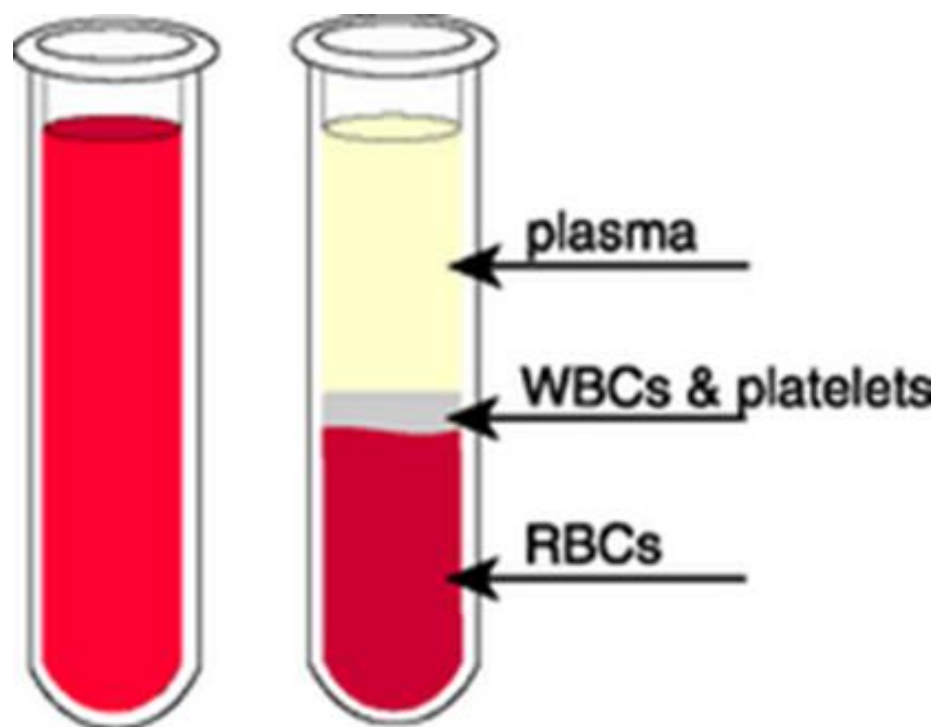




Anvari_ph@yahoo.com

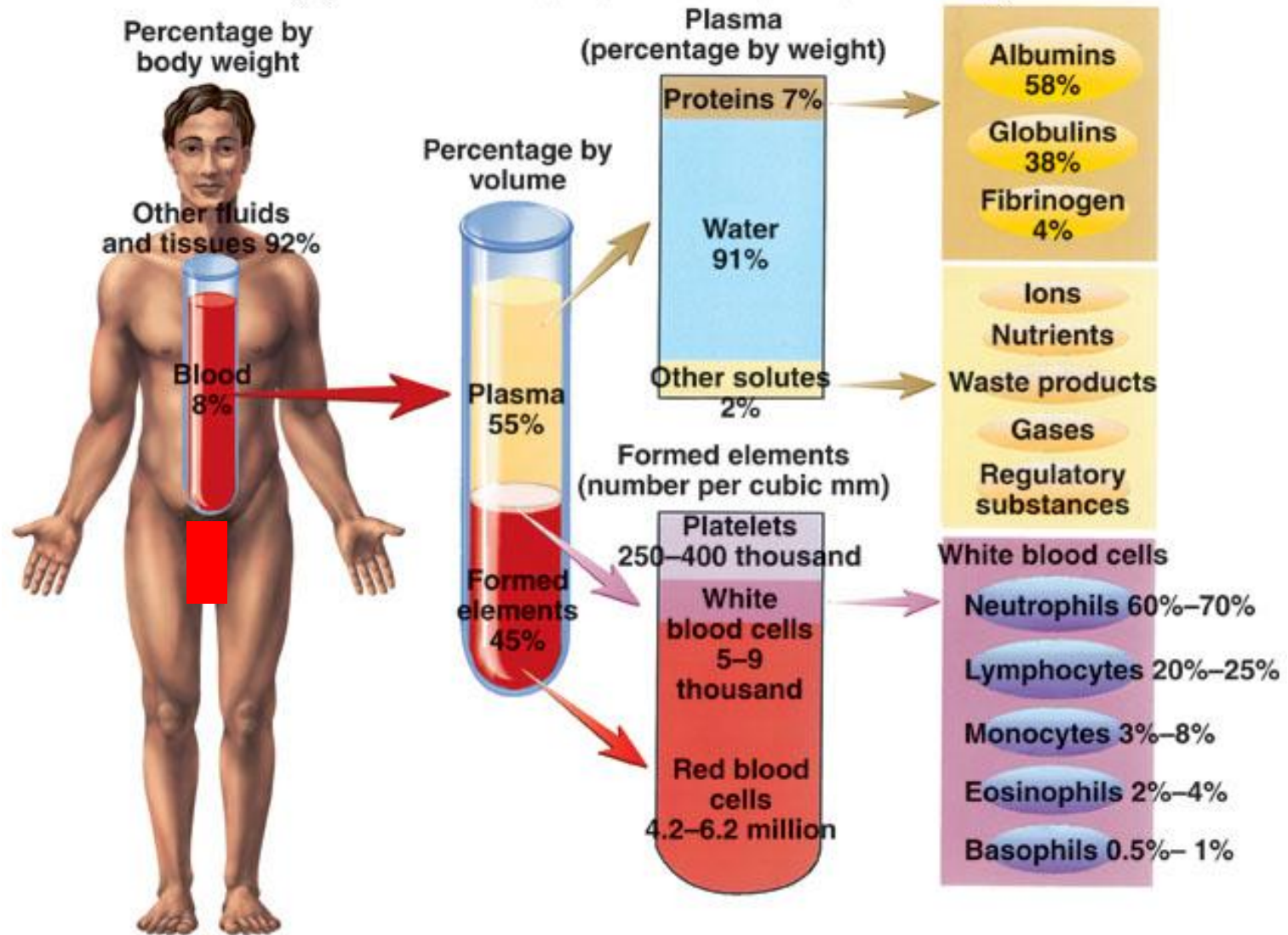
Functions of Blood

- Transport of:
 - Gases, nutrients, waste products
 - Processed molecules
- Maintenance of body temperature
- Protection against foreign substances
- Clot formation



Composition of Blood

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Plasma

- Liquid part of blood
 - Pale yellow made up of 91% water, 9% other
