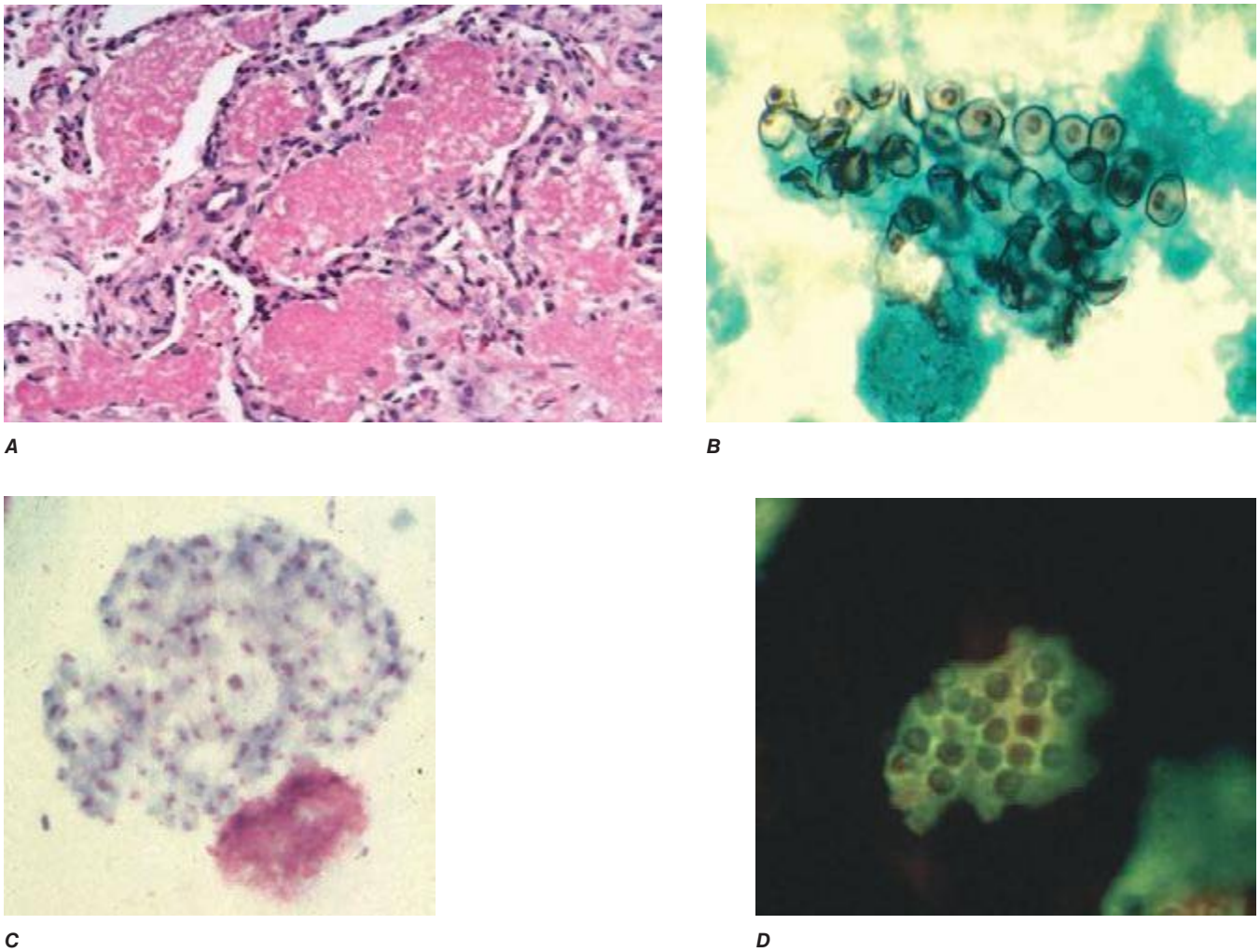

FIGURE 244-1 **Direct microscopy of *Pneumocystis* pneumonia.** ***A.*** Transbronchial lung biopsy stained with hematoxylin and eosin shows eosinophilic alveolar filling. ***B.*** Methenamine silver–stained bronchoalveolar lavage (BAL) fluid. ***C.*** Giemsa-stained BAL fluid. ***D.*** Immunofluorescent stain of BAL fluid.

response. The alveoli become filled with proteinaceous material, and alveolar damage results in increased alveolar-capillary injury and surfactant abnormalities. Stained lung sections typically show foamy, vacuolated alveolar exudates composed largely of viable and nonviable organisms (Fig. 244-1*A*). Interstitial edema and fibrosis may develop, and organisms can be seen in the alveolar space with silver or other stains. Moreover, the organisms can be seen when tissue is subjected to colorimetric or immunofluorescent staining (Fig. 244-1*B–D*).

CLINICAL FEATURES

Clinical Presentation PCP presents as acute or subacute pneumonia that may initially be characterized by a vague sense of dyspnea alone but that subsequently manifests as fever and nonproductive cough with progressive shortness of breath ultimately resulting in respiratory failure and death. Extrapulmonary manifestations of PCP are rare but can include involvement of almost any organ, most notably lymph nodes, spleen, and liver.

Physical Examination The physical examination findings in PCP are nonspecific. Patients have decreased oxygen saturation—at rest or with exertion—that, without treatment, progresses to severe hypoxemia. Patients may initially have a normal chest examination and no adventitious sounds but later, without treatment, develop diffuse rales and signs of consolidation. Oral thrush in a patient with HIV infection indicates an increased risk for PCP.

Laboratory Findings The results of routine laboratory tests are nonspecific in PCP. Serum levels of lactate dehydrogenase (LDH) are often elevated due to pulmonary damage; however, a normal LDH level does not rule out PCP, nor is an elevated LDH value specific for PCP. The peripheral white blood cell count may be elevated, but the increase is usually modest. Hepatic and renal function are typically normal.

Radiographic Findings Although the initial chest radiograph may be normal when patients have mild symptoms, the classic radiographic appearance of PCP consists of diffuse bilateral interstitial infiltrates that are perihilar and symmetric (Fig. 244-2*A*)—yet another finding that is not specific for PCP. The interstitial infiltrates can progress to alveolar filling (Fig. 244-2*B*). High-resolution chest CT shows diffuse ground-glass opacities in virtually all patients with PCP (Fig. 244-2*C*). A normal chest CT essentially rules out the diagnosis of PCP. Cysts and pneumothoraces are common chest radiographic findings (Fig. 244-2*D*). A wide variety of atypical radiographic findings have been described, including asymmetric patterns, upper lobe infiltrates, mediastinal adenopathy, nodules, cavities, and effusions.

DIAGNOSIS

The optimal sample for diagnostic examination depends on how ill the patient is and what resources are available. Before the 1990s, diagnoses of PCP were usually established by open lung biopsy; later, transbronchial lung biopsy was employed. Hematoxylin and eosin staining of pulmonary