

THE RESPIRATORY SYSTEM

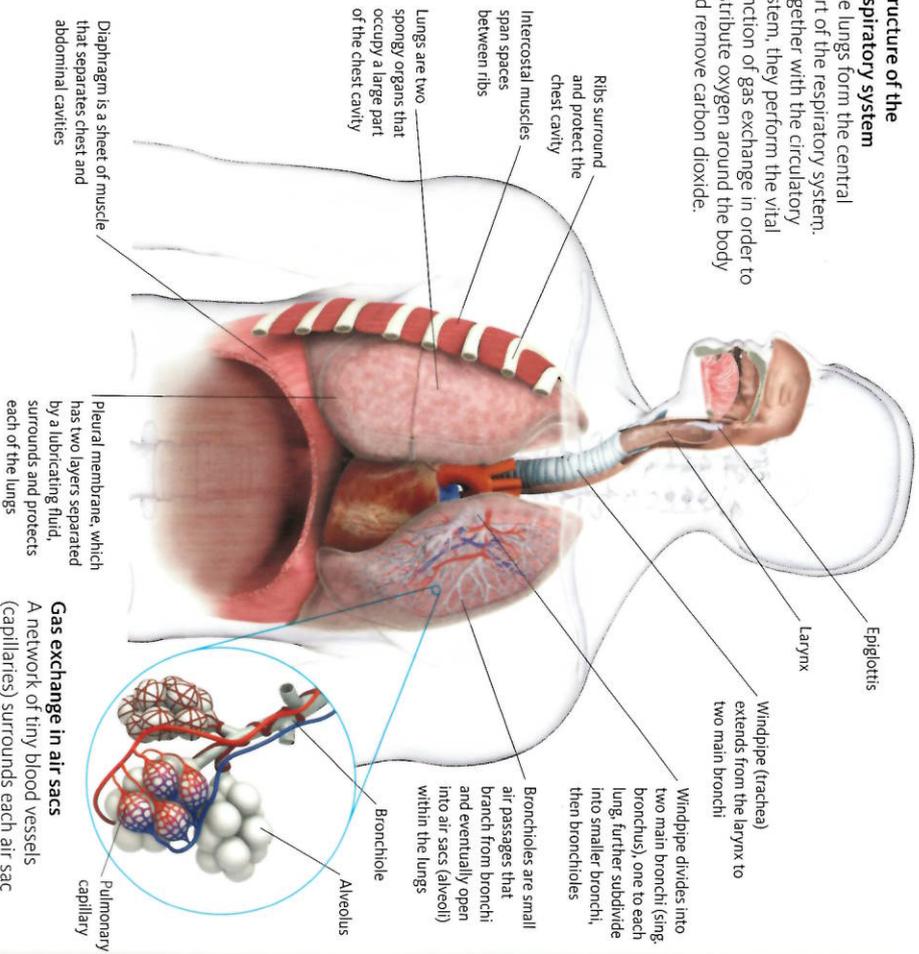
This system comprises the mouth, nose, windpipe (trachea), lungs and pulmonary blood vessels (the blood vessels of the lungs). Respiration involves the process of breathing and the exchange of gases (oxygen and carbon dioxide) both in the lungs and in cells throughout the body.

We breathe in air to take oxygen into the lungs, and we breathe out to expel the waste gas, carbon dioxide, a by-product of respiration.

When we breathe, air is drawn through the nose and mouth into the airway and the lungs. In the lungs, oxygen is taken from air sacs (alveoli) into the pulmonary capillaries. At the same time, carbon dioxide is released from the capillaries into the alveoli. The carbon dioxide is then expelled as we breathe out. An average man's lungs can hold approximately 6 litres (10 pints) of air; a woman's lungs can hold about 4 litres (7 pints) of air.

Structure of the respiratory system

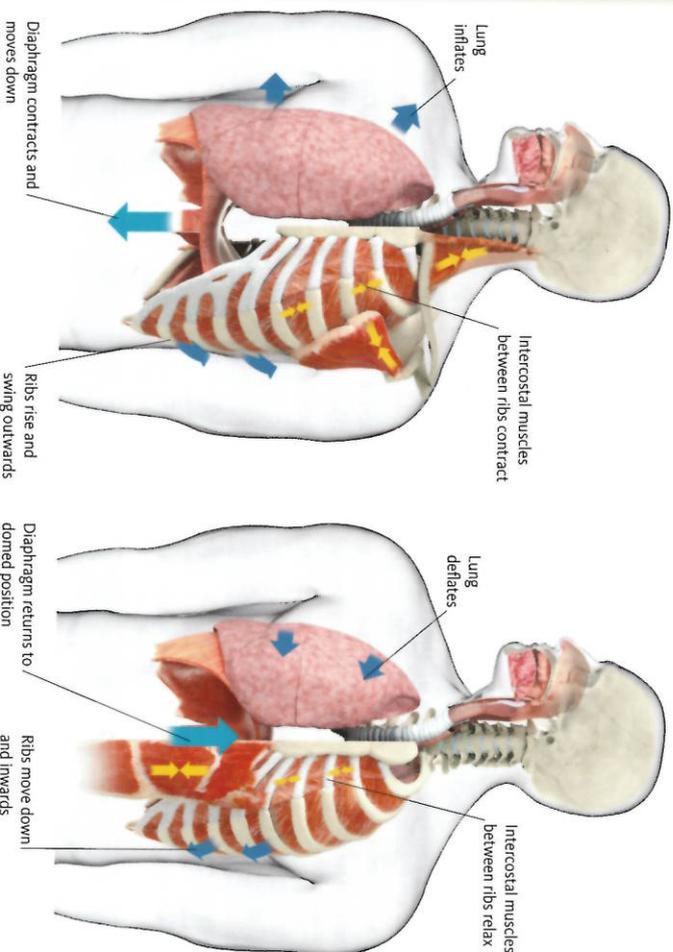
The lungs form the central part of the respiratory system. Together with the circulatory system, they perform the vital function of gas exchange in order to distribute oxygen around the body and remove carbon dioxide.



HOW BREATHING WORKS

The breathing process consists of the actions of breathing in (inspiration) and breathing out (expiration), followed by a pause. Pressure differences between the lungs and the air outside the body determine whether air is drawn in or expelled. When the air pressure

in the lungs is lower than outside, air is drawn in; when pressure is higher, air is expelled. The pressure within the lungs is altered by the movements of the two main sets of muscles involved in breathing: the intercostal muscles and the diaphragm.



Breathing in

The intercostal muscles (the muscles between the ribs) and the diaphragm contract, causing the ribs to move up and out, the chest cavity to expand, and the lungs to expand to fill the space. As a result, the pressure inside the lungs is reduced, and air is drawn into the lungs.

Breathing out

The intercostal muscles relax, and the ribcage returns to its resting position, while the diaphragm relaxes and resumes its domed shape. As a result, the chest cavity becomes smaller, and pressure inside the lungs increases. Air flows out of the lungs to be exhaled.

HOW BREATHING IS CONTROLLED

Breathing is regulated by a group of nerve cells in the brain called the respiratory centre. This centre responds to changes in the level of carbon dioxide in the blood. When the carbon dioxide level in the body rises, the respiratory

muscles and the diaphragm to contract, and a breath occurs. Our breathing rate can be altered consciously under normal conditions or in response to abnormal levels of carbon dioxide, low levels of oxygen, or with stress, exercise.