CANDIDIASIS

Endocrine block

Objectives

Students at the end of the lecture will be able to:

1. Acquire the basic knowledge about Candida as a pathogen
2. know the main infections caused by Candida species
3. Identify the clinical settings of such infections
4. Know the laboratory diagnosis, and treatment of these infections.

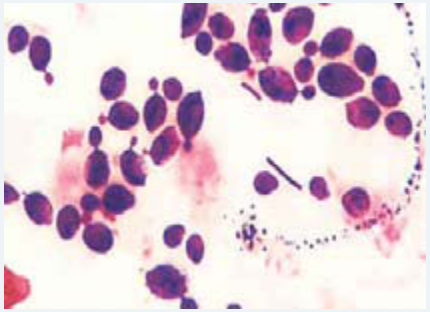
THE ORGANISM

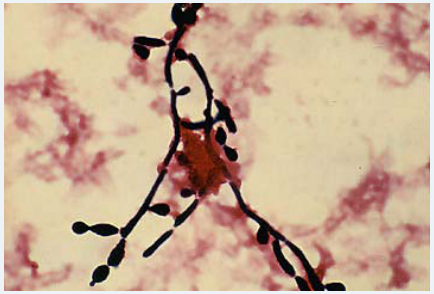
Candida

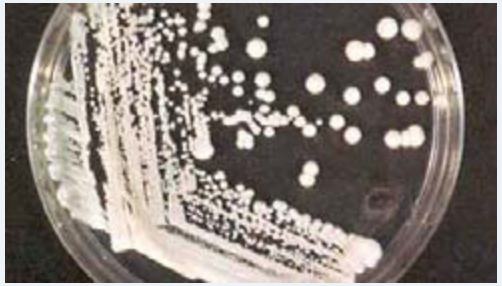
Candida

- *Candida* is a unicellular yeast fungus.
- It is imperfect reproducing by budding

- <u>Morphology</u>
  - **Microscopy:** Budding yeast cells, and Pseudohyphae.
  - **Culture:** Creamy colony, fast growing on Sabouraud Dextrose agar (SDA), Blood agar (48 hr)







Candida

- There are many species of *Candida* (>150)
- The common species are:

  Candida albicans,

  C.parapsilosis

  C.tropicalis,

  C.glabrata,

  C.krusei,

Candida

- **Human commensal**
  - Oral cavity
  - Skin
  - Gastrointestinal tract
  - Genitourinary tracts

THE DISEASE

Candidiasis

Candidiasis

- Definition:
  - Any infection caused by any species of the yeast fungus *Candida*.
  - The most common invasive fungal infections in immunocompromised patients
  - 4th most common cause of nosocomial blood stream infection

- It is considered opportunistic infection

Candidiasis
Opportunistic Fungal Infections

- Alteration in
  - Immunity
  - Normal physiology
  - Normal flora
- Damage in the barriers

- Clinical – Spectrum of disease

Transmission of Opportunistic Fungi

- **ENDOGENOUS**
  - Colonization precedes infection
  - Antibiotic suppression of normal flora, fungal overgrowth

- EXOGENOUS ??

Candida - Clinical

- **Mucous membrane infections**
  - Thrush (oropharyngeal)
  - Esophagitis
  - Vaginitis

- **Cutaneous infections**
  - Paronychia (skin around nail bed)
  - Onychomycosis (nails)
  - Diaper rash
  - Chronic mucotaneous candidiasis
    - children with T-cell abnormality

Mucocutaneous infections

- Oropharyngeal Candidiasis
  - Oral thrush:
    - White or grey Pseudomembranous patches on oral surfaces especially tongue with underlying erythema.
    - Common in neonates, infants, elderly
    - In immunocompromised host, e.g. AIDS.
- Esophagitis
- Vulvovaginitis :
  - Common in pregnancy, diabetics, use of contraceptives.
  - Thick discharge, itching irritation . Lesion appear as white patches on vaginal mucosa.

Cutaneous infections

- Intertriginous candidiasis:

  Infections of skin folds eg. axilla, buttock, toe web, under breast.

  Erythematous lesion, dry or moist or whitish accompanied by itching and burning.

