**SYSTEMIC MYCOSES**

BLASTOMYCOSIS

* Synonyms – Gilchrist’s disease, North American balstomycosis
* Chronic infection found mainly in the lungs with suppurative and granulomatous lesions with characteristic skin lesions
* Etiology – Blastomyces dermatitides

EPIDEMIOLOGY

* Mississippi River Valley basin
* Reported also in other parts of the world
* Organism is thought to grow in soil but it has rarely been cultured from nature

CLINICAL FORMS:



1. Pulmonary

* radiographically, it may mimic PTB

Pulmonary Blastomycosis of lungs

( B. dermatitidis )

1. Systemic

* extension of the pulmonary form
* granulomatous lesions and abscesses often occur

1. Cutaneous

* lesions appear crusty, elevated with well defined margins, usually with microabscesses



Blastomycoses:skin lesions occurs after systemic dissemination of Blastomyces dermatitidis from a primary pulmonary focus. Lesions are vegetating plaques with slowly advancing, raised, hyperkeratotic, or verrucous borders with central healing and scarring.

Blastomycosis of forearm ( B. dermatitidis)



Blastomycosis of Eye brow

PREDILECTION

* Men
* Persons who have more than normal contact with soil

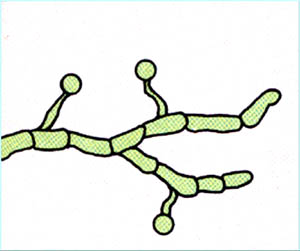
TISSUE FORM

* grows as thick walled yeast cells with broad based bud

DIAGNOSIS

* Direct microscopy
* Sputum
* skin scrapings
* biopsy material
* Culture

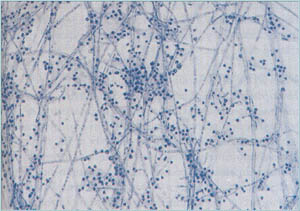
MICROSCOPIC EXAMINATION



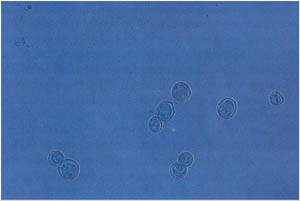
Blastomyces dermatitidis

Microscopic examination of sputum and

Skin scrappings showed an oval conidia borne laterally on branching hyphae



. dermatitidis, mycelial form, showing oval conidia borne laterally on branching hypae



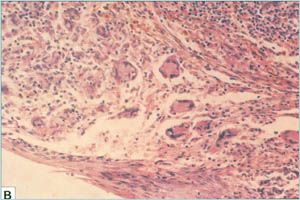
B. dermatitidis, yeast form, showing thick-walled, oval to round, single- budding, yeastlike cells

BIOPSY MATERIAL



Blastomycosis. Microscopic examination shows

Prominent pseudoepitheliomatous hyperplasis, Diffuse infiltration of the dermis with Inflammatory cells

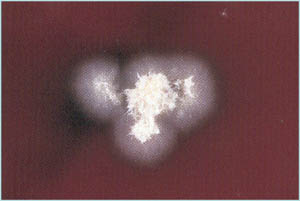


Blastomycosis.

This micrograph shows histiocytic infiltration of the dermis with multinucleated giant cells in the dermis or free in the micropurtules of the epidermis

CULTURE MATERIAL

* Dimorphic fungus
* Room temp.
  + fluffy white fungus on SDA/Mycosel
  + Pyriform spores (infection particles)
* 37°C on BHI agar – yeast cells identical to the tissue forms are produced

Blastomyces dermatitidis colonies (Brain heart infusion agar with 10% sheep blood, gentamycin, and chloramphenicol.)

At 25°C the mold produces white to tan, cottony colonies that grow fairly rapidly in a week. With age they turn dark brown. AT 37°C the yeast form produces cream brown, wrinkled, waxy-looking colonies

TREATMENT

* Itraconazole
* Oriental consideration
  + Blastomycosis is not an oriental disease; but it has been recorded in other countries possibly as a result of fomite transmission

PARACOCCIDIOIDOMYCOSIS

* Synonyms – South American blastomycosis
* Chronic granulomatous disease (skin, lymph nodes, mucous membranes and internal organs)
* Etiology – Paracoccidioides brasiliensis

EPIDEMIOLOGY

* South American esp. Brazil
* Organism probably resides in the soil

CLINICAL FORMS

* most commonly involve nasal and oral mucosa with resulting lymph node enlargement
* skin lesions usually develops in the face



Mucocutaneous paracoccidioidomycosis (upper lip)

Mucocutaneous paracoccidioidomycosis.

