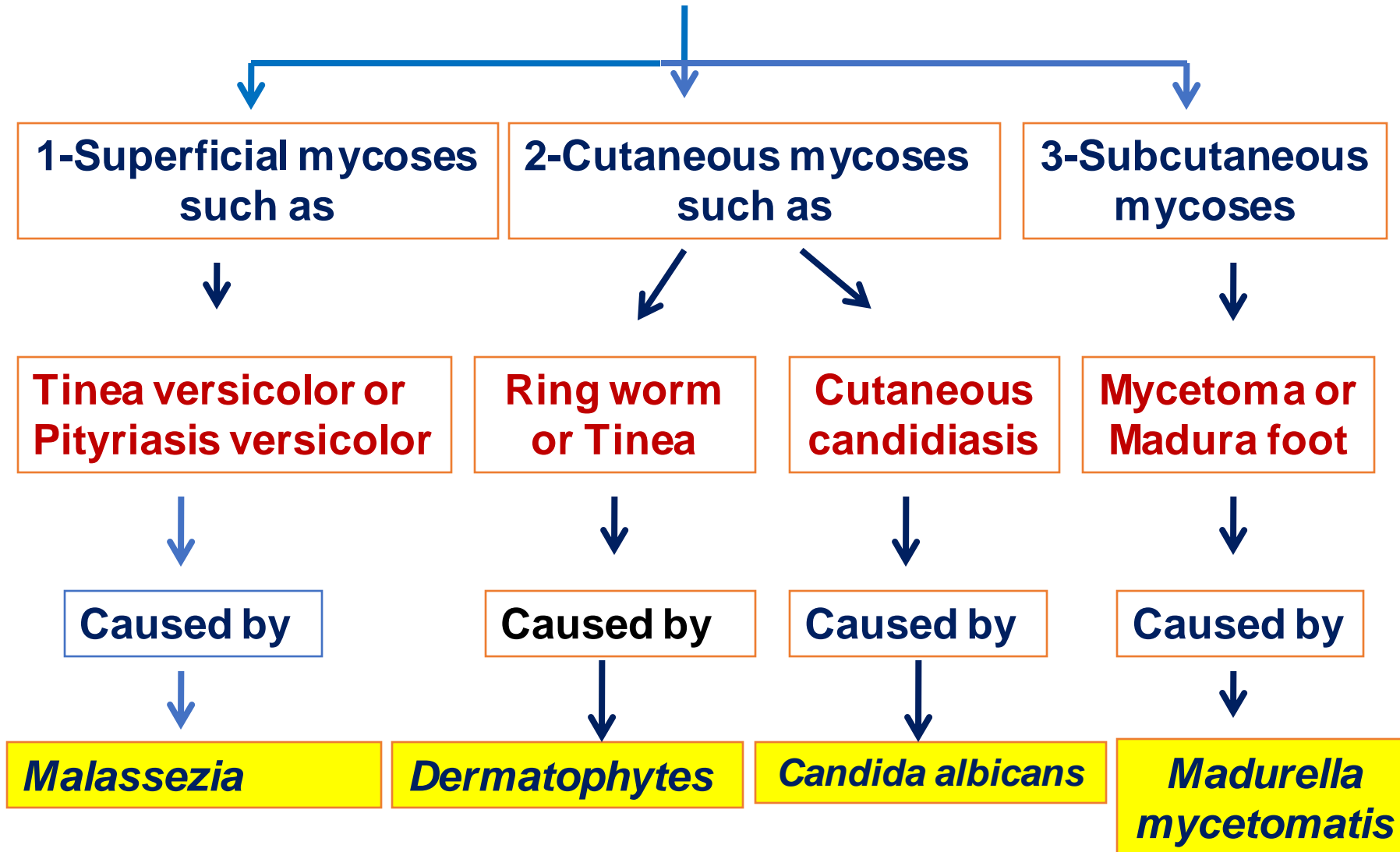


# Fungal infections

By: Nader Alaridah MD,PhD

# Skin & subcutaneous Mycoses



# Superficial Malessezia infections:

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

# Superficial Malassezia 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 Malassezia infections

## Pityriasis