Immune function of blood

By: Aitmagambet Askhat 42-1

Function

3 major functions

- Transportation
- Regulation
- Protection

Transportation

- Respiratory

Red blood cells or erythrocytes transport Oxygen from lungs to cells and Carbon dioxide from cells to lungs

- Nutritive

Blood absorb nutrients from digested foods in gastrointestinal tract and transport to all the cells in body

- Excretory

Metabolic wastes, excess water and ions , and other molecules not needed by the body are carried by the blood to the kidneys and excreted in the urine

Regulation

- Hormonal

Blood carries hormones from their site of origin to distant target tissues , where they perform the regulatory functions

- Temperature

Blood is responsible to carry body heat to the surface in high temperature environment as well as to keep body heat in within low temperature environment

Protection

- Clotting

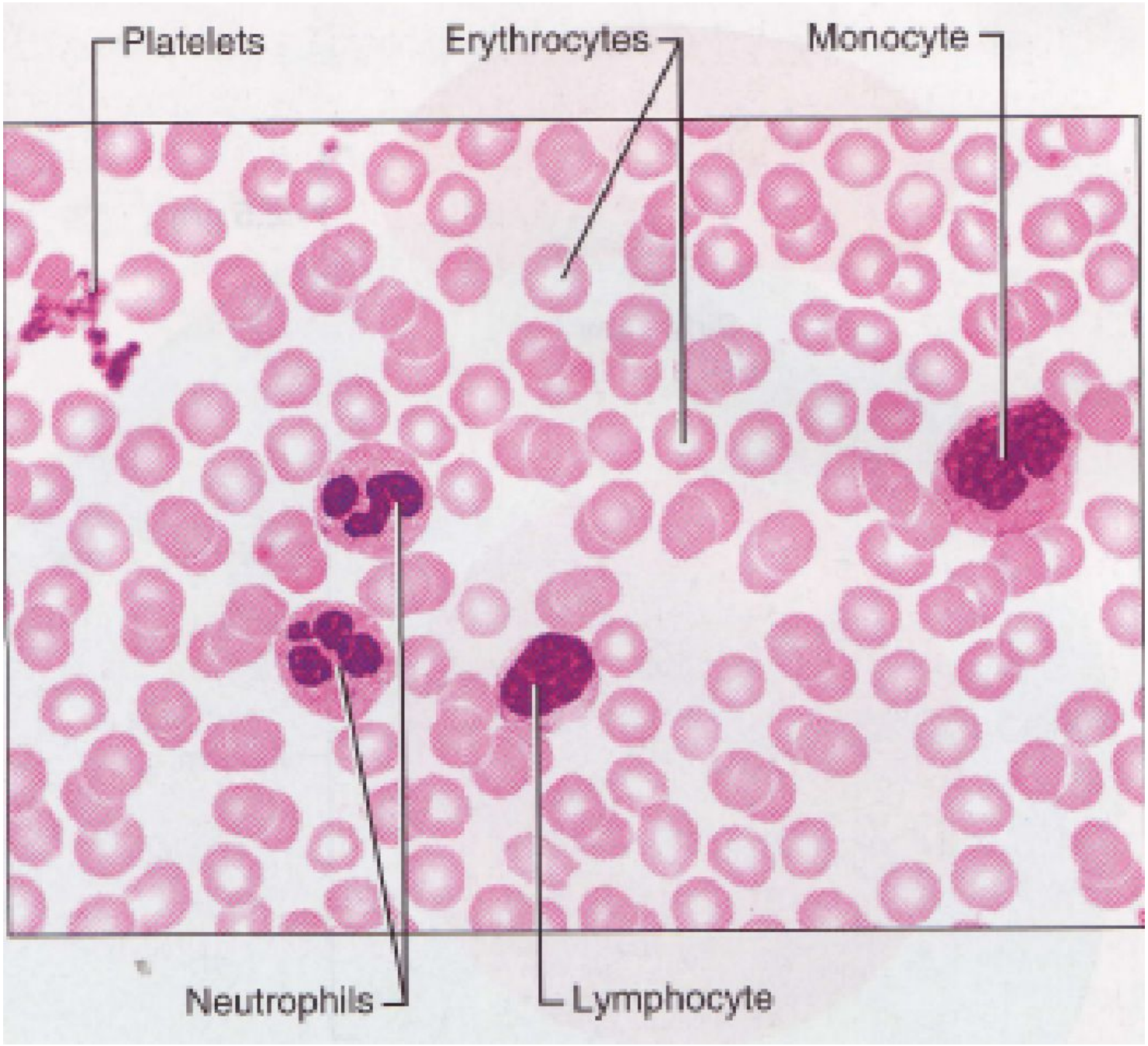
The clotting mechanism protects against blood loss when vessels are damaged

