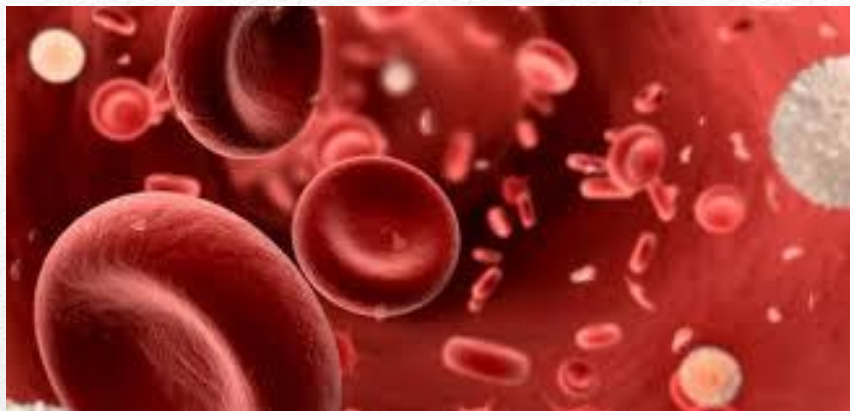




Blood Physiology

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Practical Physiology
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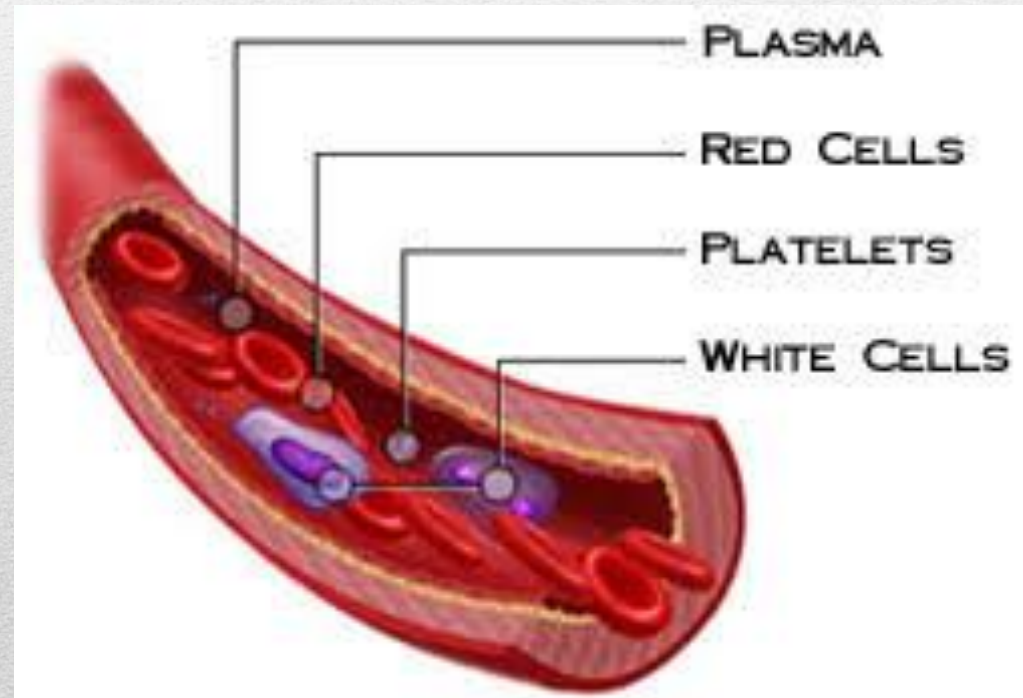
-**Blood** is specialized connective tissue consisting of cellular elements suspended in plasma.

-The cells make up approximately **45%** of the total blood volume.

-The blood is one of the largest organs of the body, which a volume of **about 5 liters** & a weight of 5.5 kg an average 70 kg man.

