Blastomycosis

*Blastomyces dermatitidis* causes blastomycosis, known as North American blastomycosis
Dimorphic Fungi

- Histoplasmosis
- Blastomycosis
- Coccidioidomycosis
- Paracoccidioidomycosis
- Sporotrichosis
- Penicilliosis marneffei
Properties of *Blastomyces*

- *B. dermariridis* is a dimorphic fungus that exists as a mold in soil and as a yeast in tissue.
- The yeast is round with a doubly refractive wall and a single broad-based bud.

Note that this organism forms a broad-based bud, whereas *Cryptococcus neoformans* is a yeast that forms a narrow-based bud.
Blastomycosis

• Blastomyces dermatitidis is a dimorphic fungus
  →mycelial form at room temperature
  & yeast form at body temperature.

• Etiology of spectrum of diseases that occur either in sporadic or epidemic cases.

• 2 serotypes : A antigen +ve or –ve {mainly in Africa}
Epidemiology

• Estimating incidence has been difficult
  → lack of sensitive & specific diagnostic tests
  considerable number of cases are subclinical

• Based on clinical reports of cases endemic areas are
  states bordering Mississippi & Ohio rivers
  → Southeastern & South-central
  & states bordering the great lakes
  → Canadian provinces, Midwestern
Epidemiology

• Environment is soil containing decayed vegetations or decomposed woods

• Rain fall or proximity to water source maintaining humidity is a major factor

• Those environmental factors are short lived
FIGURE 44-7 Schematic illustration of the natural history of the saprobic and parasitic cycle of Blastomyces dermatitidis.
In the environment, Blastomyces dematiaceous exists as a mold to with septate aren't together. The hypotrophic portion contains spores (2). These spores are either inhaled or ingested into the soil of a susceptible host. The warmer temperature inside the host suppresses transformation of into a broad-based budding yeast. The yeast may continue to colonize the lungs or disseminate in the bloodstream (3) to other parts of the body, such as the skin, bones, pungs, organs, and central nervous system.
<table>
<thead>
<tr>
<th>Pathogen</th>
<th>Human</th>
<th>Soil</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blastomyces dermatitidis</td>
<td>1898</td>
<td>1964</td>
</tr>
<tr>
<td>Cryptococcus neoformans</td>
<td>1894</td>
<td>1951</td>
</tr>
<tr>
<td>Histoplasma capsulatum</td>
<td>1934</td>
<td>1949</td>
</tr>
<tr>
<td>Coccidioides immitis</td>
<td>1900</td>
<td>1932</td>
</tr>
</tbody>
</table>
Transmission & Epidemiology of Blastomyces

• This fungus is endemic primarily in eastern North America, especially in the region bordering the Ohio, Mississippi, and St. Lawrence rivers, and the Great Lakes region.

• Less commonly, blastomycosis has also occurred in Central and South America, Africa, and the Middle East. It grows in moist soil rich in organic material, forming hyphae with small pear-shaped conidia.

• Inhalation of the conidia causes human infection.
Pathogenesis & Clinical Findings of Blastomyces

• Infection occurs mainly via the respiratory tract.
• Asymptomatic or mild cases are rarely recognized.
• Dissemination may result in ulcerated granulomas of skin, bone, or other sites.
Presentations

• **General**: fever, malaise, fatigue & Wt loss

• **Pulmonary**: Acute resemble CAP
  Chronic might be mistaken for malignancy
  Reported cases → empyema & ARDS
  CXR → alveolar disease
  upper lobes predominance
  or Mass, miliary reticulonodular pattern
  Cavitations & effusions are rare
Presentations

- **Cutaneous:** 2nd most common
  Isolated or concomitant with respiratory involvement
  Either verrucous or ulcerative lesions
  Aspirations or Bx will yield Dx

- **Osseous:** both axial & peripheral bones
  Radiological findings are non specific
  Bx \(\rightarrow\) granulomatous inflammation
Presentations

• **CNS**: Meningitis, abscess
  Ventricular fluid has a higher yield than LP

• **GU**: Prostatitis & epididymoorchitis

• **Rare**: LN, Liver & spleen abscess
  ocular, adrenal, breast
  Presenting with ITP, Immune hemolysis
  Associated with TB, Histo & Coccidio
Blastomycosis

Skin lesions resulting from the dissemination of the fungus from the lungs
Laboratory Diagnosis of *Blastomyces*

- In tissue biopsy specimens, thick-walled yeast cells with single broad-based buds are seen microscopically.
- Hyphae with small pear-shaped conidia are visible on culture.
- The skin test lacks specificity and has little value.
- Serologic tests have little value.
Diagnosis

• High diagnostic yields from culture specimen & culturing different sources will increase yield

• Increase number of specimens increase yield

• Average time to confirm Dx by Culture
  → 5 weeks
Diagnosis

• KOH may provide faster & comparable yield to cultures

• Serology yield 16-40%

• Wet smear & cytology might be helpful in endemic areas when starting treatment is urgent to avoid more invasive investigations
Broad based budding and thickened cell walls and globose shape are characteristic of the yeast form of *Blastomyces dermatitidis*

*One-celled conidia formed on short conidiophores.*
Blastomycosis

Tissue sections showing large, broad-based, unipolar budding yeast-like cells
FIGURE 44-8 Broad-based budding yeast cells of *Blastomyces dermatitidis* seen in purulent material expressed from a microabscess.
**Blastomyces dermatitidis**  The yeast phase of Blastomyces dermatitidis has a thick refractile cell wall (arrows). Courtesy of Stanley W Chapman, MD.
Treatment

• Spontaneous resolution is very uncommon

• Untreated cases might have mortality 60%

• No randomized trial comparing antifungal Rx

• Rx selection depends on immune status & severity of infection
Treatment

• Immunocompromized with CNS, Respiratory failure or multioragn failure → Ampho B

• Itraconazole is the drug of choice 200 mg. 6 months cure rate > 90%

• Ketoconazole variable cure rates with higher CNS relapse
Treatment & Prevention of *Blastomyces*

- Itraconazole is the drug of choice for most patients.
- Amphotericin B should be used to treat severe disease.
- Surgical excision may be helpful.
- There are no means of prevention.