The gingival ridge shows granulomatous infiltration and loss of all teeth.

PREDILECTION

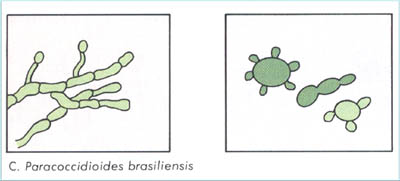
* Men
* 20 to 30 years old

TISSUE FORM

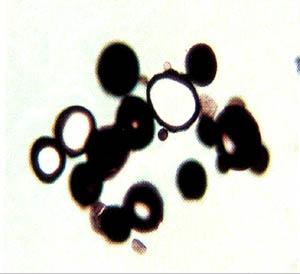
* large yeast cells (larger than Blastomyces) with multiple buds (mariner’s wheel)

DIAGNOSIS

* Direct Microscopic Examination Biopsy



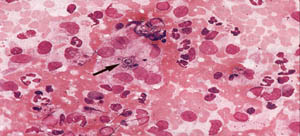
Microscopic examination: Large yeast cells with multiple buds.



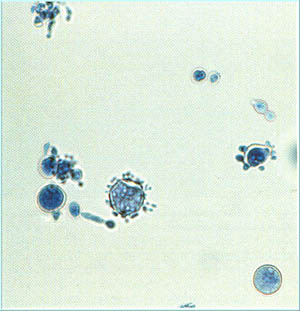
**Paracoccidioides brasiliensis (Adrenal tissue)**

Gomoris methenamine silver stain

The stain showed numerous thick-walled yeast cells, spherical to oval with multiple narrow-based buds that give the appearance of a steering wheel



Paracoccidioides brasiliensis in bone marrow showing yeast cells having multiple buds



Parcoccidioides brasiliensis stained with

Lactophenol cotton blue.

Culture showed thick-walled cells with multiple buddings.

Paracoccidioides brasiliensis: mycelial form, showing septate hyphae and pyriform conidia singly borne

* Culture
  + Dimorphic fungus
  + RT – SDA – non-sporeforming septate fungus
  + 35°C – BHI agar – yeast cells with multiple buds
* Other tests : serology
  + complement fixation
  + immunodiffusion

TREATMENT

* Amphotericin B
* Itraconazole

COCCIDIOIDOMYCOSIS

* Synonyms – San Joaquin Valley fever, desert fever
* Etiology – Coccidioides immitis

CLINICAL FORMS:

1. Primary pulmonary

* after inhalation of spores conversion to a positive skin test & flu-like symptoms
* some may develop rashes (erythema nodosum/ multiforme)
* no progression of disease, the infected person develops resistance

1. Benign form

* Positive for skin test, precipitin tests and complement fixation titers
* Well defined lung cavitation (which may go unnoticed as far as symptoms)
* It may progress into the disseminated form

1. Disseminated form

* spreads to internal organs like the brain
* Precipitin titers disappear but complement fixing titers continue to rise
* A state of anergy may exist
* Prognosis is usually grave



**Disseminated coccidioidomycosis**

A warty whitish plaque over the right upper eyelid.

The skin lesion is described as verrucous plaques.

**Disseminated coccidioidomycosis**

A large subcutaneous mass on the chest wall

**Disseminated coccidioidomycosis**

A warty hyperkeratotic lesion on the thumb

EPIDEMIOLOGY

* Southwestern part of the US (Great Desert Area)
* Mexico
* Central and South America
* Organism resides near the surface of the soil
* Arthrospores which become airborne are the infectious particles

PREDILECTION

* Any person present in an endemic area
* Individuals who work with the soil
* Darker skinned individuals

TISSUE FORM

* Present as sporangia (thick walled) in varying sizes
* Best stain is PAS

DIAGNOSIS

* Direct microscopy
  + Sputum
  + Skin
  + other tissues



**Coccidioides immitis (KOH mounth)**

Mature spherules of C. immitis are round or oval, have a well demarcted wall and produce endospores.

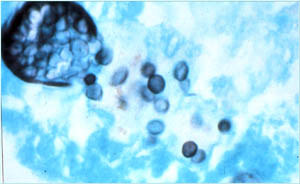


**Coccidioides immitis (Calcofluor white preparation)**

Mature spherules of C. immitis are round or oval, have a well demarcated wall and produce endospores



C. immitis, tissue form, showing spherule containing numerous spherical endosphores



**Coccidioides immitis spherules (Silver stain)**

* Culture
  + Dimorphic fungus
  + RT – SDA – fluffy white fungus, arthrospores
  + In vivo – spherules

TREATMENT

* Therapy – Amphotericin B



**Coccidioides immitis (Sabourauds dextrose agar)**

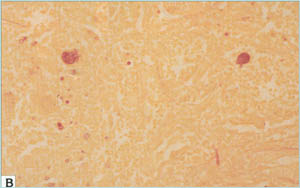
The colony has a powdery, cottony appearance resulting from the formation of arthroconidia from the hyphae.



