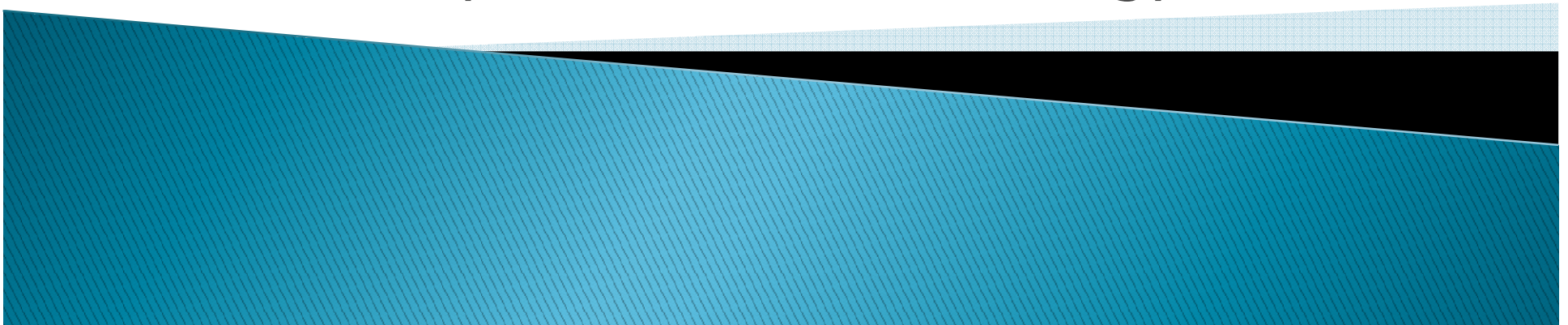


# Systemic mycoses

Dr. Bhavin Prajapati

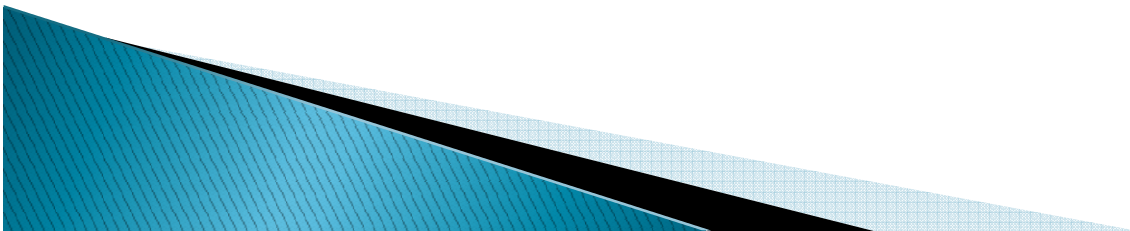
Assistant Professor

Department of Microbiology



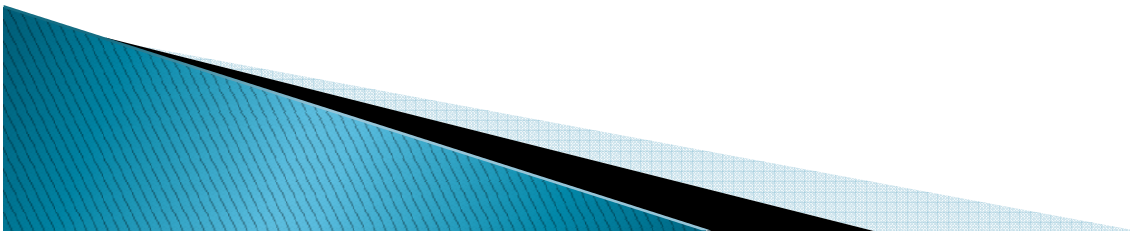
# Introduction

- ▶ Usually caused by dimorphic fungi
- ▶ Exist as yeast in the host tissue & culture at 37<sup>0</sup> C & as hyphae or mycelial form in the soil or the culture at 22–25<sup>0</sup>C



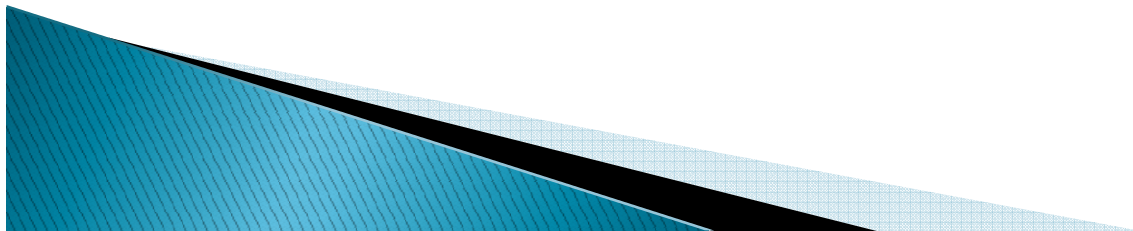
# Introduction

- ▶ Acquired by inhalation
- ▶ May disseminate to CNS, bones & other internal organs
- ▶ Includes blastomycosis, histoplasmosis, paracoccidioidomycosis, coccidioidomycosis, cryptococcosis
- ▶ Systemic & subcutaneous mycoses named as deep mycoses