- Immune

The immune function of blood is performed by the leukocytes that protects against many disease causing agents

Composition of the Blood

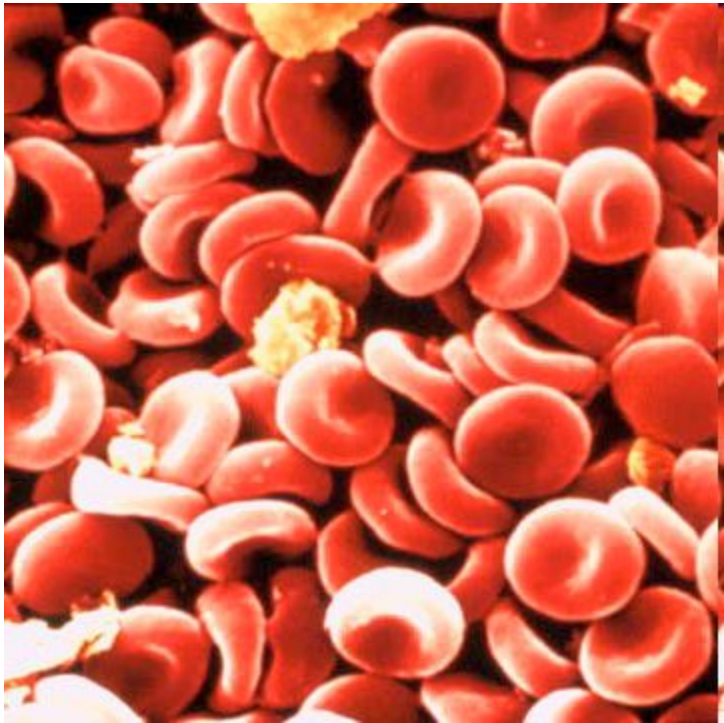
- Blood consists of formed elements that are suspended and carried in a fluid called plasma
- The formed elements
- Erythrocytes → Oxygen transport
- Leukocytes → Immune defence
- Platelets → Blood clotting

