

CANDIDIASIS

[Fungal diseases]

Microbiology III



Candidiasis

- Candidiasis (Candidosis, Moniliasis) is an infection of the skin, mucosa & rarely of the internal organs
- It is caused by a **yeast** like fungus - *Candida albicans*.
- It is the commonest pathogen among other 81 *Candida* species.
- Important species of *Candida*:

- *Candida albicans*
- *C. tropicalis*
- *C. pseudotropicalis*
- *C. brumptii*
- *C. parapsilosis*
- *C. guilliermondii*
- *C. krusei*

Kingdom: Fungi

Class: Saccharomycetes

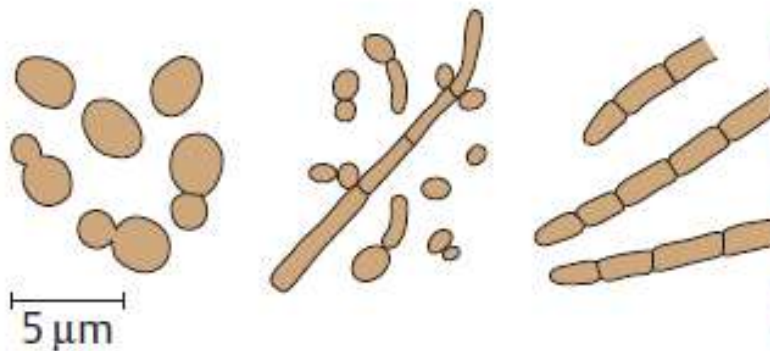
Genus: *Candida*

Species: *Candida Albicans*

Morphology and culture.

- *C. albicans* is an **ovoid** or spherical **budding** cell, produces **pseudomycelia** in culture and in tissues.
- They reproduce by budding, ferment a number of sugars and assimilate nitrogen.
- Cultures on **Sabouraud's agar** medium produce moist, glistening **creamy colonies** of a dull white or greyish white colour.

– *Candida albicans* –

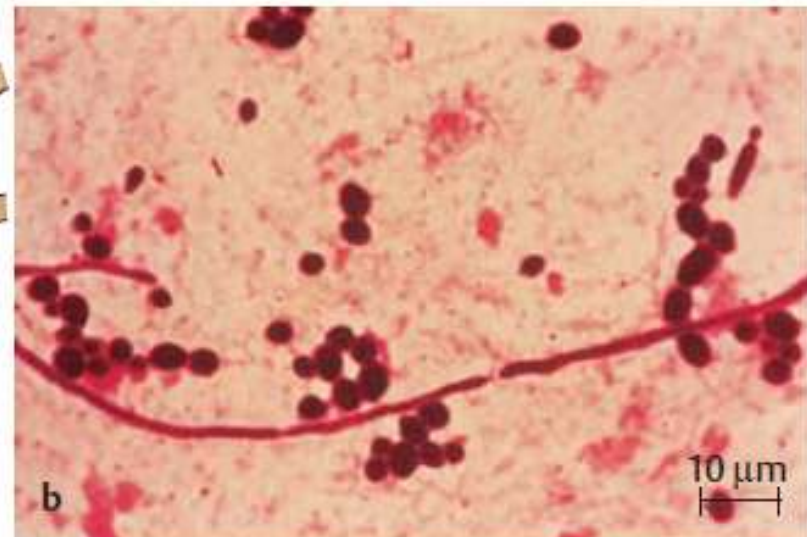


Yeast cells

Pseudomycelium

Mycelium

a



b

10 μm

Pathogenesis and clinical symptoms

- Candida is a normal inhabitant of skin and mucosa (commensal)
- **Candidiasis** is an **opportunistic endogenous** infection
- The predisposing factors are diabetes, pregnancy, progesterone therapy, and intensive antibiotic treatment.
- It usually develop in persons whose immunity is compromised.
- Most frequently in the presence of disturbed **cellular immunity**
- The **mucosa** are affected most often, less frequently the outer skin and inner organs (deep candidiasis).

Stages of Infection

1. Colonization

- Epithelial adhesion
- Nutrient acquisition

2. Superficial Infection

- Epithelial penetration
- Degradation of host protein

3. Deep-Seated Infection

- Tissue penetration
- Vascular invasion
- Immune evasion or escape

4. Disseminated Infection

- Endothelial adhesion
- Infection of other host tissues
- Activation of coagulation and blood clotting cascades.

