Fungal infections

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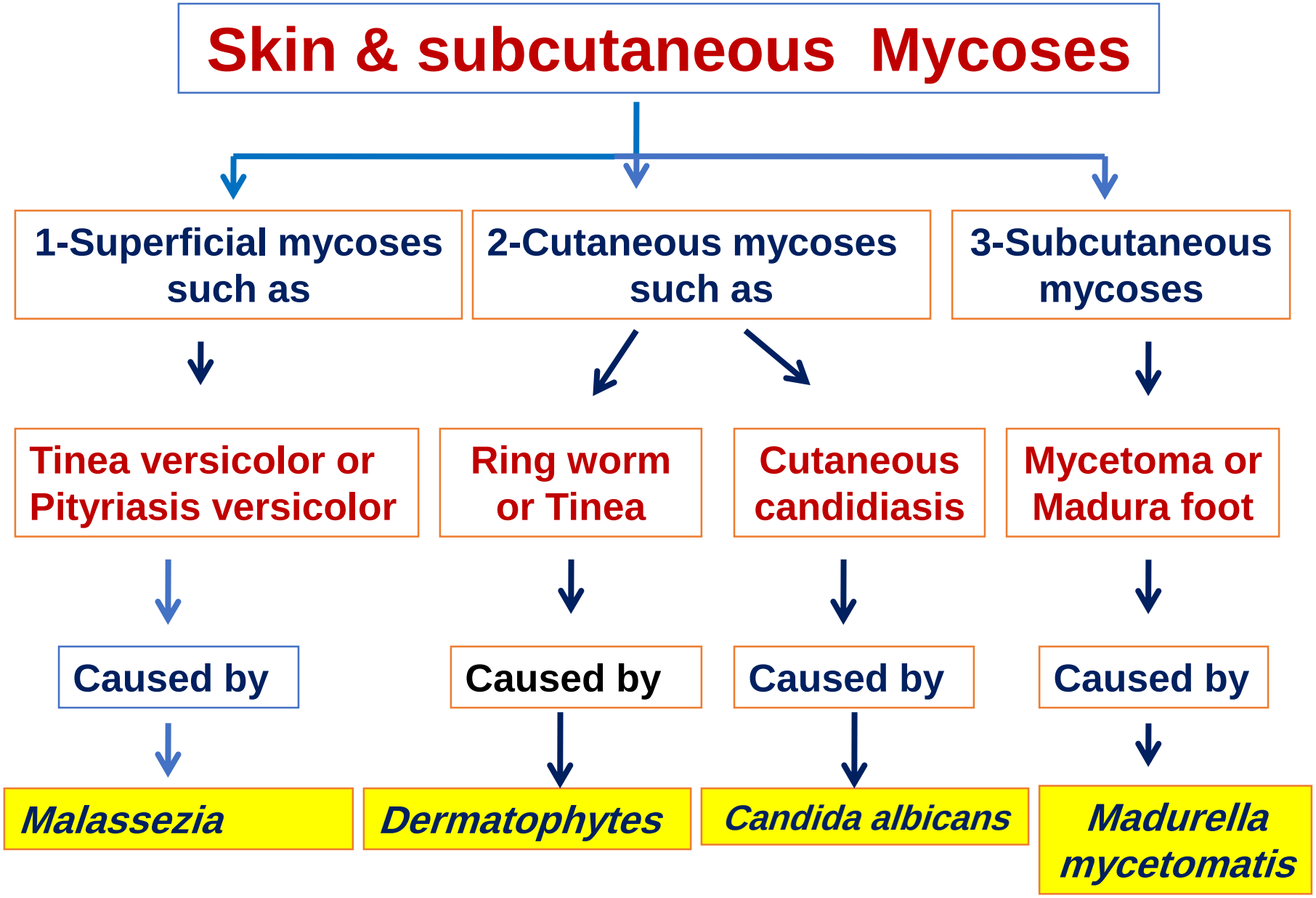
Skin & subcutaneous Mycoses
1-Superficial mycoses such as
2-Cutaneous mycoses such as
3-Subcutaneous mycoses
Tinea versicolor or Pityriasis versicolor
Ring worm or Tinea
Cutaneous candidiasis
Mycetoma or Madura foot
Caused by
Caused by
Caused by
Caused by
Malassezia
Dermatophytes
Candida albicans
Madurella mycetomatis

