College of Environmental sciences
Dep. Environmental Health.
First stage
Basma Bashar

Wednesday 22 / 1 /2025

3- Connective tissue

Connective tissues are the most abundant tissues of animals. Binds and Supports body parts (tissues and organs).

Connective tissues divided to :-

1- Connective tissue proper

2-Specialized connective tissue like blood .

- The Blood

The blood is composed of elements or cells suspended in a fluid matrix(plasma).

Plasma is the extracellular matrix of blood with red blood cells white blood cells, and platelets.

plasma composed of: • water (90%) • Proteins (7%) • Organic salt (1%)

• organic compound (2%) such as amino acids, lipid and vitamins.

The cellular element composed of:-

- Erythrocyte (Red blood cell)
- Leucocytes (White blood cell)
- Platelets or Thrombocytes.

Erythrocytes (RBCs):

In the normal male the average number of (RBC) is about 5-6million/m^3 , in the female it is about 4.5-5 million /m^3. The life span of RBC is 4 moths . Mature RBCs are flexible and oval biconcave disk

General Biology Lab 10

College of Environmental sciences
Dep. Environmental Health.
First stage
Basma Bashar

Wednesday 22 / 1 /2025

Leukocytes (WBC):

According to the type of cytoplasmic granules and the shape of nuclei Leukocyte are classified into:

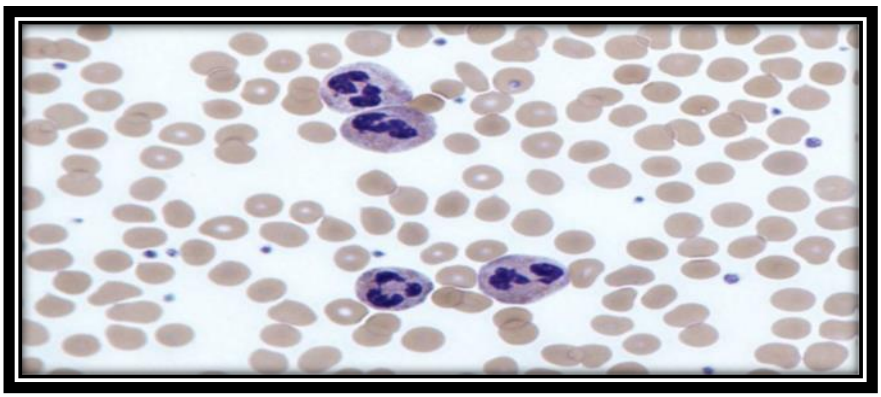
a. granular leukocytes. b. A granular leukocytes.

a - granular leukocytes

They contain specific granular and lobulated nuclei . this type of leukocytes involved:

1. Neutrophils

- Compose 60 to 70% of the blood leukocytes.
- Nuclei have 3-5 lobes
- First line of cellular defense against microorganism.



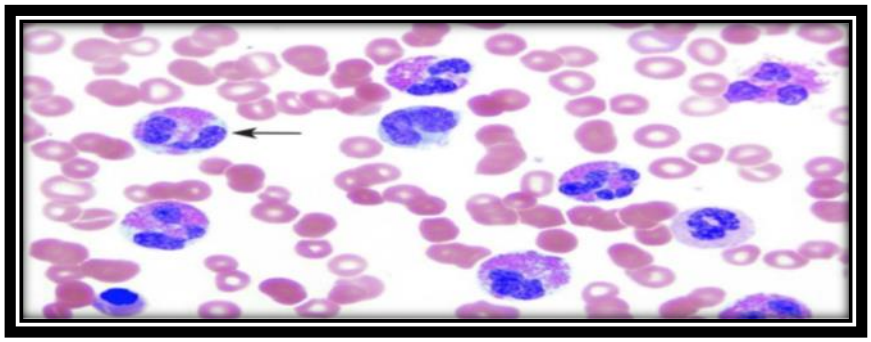
Neutrophils

College of Environmental sciences
Dep. Environmental Health.
First stage
Basma Bashar

Wednesday 22 / 1 /2025

2. Eosinophils

- Compose 2 to 4% of the blood leukocytes.
- Nucleus: is bi-lobed but a small third lobe may be present.
- The cytoplasm granules are stained red or pink with eosin or other similar dyes.
- Recognize and phagocytosis antigen-antibody complexes and particle that are associated with these complexes that are found during an immune response.

