Fungal Diseases in Immunocompetent and Immunocompromised Hosts

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Disclosures of Financial Relationships with Relevant Commercial Interests

- None

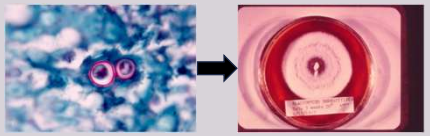
What We Are Going To Do

- I give key characteristics, you name mycosis
- Leave treatment to Dr. Alexander
- Skim over the top

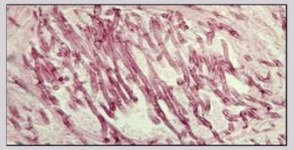
Must Know Fungal Facts
#1 Understand Dimorphism

- Fungus looks likes yeast in tissue or smear, grows like mold (dimorphic)
  - Blastomycosis
  - Histoplasmosis
  - Coccidioidomycosis
  - Paracoccidioidomycosis
  - Sporotrichosis
  - Talaromycosis
- Looks like a yeast, grows like a yeast
  - Cryptococcosis
  - Trichosporonosis
  - Candidiasis (pseudohyphae in tissue except glabrata)
- Looks like a mold, grows like a mold
  - Aspergillosis
  - Mucormycosis
  - Fusariosis
  - Scedosporiosis

Blasto Yeast and Blasto Mold



Aspergillus hyphae in a blood vessel



Must Know Fungal Facts

#2 Location, Location, Location!
(Major Areas For Infection)

- West of the Mississippi, Mexico: Coccidioidomycosis
- Southeast Asia, South China: Talaromycosis (Penicilliosis)
- Mississippi and Ohio River valleys: Blastomycosis
- South America: Paracoccidioidomycosis

Coccidioidomycosis


Talaromycosis


Blastomycosis


Paracoccidioidomycosis

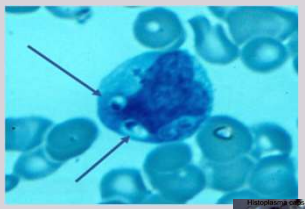
Question #1

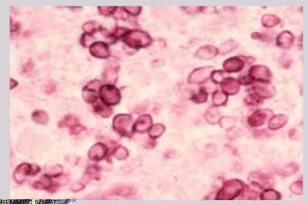
What mycosis has these key characteristics?

- Yeast in tissue, mold in culture
- Predispose: Anti-TNF drugs, HIV, corticosteroids
- Can have pancytopenia, abnormal LFT, miliary lung infiltrates
- Addison's disease, blood culture negative endocarditis
- Urine, serum antigen useful
- Acute pneumonia case clusters exposed to soil with bird or bat guano

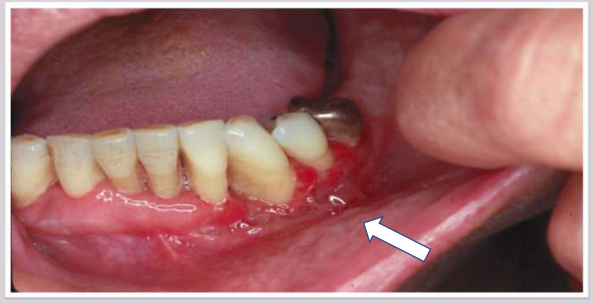
A. Cryptococcus
B. Histoplasmosis
C. Coccidioidomycosis
D. Blastomycosis

Histoplasmosis



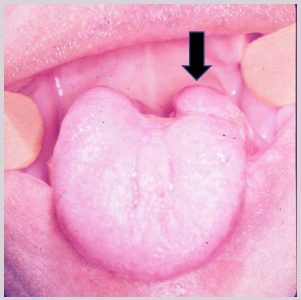


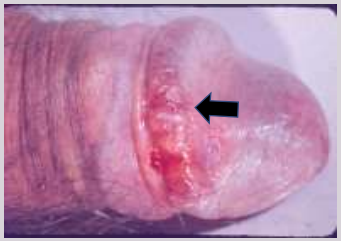
Gingival Ulcer



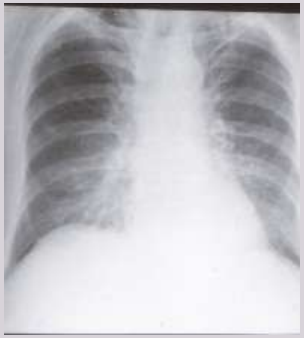
¼ Cases have oral lesion in disseminated histoplasmosis

Tongue and Penile Lesions Mucosal Lesions Can Resemble Squamous Carcinoma





Miliary Lung Lesion in Disseminated Histoplasmosis
(Looks Like PJP on Imaging)



Question #2

What mycosis is this?