versicolor:

### Clinically:

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







# Superficial Malassezia infections

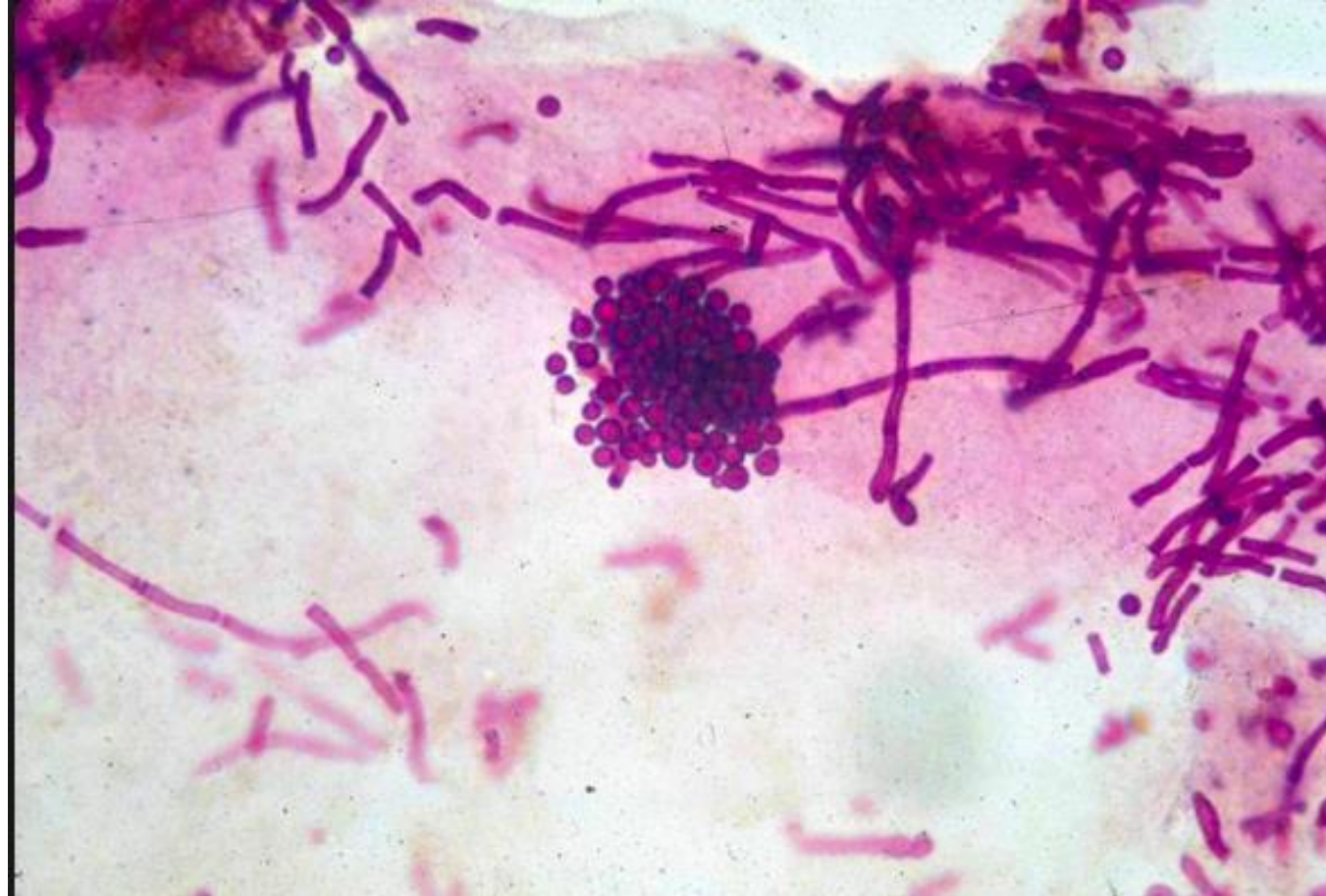
## Pityriasis versicolor:

:

### 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 Malassezia 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

