

Red Blood Cells and Hemoglobin

by Sophia

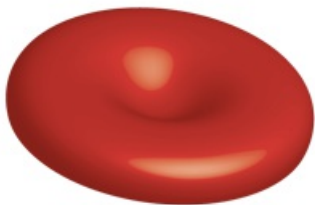


WHAT'S COVERED

In this lesson, you will learn to identify the structure and function of red blood cells. Specifically, this lesson will cover:

1. Structure & Function of Erythrocytes

Red blood cells are also known as **erythrocytes**, and they make up about 45% of total blood volume. Their main role is to carry oxygen to cells and to carry carbon dioxide away. They are shaped like a disk with a little indentation in the middle of it; the shape of a red blood cell is important to its function.



An important component of red blood cells is a protein called hemoglobin, which gives the red blood cell its color. It allows the red blood cells to carry oxygen to cells and tissues.

Maintaining a stable red blood cell count is important for homeostasis; without enough red blood cells, we'd be unable to provide all the cells in our body with sufficient oxygen.

Some facts about red blood cells:

- The lifespan of a red blood cell is about 120 days. After that, the cell will die and the different parts can be recycled throughout the body.
- A **cell count** is the number of cells in a microliter of blood. This varies a little bit from person to person, depending on the person's size and whether they're a male or female, but the average cell count of a red blood cell is between 4.8 to 5.4 million.



TERMS TO KNOW

Red Blood Cells

Cells found in the blood that carry oxygen and carbon dioxide.

Erythrocytes

Another name for red blood cells.

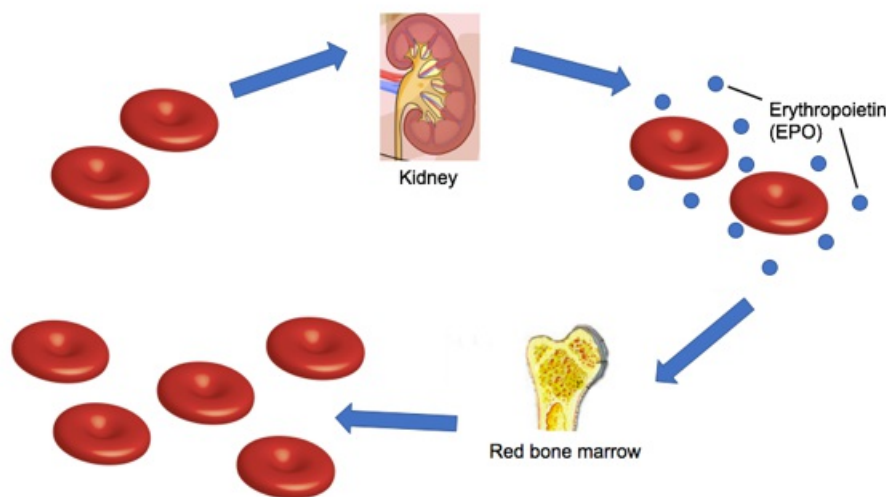
Cell Count

The number of red blood cells in a microliter of blood.

2. Production of Erythrocytes

Production of red blood cells is an important process for our body; this process starts with the kidneys. The kidneys play a large role in filtering blood, and, as blood is being filtered, they help to monitor oxygen levels in the blood. If the kidneys detect a decrease in oxygen levels, they are going to create and secrete a hormone called **erythropoietin**, abbreviated as EPO. EPO will then stimulate bone marrow to produce new red blood cells.

This is an example of a negative feedback loop because a change (low blood oxygen) was detected and then reversed to bring the body back to homeostasis.



TERM TO KNOW

Erythropoietin

When blood oxygen levels are low, the kidneys secrete more erythropoietin; this hormone stimulates the bone marrow to produce more erythrocytes.

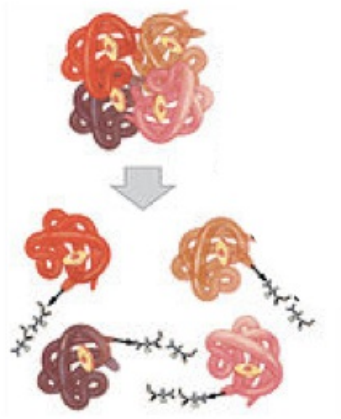
3. Hemoglobin

Erythrocytes deliver oxygen to the body's tissues with lots of hemoglobin.

Hemoglobin is a quaternary protein made of four **globin** polypeptides. Each globin contains a **heme group**; each heme contains an atom of **iron**, and it is this iron atom that binds to oxygen.

Oxyhemoglobin is the name that we give to hemoglobin that is carrying oxygen.

Hemoglobin



One molecule of hemoglobin can bind up to four oxygen molecules at a time, but factors such as the ratio of carbon dioxide to oxygen in the blood, temperature, and acidity of the tissues can affect this amount of oxygen that binds to hemoglobin.



DID YOU KNOW

When iron is exposed to oxygen, it produces rust. The process of that reaction happening gives blood that deep red color when the iron in the heme group binds with oxygen.

When hemoglobin is lacking oxygen, the blood appears to be more of like a purplish, bluish color as it travels through your veins.



TERMS TO KNOW

Hemoglobin

Hemoglobin is a quaternary pigment protein (it is made up of four globin polypeptides); it is primarily used in erythrocytes to transport oxygen and some carbon dioxide.

Globin

A term used to describe the protein structure of hemoglobin.

Heme Group

This is the iron group in the center of each globular protein in a hemoglobin molecule; therefore one hemoglobin molecule has four heme groups associated to it. The heme group is what oxygen binds to when red blood cells are circulating oxygen throughout the body.

Iron

Within the heme group of each globin polypeptide, iron is the atom to which oxygen binds.

Oxyhemoglobin

The term used to describe when oxygen is bound to hemoglobin; oxygen + hemoglobin = oxyhemoglobin.



SUMMARY

The **structure** of a red blood cell is that of a disk with an indentation in the middle. It contains hemoglobin, which gives the cell its red color. Its **function** is to carry oxygen to the cells of the body and carry away carbon dioxide. Hemoglobin is the protein that allows red blood cells to carry oxygen. Red blood cells are **produced** when the kidneys detect low oxygen levels in the blood. They create and secrete a hormone called erythropoietin, which signals bone marrow to produce more red blood cells.

The structure of **hemoglobin** comprises two parts: globin and a heme group. The heme group contains iron in the middle of it that can bind with oxygen. Hemoglobin is a component of the red blood cell. The function of hemoglobin is to carry oxygen in the blood to the cells and tissue of the body. Oxyhemoglobin is a hemoglobin molecule carrying oxygen. Because of the reaction between iron and oxygen in oxyhemoglobin, blood has a deep red color.

Keep up the learning and have a great day!

Source: THIS WORK IS ADAPTED FROM SOPHIA AUTHOR AMANDA SODERLIND



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