MOHANLAL SUKHADIA UNIVERSITY UDAIPUR

DEPARTMENT OF ZOOLOGY

Topic:

RBC and WBC Count in Blood

B.Sc. 3rd

Practical of Zoology

By

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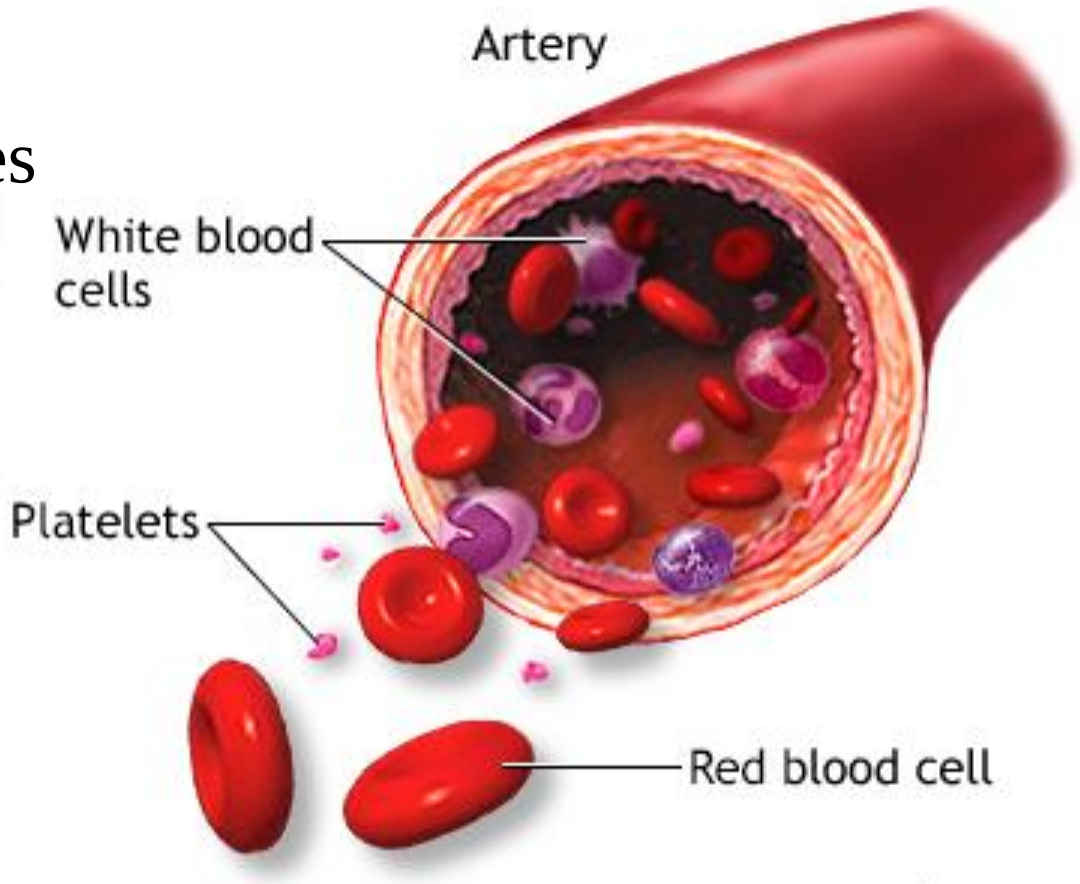
RBC : Red Blood Cell or Red Blood Corpuscles

Also Known as Erythrocytes

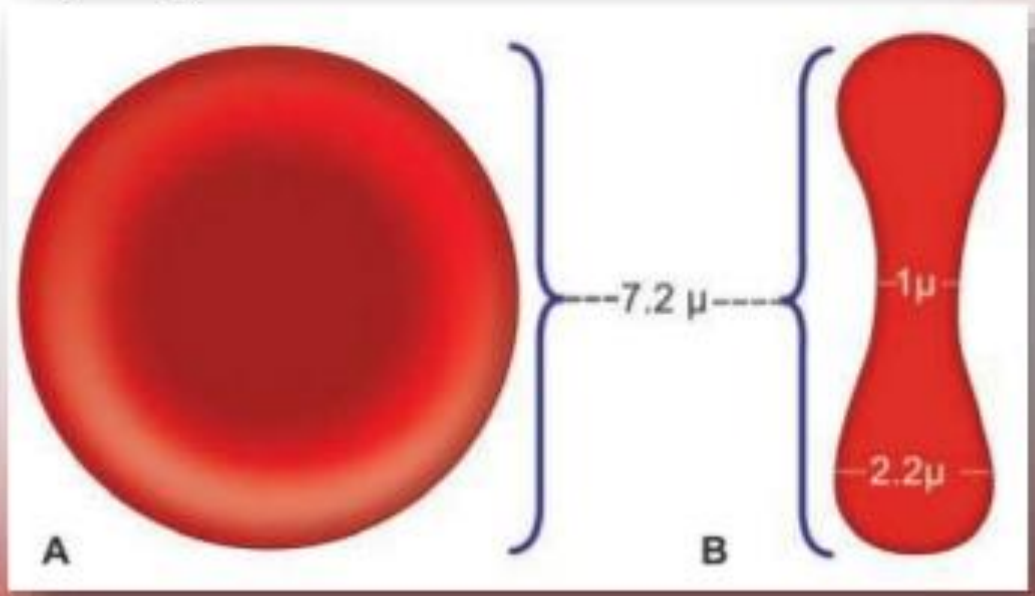
Greek word "*Erythros*" for "*Red*" and -*cyte* referred as "*cell*".