- **Colloid**: Liquid containing suspended substances that don't settle out
 - **Albumin**: Important in regulation of water movement between tissues and blood
 - **Globulins**: Immune system or transport molecules
 - **Fibrinogen**: Responsible for formation of blood clots

Formed elements

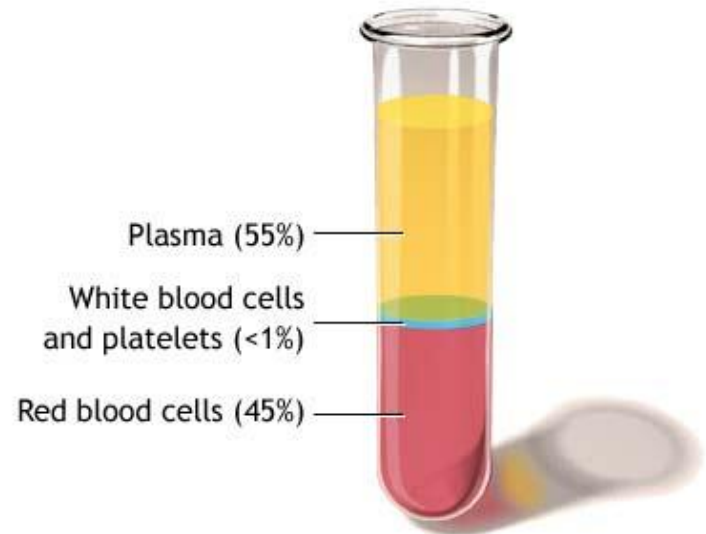
☐ Red Blood Cells → Erythrocytes

✓ Red blood cells make up 99% of the blood cells.