# Features of dimorphic fungi

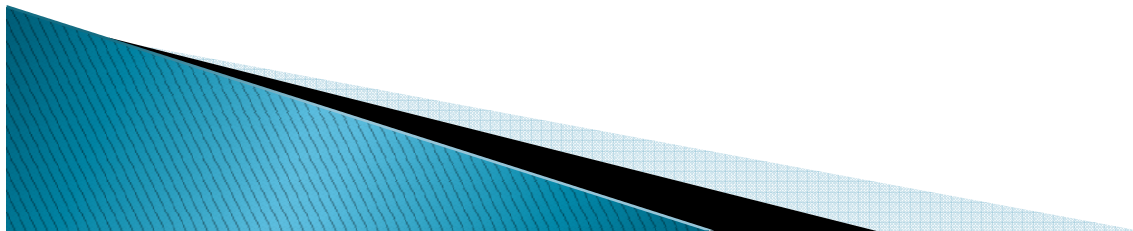
- ▶ Yeast form: In tissues & culture at 37<sup>0</sup> C
- ▶ Mycelial form: In culture at 25<sup>0</sup> to 30<sup>0</sup>C
- ▶ Appear as moulds or filaments
- ▶ Endemic to specific geographic area
- ▶ Absent in normal human flora
- ▶ Capable of causing multiple kinds of infections
- ▶ Cause systemic infection



	Disease	Causative agent
1	Candidiasis	Candida species
2	Cryptococcosis	C.neoformans
3	Histoplasmosis	H. capsulatum
4	Blastomycosis	B.dermatitidis
5	Paracoccidioido - mycosis	P.braziliensis
6	Coccidioidomycosis	C.immitis

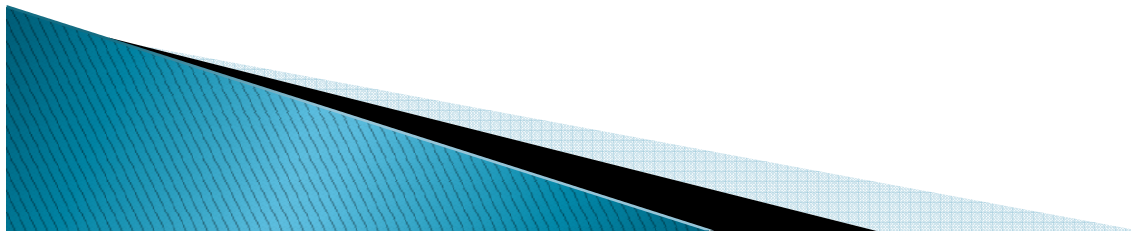
# Pathogenicity

- ▶ Primary infection is pulmonary through inhalation of conidia
- ▶ Asymptomatic or mild infections like common cold or flu in immunocompetent persons
- ▶ May progress from acute to chronic progressive diseases characterized by granulomatous lesions in lung in immunocompromised persons



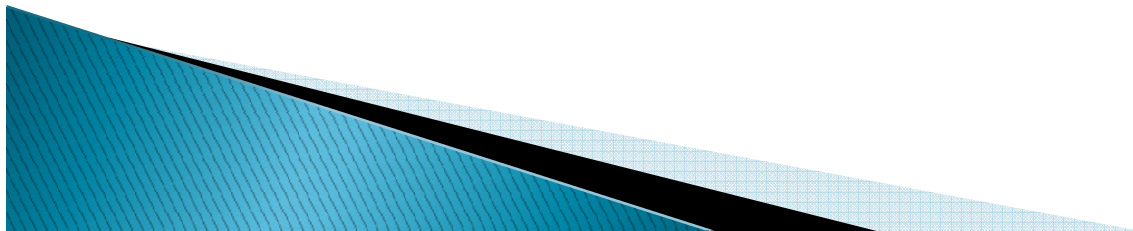
# Blastomyces dermatitidis

- ▶ Dimorphic fungus
- ▶ Chronic infection of the lungs which may spread to other tissues, particularly to skin, bone & genitourinary tract
- ▶ Infection confined to North American Continent, Known as North American blastomycosis
- ▶ Known as Chicago's disease



# Blastomycosis

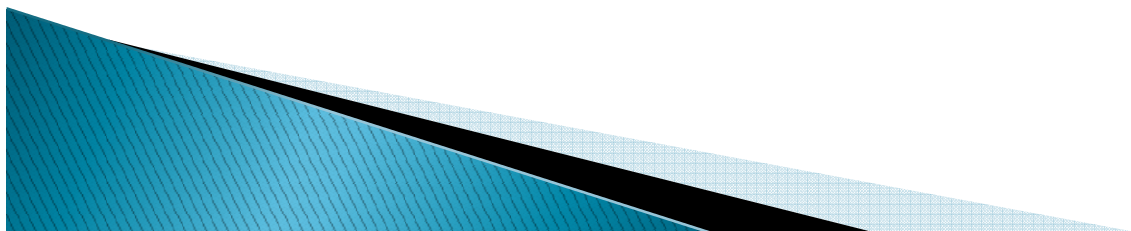
- ▶ Causative agent: *Blastomyces dermatitidis*
- ▶ Source of agent: soil
- ▶ Entry through inhalation of conidia or rarely through skin (trauma)
- ▶ Male: Female 4:1
- ▶ Age: 20 to 50 years
- ▶ Common in rural area– farmers & tree cutters





# Clinically

- ▶ Pulmonary form: Productive cough, muscle joint pain, pleuritic chest pain or asymptomatic
- ▶ Cutaneous form: Papule or nodule which breaks down to form fistula discharging purulent material
- ▶ Disseminated form: Bones, genitourinary organs through hematogenous route