Hemoglobin filled vesicles



DIMENSIONS

- Shape: Biconcave
- Size: 7.2um in diameter
- Thickness: 2um at the periphery and 1um at the center
- Volume: $87um^3$



Numbers:

Male: 4.5-6 million per mm^3

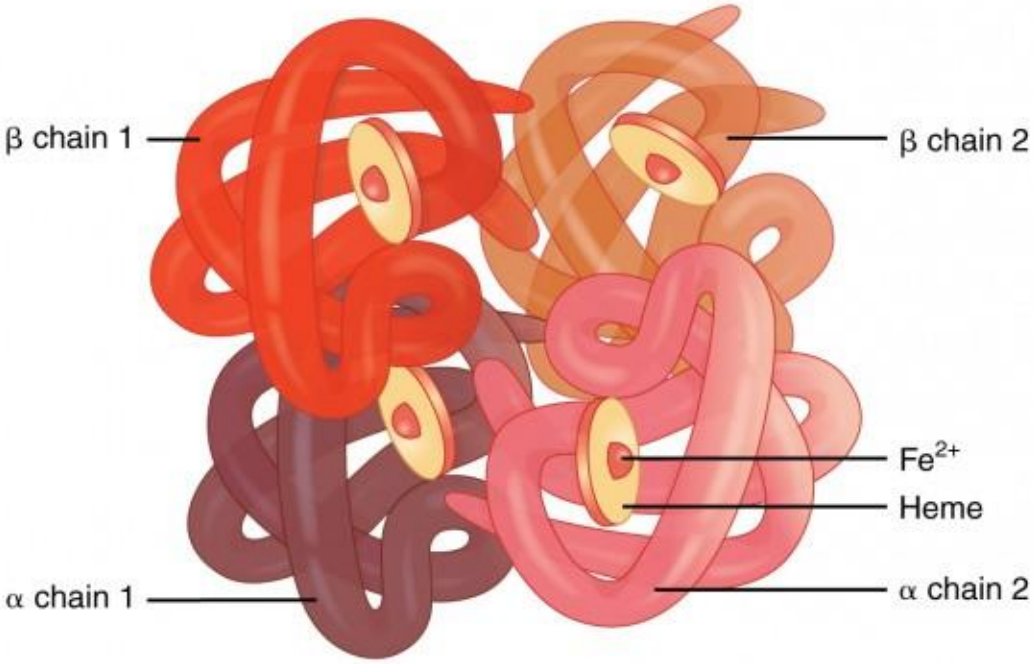
Female: 4-5 million per mm^3

Life span: 100-120 Days

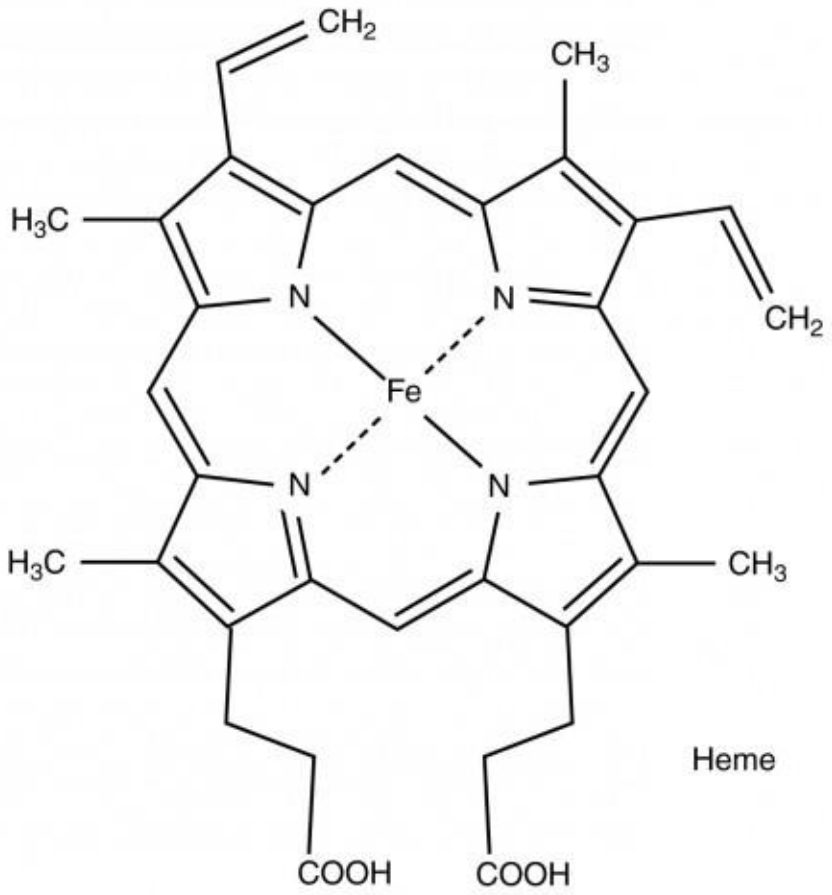
Function:

O_2 and CO_2 Transportation

Hemoglobin Structure:



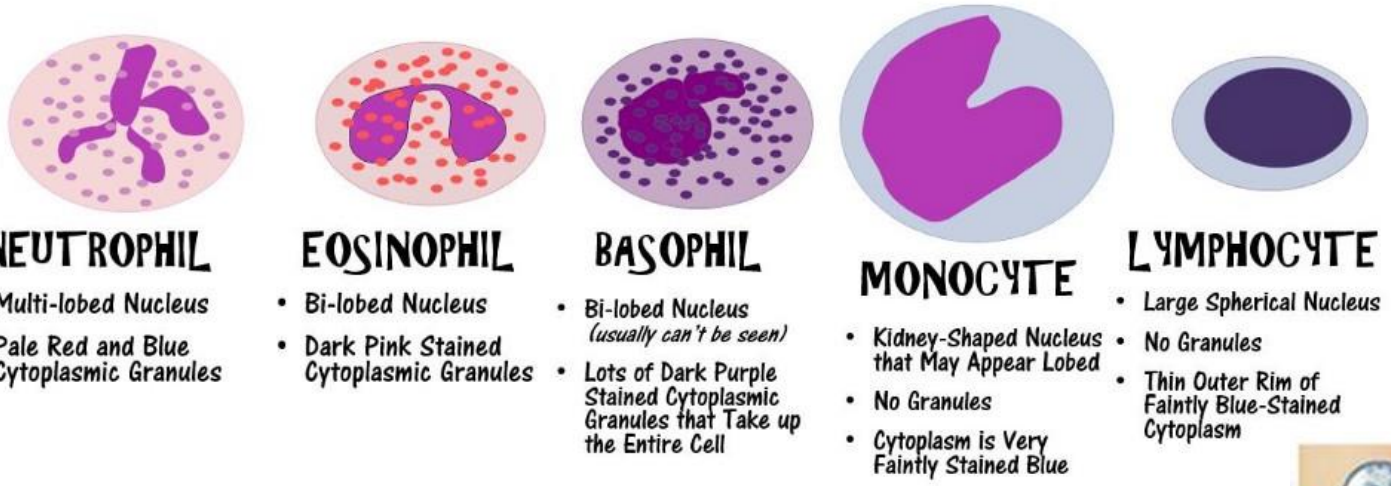
(a)

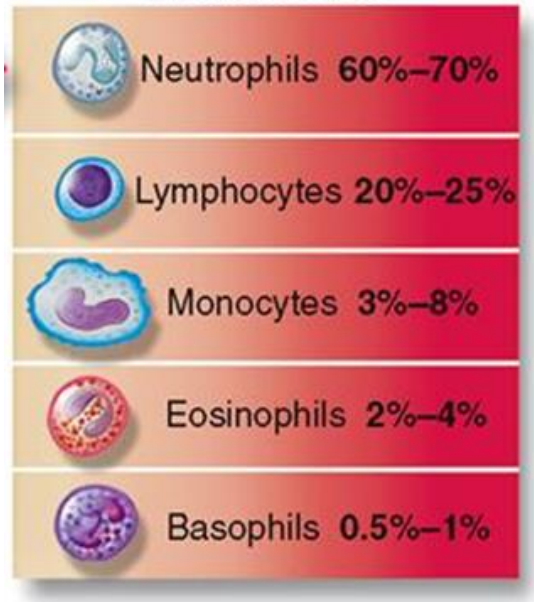


(b)