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Normal peripheral blood is composed of **three types** of cell, **red blood cells, white blood cells & platelets**, suspended in a pale yellow fluid called plasma

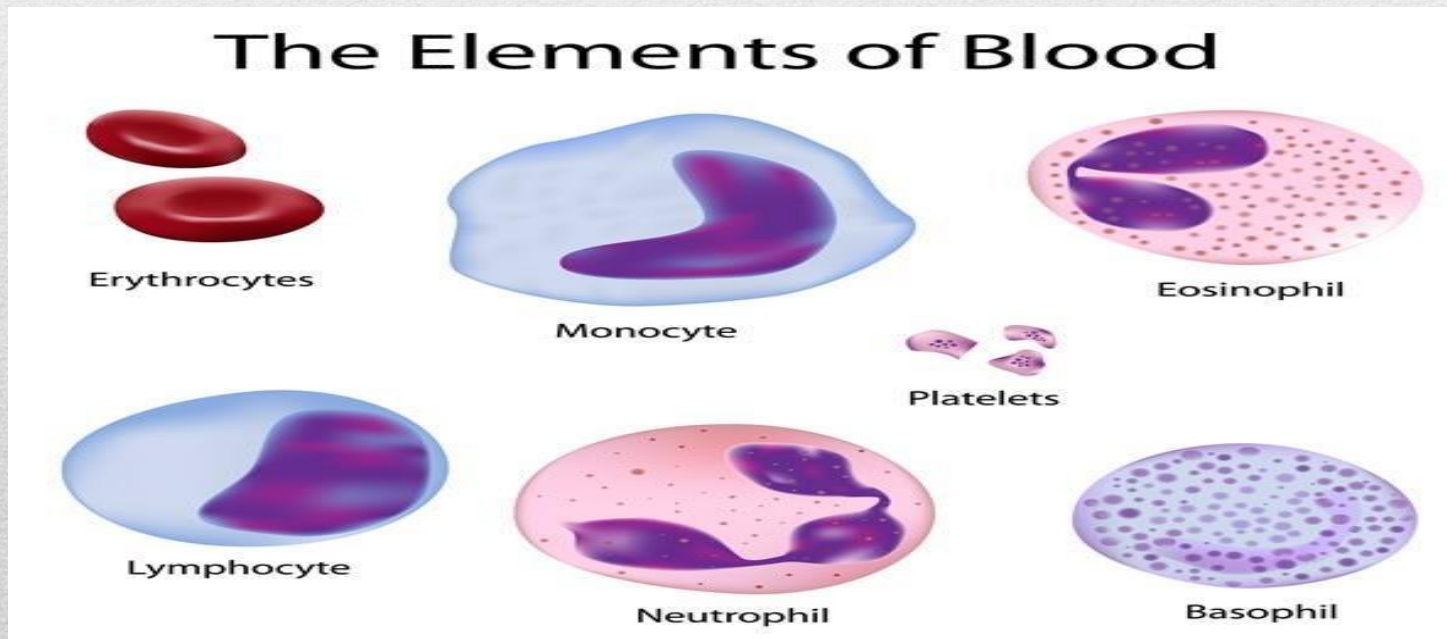


(1) The cellular elements:-

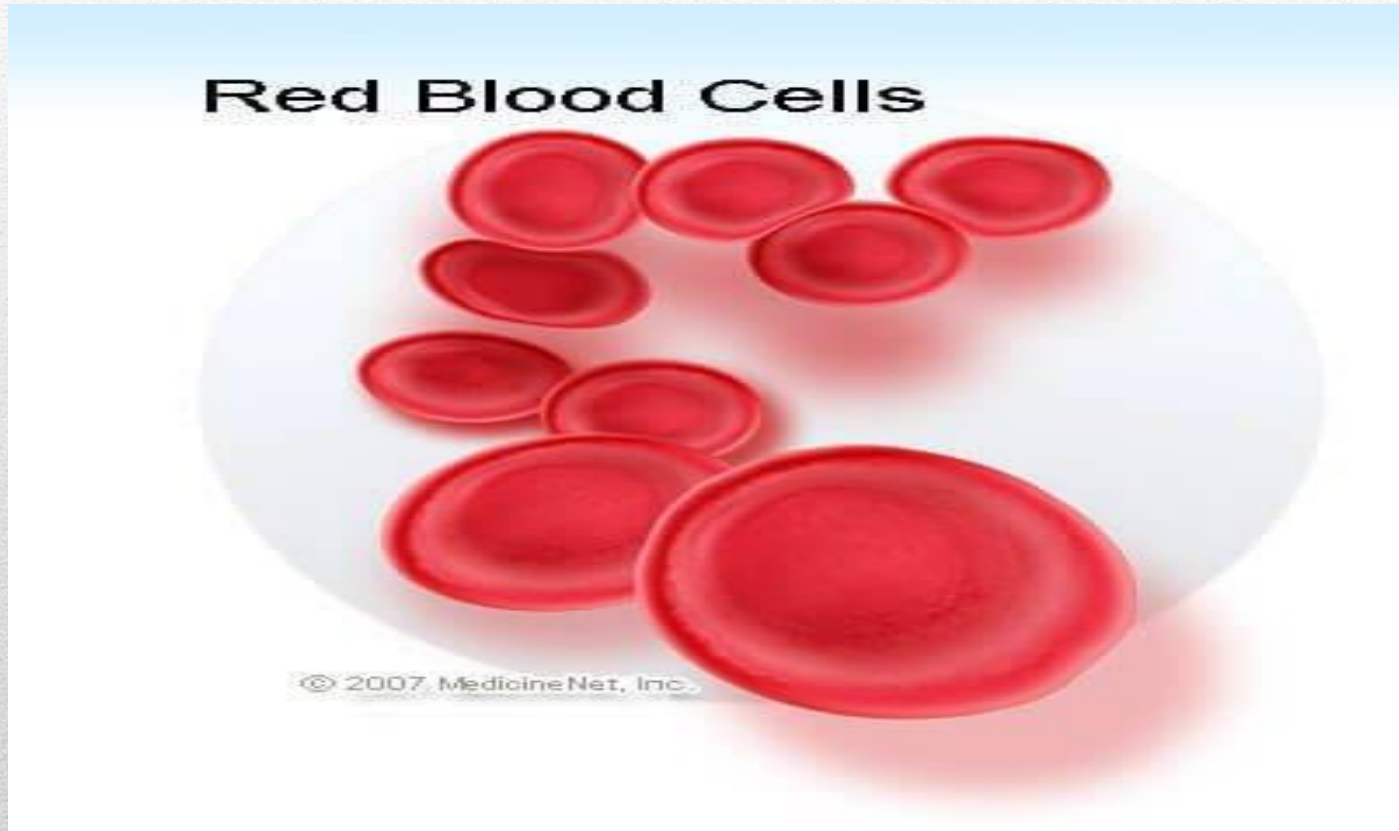
A- Red blood cells (erythrocytes)

B- White blood cells (leucocytes)

C- Platelets.



