

# YAKEEN NEET 2.0

2026

BODY FLUIDS AND CIRCULATIONS

ZOOLOGY

Lecture – 2

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11.07.2025





## Topics to be covered

1

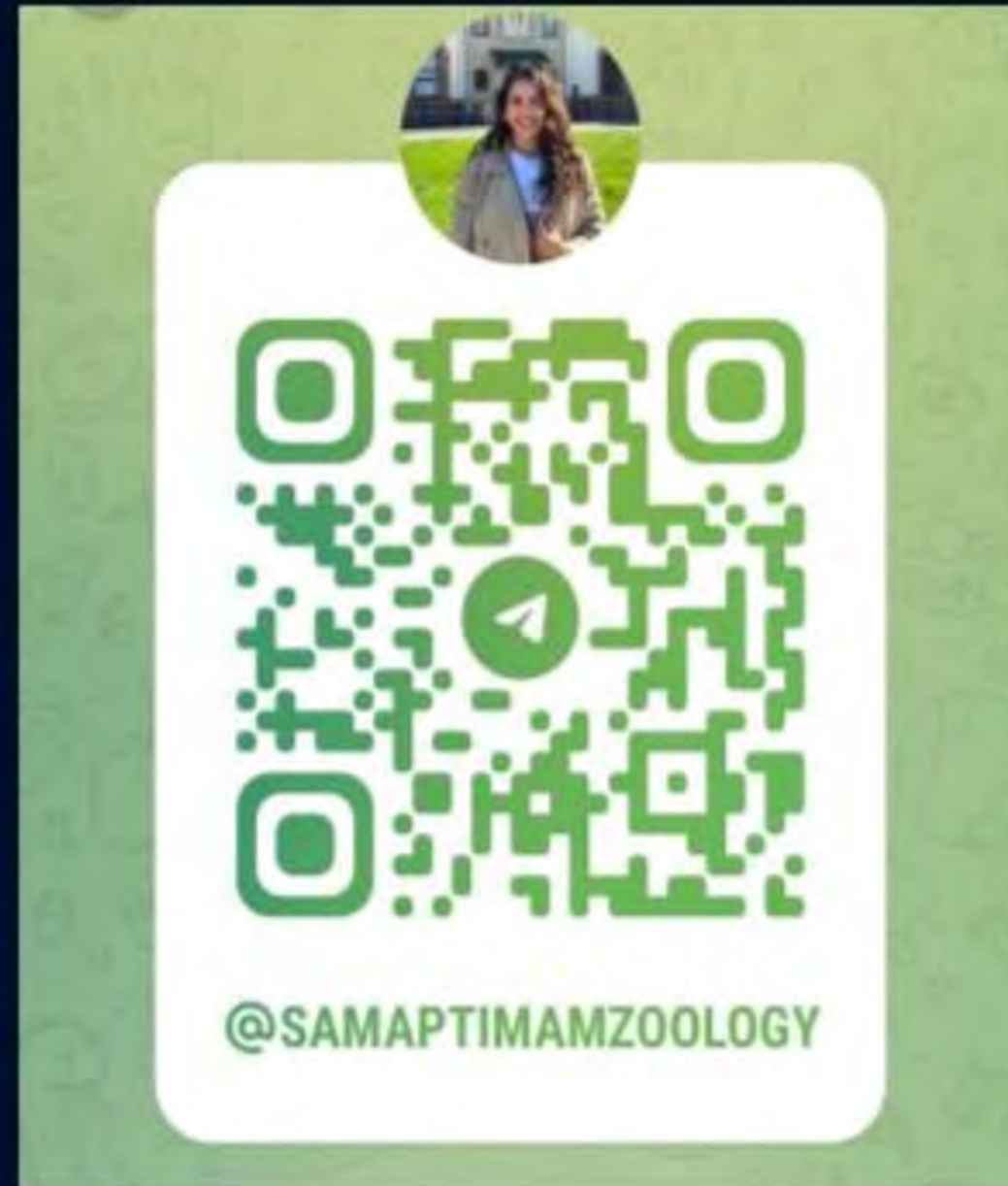
BLOOD-2

2

3

4





# Formed elements: (45.1.)



## ① Erythrocytes / RBC:



1) Number: 5 - 5.5 million / mm<sup>3</sup> blood.

