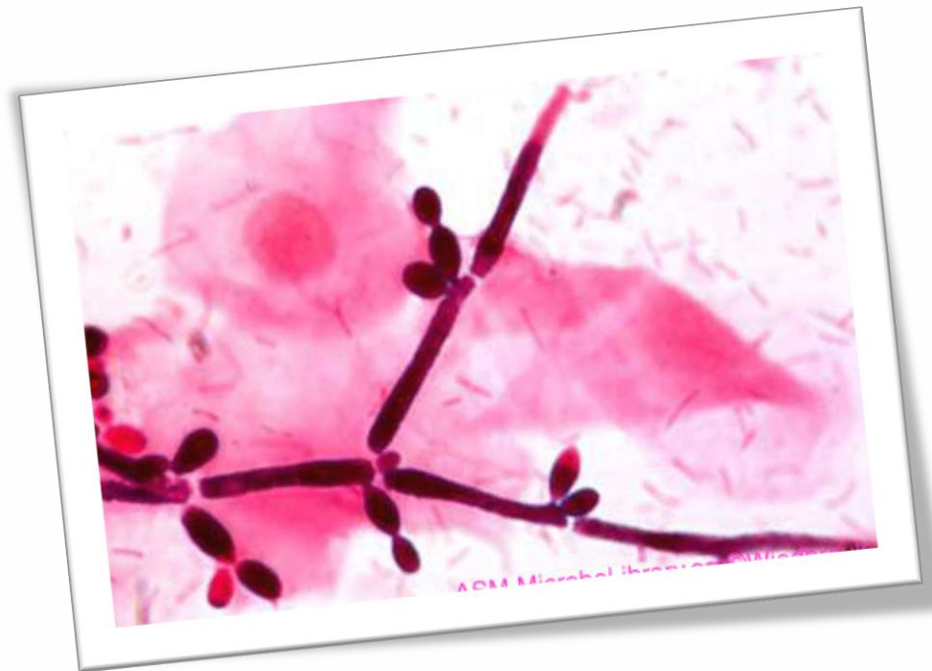


Objectives

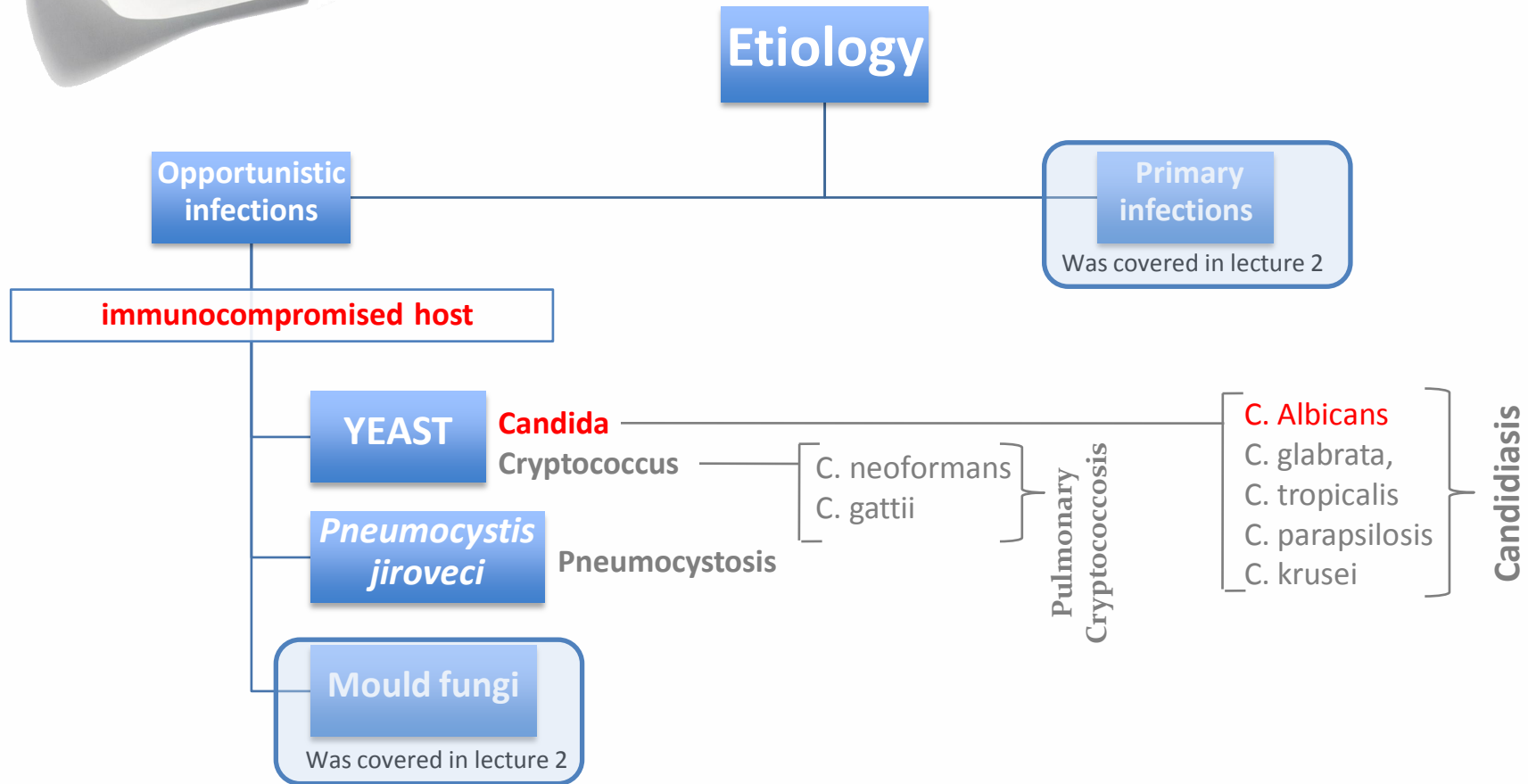
No objectives





Mind map

(Respiratory Fungal Infections)



1- Candidiasis

Candidiasis refers to infection caused by any of the species of **the genus Candida** (more than 160 species)

morphology	Other species include	Part of the endogenous flora of:	High-risk patients	How to catch it
1- Yeasts	C. Albicans	Skin	AIDS	ICU* >7 days
2- Pseudohyphae	C. glabrata,	Gut	Premature infants	CVCs*
	C. tropicalis	Mucosal surfaces	Surgery	Antibiotics
	C. parapsilosis		Malignancy	TPN:" total parental nutrition "
	C. krusei			

★ Candida is the Most common fungal pathogen
Candida albicans is the most common species causing candidiasis

- ★ ➤ Endogenous source for majority of Candida infection" **our flora**"
- Exogenous transmission is **rare**
- **Antibiotics**: kill bacteria normal flora that will lead to overgrowth of yeast

Additional info:
 Bacteria and fungi have the ability to proliferate and colonize around catheters.

*: intensive care unit
 **: central venous catheter

Disease spectrum

- Infections of the skin and nail
- Gastrointestinal infections (oral cavity, esophagus)
- Infection of genitalia (female)

Candidemia: the presence of *Candida* species in the blood.
عندهم نقص مناعه

Chronic mucocutaneous candidiasis (CMC)
(congenital, immunological defect) موجوده عند
الاطفال

Pulmonary Candidiasis

- Primary pneumonia : is less common and could be a result of Aspiration
- Secondary pneumonia: commonly seen with hematogenous candidiasis