- Nail infections:

  Onychomycosis and paronychia

- Diaper rash
- Chronic mucocutaneous candidiasis

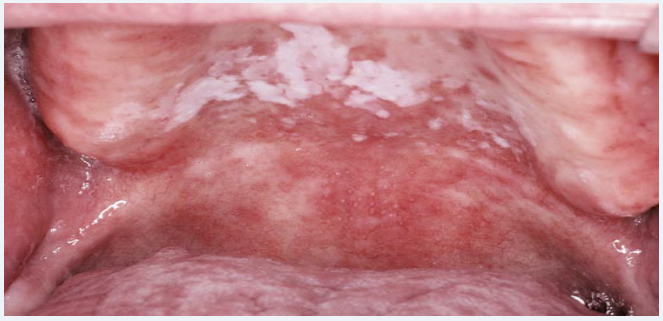
Mucosal candidiasis

Oral thrush

Forms of Oral candidiasis

pseudomembranous form

erythematous form



pseudomembranous-erythematous form.

Forms of Oral candidiasis

A)

Painful, depapillation of the tongue dorsum.

B)

Painful hyperplastic Candida of the lateral tongue

Forms of Oral candidiasis

Hyperplastic candidiasis, that was mistaken for leukoplakia

Cutaneous candidiasis

Chronic mucocutaneous candidiasis

Chronic mucocutaneous candidiasis

Candida - Clinical

- Urinary tract infection
- Candidemia
- Disseminated (systemic, invasive) infection
  - Endophthalmitis (eye)
  - Liver and spleen
  - Kidneys
  - Skin
  - Brain
  - Lungs
  - Bone

Pulmonary Candidiasis

- Primary pneumonia is less common and could be a result of Aspiration
- Secondary pneumonia commonly seen with hematogenous candisiasis
  - Immunocompromised patients
- Isolation of *Candida* from sputum, BAL is not always significant
  - Clinical features
  - Radiology,
  - Other Lab investigations

Candidemia

- Increased colonization (endogenous or exogenous factors)
- Damage in host barriers by catheters, trauma, surgery
- Immunosuppression

- Central venous catheters (CVC)

- Disseminated candidiasis (involvement of any organ)
  - Septic shock
  - Meningitis
  - Ocular involvement (retinitis)

- Fever could be the only clinical manifestation

Candidemia

- Candida is the fourth in causing nosocomial bloodstream infections (BSI)

Rank	Pathogen	BSI per 10,000 admissions	% BSI			% Crude Mortality		
			Total (n=20,978)	ICU (n=10,515)	Non-ICU (n=10,515)	Total	ICU	Non-ICU
1.	CoNS	15.8	31.3	35.9	26.6	20.7	25.7	13.8
2.	*S aureus*	10.3	20.2	16.8	23.7	25.4	34.4	18.9
3.	*Enterococcus* spp	4.8	9.4	9.8	9.0	33.9	43.0	24.0
4.	*Candida* spp	4.6	9.0	10.1	7.9	39.2	47.1	29.0
5.	*E coli*	2.8	5.6	3.7	7.6	22.4	33.9	16.9
6.	*Klebsiella* spp	2.4	4.8	4.0	5.5	27.6	37.4	20.3
7.	*P aeruginosa*	2.1	4.3	4.7	3.8	38.7	47.9	27.6
8.	*Enterobacter* spp	1.9	3.9	4.7	3.1	26.7	32.5	18.0
9.	*Serratia* spp	0.9	1.7	2.1	1.3	27.4	33.9	17.1
10.	*A baumannii*	0.6	1.3	1.6	0.9	34.0	43.4	16.3

Wisplinghoff H, et al. *Clin Infect Dis.* 2004;39:309-317.

Candidiasis – Laboratory diagnosis

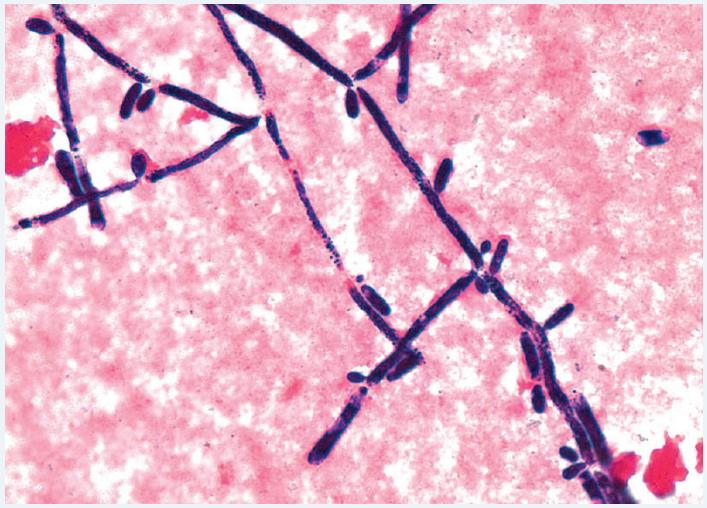
Specimen depend on site of infection.