Tinea corporis & cruris

Tinea capitis

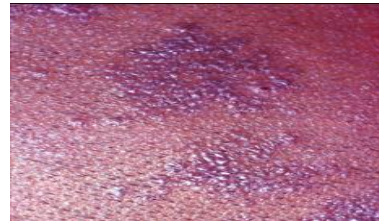
Tinea unguinum

Toes web

Body & groin area

Head

Nail



❖ **Clinical pictures:**

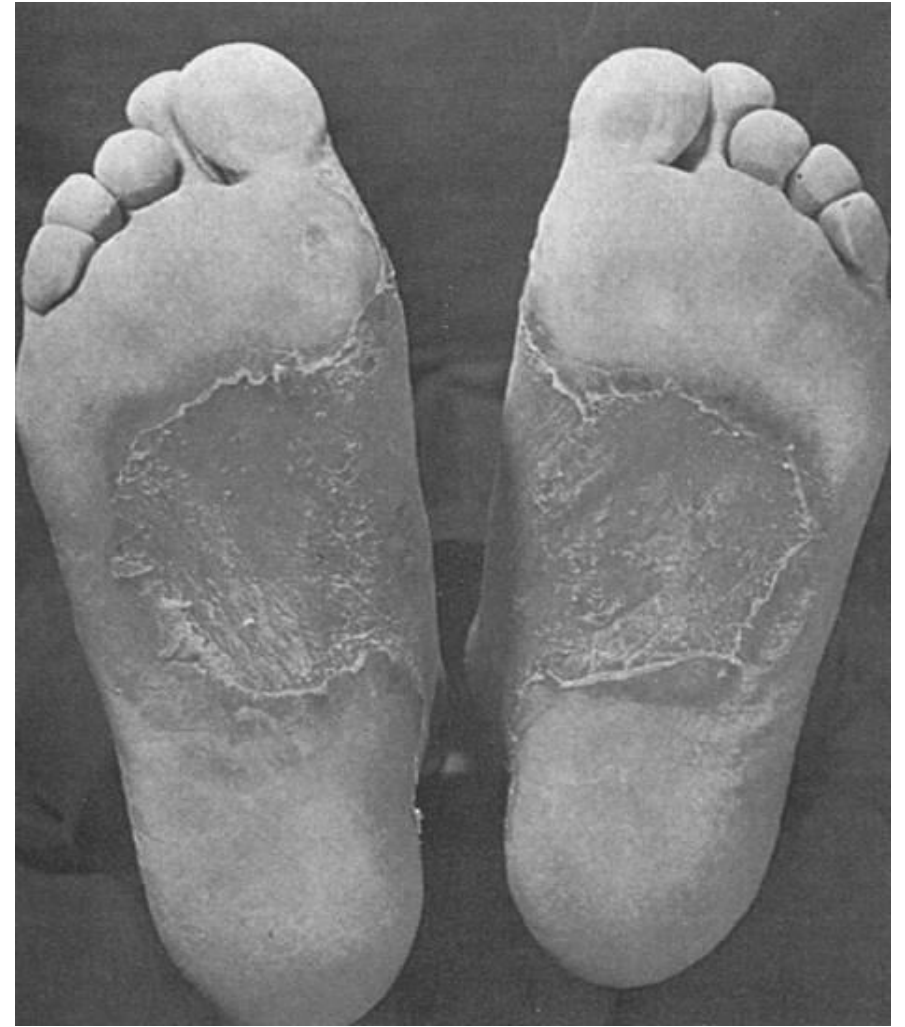
- **Red, itchy scaly rash, ring like with raised more inflamed border on the body or groin.**
- **Scaling and hair loss leaving black dots.**
- **White and opaque / yellow , thickened & broken nails.**
- **DDX: Eczema, psoriasis, impetigo, alopecia, drug reactions.**