(A) Red blood cells (RBCs) :-



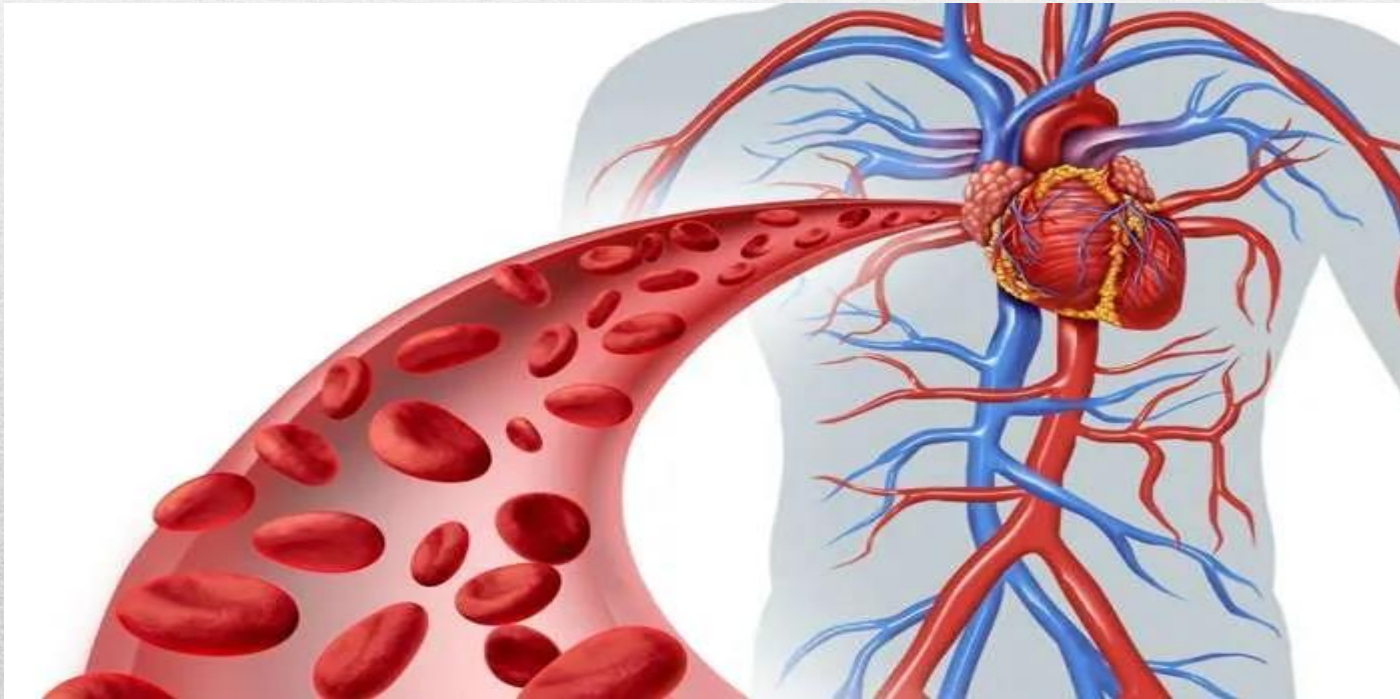


-**RBCs** are biconcave discs approximately 7.5 micron in diameter and 2 micron thick, but their extreme pliability allow them to squeeze through capillaries less than 5-micron diameter.

-Red blood cells survive in the circulation for about 120 days before being sequestered in the spleen & consumed by the phagocytic cells of the reticuloendothelial system..

The major function of red cells is to transport hemoglobin, which in turn carries oxygen from the lungs to the tissues & transport CO₂ from tissues back to the lungs

-The percentage of the total blood volume comprised of red blood cells is called the hematocrit, & this is normally about 40% in women & about 45% in men.



(B):-White blood cells (leucocytes) :-

The leucocytes are the mobile units of the body's protective system.

-They are formed partially in the **bone marrow** (the granulocytes & monocytes, & a few lymphocytes) & partially **in the lymph tissue** (lymphocytes & plasma cells), but after formation they are transported in the blood to the different parts of the body where they are to be used.

Leucocytes are of two main types :-

- (1) Granular leucocytes.
- (2) A granular leucocytes

(1):- Granular leucocytes :-

-Are the most numerous. Always contain specific granules, & they are characterized by the presence of many lobed nucleus for this reasons they are referred to as **Polymorphonuclear** leucocytes

