pack-years of exposure, and it is inversely related to the age at onset of smoking and, in the case of lung cancer, the interval since smoking cessation.

A history of exposure to other inhaled toxins, irritants, or allergens should be elicited. A careful occupational history often uncovers exposure to inorganic dust or fibers such as asbestos, silica, or coal dust. Organic dusts may cause hypersensitivity pneumonitis and other interstitial lung diseases. Solvents and corrosive gases also cause pulmonary disease. The presence of pets in the home should be documented. Cats are the most allergenic for asthma, and birds may cause hypersensitivity or fungal lung disease.

A travel history is important in evaluating infectious causes of pulmonary disease. For example, histoplasmosis is common in the Ohio and Mississippi River valleys, and coccidioidomycosis is found in the desert Southwest. Travel to developing countries increases the risk of exposure to tuberculosis. A family history is important in assessing the risk for genetic lung diseases such as cystic fibrosis and α_1-antitrypsin deficiency and susceptibility to asthma, emphysema, or lung cancer.

PHYSICAL EXAMINATION

The physical examination should be complete, with emphasis on areas highlighted by the history. The first steps in the physical examination of the patient with pulmonary disease are observation and inspection, which must be done when the patient's chest is bare. The physician should start by evaluating the general appearance of the patient. Particular attention should be given to the presence or absence of respiratory distress. This observation helps in making the diagnosis and suggests the urgency of the case.

Body habitus is important because morbid obesity in a patient with exercise intolerance and sleepiness may point to a diagnosis of sleep-disordered breathing, whereas dyspnea in a thin, middle-aged man with pursed lips may suggest emphysema. Race and sex should be considered because certain conditions are more frequently encountered in specific populations. For example, sarcoidosis is most common in African Americans in the Southeast, whereas lymphangioleiomyomatosis is a rare disorder that essentially affects young women of childbearing age. Tachycardia and pulsus paradoxus are important signs of severe asthma.

The physician should watch the patient breathe and notice the effort required for breathing. Increased respiratory rate, use of accessory muscles of respiration, pursed-lip breathing, and paradoxical abdominal movement indicate increased work of breathing. Paradoxical abdominal movement indicates diaphragm weakness and impending respiratory failure. The patient's inability to speak in full sentences indicates severe airway obstruction or neuromuscular weakness. The physician should listen for cough during the history and physical examination and should observe the strength of the cough because it may signal respiratory muscle weakness or severe obstructive lung disease. The patient's rib cage should expand symmetrically with inspiration. The shape of the thoracic cage should be considered. Increased anteroposterior diameter is observed in those with lung hyperinflation due to obstructive lung disease. Severe kyphoscoliosis, pectus excavatum, ankylosing spondylitis, and morbid obesity can produce restrictive ventilatory disease as a consequence of distortion and restriction of the volume of the thoracic cavity.

The patient's hands may reveal important signs of lung diseases. Clubbing is commonly associated with respiratory disease. An uncommon association with clubbing is hypertrophic pulmonary osteoarthropathy (HPO). HPO is characterized by periosteal inflammation at the distal ends of long bones, the wrists, the ankles, and the metacarpal and metatarsal bones. There is swelling and tenderness over the wrists and other involved areas. Rarely, HPO may occur without clubbing. The causes of HPO include pleural mesothelioma, pulmonary fibrosis, and chronic lung infections, such as lung abscess.

Staining of the fingers (caused by tar because nicotine is colorless) is a sign of cigarette smoking. The patient should be asked to dorsiflex the wrists with the arms outstretched and to spread out the fingers. A flapping tremor (i.e., asterixis) may be seen with severe carbon dioxide retention. Wasting and weakness are signs of cachexia due to malignancy or end-stage emphysema. Compression and infiltration by a peripheral lung tumor of a lower trunk of the brachial plexus results in wasting of the small muscles of the hand and weakness of finger abduction.

Examination of the head and neck is important. The eyes are inspected for evidence of Horner's syndrome (i.e., constricted pupil, partial ptosis, and loss of sweating), which can be caused by an apical lung tumor compressing the sympathetic nerves in the neck. The voice is assessed for hoarseness, which may indicate recurrent laryngeal nerve palsy associated with carcinoma of the lung (usually left sided) or laryngeal carcinoma. However, the most common cause is laryngitis.

The patient is examined for nasal polyps (associated with asthma), engorged turbinates (various allergic conditions), and a deviated septum (nasal obstruction). Sinusitis is indicated by tenderness over the sinuses on palpation.

The tongue is assessed for central cyanosis. The mouth may hold evidence of an upper respiratory tract infection (i.e., reddened pharynx and tonsillar enlargement with or without a coating of pus). A broken tooth or gingivitis may predispose to lung abscess or pneumonia. There may be facial plethora or cyanosis if the superior vena cava is obstructed. Some patients with obstructive sleep apnea are obese and have a receding chin, a small pharynx, and a short, thick neck.

Palpation of the chest is performed by first palpating the accessory muscles (i.e., scalene and sternocleidomastoid) of respiration in the patient's neck. Hypertrophy and contraction indicate increased respiratory effort. The trachea should be palpated and should lie in the midline of the neck. Deviation of the trachea may suggest lung collapse or a mass. Neck masses should be documented.

The physician should place both hands on the lower half of the patient's posterior thorax with thumbs touching and fingers spread; the hands should be kept in place while the patient takes several deep inspirations. The physician's thumbs should separate slightly and the hands should move symmetrically apart during the patient's inspiration.

Fremitus is a faint vibration felt best with the edge of the hand against the patient's chest wall while the patient speaks. Fremitus is increased in areas with underlying lung consolidation, and it is decreased over a pleural effusion. Next, the patient's chest should