**Ring like lesion**



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



Dermatophytosis of the soles

# Diagnosis

## Microscopic examination

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

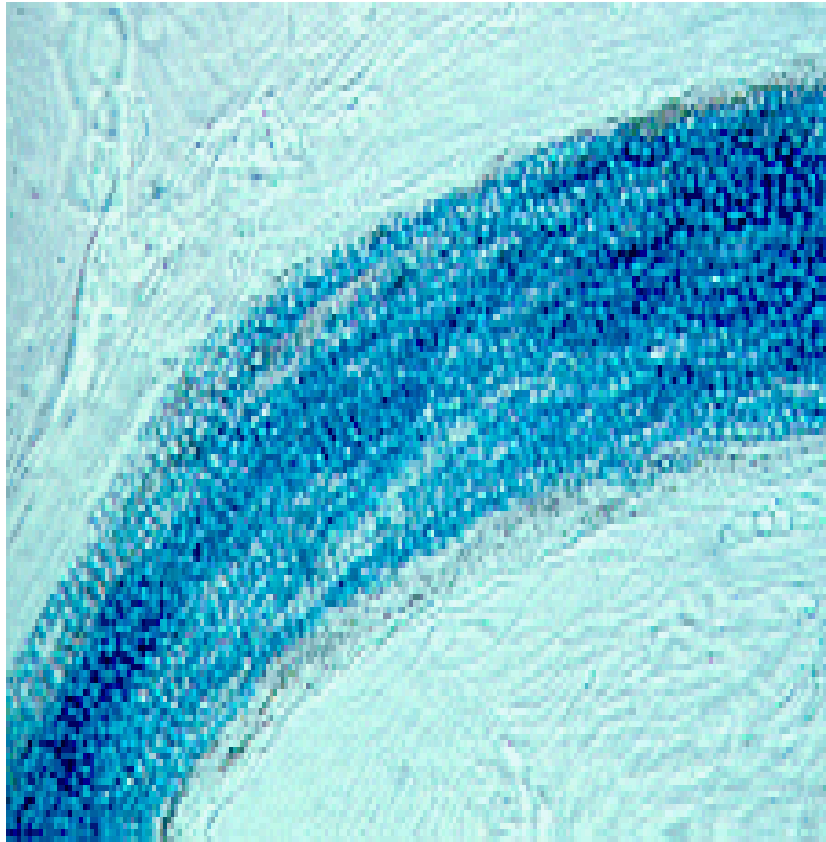
Thick wall spindle shape multicellular



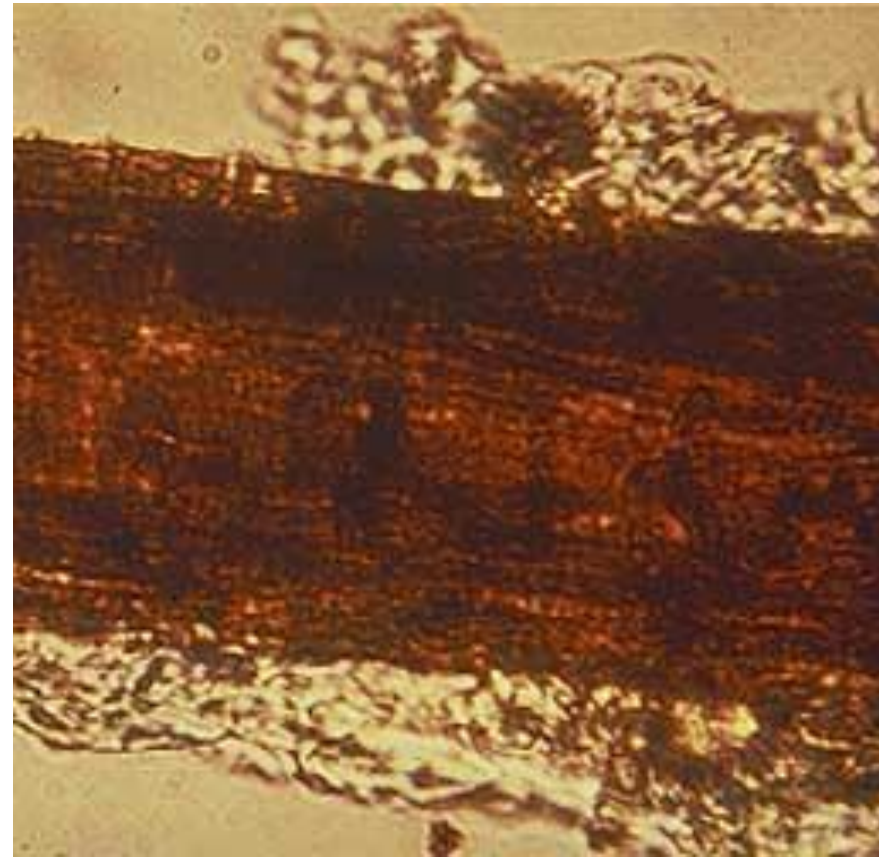
## *Trichophyton*:

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**.

