Cough and Lethargy

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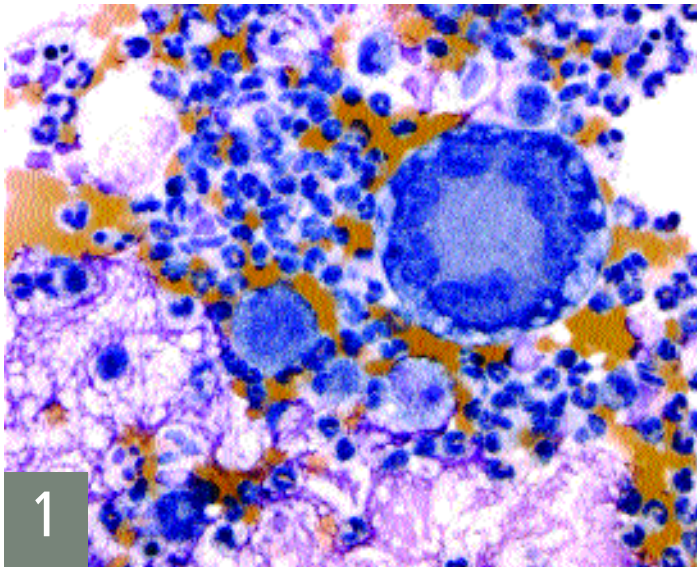
A 4-year-old, female spayed Labrador retriever mix was presented for cough, lethargy, and decreased appetite of l-week duration.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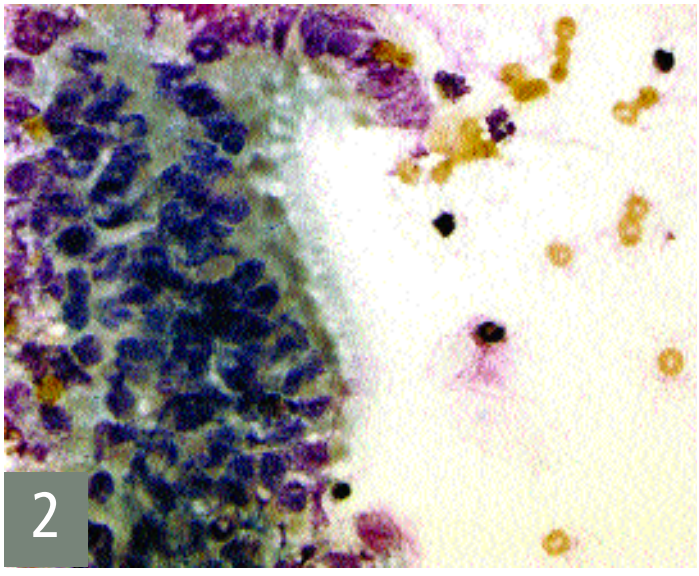
Physical examination showed depression, weight loss, and harsh lungs sounds. A moderate, diffuse, nodular interstitial pattern was identified on thoracic radiographs. Fluid collected from a tracheal wash was submitted to the diagnostic laboratory for cytologic evaluation. Concentrated smears were examined (**Figures 1 to 3**).

ASK YOURSELF ...

- What are the expected cytologic findings in tracheal fluid from a normal dog?
- What are the differential diagnoses?
- What are the distinguishing cytologic features of the etiologic agent?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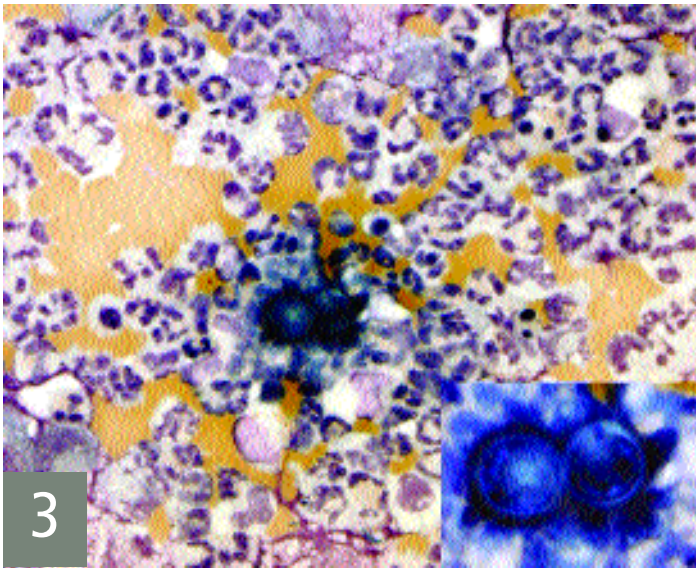
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Diagnosis: Blastomycosis