Superficial Malessezia infections:

- Lipophilic yeast round in shape
- Normal commensals of skin
- Can cause skin infections and catheter associated infections

Superficial Malessezia infections

Pityriasis versicolor:

:

- Skin (stratum corneum) infection
- Trunk and proximal limbs

- M. furfur and M. globosa
- Common in tropics and precipitated by sun exposure

- Carboxylic acid produced by the yeast causes the depigmentation

Superficial Malessezia infections

Pityriasis versicolor:

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Clinically:

- Asymptomatic Non itchy macules hypo or hyper pigmented
- Can coalesce to form scaly plaques

Superficial Malessezia infections

Pityriasis versicolor:

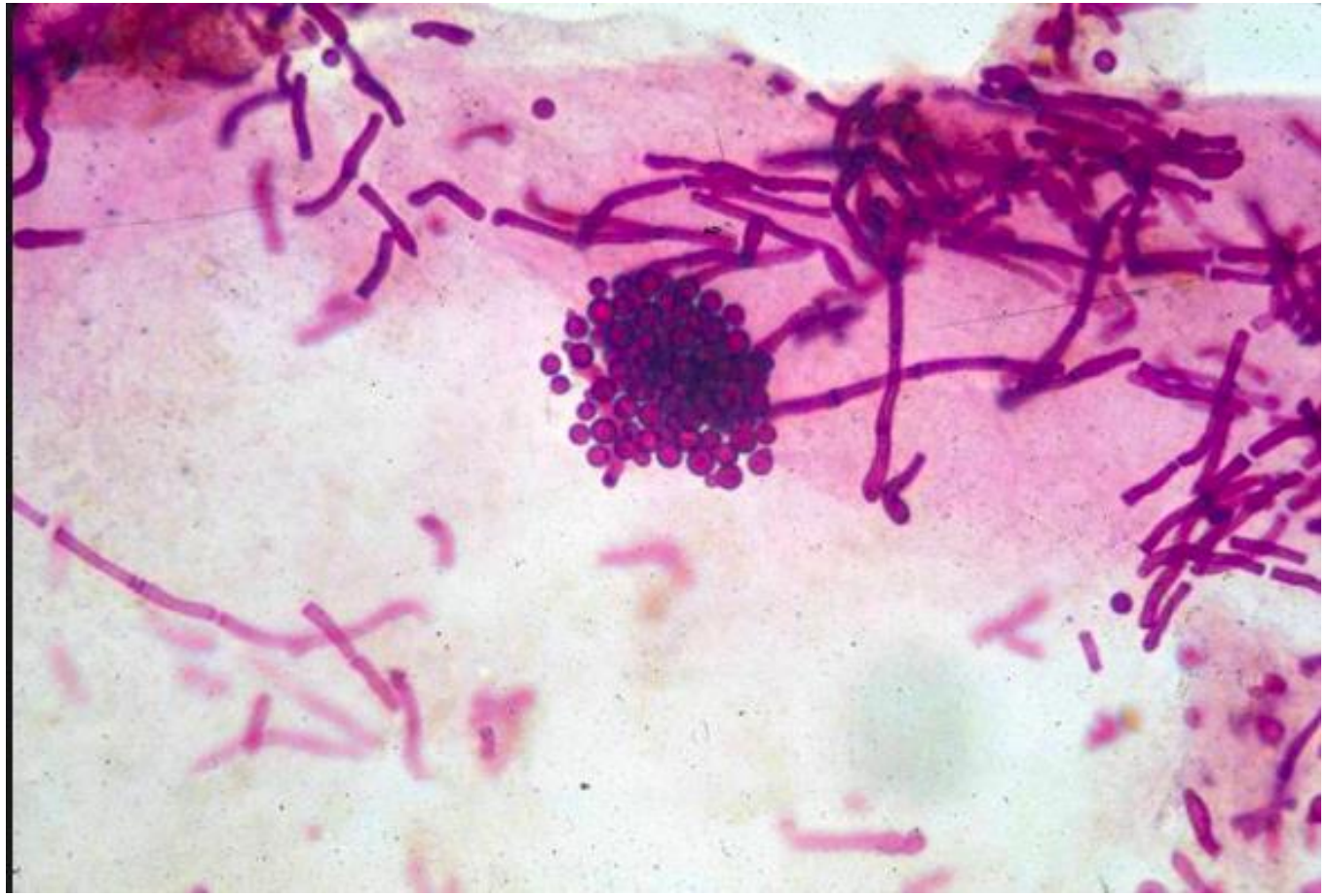
:

