



FIGURE 18-1: Respiratory system.

The brain regulates the rate and depth of breathing, depending on the needs of the body. For example, when you exercise, your body requires more O_2 , and therefore you breathe more rapidly.

The exchange of CO_2 and O_2 occurs at the level of the **alveoli** (tiny air sacs in the lungs). Any time alveolar function is impaired, CO_2 builds up, and oxygenation declines. Changes in alveolar function occur with smoking and in diseases such as asthma.

O_2 is vital to every cell in the body, and the brain needs O_2 to function. Even 4 to 6 minutes without breathing can cause death. The lack of O_2 can cause the heart to stop beating or have serious implications for other systems that can lead to failure. Often, it is a medical emergency when someone either stops breathing or presents with **dyspnea** (trouble breathing) (Fast Tip 18.1).

Fast Tip 18.1 Fast Relief for Dyspnea

Pulmonary medications are usually administered via inhalation for quick action. Examples of this route are the nebulizer and the inhaler.