Cytologic evaluation. Smears were highly cellular and contained many inflammatory cells (**Figure 1**), moderate numbers of erythrocytes, and occasional clusters of columnar epithelial cells (**Figure 2**) in a thick background of mucus. The inflammatory cells were primarily neutrophils with moderate numbers of macrophages and relatively few multinucleated giant cells, lymphocytes, and plasma cells. The epithelial cells were well-differentiated. Occasional extracellular yeast organisms (**Figure 3**) were identified. These organisms were round and 10 to 20 µm in diameter with a thick, blue wall and granular blue internal contents. Broad-based budding was common. No other etiologic agents were observed.

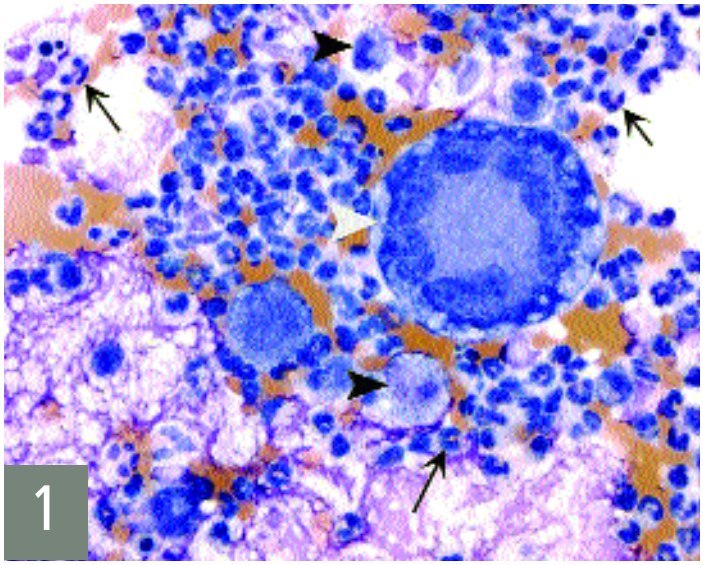
Diagnosis. Definitive diagnosis is made by cytologic or histologic identification of the organism.[1,2] Infection typically causes a suppurative to pyogranulomatous inflammatory response.[3] Choice of tissue sample depends on clinical signs and affected sites. In dogs with respiratory signs, tracheal wash or bronchoalveolar lavage may be useful; however, most samples are not diagnostic due to the interstitial location of the organism.[4] If either procedure is negative, fine-needle aspiration of the lungs may reveal organisms. Fine-needle aspiration or impression smears of affected lymph nodes, cutaneous or subcutaneous lesions, bone, or vitreous are diagnostic in most dogs.[2,4]

Foundation of Blastomycosis

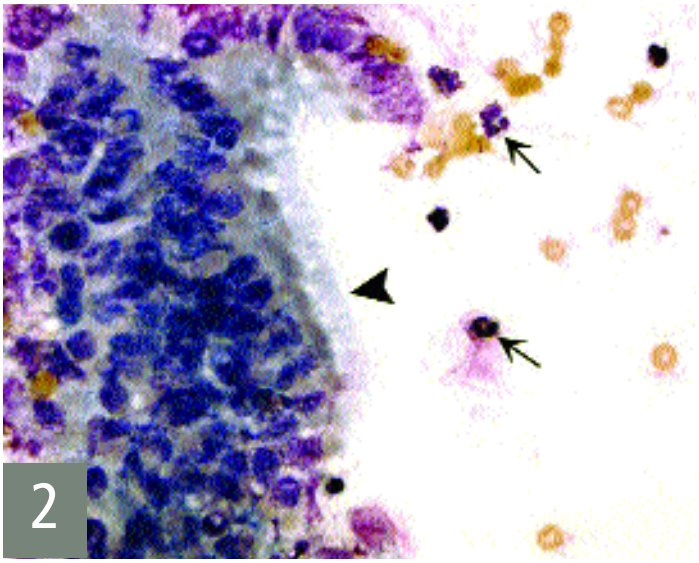
PATHOPHYSIOLOGY: Systemic disease in dogs caused by the dimorphic fungus *Blastomyces dermatitidis*; infection usually occurs by inhaling mycelial spores[1]; spores are transformed into the yeast phase after phagocytosis by alveolar macrophages; organism may remain localized in lung or disseminate systemically via blood or lymphatics

COMMONLY AFFECTED DISTANT SITES: Skin, eyes, bones, lymph nodes, and subcutaneous tissue[1,2]

CLINICAL SIGNS: Often nonspecific, including weight loss, lethargy, anorexia, depression, and fever; respiratory signs are common and include cough, tachypnea, dyspnea, and harsh lung sounds on auscultation[2,4]



Mixture of inflammatory cells and erythrocytes in a background of mucus. Neutrophils predominate (black arrows) with fewer macrophages (black arrowhead) and multinucleated giant cells (white arrowhead) (modified Wright's stain; original magnification, 50×, reduced 38.4%).



