

PHARMACIST BOOSTER - 27

HUMAN ANATOMY AND PHYSIOLOGY

BLOOD CLASSIFICATION

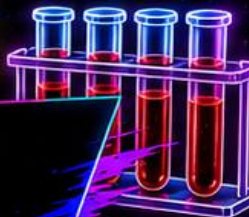


Important for RRB, AIIMS, ESIC,
SEPOY, CISF, GSSSB, DSSSB,
SSC, CGHS etc.



Concept + Revision
कॉन्सेप्ट + रिविजन

हिंदी + English में



Tanu Ma'am

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BLOOD CLASSIFICATION



BLOOD

PLASMA

WATER

- Salts
- Food
- Hormones
- Waste



DISSOLVED SUBSTANCES (PLASMA PROTEINS)

- Albumin – osmotic pressure
- Fibrinogen – clotting



BLOOD AT A GLANCE



PLASMA + RBC + PLATELETS + WBC

BLOOD CELLS

RBC

Oxygen transport



PLATELETS

Clotting



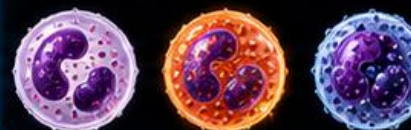
WBC

Defence



GRANULOCYTES

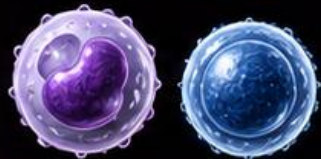
Neutrophils, Eosinophils, Basophils



AGRANULOCYTES

Monocytes, Lymphocytes

- B cells – antibodies
- T cells – kill infected/cancer cells





PLASMA & PLASMA PROTEINS



PLASMA

= fluid part
of blood

90-92%
WATER



CONSTITUENTS



SALTS



NUTRIENTS



WASTE



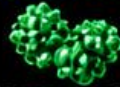
HORMONES



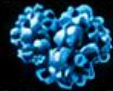
GASES

MAIN PROTEINS

● ALBUMIN



● GLOBULINS



● FIBRINOGEN



PLASMA PROTEINS

≈ 7%



FUNCTIONS



OSMOTIC
PRESSURE



HEAT
REGULATION



IMMUNITY



CLOTTING



PLASMA

=



PROTEINS

+



SALTS

+



NUTRIENTS

+



WASTE

+



HORMONES

+



GASES



ERYTHROCYTES (RBC)