2) formation: is k/a 'ERYTHROPOESIS'

Embryonic Life   
 → i) Yolk sac (Early Embryonic)   
 → ii) Liver, & spleen (Later " )   
 → iii) Red Bone Marrow (Last stages in Gestation)   
 Adults: Red Bone Marrow.

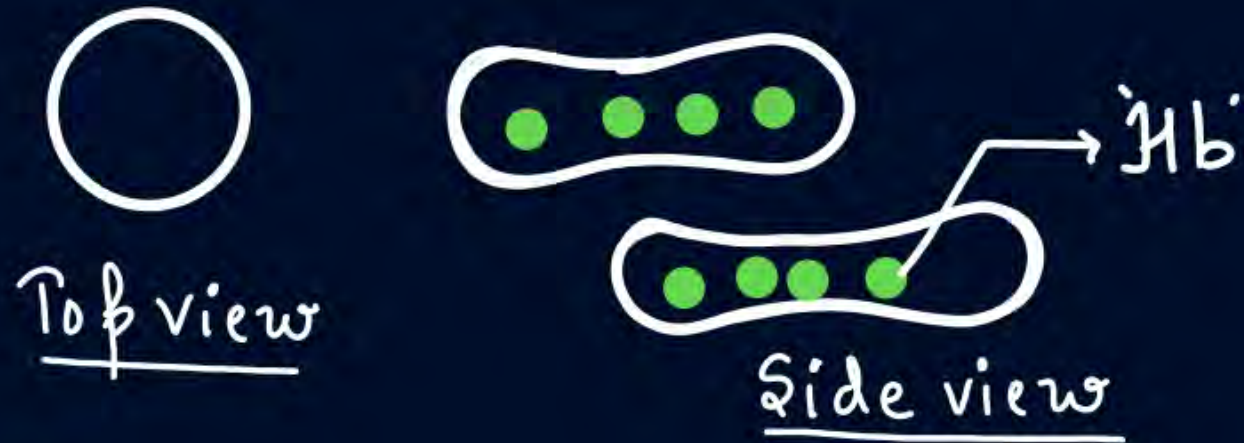
→ (Embryonic development)



3) Shape: Circular, Biconcave, Enucleated (Mature RBC)

Absence Nucleus

to create entire space for 'Hb'



(Note) Vit-B<sub>12</sub> (cyanocobalamin), Vit B<sub>9</sub> (folic acid) essential for RBC  
extra maturation.

• Polycythemia: ↑ in no. of RBC (as in Altitude sickness).

4) Life span: 120 days, destroyed in Spleen → Graveyard of RBC.

5) function: Transport of gases

\* RBC of most of the mammals is enucleated.

↳ except Camel & Llama (nucleated)



### 18.1.2 Formed Elements

Erythrocytes, leucocytes and platelets are collectively called formed elements (Figure 18.1) and they constitute nearly 45 per cent of the blood.

**Erythrocytes** or red blood cells (RBC) are the most abundant of all the cells in blood. A healthy adult man has, on an average, 5 millions to 5.5 millions of RBCs  $\text{mm}^{-3}$  of blood. RBCs are formed in the red bone marrow in the adults. RBCs are devoid of nucleus in most of the mammals and are biconcave in shape. They have a red coloured, iron containing complex protein called haemoglobin, hence the colour and name of these cells. A healthy individual has 12-16 gms of haemoglobin in every 100 ml of blood. These molecules play a significant role in transport of respiratory gases. RBCs have an average life span of 120 days after which they are destroyed in the spleen (graveyard of RBCs).

