What Is The Work Of The Blood? U-4 L-5

Exploring Science / Historical Steps

Dr. Drew - "Father Of The Blood Bank"

In a **transfusion** (trans-FYOO-zhun) one person's blood is given to another. With so many people injured during World War II, there was a desperate need for blood for transfusions.

Plasma (PLAZ-muh) is the blood's liquid part. **Dr. Charles Drew**, an African American, developed a way to dry blood plasma. When dried, plasma is much easier to store and to ship. Just before use, the dried plasma is mixed with water. As the war progressed, thousands of units of dried plasma were sent from the USA to Britain. Thanks to the work of Dr. Drew, many lives were saved.

A person donating blood

➢ Donors at a blood bank are given fruit juice and sweets after they give blood. What two parts of the lost blood are partly replaced by these foods? Explain.

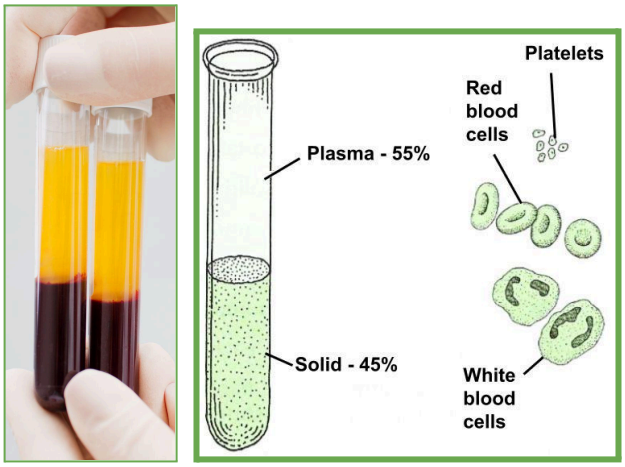
The Work of the Blood

Has a doctor ever tested your blood? For many tests, a test tube is filled with blood. The tube is put in a machine called a **centrifuge** (SIN-truh-FYOOJ) that spins very fast. When the spinning stops, the blood has been separated into two layers. At the top is the liquid part, called **plasma** (PLAZ-muh)**.** At the bottom is the "solid" part.

Plasma is 90 percent water. Dissolved in the plasma are digested foods, wastes from cells, and special chemicals. When you get a cut, one chemical helps the blood to clot (stop flowing). Other chemicals help to fight germs.

The solid part of the blood has three kinds of cells. **Red blood cells** are small and shaped like disks with thin centers. Often they are simply called **RBCs**. They have no nuclei. A protein called **hemoglobin** (HEE-muh-gloh-bin) in the red blood cells gives them their color. It is the hemoglobin that actually carries the oxygen to all of your body cells.

White blood cells (often called **WBCs**) come in several different forms. These cells *do* have nuclei. There are many fewer white blood cells than red blood cells. The job of the white blood cells is to fight germs. You will learn more about these on pages 273-4.



Left: Tubes of blood after being spun in a centrifuge

Far Right: The solid part is made of platelets, red blood cells, and white blood cells.

Tiny blood cells called **platelets** (PLAYT-lits) are also in the solid part of the blood. When you are cut, the platelets release a chemical. This chemical works with part of the plasma to make a thread-like net. This net catches some red blood cells, and together they form a clot. The clot keeps blood from flowing from the wound. Gradually, the clot dries and becomes a **scab**. After the skin heals, the scab drops off.

How do molecules such as water, oxygen and carbon dioxide actually move into and out of the blood? A key method, called **diffusion** (Di-FYOO-zhun) is illustrated below.

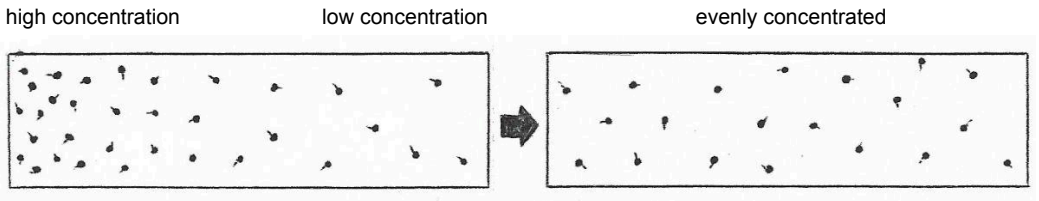
You probably know that molecules in liquids naturally bounce around. On the whole, the molecules bounce from areas where they are crowded toward areas where they are less crowded. We say that the molecules diffuse. In the first case illustrated below, the molecules at the left are diffusing from left to right.

What if a membrane is present? As shown in the second case below, cell membranes have very tiny openings through which small molecules can move.

Eventually, molecules become evenly spaced on both sides. At this point, diffusion continues, but the movements left and right are balanced.

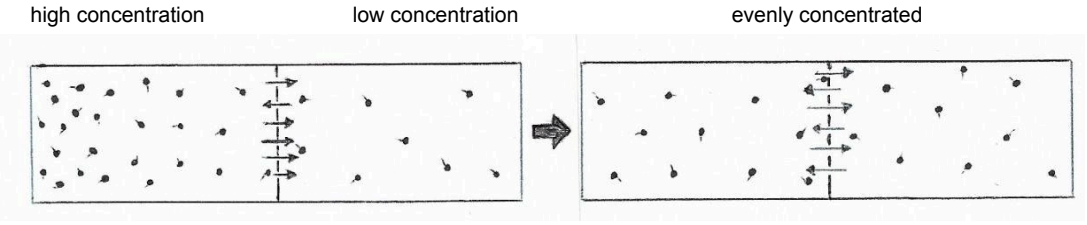
A great deal of diffusion occurs in the body. For a few examples, look ahead at the large illustration on page 110.

Diffusion of small molecules



Most movement to the right **Movement balanced**

Diffusion of small molecules through a membrane



(membrane) (membrane)

Most movement to the right **Movement balanced**

---------- REVIEW ---------- U-4 L-5

I. In each blank, write the word that fits best. Choose from the words below.

platelets **plasma** **hemoglobin** **clot** **white** **red**

The liquid part of the blood is _____. Blood cells that fight germs are _____ blood cells. Disk-shaped cells without nuclei are _____ blood cells. The _____ in red blood cells carries oxygen. Tiny cells that help to form clots are _____.

II. Circle the choice (between the brackets) that makes each statement correct.

A. A net of threads in a clot forms partly from **[**plasma chemicals / white blood cells**]**.

B. A scab forms from dried **[**white / red**]** blood cells and a chemical from platelets.

C. [Diffusion / Dilution**]** is the movement of molecules from crowded to uncrowded areas.

III. Blood clots sometimes form inside of the body rather than where the skin is cut. Why could such a clot be harmful?