**Coccidioides immitis spherules (Silver stain)**

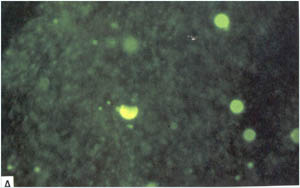
**Arthroconidia of Coccidioides immitis** (Lactophenol Cotton Blue preparation)

The organism appear in the branches of the hyphae as thick-walled, barrel-shaped structures. Alternating with the arthoconidia are weakly stained empty cells, a characteristic that differentiates this microorganism from Geotrichum spp. The arthroconidia produce an infection in susceptible individuals.



**Coccidioides immitis (Periodic acid-Schiff staining of skin section)**

Lesions showed yeast forms and spherules in the dermis



**Coccidioides immitis**

**(Calcifluor stain of fluid aspirated from the chest wall)**

Lesions demonstrated the yeast form

HISTOPLASMOSIS

* Etiology – Histoplasma capsulatum

CLINICAL FORMS

1. Primary acute

* after inhalation of microconidia, person maybe asymptomatic or develop flu-like symptoms
* Becomes skin test positive

1. Chronic cavitary

* development of large pulmonary cavities which maybe asymptomatic or may progress into disseminated disease
* often mistaken for PTB

1. Severe disseminated

* spreads to the RES
* often fatal



**Histoplasmosis.**

Indurated ulcer on the tongue

EPIDEMIOLOGY

* worldwide
* US - Mississippi River Valley Basin
* Organism resides exclusively in soil containing feces of certain birds (starlings, chicken, black birds) and bats. In the soil, organism exists in mycelial form and the microconidia are the infectious particles.

PREDILECTION

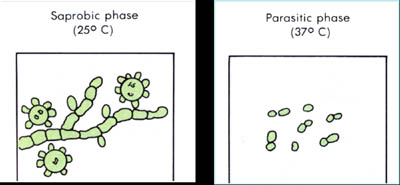
* Persons who are exposed to massive numbers of microconidia may develop severe form of Histoplasmosis

TISSUE FORM

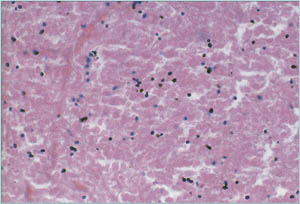
* Exists as small (3-5u),non-encapsulated intracellular yeast cells. (Maybe mistaken with Leishmania spp.)
* Best stain - PAS

LABORATORY DIAGNOSIS

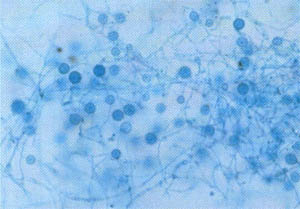
* Direct microscopy



**Histoplasma capsulatum**



H. capsulatum, yeast form, showing intracellular, oval yeast cells, deeply stained



Histoplasma capsulatum taken from a cultures material.

It demonstrates the characteristic mycelia, microconidia and tuberculate macroconidia.



Histoplasma capsulatum, mycelial form showing characteristic macroconidia

* Culture
  + Dimorphic fungus
  + RT – SDA
    - white, fluffy fungus
    - septate hyphae with microconidia and tuberculate macroconidia (diagnostic feature)
    - 35-37°C – BHI broth/agar – smooth yeast colony (nonspecific features except for the small size)
* Other lab tests
  + Histoplasmin skin test
  + Precipitin test
  + Complement fixing Ab titer

TREATMENT

* therapy – Itraconazole
* Oriental Consideration – Bat caves are usually heavily infected

AFRICAN HISTOPLASMOSIS

* Mycotic infection that localizes in skin, lymph nodes and bone, producing subcutaneous abscesses and skin lesions
* Etiology – Histoplasma capsulatum var. duboisii

TISSUE FORM

* Exists as large yeast cells (7-15u) inside giant cells

DIAGNOSIS

* Culture
  + RT – SDA :Mycelial form with tuberculate macroconidia and microconidia
  + 35-37°C – BHI agar :yeast cells, larger than the yeast cells of H. capsulatum