- Immunocompromised patients

Diagnosis

- 1) Isolation of *Candida* from sputum, BAL is not always significant
- 2) Clinical features
- 3) Radiology

Other **yeast causing** Pulmonary infections :

- ❖ Trichosporon
- ❖ Geotrichum

How Candidemia develops ?	Disseminated candidiasis (involvement of any organ)
<ul style="list-style-type: none"> ➤ Increased colonization (endogenous or exogenous factors) ➤ Damage in host barriers by catheters, trauma, surgery ➤ Immunosuppression ➤ Central venous catheters (CVC) 	<ol style="list-style-type: none"> 1) Septic shock 2) Meningitis 3) Ocular involvement (retinitis)

Candidiasis - diagnosis

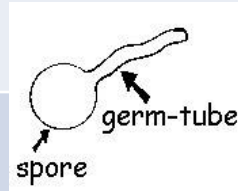
Laboratory	Direct microscopy	Culture	Serology	PCR
<p>The Specimen depends on the site of infection</p> <p>e.g.</p> <p>Swabs, Urine, Blood, Respiratory specimens, CSF, Blood for serology</p>	<p>Stains:</p> <p>Gram stain, KOH, Giemsa, GMS, or PAS stained smears.</p> <p>Budding yeast cells and pseudohyphae will be seen in stained smear or KOH.</p>	<p>on SDA & Blood agar at 37oC, creamy moist colonies in 24 - 48 hours</p> <p>Blood culture</p> <p>(it useful to diagnosis Candidemia)</p>	<p>Patient serum Test for Antigen e.g. Mannan antigen using ELISA</p> <p>Test for Antibodies</p>	<p>—</p>

Candidiasis - diagnosis

We do the following tests 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 (CMA)

3. Resistance to Cycloheximide

will grow on Mycobiotic Medium

Test results

If these 3 are positive → 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).....

