

# Connective Tissue

- **■ Blood and Hemopoiesis**

- Blood is a bright to dark red, viscous, slightly alkaline fluid (pH, 7.4) that accounts for approximately 7% of the total body weight. The total volume of blood of an average adult is about 5 L, and it circulates throughout the body within the confines of the circulatory system.

- Blood is a specialized connective tissue composed of formed elements-**red blood cells (RBCs; erythrocytes)**, **white blood cells (WBCs; leukocytes)**, and **platelets**-suspended in a fluid component (the extracellular matrix), known as **plasma**

## ■ Erythrocytes

Erythrocytes (red blood cells), the smallest and most numerous cells of blood, have no nuclei and are responsible for the transport of oxygen and carbon dioxide to and from the tissues of the body

Table. ABO Blood Group System

<b>Blood Group</b>	<b>Antigens Present</b>	<b>Miscellaneous</b>
A	Antigen A	
B	Antigen B	
AB	Antigens A and B	Universal acceptor
O	Neither antigen A nor B	Universal donor

The extracellular surface of the red blood cell plasmalemma has specific inherited carbohydrate chains that act as antigens and determine the blood group of an individual for the purposes of blood transfusion. The most notable of these are the **A and B antigens**, which determine the four primary blood groups, **A, B, AB, and O** .

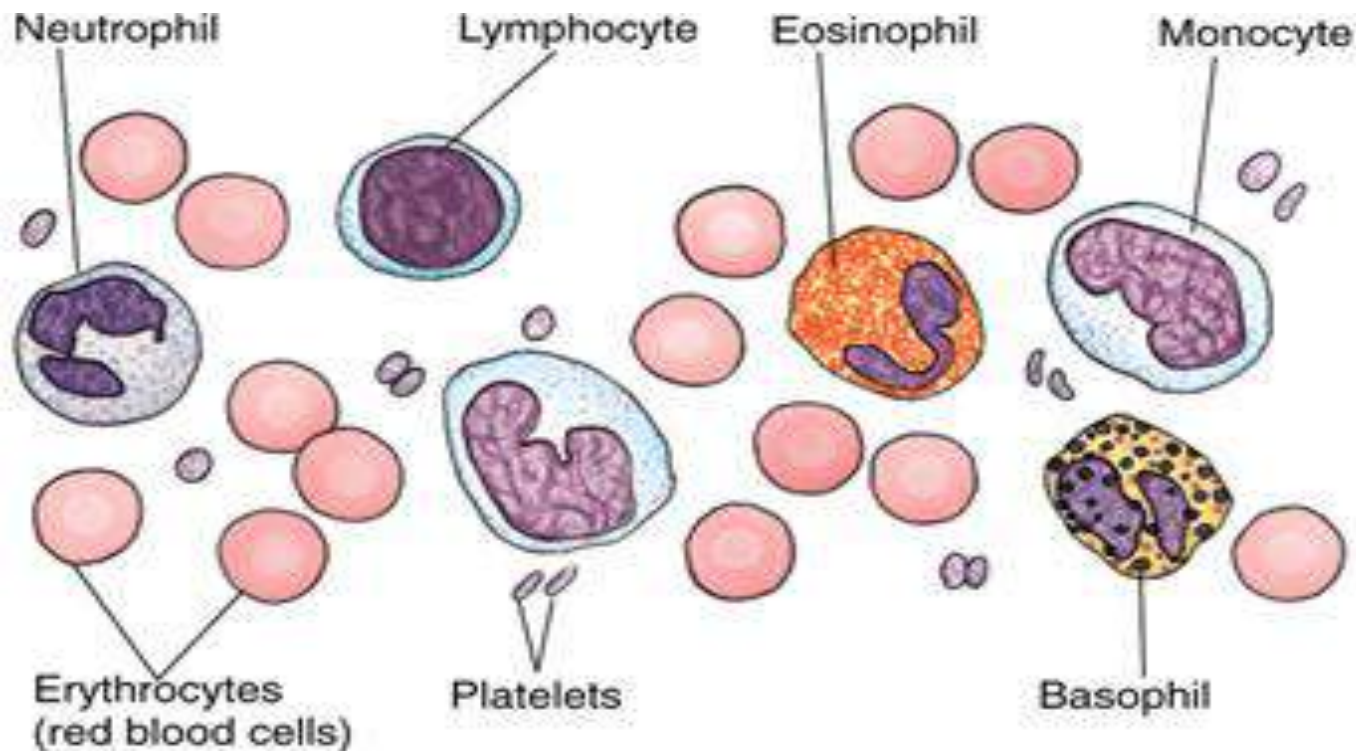
- People who lack either the A or B antigen, or both, have antibodies against the missing antigen in their blood; if they undergo transfusion with blood containing the missing antigen, the donor erythrocytes are attacked by the recipient's serum antibodies and are eventually lysed