☐ White Blood Cells → Leukocytes

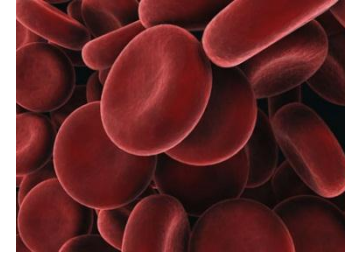
✓ White blood cells and platelets make up the other 1%.

☐ Platelets → Thrombocytes



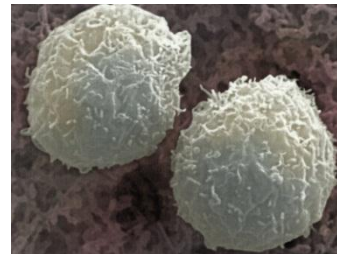
Formed Elements

- Red blood cells (**erythrocytes**)
- White blood cells (**leukocytes**)



- **Granulocytes**

- Neutrophils
- Eosinophils
- Basophils



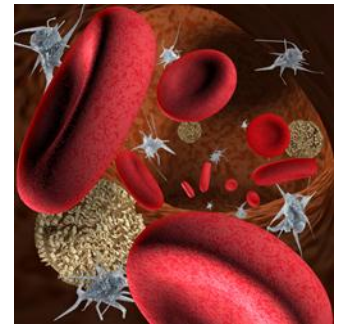
- **Agranulocytes**

- Lymphocytes
- Monocytes

- Platelets (**thrombocytes**)



