEONATORUM, EPIDERMIOLYSIS ACUTA TOXICA, EPIDERMIOLYSIS COMBUSTIFORMIS ACUTA, KERATOLYSIS NEONATORUM, LYELL DISEASE, LYELL SYNDROME, RITTER DERMATITIS, RITTER DISEASE, RITTER VON RITTERSHAIN DISEASE)**

Agents: *Staphylococcus aureus* (reaction to toxin, exfoliatin, produced by certain strains), certain other microorganisms, certain pharmaceuticals (including numerous antibiotics)

Diagnosis: erythema, formation of bullae, separation of epidermis, continued desquamation; swab culture

Treatment: penicillinase-resistant penicillin, erythromycin, clindamycin; healing is usually complete in 2 w with adequate treatment

ERYSIPELAS (IGNIS SACER, ST ANTHONY'S FIRE, ST FRANCIS' FIRE): acute disease of skin and subcutaneous tissues; predisposing factors newborn and elderly, nephrotic syndrome, preexisting lymphatic obstruction or edema, prior episode of erysipelas, any break in skin; 0.01% of new episodes of illness in UK; considerable toxic component

Agents: *Streptococcus pyogenes*, similar condition due to *Yersinia enterocolitica*

Diagnosis: raised, edematous, red area of inflammation that is well demarcated, especially when it affects a part of the body where the skin is taut (eg., the forehead); culture of skin blebs swab (also throat swab and wound swab); blood cultures; serology (ASOT, anti-DNAse B); neutrophilia in most cases

Differential Diagnosis: early herpes zoster, contact dermatitis, giant urticaria, inflammatory carcinoma

Treatment:

Streptococcus pyogenes: possibility of glomerulonephritis developing with toxigenic strains should be borne in mind

Severe: benzylpenicillin 30 mg/kg to 600 mg i.v. 4 hourly

Penicillin Hypersensitive (Not Immediate): cephalothin 50 mg/kg to 2 g i.v. 6 hourly, cephazolin 50 mg/kg/d to 2 g i.v. 8 hourly

Immediate Penicillin Hypersensitivity: clindamycin 10 mg/kg to 450 mg i.v. or orally 8 hourly, lincomycin 25 mg/kg to 600 mg i.v. 8 hourly, vancomycin 25 mg/kg (< 12 y: 30 mg/kg) to 1 g i.v. slowly 12 hourly (monitor blood levels and adjust dose accordingly)

Less Severe: procaine penicillin 50 mg/kg to 1.5 g i.m. daily for at least 3 d, phenoxymethylpenicillin 10 mg/kg to 500 mg orally 6 hourly for 10 d

Penicillin Hypersensitive (Not Immediate): cephalexin 12.5 mg/kg to 500 mg orally
6 hourly for 7-10 d

Immediate Penicillin Hypersensitivity: clindamycin 10 mg/kg to 450 mg orally 8
hourly for 7-10 d

Yersinia enterocolitica: cotrimoxazole

ERYSIPELOID (FISH HANDLER'S DISEASE; DIAMONDBACK, DIAMOND SKIN INFECTION, SWINE ERYSIPELAS IN ANIMALS): cutaneous erysipeloid (erythema migrans, erythema serpens, Rosenbach disease, Rosenbach erysipeloid, Rosenbach rouget) and disseminated erysipeloid (Klauder disease; rare)

Agent: *Erysipelothrix rhusiopathiae*

Diagnosis: contact with pigs or fish; butcher, cook or fish handler; culture of swab of material under skin over inflammatory swelling

Cutaneous Erysipeloid: most frequently on skin of hand or forearm; pruritic, purplish-red patch that is slightly indurated and has a slightly raised margin, which spreads centrifugally while centre heals; recovery usually spontaneous after 2-3 w

Disseminated Erysipeloid: diffuse generalised skin lesions with fever and generalised lymphadenopathy

Treatment: penicillin, erythromycin

ERYTHRASMA

Agent: *Corynebacterium minutissimum*

Diagnosis: pink to brown irregular patches with fine creasing; coral pink fluorescence of lesion and scrapings under Wood's light; oil immersion microscopy of skin scraping (diphtheroids seen)

Treatment: erythromycin 1 g/d for 5-7 d

DERMATOPHILOSIS (CONTAGIOUS DERMATITIS, EPIDEMIC ECZEMA, SPOROTRICHOSIS; LUMPY WOOL IN SHEEP): common in cattle and, especially, sheep; rare in man

Agent: *Dermatophilus congolensis*

Diagnosis: multiple painless pustules on the dorsal surface of the hands 2-7 d after exposure to cattle, sheep or goats; Giemsa stain and culture of scabs and exudates

Treatment: penicillin + streptomycin

CUTANEOUS ANTHRAX (MALIGNANT CARBUNCLE, MALIGNANT PUSTULE): most common form of anthrax (> 95%); acquired from handling contaminated hides, carcasses, wool, etc; case-fatality rate 20% without antibiotic treatment, < 1% with antibiotics

Agent: *Bacillus anthracis*

Diagnosis: incubation period 1-6 d; pruritus at site of inoculation, followed by small, painless but itchy raised bump or papule, resembling insect bite, enlarging into 1-3 cm vesicles within 1-2 d and rupturing, draining serosanguineous fluid and leaving a painless depressed eschar 1-3 cm diameter with a characteristic black necrotic area in the centre and, sometimes, satellite vesicles, with edema out of proportion to size of lesion and regional lymphadenopathy in many cases; > 90% of lesions on exposed face, neck, arms and hands; occasionally, extensive local involvement, with severe edema, formation of bullae and septicemia (septicaemic cutaneous anthrax, malignant anthrax, malignant oedema); contact with cattle, sheep, pigs, hides; Gram stain (Gram positive rods and few neutrophils) and culture of vesicle fluid or from under edge of eschar; ELISA, Western blot, toxin detection, chromatographic assay, fluorescent antibody test

Treatment: ciprofloxacin 15 mg/kg to 500 mg orally twice a day or doxycycline 2.5 mg/kg to 100 mg orally twice a day (not < 8 y) till clinical improvement then amoxicillin 15 mg/kg to 500 mg orally 3 times a day for total 60 d

Severe or Associated with Systemic Symptoms: ciprofloxacin 400 mg i.v. every 12 h or doxycycline 100 mg i.v. every 12 h + rifampicin, vancomycin, clindamycin, penicillin, chloramphenicol, imipenem, amoxy/ampicillin or clarithromycin

Prophylaxis (Post-exposure): oral doxycycline or ciprofloxacin as above; consider 3 doses of anthrax vaccine 0, 2 and 4 w after exposure

CUTANEOUS DIPHThERIA: disease of the skin that, on rare occasions, has been associated with diphtheric throat infections; more commonly, especially in tropics, disease is result of infection of open sores, wounds and eczematous skin lesions; cases in Aborigines in Central Australia

Agent: *Corynebacterium diphtheriae*

Diagnosis: primary cutaneous diphtheria may occur as a single or several pustules, usually on lower extremity, progressing to a punched-out ulcer covered by grey-brown membrane; often fatal myocarditis or diphtheric polyneuritis (post-diphtheric paralysis) may occur; Albert's or Neisser stain and culture of swab of lesion

Treatment: isolation and bed rest + antitoxin 10,000-100,000 U depending on severity; always precede by test for allergy to horse serum

Carriers: erythromycin 500 mg orally 6 hourly (child: 30-40 mg/kg daily orally in 3 divided doses), procaine penicillin 600,000 U i.m. 12 hourly for 10 d (child: 25,000-50,000 U/kg i.m. daily in 2 divided doses)