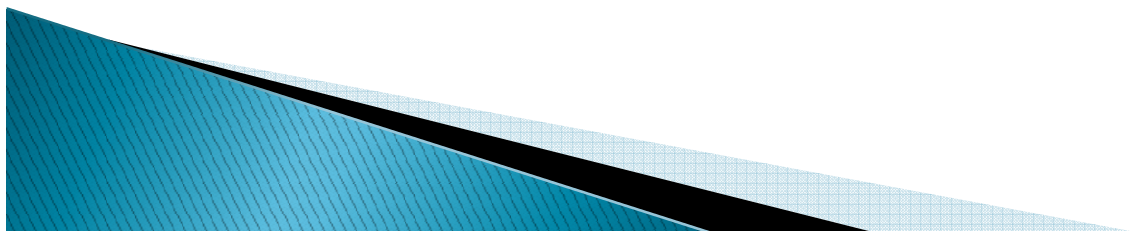


# Cutaneous form of Blastomycosis

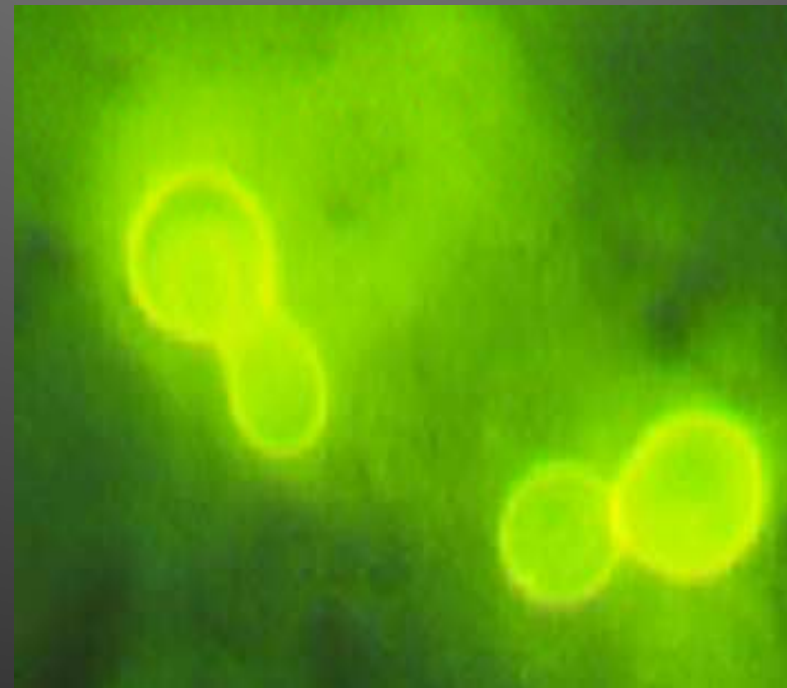
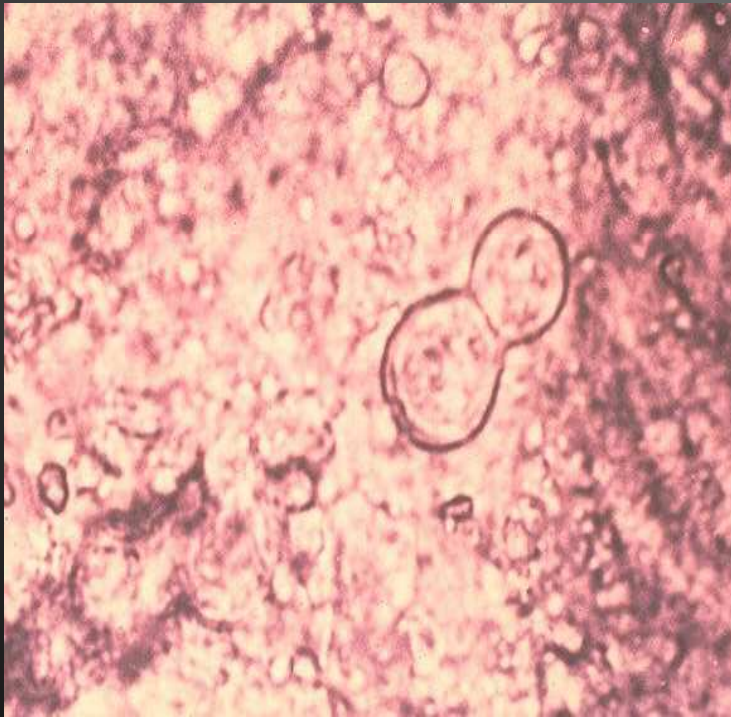


# Laboratory diagnosis

- ▶ Specimen: sputum, pus, skin scraping from lesion
- ▶ Direct wet mount (KOH) : Thick walled yeast cells with a single broad based bud
- ▶ Culture: At 37<sup>0</sup>C: Spherical or oval budding yeast cells (7–20μm) with thick, double contoured walls. At 25<sup>0</sup>C: Filamentous septate hyphae with many round to oval to pyriform conidia



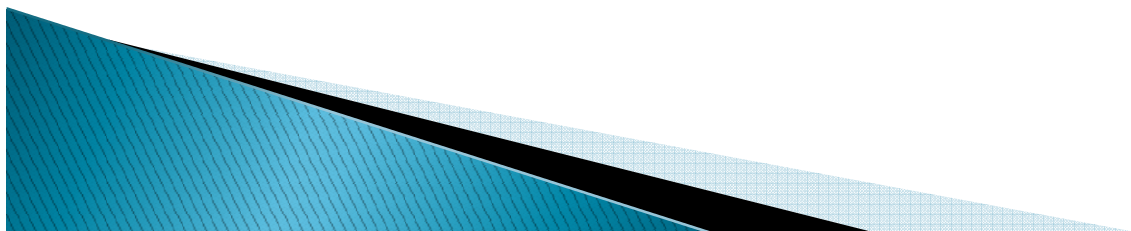
# Direct microscopy: KOH & Calcofluor white stain