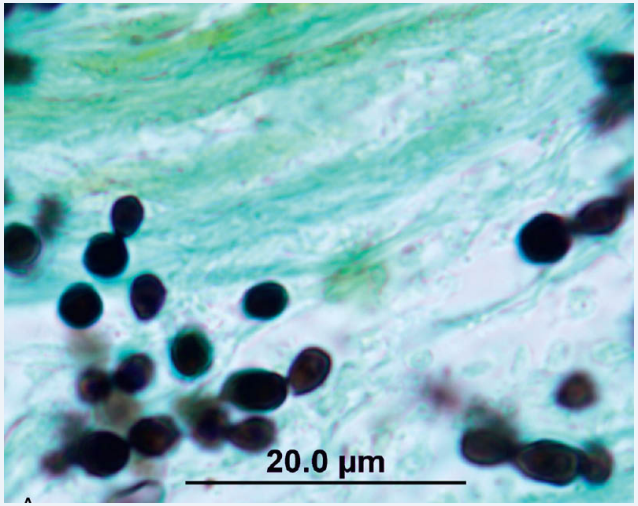
Swabs, Urine, Blood, Respiratory specimens, CSF, Blood

1. Direct microscopy :

Gram stain, KOH, Giemsa, GMS, or PAS stained smears.

Budding yeast cells and pseudohyphae will be seen in stained smear or KOH.



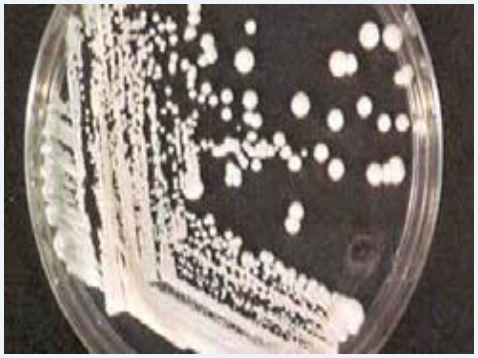


Candidiasis – Laboratory diagnosis

2. Culture:

Media: SDA & Blood agar at 37°C,

Creamy moist colonies in 24 - 48 hours.



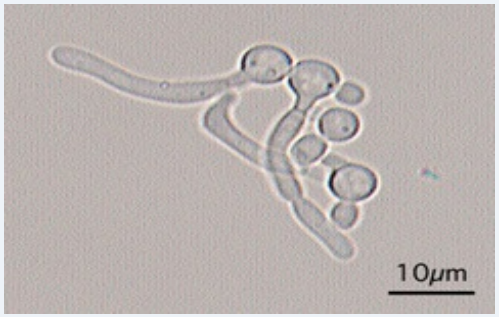
3. Blood culture

Candidiasis – Laboratory diagnosis

Laboratory identification of Yeast

Because *C. albicans* is the most common species to cause infection

- **The following tests are used to identify *C. albicans:***
  1. Germ tube test : Formation of germ tube when cultured in serum at 37°C
  2. Chlamydospore production in corn meal Agar
  3. Resistance to 500 µg/ml Cycloheximide



Germ tube test

- If these 3 are positive this yeast is *C.albicans*,
- If negative, then it could be any other yeast,
  - Use Carbohydrate assimilations and fermentation.
    Commercial kits available for this like: API 20C, API 32C
  - Culture on Chromogenic Media (CHROMagar™ Candida)