Diagnosis:

•UV light: pale greenish colour under **Wood's ultra-violet light**

•Skin scraping then Ink and KOH staining

➢ thick septate hyphae and clusters of budding yeast cells (Spaghetti and meatballs)



Superficial Malessezia infections

Treatment if needed is for cosmetic reasons:

- Some resolve spontaneously
- Topical azoles cream/ shampoo for 2 weeks or in severe cases use oral azoles
- Recurrence is common

(Seborrheic dermatitis):

Skin hyperproliferation with dandruff being the mildest manifestation.

Lesions are red and covered with greasy scales and itching is common in the scalp.

M. furfur

Azoles

Cutaneous Mycoses

Ring worm or tinea

- Caused by dermatophytes (filamentous fungi / moulds) which include 3 genera: *Microsporum*, *Trichophyton* & *Epidermophyton*.
- These fungi affect the keratinized tissues as skin, hair & nails.
- Infection not spread to deeper tissues.

Source of infection

1- Man to man by direct contact (Anthrophilic)

2- From animals e.g. dogs and cats (Zoophilic)

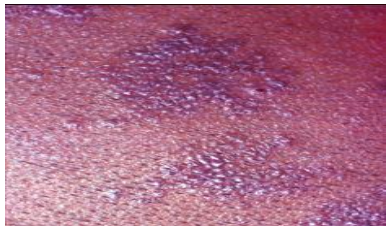
3- From the soil (Geophilic).

N.B.

- The intact skin is an important barrier against infection.
- Heat and humidity enhance the infection.

Clinical forms

- **Tinea pedis or Athlete's foot** → Toes web
- **Tinea corporis & cruris** → Body & groin area
- **Tinea capitis** → Head
- **Tinea unguinum** → Nail



❖Clinical pictures:

➢Red, itchy scaly rash, ring like with raised more inflamed border on the body or groin.

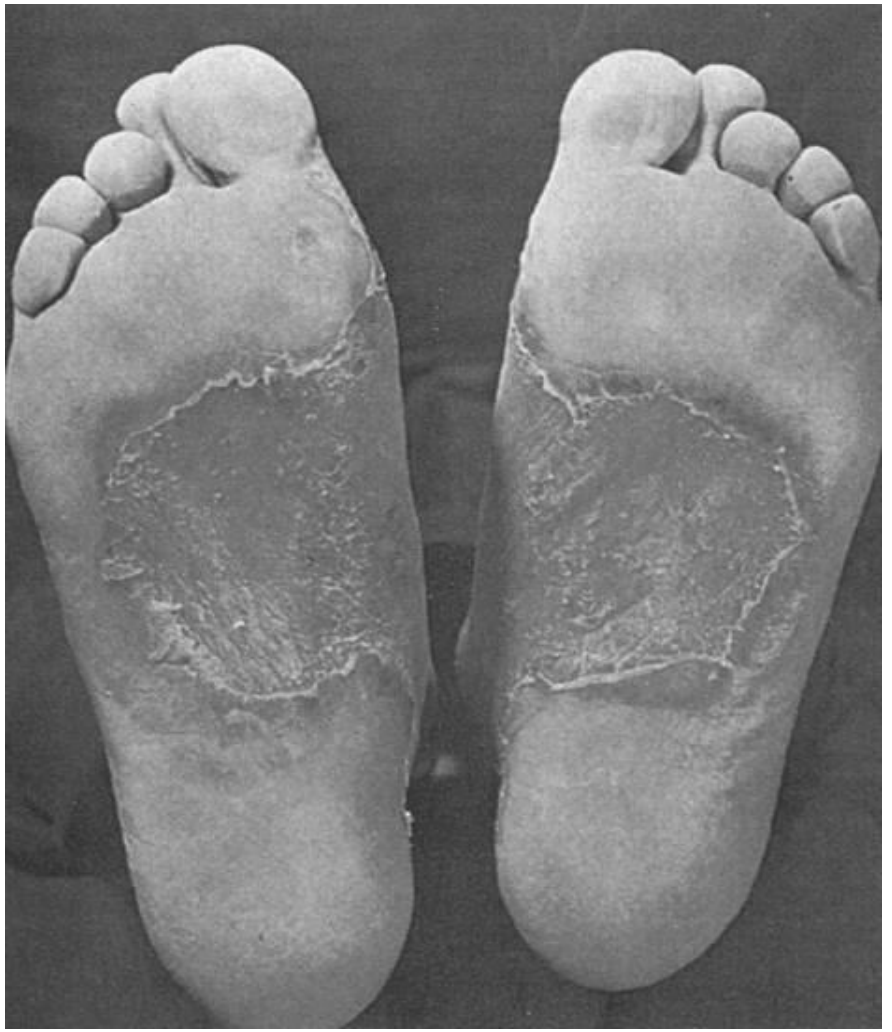
➢ Scaling and hair loss leaving black dots.