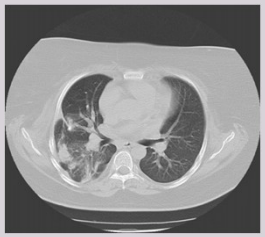
- Chronic meningitis: headache, altered mental state
- Predispose: HIV, corticosteroids
- Serum, CSF antigen useful
- Yeast in body and in culture

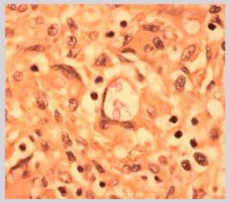
A. Cryptococcus
B. Histoplasmosis
C. Coccidioidomycosis
D. Blastomycosis
E. Paracoccidioidomycosis

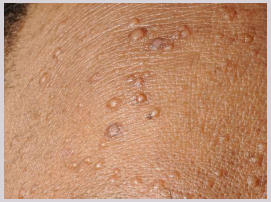
Cryptococcosis

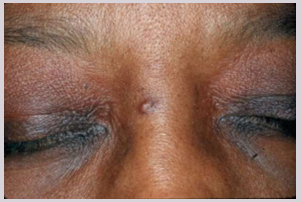
- Cryptococcus neoformans species complex:
  - Worldwide, pigeon guano, corticosteroids, transplants, HIV , ICL
- *Cryptococcus gattii* species complex
  - Pacific coast, Australia, tropics, trees, often previously healthy
  - Serum antibody to GM-CSF
- Chronic lymphocytic meningitis
  - Headache, confusion, cranial nerve palsies, +/- fever, vision loss
  - Relieve high opening pressure (LP's, shunt)
  - HIV ARV-naïve: consider delay ARV (IRIS)
  - Skin lesions (10%) like molluscum contagiosum
- Lung: Serum antigen can be negative if just lung
- Cryptococcal antigen in CSF, serum
  - screening blood of HIV+ with low CD4

- Cryptococcal lung lesions usually asymptomatic
- Skin lesions can resemble molluscum contagiosum
- Mucicarmine often stains crypto pink









Question #3

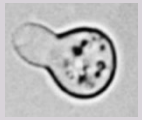
What mycosis is this?

- Broad based budding yeast, grows as mold
- Previously healthy with lung portal but skin lesions in 70%
- A few case clusters around waterways
- USA: Mississippi and Ohio River valleys

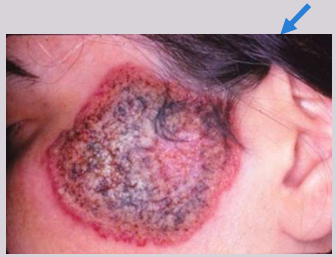
A. Cryptococcus
B. Histoplasmosis
C. Coccidioidomycosis
D. Blastomycosis
E. Paracoccidioidomycosis

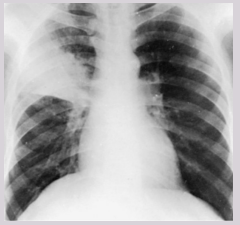
Blastomyces dermatitidis, B. gilchristii

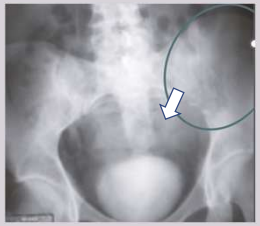
- Yeast with broad based bud, thick wall
- Acute pneumonia may self heal
- Indolent, progressive pneumonia
- Disseminates to skin, bone, male GU track
- Histo antigen often positive



