

1. Introduction

FUNGI

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2. Fungi

Fungi

- Outline of the lecture:
 - Introduction
 - General comments
 - *Coccidioides immitis*
 - *Candida albicans*
 - *Cryptococcus neoformans*

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3. Terms you may not know:

Terms you may not know:

- Hyphae
- Mycelium
- Arthroconidia
- Spherule
- Ergosterol

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4. General comments:

General comments:

- Because they are eukaryotic cells, many aspects of the cellular physiology of fungal cells and human cells are identical or at least very similar. This fact limits the targets for antifungal drugs.

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5. Encounter / Entry

Encounter / Entry

- **ENCOUNTER:**
 - Usually from the environment.
 - Exception, the yeast *Candida albicans*
 - is a human commensal.
- **ENTRY:**
 - Often inhalation.
 - Breaching of natural barriers, e.g. skin or mucosal surfaces.

From reference (3)

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6. Spread/Multiplication

Spread/Multiplication

Usually nonspecific inflammatory reactions eliminate fungi. Neutrophils play a key role. Fungal infections are usually self-limiting.

From reference (3)

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Damage

Damage

- Usually do not produce toxins.
- Invade and destroy host structures.
- Damage due to the inflammatory response.
- Fungus balls can cause physical occlusion.

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Primary Pathogens

Primary Pathogens

<i>Coccidioides immitis</i>	Southwestern US Central & S. America	Soil
<i>Histoplasma capsulatum</i>	Ohio & Mississippi River valleys	Soil; Bird & bat guano

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9. Opportunistic Pathogens/ Predisposing Factors

Opportunistic Pathogens/Predisposing Factors

<i>Candida albicans</i>	Immunosuppression Broad-spectrum antibiotics
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<i>Cryptococcus neoformans</i>	Immunosuppression AIDS
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<i>Aspergillus fumigatus</i>	Immunosuppression
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From reference (4)

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10. A fungal pathogen

A fungal pathogen

- *Coccidioides immitis* is a dimorphic fungus that lives in the soil and is endemic in the Southwestern US. Entry is by inhalation.

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Coccidioidomycosis

Coccidioidomycosis

- 60% asymptomatic or mild upper respiratory infections.
- 40% develop symptoms within 1-3 weeks. E.g., cough, flu-like symptoms, fever, arthralgia.
- 0.5% experience disseminated disease. Bones, joints and skin are commonly involved.

From reference (7)

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Rate of dissemination

Rate of dissemination

- Rate of dissemination is higher in certain ethnic groups.
- In patients with impaired immune function, the rate of disseminated disease is high.

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Main Conclusions

Main Conclusions

- Primary fungal pathogens are endemic in certain geographic areas.
- Within endemic areas, many people are exposed.
- Disease is usually mild.
- Disseminated disease can occur in immunologically competent people.
- Immunosuppression predisposes to disseminated disease.

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An opportunistic fungal pathogen

An opportunistic fungal pathogen

- *Candida albicans*, a dimorphic yeast, is a normal human commensal and an opportunistic pathogen. In the hospital, *Candida* is a very important pathogen. Most infections are believed to be of endogenous origin.

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15. Patients at high risk for *Candida* infection

Patients at high risk for *Candida* infection

- Immunosuppression: malignancies, transplantation, AIDS.
- Violation of barriers: burns, surgery, catheter use.
- Broad spectrum antibiotic use.

From reference (2)

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16. Mucous membrane infections

Mucous membrane infections

- Thrush
- Esophagitis
- Vaginitis

Cutaneous Candidiasis

- Intertrigo
- Paronychia
- Diaper rash

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17. Disseminated Candidiasis

Disseminated Candidiasis

- Kidney infection
- Endophthalmitis
- Skin lesions
- Osteomyelitis
- Meningitis

From reference (2)

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18. Diagnosis of disseminated candidiasis is challenging.

Diagnosis of disseminated candidiasis is challenging.

- Prophylactic use of fluconazole is leading to an increase in infection by fluconazole resistant organisms such as *Candida glabrata*.

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Main Conclusions

Main Conclusions

- *Candida albicans* is a human commensal and an opportunistic pathogen.
- There are three general types of predisposing factors.
- Disseminated candidiasis is a serious disease that is difficult to diagnose.

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An opportunistic fungal pathogen

An opportunistic fungal pathogen

- *Cryptococcus neoformans* is an encapsulated yeast that occurs in the environment. The most common predisposing factor is AIDS. Most commonly presents as meningitis.

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Cryptococcal meningitis

Cryptococcal meningitis

- Patients usually symptomatic, e.g., headache, lethargy, mild fever.
- In AIDS patients, a second site of infection, e.g. lung, skin, blood.
- Course of disease correlates with immunosuppression of patient.

From references (1, 6)

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Main Conclusions

Main Conclusions

- Exposure to *Cryptococcus neoformans* is common.
- AIDS is a common predisposing factor for cryptococcosis.
- A classic method for diagnosis is the India ink smear.

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References

References

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