Blastomycosis

**Taxonomy:**
- **Kingdom:** Fungi
  - **Phylum:** Ascomycota
    - **Genus:** Blastomyces

**Background**
- *Blastomyces dermatidis* is the only known species
  - Directly related to the disease blastomycosis
- Thermal dimorphic fungus:
  - Found as mycelial (mould like) form in environment (25°C)
    - Conidial form is infectious
  - Transforms to yeast inside the body (37°C)
    - Life cycle ends within the body (non infectious)
- Blastomycosis is usually obtained by inhalation
- Two clinical forms include:
  - Systematic, and
  - Cutaneous
- Known as a primary pathogen and will affect:
  - Immunocompetent, and
  - Immunodeficient individuals
- Endemic areas include:
  - North America
    - Ohio river valley
    - Mississippi river valley
Missouri river valley

- Great lakes region
  - Africa

**Case Report 1: Blastomycosis in a South Indian patient after visiting an endemic area in USA**

- In March 2003, a 41 year old diabetic male was admitted in a hospital for coughing and fever of 3 months in Bangalore, India.
- His history indicated a one month visit to the US between October and November of 2002.
- During this visit, the patient visited Milwaukee, Wisconsin commonly known as an endemic region for *Blastomyces dermatidis*.
- Two weeks after return, he developed Bell’s Palsy and was treated with prednisolone.
  - After four weeks, treatment was discontinued due to improved conditions.
- Two weeks later in January 2003, a dry cough developed with an intermittent fever.
  - Treated with antibiotics; symptoms persisted.
  - X-ray findings were suggestive of tuberculosis and the patient received anti-tubercular treatment.
  - Patient had a weight loss of 10 kg and loss of appetite in two month period.
  - Developed swelling on left knee and below left jaw.

**Biopsy samples**

- No bacterial pathogens found in sputum, blood, and urine cultures.
- Gram stained smears of pus indicated budding cells representing *B. dermatidis*.
- Similar cells were found in fibro-connective tissue from curettage tissue via H&E, PAS, and GMS stain procedures.
Lab work

- The pus and curettage tissue from the abscess were cultured on:
  - Sabouraud dextrose
  - Blood agar
  - Biphasic brain heart infusion agar

- Duplicate cultures were incubated at 25°C and 37°C
  - At room temperature, White moist cottony colonies became visible on week 3
  - The Mycelial colony was then prepared and incubated on potato dextrose agar
    - After only ten days: hyaline, septate branching hyphae, pear shaped 1-celled conidia on short stalks or directly on hyphae were present.
    - Isolate was converted to yeast form after several subcultures on BHI agar at 37°C
    - The yeast form showed budding cells of B. dermatidis characteristics

- A subculture of the mycelial isolate was sent to AAP in Atlanta, Georgia for a confirmation
  - The mycelial-yeast conversion was successful on Kelley’s agar at 37°C showing broad based budding characteristics of B. dermatidis

Treatment

- Withdrew anti-tubercular treatment once B. dermatidis was confirmed
- Patient was treated with 40 mg daily of amphotericin B (Received total of 2.5g)
- After successful treatment of amphotericin B, the patient took 200 mg of itraconazole daily
- Itraconazole treatment was discontinued after six months and patient is free of infection to present time

Case Report 2: Common diagnostic challenges posed by North American blastomycosis as in a patient from Toronto, Canada
A 42 year old female reported to her physician in January 2000 with the following symptoms:

- Mild diarrhea
- Upper abdominal cramps
- General malaise of one month

An ultrasound discovered a large gall bladder and cholecystitis was suspected.

A cholecystectomy was conducted on April 28, 2000

- One week after surgery, all previous symptoms remained
- A recommendation for endoscopic retrograde sphincterotomy was made but declined by patient concerns

Chest radiographs were performed and revealed suggestive pneumonia in the right lower lobe

- Antibiotics were given and a follow up radiograph was conducted with no resolution of the right lower lobe.

A computed tomography (CT) scan was conducted by a respirologist and discovered an oval mass in the lower lobe of the right lung measuring 5cm.

With suggestion of potential malignancy, a bone scan was performed with negative results.

On June 21st a 2000 needle biopsies were performed for cytologic analysis and reported negative for malignant cells.

The patient had a total weight loss of 12 pounds.

The patient then attended a walk in chiropractic clinic with mid back pain presenting a series of chest radiographs and CT scans.