CUTANEOUS AND MUCOCUTANEOUS BARTONELLOSIS (BOUTON DES ANDES, PERUVIAN WART, VERRUGA ANDICOLA, VERRUGA PERUANA): appears weeks or months after termination of systemic bartonellosis or, on rare occasions, without primary history of systemic illness

Agent: *Bartonella bacilliformis*

Diagnosis: pleomorphic eruption of hemangiomatic papules and nodules that gradually assume aspect of warts, usually localised in skin but sometimes in subcutaneous tissue, mucous membranes, muscles, bones or viscera; organisms seen in endothelial cells in stained smears of material from granulomatous skin lesions; blood cultures

Treatment: tetracycline

ACUTE SKIN ULCERS

Agents: *Francisella tularensis*, *Chromobacterium violaceum* (in 11% of infections), *Flavobacterium meningosepticum* (waterborne), *Pseudomonas paucimobilis*

Diagnosis: culture of lesion swab, lymph node aspirate, blood

Treatment:

Francisella tularensis: streptomycin, tetracycline

Chromobacterium violaceum: chloramphenicol

Flavobacterium meningosepticum: clindamycin

Pseudomonas paucimobilis: ciprofloxacin

CHRONIC SKIN ULCERS

Agents: *Arcanobacterium haemolyticum*, *Corynebacterium bovis*, *Mycobacterium marinum* (swimming pool granuloma, swimming pool granuloma disease), *Mycobacterium ulcerans* (Bairnsdale ulcer, Buruli ulcer, Searl ulcer; third most prevalent mycobacterial disease), *Mycobacterium chelonae*, other mycobacteria; may be complicated by superinfection with *Streptococcus pyogenes* and *Staphylococcus aureus*

Diagnosis: Gram stain and Ziehl-Neelsen stain and culture at 30-34°C and 37°C of ulcer swab or biopsy

Mycobacterium marinum: chronic granulomatous nodules or cutaneous or subcutaneous ulcers

Mycobacterium ulcerans: painless, firm nodule with erythema and induration progressing to painless ulcer with undermined edges and necrotic slough containing extracellular acid-fast bacilli

Differential Diagnosis: blastomycosis (pulmonary lesions commonly present; biopsy and culture), chromoblastomycosis (biopsy and culture), foreign body granuloma (history of trauma may be available; absence of significant bacteria on stain and culture), inoculation tuberculosis (rare; occupational history; biopsy and culture of lesion), sporotrichosis (history of work or hobby; biopsy and culture), nocardial infection (acid fast stain and culture), nodular fasciitis, injection abscess and panniculitis (biopsy with special stains)

Treatment:

Arcanobacterium haemolyticum, *Corynebacterium bovis:* erythromycin + rifampicin

Mycobacterium marinum: may resolve spontaneously or on curettage; clarithromycin 12.5 mg/kg to 500 mg orally 12 hourly, cotrimoxazole 4/20 mg/kg to 160/800 mg orally 12 hourly, doxycycline 2.5 mg/kg to 100 mg orally (not < 8 y) 12 hourly

Mycobacterium ulcerans: wide excision and skin grafting, local heat + rifampicin and amikacin for 8 w

Mycobacterium chelonae: clarithromycin 500 mg twice a day

Other Mycobacteria: excision; streptomycin + dapsone ± ethambutol

TROPICAL ULCER (ADEN ULCER, COCHIN SORE, MALABAR ULCER, MOZAMBIQUE ULCER, NAGANA SORE, NECROTISING ULCER OF THE SKIN SURFACE, PHAGEDANA TROPICA, TROPICAL PHAGEDAENA, TROPICAL PHAGEDENA, TROPICAL PHAGEDENIC ULCER, TROPICAL SLOUGHING PHAGEDENA, ULCUS TROPICUM, YEMEN ULCER): causes 2% of fever in returned travellers to Australia

Agents: believed to be due to a mixed infected with *Treponema vincentii* and 'fusiform' bacteria such as *Leptotrichia buccalis*

Diagnosis: chronic, usually solitary, ulcer occurring most commonly in tropical areas and characterised by sloughing of tissue; Gram stain or simple stain of swab of lesion

Treatment: metronidazole

ISCHEMIC, VARICOSE AND DECUBITUS SKIN ULCERS

Agents: colonised by various bacteria

Diagnosis: clinical; culture of deep tissue biopsy; computed tomography, magnetic resonance imaging, bone biopsy and histopathological evaluation to detect osteomyelitis

Treatment: antibiotics are not required unless cellulitis or osteomyelitis is present or the patient is diabetic (treat as for **ULCERS IN DIABETICS**); extirpation by physical means or enzymes or maggot debridement may sometimes be indicated; bismuth formic iodide powder or povidone iodine gauze pads may sometimes be useful in controlling excessive colonisation; treatment should be aimed at correction or prevention of the precipitating cause

SKIN ULCERS IN DIABETICS (FOOT AND LEG SORES)

Agents: coliforms, *Proteus*, anaerobes, *Staphylococcus*, *Streptococcus*, numerous others; all isolates may be significant except coagulase negative staphylococci, *Micrococcus*, skin flora coryneforms

Diagnosis: Gram stain of direct smear, culture of swab in Stuart's transport medium of sore (deeper specimens give no greater information)

Treatment: should always be regarded as serious and treated vigorously; surgical or maggot debridement if necessary; consider underlying osteomyelitis

Severe: ticarcillin-clavulanate 3/0.1 g i.v. 6 hourly, piperacillin-tazobactam 4/0.5 g i.v. 8 hourly, meropenem 500 mg i.v. 8 hourly; recombinant granulocyte colony stimulating factor reduces amputation rate in limb-threatening foot infections

Penicillin Hypersensitive: ciprofloxacin 400 mg i.v. or 750 mg orally 12 hourly + clindamycin 900 mg i.v. 8 hourly by slow infusion or lincomycin 900 mg i.v. 8 hourly by slow infusion

Less Severe: metronidazole 400 mg orally 12 hourly + cephalexin 500 mg orally 6 hourly; amoxicillin-clavulanate 875/125 mg orally 12 hourly for at least 5 d

Penicillin Hypersensitive: ciprofloxacin 500 mg orally 12 hourly + clindamycin 600 mg orally 8 hourly for at least 5 d

TRICHOSIS AXILLARIS (LEPOTHRIX, TRICHOMYCOSIS AXILLARIS): superficial disease of axillary or pubic hairs

Agent: '*Corynebacterium tenuis*' (invalid name)

Diagnosis: adherent yellow, red or black nodules on hair shaft; microscopy of hair

Treatment: shaving; sulphur ointment

BLACK PIEDRA: mainly tropical

Agent: *Piedraia hortae*

Diagnosis: micro and culture of nodules on hair shafts

Treatment: shaving; sulphur ointment

WHITE PIEDRA

Agent: *Trichosporon cutaneum*

Diagnosis: microscopy and culture of infected hairs

Treatment: shaving; sulphur ointment

CHROMOBLASTOMYCOSIS (VERRUCOUS DERMATITIS, CHROMOMYCOSIS, MOSSY FOOT)

Agents: *Cladophialophora carrionii* (in Australia, S.Africa, Venezuela), *Fonsecaea compacta* and *Fonsecaea pedrosoi* (in Far East), *Phialophora verrucosa*, *Rhinochadiella*

Diagnosis: slow development of warty skin nodules, with subsequent development of elephantiasis when lymphatics involved in chronic inflammation, accompanied by fibrotic change in deeper tissues; visualisation of fungus in wet preparations; fungal culture of crusts, pus, biopsy; complement fixation test

