RED BLOOD CELLS

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THE RED BLOOD CELLS

INTRODUCTION

- 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.

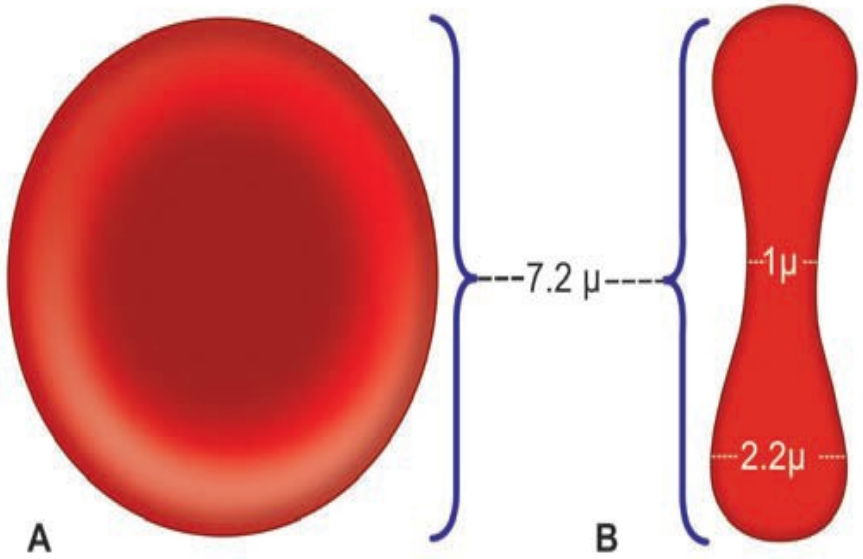
NORMAL VALUE

- 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.

MORPHOLOGY OF RED BLOOD CELLS

NORMAL SHAPE

- RBCs are disk shaped and biconcave (dumbbell shaped).
- Central portion is thinner and periphery is thicker.



NORMAL SIZE

- Diameter : 7.2 µ (6.9 to 7.4 µ).
- Thickness : At periphery 2.2 µ and at the center 1 µ.
- Surface area : 120 sq µ. Volume : 85 to 90 cu µ.

NORMAL STRUCTURE

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

- Other organelles like mitochondria also absent in RBC.
- Because of absence of mitochondria, the energy is produced from glycolytic process.
- Red cell does not have insulin receptor and so the glucose uptake by this cell is not controlled by insulin.

LIFESPAN OF RED BLOOD CELLS

- Average lifespan of RBC is about 120 days.
- After the lifetime the senile (old) RBCs are destroyed in reticuloendothelial system.

Determination of Lifespan of Red Blood Cells

- Lifespan of the RBC is determined by radioisotope method.

FATE OF RED BLOOD CELLS

- When the cells become older (120 days), the cell membrane becomes more fragile.
- However, because of the fragile nature, the older cells are destroyed while trying to squeeze through the capillaries.
- The destruction occurs mainly in the capillaries of spleen because the diameter of splenic capillaries is very small So, the spleen is called 'graveyard of RBCs'.
- Destroyed RBCs are fragmented and hemoglobin is released from the fragmented parts.
- Hemoglobin is immediately phagocytized by the macrophages present in liver (Kupffer cells), spleen and bone marrow.

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:

- Hemoglobin in RBC combines with oxygen to form oxyhemoglobin. About 97% of oxygen is transported in blood in the form of oxyhemoglobin.

2. Transport of Carbon Dioxide from the Tissues to the Lungs:

- Hemoglobin combines with carbon dioxide and form carbhemoglobin. About 30% of carbon dioxide is transported in this form.

3. Buffering Action:

- In Blood Hemoglobin functions as a good buffer. By this action, it regulates the hydrogen ion concentration and thereby plays a role in the maintenance of acid base balance.

4. In Blood Group Determination:

- RBCs carry the blood group antigens like A antigen, B antigen and Rh factor. This helps in determination of blood group and enables to prevent reactions due to incompatible blood transfusion.

THANK YOU