University of Al-Ameed / College of Medicine
Department of Physiology and Medical Physics

ntial Leukocyte Count (

Dr. Hussein A. Al-Ghanimi

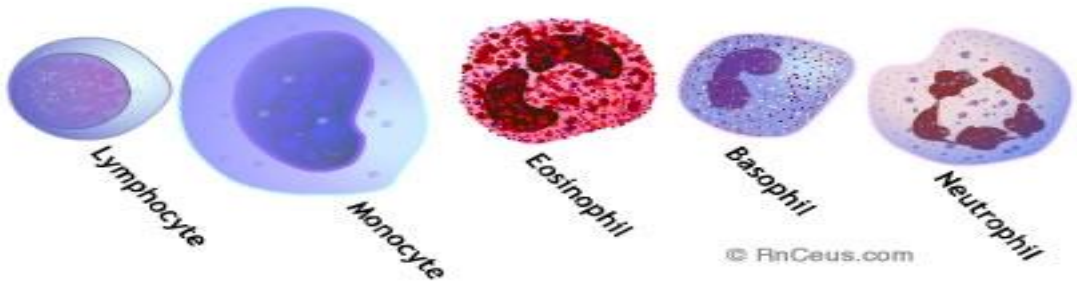
M.Sc. Hawraa Hamid

2019-2020

Types of WBC

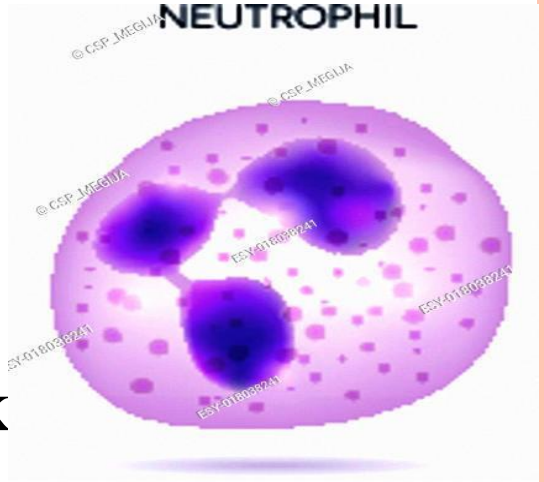
- WBCs are classified into two groups:

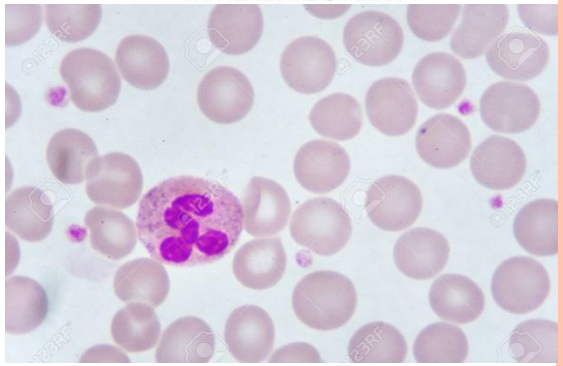
Agranulocytes	Granulocytes
Lymphocytes	Neutrophils
Monocytes	Eosinophil's
	Basophils



Granulocytes (Neutrophils)

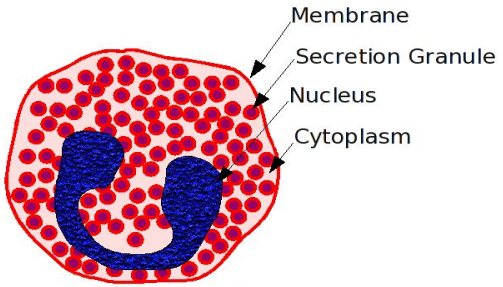
- Cell diameter: 10-15 µm.
- Nucleus: multi-lobed (2-5 lobes), dark purple-blue in color.
- Cytoplasm: Pink with fine violet-pink granules.
- Normal %: 40-80.
- Absolute count per µl: 2000-7500
- Function: Phagocytosis of bacteria and fungi.



