

Dermatophytosis

Tinea capitis



Tinea capitis due to *Trichophyton tonsurans*.



Kerion due to *Trichophyton verrucosum*.

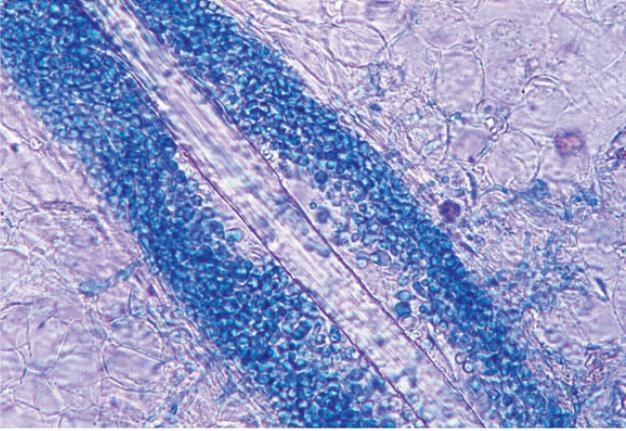
Definition

Tinea capitis describes infection of the scalp and hair with a dermatophyte.

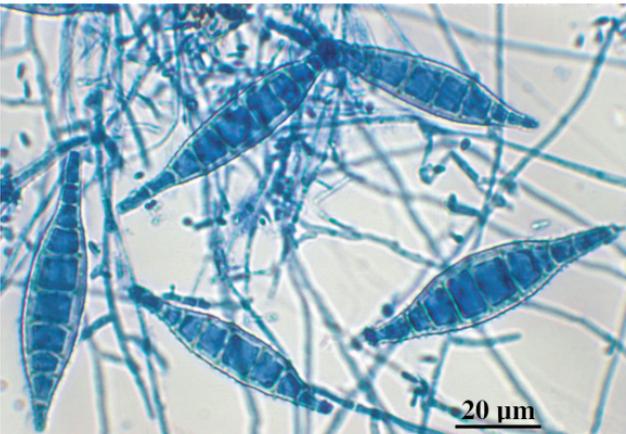
Geographical distribution

World-wide, but more common in Africa, Asia and southern and eastern Europe, occurring mainly in prepubescent children. Increasing incidence.

Dermatophytosis



Hair infected by *Microsporum gyseum* showing large-spored ectothrix invasion.

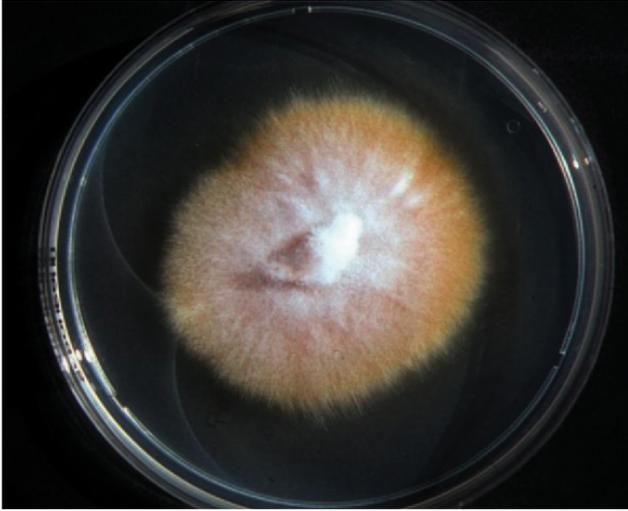


Macroconidia of *Microsporum canis*.

Causal organisms and habitat

- Several *Trichophyton* spp. and *Microsporum* spp.
- Zoophilic *M. canis* (cats and dogs) is common in western Europe.
- Anthropophilic *T. violaceum* is predominant in eastern and southern Europe and north Africa.
- Anthropophilic *T. tonsurans* is increasing in prevalence, especially in North America.

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Microsporum canis in culture.

- Anthropophilic species can be contagious and endemic.
- *T. schoenleinii* causes favus.

Clinical manifestations

- Mild scaling lesions to widespread alopecia.
- Kerion: highly inflammatory, suppurating lesion caused by zoophilic dermatophytes.
- Black dot appearance seen with ectothrix hair invasion.
- Favus is a distinctive infection with grey, crusting lesions.
- Asymptomatic carrier state recognized, may promote spread of infection.
 - *T. tonsurans* and *T. violaceum* – most commonly implicated in the carrier state.
 - Minimal inflammatory response.
 - Low spore numbers.
 - Topical treatment appears to help prevent spread of infection.
 - Fomites also implicated in spread.