$RBC > Platelets > WBC$

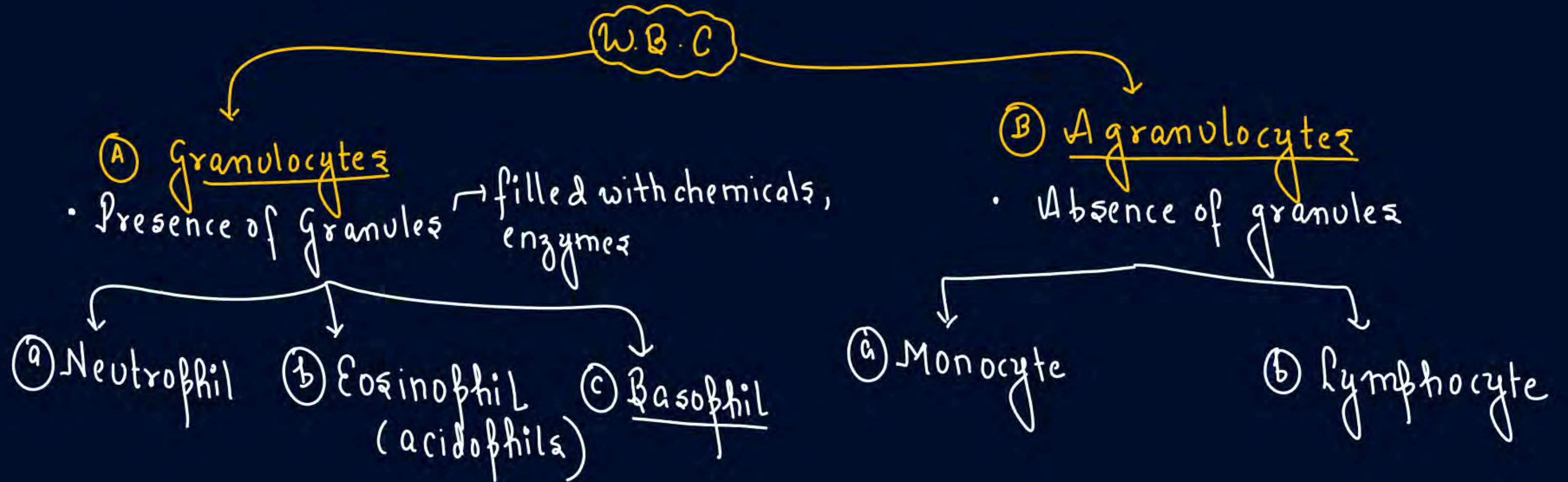
except  
 $Fe^{+2}$






## ② Leucocytes (W.B.C)

- 1) No.: 6000-8000/mm<sup>3</sup> Blood
- 2) formation: Red Bone Marrow, Leucopoiesis

Note Leukemia (Blood cancer): ↑ in No. of WBC.





Characteristic	NEUTROPHIL	EOSINOPHIL	BASOPHILS
1. <u>Number</u>	60-65% (Maximum)	2-3%	0.5-1% (Least)
2) <u>Shape</u>	 <ul style="list-style-type: none"> <li>• Multi-lobed nuclei</li> </ul>	 <ul style="list-style-type: none"> <li>• Headphone shaped</li> </ul>	 <ul style="list-style-type: none"> <li>• 'S' shaped nuclei</li> </ul>
3) <u>formation</u>	← Bone marrow →		
4) <u>Life span</u>	← Short-lived →		
5) <u>function</u>	PHAGOCYTIC in Nature ↳ performs phagocytosis	<ul style="list-style-type: none"> <li>• Level ↑ during Allergic responses (Anti-allergic) or during parasitic infection (helminth infection)</li> </ul>	<ul style="list-style-type: none"> <li>• Inflammation response               <ul style="list-style-type: none"> <li>↳ Redness, Swelling, Warm</li> </ul> </li> <li>• Secretes               <ul style="list-style-type: none"> <li>↳ HISTAMINE</li> <li>↳ HEPARIN</li> <li>↳ SEROTONIN</li> </ul> </li> </ul>





Note : Eosinophil: Secrete: HISTAMINIDASE (anti-histamine)

Basophil: ,, HISTAMINE  
(during inflammation)  
↳ act like mast cell.

