

# Northern Wisconsin Married Couple Infected with Blastomycosis

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## ABSTRACT

Blastomycosis is an uncommon, chronic, granulomatous disease caused by the dimorphic fungus *Blastomycosis dermatitidis*. The great majority of infections start with primary pulmonary involvement through inhalation of spores. Hematogenous dissemination to other sites occurs in 25% to 30% of cases. The most common secondary site is the skin, followed in order by bone, genitourinary system, and central venous system.

We report 2 cases of blastomycosis originating in a husband and wife who were both symptomatic and diagnosed with blastomycosis within 4 months of each other. One presented with pulmonary symptoms, the other with cutaneous symptoms. These 2 cases of husband and wife are of interest not only because of their rarity but also because of the potential mode of transmission.

## INTRODUCTION

Blastomycosis was first described in 1894 by Gilchrist in the United States.<sup>1</sup> Blastomycosis is one of the endemic mycoses in North America including the Southeastern, South Central, and Midwestern states.<sup>2,3</sup> Infection is acquired via inhalation of airborne spores from disturbed contaminated soil<sup>4</sup> and transforms at body temperature to the yeast phase (thermal dimorphism).<sup>1</sup> The lung has a natural resistance, which is mediated by neutrophils, monocytes, and alveolar macrophages that can phagocytize and kill the conidia (spores).<sup>2</sup> Conidia that escape the natural defense are rapidly converted in the tissue to yeast forms, which are more resistant to phagocytosis and killing.<sup>2</sup> Therefore, in immunocompromised patients, blastomycosis is often more aggressive, with a mortality rate of 30%<sup>4</sup> in contrast to a treated immunocompetent host with a 0%-2% mortality rate.<sup>1</sup>

The great majority of infections start with primary involvement through inhalation of spores. The pulmonary symptoms tend to appear approximately 6 weeks after exposure, and the patients typically have pneumonia-like presentation. Symptoms include pleuritic chest pain, productive cough, and constitutional symptoms (that might be passed off as colds) to severe illness with significant hypoxemia and diffuse infiltrates.<sup>5</sup> Cutaneous lesions are usually manifestations of dissemination from lung infection or as a primary cutaneous blastomycosis occurring from infected animal bites or accidental inoculation by infected materials.<sup>5</sup>

Understanding the incidence and epidemiology of blastomycosis has been hindered by the difficulty in isolating *B. dermatitidis* from nature. Knowledge of blastomycosis is based instead on the clinical reports of epidemics or point source outbreaks of disease.<sup>2</sup> Deuter et al, Klien et al, and others isolated *B. dermatitidis* from soil, rotting wood, decayed vegetation,<sup>2</sup> and rotting organic matter that was contaminated with feces from a wide variety of birds and mammals.<sup>6-8</sup>

## CASE REPORT #1

A 55-year-old female began experiencing an intermittent cough in January 2005. She treated herself with home remedies without any improvement. In April of 2005, she presented to the local clinic complaining of cough, fatigue, chest pain, shortness of breath, and weight loss of 20 pounds. She denied hemoptysis.

Her past medical history was positive for diabetes type 2, hypertension, depression, and hypercholesterolemia. Her medications included rosiglitazone, atorvastatin, glyburide, ramipril, paroxetine, and niacin.

On examination, her weight was 248 pounds, blood pressure was 128/76 with a pulse of 72. She had an oxygen saturation of 95% on room air. Her lungs were clear to auscultation, her heart was in a regular rate and rhythm without murmurs. Her initial chest x-ray showed a poorly defined area of consolidation in the left lower lobe anterolaterally measuring 4x4x6 cm. There was also a possible nodular density overlying the

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anterior right fourth rib as well. A chest CT showed multiple nodules with a dominant lesion in the left lower lobe laterally. Bronchoscopy was performed and results were nondiagnostic. A CT-guided fine needle aspiration of the largest left lower lobe lung mass was performed, which showed granulomatous inflammation with large yeast forms consistent with blastomycosis.

She was treated with itraconazole, 200 mg orally daily for 6 months with follow-up chest x-rays and liver function tests every month. She tolerated the medication and is scheduled to complete the course in November with the itraconazole. Her subsequent chest x-rays and CT scans of her lungs have shown regression of the nodules, and the August scans show that the nodules have almost totally resolved in both the left and right lung fields. She states she feels fine and has made a full clinical recovery from the disease.

## CASE REPORT #2

A 62-year-old male (husband to Case #1), living in northern Wisconsin, resides with his wife in an older home located on a nearby river. Their basement contained rotting firewood and is always damp due to a water seepage through the basement walls. He hunts, traps, and also works outside cleaning out blocked culverts that have been damned by beavers.

He presented to the local clinic on June 21, 2005, with a 1-week history of a potential Brown Recluse spider bite that he maintained had created an oval-shaped ulcer with purulent discharge over his left deltoid region. The patient's past medical history was insignificant. He denied diabetes, hypertension, cancer, fever, chills, or weight loss. He also denied a history of heart disease, liver disease, or renal insufficiency and took no medication except for vitamins. He was healthy, had never been hospitalized, denied any respiratory symptoms, worked outdoors, and enjoyed significant outdoor activities.

On examination he had a blood pressure of 130/72, a pulse of 68. He had a warm, erythematous area, 4 cm in diameter with a fluctuant center over his left deltoid area. The patient refused any surgical intervention; therefore, he was instructed to wash the area twice daily with soap and water and apply protective dressing. He was also given cephalexin, orally 500mg to be taken 3 times a day. Initially, the lesion improved as the fluctuance and hyperemic area decreased in size after 10 days of treatment.