Treatment of Candidiasis

Systemic

- Fluconazole
- Voriconazole
- Caspofungin
- Amphotericin

Candidemia

Treat for 14 days **after last positive culture** and resolution of signs and symptoms
Remove all intravascular catheters, if possible

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

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

★ Candida is the fourth in causing nosocomial bloodstream infections (BSI) with **high number of mortality**.

2- Pulmonary Cryptococcosis

Causative agent	Source of infection	Pathogenesis	Diagnosis	Treatment
<i>Cryptococcus neoformans</i>	Pigeon or birds droppings & contaminated soil	Human infection by inhalation	Smear show budding yeast cells (CSF samples are stained by <u>India Ink</u>)	Amphotericin B Combination of Amphotericin B & flucytosine
<i>Cryptococcus gattii</i>		infections could be asymptomatic May develop pneumonia, disseminate to CNS causing meningitis in immunocompromised	preparation Yeast cell with a thick capsule Culture on SDA Serology	

- ◆ **Cryptococcosis:** A typical yeast with a thick capsule
- ◆ Cryptococcosis doesn't appear as **psuodohyphae (only budding yeast cells)**

3- Pneumocystosis (PCP)

Opportunistic fungal pneumonia	Etiology:	Diagnosis:	Treatment
<ul style="list-style-type: none">❖ It is interstitial pneumonia of the alveolar area.❖ Affect compromised host❖ Common in AIDS patient	<p style="text-align: center;"><i>“Pneumocystis jiroveci”</i></p> <ul style="list-style-type: none">❖ Previously thought to be a protozoan parasite but it has been proven to be a fungus❖ Does not grow in laboratory media like SDA❖ Naturally found in rodents (rats) and other animals	<p style="text-align: center;"><u>Patient specimen:</u> Bronchoscopic specimens (B.A.L.), Sputum, Lung biopsy tissue.</p> <p style="text-align: center;"><u>Stains:</u> Histology sections or smears stained by Silver stain (GMS).</p> <p style="text-align: center;"><u>Morphology:</u> Cyst or trophozoites</p>	<p style="text-align: center;">Trimethoprim-sulfamethoxazole</p>

SUMMARY

Disease	Candidiasis	Pulmonary Cryptococcosis	Pneumocystosis (Pcp)
Etiology	candida albicans	cryptococcus neoformans c.gattii a typical yeast with a thick capsule	pneumocystis jiroveci
Risk Factor	aids – surgery - malignancy – burns - premature infants		<u>Aids Patients</u>
Source Of Infection	icu \geq 7 days , cvcs , antibiotics , tpn , colonization	-pigeon or birds droppings & contaminated soil -human infection by inhalation -infections could be asymptomatic	naturally found in rodents (rats), other animals (goats, horses), humans contract it during childhood.
Direct Microsc	budding yeast cells and pseudohyphae will be seen in stained smear or koh.	1. india ink preparatio yeast cell with a thick capsule 2.gmc , koh budding yeast without pseudo- hyaphae	histology sections or smears stained by silver stain (gms). better sensitivity)(immunofluorescence if positive will see <u>cysts</u> of hatshape, cup shape, crescent
Diagnosis	<u>culture</u> ; on SDA & blood agar at 37°C , , creamy moist colonies in 24 - 48 hours. <u>serology</u> : patient serum test for antigen , e.g. mannan antigen using elisa test for antibodies pcr	<u>culture</u> : on SDA identify using api 20c , urease +ve phenol oxidase +ve <u>serology</u> : capsular antigen by latex agglutination excellent sensitivity	does not grow in laboratory media e.g. SDA
Treatment	fluconazole (candia albican) voriconazole caspofungin amphotericin *c. glabrata can be less susceptible or resistant to fluconazole *c. krusei is resistant to fluconazole	amphotericin b combination of amphotericin b & flucytosine	trimethoprim – sulfamethoxazole
Notes:	candida is the fourth in causing nosocomial bloodstream infections (bsi)		-previously thought to be a protozoan parasite. -it has been proven to be a fungus -it is interstitial pneumonia of the alveolar area