



Tishk International University (TIU)

Fungal Infections & Candida

Course: Medical Mycology

Lecture 2

Date 27/8/2026



Some Definitions

- **Mycosis:** Any fungal infection.
- **Opportunistic Pathogen:** Harmless organism causing disease when host defenses drop.
- **Keratinized Tissues:** Non-living outer body structures (skin, hair, nails).
- **Biofilm:** Surface-attached microbial community resistant to drugs and immune responses.
- **Dermatophytes:** A group of specialized fungi that invade and feed on keratinized tissues, causing tinea infections
- **Lipophilic Yeast:** A yeast organism that requires lipids (fats/oils) to grow, such as *Malassezia furfur*

Main types Fungal infections based on depth of invasion

1. Superficial Mycoses.



2. Cutaneous Mycoses.



3. Subcutaneous Mycoses.



4. Systemic Mycoses.



Superficial Mycoses

- Superficial Mycoses are fungal infections that affect the **outermost layers of the skin**, hair, or nails, without invading deeper tissues.
- These infections are typically **mild** but can be chronic. They are caused by dermatophytes, yeasts, or non-dermatophyte molds.

- **Pityriasis Versicolor (*Malassezia furfur*):** Scaly patches on chest/back.
Treated with topical selenium sulfide or ketoconazole.
- **Piedra (White/Black):** Nodules on hair shafts. Treated by hair shaving + topical azoles



White Piedra



Pityriasis Versicolor



Black Piedra

Cutaneous Mycoses

- (Infect keratinized tissues: skin, hair, nails)

Dermatophytoses (Tinea Infections)

- Tinea corporis (body) – *Trichophyton rubrum*
- pedis (feet) – *Trichophyton mentagrophytes*



Feature	Superficial Mycoses (e.g., <i>Tinea versicolor</i>)	Cutaneous Mycoses (True <i>Tinea</i> , e.g., ringworm)
Keratin Target	Strictly the dead, non-living stratum corneum or extrafollicular hair shaft.	The epidermis, active hair follicles, and nail beds.
Fungal Action	They rest on top of the tissue without actively destroying its integrity.	They secrete specialized keratinase enzymes to break down and consume keratin.
Immune Response	No inflammatory response.	Active cellular and inflammatory response.
Symptoms	Cosmetic changes only (discolored skin patches).	Intense itching, pain, redness, and scaling.

Subcutaneous Mycoses

(Traumatic inoculation into deeper tissues)

- Sporotrichosis ("Rose Gardener's Disease"): Caused by *Sporothrix schenckii* via plant trauma (thorns/splinters). Spreads via lymphatic vessels (lymphocutaneous form).
- It primarily affects gardeners, florists, and agricultural workers who handle contaminated plants (especially roses, sphagnum moss, or hay).
- Chromoblastomycosis: Warty, cauliflower-like lesions.
- Mycetoma: Tissue swelling with draining sinuses

Entry Route:

- Skin trauma (thorn pricks, splinters, scratches). Zoonotic spread (from infected cats, especially in Brazil).
- Risk Groups: Gardeners, farmers, florists.



"Rose gardener's disease"

Rose gardener's disease Clinical Forms

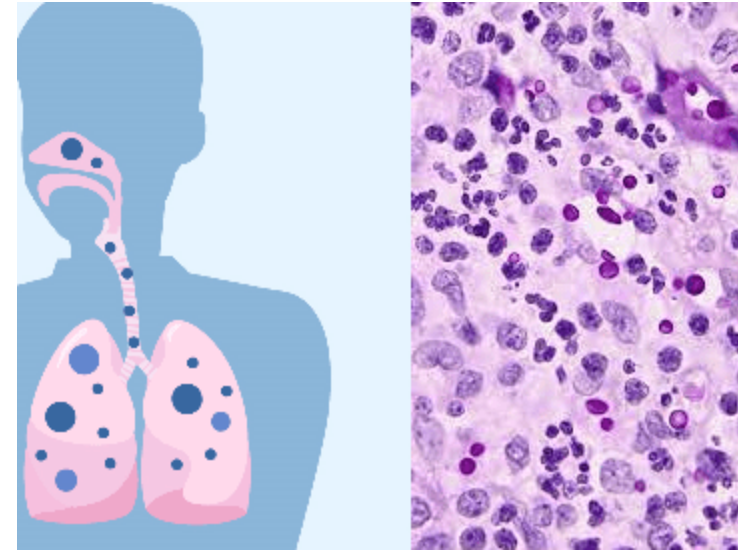
- 1. Lymphocutaneous** (Most Common, 75% of Cases): Starts as a painless nodule at the inoculation site. Spreads via lymphatic vessels, forming secondary nodules.
- 2. Fixed Cutaneous (Localized):** Non-spreading ulcer or plaque at the injury site. Common in endemic areas (e.g., Peru, Mexico).
- 3. Disseminated (Rare, in Immunocompromised):** Affects lungs, bones, joints, or meninges.