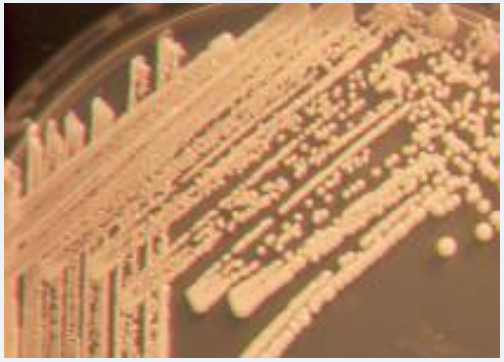
Chlamydospores of *C. albicans* in CMA

Candida species

Candida albicans

Sabouraud Agar

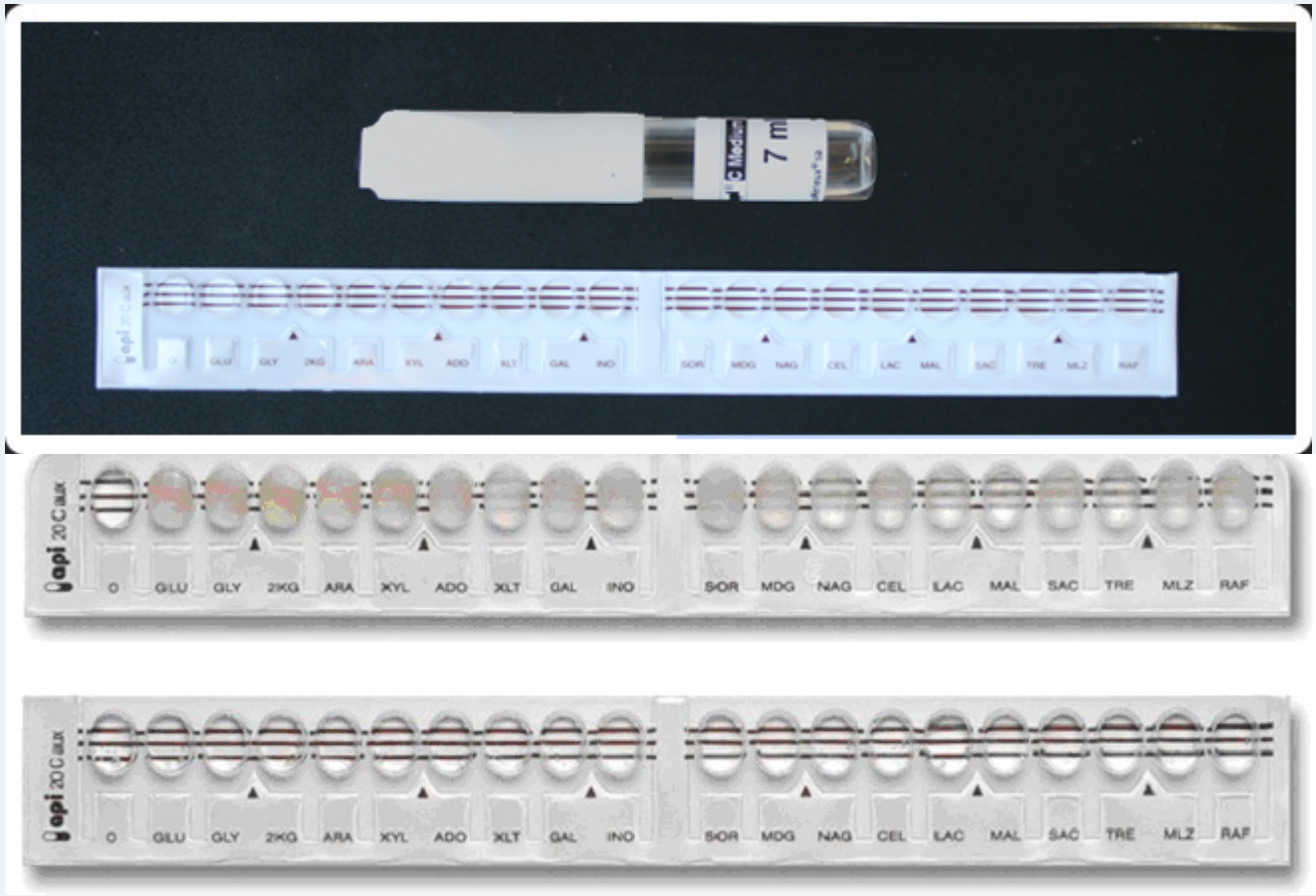
Morphology: Creamy white yeast, may be dull, dry irregular and heaped up, glabrous and tough



Chromagar

producing green pigmented colonies on specially designed medium to speciate certain yeasts based on color they produce

Yeast Identification



Carbohydrates assimilation test , API 20C

Candidiasis – Laboratory diagnosis

4. Serology:

Patient serum

Test for Antigen , e.g. Mannan antigen using ELISA

Test for Antibodies

5. PCR

Candidiasis- Treatment

- **Oropharyngeal:**
  - Topical Nystatin suspension, Clotrimazole troches ,Miconazole, Fluconazole suspension.
- **Vaginitis:**
  - Miconazole, Clotrimazole, Fluconazole

  - **Systemic treatment of Candidiasis**
    - Fluconazole
    - Voriconazole
    - Caspofungin
    - Amphotericin

  - In candidemia :
    - Treat for 14 days after last negative culture and resolution of signs and symptoms
    - Remove catheters, if possible

Candidiasis- Treatment

Antifungal susceptibility testing in not done routinely in the microbiology lab.

It is done in the following cases:

- For fungi isolated from sterile samples
- If the patient is not responding to treatment
- In case of recurrent infections

- **Points to consider:**

  - C. *glabrata* can be less susceptible or resistant to fluconazole
  - C. *krusei* is resistant to fluconazole

THANK YOU