What Happens When You Breathe? U-5 L-2

Exploring Science / Historical Steps

The Boy Who Did Not Drown On a cold January day in 1984, **Jimmy Tontlewicz** went sledding with his dad along the shore of Lake Michigan. Four-year-old Jimmy threw his sled onto the frozen lake. His dad walked on the ice to bring back the sled. Jimmy followed. He jumped onto the ice … and both of them fell through!

Jimmy's dad was rescued by passersby. It was at least 20 minutes before divers finally pulled Jimmy out, and there were no signs of life.

A few years before this happened, Jimmy would have been another boy who drowned. For many years scientists thought that no one could survive for more than 4 minutes under water. Fortunately, by 1984 it was known that some people survive even after an hour in cold water!

So the rescue team did not give up. They immediately used **CPR** (a method that anyone can learn) to help restart Jimmy's heart and to get him breathing again. In the hospital, doctors put to use special methods that they had recently learned. Soon, Jimmy was on his way to being well again.

A woman learning CPR on a baby manikin

➢ Explain how Jimmy's case shows that the body can store oxygen for use at a later time.

➢ Want more? Search the "mammalian diving reflex" to learn why some "drowned" people are able to survive.

➢ To Do Yourself

How can you measure your exhaled carbon dioxide?

You will need:

Bromothymol blue solution; straw; glass jar; timer (stopwatch)

1. Fill the jar half full with bromothymol blue solution.

2. Take a deep breath and exhale through the straw into the solution.

3. When enough carbon dioxide is bubbled through the bromothymol blue solution, it turns green, then olive. Have a partner time how long it takes for the blue to disappear.

Questions

1. How long did it take for the blue color to disappear? _____

2. How did this time compare to other students (or family members)?_____

Respiration and Breathing

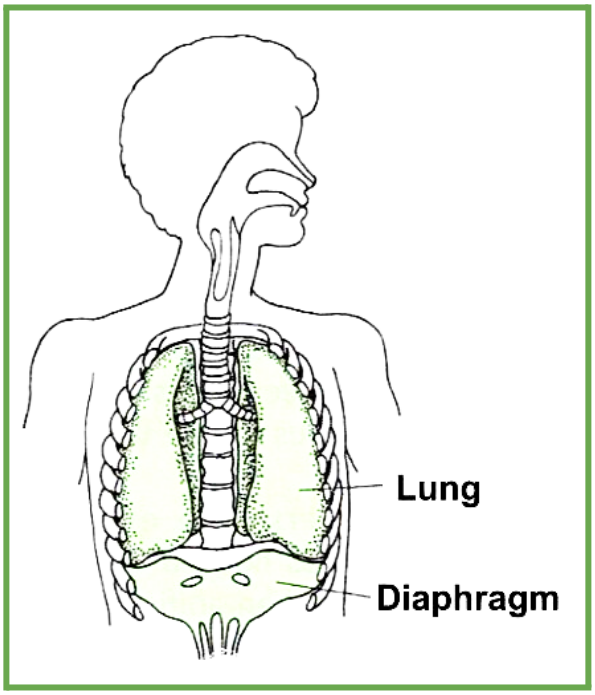
When Jimmy went under the water, he could no longer take oxygen into his lungs. But there was already enough oxygen in his body to keep him alive for a while. His breathing and even his heartbeat had stopped. But the process that keeps the cells alive had not stopped. Have you guessed what this important process is called? **Cell respiration!** (Look back at page 71).

As a reminder, here are the major steps of cell respiration - the process used by nearly all living things: The cells take in both oxygen and food. When the food (a simple sugar) combines with oxygen (burns), energy is released. Carbon dioxide and water are given off.

Moment by moment, so that your cells receive the molecules they need and remove other molecules, you breathe. This moves air into and out of your lungs. Recall that the word **respiration** (by itself) means breathing.

Muscles in your chest help you breathe. One of your breathing muscles is the **diaphragm** (DY-uh-fram). The diaphragm is like an elastic sheet. It lies below the lungs. At rest, this thin muscle is curved upward, like an upside-down bowl. When you **inhale** (take air in), the central area of your diaphragm moves down and this muscle becomes less curved. At the same time, the rib muscles move your ribs up and out. The result is an increase in the space inside of your chest. To fill this larger space, air from the outside rushes through your mouth and nose, and into your lungs.

The above steps are reversed as you **exhale** (breathe out). The central area of the diaphragm moves up, becoming more curved. At the same time, your ribs move down and in. The space inside of your chest gets smaller, and air is pushed from your lungs to the outside.



The sheet-like diaphragm helps you breathe.

REVIEW U-5 L-2

I. In each blank, write the word (from the list below) that fits best. Use each choice only once.

breathing **respiration** **CPR** **diaphragm** **ribs** **bronchi**

In cell _____, sugar combines with oxygen. The *common* term for the process of moving air into and out of your lungs is_____.

Muscles move your _____ up and out when you breathe in. When your _____ moves up, air is pushed out of your lungs.

II. Circle the word or phrase (between the brackets) that makes each statement correct.

A. The diaphragm becomes **[**more / less**]** curved when you inhale.

B. When you exhale, your ribs move **[**up and out / down and in**]**.

C. A process that takes place in all body cells is **[**breathing / cell respiration**]**.

III. Some bacteria can live only in areas without oxygen. Do you think that these bacteria carry out cell respiration? If not, how do you think that they survive? [Just make a guess.]