Cluster of ciliated columnar epithelial cells (black arrowhead) and neutrophils (black arrow). The cells are beginning to deteriorate due to the delay between sample collection and smear preparation (modified Wright's stain; original magnification, 50×, reduced 38.4%).

Serologic testing should be done if organisms have not been identified after repeated cytologic or histologic examination of affected tissue.[1,2] Titers may be negative during the early phase of infection. Positive titers may persist after successful resolution of infection. Thoracic radiographic findings often include diffuse to nodular interstitial, bronchointerstitial, or alveolar patterns in the lung and tracheobronchial lymphadenopathy. In dogs with bone involvement, radiographs reveal osteolysis, periosteal proliferation, and soft tissue swelling. Routine blood test results are nonspecific. CBC findings may include mild nonregenerative anemia and neutrophilic leukocytosis with or without a left shift. The most common abnormalities on a biochemical profile are hypoalbuminemia and hyperglobulinemia. Hypercalcemia is present in a small percentage of dogs.[1,2,4]

See Aids & Resources, back page, for references, contacts, and appendices.

DID YOU ANSWER …

- **Tracheal washes from healthy dogs typically have low cellularity and contain primarily ciliated and nonciliated columnar to cuboidal epithelial cells, macrophages, and a small amount of mucus. Neutrophils usually comprise less than 5% of the nucleated cell population. Other cells found in low numbers include lymphocytes (< 15%), eosinophils (< 5%), and mast cells (< 2%).[3] Direct and concentrated smears of the fluid should be made as soon as possible after collection because cells deteriorate in vitro.**
- **Pyogranulomatous inflammation occurs with fungal infections (e.g., blastomycosis, coccidioidomycosis, aspergillosis, histoplasmosis), protozoal infections, or foreign body reactions.[3] Mixed inflammatory reactions are also found with necrosis associated with neoplasia or lung torsion.**
- **The distinguishing cytologic features of the yeast form of *Blastomyces dermatitidis* are the round shape; size (generally 5 to 20 µm); thick, biconcave wall; granular internal contents; and frequent broad-based budding.[3] The organism stains a dark blue with Romanowsky-type stains (e.g., Wright's stain, Diff-Quik). Hyphal forms are rarely found in tissues.[1]**

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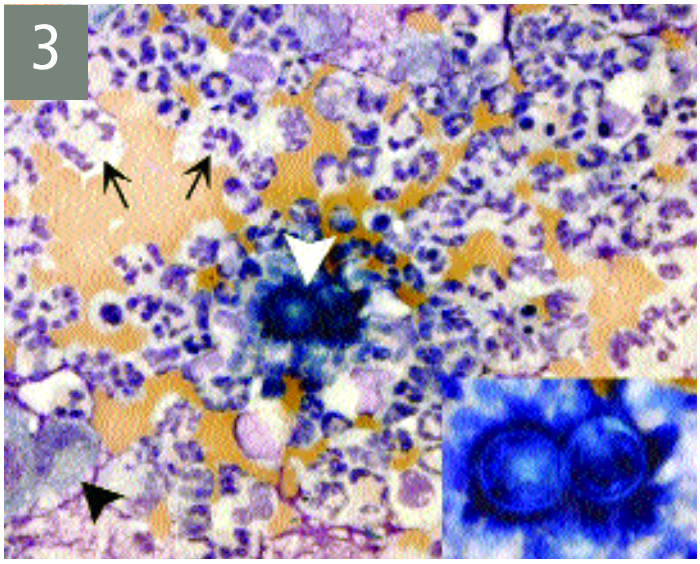

Note the yeast consistent with *Blastomyces dermatitidis* (white arrowhead), admixed with neutrophils (black arrows), macrophages (black arrowhead), and erythrocytes (modified Wright's stain; original magnification, 50×, reduced 40%). The inset is a higher magnification (100×, reduced 40%) of the organism, demonstrating the round shape, thick wall, and broad-based budding.