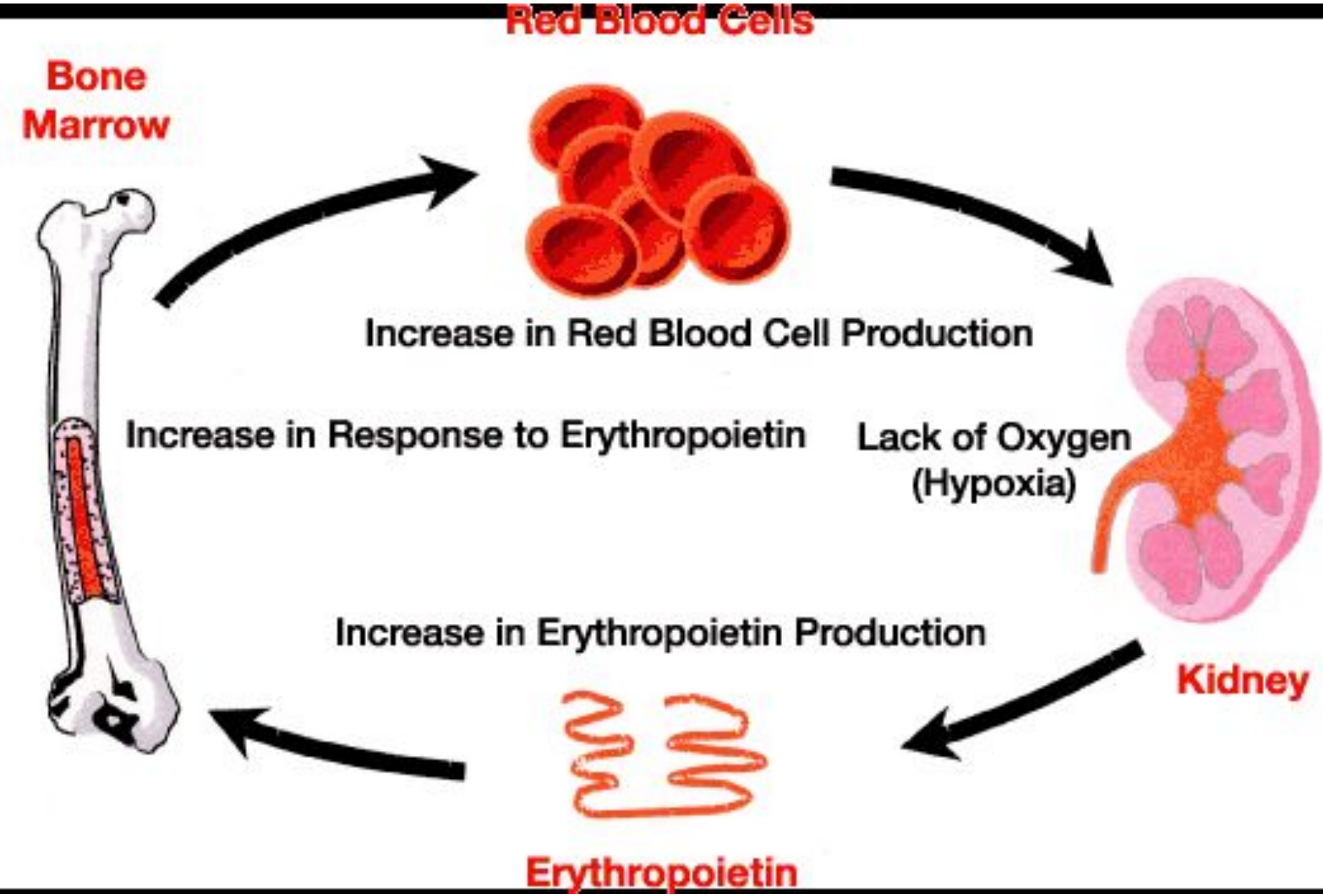

Platelets
Erythrocytes
Monocyte
Neutrophils
Lymphocyte

RBC/ Erythrocytes

- An RBC is a 7.5 micron disc shaped body with a central depression
- The cell is without a nucleus or mitochondria
- AN RBC contains hemoglobin and filamentous proteins attached to the cell wall to impart flexibility on it
- Life span 120 days

- Erythrocytes are produced in bone marrow
- Older erythrocytes are removed from the circulation by phagocytic cells in the liver, spleen and bone marrow.




Red Blood Cells
Bone Marrow
Increase in Red Blood Cell Production
Increase in Response to Erythropoietin
Lack of Oxygen (Hypoxia)
Kidney
Increase in Erythropoietin Production
Erythropoietin

- Antigens are embedded in the cell membrane, they decide the blood group
- The RBC cytoplasm provides energy to maintain intracellular homeostasis
- This energy is generated mostly through anaerobic glycolysis
- RBCs function is gas exchange: O_2 to the tissues and CO_2 to the lungs

White Blood Cells/Leukocytes

- Leukocytes contain nuclei and mitochondria and can move in an amoeboid fashion
- Because of their amoeboid ability, leukocytes can squeeze through pores in capillary walls and move to a site of infection.
- Produced in bone marrow and destructed in spleen

Types

- The total number of WBCs is 4000 to 11,000/mm^3
- There two main types of WBCs: granulucytes and agranulocytes

- Granulocytes, are of three types:

  Neutrophils (polymorphs) 50-70%, destroy bacteria

  Eosinophils, 2-4% bilobed nuclei, attack parasites

  Basophils, 1% in peripheral blood, reside in the tissues, contain histamine, involved in hypersensitivity reaction