- List of differentials that included
  - Bacterial pneumonia
  - Bronchogenic carcinoma
  - Tuberculosis
Histoplasmosis

- In early August a cutaneous lesion developed on her chin
  - A biopsy of the lesion confirmed blastomycosis

Treatment

- Patient was prescribed 200 mg of Sporanox a day
  - In one week, the fever resolved and the lesion diminished significantly
- Follow up CT scans and radiographs performed in October 2000 revealed that the pulmonary lesion had diminished substantially
- Spinal manipulative therapy was directed towards the thoracic spine due to:
  - Myofascial hypertonicity – a response to the mycotic respiratory infection
    - Her thoracic discomfort improved rapidly

Case Report 3: Blastomycosis acquired by three children in Toronto


(Patient one)

- A 17 year old Iraqi girl was admitted into a hospital in late 1997 for a swollen, painful left ankle with 4.5 kg weight loss
  - No history of fever,
  - Trauma
  - or sexual activity
- Immigrated to Toronto 6 years prior and had not traveled out of Toronto since her arrival.
- Seen an orthopedic surgeon and found arthritis of the left ankle joint, pain over the mid-foot, and a tender papule over the talus
- The papule was incised thus leaving a 2cm ulceration at the incision site
- Gram stain and bacterial culture of the purulent fluid was negative
- After intravenous antibiotics her symptoms did not improve and she developed a right sided chest pain
- A chest x-ray revealed a small right pleural effusion and infiltrate at the right base
- An x-ray of the left ankle showed a 1cm lytic lesion in the talus

**Biopsies**

- Synovial fluid and biopsies of the bone and synovium were deemed negative using Gram, acid fast, and calcofluor stains
- On culture, the white fluffy filamentous fungus Blastomyces dermatidis was grown
- A CT scan of the head showed a lytic lesion in the lateral aspect of the left orbital roof without intracranial extension

**Lab/Cultural**

- Four to six days of incubation at 30°C
- B. dermatidis isolates were recovered from brain-heart infusion agar containing:
  - 5% sheep blood
  - 5 mg/L gentamicin sulfate
  - 16 mg/L chloramphenicol
- Isolates identified as yeast in tissue and mould in culture
- ***Same procedure used in patient two***

**Treatment**

- Treated with (1mg/kg/day) of conventional intravenous amphotericin B for six days
- Switched to alternate day amphotericin B lipid complex (5mg/kg/day) due to renal toxicity and hypokalemia
- After one month of amphotericin B treatment she was altered to (200 mg/day) of itraconazole for 10 months
- Two months after treatment reduction in lytic lesions occurred both in the lower lung and skull
- Three years after treatment she remained in well condition with a normal ankle X-ray
(Patient two)

- In 1997 a healthy Ethiopian boy presented right maxillary swelling and severe dental caries
- Resided in Toronto for five years prior
- Two molars and surrounding necrotic soft tissue were removed surgically when vascular granulation tissue and osteomyelitis of the maxilla were noted
- The Gomori methenamine silver stain resulted negative for the presence of fungi
- Tested Negative for HIV
- A tuberculin skin test was positive with 10mm of induration
- Diagnosed with actinomycotic and tuberculous osteomyelitis of the maxilla with necrotizing gingivitis
  - Treated with amoxicillin
  - Isoniazid
  - Rifampin
  - Ethambutol
- Facial swelling resolved but granulation in wound persisted
- Shortly before completion of 12 month antituberculous; new symptoms appeared:
  - Weight loss
  - Fever
  - Anorexia
  - Cough
- A bronchoalveolar lavage was performed
  - The calcoflour stain was negative and the culture grew B. dermatidis

**Treatment**

- Oral itraconzaole of 100/mg/day was prescribed
- After 6 months the oral lesion healed and the lymphadenopathy resolved.
- Remained clinically healthy four years after therapy

(Patient 3)
- In 1999 a previously healthy 11 year old Canadian girl from Oakville, Ontario presented:
  - One month of fever,
  - Cough
  - Left sided pain
- Chest X-ray revealed infiltrate of the left lower lobe
- Symptoms did not improve after 3 courses of antibiotics
- A bronchoalveolar lavage was performed
  - Culture grew B. dermatidis
- Patient had no known travel to an endemic region

Treatment
- Started on 1/mg/kg/day of intravenous amphotericin B
- After a two week improvement, switched to 400 mg/day of oral itraconazole for 6 months
- After end of therapy she was entirely well

Epidemiology:
- Typically an infection of mid aged males with extensive outdoor exposure
- Not infectious from human to human
- Typically found along river banks
- Favored by high organic matter and high acidic levels
- Sensitive to drying
- Conidia only released when wet
- Rare in urban areas

Clinical manifestations:
- Asymptomatic
- Acute Pulmonary
- Bone & Joint Infection
- Chronic Pulmonary
- Genitourinary Tract Infection
- Skin disease
- Subcutaneous Nodules

**Diagnosis:**
- Tests include:
  - Antigen – urine and serum (blastomyces antigen)
  - Cytology – sputum, biopsy of lesion
  - KOH
  - Histopathology – Biopsy of lesion
  - Culture - sputum
  - Bronchoscopy lavage

**Treatment:**
- Via intravenous or oral
  - Amphotericin B
  - Itraconazole
  - Ketoconazole
  - Fluconazole
References

www.doctorfungus.com (accessed on June 4, 2008)