# Histoplasma

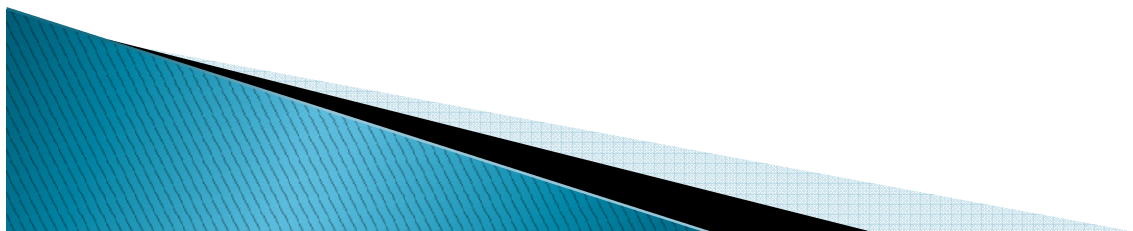
## Types

- ▶ *H. duboisii* : Cutaneous or bone involve.
- ▶ *H. capsulatum* : Classical histoplasmosis in males
- ▶ *H. farciminosi*: Epizootic lymphangitis of
- ▶ horses



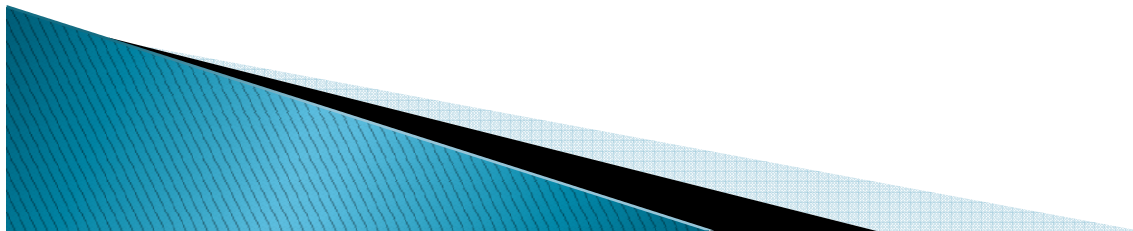
# Histoplasma capsulatum

- ▶ Causing Histoplasmosis (Darling's disease, Ohio valley disease)
- ▶ World wide, most common in America
- ▶ Disease of reticuloendothelial system
- ▶ Fungus present in soil enriched with excreta of birds or bats
- ▶ Route of infection: Through inhalation of spores

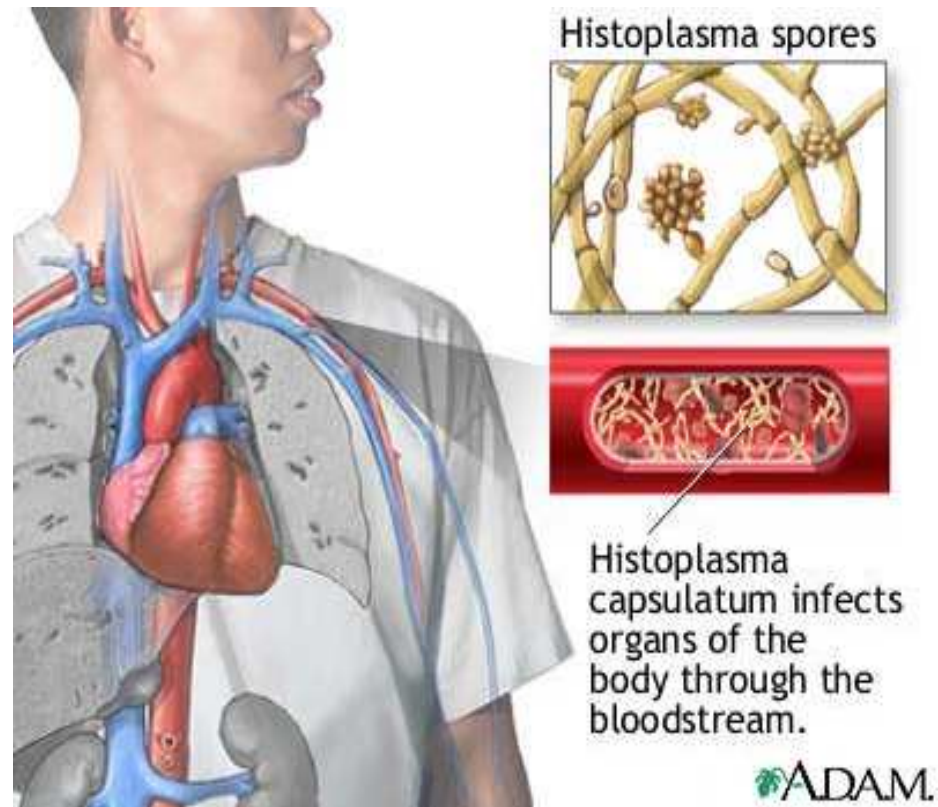


# Clinically

- ▶ Asymptomatic
- ▶ Some individuals develop pulmonary disease which resembles tuberculosis
- ▶ Involvement of reticuloendothelial system results in lymphadenopathy, hepatosplenomegaly, fever, anaemia & high rate of fatality
- ▶ Granulomatous or ulcerative lesions on skin or mucosa