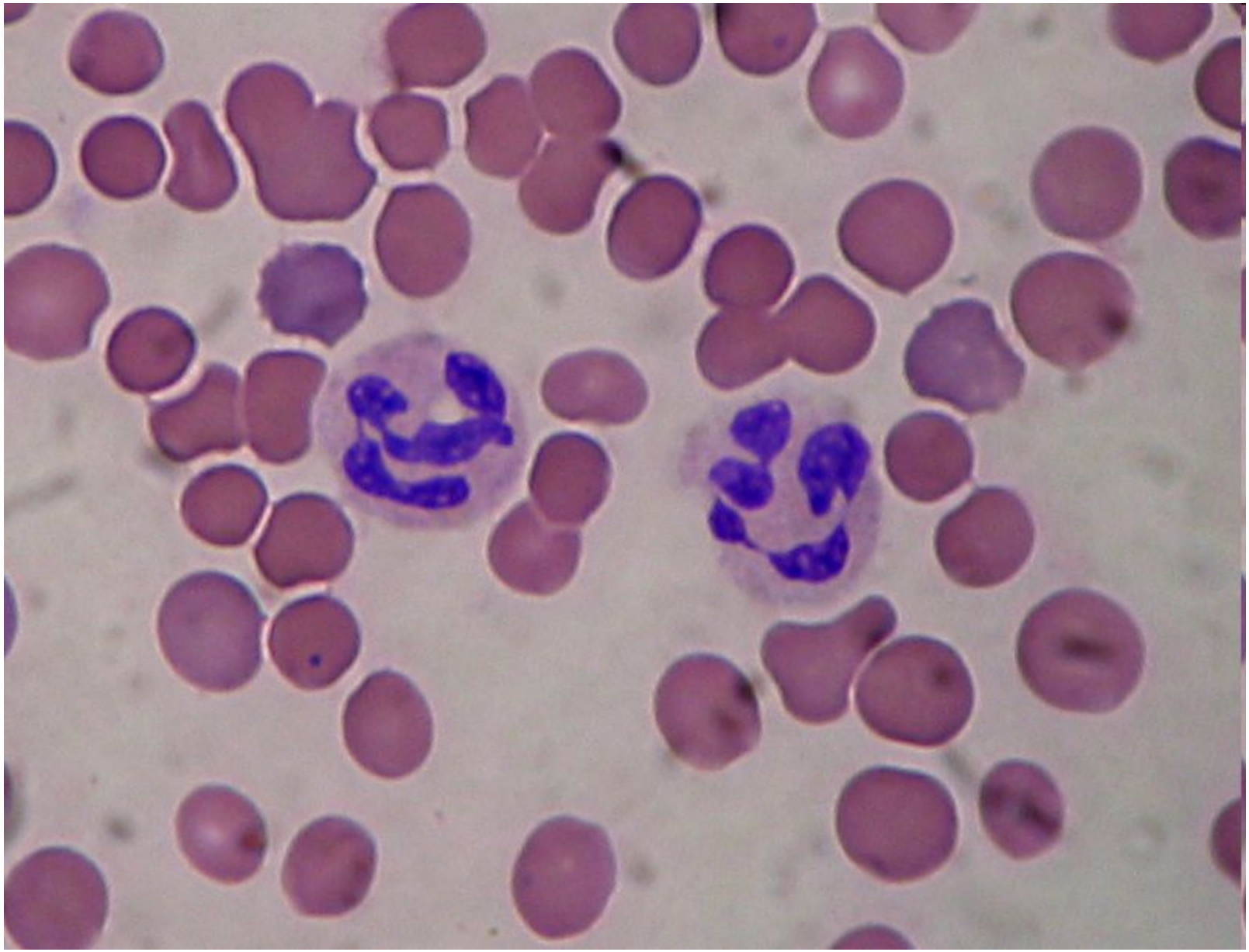
- Agranulocytes are of two types

  Lymphocytes, the smallest and second most abundant

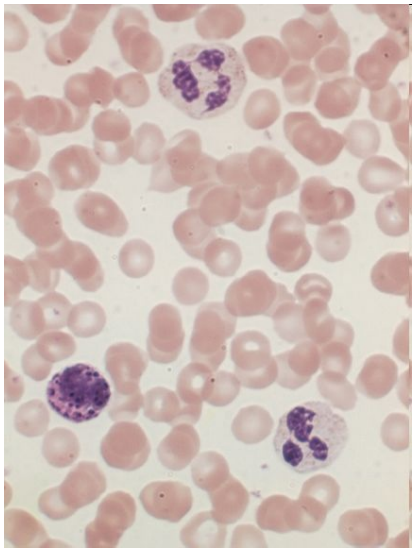
  T cells (80%) mediate cellular immunity

