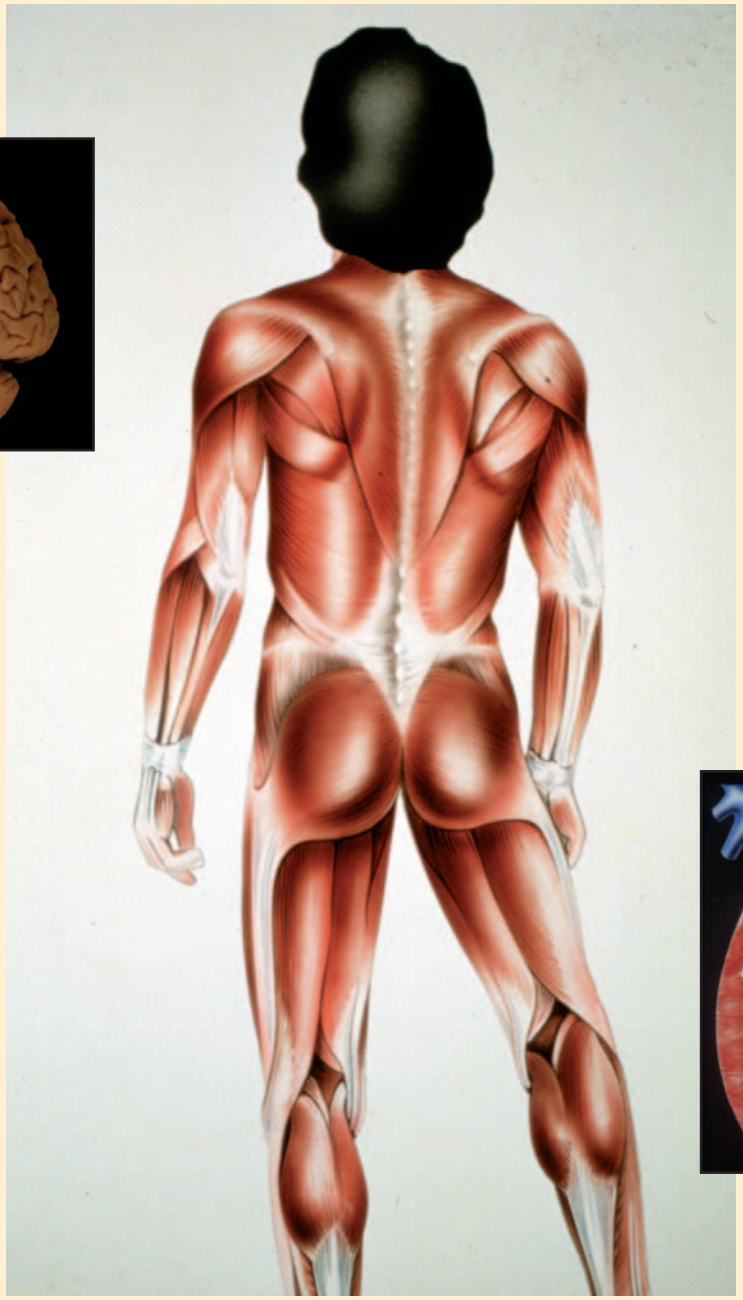
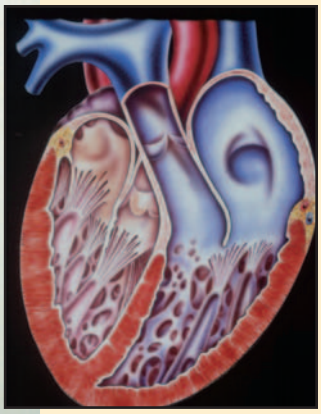
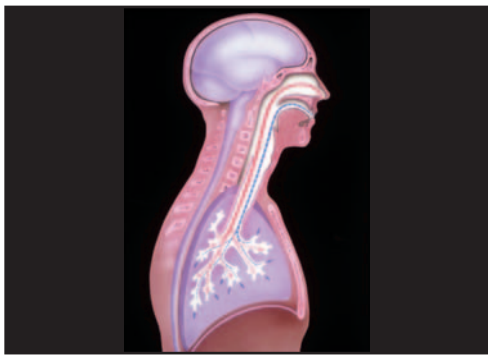




The Living BODY

FILMS FOR THE HUMANITIES & SCIENCES®

Breath of Life



Summary

This program uses as a dramatic framework the encounter between a young man lounging at a sidewalk cafe and a thief to examine the functioning of the respiratory system. The program includes segments on the structure of the lungs, the role of hemoglobin in red blood cells in the exchange of oxygen and carbon dioxide, and the mechanics of breathing.

The respiratory system benefits every cell in the body, supplying oxygen and preventing suffocation from carbon dioxide. The camera follows the path travelled by air as it is breathed into the lungs, descending through the trachea, forking into the two bronchi and into the walls of the bronchi where mucus is secreted. Some of the cells in these walls have tiny hairs that beat the mucus layer upwards towards the throat; a microscopic view shows these hairs at work, as well as the cells that wander through these air passages, searching out bacteria and destroying them before they can reach the lungs. The bronchial tubes become increasingly narrower and divide and redivide until they end up in the tiny spherical alveoli.

The alveoli are the working units of the lungs. It is here that blood cells flow through extremely thin-walled blood vessels, picking up oxygen and unloading carbon dioxide. These vessels are so narrow that the red blood cells are forced to squeeze through single file.

Each red blood cell contains a special pigment called hemoglobin that gives the cell its red color. In an oxygen-filled environment, hemoglobin attracts oxygen molecules and holds onto them. When the blood reaches body tissue short of oxygen, the hemoglobin releases its load of oxygen.

The design of the human lungs—containing more than a thousand miles of blood vessels—is one of the most efficient examples of space-saving in the body. Breathing is controlled by a section of the brain stem, which automatically sets the rhythm of breathing; this rhythm can change if the brain's cells detect increased levels of carbon dioxide in the blood flowing past them. Sudden or heavy physical exertion will trigger an increase in the rates of oxygen intake and carbon dioxide expulsion.

Objectives

1. To illustrate the structures of the respiratory system, including the trachea, bronchi, and alveoli.
2. To explain how hemoglobin in red blood cells picks up oxygen in the lungs and unloads it in the body's tissues.
3. To describe the mechanics of breathing and its regulation by the brain stem.
4. To show how breathing out helps create the sounds of human communication as air vibrates the vocal cords.
5. To demonstrate adjustments in the respiratory system to meet the body's demand for extra oxygen and carbon dioxide expulsion during heavy physical exercise.

Recall Questions

1. Why does the body require a continual intake of oxygen? How does the body use the oxygen?
2. Why did land creatures have to develop a respiratory system in the first place?
3. Why do the lungs prefer air breathed in through the nose?
4. What is the role of hemoglobin in the exchange of gases in the body's tissues?
5. Describe the nerve signals sent by the brain stem every time a breath is taken.
6. How does the brain "know" when to increase the breathing rate?

Interpretive Questions

1. The bands of cartilage in the trachea, which can be felt when touching the throat, hold the air passages open at all times. Why aren't the air passages constructed like the esophagus, which remains pressed flat until something is swallowed?
2. Iron is a critical component of hemoglobin. If the body is lacking in iron, thus interfering with the production of hemoglobin, how would this affect the ability of red blood cells to transfer oxygen and carbon dioxide?

Vocabulary Required for Effective Viewing

- alveoli
- brain stem
- bronchi
- carbon dioxide
- diaphragm
- diffusion
- hemoglobin
- lungs
- oxygen
- red blood cells
- trachea
- vocal cords