Essential investigations

Microscopy

Direct microscopic examination of hair roots and skin softened

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with KOH reveals hyphae, arthrospores and distinctive patterns of hair invasion: ectothrix – large or small arthrospores form a sheath around the hair shaft; endothrix – large or small arthrospores form within the hair shaft; ectoendothrix – spores form around and within the hair shaft; and favus – hyphae and air spaces form within the hairs.

Fluorescence under Wood's light may reveal hairs infected with *Microsporum* spp; not effective for revealing *T. tonsurans*.

Culture

Culture at 28°C for at least 1 week is essential to identify the organism.

Management

Mycological confirmation is essential before commencing oral treatment. Treat with these alternatives:

- griseofulvin 10 mg/kg for up to 3 months, absorption and bioavailability vary with dietary fat intake, rapidly eliminated from body when discontinued; some side effects
 - itraconazole 100 mg/day for 4–6 weeks in adults, depending on causative species; note potential drug interactions
 - itraconazole pulse therapy for children, oral solution, 5 mg/kg/day for 1 week per month for 3–4 months
 - terbinafine 250 mg/day for 4–6 weeks, higher dose and longer duration if *Microsporum canis* is present; only mild and transient side effects
 - fluconazole, oral suspension, daily or weekly regimens, good absorption, optimum dose to be determined.
- Topical treatment of lesions with an azole, such as 2% ketoconazole shampoo, or 1% selenium sulphide shampoo, may reduce spread.

Recent studies suggest that a child does not need to be kept from school during treatment.

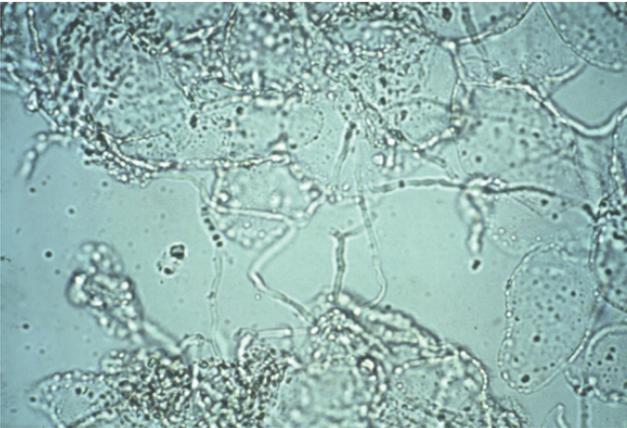
Regular epidemiological surveillance of causative fungal organisms in the community and their antifungal susceptibility is an essential component in management of tinea capitis.

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Tinea corporis



Tinea corporis due to *Trichophyton mentagrophytes*.



Infected skin scrapings softened in KOH.

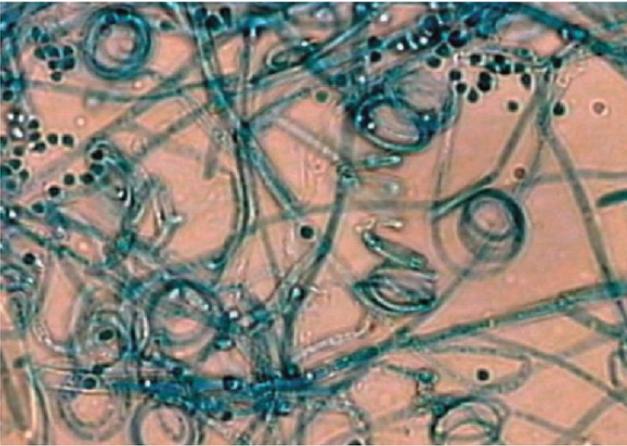
Definition

Infection of the skin of the trunk, legs and arms with a dermatophyte.

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Culture of *Trichophyton mentagrophytes*.



Microscopic morphology of *Trichophyton mentagrophytes* showing spiral hyphae.

Dermatophytosis

Geographical distribution

World-wide, but more prevalent in tropical and subtropical regions.