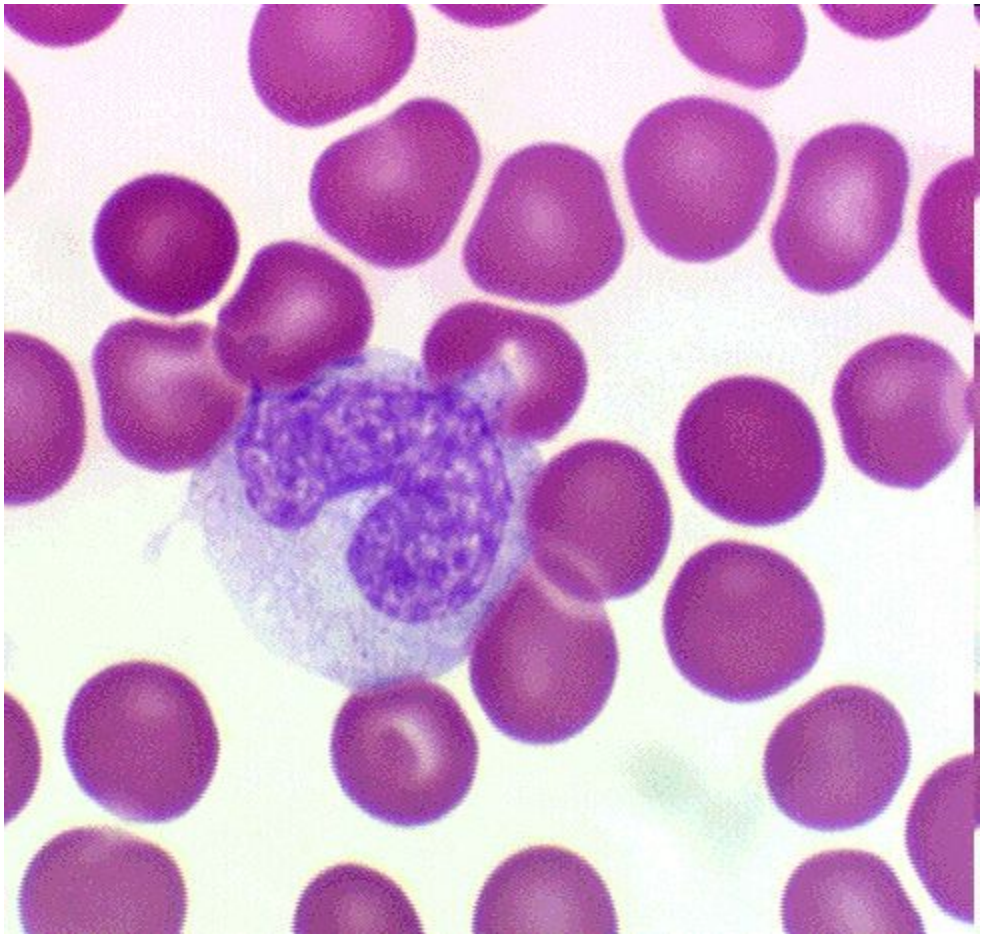
  B cells mediate humoral immunity

  Monocytes, the largest, migrate to the tissues and become macrophages involved in cellular immunity