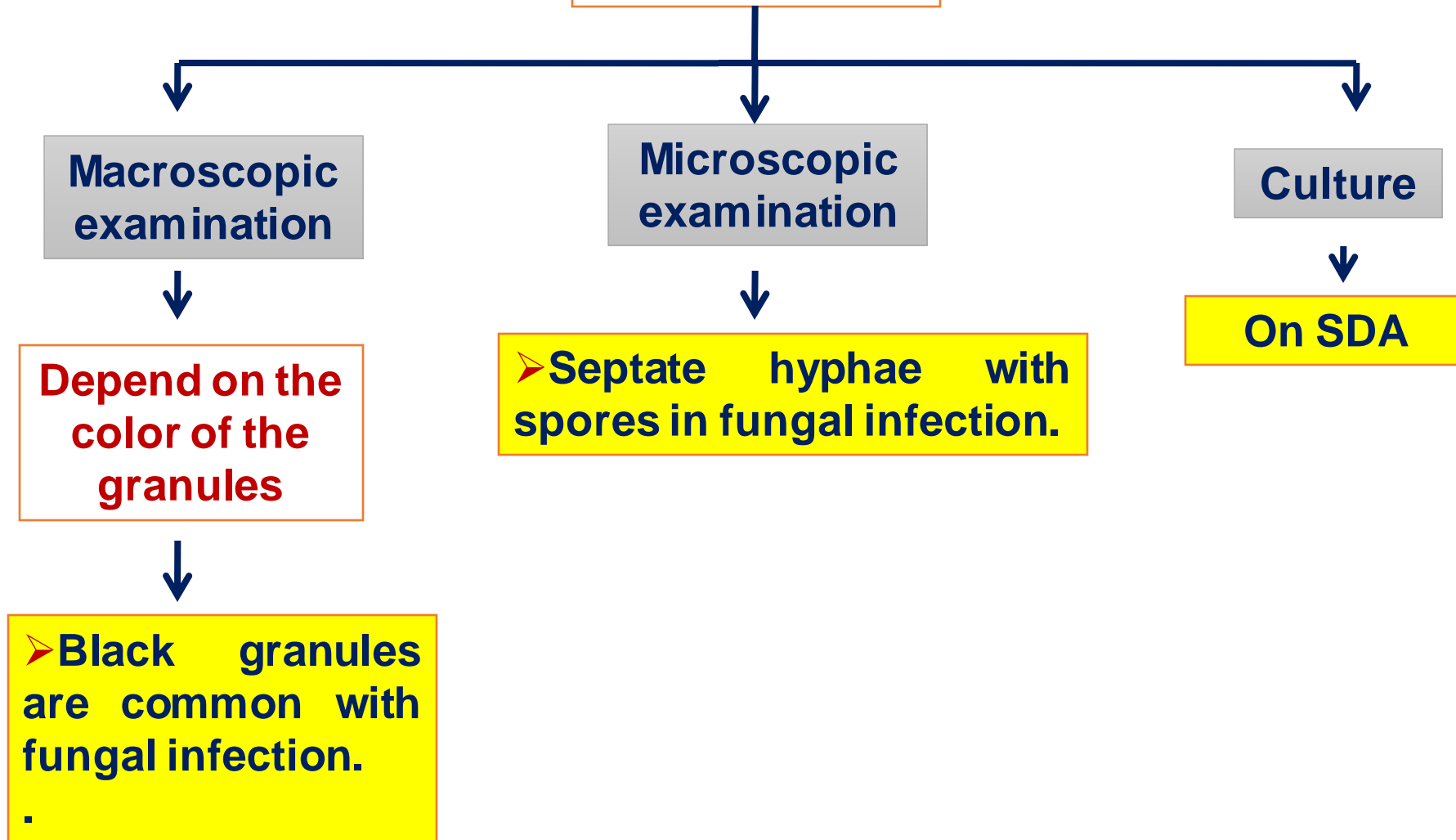
## Causative organism of mycetoma

- 1- Eumycetoma: caused by fungi *Madurella mycetomatis* which having true septate hyphae.
- 2- Actinomycetoma: caused by species of actinomycetes (filamentous aerobic bacteria).