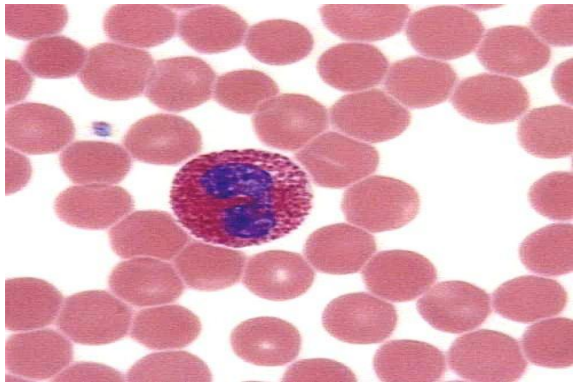


Eosinophil's

- Cell diameter: 12-17 µm.
- Nucleus: Bi-lobed, spectacle shape, purple in color.
- Cytoplasm: has orange -red granules.
- Normal %: 1-5.
- Absolute count per µl : 40-400.
- Function: Involved in allergy, parasitic infections.

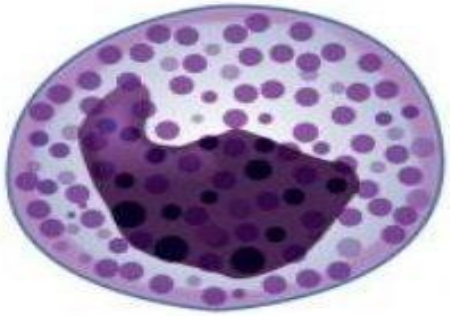


Eosinophil

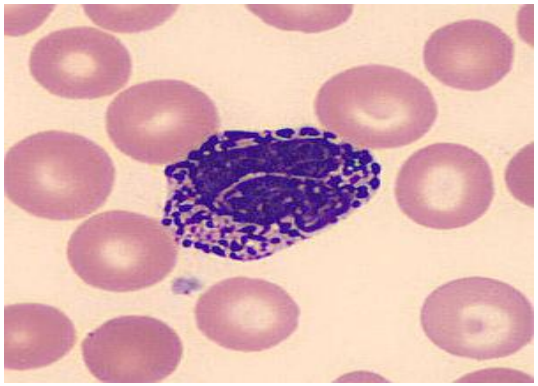


Basophils

- Cell diameter: 10-15 µm.
- Nucleus: Bi-lobed, purple in color.
- Cytoplasm: dark blue or purple granules.
- Normal %: 0-1.
- Absolute count per µl : 10-100.
- Function: involved in immune response to parasites. Release histamines that mediate inflammation and allergic responses.

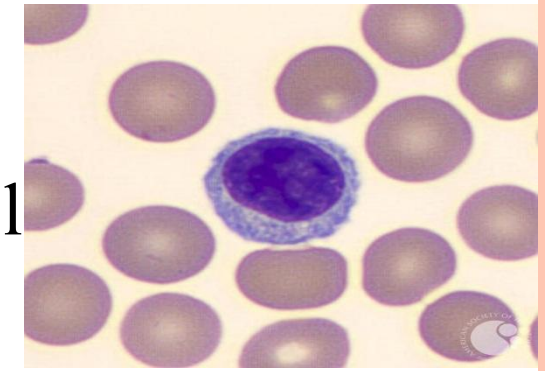


Basophil



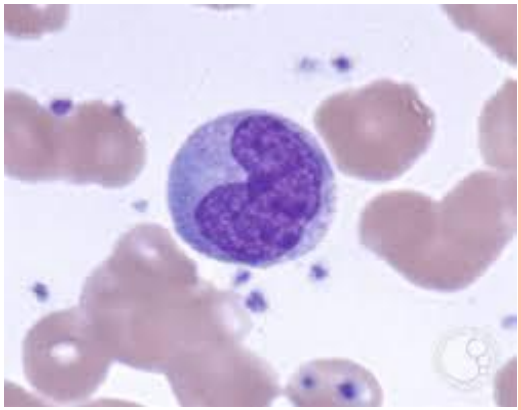
Agranulocytes (Lymphocytes)

- Cell diameter: small 7-9 /large 12-16 µ
- Nucleus: large, round to indented fills
- Cytoplasm: pale blue, no granules.
- Normal %: 20-40.
- Absolute count per µl : 1500-4000.
- T cells: (attack viruses and cancer cel
- B cells: (produce antibodies)



Monocytes

- Cell diameter: 12-20 µm.
- Nucleus: large and curved, like kidney shape.
- Cytoplasm: large amount of pale bluish-grey, no granules seen.
- Normal %: 1-10.
- Absolute count per µl : 200-800.
- Function: important in the inflammatory response.