Treatment: surgical excision; flucytosine 25 mg/kg orally 6 hourly (< 50 kg: 1.5-4.5 g/m² orally daily) + thiabendazole 25 mg/kg orally daily or amphotericin B under expert supervision; ketoconazole 200-400 mg orally (child < 20 kg: 50 mg; 20-40 kg: 100 mg; > 40 kg: 200 mg) daily ± flucytosine 25 mg/kg orally 6 hourly (< 50 kg: 1.5-4.5 g/m² orally daily); itraconazole 200-400 mg orally (child: 3.5 mg/kg) once daily (not in pregnancy)

PHAEOPHYPHOMYCOSIS

Agents: *Alternaria alternata*, *Cochliobolus hawaiiensis*, *Cladophialophora bantiana*, *Curvularia geniculata*, *Exophiala jeanselmei*, *Exophiala moniliae*, *Exophiala pisciphila*, *Bipolaris spicifera*, *Exserohilum rostratum*, *Phaeoannellomyces elegans*, *Lecythophora hoffmannii*, *Phaeoacremonium parasiticum* (may disseminate to contiguous joint), *Pleurostomophora repens*, *Pleurostomophora richardsiae*, *Exophiala spinifera*, *Phialophora verrucosa*, *Phoma*, *Pleurophoma*, *Exophiala dermatitidis*

Diagnosis: biopsy and culture of lesions

Treatment: surgical excision; amphotericin B, topical miconazole, topical dry heat

CUTANEOUS CRYPTOCOCCOSIS: found in \approx 10% of cases, usually in disseminated cases; rarely primary; cystic or firm subcutaneous swellings which ulcerate, crusted granulomas, plaques or nodules, ulcers; mucosal lesions in \approx 3%

Agent: *Cryptococcus neoformans*

Diagnosis: biopsy and culture of lesions

Treatment:

Mild: fluconazole 800 mg orally or i.v. initially, then 400 mg daily for 10 w

More Severe: amphotericin B desoxycholate 0.7 mg/kg i.v. daily for 2-4 w \pm flucytosine 25 mg/kg i.v. or orally 6 hourly for 2-4 w; if clinical improvement after 2 w, change to fluconazole 800 mg orally initially then 400 mg daily for 8 w

Secondary Prophylaxis in HIV Infection: fluconazole 200 mg orally daily or itraconazole 200 mg orally daily

CUTANEOUS CANDIDIASIS: intertriginous, thrush, perleche on angles of lips, paronychia, 5% of tinea pedis; 0.2% of ambulatory care visits in USA

Agent: *Candida albicans*, other *Candida* species

Diagnosis: micro (small oval budding yeast cells, sometimes with pseudohyphae, which do not take up Quink ink) and culture of swab of scrapings

Treatment: keep affected area as clean and dry as possible; nystatin 100,000 U/g, miconazole 2%, clotrimazole 1% or econazole 1% applied topically 8-12 hourly, continuing for 2 w after symptoms resolve

CUTANEOUS BLASTOMYCOSIS

Agent: *Ajellomyces dermatitidis*

Diagnosis: visualisation of buds in wet preparations, confirmed by culture

Treatment: ketoconazole 200-400 mg orally daily for up to 1 y, hydroxystilbamidine isethionate 225-250 mg (child: 3-4.5 mg/kg) i.v. daily to total dose of 8 g, itraconazole

CUTANEOUS HISTOPLASMOSIS

Agent: *Histoplasma capsulatum*

Diagnosis: visualisation of fungi in pus or skin biopsy, confirmed by culture; may become disseminated in patients infected with human immunodeficiency virus

Treatment: surgery

TINEA AND RINGWORM: transmission from human and animal lesions, contaminated objects; 0.8% of new episodes of illness in UK; 0.3% of ambulatory care visits in USA; common worldwide

Agents: *Epidermophyton floccosum* (anthropophilic; groin and other intertrigo infections, especially under breasts, less commonly elsewhere on body, including feet and nails), *Microsporum audouinii* (epidemic scalp infections, tinea corporis), *Microsporum canis* (zoophilic; ringworm and nonepidemic scalp infections; 75% of tinea capitis in Queensland; reservoir cats and dogs), *Microsporum gypseum* (geophilic; ringworm; 11% of tinea capitis in Queensland; severe infection with kerion), *Athroderma cajetani* (foot), *Microsporum ferrugineum* (ringworm of scalp and glabrous skin; Africa, India, China, Japan), *Athroderma fulvum* (sporadic tinea corporis, tinea capitis, tinea barbae), *Athroderma obtusum* (body), *Scedosporium* (rare onychomycosis), *Trichophyton mentagrophytes var granulorum* (zoophilic; ringworm on arms, legs, torso, scalp and beard infections), *Trichophyton interdigitale* (anthropophilic; tinea pedis, tinea mannis, tinea cruris, tinea unguium), *Trichophyton erinacei* (scalp, body), *Trichophyton rubrum* (anthropophilic; tinea pedis, tinea cruris, lesions and rashes elsewhere on body, including beard, arms, legs, torso, hands, nails), *Trichophyton schoenleinii* (tinea favosa of scalp, torso), *Trichophyton tonsurans* (epidemic scalp infections, tinea corporis, sycosis, onychomycosis; common in Aborigines; 11% of tinea capitis in Queensland, 96% in USA), *Trichophyton verrucosum* (nonepidemic scalp infections, tinea barbae, ringworm), *Trichophyton violaceum* (tinea favosa of scalp, torso, onychomycosis), *Trichophyton concentricum* (body), *Trichophyton equinum* (from horses), *Trichophyton soudanense* (tinea capitis, tinea corporis), *Trichophyton terrestre* (all sites except scalp, face), *Curvularia lunata* (rare onychomycosis)

Diagnosis: Wood's UV light of infected skin; micro of KOH-Parker Quink preparation (long, branching, hyaline, septate strands of hyphae) of skin, histopathologic sections of biopsy material stained with periodic acid-Schiff, culture (dermatophyte test medium most sensitive) of appropriate specimen:

Skin Lesions: scraping from periphery

Nail Infections: nail clippings and scrapings of inner margin of infected area, subungual debris

Scalp: plucked hairs (especially Wood's light positive ones), scraping from lesion

Tinea Pedis with Vesicular Eruption: domes of vesicles snipped off, swab of fluid and scraping from base of vesicle (note that tinea pedis frequently—especially under occlusion—becomes secondarily infected with Gram negative bacteria (particularly *Pseudomonas aeruginosa*), which change the normal dry, scaling condition into a painful, hyperkeratotic or erosive process with exudation and intense inflammation; under such conditions, dermatophytes will be demonstrated in only about 25% of cases)

Treatment:

Tinea Corporis, Pedis and Cruris: bifonazole 1% topically once daily, terbinafine 1% topically once or twice daily, clotrimazole 1% topically 2 or 3 times daily, econazole 1% topically 2 or 3 times daily, ketoconazole 2% topically twice daily, miconazole 2% topically twice daily, continuing for 2 w after symptoms resolve

Unresponsive Cases: terbinafine (< 20 kg: 62.5 mg; 20-40 kg: 125 mg; > 40 kg: 250 mg) orally once daily for at least 2 w, griseofulvin fine particle 10 mg/kg to 500 mg or ultrafine particle 5.5 mg/kg to 330 mg (not < 2 y) orally once daily for at least 4 w

Web Infections Due to *Pseudomonas Aeruginosa*: cleaning, debriding infected skin, avoiding wetness, dilute acetic acid