## Clinical pictures

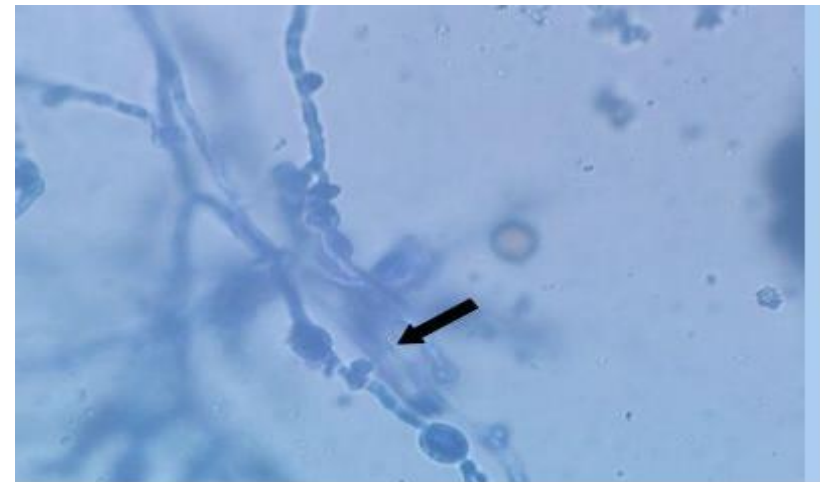
Swelling following trauma, purplish discolouration & multiple sinuses that drain pus containing yellow, white, red or black granules.

# Diagnosis





**Madura foot**



***Madurella mycetomatis* with  
intercalary chlamydospores**

# Treatment

## **1. Medical:**

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

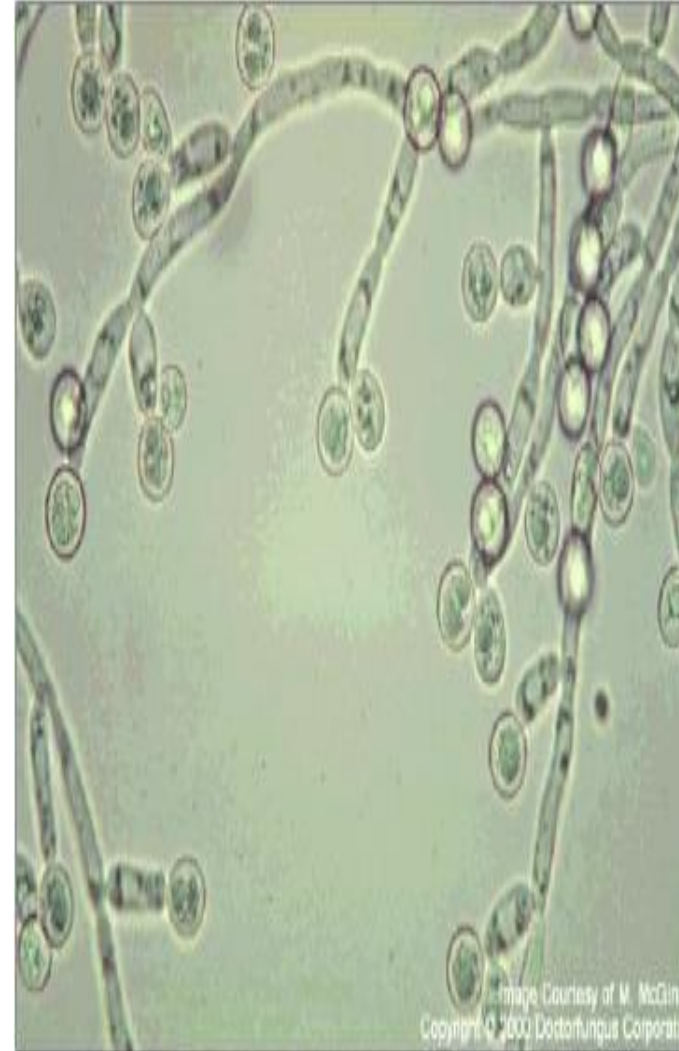
# OPPORTUNISTIC MYCOSES

- Opportunistic mycoses are caused by globally distributed fungi that are either members of the human microbiota, such as 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/ $\mu$  L, as well as those treated with immunosuppressive (eg, corticosteroid) or cytotoxic drugs



