Bewildered by Blastomycosis

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Reports of an unusual granulomatous infection have recently appeared primarily in Northwestern Ontario and Manitoba. This infection is neither caused by a newly identified agent, nor is it a new disease. It is blastomycosis, caused by *blastomyces dermatitidis* which is our **Bug of the Month.**

What is blastomycosis?

Blastomycosis is an uncommon but potentially serious granulomatous infection, primarily affecting humans and dogs. It results from inhaling conidia (spores) produced by the fungus *Blastomyces dermatitidis. (B. dermatitidis)*,Reports exist of cutaneous infections caused by direct inoculation of the pathogen into the skin. The most frequently encountered infections are pulmonary, ranging from minor pneumonias to overwhelming respiratory failure and death, as well as other common infections of the:

- Skin and soft tissue,
- Bone
- Prostate

What is B. dermatitidis?

B. dermatitidis is a thermally dimorphic fungus found in moist, wooded areas, rich in decaying foliage and vegetation, endemic to:

- eastern Manitoba,
- Saskatchewan,
- Quebec,
- northern Ontario and other areas around the Great Lakes,
- along the St. Lawrence River,
- the Mississippi River and along
- the Ohio River basins.

Little is known about the actual fungal locations at any particular time or the specific conditions of humidity, temperature and nutrition that cause the fungus to grow or die out in the soil.

B. dermatitidis exists as mould in soil or at room temperature. However, once spores are inhaled into the lungs, at body temperature (37 C), *B. dermatitidis* transforms into invasive yeast, which multiplies and invades lung tissue with the potential for further distribution via blood and lymphatics to skin. The characteristic finding under the microscope is a broad- based budding yeast (Figure 1).

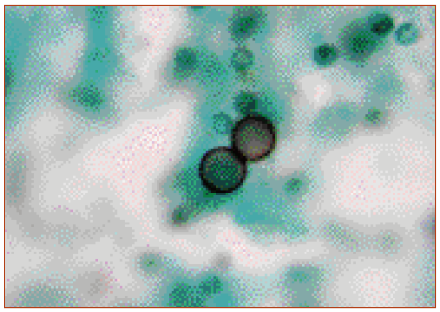

Figure 1. Culture of the draining mass revealed a broad-based budding yeast compatible with *B. dermatitidis.*

How can you acquire blastomycosis?

Blastomycosis is most frequently acquired by contact with *B. dermatitidis* in the soil or the fungal spores in the air. Since *B. dermatitidis* exists as mould in soil, construction, digging, gardening, or any other activities that disturb soil that serve to aerosolize the fungal spores which can then be inhaled and possibly lead to blastomycosis. In the yeast phase, spores are not generated, thus transmission is exceedingly unlikely, which is why blastomycosis is not communicable from animals to humans and human to human.

Who is at risk of blastomycosis?

The risk of acquiring blastomycosis is generally low, but highest for anyone who is often exposed to moist soil that contains alot of orgranics, such as rotting leaves and wood, specifically:

- Farmers
- Construction workers
- Hunters
- Campers

The incidence and severity of blastomycosis seems to be increased in the immunocompromised including, but not limited to:

- Organ transplant recipients
- Those recieving chemotherapy or steroids
- Those with HIV/AIDS

What are the symptoms of blastomycosis?

Symptoms of blastomycosis are highly variable. They may develop suddenly, or days to weeks after exposure to *B. dermatitidis*. In many instances, first signs of the disease are missed because they appear to be similiar or mimic other illnesses. Symptoms are often flu-like in nature and include:

- mild and rapidly increasing respiratory symptoms,
- productive cough with brown or bloody sputum,
- chest pain and shortness of breath,
- pneumonia, sweating, chills and fever,
- fatigue,
- general discomfort and uneasiness,
- ill-feeling and unintentional weight loss,

- joint stiffness and pain,
- muscular stiffness, aches and muscle pain, along with
- rash and skin lesions.

The presumed portal of entry is the lungs, with secondary dissemination, not dissimilar to TB. The cutaneous manifestations can be varied and may mimic a number of different conditions such as:

- Abscesses
- Psoriatic plaques and
- Skin neoplasms (Figure 2)

In some persons, the symptoms resolve spontaneously, but in others, especially if untreated, symptoms may develop into a progressive illness involving multiple organ systems representative of systemic disease. Extrapulmonary dissemination more often occurs in patients with chronic pulmonary illness and in those who are immunocompromised; however, it also occurs in those presumed to be immunologically intact.

When should blastomycosis infection be suspected?

There is no definitive clinical syndrome characteristic of blastomycosis. Blastomycosis is a systemic disease and may imitate, at a respiratory level, TB or other respiratory illnesses caused by bacteria or fungi. At a cutaneous level, it may initiate diseases such as bromoderma, pyoderma gangrenosum, Majocchi's granuloma, leishmaniasis, *Mycobacterium marinum* infection, giant keratoacanthoma and squamous cell carcinoma.

How is blastomycosis diagnosed?

Blastomycosis is difficult to diagnose as it has a variety of presentations. Serology and skin tests are not accurate in diagnosing blastomycosis, as both tests have poor sensitivity and specificity and thus the definitive diagnosis requires growth or visualization of *B. dermatiditis* on a clinical specimen. A heightened level of suspicion is needed to entertain blastomycosis in the differential diagnosis.

Figure 2. A raised draining mass had been present on this patient's foot for six months.

How are blastomycosis infections treated?

Although blastomycosis may spontaneously resolve, treatment is indicated for all clinical presentations. If left untreated, blastomycosis may progress and eventually lead to death. Therapy is prolonged, lasting six months to one year (or longer depending upon the clinical manifestation) and with a systemically acting agent, as it is presumed that the portal of entry is the lung with dissemination throughout the body. Most clinicians will await the laboratory confirmation prior to initiating treatment, given that therapy is prolonged and potentially toxic.

Blastomycosis may be treated with one of numerous antifungal drugs, the most frequently of which include itraconazole and amphotericin B (and rarely fluconazole). For life-threatening blastomycosis or disease of the central nervous system (CNS), amphotericin B is the treatment of choice. For those who are not critically ill, or who have no CNS involvement, itraconazole is the usual choice. Prior to initiating therapy, it may be prudent to seek guidance from a specialist knowledgeable with this condition.

How is blastomycosis avoided?

The answer to this question is not straightforward, as the microorganism is an environmental pathogen, thus it may be impossible to avoid the airborne conidia. In endemic areas, the usual recommendations are to wear a protective dust mask or N95 mask when undertaking tasks where soil will be disturbed, particularly when working in enclosed spaces. However, it must be acknowledge that it is impossible to predict when one will come in contact with spore laden dust and thus, it may be difficult, if not impossible, to eliminate the risk of exposure to this pathogen. If after visiting any of the endemic areas and unusual symptoms or non-resolving respiratory infections ensue, blastomycosis should be considered as the differential diagnosis.

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