Types of Candidiasis

□ Mucosal Candidiasis

- **Oral candidiasis:** mucous membrane of mouth – ‘oral thrush
- Creamy white patches appear on – tongue, buccal mucosa
- It leaves a red oozing surface on removal

- **Vulvovaginitis**
 - **Balanitis**
 - Appearance of white lesions of *C. albicans*
- } genital infections



❑ Cutaneous Candidiasis

- **Candida folliculitis:** infection and inflammation of **hair follicles**, rash may appear as pimples.
- **Candidal intertrigo:** infection of skin located between intertriginous **folds of adjacent skin**.
- **Candidal paronychia:** inflammation of the nail fold.
- **Candidal onychomycosis:** **nail** infection
- **Chronic mucocutaneous candidiasis:** immune disorder of T cells, deficient of CMI.
- **Perianal candidiasis:** irritation of the skin at the exit of the rectum.
- **Congenital cutaneous candidiasis:** skin condition in new borne babies caused by premature rupture of membranes together with a birth canal infected with *C. albicans*.



□ Systemic Candidiasis

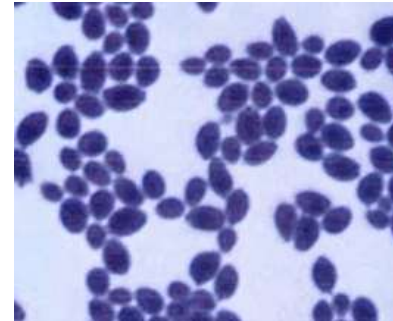
- Candidemia: leads of sepsis
- Disseminated candidiasis (organs)
- Endocarditis
- Gastro intestinal tract infection
- Respiratory tract infection
- Genitourinary candidiasis
- Hepatosplenic candidiasis (Chronic Disseminated Candidiasis)

Laboratory Diagnosis

- **Specimens:** Exudates, Tissues, Scrapings

☐ **Microscopy (Scraping)**

- Examined in wet film in 10% KOH
- Visualization of pseudohyphae and budding yeast cells of candida
- Gram staining: Gram positive (+ve)



☐ **Culture**

- SDA: Creamy white, smooth colonies
- CHROMAGAR: Green colonies



Identification of *albicans*

- ❑ **Germ Tube Test:** produce germ tube test within 2 hours when incubated in human serum at 37°C.
- ❑ **Chlamydoconidia:** produced by *C. albicans* on corn meal/rice agar at 25°C. They produce round thick walled **chlamydoconidia** borne terminally or laterally.
- ❑ **Biochemical Tests:** Glucose and maltose fermented with acid and gas production, sucrose and lactose not fermented, Pale pink coloration in Tetrazolium reduction medium

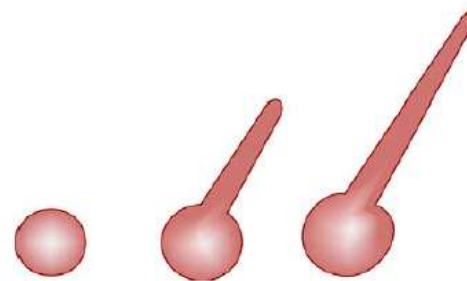


Fig. 76-32. Germ tube formation by *C. albicans*

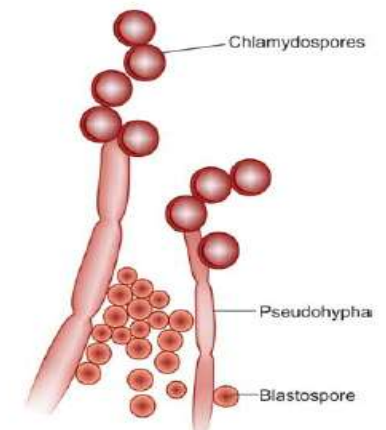


Fig. 76-31. *Candida albicans* in culture

□ Serology

- Limited specificity
- Serum antibodies and cell mediated immunity are demonstrable in most people because of life long exposure to *C. albicans*.
- *C. albicans* antigen is a delayed hypersensitivity skin test, which is used as an indicator of functions of the CMI.
- ELISA and RIA: detection of circulating Candidial antigen either cell wall mannan or cytoplasmic constituents.

❑ **1,3-beta-D-glucan assay**

- Beta-D-glucan is a component of the cell wall of fungi.
- Detected by its ability to activate factor G of the horseshoe crab coagulation cascade.
- Highly specific and sensitive test.

❑ **DNA probe and PCR**

Treatment:

- **Oral candidiasis:** Nystatin, miconazole, amphotericin B.
- **Cutaneous candidiasis:** Clotrimazole, econazole, ciclopirox, miconazole, ketoconazole, nystatin.
- **Systemic and oral azoles:** Fluconazole, Itraconazole or posaconazole.
- **Vulvovaginitis:** single dose of oral fluconazole, topical antifungals (clotrimazole, miconazole, nystatin).
- **Blood infections:** intravenous fluconazole or an echinocandin (caspofungin)
- **Candidemia:** Fluconazole and Anidulafungin.



Thank you