Causal organisms and habitat

- Many *Trichophyton* spp., *Microsporum* spp. and *Epidermophyton floccosum*.
- Often zoophilic, occasionally geophilic organisms.
- Infection frequently contracted from a household pet.
- May follow infection of another body site.
- Person to person transmission may occur in contact sports.
- *M. canis* from cats and dogs most frequent.
- *T. verrucosum* from cattle in rural areas.

Clinical manifestations

- Usually affects exposed body sites.
- Exact nature depends on infecting organism; infections due to zoophilic species are often more inflammatory and may be pustular.
- Typically, there are itching, dry, circular, scaling lesions.
- Fungus more active at margin therefore more erythematous.

Essential investigations

Microscopy

Skin scrapings should be collected from the raised border. Direct microscopy of skin scrapings softened with KOH reveals branching hyphae with or without arthrospores. The use of an optical brightener such as Calcofluor white which is viewed under a fluorescence microscope enhances the microscopic detection of fungal elements.

Adhesive tape strippings may be used if little material can be scraped.

Culture

Isolation of the dermatophyte at 28°C allows identification.

Dermatophytosis

Management

This condition seldom resolves if untreated. However, it often responds to topical treatment with an azole (clotrimazole, econazole, miconazole, sulconazole), naftifine or terbinafine morning and evening for 2–4 weeks.

Oral therapy is indicated if the lesions are extensive or refractory. Treat with these alternatives:

- itraconazole 200 mg/day for 1 week
- terbinafine 250 mg/day for 2–4 weeks
- griseofulvin 10 mg/kg for 4 weeks.

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Tinea cruris



Tinea cruris due to *Trichophyton rubrum*.

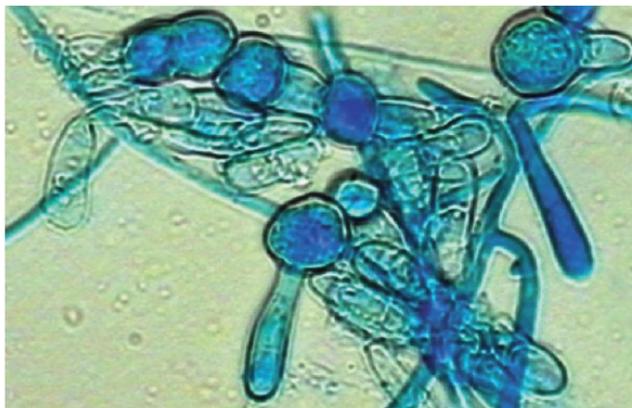


Colonial appearance of *Trichophyton rubrum*.

Definition

Infection of the skin of the groin and pubic region with a dermatophyte.

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Microscopic morphology of *Epidermophyton floccosum*.

Geographical distribution

World-wide.

Causal organisms and habitat

- Anthropophilic dermatophytes *Epidermophyton floccosum* and *Trichophyton rubrum* are most common.
- Maceration and occlusion of groin skin gives rise to infection.
- Often transferred from another infected body site.
- Highly contagious via contaminated towels, floors, etc.

Clinical manifestations

- One or more rapidly spreading erythematous lesions with central clearing on the inside of the thighs, intense pruritis.
- Lesions with raised erythematous border and brown scaling.
- Infection may extend locally and spread to other body sites.

Essential investigations

Microscopy

Direct microscopy of skin scrapings softened with KOH reveals branching hyphae with or without arthrospores.

Dermatophytosis

Culture

Isolation of the dermatophyte at 28°C allows identification.

Management

This condition seldom resolves if untreated. However, it often responds to topical treatment with an azole (clotrimazole, econazole, miconazole, sulconazole), naftifine or terbinafine morning and evening for 2–4 weeks.

Oral therapy, if indicated, includes these alternatives:

- itraconazole 200 mg/day for 1 week
- terbinafine 250 mg/day for 2–4 weeks
- griseofulvin 10 mg/kg for 4 weeks.

Hygiene measures such as thorough drying and using separate towels for the groin area should prevent spread.

There is a recurrence in 20–25% of patients.



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Tinea pedis



Interdigital tinea pedis due to *Trichophyton rubrum*.



Moccasin form of tinea pedis.

Definition

Dermatophyte infection of the feet.

Geographical distribution

World-wide, but more common in countries where there is ready access to communal sports or bathing facilities.