# Candidiasis

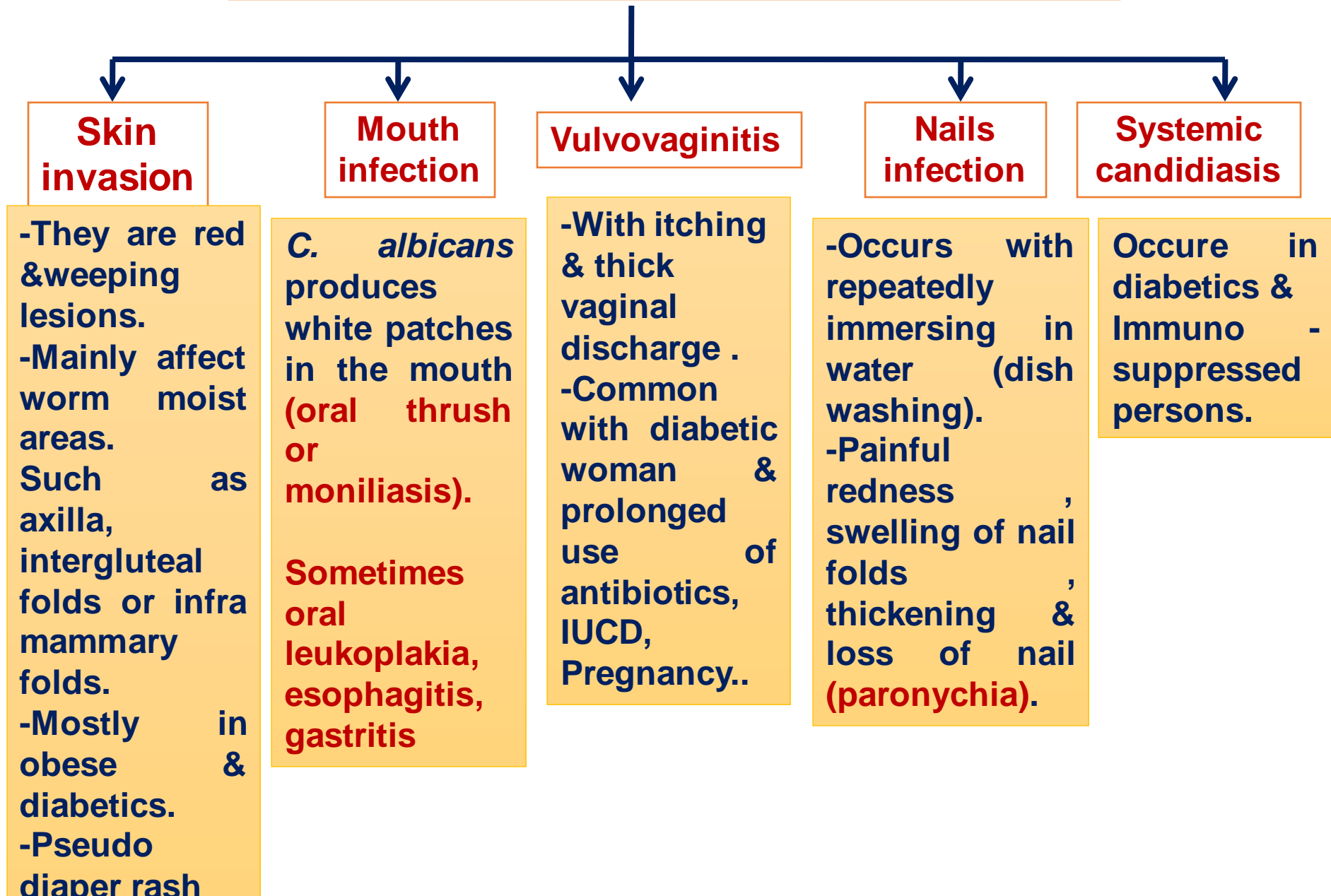
- ***Candida albicans*** is the most important species of candida (other species...).
- ***Candida albicans*** is oval gram positive budding yeast which produce pseudohyphae.
- It colonises the mucous membranes of the **upper respiratory, GIT & female genital tracts.**
- It causes superficial infections 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 mellitus.**
- 2- Drugs: prolonged treatment with broad spectrum antibiotics & corticosteroids.**
- 3- General debility.**
- 4- Indwelling urinary catheters.**