There are three types of granular leucocytes :-

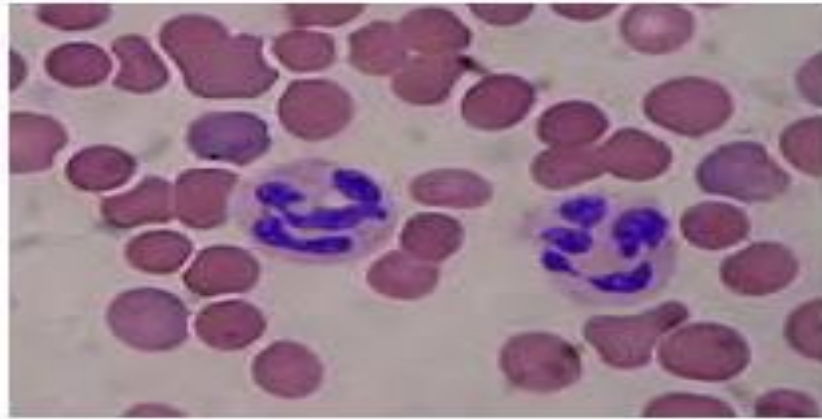
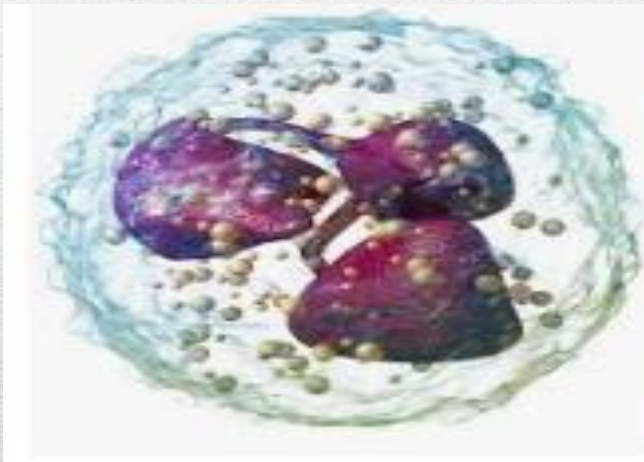
(a):-Neutrophils (b):-Eosinophils (c):-Basophils.

(a):-Neutrophils :-

-They are the most numerous of the leukocytes in human blood, which constitute 50-70% of the total white blood cells.

-The neutrophil nucleus is highly polymorphous Which usually consist of from 3 to 5 irregular ovoid lobes connected by a thin chromatin strand.

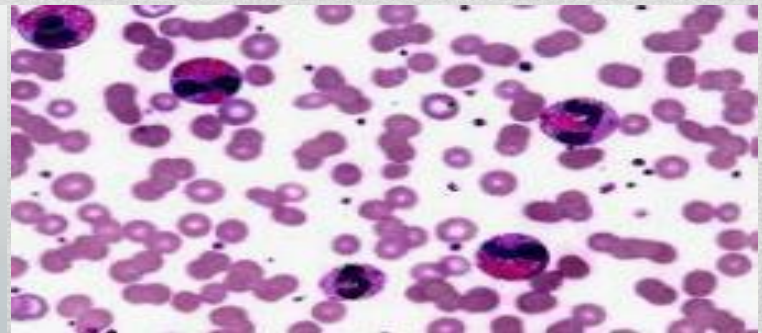
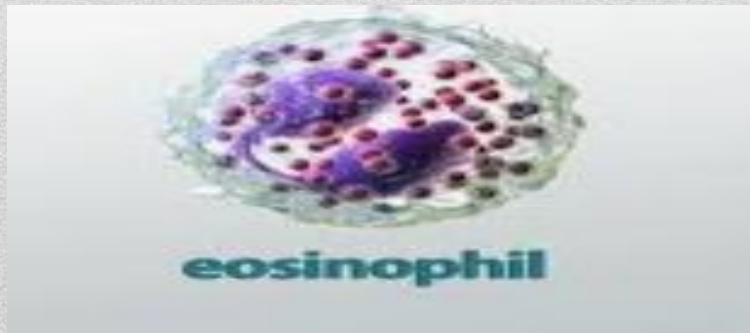
-**Neutrophil cytoplasm** contains numerous fine neutrophil granules, which are special types of lysosomes that contains principally hydrolytic enzymes



-Neutrophils constitute the first line of defense against invading organism so the main function of neutrophils is **bacterial killing by phagocytosis.**

(b):-Eosinophil :-

- They normally constitute about 1 to 4 percent of the total white blood cells.
- The nucleus is usually **bilobed**.
- This name is derived from the staining Characteristic of the large cytoplasmic granules of uniform sized which stain strongly with the acidic dye eosin.



