

Introduction to the Respiratory System

You just got done with a long run. You are gasping for air. Why does your body react this way? What is the purpose of breathing? All the cells of your body need oxygen to work properly. Your body's circulatory system works with the **respiratory system** to deliver the oxygen. Your blood carries red blood cells. The main job of red blood cells is to carry oxygen throughout your body. The red blood cells get oxygen to the lungs. The lungs are the main organs of the respiratory system. The respiratory system is the body system that takes in oxygen. It then releases carbon dioxide back to the atmosphere. The carbon dioxide is the waste material from the cells.

What Is Respiration?

Respiration is the exchange of oxygen with carbon dioxide. This process consists of two stages. In one stage, air is taken into the body. Carbon dioxide is then released to the outside air. In the other stage, oxygen is delivered to all the cells of the body. Carbon dioxide is carried away from the cells. Oxygen and carbon dioxide are the two gases exchanged through respiration.

Parts of the Respiratory System

You can see the main structures of the respiratory system in the Figure below. They include the nose, trachea, lungs, and diaphragm. Use the Figure to trace how air moves through the respiratory system.

Steps in Respiration

Take in a big breath of air through your nose. As you breathe in, you may feel the air pass down through your throat. Your chest expands. Now breathe out and observe the opposite events occurring. Breathing in and out may seem like simple actions. They are just one part of a complex process.

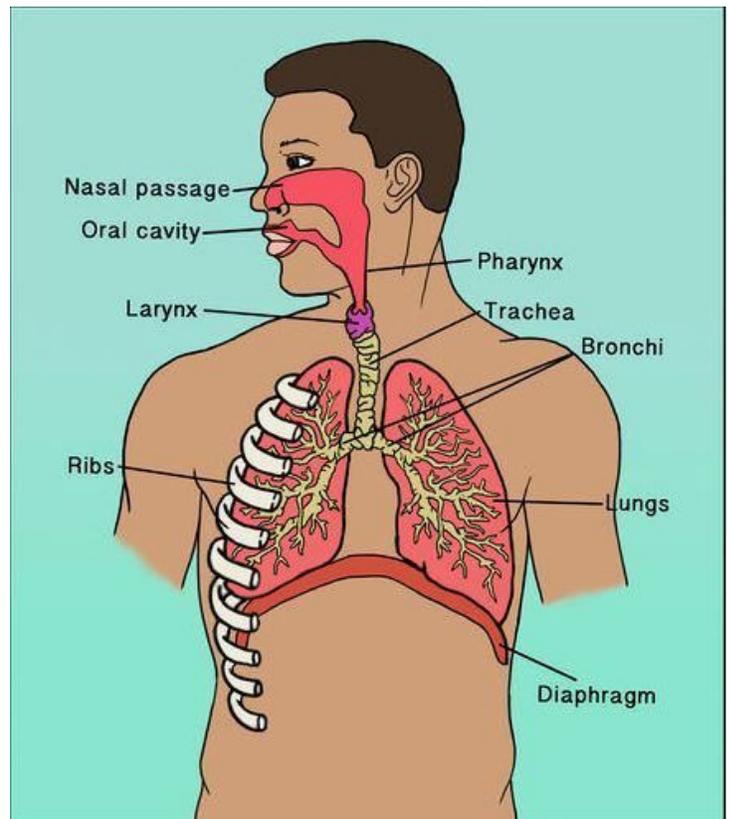
Respiration actually occurs in four steps:

1. Breathing (inhaling and exhaling).
2. Oxygen and carbon dioxide exchange between the air and blood.
3. Gas transport by the blood.
4. Oxygen and carbon dioxide exchange between the blood and cells.

Breathing

Breathing is the process of moving air into and out of the lungs. The process depends on a muscle called the diaphragm. This is a large, sheet-like muscle below the lungs.

- Inhaling, or breathing in, occurs when the diaphragm muscle tightens. This increases the size of the chest. This also decreases air pressure inside the lungs. This action allows air and gases to enter the lungs.



- Exhaling, or breathing out, occurs when the diaphragm muscle relaxes. This decreases the size of the chest. This also increases air pressure inside the lungs. This action allows for air to leave the lungs.

When you inhale, air enters the respiratory system through your nose and ends up in your lungs, where gas exchange with the blood takes place. What happens to the air along the way?

- In the nose, mucus and hairs trap any dust or other particles in the air. The air is also warmed and moistened.
- Next, air passes through a passageway that is connected to the windpipe.
- The air then finds its way to the lungs.
- In the chest, the windpipe splits so that air enters both the right and left lung. These passages are covered with mucus and tiny hairs called cilia. The mucus traps any remaining particles in the air. The cilia move and sweep the particles and mucus toward the throat so they can be released from the body.

Gas Exchange

Within the lungs there are thin pockets. It is in these thin pockets that gases are exchanged between the lungs and the blood. Here, oxygen enters red blood cells and carbon dioxide leaves the red blood cells. Once red blood cells are rich in oxygen, they leave the lungs. They travel through the heart. The heart pumps the oxygen-rich blood into arteries. The arteries carry the oxygen-rich blood throughout the body. Once red blood cells reach the cells, they exchange the oxygen for carbon dioxide wastes. The carbon dioxide travels back to the lungs. The carbon dioxide is then passed into the lungs where it is exhaled out of the body. Every time you breathe in and out your body is exchanging gases. Each time you breathe in you take in oxygen. Each time you breathe out you get rid of carbon dioxide. Breathing allows for the continuous process of exchanging these gases.

Summary

- The respiratory system is the body system that exchanges gases with the outside air. It brings air containing oxygen into the body for the cells. It also releases carbon dioxide from the cells into the air. This exchange of gases is called respiration.
- Breathing is the process of moving air into and out of the lungs. It depends on the muscle called the diaphragm.
- The lungs are the main organs of the respiratory system. This is where gases are exchanged between the air and the blood. Gases are also carried by the blood throughout your body. The blood carries back the waste gases from your cells so they can be exhaled through your lungs.