WBC : White Blood Cell

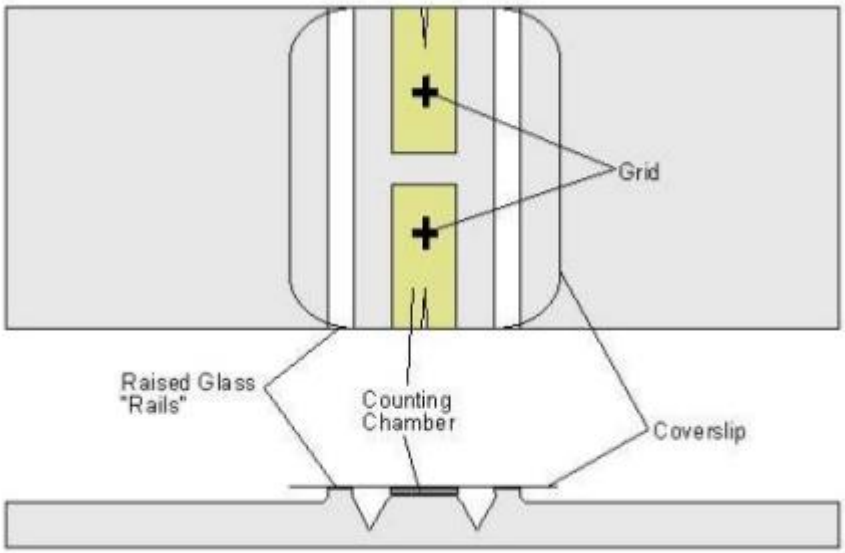
Number: 5,000-10,000 / mm^3

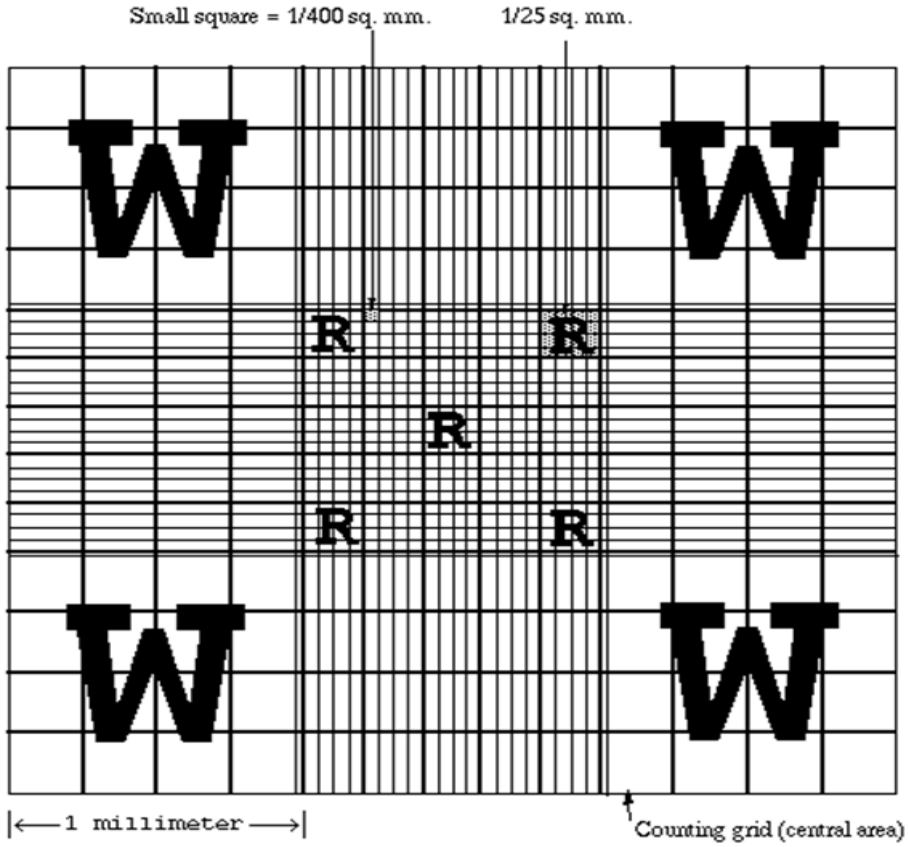




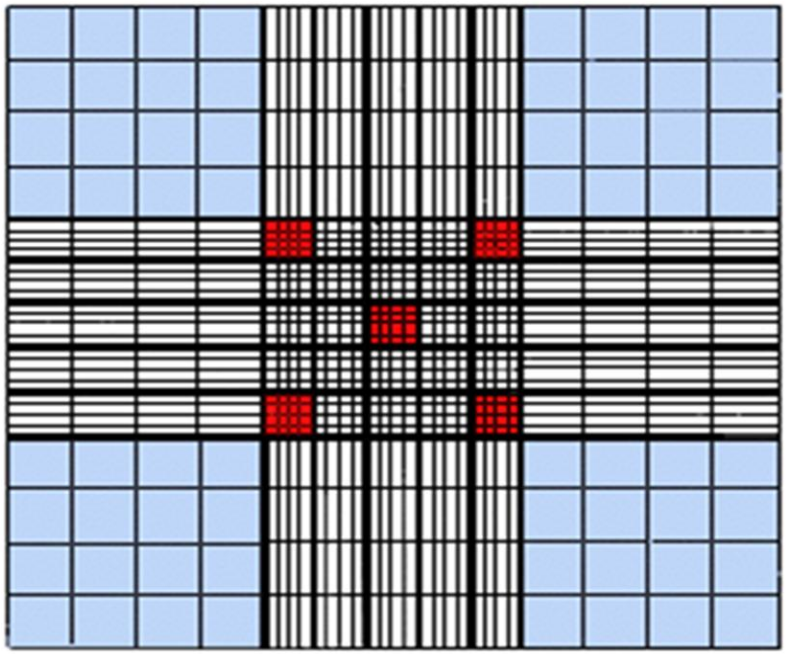
Formed element	Major subtypes	Numbers present per microliter (μL) and mean (range)	Appearance in a standard blood smear	Summary of functions	Comments
Erythrocytes (red blood cells)		5.2 million (4.4–6.0 million)	Flattened biconcave disk; no nucleus; pale red color	Transport oxygen and some carbon dioxide between tissues and lungs	Lifespan of approximately 120 days
Leukocytes (white blood cells)		7000 (5000–10,000)	Obvious dark-staining nucleus	All function in body defenses	Exit capillaries and move into tissues; lifespan of usually a few hours or days
	Granulocytes including neutrophils, eosinophils, and basophils	4360 (1800–9950)	Abundant granules in cytoplasm; nucleus normally lobed	Nonspecific (innate) resistance to disease	Classified according to membrane-bound granules in cytoplasm
	Neutrophils 	4150 (1800–7300)	Nuclear lobes increase with age; pale lilac granules	Phagocytic; particularly effective against bacteria. Release cytotoxic chemicals from granules	Most common leukocyte; lifespan of minutes to days
	Eosinophils 	165 (0–700)	Nucleus generally two-lobed; bright red-orange granules	Phagocytic cells; particularly effective with antigen- antibody complexes. Release antihistamines. Increase in allergies and parasitic infections	Lifespan of minutes to days
	Basophils 	44 (0–150)	Nucleus generally two-lobed but difficult to see due to presence of heavy, dense, dark purple granules	Promotes inflammation	Least common leukocyte; lifespan unknown