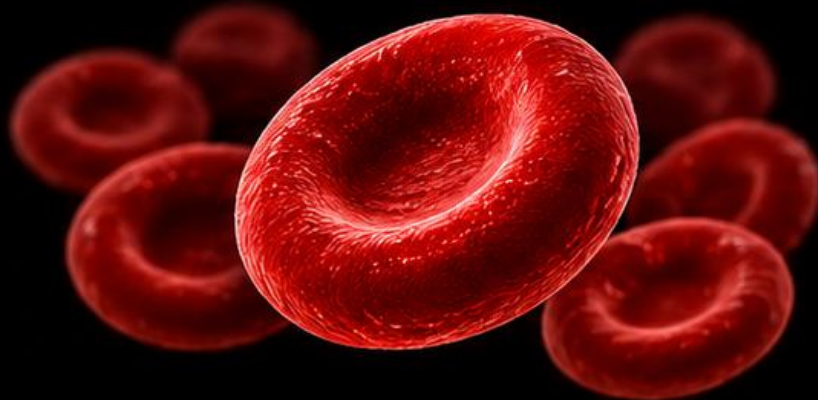
RBC = 45% of blood cells

STRUCTURE

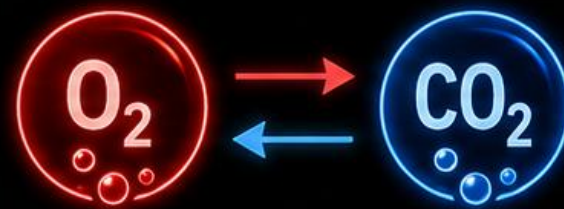


7-8 μm

- Biconcave disc
- No nucleus / no organelles
- Contains **haemoglobin**



MAIN WORK



Transport **O₂** & **CO₂**

LIFE SPAN



~120 days

GRAVEYARD



Spleen



Liver



Bone Marrow

RBC COUNT



Male

4.5-6.5
million/ mm^3



Female

3.8-5.8
million/ mm^3

ERYTHROPOIESIS



~7 days

NEEDS



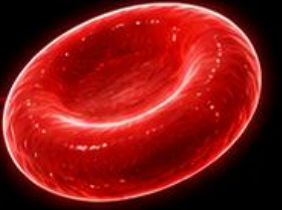
Vitamin B12



Folic acid



HEMOGLOBIN



STRUCTURE

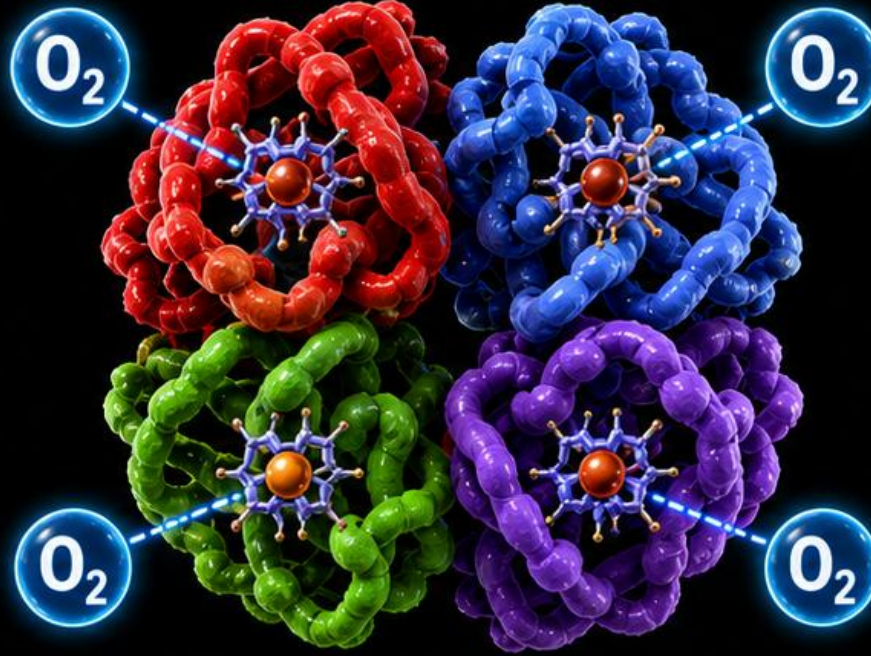
globin + heme



+

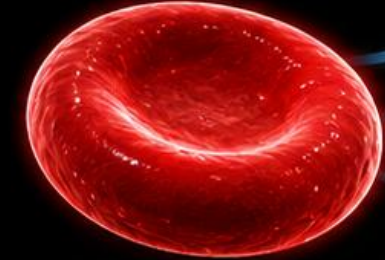


(Iron-containing pigment)



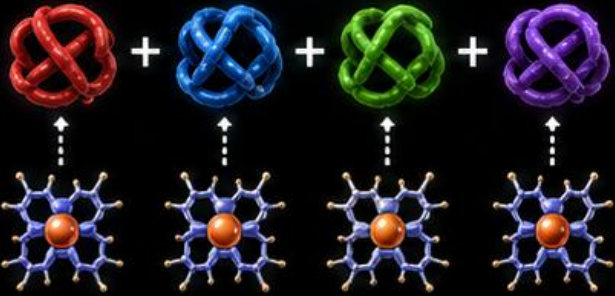
MAIN FUNCTION

transports **oxygen**
by RBCs



COMPOSITION

4 globin chains
+ 4 heme units



1 HEMOGLOBIN

carries 4 O₂ molecules

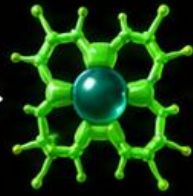


PIGMENT CHANGE



HEME

→



BILIVERDIN

→



BILIRUBIN



LEUKOCYTES (WBC)