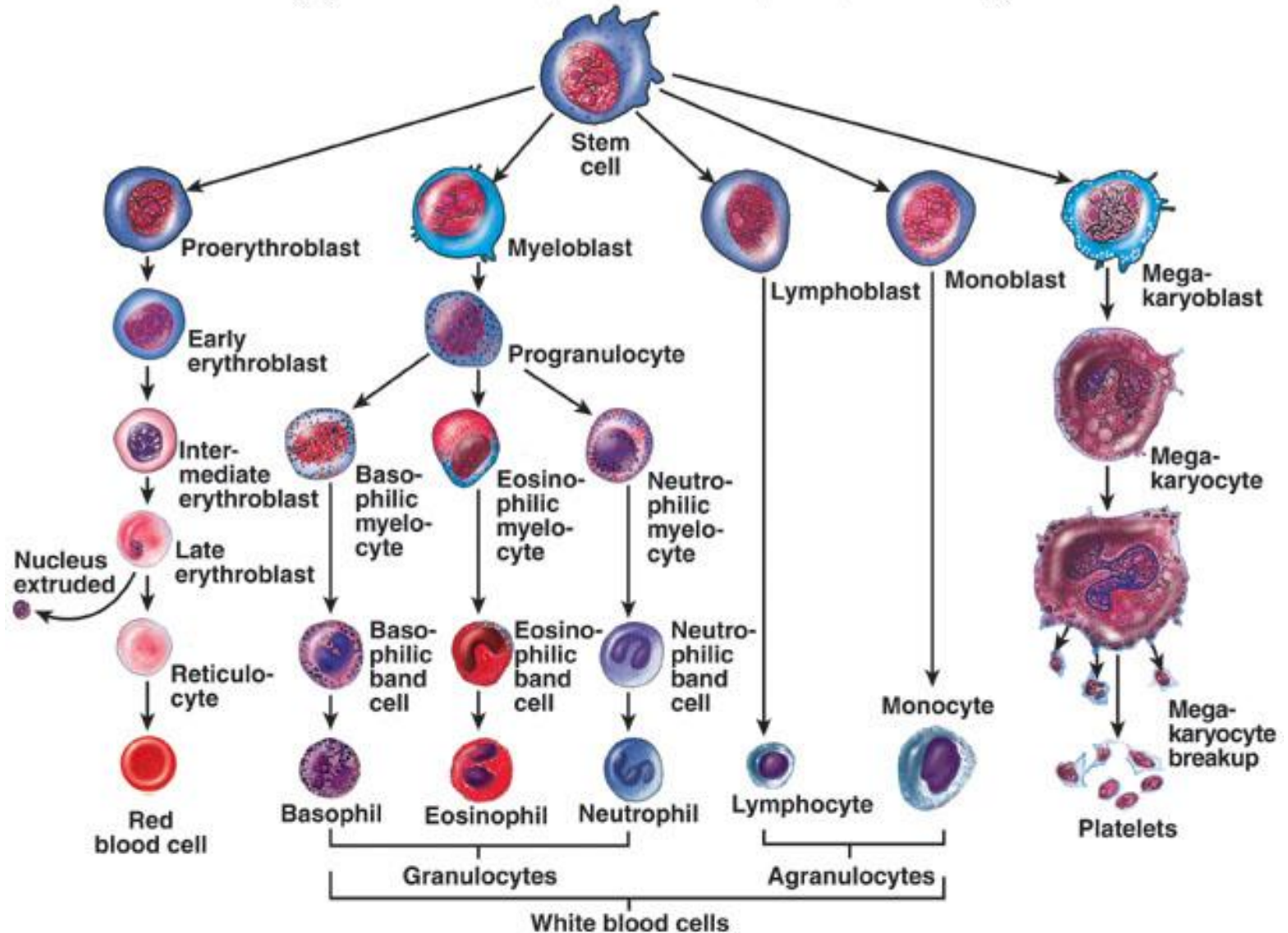
Formation of Blood



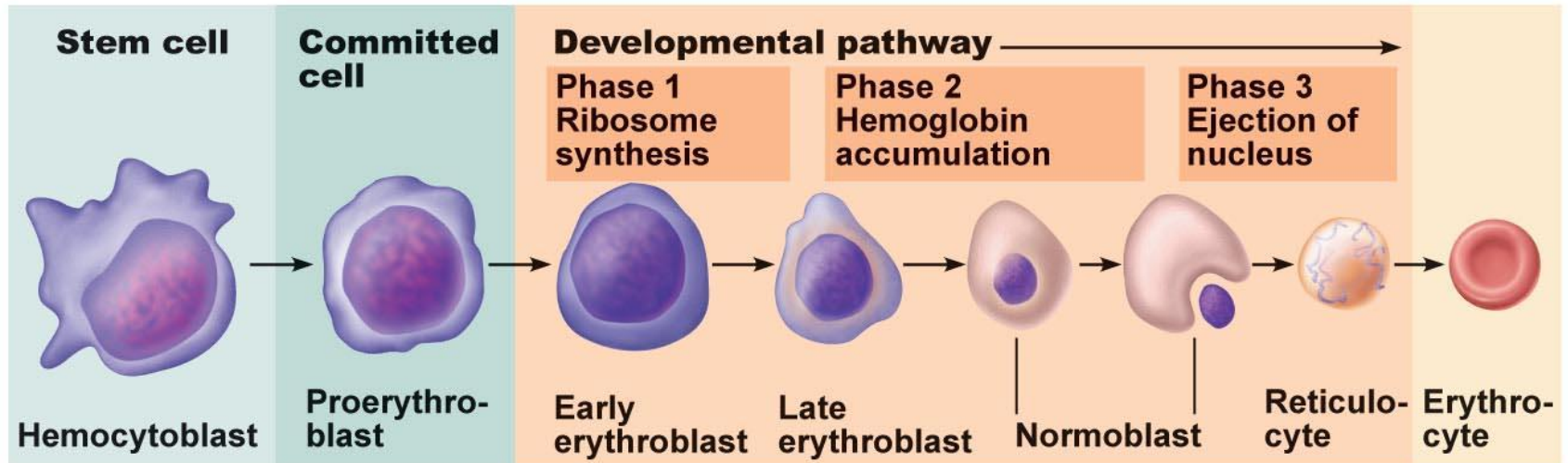
- Hematopoiesis → the formation and development of blood cells
- In adults the cellular elements are produced in the bone marrow.
- Some WBCs are produced in the lymphatic tissue and bone marrow.
- Blood cells need certain nutrients to form properly.
- Examples include.....
 - ✓ Iron
 - ✓ Folic acid
 - ✓ Vitamin B12
- All blood cells formed come from a hematopoietic stem cell.
- These cells can become any blood cell.