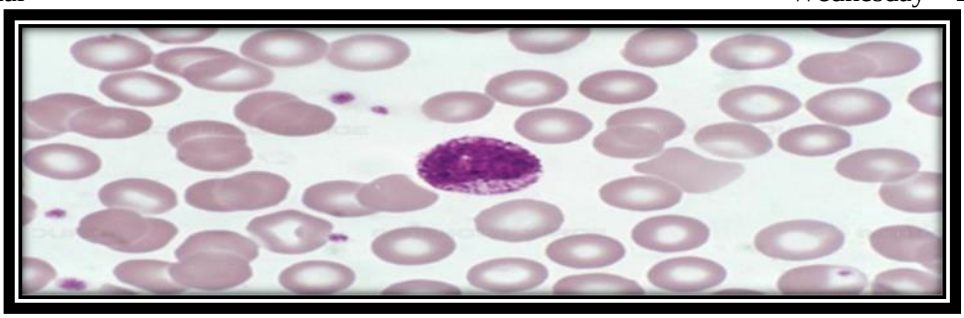


Eosinophils

3. Basophils

- The nucleus is bi-lobed which hidden by the large cytoplasmic granules.
- The granules in basophil are not as numerous as in eosinophil; however they are more variable in size, less densely packed, and stain dark blue or brown.
- These cell carry histamine, heparin and various mediators of inflammation and other protein chemicals.

College of Environmental sciences
Dep. Environmental Health.
First stage
Basma Bashar Wednesday 22 / 1 /2025



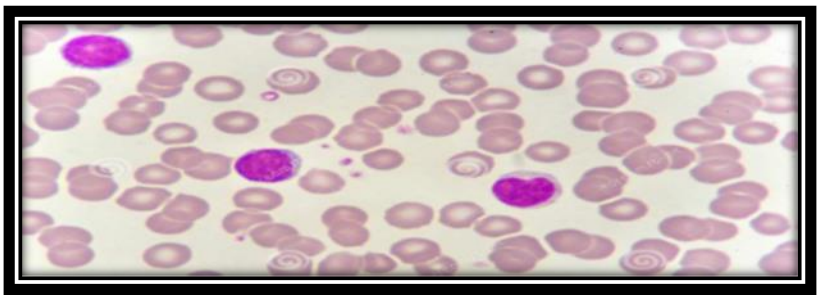
Basophils

B. Non Granular leukocytes

They do not have specific granule with non-lobulated nuclei .This type can be sub divided into:

1-Lymphocytes

- Lymphocytes represent 20 to 40 % of the differential white cell count
- There are two structure types: a. Small lymphocytes b. Large lymphocytes



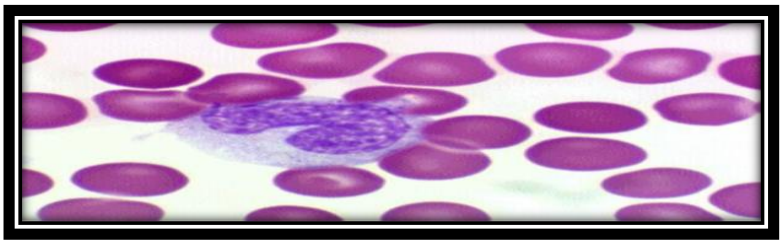
Lymphocytes

College of Environmental sciences
Dep. Environmental Health.
First stage
Basma Bashar