➢ White and opaque / yellow , thickened &broken nails.

➢DDX: Eczema, psoriasis, impetigo, alopecia, drug reactions.

Ring like lesion

- Tinea pedis showing interdigital scalping
- *T. mentagrophytes*



Dermatophytos of the soles

Diagnosis

Microscopic examination

❖Skin scales, nail & hair are examined microscopically after digestion using 10% KOH.

➢Branching hyphyae are detected among epithelial cells of skin & nails.

➢Hyphae or spores are detected in the hair. Spores either detected inside the hair (endothrix) or outside the hair (ectothrix).

Culture

❖Culture on Sabouraud's dextrose agar (SDA):

❖The agar incubated at room temperature for 4 ws.
The arising colonies examined microscopically after staining with lactophenol cotton blue stain.

Treatment

Local antifungal cream as miconazole or oral terbinafine weeks to months

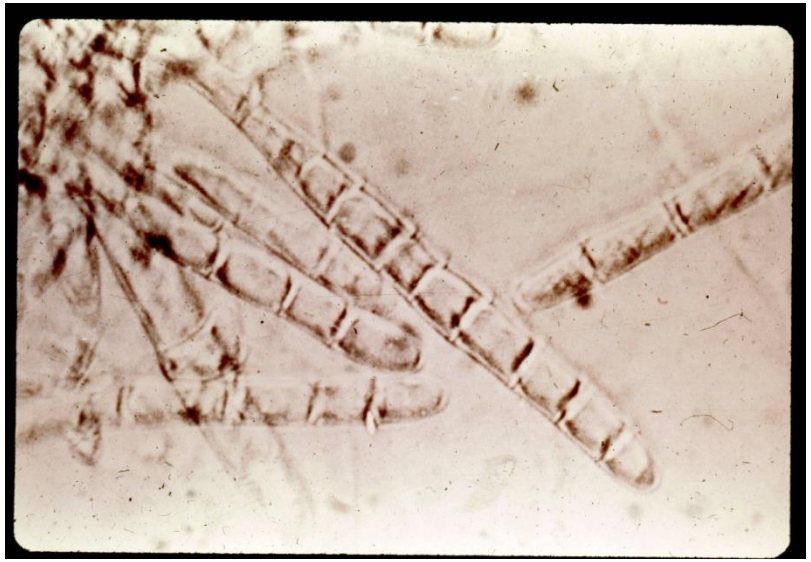
Common Dermatophytes

Epidermophyton floccosum:

Bifurcated hyphae with multiple, smooth, club shaped macroconidia (2-4 cells)

Microsporum:

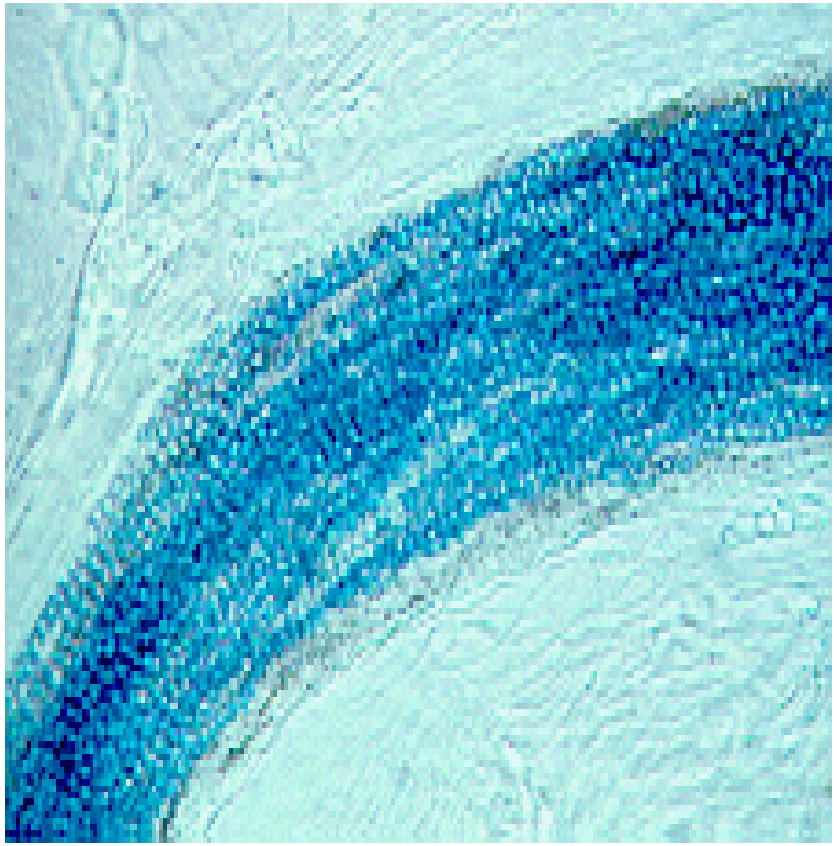
Thick wall spindle shape multicellular



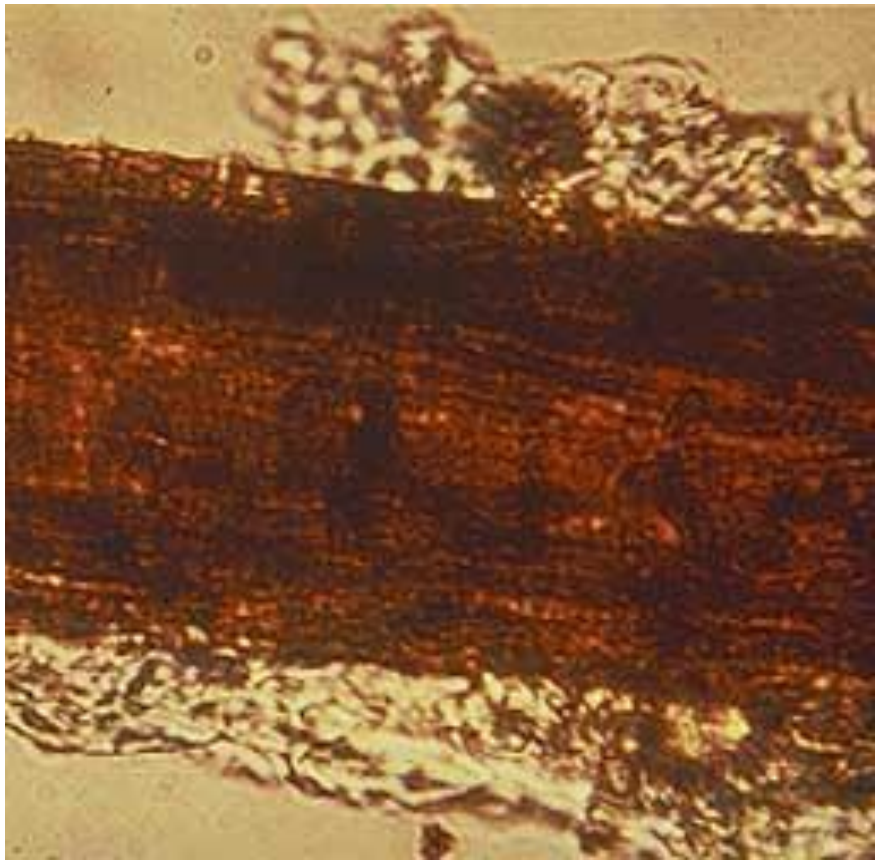
Trichophyton:

Large, smooth, thin wall, septate, pencil-shaped

Hair examination



Endothrix



Ectothrix

Subcutaneous mycoses

Mycetoma (Madura foot)

- These infection caused by fungi that grow in soil & on decaying vegetations.
- The fungi introduced into subcutaneous tissues through trauma.
- Mycetoma is a chronic granulomatous infection usually affects the lower limbs and hands
- The disease usually affects farmers.