	Agranulocytes including lymphocytes and monocytes	2640 (1700–4950)	Lack abundant granules in cytoplasm; have a simple-shaped nucleus that may be indented	Body defenses	Group consists of two major cell types from different lineages
	Lymphocytes 	2185 (1500–4000)	Spherical cells with a single often large nucleus occupying much of the cell's volume; stains purple; seen in large (natural killer cells) and small (B and T cells) variants	Primarily specific (adaptive) immunity: T cells directly attack other cells (cellular immunity); B cells release antibodies (humoral immunity); natural killer cells are similar to T cells but nonspecific	Initial cells originate in bone marrow, but secondary production occurs in lymphatic tissue; several distinct subtypes; memory cells form after exposure to a pathogen and rapidly increase responses to subsequent exposure; lifespan of many years
	Monocytes 	455 (200–950)	Largest leukocyte with an indented or horseshoe-shaped nucleus	Very effective phagocytic cells engulfing pathogens or worn out cells; also serve as antigen-presenting cells (APCs) for other components of the immune system	Produced in red bone marrow; referred to as macrophages after leaving circulation
Platelets 		350,000 (150,000–500,000)	Cellular fragments surrounded by a plasma membrane and containing granules; purple stain	Hemostasis plus release growth factors for repair and healing of tissue	Formed from megakaryocytes that remain in the red bone marrow and shed platelets into circulation


