

# Endemic Fungal Infections in the United States



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## KEYWORDS

- Endemic fungi • Endemic mycosis • Coccidioidomycosis • Blastomycosis
- Histoplasmosis • Fungal infections • Treatment • Diagnosis

## KEY POINTS

- Endemic mycoses are infections caused by 3 specific fungi, *Blastomyces dermatitidis*, *Coccidioides* spp, and *Histoplasma capsulatum*, mostly found in specific geographic locations of the United States.
- The endemic fungi normally live in the soil and are capable of generating aerosolized spores that, once inhaled into the lungs of humans, can cause infections.
- Endemic mycoses primarily present clinically as mild or asymptomatic pulmonary infections but can progress to more serious pulmonary infections or disseminated disease, especially in immunocompromised hosts.
- Endemic mycoses are often overlooked as a cause of community acquired pneumonia, resulting in delayed antifungal treatment and disease progression or even death.
- Antifungal azoles and amphotericin B are the drugs of choice to treat endemic mycoses, and guidelines are available to help in the medical management of infected patients.

## INTRODUCTION

Commonly referred to as the endemic fungi, *Blastomyces dermatitidis*, *Coccidioides* spp, and *Histoplasma capsulatum*, are the 3 primary fungal species that cause endemic mycoses in the United States.<sup>1</sup> All 3 endemic fungi are soil-dwelling microorganisms that are predominantly restricted to specific geographic regions in the United States<sup>2-4</sup>; however, they also can be found to some extent in areas outside traditional endemic regions.<sup>5-7</sup> These endemic fungi are capable of causing a variety of specific diseases in humans but the predominant manifestation is pneumonia.<sup>1,2</sup> The respiratory tract is the main pathway for entry into the human host. Aerosolized spores, released from disrupted soil by activities, such as dust storms, military exercises, and earth excavations, are inhaled into the lungs. Once inside the lungs, the spores

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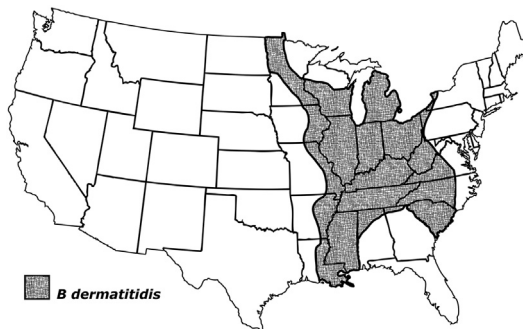
grow and spread to surrounding tissues. The fungi subsequently can spread even further to other tissues of the body by hematological and/or lymphatic routes, and thus can progress to disseminated disease.<sup>1,2</sup> Rarely do infections occur through cutaneous inoculation.<sup>8</sup>

*B dermatitidis*, *Coccidioides* spp, and *H capsulatum*, cause the specific human endemic fungal infections (endemic mycoses) of blastomycosis, coccidioidomycosis, and histoplasmosis, respectively.<sup>1</sup> Each of these endemic mycoses have specific disease characteristics but they also share some common clinical presentations: (1) the clinical spectrum of disease presentation ranges from asymptomatic to severe life-threatening illness and death, (2) symptomatic disease occurs in both immunocompromised and immunocompetent hosts, and (3) the most common manifestation is pneumonia.<sup>1,2,9</sup> The endemic fungi are frequently overlooked as an underlying cause of community acquired pneumonia.<sup>10</sup> Endemic mycoses can result in hospitalizations and, often in severe cases, can even be fatal. Estimates are that around 10% of all hospitalized cases result in death.<sup>3</sup> In cases of misdiagnosed cause, patients diagnosed with community acquired pneumonia will receive courses of empiric antibacterial therapy without improvement or develop worsening illness before the correct diagnosis of pulmonary endemic mycosis is made and the appropriate antifungal therapy initiated.<sup>10</sup> Delays in diagnosis and proper treatment are the major factors that result in increased morbidity and mortality.

Greater awareness and a more thorough knowledge of the endemic mycoses will likely aid health care providers to better diagnose and treat these illnesses. For all patients who live in or have recently traveled to endemic fungal areas and have suspected community acquired pneumonia, endemic mycosis should be on the differential. Guidelines for the treatment of the endemic mycoses are available through the Infectious Diseases Society of America (see later discussion) but, in general, treatment depends on the severity of the illness and organs affected by the disease. Moreover, 3 excellent reviews on the various endemic mycosis have recently been published<sup>11–13</sup> (see later discussion).

## BLASTOMYCOSIS

*B dermatitidis* is a thermally dimorphic fungus that exists as a mold in the soil and as a yeast in human tissues.<sup>11</sup> It is found primarily in the upper Midwest, southeast, and south-central United States. It is especially endemic to those states bordering the Ohio and Mississippi River Valley but also can be found in northern New York<sup>14</sup> (Fig. 1). The states with the highest number of reported cases of blastomycosis are



**Fig. 1.** Geographic distribution of *B dermatitidis* in the United States. (Adapted from Castillo CG, Kauffman CA, Miceli MH. Blastomycosis. *Infect Dis Clin North Am* 2016;30:248; with permission.)

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