Hematopoiesis or hemopoiesis

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ERYTHROPOIESIS



Red Blood Cells (erythrocytes)

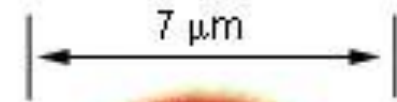
1. Function

- erythrocyte as a **bag for hemoglobin**
- $O_2 \rightarrow$ transport (from lungs to tissues)
- $CO_2 \rightarrow$ transport, formation of HCO_3^-
- $H^+ \rightarrow$ transport, maintaining pH
(35% of blood buffering capacity)

Red Blood Cells (erythrocytes)

2. Structure

- large surface
(diffusion of gases)
- cytoskeletal proteins
(elasticity)
- membrane as an osmometer
(Na^+/K^+ -ATPase)



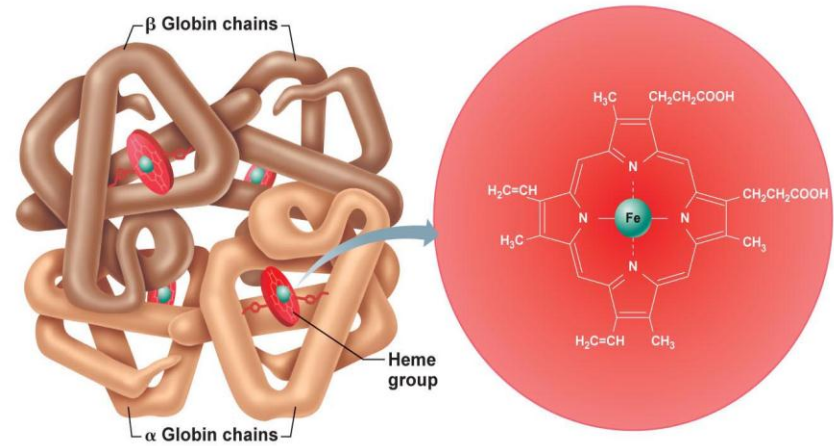
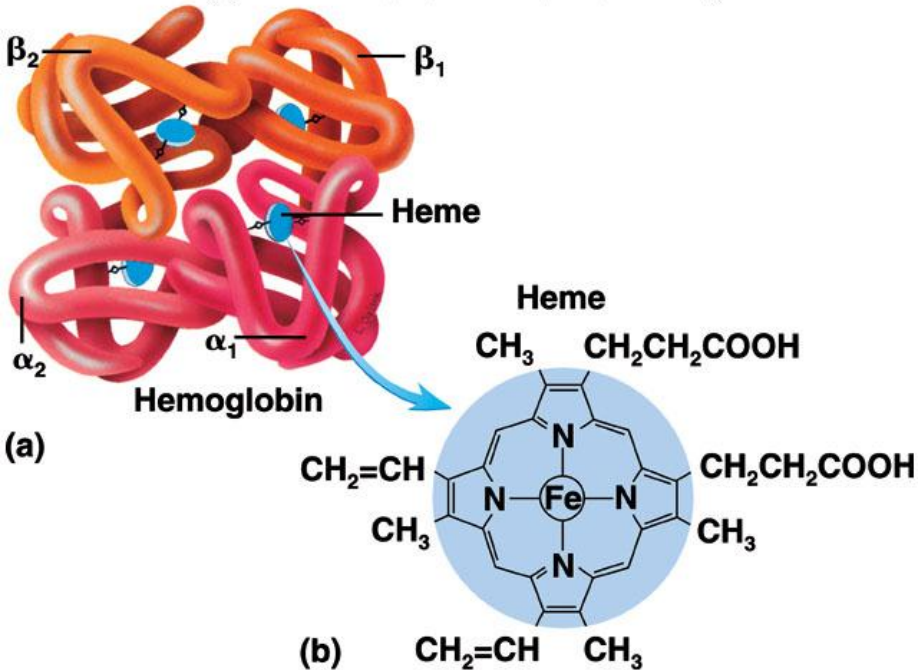
Top View shows RBC
to be circular



Side view shows RBC
to be a biconcave disc

Hemoglobin

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(a) Hemoglobin consists of globin (two alpha and two beta polypeptide chains) and four heme groups.