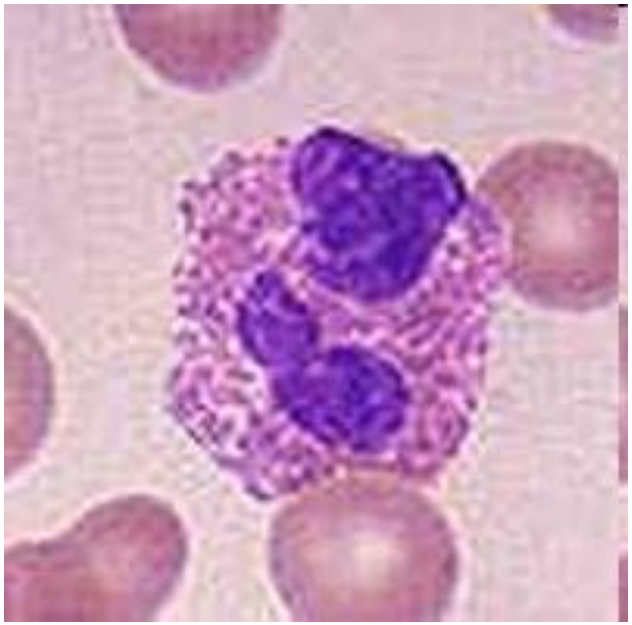


Neutrophils

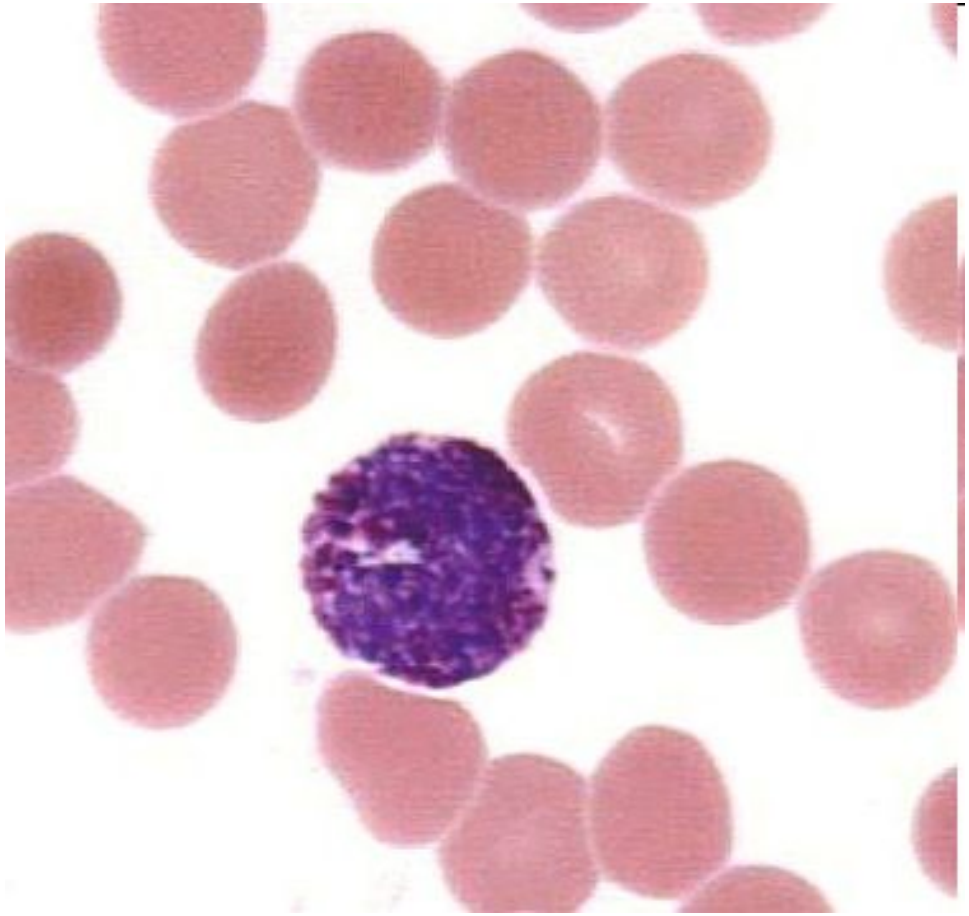




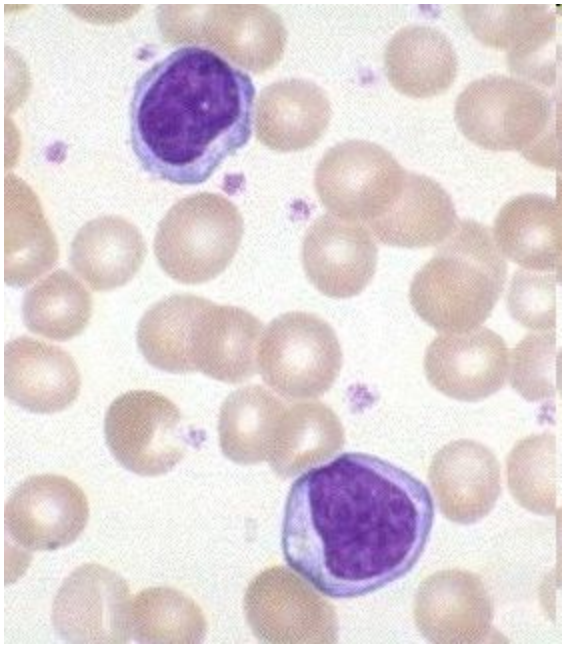
Monocytes



Eosinophils



Basophils



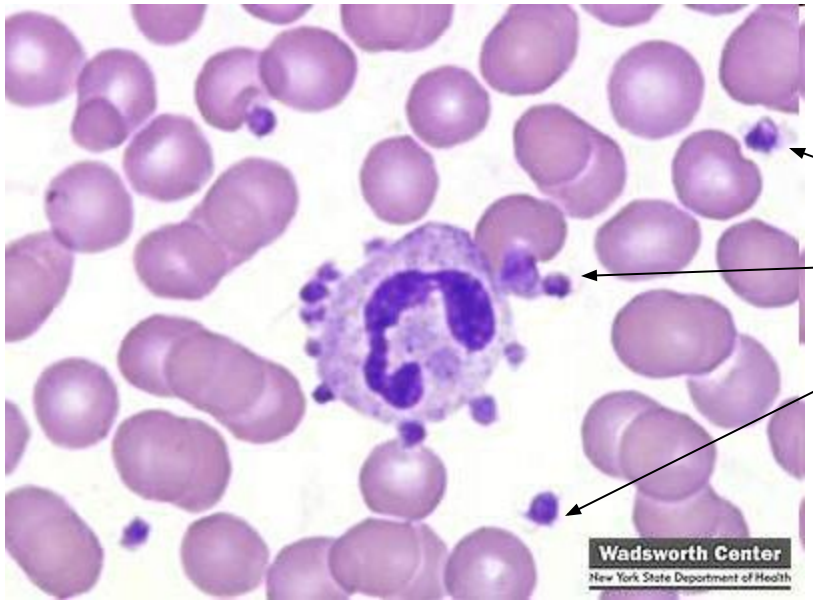
Lymphocytes

Platelets

- Platelets are only about 20% of the diameter of red blood cells, the most numerous cell of the blood.
- The normal platelet count is 150,000-350,000 per microliter of blood
- Platelets are produced in bone marrow and destroyed in the spleen and liver
- Life span 5 to 9 days

- They are fragments of cells called megakaryocytes, they have no nuclei but like leukocytes are capable of amoeboid movements
- Platelets play an important role in blood clotting
- They constitute most of the mass of the clot, and phospholipids in their cell membranes activate the clotting factors in plasma that result in threads of fibrin, which reinforce the platelet plug.