Causative organism of mycetoma

1- Eumycetoma: caused by fungi *Madurella mycetomatis* which having true septate hyphae.

2- Actinomycetoma: caused by species of actinomycetes (filamentous aerobic bacteria).

Clinical pictures

Swelling following trauma, purplish discolouration & multiple sinuses that drain pus containing yellow, white, red or black granules.

Diagnosis

Macroscopic examination

Depend on the color of the granules

➢Black granules are common with fungal infection.

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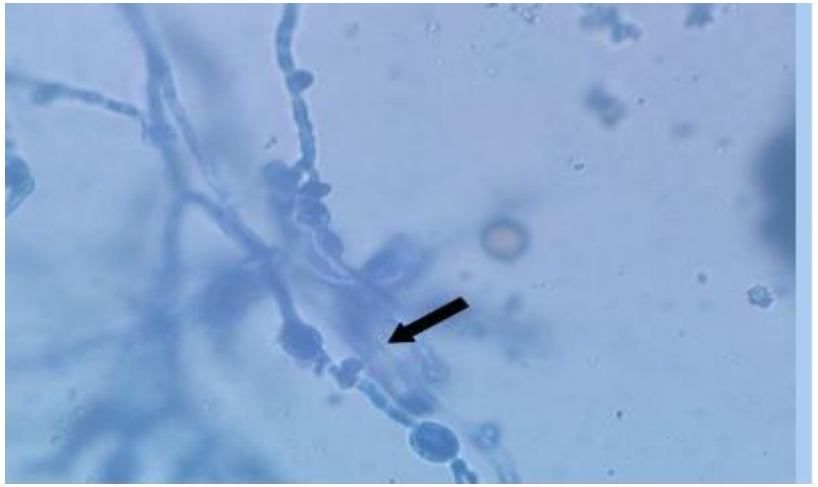
Microscopic examination

➢Septate hyphae with spores in fungal infection.

Culture

On SDA

Madura foot



Madurella mycetomatis with intercalary chlamydospores

Treatment

1.Medical:

- **- ketoconazole**
- **- Itraconazole**
- **- Amphotericin B**
- **2. Surgical.**

OPPORTUNISTIC MYCOSES

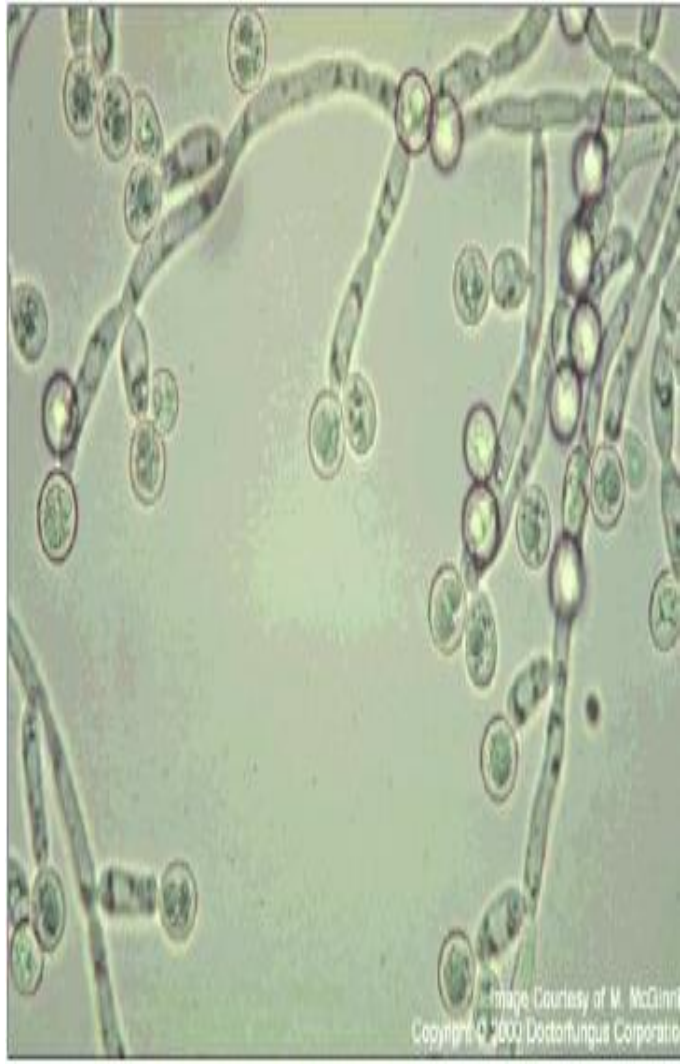
- Opportunistic mycoses are caused by globally distributed fungi that are either members of the human microbiota, such a Candida species, or environmental yeasts and molds.