Wednesday 22 / 1 /2025

2-Monocytes

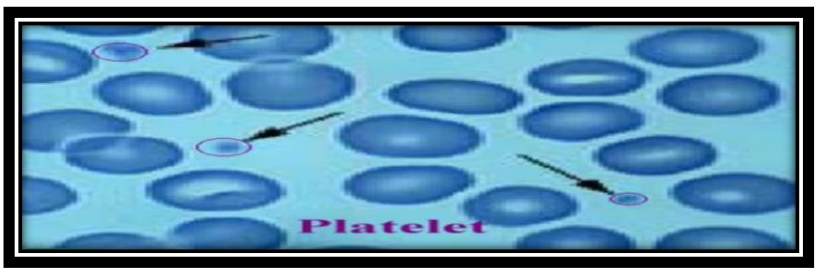
- Monocytes are large cells,represent 2 to 10% of the differential white cell count.
- Monocytes are highly motile and phagocytic cells.
- Their nucleus C-shaped or kidney shaped.



Monocytes

3. Blood platelets or Thrombocytes

- Platelets or thrombocytes are small fragments of cytoplasm , not contain nucleus. rounded or oval, biconvex discs.
- Their number is 150,000-400,000/mm3.



Platelet

College of Environmental sciences
Dep. Environmental Health.
First stage
Basma Bashar

Wednesday 22 / 1 /2025

4-Muscular Tissue

Musculer tissue is composed of cells that have the special ability to shorten or contract in order to produce movement of the body parts. The cells of muscle tissue are long and contain protein fibers capable of contracting to provide movement. The bulk of muscle tissue is made up of two proteins, myosin and actin, these proteins are organized into muscle fibers called myofilaments.

depending on the arrangement of these myofilaments There are three (3) types of muscular tissue :-

1- Skeletal Muscle

The skeletal muscle is considered "voluntary muscle" and attached to skeleton by tendons and its (fibers) are long and cylindrical, with multiple peripherally located and oval nuclei. just under the thin elastic membrane (sarcolemma) the sarcoplasm also has many alternating light and dark bands that result from arrangement of actin and myosin giving the fiber a cross striated appearance (why?). These muscles can be generated body movements (limb movement, jaw movement, breathing, etc.

2- Smooth Muscle

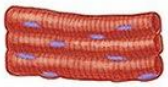
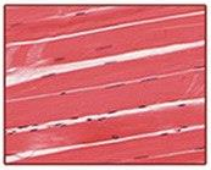
Smooth muscle (is an involuntary, non-striated muscle) made of thin - elongated muscle (fibers) which they have a single large oval-elongate nucleus, and have tapered ends , each fiber has many myofibrils located parallels to the direction of the long axis of the fiber. It is found in the walls of hollow organs, such as the digestive system, blood vessels and the bladder. Contractions role of these muscles drive fluid or materials through the organs .

College of Environmental sciences
Dep. Environmental Health.
First stage
Basma Bashar

Wednesday 22 / 1 /2025

3-Cardiac Muscle

Cardiac muscle is the major tissue making up the heart. It is an involuntary muscle that is striated in appearance . fibers like those of skeletal muscle have cross-striations and contain single nucleus, the sarcoplasm has myofilaments but this fiber are short, branched and contain intercalated discs which represented area of folded plasma membrane(sarcolemma) between fibers help with coordinated contractions of the heart. Cardiac muscle tissue has a very large number of mitochondria (Why?) to provide the energy source for the continuous contracting action of the heart.

	Main features	Location	Type of cells	Histology
Skeletal muscle	- Fibers : striated, tubular and multi nucleated - Voluntary - Usually attached to skeleton			
Smooth muscle	- Fibers : non-striated, spindle-shaped, and uninucleated. - Involuntary - Usually covering wall of internal organs.			
Cardiac muscle	- Fibers : striated, branched and uninucleated. - Involuntary - Only covering walls of the heart.