Tiefe · Depth
Profondeur
0,100mm
0,0025 mm²
Neubauer
improved CE
MARIENFELD

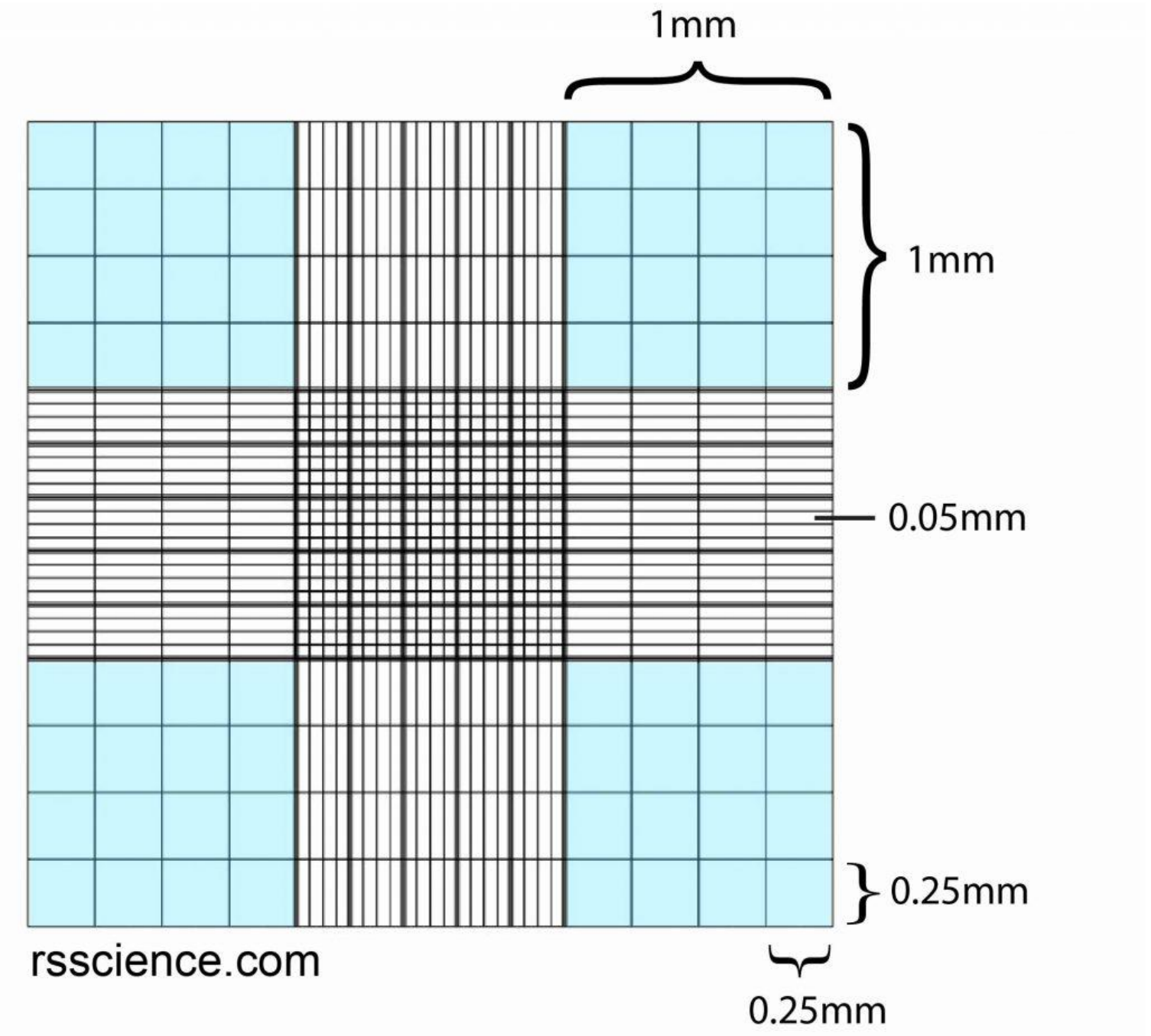

Grid
Raised Glass
"Rails"
Counting
Chamber
Coverslip



areas of the grid where WBC are counted