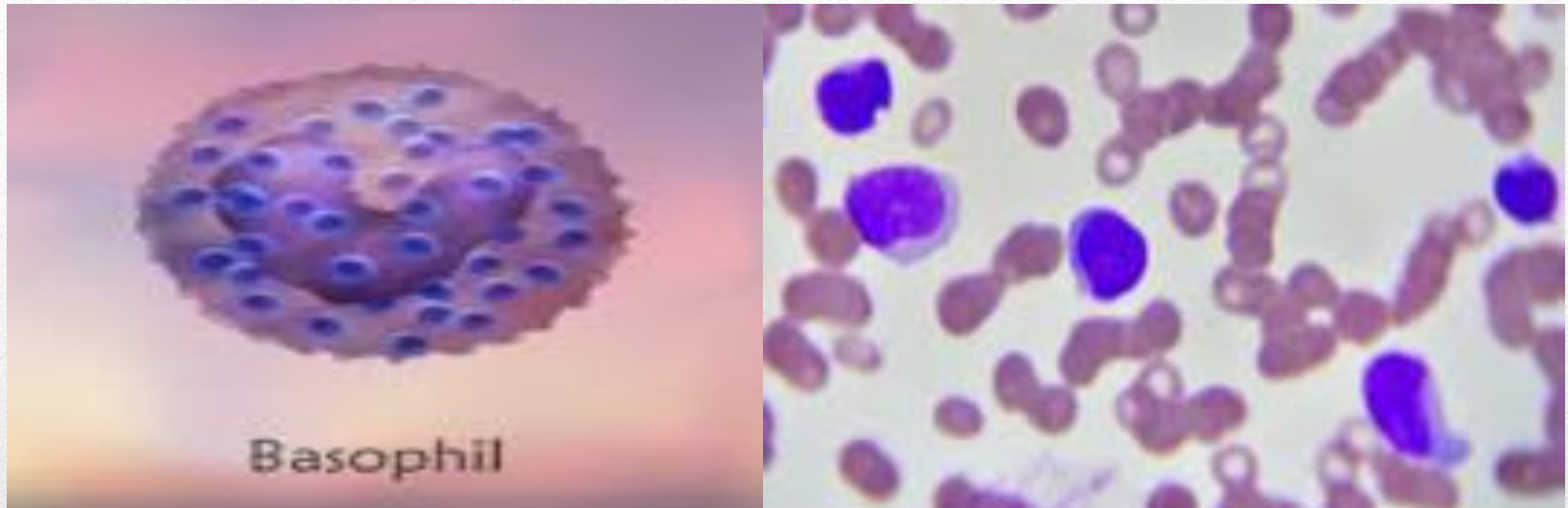


-Eosinophils are produced in large numbers in persons with **parasitic infections**.

-Large numbers of eosinophils also appear in the blood in **allergic conditions & may help detoxify toxins** that are released by allergic reactions.

(c) Basophils :-

- These cells are difficult to find in human blood, since they constitute only about 0.5 to 1 percent of the total number of leucocytes.
 - The nucleus often is **irregular** in outline & partially constricted into **two lobes (S shape like)**.
 - The cytoplasmic granules are round & variable in size, which stain with basic dyes.
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The basophils are very similar to mast cells located immediately outside many of the capillaries in the body.

- Basophils & mast cells are important **for allergic reaction**.
 - Also, basophils & mast cells liberate heparin into the blood, a substance that can prevent blood coagulation. As well as **histamine**.
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