Blastomycosis







Question #4

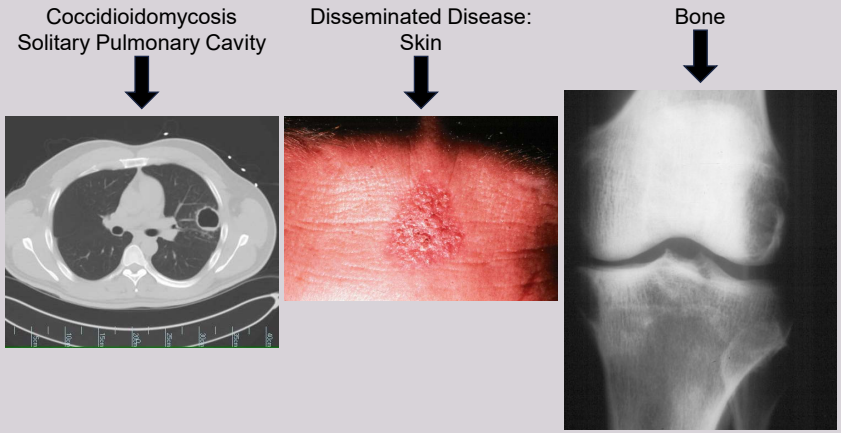
What mycosis is this?

- Dust exposure
- West of Mississippi, Mexico
- Round in tissue, mold in culture

A. Cryptococcus
B. Histoplasmosis
C. Coccidioidomycosis
D. Blastomycosis
E. Paracoccidioidomycosis

Coccidioidomycosis = Valley Fever

- Two species, one disease: C. immitis and C. posadasii
  - Both serious lab hazards
  - Southwest USA; Washington state
- Acute pneumonia 2 weeks after inhalation: arthralgias or erythema nodosum may accompany. Resolves.
- Residual nodule or thin-walled cavity may persist
- Dissemination: African Americans, HIV, SOT, TNF inhibitors
- Bone, skin, chronic meningitis
- Eosinophils in blood and CSF



Question #5

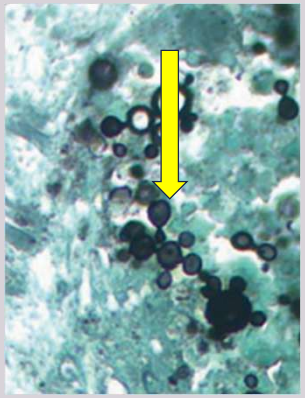
What mycosis is this?

- Worked on a farm years ago in Brazil, Columbia, Venezuela, Ecuador
- Mouth or nose lesion, asymptomatic lung lesion
- Multi-budding yeast on biopsy, mold on culture

A. Cryptococcus
B. Histoplasmosis
C. Coccidioidomycosis
D. Blastomycosis
E. Paracoccidioidomycosis

Paracoccidioidomycosis

- Rural Central and South America
- Several Species
- Starts in lung, disseminates
- May appear decades after leaving endemic area
- Multiple Buds



Question #6

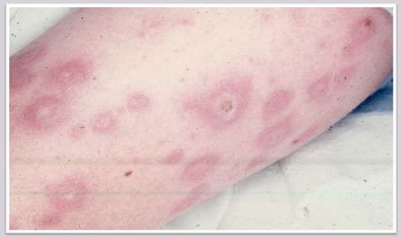
What mycosis is this?

- Grows as a mold in the body and in culture
- Multiple painful red skin lesions in half
- Routine blood cultures grow a septated mold in a third to a half
- Very, very immunosuppressed patients

A. Scedosporiosis
B. Lomentosporiosis
C. Mucormycosis
D. Fusariosis
E. Alternariosis

Fusariosis

Typical skin lesions with varying degrees of central necrosis



Fusariosis

- Severely immunocompromised patients
- Mold, looks like Aspergillus in tissue
- Red, tender skin nodules
- Routine blood culture grows mold in a third to half the patients

Question #7

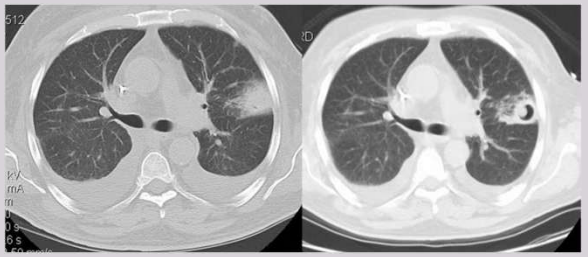
What mycosis is this?