Diapedesis: The squeezing out of WBC out of blood capillaries during the injury by changing its shape is called Diapedesis.



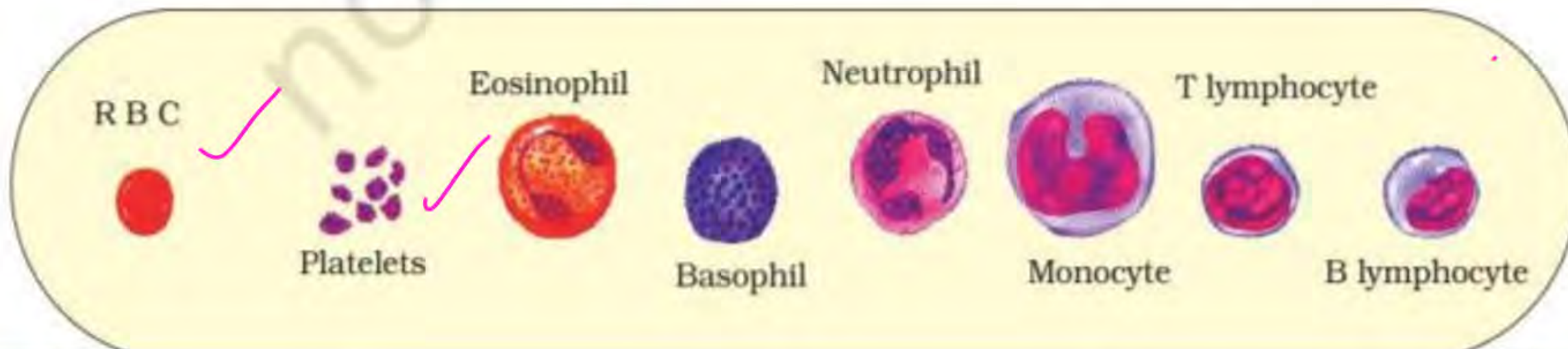


Characteristics	Monocytes	Lymphocytes
1) <u>No.</u>	6-8 /	20-25 /
2) <u>Shape</u>	 <p>Horse-shoe / Kidney / Bean shaped Nuclei</p>	 <p>Round nuclei</p>
3) <u>Life span</u>	<p>• Largest WBC</p> <p>← Short Lived →</p>	
4) <u>formation</u>	<p>← Bone marrow →</p>	
5) <u>function</u>	<p>Phagocytic</p>	<p>• In defense (Immunity)</p> <ul style="list-style-type: none"> <li>→ T-Lymphocytes</li> <li>→ B-Lymphocyte</li> </ul>



**Leucocytes** are also known as white blood cells (WBC) as they are colourless due to the lack of haemoglobin. They are nucleated and are relatively lesser in number which averages  $6000-8000 \text{ mm}^{-3}$  of blood. Leucocytes are generally short lived. We have two main categories of WBCs – granulocytes and agranulocytes. Neutrophils, eosinophils and basophils are different types of granulocytes, while lymphocytes and monocytes are the agranulocytes. Neutrophils are the most abundant cells (60-65 per cent) of the total WBCs and basophils are the least (0.5-1 per cent) among them. Neutrophils and monocytes (6-8 per cent) are phagocytic cells which destroy foreign organisms entering the body. Basophils secrete histamine, serotonin, heparin, etc., and are involved in inflammatory reactions. Eosinophils (2-3 per cent) resist infections and are also