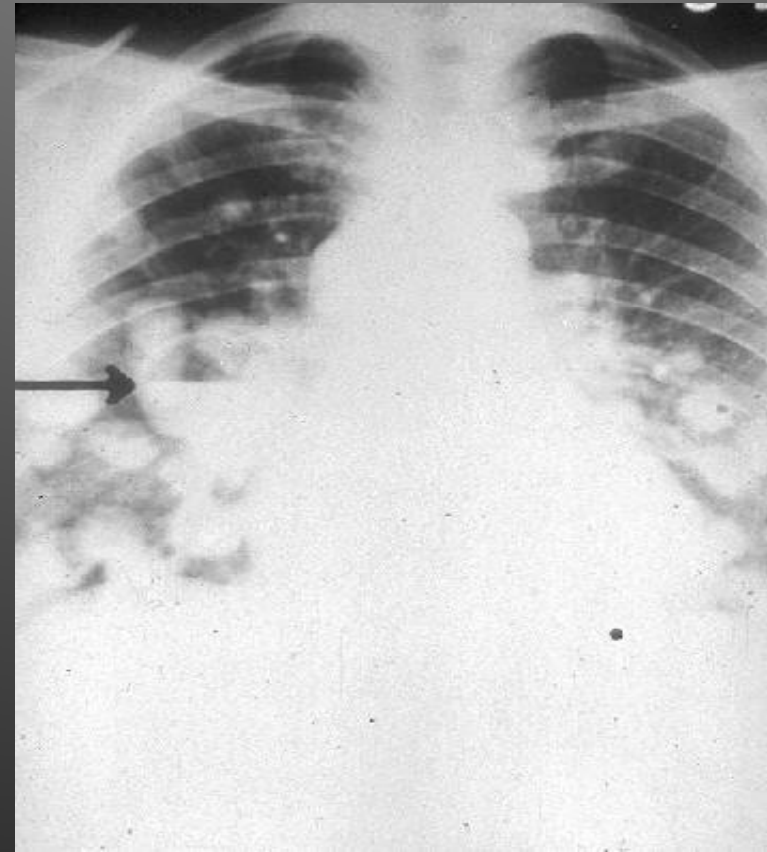
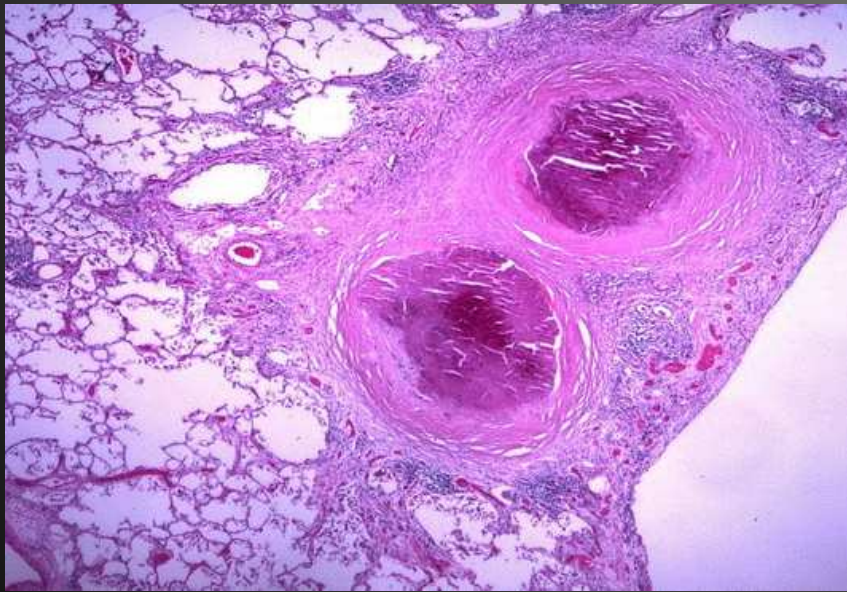


# Spread: Histoplasmosis



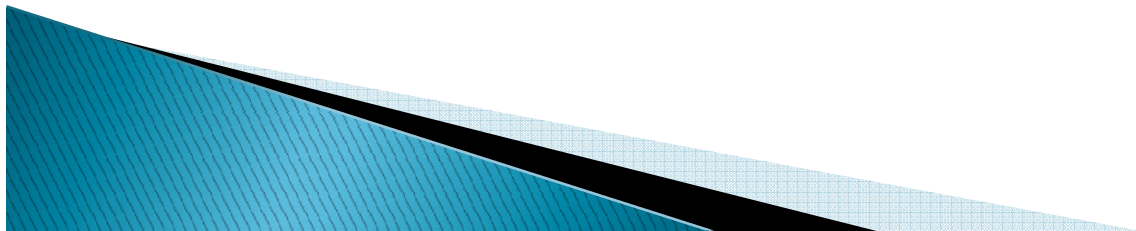


# Histoplasmosis: HPE & X-ray



# Specimen

- ▶ Sputum
- ▶ Bone marrow aspirate
- ▶ Peripheral blood
- ▶ Scraping from dermal or mucosal ulcer
- ▶ Biopsy of lymphnode or other organs
  