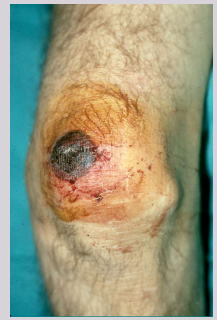
- Immunosuppressed:
  - Prolonged severe neutropenia
  - Stem cell and solid organ transplants
  - Chronic granulomatous disease
- Inhaled spores into lung or paranasal sinus
- Septate hyphae
- Halo sign or crescent sign on CT, ecthyma gangrenosa

A. Scedosporiosis
B. Aspergillosis
C. Mucormycosis
D. Lomentosporiosis

Aspergillosis

Halo Sign | Crescent Sign | Ecthyma





Question #8

What mycosis is this?

- Mold in tissue, mold in culture. Wide, pauciseptate hyphae
- Sinusitis in poorly controlled diabetics
- Pneumonia, dissemination in immunosuppressed

A. Scedosporiosis
B. Aspergillosis
C. Fusariosis
D. Mucormycosis

Question #8

What mycosis is this?

- Mold in tissue, mold in culture. Wide, pauciseptate hyphae
- Sinusitis in poorly controlled diabetics
- Pneumonia, dissemination in immunosuppressed

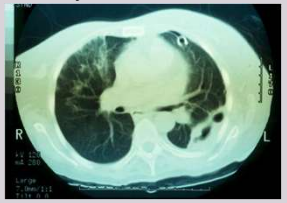
A. Scedosporiosis
B. Aspergillosis
C. Fusariosis
D. Mucormycosis*

Mucormycosis

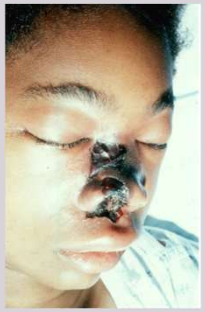
- Infection acquired by inhaling spores into lung or paranasal sinus
- Rhizopus, Rhizomucor, Mucor, Cunninghamella, Apophysomyces, Saksenaea
- Broad, flexible non-septate hyphae, right angle branching
- Rhino-orbital: poorly controlled Diabetes mellitus or immunosuppression
- Pulmonary: neutropenia, immunosuppression

Mucormycosis

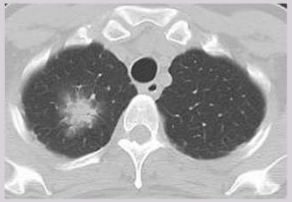
Cavity After PMN Return



Ethmoid Sinus Infection



Halo Sign in a Leukemic



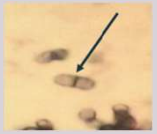
Question #9

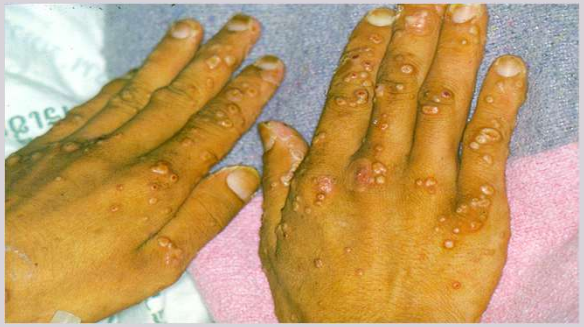
What mycosis is this?

- Southeast Asia, Southern China, Taiwan
- Yeast in tissue, mold in culture
- Papular skin lesions
- Majority of cases PLWH

A. Lomentosporiosis
B. Scedosporiosis
C. Talaromycosis
D. Paracoccidioidomycosis
E. Pythiosis

Talaromycosis

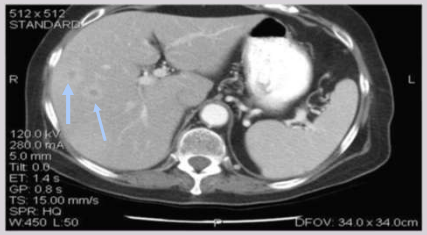




Question #10

What are these lesions in a febrile, recently neutropenic patient?