Another important blood group, the **Rh group**, is so-named because it was first identified in rhesus monkeys. This complex group comprises more than two dozen antigens, although many are relatively rare. Three of the Rh antigens (C, D, and E) are so common in the human population that the erythrocytes of 85% of Americans have one of these antigens on their surface, and these individuals are thus said to be **Rh-positive (Rh<sup>+</sup>)**. Individuals lacking these antigens are **RH-negative (RH<sup>-</sup>)**.



- **Leukocytes**

*Leukocytes are white blood cells that are classified into two major categories: granulocytes and agranulocytes.*



*White blood cells are classified into two groups*  
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- Granulocytes, which have specific granules in their cytoplasm
- Agranulocytes, which lack specific granules.

There are three types of **granulocytes**:

- Neutrophils
- Eosinophils
- Basophils.

*There are two types of agranulocytes:*

- Lymphocytes
- Monocytes.

## **Neutrophils**

*Neutrophils compose most of the white blood cell population; they are avid phagocytes, destroying bacteria that invade connective tissue spaces.*

### **NEUTROPHIL FUNCTIONS**

*Neutrophils phagocytose and destroy bacteria by using the contents of their various granules.*

## **Eosinophils**

*Eosinophils phagocytose antigen-antibody complexes and kill parasitic invaders.*

### **EOSINOPHIL FUNCTIONS**

*Eosinophils help to eliminate antibody-antigen complexes and to destroy parasitic worms*

## **■BASOPHIL**

They are round cells in suspension but may be pleomorphic during migration through connective tissue.

## **BASOPHIL FUNCTIONS**

*Basophils function as initiators of the inflammatory process*

## **■Monocytes**

*Monocytes, the largest of the circulating blood cells, enter the connective tissue spaces, where they are known as macrophages.*

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## **FUNCTION OF MACROPHAGES**

*Macrophages phagocytose unwanted particular matter, produce cytokines that are required for the inflammatory and immune responses, and present epitopes to T lymphocytes.*

## **■Lymphocytes**

*Lymphocytes are agranulocytes and form the second largest population of white blood cells.*

Lymphocytes are subdivided into **three functional categories:**

- B lymphocytes (B cells)
- T lymphocytes (T cells)
- Null cells

## **FUNCTIONS OF B AND T CELLS**

*In general, B cells are responsible for the humorally mediated immune system, whereas T cells are responsible for the cellularly mediated immune system.*

## FUNCTIONS OF NULL CELLS

Null cells are composed of two distinct populations:

- Circulating **stem cells**, which give rise to all of the formed elements of blood
- **Natural killer (NK) cells**, which can kill some foreign and virally altered cells without the influence of the thymus or T cells.

### ■Platelets

*Platelets (thromboplastids) are small, disk-shaped, non-nucleated cell fragments derived from megakaryocytes in the bone marrow*

### Platelet Function

*Platelets function in limiting hemorrhage to the endothelial lining of the blood vessel in case of injury*

## ■Plasma

*Plasma is a yellowish fluid in which cells, platelets, organic compounds, and electrolytes are suspended and/or dissolved.*

During coagulation, some of the organic and inorganic components leave the plasma to become integrated into the clot. The remaining fluid, which no longer has those components dissolved or suspended in it, differs from plasma, is straw-colored, and is known as **serum**