- Platelets that attach together in a blood clot release serotonin , a chemical that stimulates constriction of blood vessel.



Platelets

Red Blood Cell Antigens and Blood Typing

ABO System

- There are several groups of red blood cell antigens, but the major group is known as ABO system
- In terms of the antigens present on the red blood cell surface , a person may be :

Type A – with only A antigens

Type B – with only B antigens

Type AB – with both A and B antigens

Type O – with neither A nor B antigens

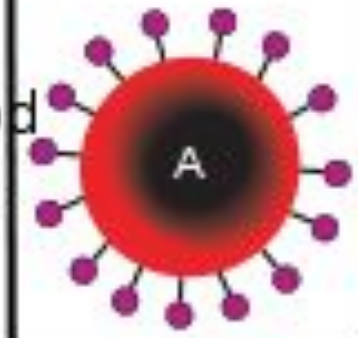
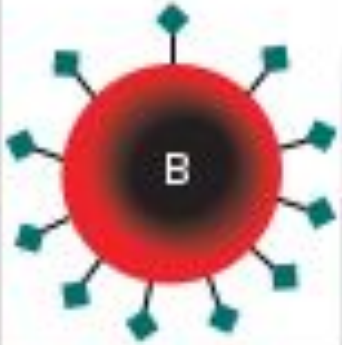
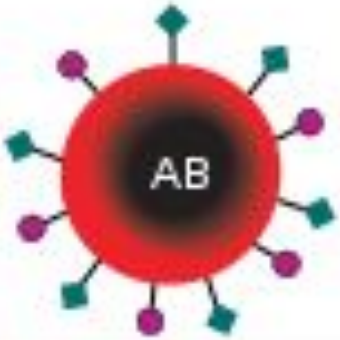
Plasma Antibodies

Type A – with only B antibodies

Type B – with only A antibodies

Type AB – with neither A nor B antibodies

Type O – with both A and B antibodies

	Group A	Group B	Group AB	Group O
Red blood cell type				
Antibodies present	 Anti-B	 Anti-A	None	 Anti-A and Anti-B
Antigens present	 A antigen	 B antigen	 A and B antigens	None

Thank you for attention...