$$1 \text{ mm}^3 \text{ Blood} = 1 \text{ mL} = 0.001 \text{ mL}$$



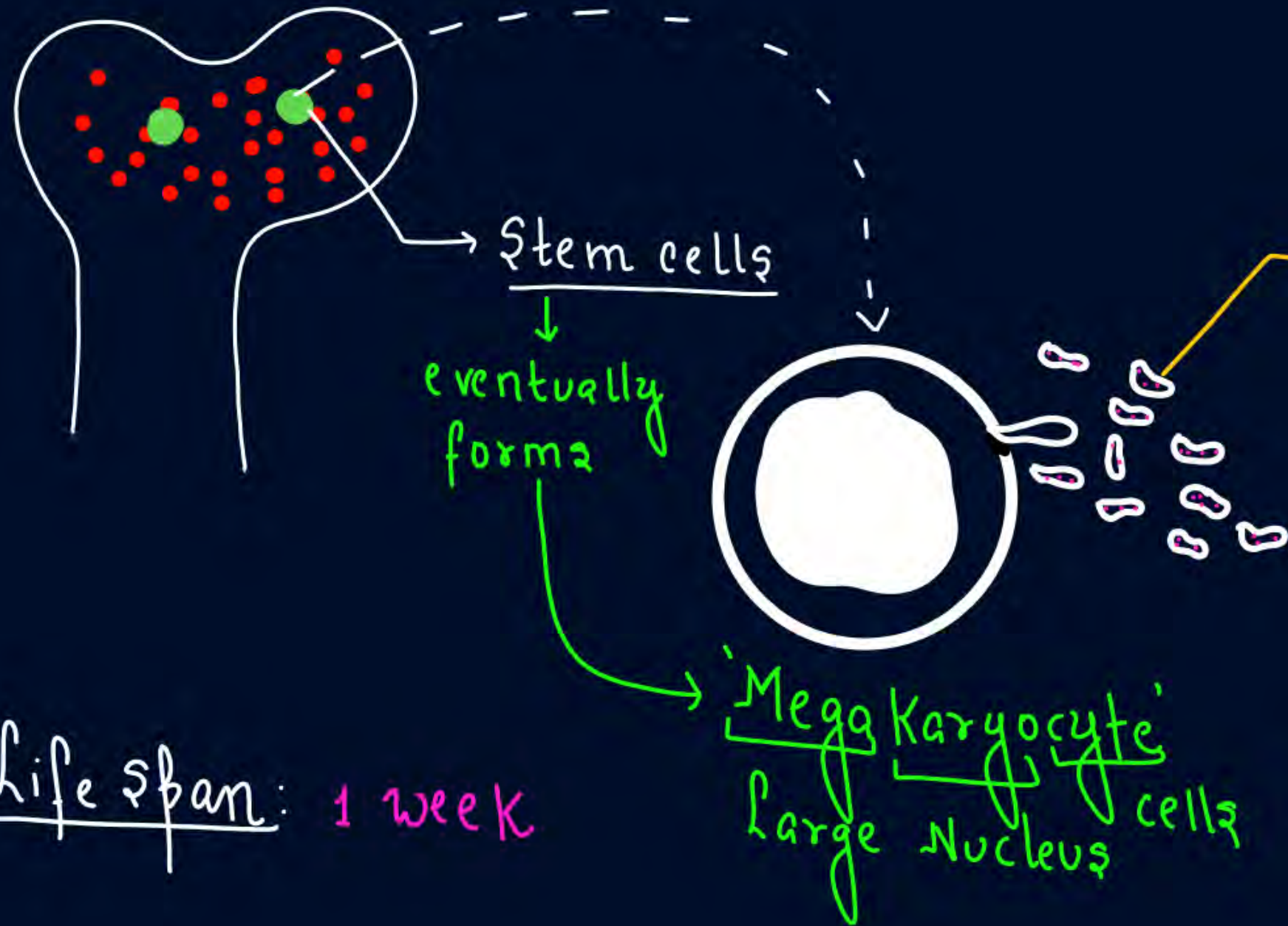


# Blood Platelets / Thrombocytes:



1) Number: 1.5 - 3.5 Lakh/mm<sup>3</sup> Blood (RBC > Platelets > WBC)

2) formation:



Platelets: Are Cellular fragments formed from the megakaryocyte

- Irregularly shaped & helps in Blood Clotting as these are filled with 'THROMBOPLASTIN'

3) Life span: 1 week

(Note) THROMBOCYTOPENIA: ↓ in Platelet  
'DENGUE'



# Blood Clotting / Coagulation:



INJURY



Tissue Injury

Injured tissue secretes 'THROMBOPLASTIN'

attracts Blood Platelets

secretes more 'THROMBOPLASTIN'

Through Cascade of rxn, an enzyme complex formed

**THROMBOKINASE**

Prothrombin  
(inactive)

$Ca^{2+}$

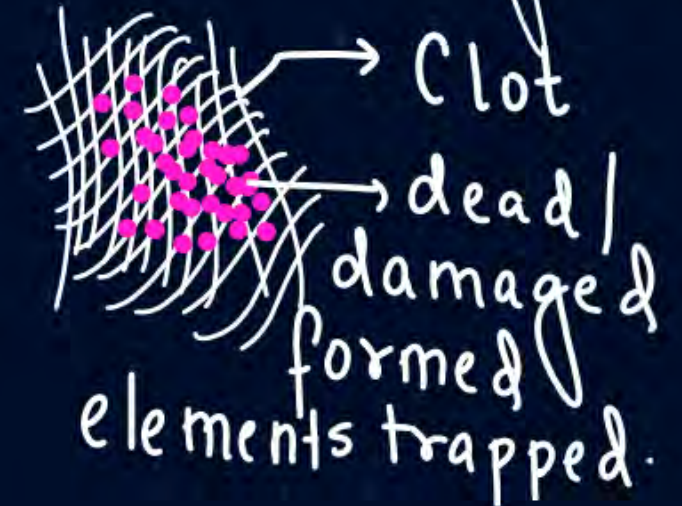
Thrombin  
(active)

Fibrinogen  
(inactive)

$Ca^{2+}$

Fibrin  
(active)

network of threads  
called clot / coagulum





Given below are two statements.

**Statement I:** Blood has plasma and formed elements.

**Statement II:** Serum cannot clot.

In the light of the above statements, choose the most appropriate answer from the options given below.

- (1) Statement I is correct but Statement II is incorrect.
- (2) Statement I is incorrect but Statement II is correct.
- (3) Both Statement I and Statement II are correct.
- (4) Both Statement I and Statement II are incorrect.

**Assertion(A):** Serum cannot clot.

**Reason (R):** Serum lacks clotting factors.

- (1) Both Assertion (A) and Reason (R) are true, and Reason (R) is a correct explanation of Assertion (A).
- (2) Both Assertion (A) and Reason (R) are true, but Reason (R) is not a correct explanation of Assertion (A).
- (3) Assertion (A) is true, and Reason (R) is false.
- (4) Assertion (A) is false, and Reason (R) is true.



Given below are two statements.

**Statement I:** RBCs are devoid of nucleus in all of the mammals.

**Statement II:** These molecules play a significant role in transport of respiratory gases.

In the light of the above statements, choose the most appropriate answer from the options given below.

- (1) Statement I is correct but Statement II is incorrect.
- (2) Statement I is incorrect but Statement II is correct.
- (3) Both Statement I and Statement II are correct.
- (4) Both Statement I and Statement II are incorrect.



**ASSERTION**– fibrinogens, prothrombins are blood proteins present in plasma in the active state normally

**REASON** – fibrinogens are the Network of threads called the clot coagulum

- A) Both Assertion (A) and Reason (R) are true, and Reason (R) is a correct explanation of Assertion (A).
- B) Both Assertion (A) and Reason (R) are true, but Reason (R) is not a correct explanation of Assertion (A).
- C) Assertion (A) is true, and Reason (R) is false.
- D) Assertion (A) is false, and Reason (R) is false.



## Homework

- REVISE CLAASNOTES / ZOOLOGY MED EASY



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**THANK**  
**YOU**