Methods of measurement

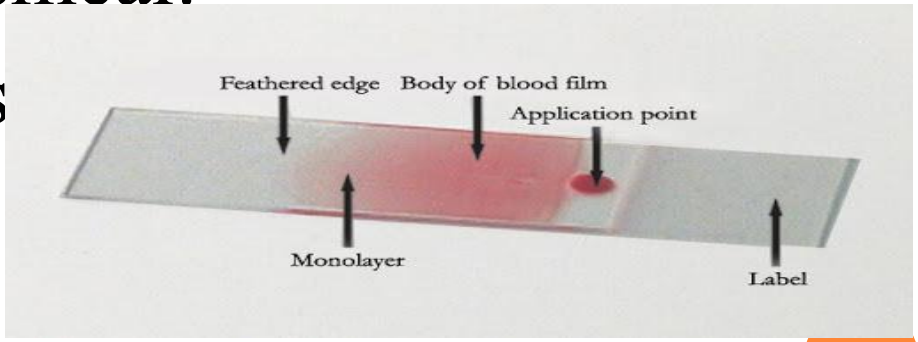
- Automated hematology autoanalyzer… as part of CBC (however not totally accurate need microscopic assessment).
- Manual method during examination of blood film .

- Blood smear: is a blood test that gives information about the number and shape of blood cells.
- Three basic steps to make the blood film:

  1-Preparation of blood smear.

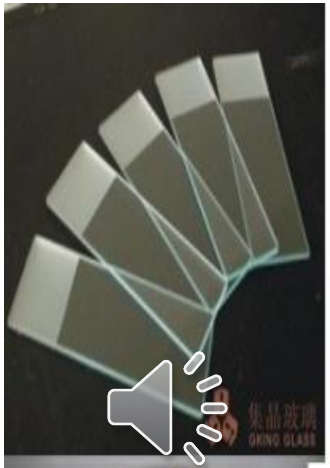
  2- Fixation of blood smear.

  3- Staining of blood s



Materials required

1- Capillary blood
2- Glass slide
3- Microscope
4- Alcohol
5- Lancet
6- Leishman's stain

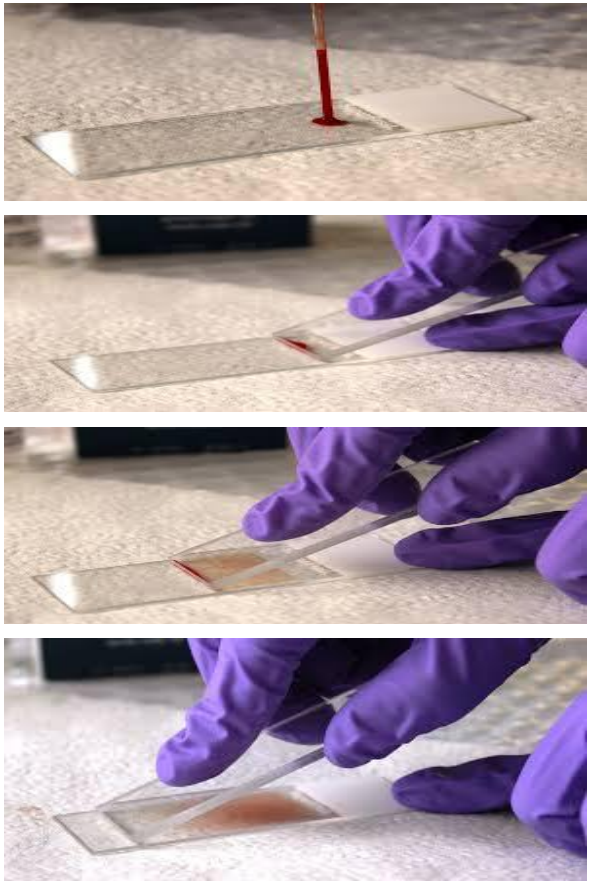


Procedure of blood film

1- Place a drop of blood 1 cm from one end of slide.

2- Place the smooth clean edge of a second (spreader) slide on the specimen slide, just in front of the blood drop.

