patients with persistent cough, pleuritic chest pain, and hemoptysis. Occasionally, pulmonary coccidioidal cavities become secondarily infected. This development is usually manifested by an air-fluid level within the cavity. Bacterial flora or *Aspergillus* species are commonly involved, and therapy directed at these organisms should be considered. Surgery is rarely required except in cases of persistent hemoptysis or pyopneumothorax. For chronic pulmonary coccidioidomycosis, prolonged antifungal therapy—lasting for at least 1 year—is usually required, with monitoring of symptoms, radiographic changes, sputum cultures, and serologic titers.

Most cases of disseminated coccidioidomycosis require prolonged antifungal therapy. Duration of treatment is based on resolution of the signs and symptoms of the lesions in conjunction with a significant decline in serum CF antibody titer. Such therapy routinely is continued for at least several years. Relapse occurs in 15–30% of individuals once therapy is discontinued.

Coccidioidal meningitis poses a special challenge. While most patients with this form of disease respond to treatment with oral triazoles, 80% experience relapse when therapy is stopped. Thus, lifelong therapy is recommended. In cases of triazole failure, intrathecal or intraventricular amphotericin B may be used. Installation requires considerable expertise and should be undertaken only by an experienced health care provider. Shunting of CSF in addition to appropriate antifungal therapy is required in cases of meningitis complicated by hydrocephalus. It is prudent to obtain expert consultation in all cases of coccidioidal meningitis.

PREVENTION

There are no proven methods to reduce the risk of acquiring coccidioidomycosis among residents of an endemic region, but avoidance of direct contact with uncultivated soil or with visible dust containing soil is reasonable. For individuals with suppressed cellular immunity, the risk of developing symptomatic coccidioidomycosis is greater than that in the general population. Among those about to undergo allogeneic solid-organ transplantation, antifungal therapy is appropriate when there is evidence of active or recent coccidioidomycosis. Several cases of donor-transmitted coccidioidomycosis have occurred during transplantation. If possible, donors from an endemic region should be screened for coccidioidomycosis before transplantation. Data on the use of antifungal agents for prophylaxis in other situations are limited. The administration of an antifungal drug to prevent symptomatic coccidioidomycosis is not recommended for HIV-1-infected patients who live in an endemic region. Most experts would administer a triazole to patients with a history of active coccidioidomycosis or a positive coccidioidal serology in whom therapy with tumor necrosis factor α antagonists is being initiated.

238 Blastomycosis

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Blastomycosis is a systemic pyogranulomatous infection, involving primarily the lungs, that follows inhalation of the conidia of *Blastomyces dermatitidis*. Pulmonary blastomycosis varies from an asymptomatic infection to acute or chronic pneumonia. Hematogenous dissemination to skin, bones, and the genitourinary system is common; however, almost any organ can be involved.

ETIOLOGIC AGENT

B. dermatitidis is the asexual state of *Ajellomyces dermatitidis*. Two serotypes have been identified on the basis of the presence or absence of the A antigen. Distinct genotypic groups have been differentiated by rDNA polymerase chain reaction restriction fragment length polymorphisms and microsatellite markers. *B. dermatitidis* exhibits thermal dimorphism, growing as the mycelial phase at room temperature and as the yeast phase at 37°C. Primary isolation in the laboratory is most dependable for the mycelial phase incubated at 30°C. Definitive identification usually requires conversion to the yeast phase at 37°C or—now more commonly—the use of nucleic acid amplification techniques that detect mycelial-phase growth. Under the microscope, the yeast cells are usually 8–15 μm in diameter, have thick refractile cell walls, are multinucleate, and exhibit a single, large, broad-based bud (Fig. 238-1).

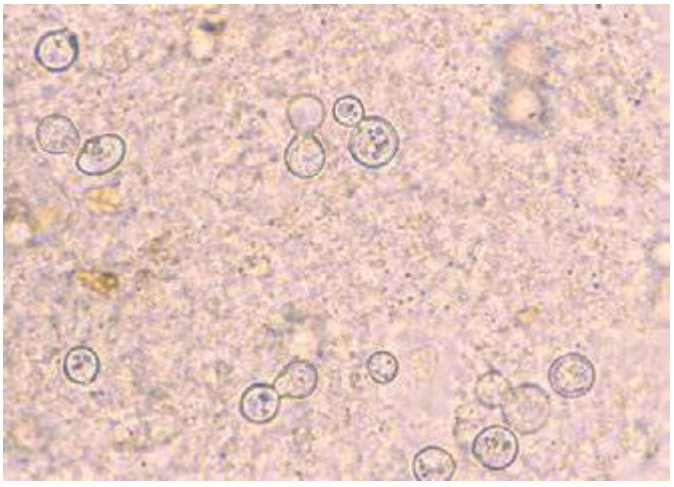

FIGURE 238-1 ***Blastomyces dermatitidis*** **broad-based budding yeast in the aspirate of a chest wall abscess.** Note the presence of multiple nuclei, the thickened cell wall, and the broad-based bud.

EPIDEMIOLOGY

Most cases of blastomycosis have been reported in North America. Endemic areas include the southeastern and south-central states bordering the Mississippi and Ohio river basins, the midwestern states, and the Canadian provinces bordering the Great Lakes. A small endemic area exists in New York and Canada along the St. Lawrence River. Acute blastomycosis is typically found only in North America, and the clinical presentation of blastomycosis in nonendemic areas is as a chronic disease.

Outside North America, blastomycosis occurs sporadically in Nigeria, Zimbabwe, Tunisia, Saudi Arabia, Israel, Lebanon, and India. The disease has been reported most frequently in Africa.

Early studies indicated that middle-aged men with outdoor occupations were at greatest risk. Reported outbreaks, however, do not suggest a predilection according to sex, age, race, occupation, or season. The specific niche in nature in which the organism resides remains uncertain; *B. dermatitidis* probably grows as microfoci in the warm, moist soil of wooded areas rich in organic debris. Inhalation of conidia following exposure to soil, whether related to work or recreation, appears to be the common factor associated with infection. Outbreaks of human disease may be preceded by the occurrence of disease in simultaneously exposed dogs. Zoonotic transmission is rare but has been reported in association with dog bites, pet kinkajou bites, cat scratches, and animal necropsies.

PATHOGENESIS

Alveolar macrophages and polymorphonuclear leukocytes are critical for phagocytosis and killing of the inhaled conidia of *B. dermatitidis*. The interaction of these mediators of the innate immune response with local host factors, such as lung surfactant, plays a significant role in inhibiting conversion to the pathogenic yeast form. This inhibition prevents the establishment of symptomatic disease and may account for the high frequency of asymptomatic infections in outbreaks. Once conversion to the thick-walled yeast form has occurred, phagocytosis and killing are much more difficult, and the development of clinically