

Red blood cells (RBCs)

Red blood cells (RBCs) are the **non-nucleated** formed elements in the blood. Red blood cells are also known as erythrocytes (erythros = red). Red color of the red blood cell is due to the presence of the coloring pigment called hemoglobin. RBCs play a vital role in transport of respiratory gases. RBCs are larger in number compared to the other two blood cells, namely white blood cells and platelets.

***Normal Value**

RBC count ranges between 4 and 5.5 million/cu mm of blood. In adult males, it is 5 million/cu mm and in adult females, it is 4.5 million/cu mm.

Erythrocyte lifespan 100-120 DAYS (primarily destroyed by macrophages in the spleen).

***Normal Structure**

Red blood cells are non-nucleated. Only mammal, which has nucleated RBC is camel. Because of the absence of nucleus in human RBC, the DNA is also absent.

Three anatomic features of erythrocytes contribute to the efficiency with which they transport O₂.

- 1- First, erythrocytes are flat, disc-shaped and biconcave. The biconcave shape provides a larger surface area for diffusion of O₂ from the plasma across the membrane into the erythrocyte than a spherical shape. Also, the thinness of the cell enables O₂ to diffuse rapidly between the exterior and innermost regions of the cell.
- 2- A second structural feature that facilitates RBCs' transport function is their flexible membrane. Red blood cells, whose diameter is normally 8 mm, can deform amazingly as they squeeze single file through capillaries as narrow as 3 mm in diameter.
- 3- The third and most important anatomic feature that enables RBCs to transport O₂ is the hemoglobin they contain.

Functions of Red Blood Cells

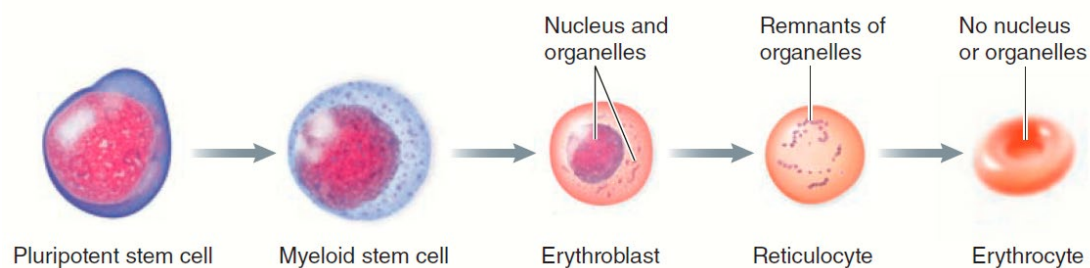
Major function of RBCs is the transport of respiratory gases. Following are the functions of RBCs:

1. Transport of Oxygen from the Lungs to the Tissues.
2. Transport of Carbon Dioxide from the Tissues to the Lungs.
3. In Blood Group Determination RBCs carry the blood group antigens like A antigen, B antigen and Rh factor.

Erythropoiesis

Erythropoiesis is the process of the origin, development and maturation of erythrocytes.

Because erythrocytes cannot divide to replenish their own numbers, the old ruptured cells must be replaced by new cells produced in an erythrocyte factory—the **bone marrow**—which is the soft, highly cellular tissue that fills the internal cavities of bones. The bone marrow normally generates new red blood cells, a process known as **erythropoiesis**, at a rate to keep pace with the demolition of old cells.



Erythrocyte Disorders:

1- Anemia: a symptom that results when blood has lower than normal ability to carry oxygen. It is the disease of insufficient erythrocyte count

- **Hemorrhagic anemia:** loss of blood from bleeding (wound, ulcer, etc.).
- **Hemolytic anemia:** erythrocytes rupture (hemoglobin/transfusion problems, infection).
- **Plastic anemia:** red marrow problems (cancer treatment, marrow disease, etc.).

2- Polycythemia: excess RBC count, causes thick blood the diseases caused by bone marrow problem and hematocrit may jump to 80%.