3- Hold the spreader slide at a 30°- 45 angle, and draw it back against the drop of blood

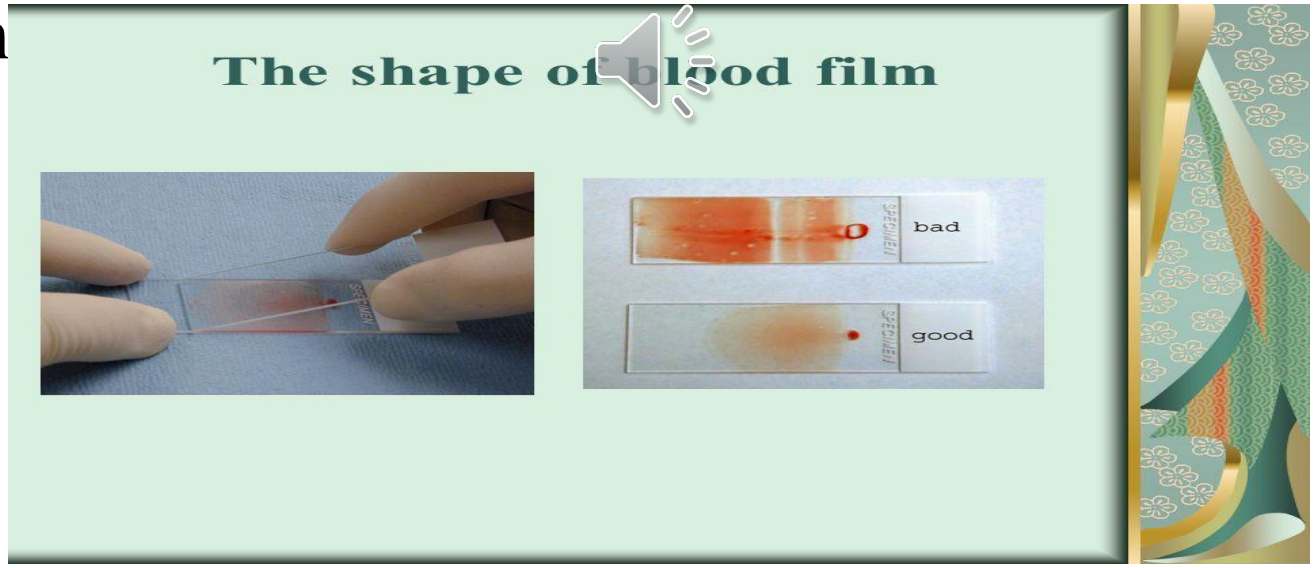


4- Allow the blood to spread almost to the edges of the slide

5- Push the spread forward with smooth speed.

6- Label one edge with patient ID.