Causal organisms and habitat

- *Trichophyton rubrum* is the most common cause.
- *Epidermophyton floccosum* and *T. mentagrophytes* var. *interdigitale* are also seen.
- Common condition often contracted by walking barefoot on contaminated floors.
- Extensive sweating and occlusive footwear predispose to the condition.
- Infection with the moulds *Scytalidium dimidiatum* (*Hendersonula toruloidea*) and *S. hyalinum* is clinically indistinguishable.

Clinical manifestations

Three types are recognized:

- acute or chronic interdigital infection: itching, peeling, maceration and fissuring of toe webs
- chronic hyperkeratotic (moccasin or dry type): fine, white scaling limited to heels, soles and lateral borders of feet
- vesicular (inflammatory) infection: vesicle formation on soles, instep and interdigital cleft.

Secondary bacterial or yeast infection is also possible.

Essential investigations

Microscopy

Direct microscopy of skin scrapings softened with KOH reveals branching hyphae with or without arthrospores.

Culture

Isolation of the dermatophyte at 28°C allows identification.

Management

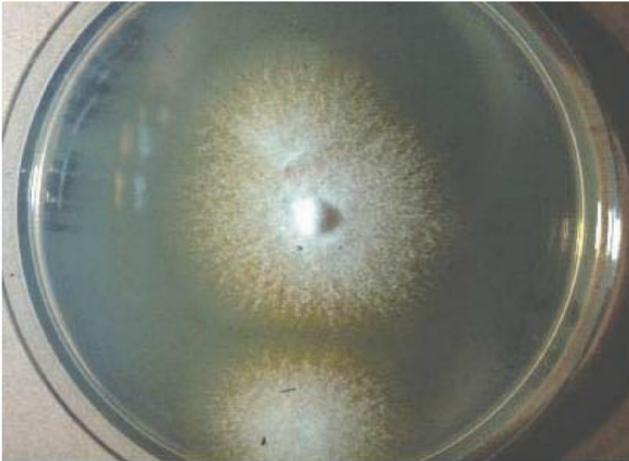
This condition seldom resolves if untreated. However, it often responds to topical treatment with an azole (clotrimazole, econazole, miconazole, sulconazole), naftifine or terbinafine morning and evening for 2–4 weeks.

Oral therapy, if indicated, includes these alternatives:

- itraconazole 200–400 mg/day for 1 week
- terbinafine 250 mg/day for 2–6 weeks.

Dermatophytosis

Tinea manuum



Colony of *Trichophyton erinacei* showing white granular surface and bright yellow pigment diffusing into the agar.



Tinea manuum due to *Trichophyton erinacei*.

Definition

Fungal infection of the hand, or hands.

Geographical distribution

World-wide.

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Causal organisms and habitat

- Most common anthropophilic dermatophytes are *Trichophyton mentagrophytes* var. *interdigitale*, *T. rubrum* and *Epidermophyton floccosum*.
- Most common zoophilic dermatophytes are *Microsporum canis* (cats and dogs), *T. verrucosum* (cattle), *T. mentagrophytes* var. *mentagrophytes* (rodents) and *T. erinaceae* (hedgehogs).
- Occasional infections due to geophilic *M. gypseum* and *M. fulvum*.
- Acquisition by contact with infected person, animal, soil or fomites, or by autoinoculation from another infected body site.
- Profuse sweating and eczema predispose to infection.

Clinical manifestations

- Usually unilateral, predominantly affecting right hand.
- Two forms: dyshidrotic (eczematoid) and hyperkeratotic:
 - dyshidrotic: annular or segmental vesicles with scaling borders containing clear, viscous fluid on palms, palmar aspect of fingers and sides of the hand, characterized by intense pruritis and burning
 - hyperkeratotic: adjacent vesicles desquamate to form an erythematous, scaling lesion with a circular or irregular thick, white, squamous margin with extensions towards the centre. Chronic cases may cover the entire palm and fingers with fissuring in the palmar creases.

Essential investigations

Microscopy

Direct microscopic examination of vesicle tops and skin scales.

Culture

Isolation in culture at 28°C for at least 1 week will permit species identification.

Management

Topical treatment with imidazole or allylamine is often effective:

- itraconazole 200–400 mg/day for 1 week
- oral terbinafine 250 mg/day for 2–6 weeks.

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Tinea unguium



Tinea unguium due to *Trichophyton rubrum*.