The patient did not return for a follow-up until August, at which time he had a painless 4 cm diameter ulcer and deep to the muscular fascia over his deltoid area. The ulcer was debrided by the general surgeon. Histological examination of the removed tissue revealed blastomycosis.

He was referred to the infectious disease department at the VA Medical Center where a chest x-ray revealed a left upper lobe infiltrate. Treatment with liquid itraconazole, orally 200mg, twice daily for 6 months was initiated in the middle of August, and within 6 weeks the ulcer had decreased to 1 cm in diameter.

## DISCUSSION

In reviewing the literature, a number of themes emerged. Complete understanding of the incidence and epidemiology of Blastomycosis dermatitidis has been hindered by the difficulty in isolating *B. dermatitidis* from nature and also by the lack of a sensitive and specific skin test or serologic test to confirm infection.<sup>9,10</sup>

The best hypothesis for pathogenesis of blastomycosis is due to inhalation of spores from the soil, highlighted by the work of Wood and Serstock who isolated the yeast phase of *B. dermatitidis* from bird droppings, and Bakerspigel and co-workers who recovered the fungus from a dirt floor in Canada.<sup>11</sup> Also, other than from bite wounds, blastomycosis has not been shown to be contagious from the animal to the human, nor is infection ordinarily spread from person to person.<sup>2</sup> Disease occurs in less than half of infected individuals.<sup>9</sup> There are no formal recommendations for preventing exposure to *B. dermatitidis*.<sup>10</sup>

From where, then, did our patient contract *B. dermatitidis*? The 3 possibilities include the outdoors, the home, or her husband. The general assumption is that blastomycosis is acquired during outdoor activities because the typical patient is a young to middle-aged man who either works or recreates in outdoor areas<sup>2</sup> where the fungus has been recovered from outdoor areas; but the fungus has also been recovered from rotting wood and dirt in basements, and patients have been found to be infected who had no known exposure to outdoor activities.<sup>12</sup>

From our experience in taking care of patients in a high risk area, we found that the hypothesis advanced by Baumgardner and Paretsky—that place of residence may be more important for exposure to the etiologic agent Blastomycosis dermatitidis than the degree or type of outdoor activity—to be more convincing than the aforementioned general assumption. The majority of people living in high risk rural areas of Northern Wisconsin work or recreate in the outdoors close to waterways or are exposed to dust and use their basements as a storage space for junk and firewood for easy access during the cold winter months. Unfortunately, most basements are never cleaned and are usually wet or damp. Remnants of firewood left to rot year after year can be an optimal place for the *B. dermatitidis* to

survive and multiply in spore and yeast form. Rodents also flourish, become infected, and produce droppings containing yeast.<sup>6-8</sup> Furthermore, most homes have a forced air heating system, which aerosolizes the spores and yeast from the basement, possibly overwhelming the lung's natural resistance. Living in such homes would seem to put the occupants at much higher risk for acquiring blastomycosis than being outdoors.

The uniqueness of these cases is reflected in the fact that the husband and wife showed signs of infection with a relatively uncommon agent within a close time frame. Blastomycosis is reported in the literature as affecting only 1 to 2 in every 100,000 humans, with more frequency in the immunocompromised patient.<sup>2</sup> In high risk areas (10 counties in the northern half of Wisconsin) the incident ranges from 10.4-41.4 per 100,000.<sup>10,13</sup> The 2 patients discussed in these case reports did not have any immunocompromised conditions; however, of note is that the wife did have Type 2 diabetes mellitus.

The husband and wife were diagnosed in the same year, only months apart. The wife presented with pulmonary symptoms and the husband presented with a cutaneous ulcer. The wife remained primarily in the house or outside of the house in and around the yard. Her husband did have more environmental risks for exposure as he participated in outdoor activities such as collecting firewood, hunting, fishing, and working at his job clearing culverts of beaver dams and debris.<sup>5</sup> The risk factors that this couple shared were living near the river; exposure to firewood in the wet, dark basement; and the wife being exposed to her husband's clothes after he had been cleaning culverts.

These 2 cases should add to the present discussions<sup>14</sup> about where patients acquire Blastomycosis dermatitidis: from home or outdoors? Could humans contract it from an infected dog? Perhaps now one could question whether the disease might be transmitted from human to human. The timeliness of these 2 cases prompts us to question whether they contracted this disease within or around the household environment, either from inhalation of spores generated from the old, rotting firewood, or the wife's inhalation of spores from her husband's contaminated clothes. Mundy et al, make the point that pulmonary infection due to blastomycosis, including severe and progressive disease leading to acute respiratory distress syndrome, is not exclusively the result of overwhelming microbe exposure.<sup>6</sup> If the wife did not acquire the disease from her husband's contaminated clothes and/or from the exposure to firewood in her basement, then we may ask whether she contracted the disease from her husband.

## CONCLUSION

In conclusion, this is a very interesting interwoven pair of cases, and the only 1 reported in the literature: a husband and wife both contracting blastomycosis at almost the same time. Most of the previously documented cases that were closely diagnosed were several years apart and found mostly in canines.<sup>14</sup> We believe that our case report may add credibility to the idea that exposure to blastomycosis can occur in and around one's household environment; alternatively, it may initiate discussion about human-to-human transmission. Of course, more research is still necessary, concurrent with specific testing, as we seek to further understand the source and routes of transmission.

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