7- Th



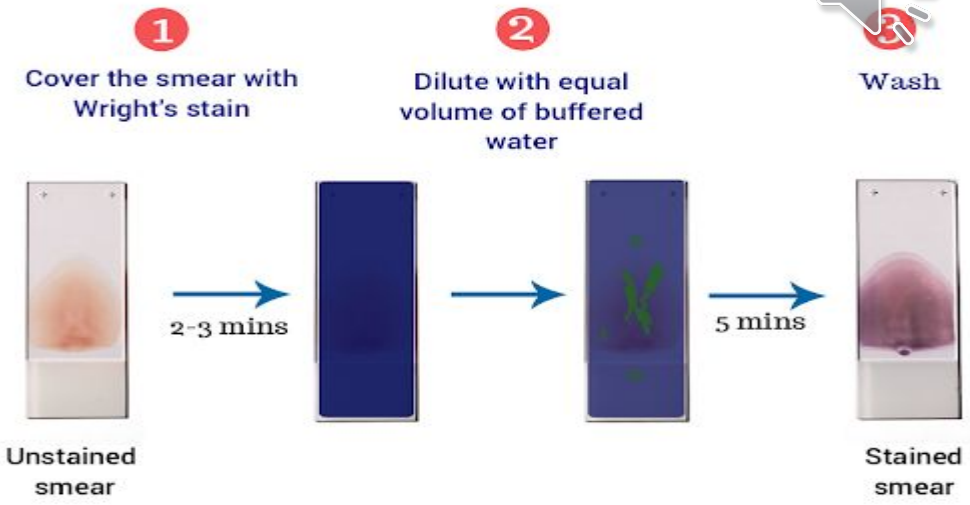
Staining the slide with Leishman stain

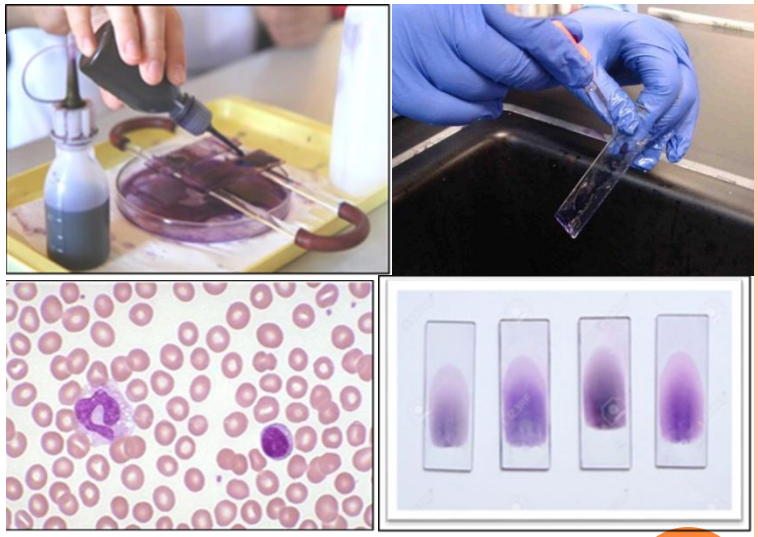
1- Cover the slide with concentrated Leishman stain for about 2-3 min.

2- Diluted the slide with DW for 5 min.

Wash with tap water.

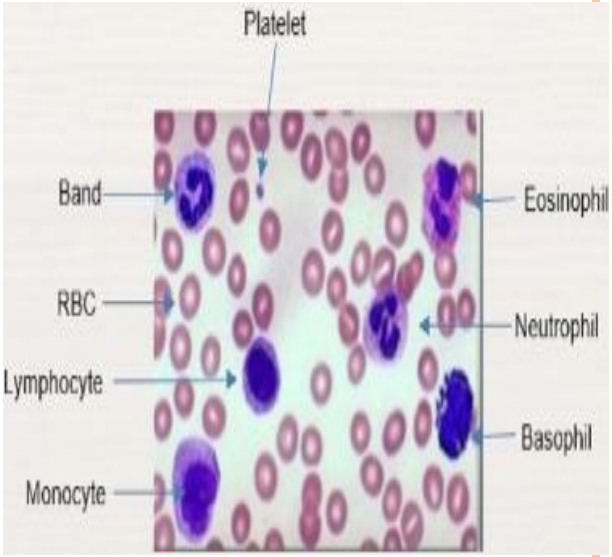
3- Leave to dry.





- Examination of the stained blood film:

1- Place the slide on the microscope stage.
2- Examine the blood film using the low power x10, to find optimal area for examination and enumeration of cells.
3- Then using power x40 to determine the morphology of white cells.
4- Place a drop of immersion oil on the



Clinical applications

differential count.

- Use to investigate patient with infection, hematological malignancy.

Normal adult differential WBC counts are:

Percentage	Types
% 40-80	Neutrophils
% 20-40	Lymphocytes
1-10%	Monocytes
1-5%	Eosinophil's
% 0-1	Basophils

↓ Decrease	↑ Increase	WBCs type
Neutropenia	Neutrophilia	Neutrophils
Viral infection Radiation therapy	Acute infection Physical or emotion stress Trauma Metabolic disorder (Uremia)	
Eosinopenia	Eosinophilia	Eosinophils
Administration of ACTH and glucocorticoid	Allergic conditions Parasitic infection	
Basopenia	Basophilia	Basophils
Hyperthyroidism drug (steroid)	Allergic disease Leukemia Polycythemia vera	

Monocytopenia	Monocytosis	
Bone marrow failure A plastic anemia	Acute tuberculosis infection Malaria	Monocytes
Lymphocytopenia	Lymphocytosis	
Steroid therapy Immunodeficiency Late stage of HIV infection	Chronic bacterial infection (typhoid, tuberculosis, brucellosis) Viral infection Lymphocytic leukemia	Lymphocytes

Thank you