(b) Iron-containing heme pigment.

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- Consists of:
 - 4 globin molecules: Transport carbon dioxide (carbonic anhydrase involved), nitric oxide
 - 4 heme molecules: Transport oxygen
 - Iron is required for oxygen transport

Red Blood Cells (erythrocytes)

5. metabolism

- glucose is the main fuel
- **90% anaerobic glycolysis**
(ATP, lactate: Cori cycle; 2,3-BPG)
- **10% hexose monophosphate pathway**
(NADPH)

- *enzyme defects*:
 - * glucose-6-P dehydrogenase
 - * pyruvate kinase

RBC Count

Object of Red blood cell count

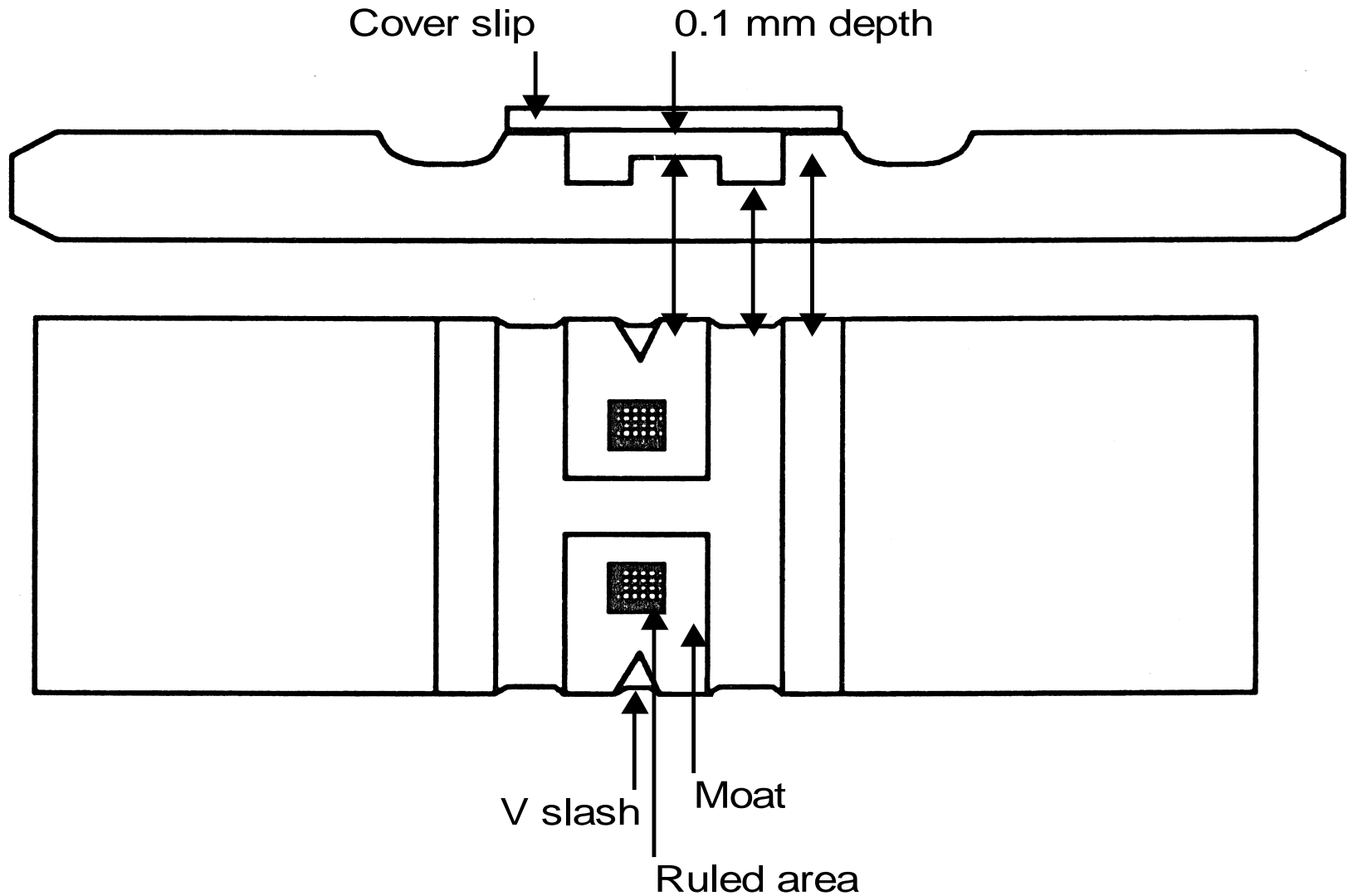
**REPORTS THE NUMBER OF RBCS IN 1
MICROLITER WHOLE BLOOD**

- **Male: 5200000 \pm 300000**
- **Female: 4700000 \pm 300000**

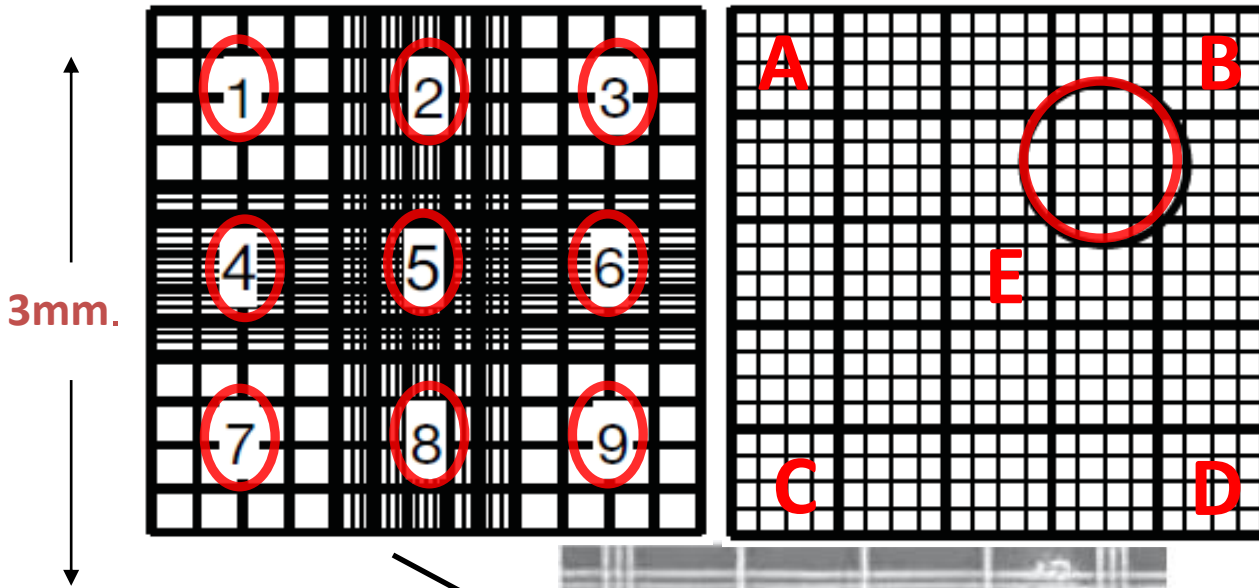
Method

- **Red cell diluting fluid: isotonic Nacl 10ml**
- **Anticoagulated blood: 50 μ l**
- **Filling of the counting chamber**
- **COUNT WITH NEUOBARE HOMOCYTOMETER
LAM UNDER MICROSCOPE**