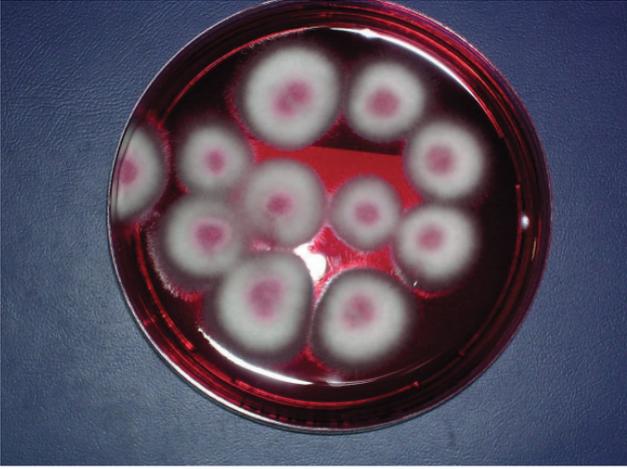


Superficial white onychomycosis.

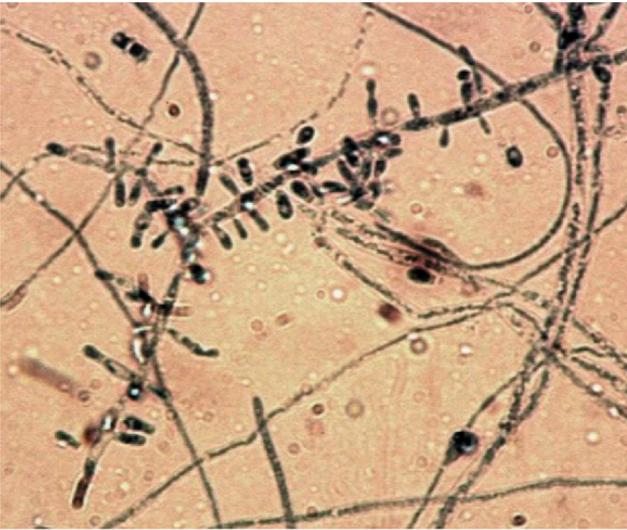
Definition

Dermatophyte infection of the fingernails or toenails. Onychomycosis is also used to describe the condition but has a broader definition encompassing nail infections with yeasts and non-dermatophyte moulds in addition to dermatophytes.

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Culture of *Trichophyton rubrum* on dermatophyte test medium.



Microscopic morphology of *Trichophyton rubrum*.

Geographical distribution

World-wide.

Dermatophytosis

Causal organisms and habitat

- Most commonly caused by anthropophilic species *Trichophyton mentagrophytes* var. *interdigitale* and *T. rubrum*.
- May be rare infections of fingernails with zoophilic species.
- Affects up to 8% of adult population.

Clinical manifestations

- Toenails more often infected than fingernails.
- Infection often follows infection of another body site.
- First and fifth toenails most commonly infected, probably due to traumatic damage by ill-fitting footwear.
- White or yellow irregular lesion appears first at free end of nail and spreads slowly to cause entire nail to become thickened, opaque and yellow in colour, and it may crumble.
- Superficial white onychomycosis is seen predominantly in patients with AIDS where crumbling white lesions, most often due to *T. mentagrophytes* var. *interdigitale*, appear on the nail surface.

Essential investigations

Microscopy

Microscopy of material from KOH softened nails is essential.

Culture

Culture at 28°C will allow identification of the infecting species.

Culture of material on plates with and without cycloheximide will allow differentiation of dermatophyte and non-dermatophyte mould infections.

Subungual material may be most productive and a nail drill or scalpel may be used.

Management

This condition is difficult to treat, requiring prolonged courses. Topical treatment may be effective for superficial white onychomycosis or where there is very limited distal nail involvement otherwise an oral therapy is indicated.

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- Topical: amorolfine at weekly intervals or tioconazole twice daily for 6 months for fingernails and 9–12 months for toenails.
- Oral: itraconazole 2 or 3 pulse treatment 400 mg/day for 1 week in 4, or continuous 200 mg/day for 3 months.
- Oral griseofulvin for 4–8 months, but low success rate in toenail infections.
- Oral terbinafine 250 mg/day for 6–12 weeks for fingernails, 12 weeks or longer for toenails.
- Oral fluconazole 150–450 mg once weekly for 6–9 months in toenail infections, 3 months for fingernails.