- ▶ 10% KOH exam. is not useful



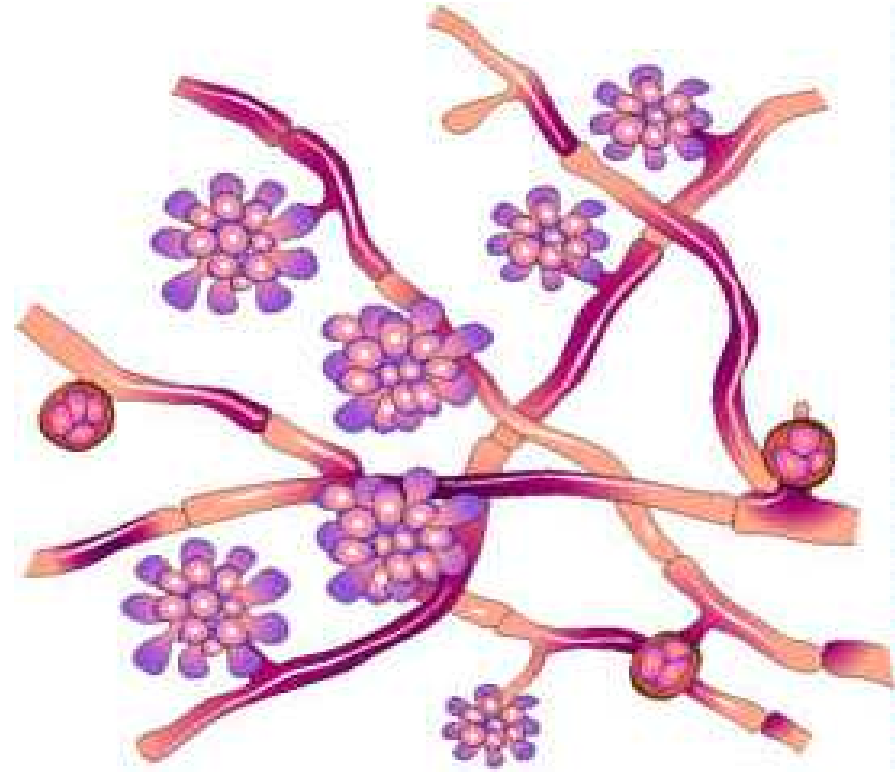
# Direct examination

- ▶ Stained with Giemsa or Wright stain
- ▶ Appears as small oval yeast cell (2–4 $\mu$ m in diameter) packed within cytoplasm of macrophages or monocytes



# Culture on SDA or BHIA at 25°C

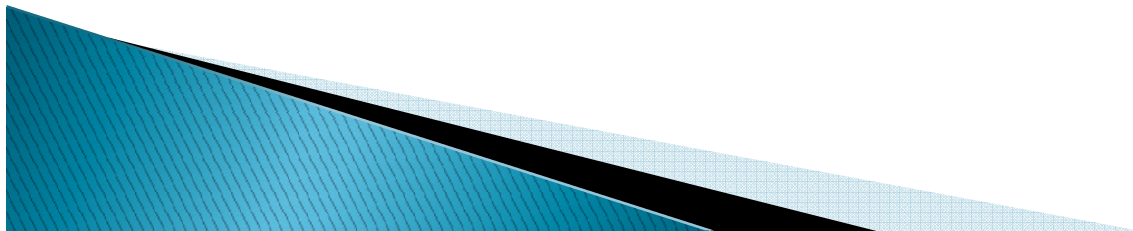
- ▶ Grossly: white cottony
- ▶ Micro: Septate hyphae, short conidiophore & presence of smooth walled microconidia & tuberculate macroconidia



*Histoplasmosis capsulatum*

# Histoplasmin skin test

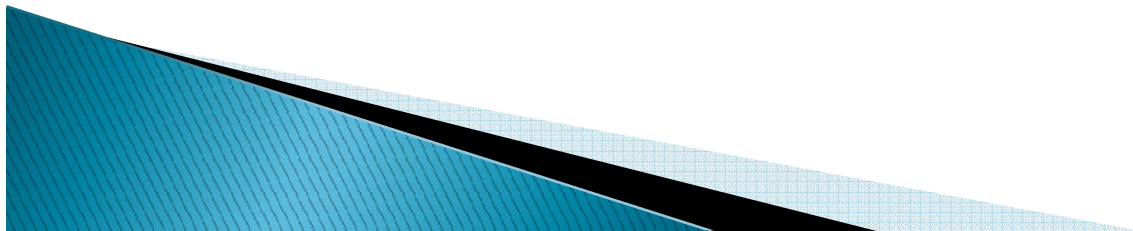
- ▶ Delayed hypersensitivity
- ▶ Similar to tuberculin test but antigen used is histoplasmin
- ▶ A positive 'histoplasmin skin test' indicates past or present infection, but does not differentiate active or past infections



Name of fungus	Coccidioides immitis	Paracoccidioides brasiliensis
Endemic area	South-West USA, north Mexico	Central & South America
Source of infection	Inhalation - Arthrospores	Inhalation - Spores
Clinically	Asymptomatic or primary pulmonary	Primary pulmonary
Dissemination	CNS, skin, bones	Mucus memb. of mouth, nose; skin, ly.nodes

# Development cycle of coccidioidomycosis

- ▶ Arthrospores in soil
- ▶ Inhalation
- ▶ Swell & develop into spherules in the body
- ▶ Enlarge & form endospores
- ▶ Rupture & release endospores
- ▶ Disseminate locally & at extrapulmonary sites