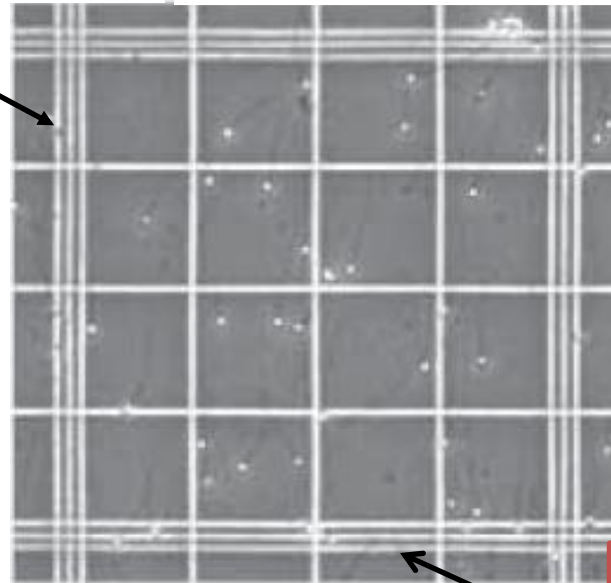
Neuobare hemocytometer lam



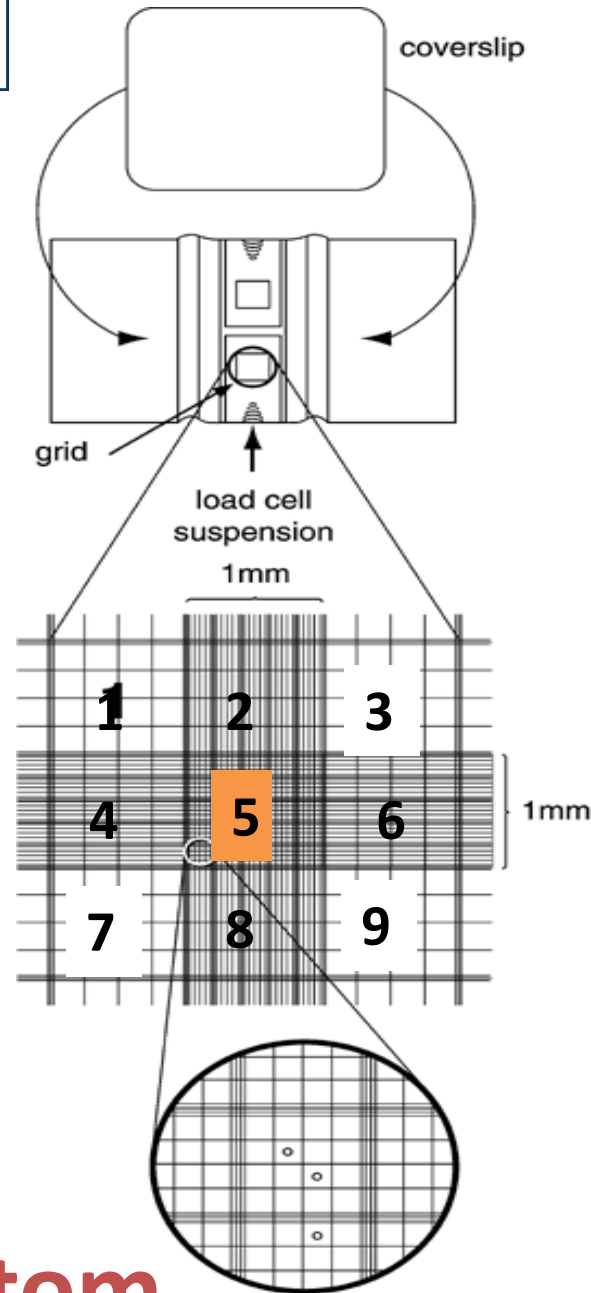
Neuobare hemocytometer lam



Left



Bottom



RBC Count Calculation

$N = n_1 \times \text{surface factor} \times \text{volume factor} \times \text{dilution factor}$

surface factor=5

volume factor=10

dilution factor=200

$$N = n_1 \times 5 \times 10 \times 200$$

