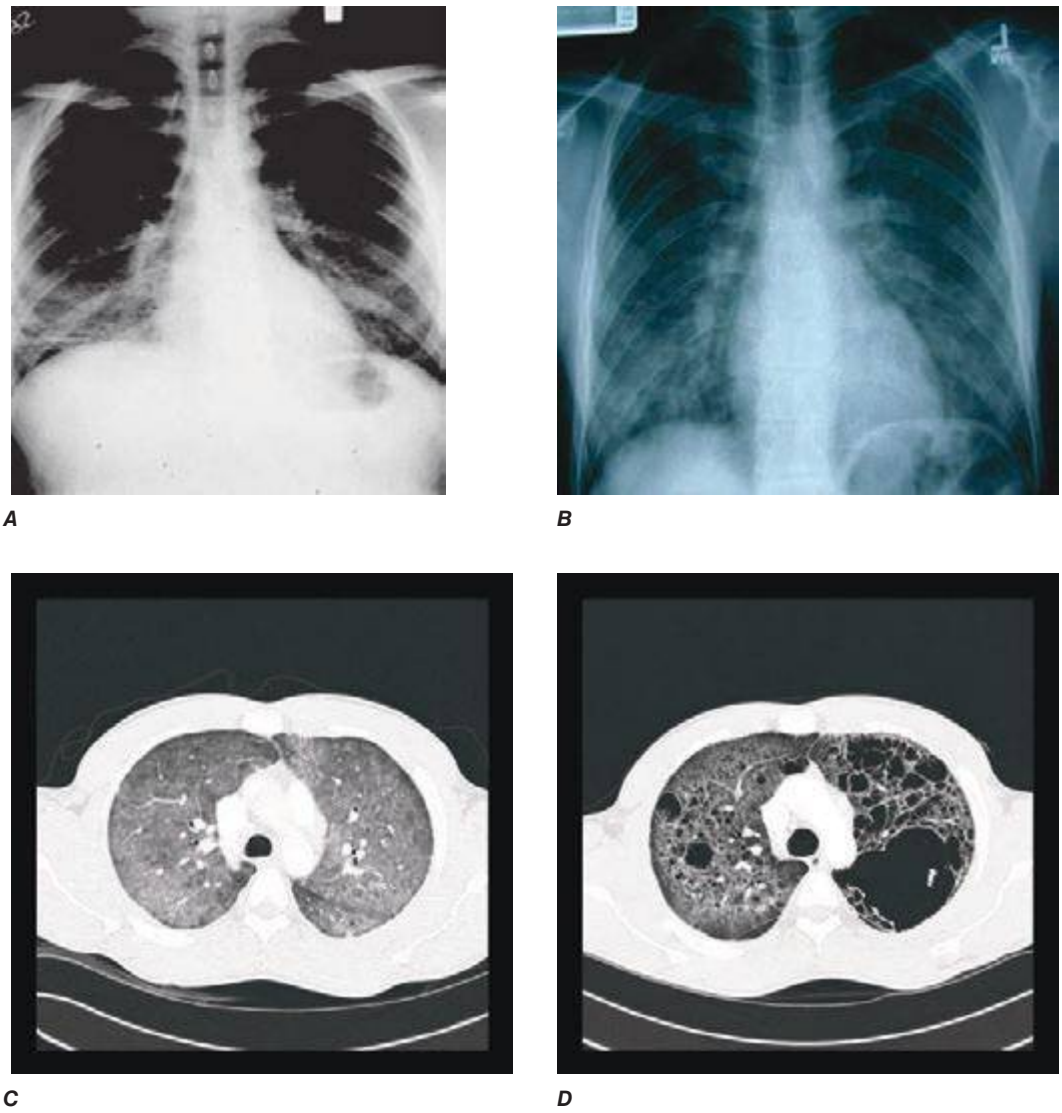

FIGURE 244-2 **Radiographs in *Pneumocystis* pneumonia.** ***A.*** Posterior-anterior chest radiograph showing symmetric interstitial infiltrates. ***B.*** Posterior-anterior chest radiograph showing symmetric alveolar infiltrates (courtesy of Alison Morris). ***C.*** CT image demonstrating symmetric interstitial infiltrates and ground-glass opacities. ***D.*** CT image showing symmetric interstitial infiltrates, ground-glass opacities, and pneumatoceles.

tissue demonstrates a foamy alveolar infiltrate and a mononuclear interstitial infiltrate (Fig. 244-2*A*). This appearance is pathognomonic for PCP even though the organisms cannot be specifically identified with this stain. The diagnosis is typically established in lung tissue or pulmonary secretions by highly specific staining of the cyst—e.g., with methenamine silver (Fig. 244-2*B*), toluidine blue O, or Giemsa (Fig. 244-2*C*)—or by staining with a specific immunofluorescent antibody (Fig. 244-2*D*).

The demonstration of organisms in bronchoalveolar lavage fluid is almost 100% sensitive and specific for PCP in patients with either HIV infection or immunosuppression of other etiologies. The organisms are identified with the specific stains indicated above for lung biopsy. While expectorated sputum or throat swabs have very low sensitivity, an induced sputum sample obtained and interpreted by an experienced provider can be highly sensitive and specific. The reported sensitivity of induced sputum for PCP is widely variable (55–90%), however, and is dependent on both the characteristics of the patient and the experience of the center conducting the test.

Recently, many laboratories have offered polymerase chain reaction (PCR) testing of respiratory specimens for *Pneumocystis*. However, these PCR tests are so sensitive that it is difficult to distinguish patients with colonization (i.e., those whose acute lung disease is due to some other process but who have low levels of *Pneumocystis* DNA in the lungs) from those with acute pneumonia due to *Pneumocystis*. Such PCR tests on appropriate samples may be more useful for ruling out a diagnosis of PCP if they are negative than for definitively attributing the disease to *Pneumocystis*.

There has been considerable interest in serologic tests such as assays for (1→3)-β-D-glucan, levels of which are frequently elevated in patients with PCP. However, no serologic assays developed to date offer substantial sensitivity or specificity.

COURSE AND PROGNOSIS

Untreated, PCP is invariably fatal. Patients with HIV infection often have an indolent course that presents as mild exercise intolerance or chest tightness without fever or cough and a normal or nearly normal posterior-anterior chest radiograph, with progression over days, weeks, or even a few months to fever, cough, diffuse alveolar infiltrates, and profound hypoxemia. Some patients with HIV infection and most patients with other types of immunosuppression have more acute disease that progresses over a few days to respiratory failure. Rare patients also develop distributive shock. A few unusual patients present with extrapulmonary manifestations in the skin or soft tissue, retina, brain, liver, kidney, or spleen that are nonspecific in presentation and can be diagnosed only by histology.

Factors that influence mortality risk include the patient's age and degree of immunosuppression as well as the presence of preexisting