- They can produce disease ranging from superficial skin or mucous membrane infections to systemic involvement of multiple organs

- Patients at risk include those with hematologic dyscrasias (eg, leukemia, neutropenia) , patients with HIV/AIDS with CD4 counts less than 100 cells/μ L, as well as those treated with immunosuppressive (eg, corticosteroid) or cytotoxic drugs

Candidiasis

- ***Candida albicans*** **is the most important species of candida (other species…).**
- ***Candida albicans*** **is oval gram positive budding yeast which produce pseudohyphae.**
- **It colonises the mucous membranes of the upper respiratory, GIT & female genital tracts.**
- **It causes superficial infections but can predominate with lowering in immunity causing infection so it is one of the opportunistic fungi.**



Predisposing factors to *Candida* infections

1- Diseases as AIDS & diabetes melllitus.

2- Drugs: prolonged treatment with broad spectrum antibiotics & corticosteroids.

3- General debility.

4- Indwelling urinary catheters.

Pathogenesis & Symptomatology

Skin invasion

-They are red & weeping lesions.
-Mainly affect worm moist areas.
Such as axilla, intergluteal folds or infra mammary folds.
-Mostly in obese & diabetics.
-Pseudo diaper rash

Mouth infection

C. albicans produces white patches in the mouth (oral thrush or moniliasis).

Sometimes oral leukoplakia, esophagitis, gastritis

Vulvovaginitis

-With itching & thick vaginal discharge .
-Common with diabetic woman & prolonged use of antibiotics, IUCD, Pregnancy..

Nails infection

-Occurs with repeatedly immersing in water (dish washing).
-Painful redness , swelling of nail folds , thickening & loss of nail (paronychia).

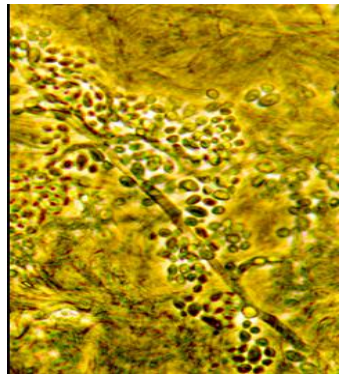
Systemic candidiasis

Occure in diabetics & Immuno - suppressed persons.

Candida fingerweb erosion：related to fatness , occupation etc.

Laboratory diagnosis

Direct microscopic examination



- Specimens from skin, vaginal discharge or exudates from mucous surfaces are examined.
- *C. albicans* is oval gram positive budding yeast cell with pseudohyphyae.