A. Babesia microti
B. Candida tropicalis
C. Fusarium oxysporum
D. Aspergillus flavus
E. Streptococcus anginosus



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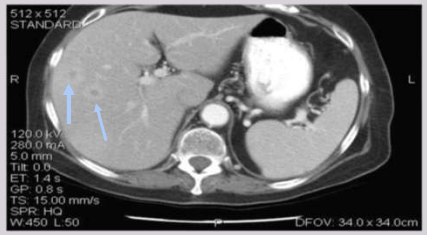
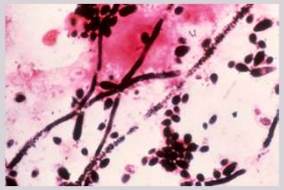
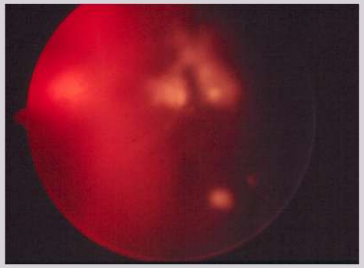


Candidiasis

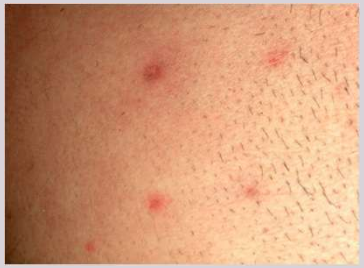


- Fundoscopy for retinal lesions in candidemia patients
  - Intravitreal Rx may be needed
- Remove intravenous catheter with candidemia
- *Candida auris* hospital outbreaks. Spreads on hands, surfaces
  - Screening for high=risk hospital admissions
- Fluconazole resistance in C. auris, C. krusei (Pichia kudriavzevii)
  - C. glabrata (Nakaseomyces glabratus)
- Fungitell (1-3) beta-D-glucan positive in serum, CSF

***Candida endophthalmitis*:**
"fluff balls" floating in the vitreous humor

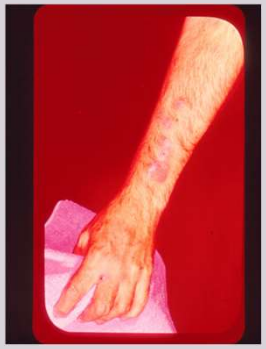


Candida Lesions in a Neutropenic Patient



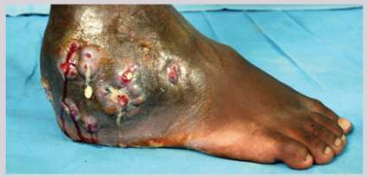
Sporotrichosis

- Sporothrix schenckii, (brasiliensis, globosa, pallida, mexicana)
- Lives on plants, inoculated by minor trauma
- Brazil and surrounding countries: >10,000 cases from infected cats
- Lymphangitic spread
- RARE: lung, disseminated
- Similar lesions: *mycobacterium marinum*, *nocardia brasiliensis*

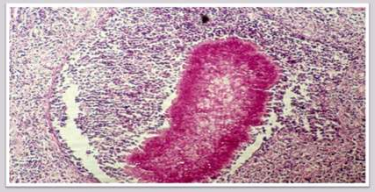


Mycetoma (Madura Foot)

- Minor trauma to foot or hand
- Firm swelling progresses over years
- Draining sinuses



- Grains in pus
- Fungi or higher bacteria



Mycoses Worth Mentioning

- Scedosporium apiospermum: immunosuppressed host clinically resembling aspergillosis. Brain abscess after near **drowning** in polluted water. **Amphotericin b-resistant**
- Trichosporonosis: like candidiasis but **echinocandin resistant**

If They Tell You This…Think This

- Capsule: cryptococcus
- Broad based bud: blastomycosis
- Septated mold: aspergillus, fusariosis, scedosporiosis
- Aseptate wide mold: mucormycosis
- Yeast on a blood smear: histoplasmosis
- Mold growing in routine blood culture: fusariosis

That's It!
It's all perfectly clear, isn't it?