Systemic (Deep) Mycoses

- **Systemic Mycoses**

Caused by inhaled endemic dimorphic fungi:

- **Histoplasmosis:** Linked to bird/bat droppings.
- **Coccidioidomycosis:** "Valley fever".
- **Blastomycosis:** Granulomatous lung infection.



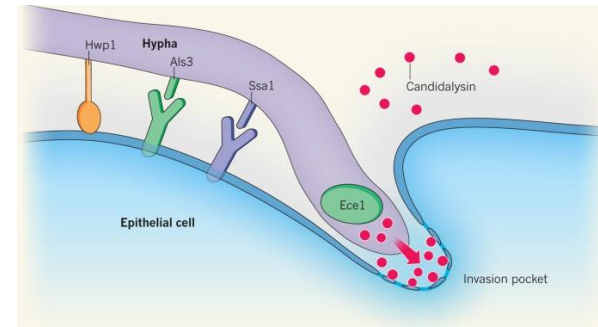
***Candida* Species**

- Yeasts forming part of normal human flora (mouth, gut, vagina).
- Become pathogenic during immune suppression or flora imbalance.
- **Key Species:**
 - ***C. albicans*:** Most common cause of candidiasis.
 - ***C. glabrata*:** UTIs; decreased azole sensitivity.
 - ***C. tropicalis*:** Bloodstream infections in neutropenic patients (have a dangerously low number of neutrophils).
 - ***C. parapsilosis*:** Catheter-related and neonatal infections.

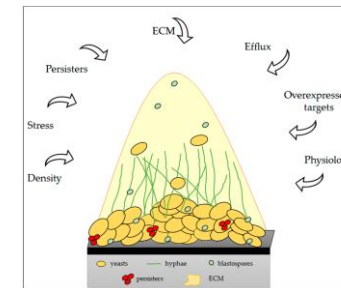


***Candida albicans* Virulence Factors**

- **Adhesion:** Uses adhesins (Hwp1, Als) to stick to host cells and catheters.
- **Biofilm Formation:** Creates protective matrices resisting antifungals.
- **Hyphal Growth:** Filamentous form invades host tissues.
- **Secreted Enzymes:** Proteases and phospholipases degrade host tissues.
- **Immune Evasion:** Alters cell wall surface to hide from immune cells.



Adhesion



Biofilm

Main diseases caused by *C. albicans*.



- **Oral Candidiasis:** White patches on the tongue and throat.
- **Cutaneous Candidiasis:** Red, itchy rash in warm, moist areas (e.g., groin, under breasts).
- **Invasive Candidiasis:** Fever, chills, and organ dysfunction, particularly in immunocompromised patients.



Oral Candidiasis



Skin Candidiasis



Invasive Candidiasis

- **Risk Factors:**
 - Immunosuppression (HIV, chemotherapy, steroids)
 - Indwelling medical devices (catheters, ventilators)
 - Broad-spectrum antibiotics (disrupt flora)
 - Uncontrolled Diabetes Mellitus

Treatment



- **Topical antifungals:** Used for superficial infections, such as creams for vaginal yeast infections.
- **Systemic antifungals:** Medications like fluconazole or echinocandins are used for more severe or invasive infections. **Management of underlying conditions:** Controlling diabetes and reviewing antibiotic use can help prevent recurrence.

Questions and Comments?