Tinea Capitis: terbinafine (< 20 kg: 62.5 mg; 20-40 kg: 125 mg; > 40 kg: 250 mg) orally daily for 4 w, griseofulvin microsize (fine particle) 10 mg/kg to 500 mg orally once daily with milk for 4-8 w, griseofulvin ultramicrosize (ultrafine particle) 5.5 mg/kg to 330 mg orally daily crushed and taken with chocolate chip ice cream for 4-8 w (not < 2 y); + 1% selenium sulphide or 2% ketoconazole shampoo

Tinea Unguium (Onychomycosis): terbinafine (< 20 kg: 62.5 mg; 20-40 kg: 125 mg; > 40 kg: 250 mg) orally daily for 6 w (finger nails) or 12 weeks (toe nails), amorolfine nail lacquer applied to affected nail after filing down once or twice weekly for at least 6 months, griseofulvin or ketoconazole as for **Tinea Capitis**

Prevention and Control: hygiene

TINEA VERSICOLOR (CHROMOPHYTOSIS, DERMATOMYOSIS, FURFURACEA, PITYRIASIS, PITYRIASIS VERSICOLOR, PITYRIASIS VERSICOLOR TROPICA, TINEA FLAVA)

Agent: *Malassezia furfur*

Diagnosis: micro of KOH-Parker Quink preparation of skin scrapings from macules especially those fluorescing under Wood's light (round, budding yeast cells and occasionally branched, truncate hyphae of variable length)

Treatment: econazole 1% solution topically to wet skin and left overnight for 3 nights; ketoconazole 2% shampoo topically daily for 10 minutes and washed off, for 10 d; selenium sulphide 2.5% suspension topically to wet skin for at least 10 min or overnight, for 1-2 w, topical sodium thiosulphate 25% (wash off after 10 min) for 2-4 w

Unresponsive: ketoconazole 200 mg orally daily for 10 d, itraconazole 200 mg orally daily for 5 d

TINEA NIGRA

Agent: *Hortaea werneckii*

Diagnosis: micro (dematiaceous tortuous hyphae with abundant branching and elongated yeast cells) and culture of skin scrapings or biopsy

Treatment: amphotericin B

CUTANEOUS AMOEBIASIS (AMOEBIASIS CUTIS, AMOEBIC SKIN ULCERATION): usually arises as extension of intestinal amoebiasis, hepatic amoebiasis or amoebic lung abscess but on occasion results from primary infection; 'genital amoebiasis' may lead to destruction of external genitalia

Agent: *Entamoeba histolytica*

Diagnosis: painful, rapidly spreading edematous ulceration of skin; usually fever and leucocytosis; biopsy

Treatment: metronidazole

CUTANEOUS LARVA MIGRANS (CREEPING ERUPTION, DERMATITIS LINEARIS MIGRANS, PLUMBER'S ITCH): humid tropical areas; parasites migrate in dermis

Agents: mainly *Ancylostoma braziliense* (hookworm larvae of dogs and cats); also *Ancylostoma caninum*, *Ancylostoma ceylanicum*, *Ancylostoma duodenale*, *Necator americanus*, *Strongyloides stercoralis* and nonhuman *Strongyloides* species, *Uncinaria stenocephala*, *Anatrichosoma haycocki* (very rare)

Diagnosis: multiple, subcutaneous, reddish-purple, pruritic, progressive, linear, papulovesicular lesions on sole of feet, with raised serpiginous lines developing; histology (may be local eosinophilic or round-cell infiltration); eosinophilia and anemia; neutrophilia in children

Treatment: usually self-limiting but treatment alleviates symptoms; individual larvae can be killed by spraying the tracks with ethyl chloride; ivermectin 200 µg/kg orally as single dose (not < 5 y), albendazole (≤ 10 kg: 200 mg; >10 kg: 400 mg) once daily for 3 d (not in pregnancy, lactation or < 6 mo)

SPIROMETROSIS (LARVAL DIPHYLLOTHRIASIS, SPARGANOSIS, SPARGANUM INFECTION)

Agent: *Spirometra* species; larvae migrate through subcutaneous tissue

Diagnosis: inflammation and edema of skin; migration around eye produces painful edematous conjunctivitis and lacrimation; histology

Treatment: as for CUTANEOUS LARVA MIGRANS

DRACUNCULIASIS (DRACONTIASIS, DRACUNCULOSIS, GUINEA WORM DISEASE, MEDINA INFECTION, MEDINA WORM INFECTION): 69% in Sudan, remainder in 12 other sub-Saharan African countries; incidence 96,000 in 1999; no deaths reported

Agent: *Dracunculus medinensis*

Diagnosis: incubation period (\approx 1 y) with no symptoms; urticaria, erythema, dyspnoea, vomiting, diarrhoea, intense pruritus, giddiness (great variability) prior to eruption of cutaneous blister which ruptures and discharges larvae on contact with water and may develop into ulcer; infection gives rise to cellulitis and abscesses, 40% of patients having severe disability lasting 43 d, while 0.5-1% of cases suffer permanent damage from joint infection; larvae in aspirate from fresh cutaneous ulcer; appearance of worm on emergence through skin; radiology may reveal calcified worms

Treatment: metronidazole 400 mg orally 8 hourly (child: 25 mg/kg daily in 3 divided doses) for 5 d, niridazole 12.5 mg/kg orally twice daily for 10 d, thiabendazole 25 mg/kg orally daily for 3 d

Prevention and Control: straining of water before drinking; step wells

GNATHOSTOMIASIS (GNATHOMIASIS, WANDERING SWELLING, YANCITSE OEDEMA)

Agent: *Gnathostoma* species

Diagnosis: local inflammation and transient granulomatous eosinophilic swelling; eosinophilia; history of travel to SE Asia or S America and ingestion of raw or inadequately cooked fish, poultry or pork

Treatment: removal of worm when appropriate

EXTERNAL HIRUDINIASIS

Agents: leeches (*Haemadipsa* spp, *Phinobdella* spp)

Diagnosis: history; punctured skin heals slowly and there is often secondary pyogenic infection; multiple punctures have been fatal owing to loss of blood

Treatment: removal; treatment of secondary infection

TUNGIASIS (BURROWING FLEA INFESTATION, CHIGOE DISEASE, JIGGER DISEASE, NIGUA, SANDFLEA INFESTATION)

Agent: *Tunga penetrans*; pregnant female sandfleas burrow into epidermis, usually sole of foot or interdigital spaces

Diagnosis: intense pruritus and inflammation; may be severe secondary infection; identification of female removed from burrows in skin (usually of toes)

Treatment: removal

CUTANEOUS MYIASIS (DERMAL MYIASIS, DERMAMYIASIS, FURUNCULAR MYIASIS, MYIASIS DERMATOSA): infestation of skin or subcutaneous tissues by larvae of certain flies

Agents: *Cochliomyia hominivorax*, *Cochliomyia macellaria*, *Cordylobia anthropophaga*, *Dermatobia hominis*, *Phormia regina*, *Sarcophaga*, *Rhagoletis meigeni*, *Wohlfahrtia vigil*

Diagnosis: maculopapular, erythematous, intensely pruritic, becoming nodular boil-like furuncles, 1-2 cm diameter, volcano-like, episodically painful, centrally necrotic, with small amounts of bloody, serous or purulent drainage; recovery of larvae from lesions

Treatment: removal of larvae; debridement as necessary

CREEPING MYIASIS (MYIASIS LINEARIS): form of cutaneous myiasis caused by larvae of certain flies; migration of larvae may be either superficial or deeply penetrating; resembles cutaneous larva migrans

Agents: *Gasterophilus haemorrhoidalis*, *Gasterophilus intestinalis*, *Gasterophilus nasalis*, *Hypoderma bovis*, *Hypoderma lineatum*