WBC = DEFENCE CELLS



LIFE SPAN:
12–13 DAYS



NORMAL COUNT:
4500–11000/ μ L



GRANULOCYTES



NEUTROPHILS

60–70% – PHAGOCYTOSIS



EOSINOPHILS

2–4% – ALLERGY / PARASITES



BASOPHILS

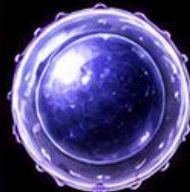
0.5–1% – HISTAMINE + HEPARIN

AGRANULOCYTES



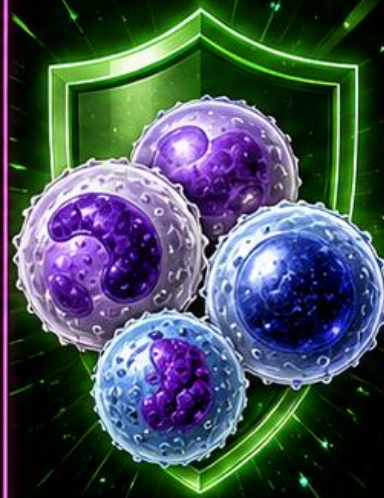
MONOCYTES

3–8% – BECOME MACROPHAGES



LYMPHOCYTES

20–25% – IMMUNITY (B, T, NK)



BEST PHARMACIST COURSE

RECOMMENDED FOR YOUR PREPARATION



RRB
PHARMACIST
 MAY BATCH
ADMISSION OPEN

LIVE CLASSES & DOUBT SOLVING
 E-NOTES & TEST SERIES
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 PHARMA TEST SERIES
 SUBJECT-WISE E-NOTES

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JOIN NOW

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 E-NOTES & TEST SERIES
 PREVIOUS YEAR PAPER

AIIMS
PHARMACIST
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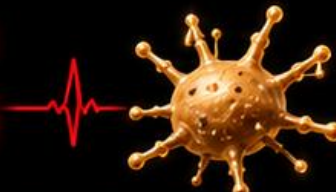
RAJASTHAN
PHARMACIST
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LIVE CLASSES & RECORDED
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CONTACT FOR ADMISSION RELATED QUERIES- 6395596959, 9259827802



PLATELETS / THROMBOCYTES



SMALL NON-NUCLEATED DISCS

Irregular, discoid fragments without nucleus.



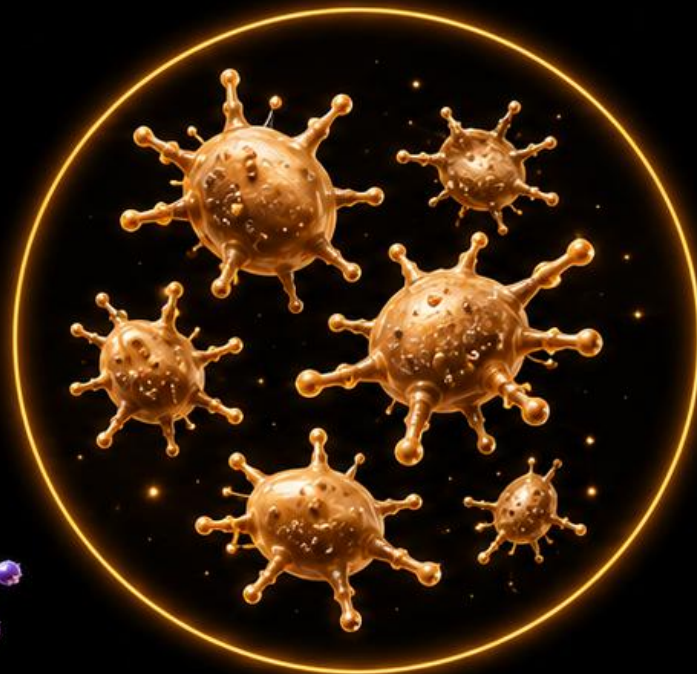
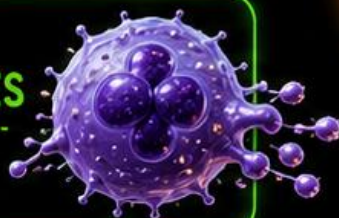
SIZE: 2–4 μm

