

nonsmokers were exposed to secondhand smoke. The true disease burden of COPD is much greater than these numbers indicate.

Other pulmonary conditions are common. Asthma affects 8% of adults and 9.5% of children in the United States. The prevalence, hospitalization rate, and mortality rate related to asthma continue to increase. In 2010, there were 1.1 million hospital discharges for pneumonia and almost 50,000 deaths. Sleep-disordered breathing affects an estimated 7 to 18 million people in the United States, and 1.8 to 4 million of them have severe sleep apnea. Interstitial lung diseases are increasingly recognized, and their true incidence appears to have been underestimated. For example, idiopathic pulmonary fibrosis, the most common of the idiopathic interstitial pneumonias, affects 85,000 to 100,000 Americans annually.

These conditions affect males and females of all ages and races. However, a disproportionate increase in the incidence, morbidity, and mortality related to lung diseases exists for minority populations. This finding is true for COPD, asthma, certain interstitial lung disorders, and other diseases. Although these differences point to genetic differences among these populations, they also indicate differences in culture, socioeconomic status, exposure to pollutants (e.g., inner-city living), and access to health care.

Classification

Lung diseases are often classified on the basis of the affected anatomic areas of the lung (e.g., interstitial lung diseases, pleural diseases, airways diseases) and the physiologic abnormalities detected by pulmonary function testing (e.g., obstructive lung diseases, restrictive lung diseases). Classification schemes based exclusively on physiologic factors are inaccurate because distinctly different disorders with different causes, consequences, and responses to therapy have similar physiologic abnormalities (Fig. 13-3).

The obstructive lung diseases have in common a limitation of airflow, called an *obstructive pattern*, as determined by pulmonary function testing. Obstructive lung diseases include COPD, asthma, and bronchiectasis.

The interstitial lung diseases are less common disorders but are more difficult to categorize because they include more than 120 distinct entities, some of which are inherited, but most do not have an obvious cause. These disorders are characterized by a restrictive physiologic condition due to decreased lung compliance and small lung volumes, which is the reason they are often referred to as *restrictive lung disorders* (e.g., idiopathic pulmonary fibrosis). However, not all interstitial lung diseases exhibit a purely restrictive pattern on pulmonary function testing. They may have airflow limitation as a result of small airway involvement (e.g., sarcoidosis, cryptogenic organizing pneumonia).

In the pulmonary vascular diseases, involvement of the pulmonary vasculature causes increased pulmonary vascular resistance. These diseases range from disorders caused by obstruction to blood flow as a result of blood clots (e.g., pulmonary embolus) to disorders characterized by tissue remodeling and obliteration of blood vessels by vascular remodeling (e.g., pulmonary arterial hypertension, formerly known as primary pulmonary hypertension).

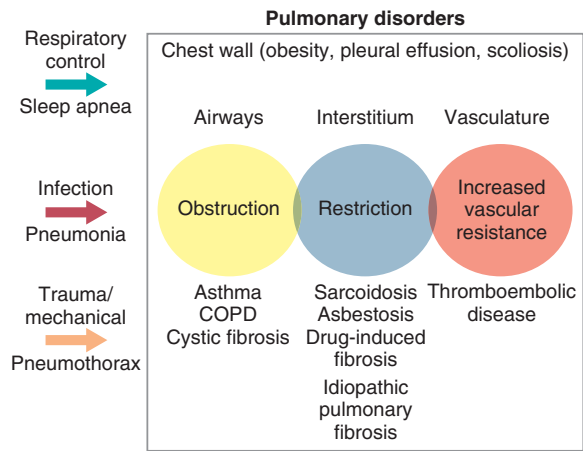


FIGURE 13-3 Lung diseases are caused by abnormalities in the lung structure (e.g., airways, interstitium, vasculature) or in the chest wall or by external forces (e.g., infection). Disorders affecting the lung structure cause physiologic derangements (e.g., obstruction to airflow, restricted lung volumes, pulmonary hypertension, hypoxia). These derangements are not necessarily specific to any particular Lung diseases, but there is extensive overlap among them, so that different disorders can have similar physiologic abnormalities. COPD, Chronic obstructive pulmonary disease.

Disorders of respiratory control include conditions in which extrapulmonary abnormalities cause respiratory system dysfunction and abnormal ventilation. Included are sleep disorders such as obstructive sleep apnea and neuromuscular system disorders such as myasthenia gravis and polymyositis, in which ventilatory abnormalities result from poor excursion of the respiratory muscles.

Disorders of the pleura, chest wall, and mediastinum are classified as such because they affect these structures. Infectious agents, commonly viruses and bacteria, cause infectious diseases of the lung. Neoplastic disorders of the lung include benign (e.g., hamartomas) and malignant (e.g., lung carcinoma) tumors, which can affect the lung parenchyma or its surrounding pleura (e.g., mesothelioma).

PROSPECTUS FOR THE FUTURE

Important questions about lung development remain. What are the primary stimuli for branching morphogenesis? How does gene regulation alter lung development? How is lung airway and blood vessel development coordinated? What are the environment-gene interactions that cause abnormal lung development and subsequent lung diseases?

There are important fundamental questions about the epidemiology of lung diseases. For example, it is not clear whether or how childhood asthma and adult COPD are related. The role of fine particulate matter air pollution in the pathogenesis of lung diseases is unknown, and the causes and pathogenesis of many lung diseases, such as sarcoidosis, are unclear.

SUGGESTED READINGS

- Schraufnagel DE, editor: Breathing in America: diseases, progress, and hope, New York, 2010, American Thoracic Society.
Whitsett JA, Haitchi HM, Maeda Y: Intersections between pulmonary development and disease, *Am J Respir Crit Care Med* 184:401–406, 2011.