

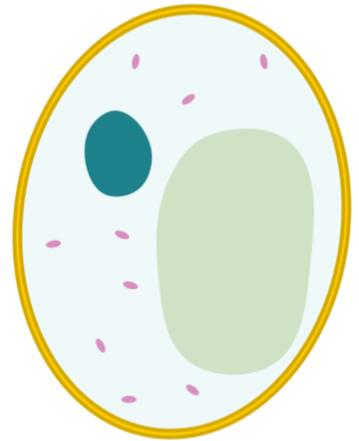
# Cell Transport Systems



Like the bus shown in the picture above, single-celled organisms and multi-celled organisms have ways of transporting substances. In the case of organisms these substances are exchanged between the organism and the outside world.

## Single-Celled Organism Transport Systems

Single-celled organisms must perform all of its life functions with its one cell. This means that it must exchange substances with its environment by allowing things into and out of its cell. The substances that enter and exit the cell include: food, waste, and gases. Look at the drawing of the yeast cell in the Figure below. The yellow barrier around the cell is called the cell membrane. Although it looks like a barrier, it actually acts more like a door. It lets the right things into and out of the cell and keeps the wrong things out.



The yellow barrier around this yeast cell is called the cell membrane.

## Multi-cellular Organism Transport Systems

Cells in multi-cellular organisms still need to exchange substances with the environment. How is a cell that is part of your stomach able to get its food and release its waste? In a multi-cellular organism, transport systems are established that allow all the cells in the organism to release and receive necessary substances.

### Skin

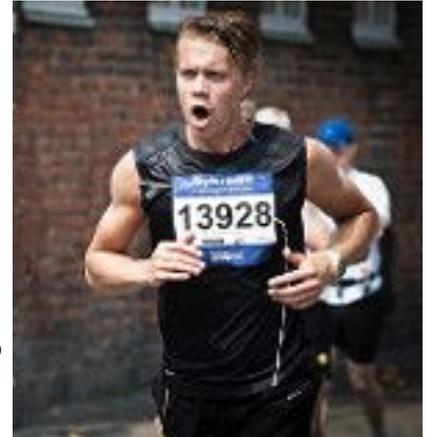
One way that your body transports substances into and out of itself is through your skin. Did you know that your skin is the largest organ in your body? Your skin is part of your **integumentary system** which is the outer covering of your body. The integumentary system is made up of your skin, hair, and nails. Your skin has many functions but the following help to transport substances into or out of the body or prevent things from entering or exiting your body:



- Provides a barrier. It keeps organisms that could harm the body out. It stops water from entering or leaving the body.
- Makes sweat (or perspiration), a watery substance that cools the body when it evaporates. This helps you control your temperature.
- Helps the body get rid of some types of waste and excess substances, which are removed in sweat. These substances include: water, salts, and sugars.

### Transporting Oxygen & Carbon Dioxide

To get oxygen to the cells in your body, a transport system is needed. In this case, your respiratory system and circulatory system work together to perform this job. As you breathe in air it travels to your lungs which lets the oxygen in the air get into your blood vessels. Once in the blood vessels, the oxygen attaches to your red blood cells and travels, with the help of your pumping heart, through your blood vessels to get to all of your cells.



This runner is using a lot of energy to run this race. In order for him to run, the cells in his muscles need lots and lots of oxygen. How can the cells in his leg muscles get the oxygen that they need?

### Transporting Food

All cells in your body require energy. To get this energy, your cells need food. The individual cells in your body do not eat. Instead, you eat and the right food gets to your cells by way of a transport system. Your digestive system and circulatory system work together to accomplish this task. Once the food is digested and broken down in your stomach, it moves into your small intestines where the nutrients in the food are absorbed into your blood vessels. There the nutrients can get to your cells and serve as food.

### Transporting Waste

So what happens to your body's wastes? Obviously, you must get rid of waste. This is the job of the **excretory system**. You remove waste as a gas (carbon dioxide), as a liquid (urine and sweat), and as a solid. Excretion is the process of removing wastes and excess water from the body.



Recall that carbon dioxide travels through the blood and is transferred to the lungs where it is exhaled. In the large intestine, the remains of food are turned into solid waste for excretion. How is waste other than carbon dioxide removed from the blood? That is the role of the kidneys. Urine is a liquid waste formed by the kidneys as they filter the blood. If you are getting plenty of fluids, your urine should be almost clear. But you might have noticed that sometimes your urine is darker than usual. Do you know why this happens? Sometimes your body is low on water and trying to reduce the amount of water lost in urine. Therefore, your urine gets darker than usual. Your body is striving to maintain homeostasis through the process of excretion.

Urine helps remove excess water, salts, and nitrogen from your body. Your body also needs to remove the wastes that build up from cell activity and from digestion. If these wastes are

not removed, your cells can stop working, and you can get very sick. The organs of your excretory system help to release wastes from the body. The organs of the excretory system are also parts of other organ systems. For example, your lungs are part of the respiratory system. Your lungs remove carbon dioxide from your body, so they are also part of the excretory system.