Diagnosis: recovery of larvae

Treatment: removal of larvae

PEDICULOSIS AND PHTHIRIASIS (CRAB-LOUSE INFESTATION, PHTHIROSIS): pediculosis and phthiriasis pubis 5% of male sexually transmitted disease, 4% of female; 66% incidence in homosexuals

Agents: *Pediculus humanus capitis*, *Pediculus humanus corporis*, *Phthirus pubis*

Diagnosis:

Pediculus humanus capitis: infestation of scalp and/or back of neck; severe pruritus, often pustular eczema; secondary infection resulting from scratching common

Pediculus humanus corporis: infestation of body, usually parts in close contact with clothing; furuncles and erythematous maculopapular rash; often a pigmented thickening of skin with parallel scratch marks ('vagabond's disease'); secondary infection resulting from scratching common

Phthirus pubis: infestation of pubic region; slight to severe pruritus; secondary infection resulting from scratching common; usually transmitted by sexual contact; may invade eyelids, causing disease resembling staphylococcal blepharitis; rare scalp infestation in children

Treatment:

Scalp and Body (Including Groin): malathion (maldison) 0.5% lotion (not < 6 mo), permethrin 1% crème rinse or pyrethrins 0.165% + piperonyl butoxide 1.65-4% in foam base to affected area, leave for 10 min, then wash off thoroughly, repeat in 1 w if necessary; lindane 1% shampoo applied for 4 minutes then washed off thoroughly (not pregnant or lactating or < 2 y); treat household child contacts and sexual contacts; wash underwear and bedclothes after treatment; use of fine tooth comb; shaving hair; hot air

Treatment Failure: 1% permethrin crème rinse + oral cotrimoxazole; ivermectin single dose

Eyelashes: occlusive ophthalmic ointment twice daily for 10 d

SCABIES (ITCH, ST MAIN EVIL, SARCOPTIC ITCH, SARCOPTIC MANGE): skin disease in which mites burrow under skin and feed on subcutaneous tissues; worldwide among poor and in geriatric homes; 2% of male sexually transmitted disease, 0.9% of female; 0.2% of new episodes of illness in UK

Agent: *Sarcoptes scabiei* (human strains cause scabies in humans; host-specific animal strains (dogs, horses, camels, etc) may produce a contact dermatitis)

Diagnosis: severe pruritus, usually vesiculation and papule formation; scratching often leads to secondary infection; under conditions such as immunosuppressive therapy, may become severe, mites multiplying in enormous numbers, with formation of extensive crusted lesions (crusted scabies, Norwegian scabies); mites obtained by scraping between fingers or toes or other infected areas with oil-moistened blade to microscope slide (scraping should be deep enough that flecks of blood appear in the oil)

Treatment:

< 6 mo: sulphur 10% (< 2 mo: 5%) in white soft paraffin daily for 2-3 d, crotamiton 10% cream daily for 2-3 d

Others: permethrin 5% cream, applied to whole body including face and hair (avoid eyes and mucous membranes, hot baths or scrubbing before application), left overnight and washed off thoroughly (not < 6 mo; recommended in pregnancy and lactation); benzyl benzoate 25% emulsion (2 mo - 2 y: dilute 1:3; 2-12 y and sensitive adults: dilute 1:1) applied to whole body including face and hair (avoid eyes and mucous membranes, hot baths or scrubbing before application), washed off after 24h; repeat after 1 w

Crusted Scabies: as above + ivermectin 200 µg orally on days 1 and 8 (less severe), 1, 2 and 8 (moderate) or days 1, 2, 8, 9 and 15 (severe; + days 22 and 29 if extremely severe) (not pregnant, lactating, < 5 y); repeat topical treatment twice weekly for 2-6 w; sailcyclic acid 5-10% in sorbolene cream or lactic acid 5% + urea 10% in sorbolene cream daily after washing on days scabicide not applied

Resistant Scabies in HIV: ivermectin 200 µg/kg orally weekly until scrapings negative and no further clinical evidence of infestation

ACARINE DERMATITIS

Agents: *Dermanyssus gallinae*, *Ornithonyssus sylvarum*, *Pyemotes*, *Demodex folliculorum*, *Tryophagus longior*, *Tryophagus putrescentiae* (cheese itch, copra itch, grocer's itch), *Acarus siro*, *Glycyphagus domesticus* (grocer's itch)

Diagnosis: recovery of mite

Dermanyssus gallinae: lesions resemble those of scabies

Ornithonyssus sylvarum: urticarial weals, papules and vesicles; scratching may lead to secondary infection

Demodex folliculorum: hair follicles and sebaceous glands; usually mild pruritus and fibrous tissue response; rarely, dry chronic erythema with burning irritation and scaling of epidermis

Glycyphagus domesticus: temporary pruritus

Treatment: symptomatic

TROMBICULOSIS (CHIGGER INFESTATION, SCRUB ITCH, TROMBICULIASIS, TROMBIDIASIS, TROMBIDIOSIS)

Agents: *Leptotrombidium akamushi*

Diagnosis: severe dermatitis; usually pustular lesion at point of entry and severe itching; may be allergic reactions; recovery of mite

Treatment: symptomatic

BEE STING: reactions, when occurring, usually anaphylactic; no consistent blood changes

HORNET STING: in cases of multiple stings, toxic muscle damage with myoglobinemia and myoglobinuria and increased serum alanine aminotransferase, serum aspartate aminotransferase, creatine phosphokinase and lactate hydrogenase may occur; nephrotoxic effects with developing renal failure may also occur

Agent: *Vespa affinis*

SCORPION STING: causes marked neutrophilia and, in young children, acute pancreatitis, acute hemolytic anemia and defibrination syndrome

WASP STING: reactions, when occurring, usually acute anaphylactic

SPIDER BITE: causes neutrophilia, acute hemolytic anemia with thrombocytopenia

DISSEMINATED RASH

Agents: syphilis, yaws (infectious; 2-3 mo)

Diagnosis: serology

Treatment: penicillin

ERYTHEMATOUS RASH

Agents: Kawasaki disease (primarily trunk), rubella (transient; conjunctivitis ±, pharyngitis ±, rhinitis ±, enanthem ±; incubation period 12-23 d; children, occasionally adults; spring), *Streptococcus pyogenes* (scarlet fever; caused by toxin; pharyngitis ++, conjunctivitis ±, rhinitis ±, enanthem absent), *Staphylococcus aureus* ('staphylococcal scalding'; diffuse or palmar erythroderma in all cases of toxic shock syndrome), *Pseudomonas aeruginosa* ('*Pseudomonas* hot foot syndrome'; exquisitely tender erythematous plantar nodules traced to wading pool), Marburg virus disease (transient, shoulders and arms), enteroviruses; also niacin associated illness

Diagnosis: clinical; hemagglutination inhibition, complement fixation test; culture of nose swab, throat swab, lesions

Treatment:

Viruses: non-specific

Scarlet Fever: penicillin, erythromycin

Staphylococcus aureus: cloxacillin

Pseudomonas aeruginosa: cold compresses, analgesics, elevation of feet

ERYTHEMA NODOSUM occurs in brucellosis, coccidioidomycosis, leptospirosis, toxoplasmosis, tuberculosis, 18% of cases of yersinosis, and in *Pasteurella*, *Streptococcus* and *Mycoplasma pneumoniae* infections; may also be due to contraceptive pills, malignant disease, sarcoidosis, sulphonamides, ulcerative colitis

ERYTHEMA CHRONICUM MIGRANS

Agent: *Borrelia burgdorferi*

Diagnosis: pruritic, erythematous papule or ring at location of tick bite, giving large, erythematous, macular, non-scaling, centrifugally spreading ring with trailing cast to 35 cm diameter, fading; biopsy