Very small cell fragments.



FORMED FROM MEGAKARYOCYTES

Produced in red bone marrow.



NORMAL COUNT:

200,000–350,000/ mm^3



LIFE SPAN:

7–10 days



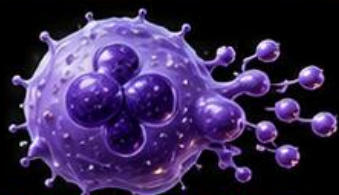
THROMBOPOIETIN STIMULATES PRODUCTION

TPO (from liver & kidneys) increases platelet production.



MAIN ROLE: BLOOD CLOTTING / HAEMOSTASIS

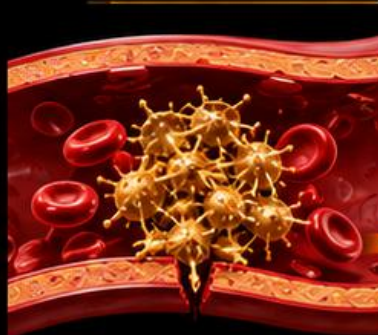
Form plugs and help stop bleeding.



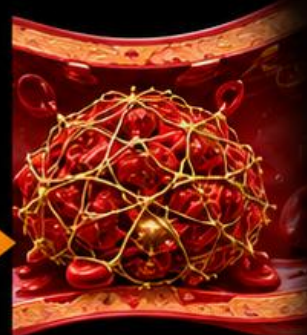
MEGAKARYOCYTE



PLATELETS



PLATELET PLUG



STABLE CLOT

FROM PRODUCTION TO CLOT



PLATELETS SYNTHESIZE THROMBOXANE

Promotes vasoconstriction and platelet aggregation.



KEY POINT:

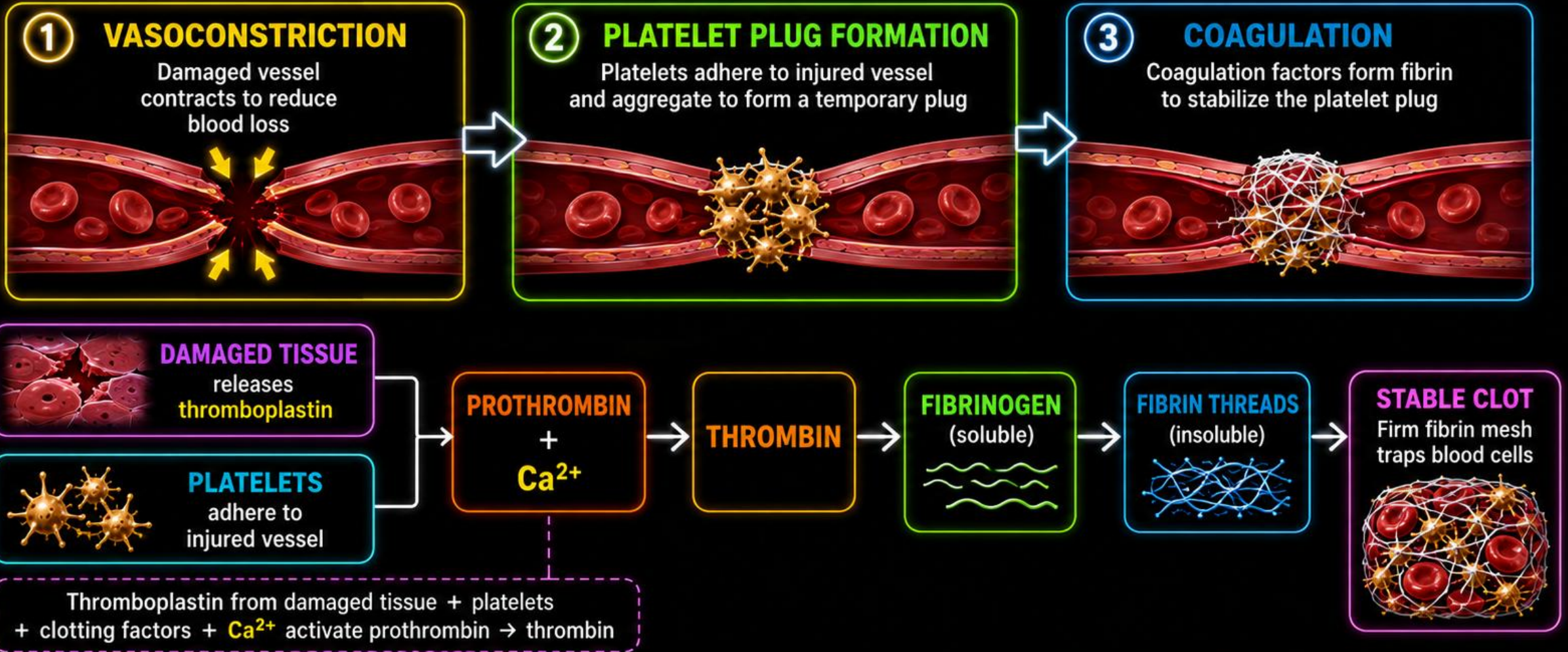
Essential for haemostasis and preventing bleeding.



HAEMOSTASIS & COAGULATION



HAEMOSTASIS = STOPPING BLEEDING



HAEMOSTASIS PREVENTS BLOOD LOSS AND PROMOTES VESSEL REPAIR



BLOOD CLOTTING FACTORS

FACTOR	NAME	KEY ROLE
I	Fibrinogen	 clot formation
II	Prothrombin	 forms thrombin
III	Tissue factor / Thromboplastin	 starts extrinsic pathway
IV	Calcium	 essential cofactor
V	Proaccelerin	 cofactor
VII	Proconvertin	 activates factor X (extrinsic pathway)
VIII	Antihaemophilic factor A	 cofactor in intrinsic pathway
IX	Christmas factor	 activates factor X (intrinsic pathway)
X	Stuart-Prower factor	 converts prothrombin to thrombin
XI	PTA	 activates factor IX
XII	Hageman factor	 initiates intrinsic pathway
XIII	Fibrin stabilizing factor	 cross-links fibrin

