

FIGURE 199-1 Nocardial pneumonia. A dense infiltrate with a possible cavity and several nodules are apparent in the right lung.

nocardial pneumonia. Infiltrates vary in size and are typically dense. Single or multiple nodules are common (Figs. 199-1 and 199-2), sometimes suggesting tumors or metastases. Infiltrates and nodules tend to cavitate (Fig. 199-2). Empyema is present in one-quarter of cases. Co-infection with *Nocardia* and *Mycobacterium tuberculosis* has been reported from regions where tuberculosis is common.

Nocardiosis may spread directly from the lungs to adjacent tissues. Pericarditis, mediastinitis, and the superior vena cava syndrome have all been reported. Nocardial laryngitis, tracheitis, bronchitis, and sinusitis are much less common than pneumonia. In the major airways, disease often presents as a nodular or granulomatous mass. Nocardiae are sometimes isolated from respiratory secretions of persons without apparent nocardial disease, usually individuals who have underlying lung or airway abnormalities.



FIGURE 199-2 Nocardial pneumonia. A computed tomography scan shows bilateral nodules, with cavitation in the nodule in the left lung.

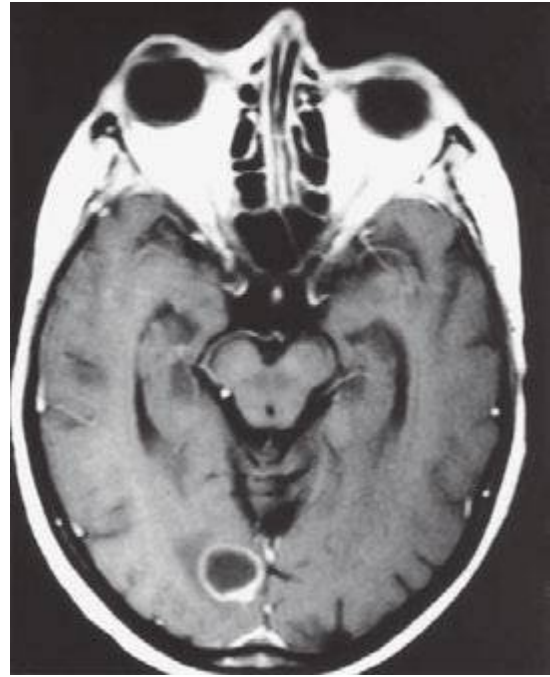


FIGURE 199-3 Nocardial abscesses in the right occipital lobe.

Extrapulmonary Disease In half of all cases of pulmonary nocardiosis, disease appears outside the lungs. In one-fifth of cases of disseminated disease, lung disease is not apparent. The most common site of dissemination is the brain. Other common sites include the skin and supporting structures, kidneys, bone, muscle, and eye, but almost any organ can be involved. Peritonitis has been reported in patients undergoing peritoneal dialysis. Nocardiae have been recovered from blood in a few cases of pneumonia, disseminated disease, or central venous catheter infection. Nocardial endocarditis occurs rarely and can affect either native or prosthetic valves.

The typical manifestation of extrapulmonary dissemination is a subacute abscess. A minority of abscesses outside the lungs or central nervous system (CNS) form fistulas and discharge small amounts of pus. In CNS infections, brain abscesses are usually supratentorial, are often multiloculated, and may be single or multiple (Fig. 199-3). Brain abscesses tend to burrow into the ventricles or extend out into the subarachnoid space. The symptoms and signs are somewhat more indolent than those of other types of bacterial brain abscess. Meningitis is uncommon and is usually due to spread from a nearby brain abscess. Nocardiae are not easily recovered from cerebrospinal fluid (CSF).

Disease Following Transcutaneous Inoculation Disease that follows transcutaneous nocardial inoculation usually takes one of three forms: cellulitis, lymphocutaneous syndrome, or actinomycetoma.

Cellulitis generally begins 1–3 weeks after a recognized breach of the skin, often with soil contamination. Subacute cellulitis, with pain, swelling, erythema, and warmth, develops over days to weeks. The lesions are usually firm and not fluctuant. Disease may progress to involve underlying muscles, tendons, bones, or joints. Dissemination is rare. *N. brasiliensis* and species in the *N. otitidiscaviarum* complex are most common in cellulitis cases.

Lymphocutaneous disease usually begins as a pyodermatous nodule at the site of inoculation, with central ulceration and purulent or honey-colored drainage. Subcutaneous nodules often appear along lymphatics that drain the primary lesion. Most cases of nocardial lymphocutaneous syndrome are associated with *N. brasiliensis*. Similar disease occurs with other pathogens, most notably *Sporothrix schenckii* (Chap. 243) and *Mycobacterium marinum* (Chap. 204).

Actinomycetoma usually begins with a nodular swelling, sometimes at a site of local trauma. Lesions (Fig. 199-4A) typically develop on the feet or hands but may involve the posterior part of the neck, the upper back, the head, and other sites. The nodule eventually breaks down,