Treatment: tetracycline

ERYTHEMA INFECTIOSUM (FIFTH DISEASE)

Agent: *human parvovirus B19*

Diagnosis: clinical ('slapped cheek' appearance; maculopapular, vesicular or petechial rash may be present; joint symptoms, numbness and tingling in fingers; incubation period 4-14 d; children and adults; summer, early autumn; duration 2-5 d); dot hybridisation and capture ELISA of serum; PCR

Treatment: none

ERYTHEMA MARGINATUM: occurs in 10% of cases of acute rheumatic fever

Agent: immunomediated reaction to preceding infection with *Streptococcus pyogenes*

Diagnosis: roughly circular lesions spreading centrifugally at the same time as they clear centrally and producing a serpiginous outline; anti-streptolysin O, anti-DNAse B, anti-hyaluronidase, streptozyme

Prophylaxis: benzathine penicillin 1.2 MU (< 6 y: 600,000 U) i.m. at 4 weekly intervals, phenoxymethylpenicillin 250 mg (child: 125 mg) orally 12 hourly, sulphadiazine (< 27 kg: 500 mg orally once daily; ≥ 27 kg: 1 g orally daily), erythromycin 250 mg orally 12 hourly; continue until patient in early twenties and until 5 y have elapsed since last attack of rheumatic fever

ERYTHEMA MUTLIFORME/STEVENS-JOHNSON SYNDROME

Agents: coxsackievirus A9, 10, 16, B4, 5, echovirus 6, 11, *Mycoplasma pneumoniae*; numerous antibiotics

Diagnosis: clinical

Treatment: careful fluid management and wound care

HEMORRHAGIC RASH

Agents: several arboviruses, rickettsioses (typhus), spotted fevers (in 49% of cases (13% in first 3 d) of Rocky Mountain spotted fever), atypical measles (petechial over face, blanching)

Diagnosis: clinical; serology

Treatment:

Viruses: non-specific

Rickettsia: tetracycline, doxycycline, chloramphenicol, cotrimoxazole

MACULAR RASH

Agents: *Ross River virus* (arms, palms, feet), St Louis encephalitis (transient, extremities), *human coxsackievirus B1, 2, 5, human echovirus 2, 4, 5, 13, 14, 17-19, 30, human enterovirus 71, Reovirus, Rickettsia* (typhus), spotted fevers, *Mycoplasma pneumoniae* (mainly on arms, legs, trunk and face), pityriasis (desquamating); also niacin-associated illness (on face or upper arms)

Diagnosis: culture of serum; serology

Treatment:

Viruses: non-specific

Rickettsia: tetracycline, doxycycline, chloramphenicol, cotrimoxazole

Pityriasis: selenium sulphide, sodium thiosulphate, ketoconazole

MACULOPAPULAR RASH

Agents: measles, atypical measles, rubella, *human echovirus 1-7, 11, 13, 14, 16-19, 25, 27, 30, 33, echo 9 virus, human parechovirus 1, human coxsackievirus A2, A4-A7, A9, A10, A16, B1-B5, enterovirus 71*, several arboviruses (including 31% of cases of dengue), infectious mononucleosis, *Reovirus*, adenovirus, roseola, erythema infectiosum, *Rotavirus, Chromobacterium violaceum, Pseudomonas aeruginosa* whirlpool-associated dermatitis, rickettsioses (including Mediterranean spotted fever and 82% of cases (46% in first 3 d) of Rocky Mountain spotted fever), *Neisseria gonorrhoeae, Neisseria meningitidis, Treponema pallidum subsp pallidum, Yersinia enterocolitica, Yersinia pseudotuberculosis, Mycoplasma pneumoniae, Trichinella spiralis* (in 70% of cases)

Diagnosis: viral culture of throat washings, throat swab, nasal swab; cytology of Koplik spots; serology; histology and immunofluorescence of skin biopsy; bacterial culture of skin lesions, blood; muscle biopsy

Measles: confluent, on face, spreading to extremities; very characteristic; conjunctivitis ++, rhinitis +, enanthem +, pharyngitis absent; incubation period 10-14 d; children, occasionally adults; winter, spring; duration 7-10 d; IgM antibody

Atypical Measles: over entire body

Rubella: faint, even non-existent; incubation period 12-23 d; children, occasionally adults; spring; duration 3-5 d; conjunctivitis ±, pharyngitis ±, rhinitis ±, enanthem ±; IgM antibody

Enteroviruses: pharyngitis ±, rhinitis ±, conjunctivitis and enanthem absent; virus isolation

Arboviruses: diffuse; extremities, torso, face

Infectious Mononucleosis: pharyngitis +, conjunctivitis, rhinitis and enanthem absent

Chromobacterium violaceum: all skin surfaces except face, hands, feet

Pseudomonas aeruginosa: becoming vesiculopustular

Mediterranean Spotted Fever: on trunk and extremities in 99% of cases, on palms and soles in 89%

Neisseria: nonsymmetrical, scattered

Mycoplasma pneumoniae: measles-like confluent or rubella-like discrete

Treatment:

Viruses: non-specific

Chromobacterium violaceum: chloramphenicol

Rickettsia: tetracycline, doxycycline, chloramphenicol, cotrimoxazole

Neisseria: penicillin

Pseudomonas aeruginosa: usually none required; silver nitrate or silver sulphadiazine if required

Yersinia: gentamicin, cefotaxime, doxycycline or ciprofloxacin if invasive disease

Mycoplasma pneumoniae: doxycycline, tetracycline, erythromycin

Trichinella spiralis: mebendazole

ROSEOLA (EXANTHEMA RUBITUM)

Agents: *human herpesvirus 6, human coxsackievirus A6, A9, B1, B2, B4, B5, human echovirus 11, 16, 25, 27, 30, echo 9 virus, adenovirus, parainfluenza, measles vaccine virus*

Diagnosis: maculopapular rash appears as fever falls; conjunctivitis ±, rhinitis ±, pharyngitis and enanthem absent; incubation period 10-15 d; infants; spring, autumn; duration 5-7 d; serology

Treatment: non-specific

FINE RASH

Agents: atypical measles (on arms, spreading to trunk and face), chromobacteriosis (generalised)

Diagnosis: clinical; epidemiological; viral culture of throat swab or washings; blood cultures; serology

Treatment:

Atypical Measles: supportive

Chromobacteriosis: chloramphenicol

POLYMORPHOUS RASH

Agents: atypical measles (petechial, maculopapular, pustular component), erythema infectiosum (maculopapular, vesicular, petechial or absent), *Neisseria gonorrhoeae* (maculopapular, vesicular), *Neisseria meningitidis* (maculopapular, vesicular), *Salmonella*, Kawasaki syndrome (in 90% of cases; nonvesicular or crusting), *Pseudomonas aeruginosa* (nonpruritic to intensely pruritic, maculopapular, vesiculopapular, vesicular, pustular)

Diagnosis: clinical; immunofluorescent antibody testing on serum and CSF; bacterial culture of skin lesions; blood cultures

Treatment:

Atypical Measles: supportive

Neisseria: penicillin

Salmonella: chloramphenicol

Pseudomonas aeruginosa: usually none required; topical 0.1% polymyxin B or washing with antibacterial soap followed by topical alcohol-based drying lotion if required