# Pathogenesis & Symptomatology





**Candida fingerweb erosion: related to fatness , occupation etc.**



# Laboratory diagnosis

## Direct microscopic examination

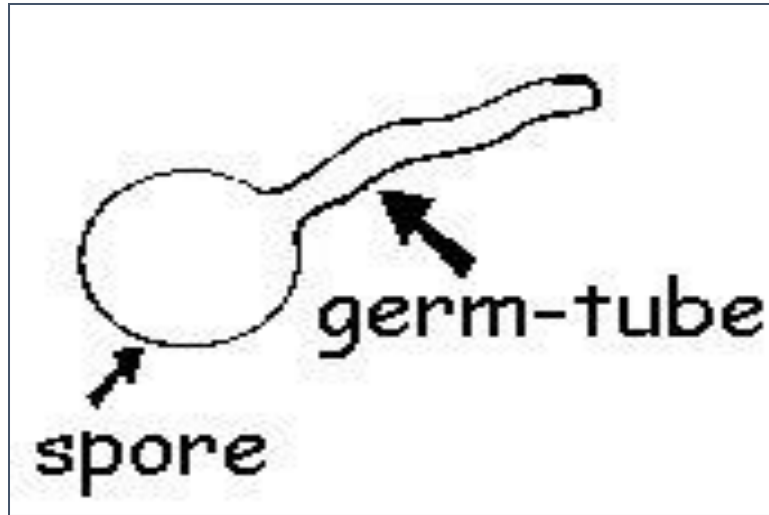
- Specimens from skin, vaginal discharge or exudates from mucous surfaces are examined.
- *C. albicans* is **oval gram positive budding yeast cell with pseudohyphae.**

## 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. **Chlamyospore** formation on corn meal agar.
  - c. **Biochemical reactions:** *C.albicans* ferments glucose & maltose with acid & gas production.



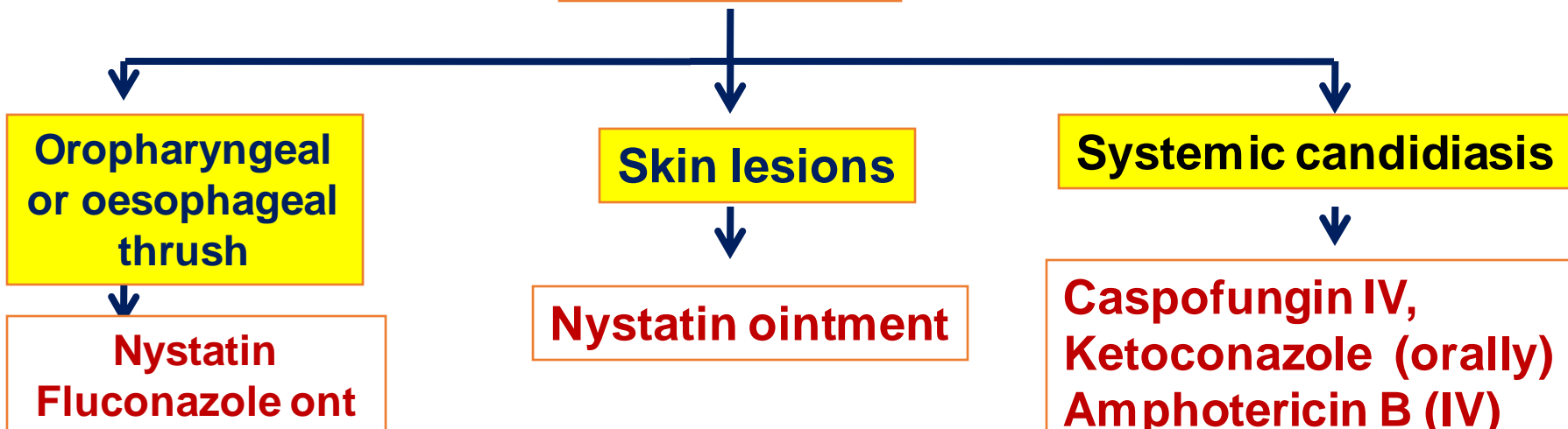


Germ tube



Terminal Chlamydospore & pseudohyphae

**Treatment**



# *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 cavities** can produce **necrotic pneumonia, and infection of brain, heart, 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**

**Diagnosis is made by direct smear and by isolation of molds from respiratory secretions or biopsy specimens.**

**Treatment:**

Control Diabetes ,surgery & amphotericin B

**Prognosis: 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