areas of the grid where RBC are counted


1mm
1mm
0.05mm
0.25mm
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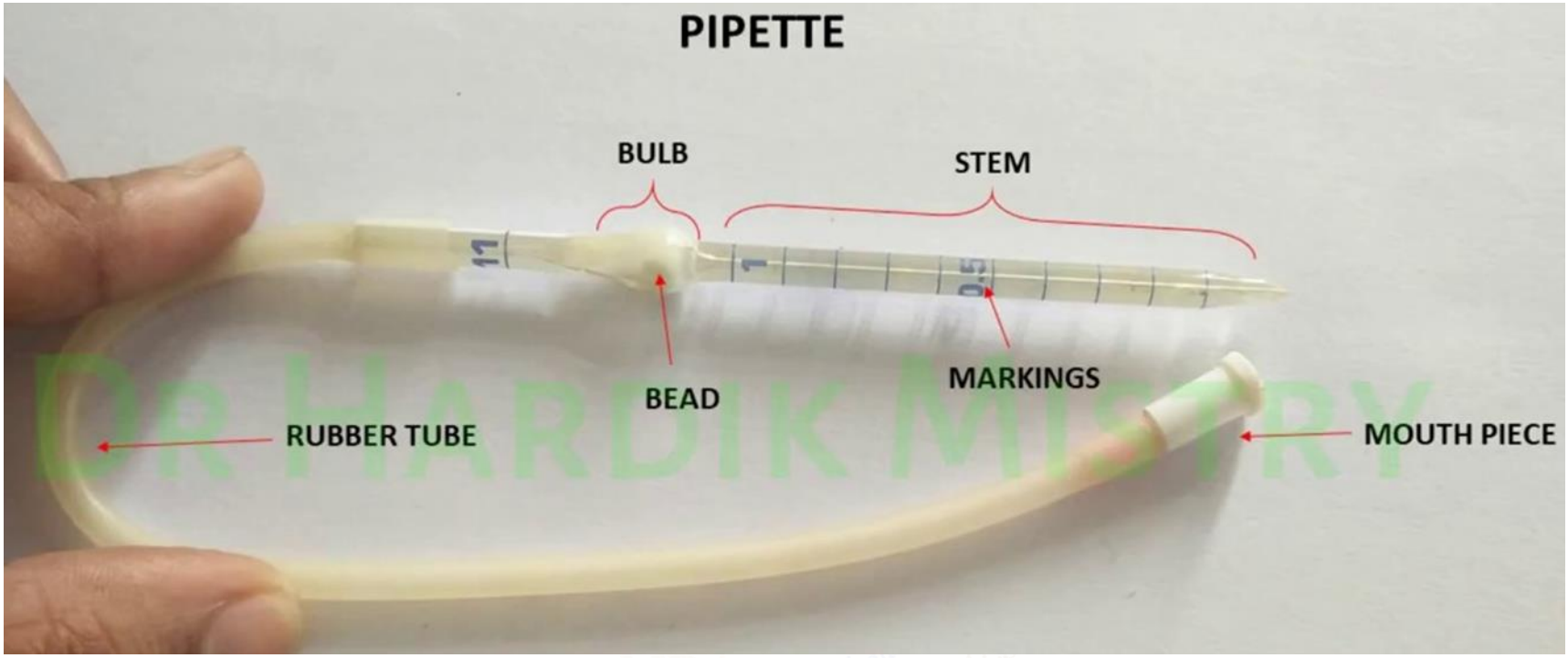
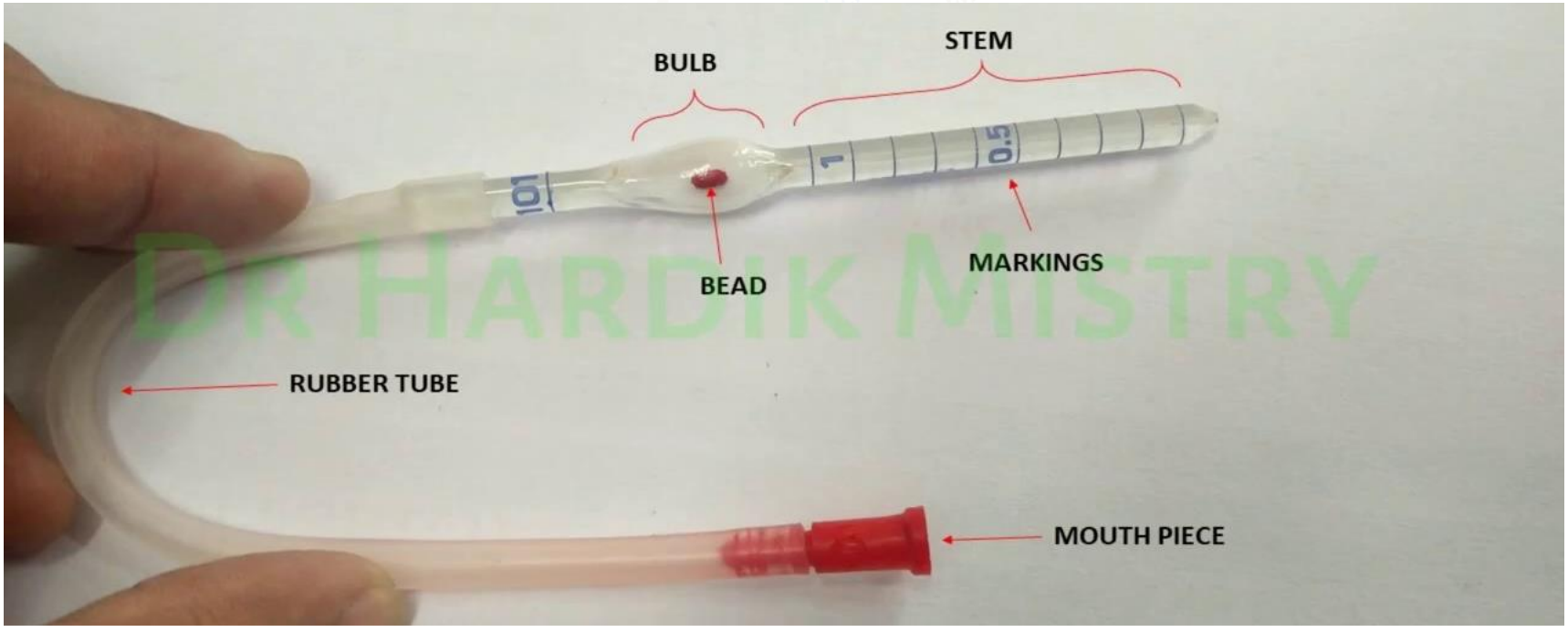
0.25mm