# Growth phase

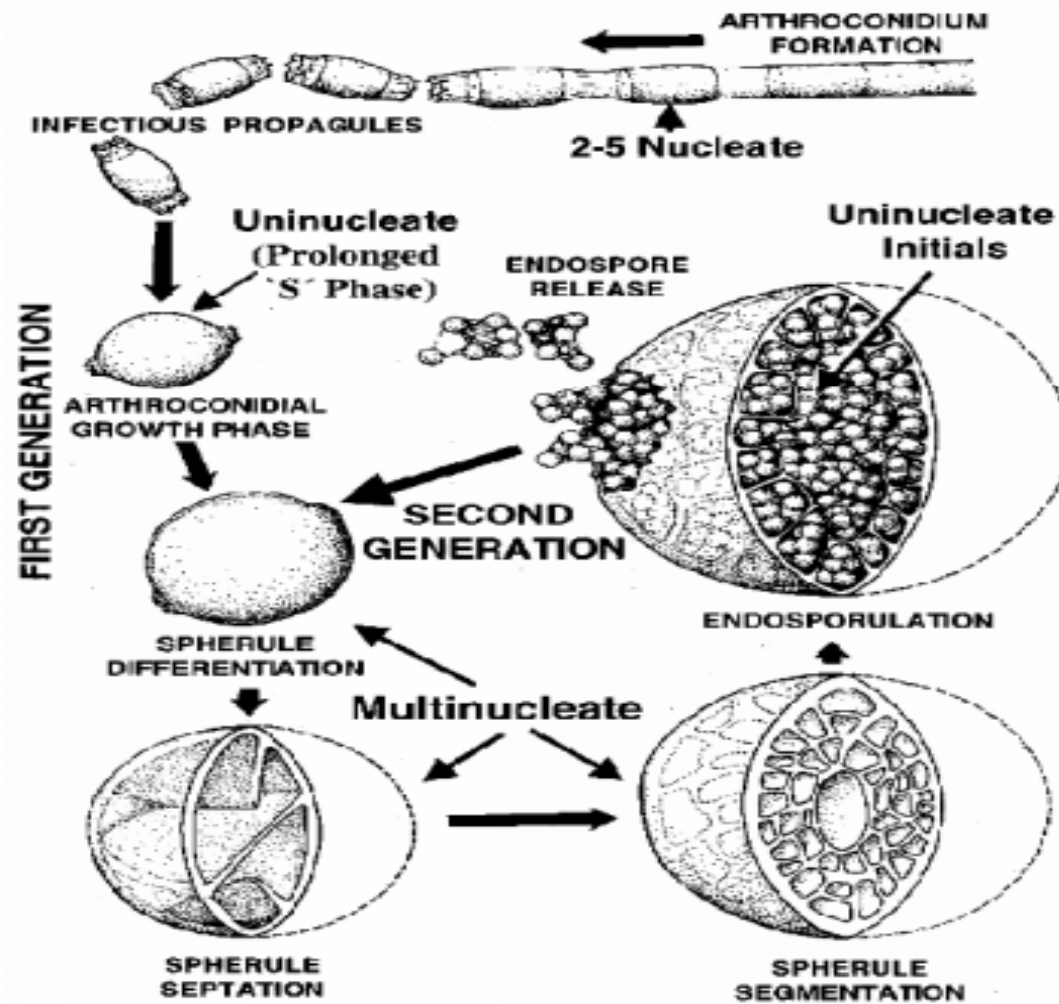
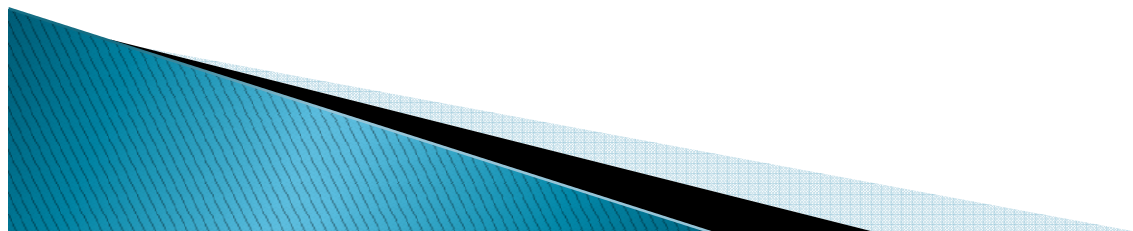


Fig. 1



Name of fungus	Coccidioides immitis	Paracoccidioides brasiliensis
Specimen	Sputum, pus, biopsy	Sputum, pus, biopsy, BAL
Direct microscopy	Mature spherules with endospores	Yeast cells with multiple buds – 'Mickey Mouse cap' appearance
Culture on SDA at 25 <sup>o</sup> C for 3 wks; Mycelial form:	Thick walled arthroconidia from septate hyphae	Septate branched hyphae & Chlamydospores

Name of fungus	Coccidioides immitis	Paracoccidioides brasiliensis
Culture on SDA at 37 <sup>0</sup> C	Spherule (15-75µm) with thick doubly refractile wall & filled with endospores	Yeast cells with multiple buds
Skin test	Useful for diagnosis	Limited value



