Cutaneous Mycoses

Dermatophytosis

The diseases involve the skin, hair and nail and collectively known as dermatophytosis, ringworm or tinea. The infections are generally restricted to the keratinized layers and caused by group of specialized fungi called dermatophytes. They produce infections range from mild to sever symptoms depending on the immunological response of the host and fungal species.

Etiologic agents:

Although there are over 100 species have been described, only 40 are considered valid and less than have of these are associated with human disease. In the anamorphic state (asexual phase), they are classified into three genera on the basis of their sporulation patterns, certain morphologic features of developments and nutritional requirements as fellows:

a. Microsporum
b. Trichophyton
c. Epidermophyton

They are also can be divided into three groups according to their natural habitat in which fungi in all three categories are capable of causing human infections.

1. Anthropophilic (human)
2. Zoophilic (animal)
3. Geophilic (soil)

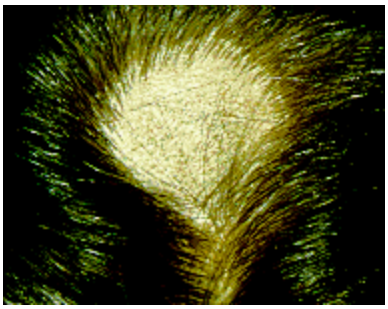
Table1. Ecology of Common Human Dermatophyte Species:

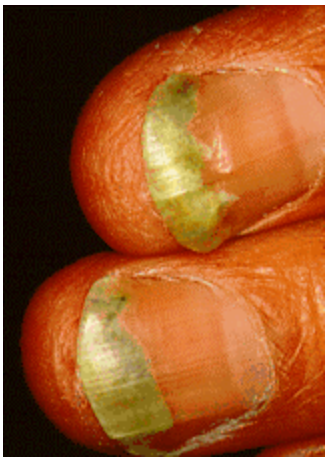
Species	Natural habitat	Incidence
Epidermophyton floccosum	Humans	Common
Trichophyton rubrum	Humans	Very Common
Trichophyton interdigitale	Humans	Very Common
Trichophyton tonsurans	Humans	Common
Trichophyton violaceum	Humans	Less Common
Trichophyton concentricum	Humans	Rare*
Trichophyton schoenleinii	Humans	Rare*
Trichophyton soudanense	Humans	Rare*
Microsporum audouinii	Humans	Less Common*
Microsporum ferrugineum	Humans	Less Common*
Trichophyton mentagrophytes	Mice, rodents	Common
Trichophyton equinum	Horses	Rare
Trichophyton erinacei	Hedgehogs	Rare*
Trichophyton verrucosum	Cattle	Rare
Microsporum canis	Cats	Common
Microsporum gypseum	Soil	Common
Microsporum nanum	Soil/Pigs	Rare
Microsporum cookei	Soil	Rare

* Geographically restricted.

Clinical manifestations: According to anatomic site

1. Tinea capitis
2. Tinea pedis
3. Tinea corporis
4. Tinea unguium
5. Tinea favus: Is characterized by the occurrence of dense mass of mycelium and epithelial debris forming yellowish cup-shaped crust called scutula. After a period years atrophy of the skin occurs leaving a cicatricial alopecia and scarring. The main causative agent is *T. schoenleinii*.




Laboratory diagnosis:

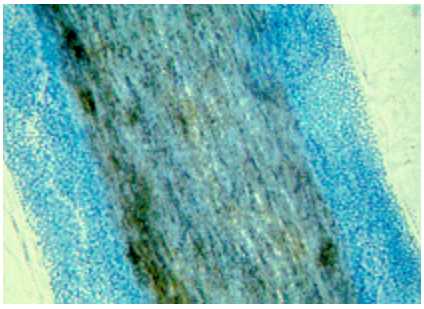
a. Direct mount:

Skin scraping, hair or nail fragments are mounted in 10% potassium hydroxide (10% KOH). Microscopically examination will reveal hyphae or arthroconidia. In the case of hair infection wood lamp is used to view the head in a darkened room, since some dermatophytes species show different color such as bright yellow green in case of *M. canis* and *M. audouinii* or dull bluish white in the case of *T. schoenleinii*

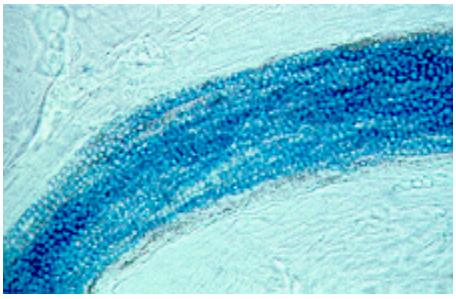
KOH mount for hair specimen:

It is used in order to observe the true position of the fungus, size and arrangement of spores on the outside or inside of the hair shaft (ectothrix or endothrix).

1. **Ectothrix hair invasion:**
    a. Spores may be small in mosaic mass such as in the case of *M. canis* and *M. audouinii* or small forming sheath in *T. mentagrophytes*
    b. Large spores in spares chain inside and outside of hair shaft such as *M. nanum* or large spores forming sheath /or in isolated chains e.g. *T. rubrum*.
2. **Endothrix hair invasion:** Chain of spores inside the hair shaft, in which hair is thickened, twisted and broken of short as in infection with *T. violaceum* and *T. tonsurans*.



Ectothrix hair invasion



Endothrix hair invasion

3. **Favic hair:** Hyphae without spores throughout hair length and fat droplet seen in the empty areas mainly seen in *T. schoenleinii*.

4. **Hair not invaded** usually seen with *E. floccosum*.

KOH of skin and nail:

Direct microscopic examination only will reveal hyphae and arthroconidia or both

KOH microscopic examination of skin or nail

b. Isolation and identification:

Carried out by inoculation of clinical specimens onto Sabouraud's dextrose agar which containing cycloheximide (actidione) and antibiotics. Plates are incubated at 30C and discard after 2-4 weeks. Identification of the species are based primarily on the conidia that produced and other biochemical tests as well as colony morphology characteristic.

General characteristic of Macroconidia and Microconidia of dermatophytes:

Genus	**Macroconidia**	**Microconidia**
Microsporum	numerous, thick- walled, rough	rare
Trichophyton	rare, thin-walled, smooth	abundant
Epidermophyton	numerous, smooth-walled	absent


Colony morphology of dermatophytes


Macroconidia **Microconidia**

Treatment:

Griseofulvin tablet or syrup and the azoles compounds for topical and systemic use depending on severity of infections.

The Cutaneous Mycoses

These are superficial fungal infections of the skin, hair or nails. No living tissue is invaded, however a variety of pathological changes occur in the host because of the presence of the infectious agent and its metabolic products.

Disease	Causative organisms	Incidence
Dermatophytosis Ringworm of the scalp, glabrous skin and nails.	Dermatophytes (*Microsporum, Trichophyton, Epidermophyton)*	Common
Candidiasis of skin, mucous membranes and nails.	*Candida albicans* and related species.	Common
Dermatomycosis	Non-dermatophyte moulds *Hendersonula toruloidea* *Scytalidium hyalium* *Scopulariopsis brevicaulis*	Rare