PIPETTE
BULB
STEM
BEAD
MARKINGS
RUBBER TUBE
MOUTH PIECE
DR HARDIK MISTRY


BULB
STEM
BEAD
MARKINGS
RUBBER TUBE
MOUTH PIECE
DR HARDIK MISTRY

FINAL CALCULATION

- Area of 1 RBC square:

Length x Width = 1/5 x 1/5 = 1/25 mm square

- Area of 5 RBC squares: 5 x 1/25 = 1/5 mm square

- **Depth** of 1 RBC square: 1/10 mm
- Volume of 5 RBC square:

Area x Depth = 1/5 x 1/10 = 1/50 mm cube

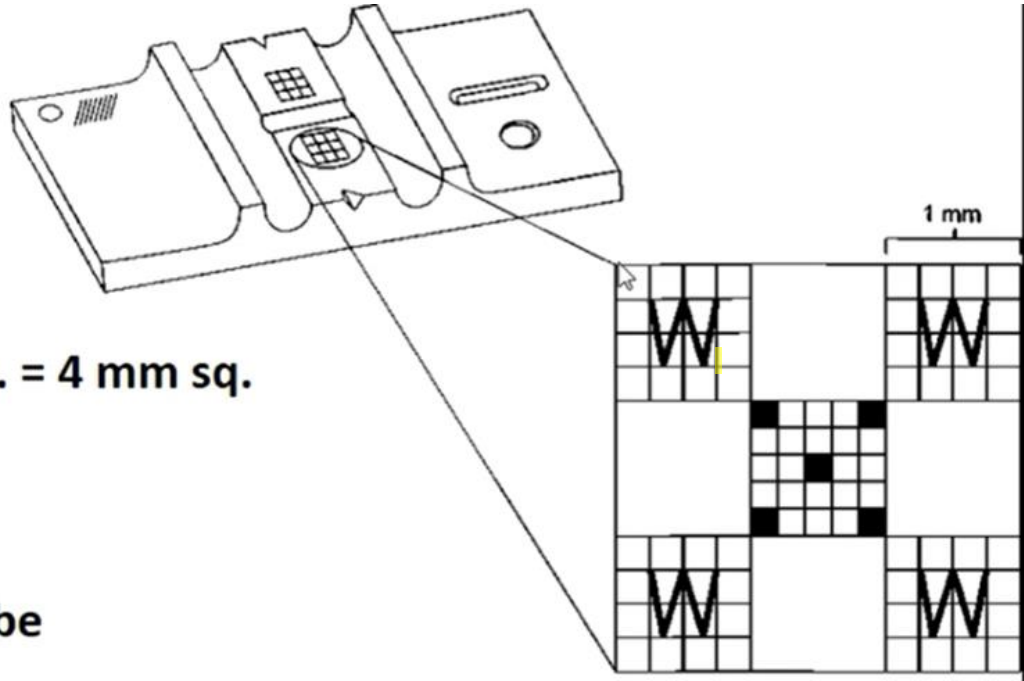
- 1/50 mm cube contains N number of cells

Then 1 mm cube contains: N x 1 / (1/50) = N x 50

- As per principal we have to multiply it with dilution factor: N x 50 x 200 = N x 10,000

(where N =N1 + N2 + N3 + N4 + N5)

FINAL CALCULATION



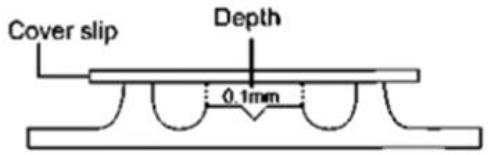
- Area of 1 WBC square:

Length x Width = 1 x 1 = 1 mm sq.

- Area of 4 WBC squares: 4 x 1 mm sq. = 4 mm sq.

- Depth = 1/10 mm
- Volume of 4 WBC square:

Area x Depth = 4 x 1/10 = 4/10 mm cube



- 4/10 mm cube contains N number of cells

Then 1 mm cube contains: N x 1 / (4/10) = (N x 10) /4

- As per principal we have to multiply it with dilution factor: [(N x 10) /4] x 20 = N x 50

(where N =N1 + N2 + N3 + N4)


Thank You