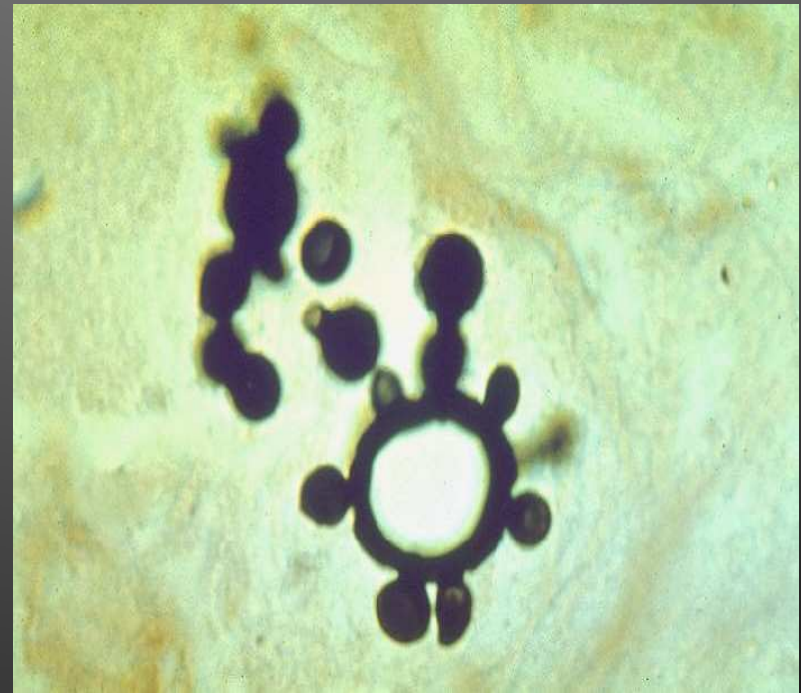
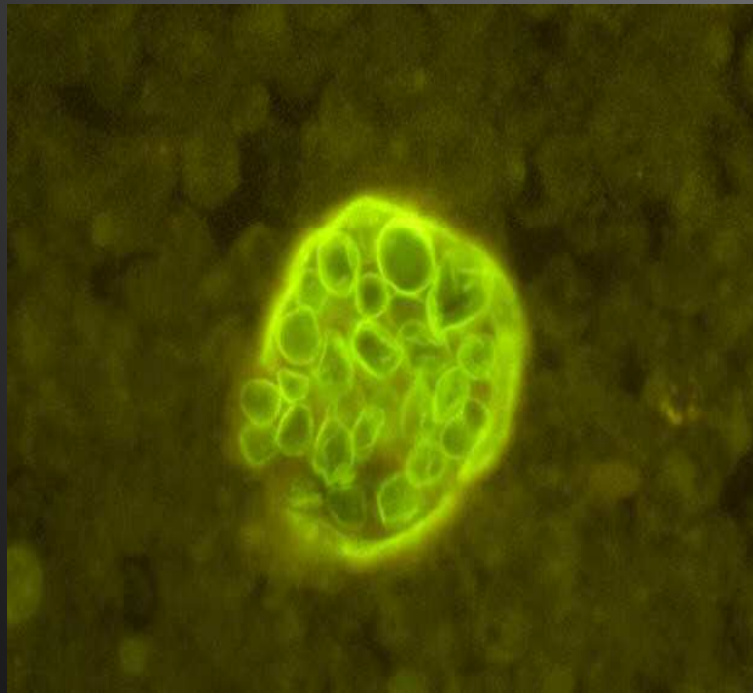
# Lesions: Coccidioidomycosis & Paracoccidioidomycosis



# Mucocutaneous lesion of Paracoccidioidomycosis

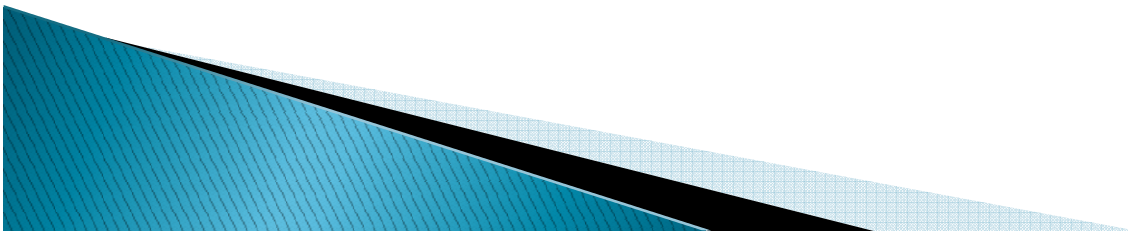


# Microscopically: *C.immitis* & *P.brasiliensis*



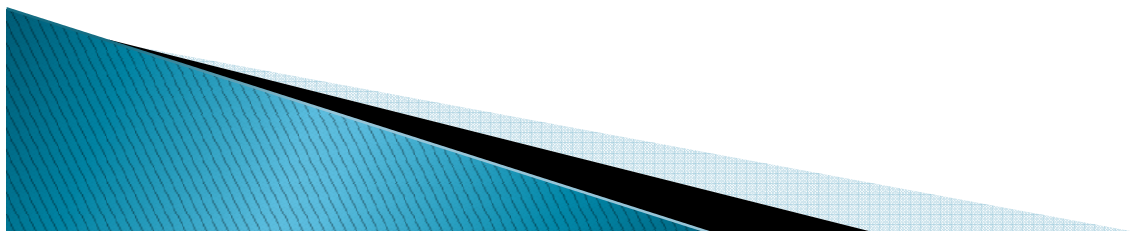
# Summary of ....

- ▶ Histoplasma
- ▶ Blastomyces
- ▶ Coccidioides



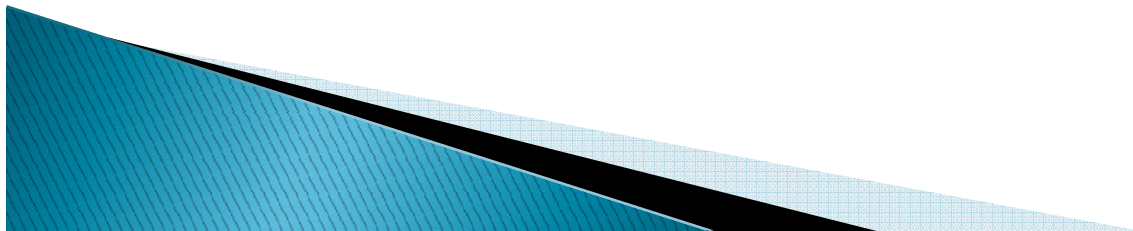
# Like Tuberculosis

- ▶ Inhaled, primary infection in lung
- ▶ Asymptomatic, mild, severe or chronic lung infection
- ▶ Lung granulomas, calcifications, &/or cavitation
- ▶ Can disseminate hematogenously to distant sites
- ▶ Skin test like PPD



# Unlike Tuberculosis

- ▶ No person to person transmission
- ▶ Fungi with spores
- ▶ NOT acid fast bacteria





**Thank You**