Culture

On nutrient agar, corn meal agar & SDA. Colonies are creamy in color & identified by:

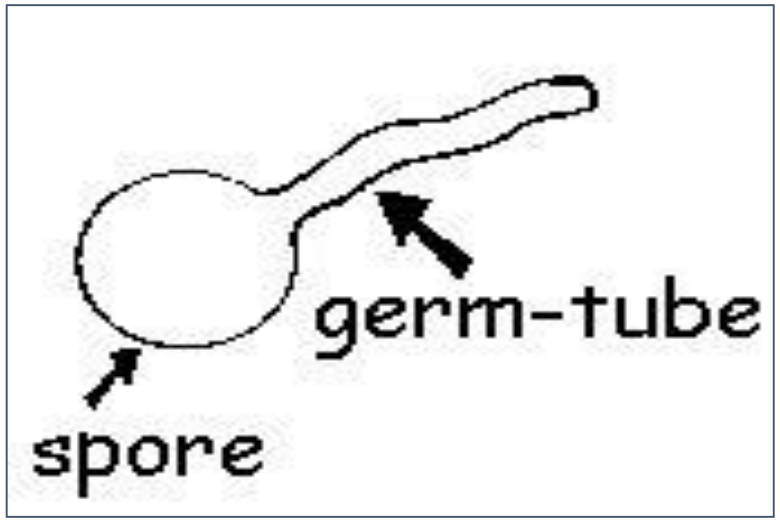
1- **Morphology:** oval budding gram +ve yeast cells.

2- **Differentiation tests:**

a. **Germ tube test :** germ tube is formed when colonies incubated with human serum at 37 C for 30 min.

b. **Chlamydospore** formation on corn meal agar.

c. **Biochemical reactions:** *C.albicans* ferments glucose & maltose with acid & gas production.



Germ tube

Terminal Chlamydospore & pseudohyphyae

Tratment

- Oropharyngeal or oesophageal thrush
  - Nystatin
  - Fluconazole ont
- Skin lesions
  - Nystatin ointment
- Systemic candidiasis
  - Caspofungin IV,
  - Ketoconazole (orally)
  - Amphotericin B (IV)

Cryptococcus neoformans

- *Cryptococcus neoformans* causes cryptococcosis.
- A widespread **encapsulated yeast** that inhabits soil around pigeon roosts
- Common infection of **AIDS**, **cancer** or **diabetes patients**
- Infection of **lungs** leads to cough, fever, and lung nodules
- **Dissemination to meninges** and brain can cause severe neurological disturbance and death.

Diagnosis

Microscopic

- **India Ink for capsule stain** (50-80% + CSF)

Culture

- Bird seed agar
- Routine blood culture

PCR

Aspergillosis: Diseases of the Genus *Aspergillus*

- Very common airborne soil fungus
- 600 species, 8 involved in human disease; *A. fumigatus* most commonly
- Serious opportunistic threat to **AIDS, leukemia**, and **transplant patients**
- Infection usually occurs in **lungs** – spores germinate in lungs and form **fungal balls**; can colonize **sinuses, ear canals, eyelids,** and **conjunctiva**
- **Bronchopulmonary allergy or Invasive aspergillosis in preformed cavitirs**can produce **necrotic pneumonia, and infection of brain, hear**t, and other organs.
- Surgery , Amphotericin B and nystatin

Zygomycosis

- Zygomycota are extremely abundant saprophytic fungi found in soil, water, organic debris, and food.
- Genera most often involved are ***Rhizopus, Absidia, and Mucor.***

- Usually harmless air contaminants invade the membranes of the **nose, eyes, heart**, and **brain** of people (Rhinocerebral mucormycosis) with **diabetes** and malnutrition, with severe consequences.
- **main host defense is phagocytosis**

<u>Diagnosis</u> is made by direct smear and by isolation of molds from respiratory secretions or biopsy specimens.

<u>Treatment</u>:
Control Diabetes ,surgery & amphotericin B

<u>Prognosis</u>: very poor

PNEUMOCYSTIS

- Pneumocystis jirovecii is the cause of a lethal pneumonia in immunocompromised persons, particularly those with AIDS.
- Definite diagnosis of pneumocystosis depends on finding organisms of typical morphology in appropriate specimens (Sputum, BAL)
- The organism has not been grown in culture
- TMP-SMX is treatment of choice

Endemic mycosis

- Endemic mycosis is caused by a thermally dimorphic fungus, and the infections are initiated in the lungs following inhalation of the respective conidia.

- Each of the four primary systemic mycoses—coccidioidomycosis, histoplasmosis, blastomycosis, and paracoccidioidomycosis—is geographically restricted to specific areas of endemicity.

- Most infections are asymptomatic or mild and resolve without treatment. However, a small but significant number of patients develop pulmonary disease.

The End