

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 keep 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.

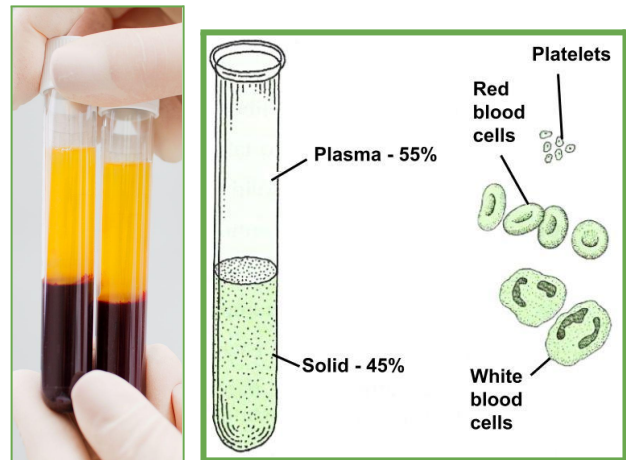
The Work of the Blood

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**) 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**. 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.

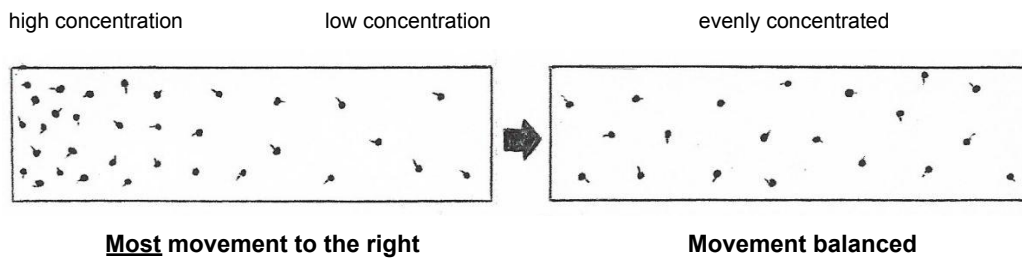
What about the molecules that are carried in the blood - like oxygen and carbon dioxide? How do these important molecules move into and out of the blood?

You probably know that molecules in liquids naturally bounce around. On the whole, the molecules bounce from areas where they are

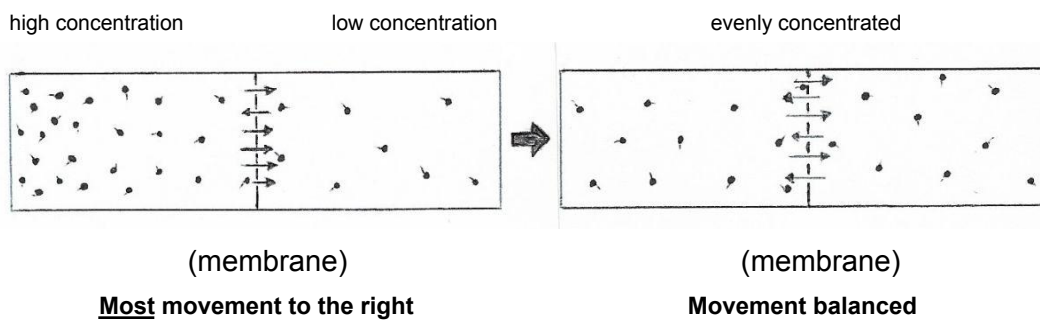
crowded toward areas where they are less crowded. This type of movement is called **diffusion**.

Cell membranes have tiny openings. During diffusion, very small molecules can move through these openings. 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



Diffusion of small molecules through a membrane



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?