PRURITIC RASH

Agents: caterpillar contact (on arms in 75% of cases, on neck in 23%, on legs in 21%), cercarial dermatitis (bather's itch, clam-digger's itch, hunter's itch, lakeside disease, rice-paddy itch, sawah itch (Bahasa, Malaysia), schistosome dermatitis, sea bather's itch, swimmer's itch; *Austroilharzia* spp, *Gigantobilharzia* spp, *Heterobilharzia americana*, *Orientobilharzia* spp, *Schistosoma bovis*, *Schistosoma mattheei*, *Schistosoma spindale*, *Schistosomatium douthitti*, *Trichobilharzia* spp), grain itch (*Pyemotes*); similar reactions may occur to fleas (*Ctenocephalides canis* from dogs, *Ctenocephalides felis* from cats, *Pulex irritans* from man), bedbugs, '*Ornithonyssus bursa*' (bird mite, paper mite), *Ornithonyssus sylvarum* (Northern fowl mite), '*Ornithonyssus bacoti*' (tropical rat mite), *Dermanyssus gallinae* (chicken mite), *Dermanyssus hirudinis* (from cage birds, swallows), *Tyrophagus* (bulb mites; from foods), *Glycyphagus domesticus* (house itch mite), *Dermatophagoides pteronyssinus* and *Dermatophagoides farinae* (house-dust mites), '*Trombicula autumnalis*' (from vegetation), *Haloclava producta* (ghost anemone dermatitis)

Diagnosis: patient history

Cercarial Dermatitis: produced in sensitised persons as a result of penetration of skin by cercariae, which subsequently die but cause irritation, pruritus, macules and papules at site of penetration; demonstration of *Schistosoma*-infected snails at site of exposure

Grain Itch: thin-walled central vesicles and erythematous areolae on torso and extremities, spreading to face and resolving to hypopigmented macules; demonstration of *Pyemotes* on patient or in environment (vegetation, grain, wood)

Treatment: antihistamines, antipruritics

Caterpillar Contact: remove affected clothing; remove hairs by applying adhesive tape and immediately pulling off

Grain Itch and Other Infestations: lindane to skin; pyrethrin-based fogging

PUSTULAR RASH

Agent: *Pseudomonas aeruginosa* whirlpool-associated dermatitis

Diagnosis: culture of skin lesions

Treatment: usually none required; topical 0.1% polymyxin B or washing with antibacterial soap followed by topical alcohol-based drying lotion if required

SLOTCHY RASH

Agent: *Chlamydia psittaci* (face and neck)

Diagnosis: clinical; serology

Treatment: erythromycin, tetracycline

GENERALISED URTICARIAL RASH

Agents: *human coxsackievirus A9, A16, B4, B5, echovirus 11, Mycoplasma pneumoniae*; hypersensitivity reaction to foods or drugs or local irritants

Diagnosis: appearance (*Mycoplasma pneumoniae* papular or giant), history; serology

Treatment:

Viruses: non-specific

Mycoplasma pneumoniae: doxycycline, erythromycin

Hypersensitivity: withdrawal of reactant, antihistamines

VESICULAR RASH

Agents: simplexvirus 3 (shingles, chickenpox; worldwide; usually a mild disease, but serious disease in population with no previous exposure and in immunocompromised; in 25% of patients with Hodgkin's disease and 3% of patients with solid tumours; trunk, extremities, palms, fingers), *human coxsackievirus A4, A5, A7-A10, A16, B1, B3, B5* and *human enterovirus 71* (hand, foot and mouth syndrome), *human echovirus 5, 6* (zoster-like rash), *9, 11, 17*, erythema infectiosum, neonatal *simplexvirus 1* and *2* infection (papulovesicular), smallpox, monkeypox, *Pseudomonas aeruginosa* whirlpool-associated dermatitis, *Neisseria gonorrhoeae, Neisseria meningitidis, Mycoplasma pneumoniae* (varicella-like; legs, trunk, face)

Diagnosis: bacterial and viral culture of vesicle fluid and scrapings; viral culture of feces, throat swab; cytology (Tzanck smear stained with Paragon Multiple stain simple, inexpensive and easy to interpret) of scraping from base of vesicle; immunofluorescence; complement fixation test, hemagglutination inhibition, neutralisation; histology of biopsy; electron microscopy of skin lesions, vesicle fluid or pus; gel diffusion of vesicle fluid or pus

Simplexvirus 3: direct fluorescent antibody staining of cells scraped from ulcerative lesions; characteristic multinucleate giant cells in vesicles seen histologically; visualisation of virus in vesicles by electron microscopy; virus isolation

Poxviruses: antigen detection

Treatment:

Simplexvirus 1* and *2: aciclovir, penciclovir

Simplexvirus 3: saline packs 12 hourly for 10 min, calamine lotion 12 hourly, povidone iodine 6 hourly topically; oral antibiotics according to bacteriology of superinfection

Varicella in Normal Patient With Pneumonitis or Encephalitis or in

Immunocompromised: aciclovir 10 mg/kg i.v. 8 hourly, each infusion administered over a period of 1 h, for 7-10 d (adjust dose for renal function)

Herpes Zoster in Immunocompromised and in Any Patient Seen Within 72 h of

Onset of Vesicles: famciclovir 250 mg orally 8 hourly for 7 d, valaciclovir 1 g orally 8 hourly for 7 d, aciclovir 20 mg/kg to

800 mg orally 5 times daily for 7 d; prednisolone 40 mg orally daily for 10 d, tapering off over 2 w, may be useful in averting or reducing post-herpetic neuralgia; herpes zoster neuralgia may be treated with nortriptyline, gabapentin, sustained release oxycodone or topical lidocaine patches

Other Viruses: non-specific; discontinue steroids

Neisseria: penicillin

Pseudomonas aeruginosa: usually none required; topical 0.1% polymyxin B or washing with antibacterial soap followed by topical alcohol-based drying lotion if required

ROSE SPOTS

Agent: *Salmonella* (enteric fever, 15% of cases of *Salmonella* brain abscess)

Diagnosis: clinical; culture of feces, blood, bone marrow; computerised axial tomography, radionuclide scan, culture and histology of brain biopsy where indicated

Treatment: chloramphenicol

PETECHIAL OR PURPURIC RASH

Agents: *human coxsackievirus A4, A9* (anaphylactoid), *B2, 5, human echovirus 3, 4, 7* (anaphylactoid), *18* (anaphylactoid), *Mycoplasma pneumoniae* (rare)

Diagnosis: clinical; serology

Treatment: supportive

Mycoplasma pneumoniae: doxycycline, erythromycin

PAPULAR-PURPURIC GLOVES AND SOCKS SYNDROME

Agent: *human parvovirus B19*

Diagnosis: pruritic erythema with edema, papular-purpuric lesions of hands and feet with sharp demarcation at wrists and ankles, lymphadenopathy, mucosal lesions, asthenia, anorexia, fever, arthralgias, mild anemia, leucocytosis or leucopenia, transient neutropenia; IgM, IgG seroconversion, serum PCR

Treatment: supportive

NON-SPECIFIC RASH is also seen in 40% of cases of Q fever endocarditis, 15% of acute viral hepatitis cases, 11% of enterovirus infections (conjunctivitis and enanthem absent, pharyngitis \pm , rhinitis \pm), in 6% of infectious mononucleosis cases due to *Epstein-Barr virus* (rarely in *human cytomegalovirus* cases, occasionally in *Toxoplasma gondii* syndromes), in 2% of cases of influenza A, in *human adenovirus B serotype 16* (but not *human adenovirus E serotype 4*) infections, in aseptic meningitis, in infections with *human coxsackievirus A2, A4, A9, A16* and *B4*, in *Staphylococcus aureus* endocarditis and toxic erythema, and in infections with dermatophytes; also in dermatomyositis (over extensor surfaces of finger joints and over large joints, heliotrope rash of eyelids), and in reactive states to local application of chemicals or to ingestion of drugs (conjunctivitis, pharyngitis, rhinitis and enanthem absent), other chemicals or foods

