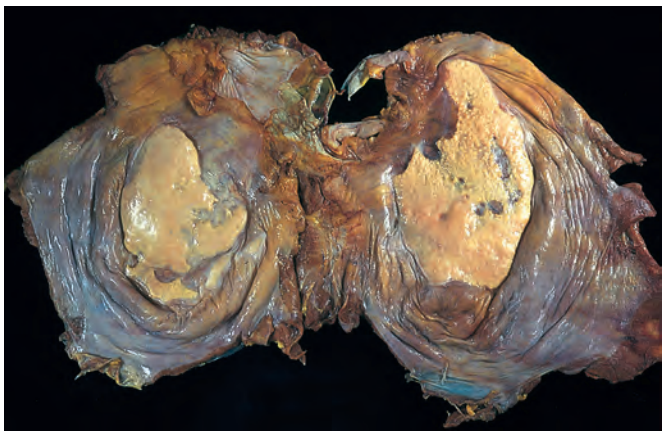

Figure 15-21 Asbestos-related pleural plaques. Large, discrete fibrocalcific plaques are seen on the pleural surface of the diaphragm. (Courtesy Dr. John Godleski, Brigham and Women's Hospital, Boston, Mass.)

and number of pleural plaques do not correlate with the level of exposure to asbestos or the time since exposure. They do not contain asbestos bodies; however, only rarely do they occur in individuals who have no history or evidence of asbestos exposure. Uncommonly, asbestos exposure induces pleural effusions, which are usually serous but may be bloody. Rarely, diffuse visceral pleural fibrosis may occur and, in advanced cases, bind the lung to the thoracic wall.

Both lung carcinomas and mesotheliomas (pleural and peritoneal) develop in workers exposed to asbestos (see sections on lung cancer and pleural tumors).

Clinical Course. The clinical findings in asbestosis are very similar to those caused by other diffuse interstitial lung diseases (discussed earlier). These rarely appear fewer than 10 years after first exposure and are more common after 20 to 30 years. Dyspnea is usually the first manifestation; at first, it is provoked by exertion, but later it is present even at rest. Cough associated with production of sputum, when present, is likely to be due to smoking rather than asbestosis. Chest x-ray studies reveal irregular linear densities, particularly in both lower lobes. With advancement of the pneumoconiosis, a honeycomb pattern develops. The disease may remain static or progress to respiratory failure, cor pulmonale, and death. Pleural plaques are usually asymptomatic and are detected on radiographs as circumscribed densities. Asbestosis complicated by lung or pleural cancer is associated with a particularly grim prognosis.

KEY CONCEPTS

Pneumoconioses

- Pneumoconioses encompass a group of chronic fibrosing diseases of the lung resulting from exposure to organic and inorganic particulates, most commonly mineral dust.
- Pulmonary alveolar macrophages play a central role in the pathogenesis of lung injury by promoting inflammation and producing reactive oxygen species and fibrogenic cytokines.
- Coal dust-induced disease varies from asymptomatic anthracosis to simple coal workers' pneumoconiosis (coal macules or nodules, and centrilobular emphysema), to progressive massive fibrosis (PMF), manifested by increasing pulmonary dysfunction, pulmonary hypertension, and cor pulmonale.
- Silicosis is the most common pneumoconiosis in the world, and crystalline silica (e.g., quartz) is the usual culprit. The lung disease is progressive even after exposure stops.
- The manifestations of silicosis can range from asymptomatic silicotic nodules to large areas of dense fibrosis; persons with silicosis also have an increased susceptibility to tuberculosis. There is two-fold increased risk of lung cancer.
- Asbestos fibers come in two forms; the stiff amphiboles have a greater fibrogenic and carcinogenic potential than the serpentine chrysotiles.
- Asbestos exposure is linked with six disease processes: (1) parenchymal interstitial fibrosis (asbestosis); (2) localized pleural plaques (asymptomatic) or rarely diffuse pleural fibrosis; (3) recurrent pleural effusions; (4) lung cancer; (5) malignant pleural and peritoneal mesotheliomas; and (6) laryngeal cancer.
- Cigarette smoking increases the risk of lung cancer in the setting of asbestos exposure; even family members of workers exposed to asbestos are at increased risk for cancer and mesothelioma.

Complications of Therapies

Drug-Induced Lung Diseases. An increasing number of prescription drugs have been found to cause a variety of both acute and chronic alterations in lung structure and function, interstitial fibrosis, bronchiolitis obliterans, and eosinophilic pneumonia. For example, cytotoxic drugs used in cancer therapy (e.g., bleomycin) cause pulmonary damage and fibrosis as a result of direct toxicity and by stimulating the influx of inflammatory cells into the alveoli. Amiodarone, a drug used to treat cardiac arrhythmias, is preferentially concentrated in the lung and causes significant pneumonitis in 5% to 15% of patients receiving it. Cough induced by ace inhibitors is very common.

Illicit intravenous drug abuse most often causes lung infections. In addition, particulate matter is introduced into the lung microvasculature where granulomas and fibrosis occur.

Radiation-Induced Lung Diseases. Radiation pneumonitis is a well-known complication of therapeutic radiation of thoracic tumors (lung, esophageal, breast, mediastinal). It most often involves the lung within the radiation port and occurs in both acute and chronic forms. *Acute radiation pneumonitis* (lymphocytic alveolitis or hypersensitivity pneumonitis) occurs 1 to 6 months after irradiation in 3% to 44% of patients, depending on dose and age. It is manifest by fever, dyspnea out of proportion to the volume of lung irradiated, pleural effusion, and infiltrates that usually correspond to an area of previous irradiation. With steroid therapy, these symptoms may resolve completely in some patients, while in others there is progression to *chronic radiation pneumonitis* (pulmonary fibrosis). The latter is a consequence of the repair of injured endothelial and epithelial cells. It may also occur without antecedent pulmonary symptoms. Morphologic changes are those of