(An exanthem and pulmonary involvement may be seen in infections with *human adenovirus B serotype 7*, *human adenovirus 7a*, *simplexvirus 1*, *simplexvirus 3*, *Epstein-Barr virus*, *human coxsackievirus A9*, *human echovirus 11*, *mammalian orthoeovirus type 3*, *measles virus*, *Chlamydia psittaci*, *Mycoplasma pneumoniae*, *Neisseria meningitidis*, *Mycobacterium tuberculosis*, *Histoplasma capsulatum*, *Cryptococcus neoformans*, *Coccidioides immitis*)

PARONYCHIA

Agents: *Candida albicans*, *Pseudomonas aeruginosa* (may lead to 'green nail syndrome'), *Staphylococcus aureus*, *Streptococcus*, anaerobes, *Haemophilus paraprophilus*, *Eikenella corrodens*, *Fusarium* (neutrophilia)

Diagnosis: culture of pus swab

Treatment: avoidance of precipitating factors (beer, milk, perspiration, water immersion, etc); topical povidone iodine paint, magenta paint, clioquinol cream; antibiotics as for **CELLULITIS** if present

Candida: miconazole 2% tincture twice daily for 5-7 d

Chronic or Unresponsive: fluconazole 50 mg orally daily for at least 2 w, itraconazole 100 mg orally daily for at least 2 w, ketoconazole 200 mg orally once daily for at least 2 w

Fusarium: nail removal, amphotericin B 1.25 mg/kg daily + 5-flucytosine

Pseudomonas aeruginosa: 0.25-1% acetic acid, 0.1% polymyxin B

Staphylococcus aureus: di/flucloxacillin 25 mg/kg to 500 mg orally 6 hourly, cephalixin 12.5 mg/kg to 500 mg orally 6 hourly

HERPETIC WHITLOW

Agent: *simplexvirus 1*

Diagnosis: may masquerade as acute pyogenic infection; swab culture

Treatment: valaciclovir 500 mg orally 12 hourly for 7-10 d, famciclovir 250 mg orally 12 hourly for 7-10 d, aciclovir 5 mg/kg to 200 mg orally 5 times daily for 7-10 d

DANDRUFF

AGENT: ? *Malassezia* spp

Diagnosis: clinical

Treatment: selenium sulphide shampoo

OTITIS EXTERNA: 0.6% of new episodes of illness in UK; 0.4% of ambulatory care visits in USA; most common cause of localised area pain

Agents: includes 'swimmer's ear' (acute diffuse otitis externa) due to infections with *Pseudomonas aeruginosa* (35-70% of all cases of otitis externa), *Proteus* (2% of all cases), *Escherichia coli* (2% of all cases), *Klebsiella pneumoniae* (2% of all cases), other coliforms, *Alcaligenes*, *Vibrio alginolyticus*, *Vibrio mimicus* (after exposure to sea water), *Aeromonas*; acute localised otitis externa due to *Staphylococcus aureus* (16% of all cases), coagulase negative *Staphylococcus* (7% of all cases), group C *Streptococcus* (0.8% of all cases), *Streptococcus pyogenes*; otomycosis due to *Candida albicans* (7% of all cases), *Aspergillus fumigatus*, *Aspergillus flavus* and *Aspergillus niger* (primary or secondary to eczematoid reactions), *Scedosporium*; very rare specific infections with *Mycobacterium* species (including *Mycobacterium tuberculosis*), *Corynebacterium diphtheriae* and *Actinomyces israelii*; mixed infections due to obligate anaerobes (*Peptostreptococcus*, *Propionibacterium acnes*, *Fusobacterium necrophorum*, *Bacteroides*, *Porphyromonas asaccharolytica*, *Prevotella intermedia*) and Gram negatives in chronic conditions (29% of total cases); and malignant (necrotising) otitis externa (infection spreads to temporal bone, zygomatic bone and bones at base of skull, causing cranial neuropathies and significant mortality) due to *Pseudomonas aeruginosa* (rarely, *Aspergillus fumigatus*, *Klebsiella oxytoca*, *Proteus mirabilis*, *Staphylococcus aureus*, coagulase negative

Staphylococcus) in elderly and diabetics; allergy and sensitivity reactions (eczema, psoriasis, seborrheic dermatitis, lupus erythematosus) may simulate infection

Diagnosis: itch, otorrhoea, pain varying from moderate to severe; hearing loss may occur if auditory canal occluded by lesion; culture of ear swab

Malignant Otitis Externa: > 60 y, diabetes mellitus; otalgia in 75-100%, headache (usually temporal or occipital and often excruciating), periauricular tenderness and swelling, profuse purulent otorrhoea, edema and erythema of ear canal, granulation tissue in external auditory canal; facial nerve palsy late complication; raised ESR (often > 100 mm/h); computerised axial tomography or magnetic resonance imaging; isolation of organism from external auditory canal or mastoid

Treatment: relieve pain with codeine or, if severe, pethidine or morphine; clean auditory canal by suction (do not syringe) or dry mopping with cotton wool on a thin carrier (not cotton bud); at least daily toilet with acetic acid 0.25% or povidone iodine 0.5% solution

Swimmer's Ear (Acute Diffuse Otitis Externa): dexamethasone 0.05% + framycetin sulphate 0.5% + gramicidin 0.005% ear drops 3 drops 3 times daily or as wick soaked in combination for 3-7 d; flumethasone 0.02% + clioquinol 1% ear drops 3 drops instilled into ear after cleaning twice daily or as wick soaked in combination for 3-7 d; triamcinolone/neomycin/gramicidin/nystatin combination 2-3 drops twice daily or inserted as saturated gauze wick; avoidance of swimming during attack; use of acetic acid + isopropyl alcohol or acetic acid + benzedthonium chloride 4-6 drops instilled into each ear after shaking water out following water immersion, or insertion of plugs of nonabsorptive material (eg., paraffin-impregnated cotton wool) may help prevent recurrence

Acute Localised Otitis Externa: di(fluc)loxacillin 12.5 mg/kg to 500 mg orally 6 hourly for 5 d

Aspergillus: if eardrum intact, clean with alcohol, then instil 2 drops 4% boric acid in 5% alcohol 6 hourly for up to 3 w

Malignant Otitis Externa:

Pseudomonas aeruginosa: gentamicin 5-7 mg/kg i.v. daily (child: 7.5 mg/kg i.v. in 1-3 divided doses) + ticarcillin-clavulanate 50 mg/kg to 3 g i.v. 4-6 hourly or ceftazidime 25 mg/kg to 1 g i.v. 8 hourly; ciprofloxacin 1.5-2.5 g/d orally for 6-10 w; piperacillin 3-4 g i.v. 4-6 hourly + tobramycin 1.3 mg/kg i.v. 8 hourly for 4-8 w

Aspergillus: incision and drainage of pinna; itraconazole 200 mg/d for 3 mo, amphotericin B ± flucytosine

Staphylococcus aureus: as for **Swimmer's Ear**; if severe, flucloxacillin 500 mg orally 6 hourly (< 2 y: ¼ dose; 2-10 y: ½ dose), erythromycin 500 mg orally 6 hourly (child: 30-50 mg/kg daily in divided doses)

Candida albicans: cleansing; clotrimazole lotion 3 drops 8 hourly for 7 d, econazole 1% solution 2 drops 12 hourly

Mycobacterium: streptomycin, paraminosalicylic acid or other anti-tuberculous drugs depending on susceptibility of isolates

Corynebacterium diphtheriae: antitoxin + penicillin, cephalosporin, erythromycin

Actinomyces israelii: penicillin ± streptomycin; tetracycline, erythromycin, cephalosporin

Others: penicillin, chloramphenicol, ticarcillin, metronidazole