BLOOD-RELATED DISORDERS

1. ANEMIA

Low Hb / RBC



😞 Fatigue

2. SICKLE CELL ANEMIA

HbS, sickle RBCs



⚡ Painful crises

3. THALASSEMIA

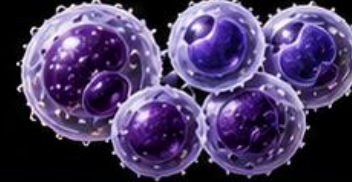
Defective globin synthesis



😞 Fatigue

4. LEUKEMIA

Uncontrolled WBC proliferation



🛡️ Infection risk

5. HEMOPHILIA

Factor VIII / IX deficiency



🩸 Easy bleeding

6. POLYCYTHEMIA

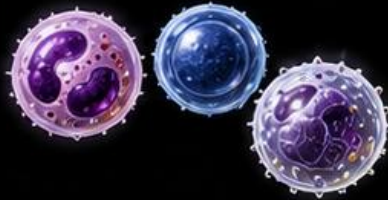
Excess RBCs



🩸 Thickened blood

7. LEUKOPENIA

Low WBC



🛡️ Infection risk

8. THROMBOCYTOPENIA

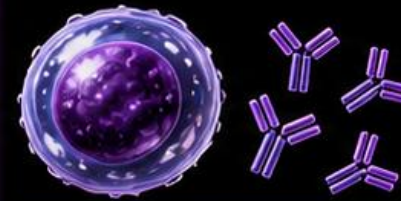
Low platelets



🩸 Easy bruising

9. MULTIPLE MYELOMA

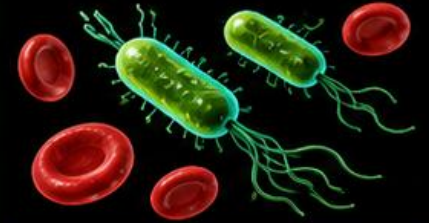
Plasma cell cancer



🦴 Bone pain

10. SEPTICEMIA

Bacteria in blood



🛡️ High fever



BLOOD GROUP SYSTEM



ABO SYSTEM

A

ANTIGEN A



 **RECEIVES:** A / O

 **DONATES:** A / AB

B

ANTIGEN B



 **RECEIVES:** B / O

 **DONATES:** B / AB

AB

ANTIGENS A + B



 **UNIVERSAL RECIPIENT**

RECEIVES: A / B / AB / O

O

NO ANTIGEN



 **UNIVERSAL DONOR**

DONATES: A / B / AB / O

RH FACTOR (D ANTIGEN)



Rh+

RECEIVES + OR -



Rh-

RECEIVES ONLY -

EASY TO REMEMBER



O

GIVES ALL



AB

RECEIVES ALL



BOMBAY GROUP

No H antigen.
Rare group.
(Oh phenotype)





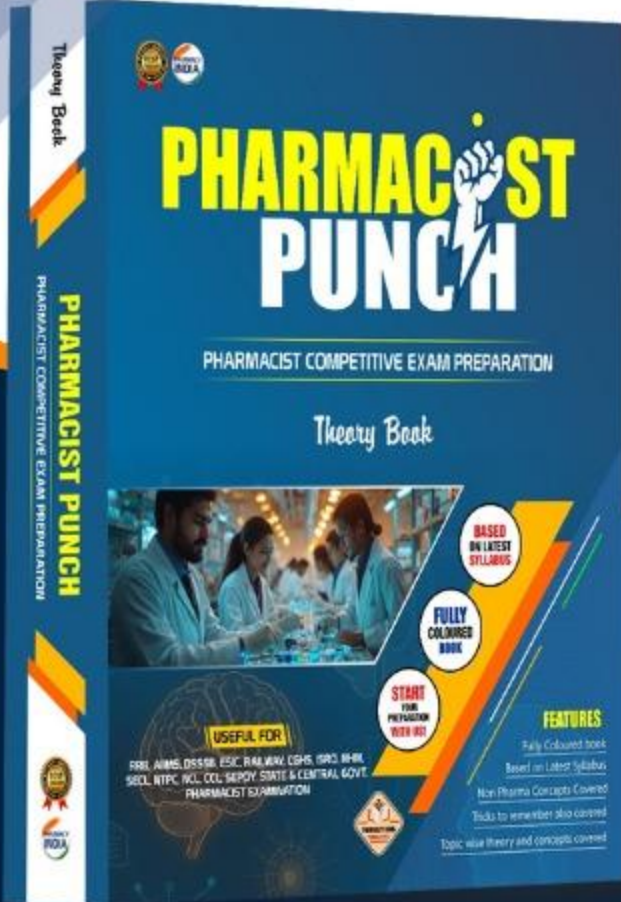
YOUR FINAL

PUNCH



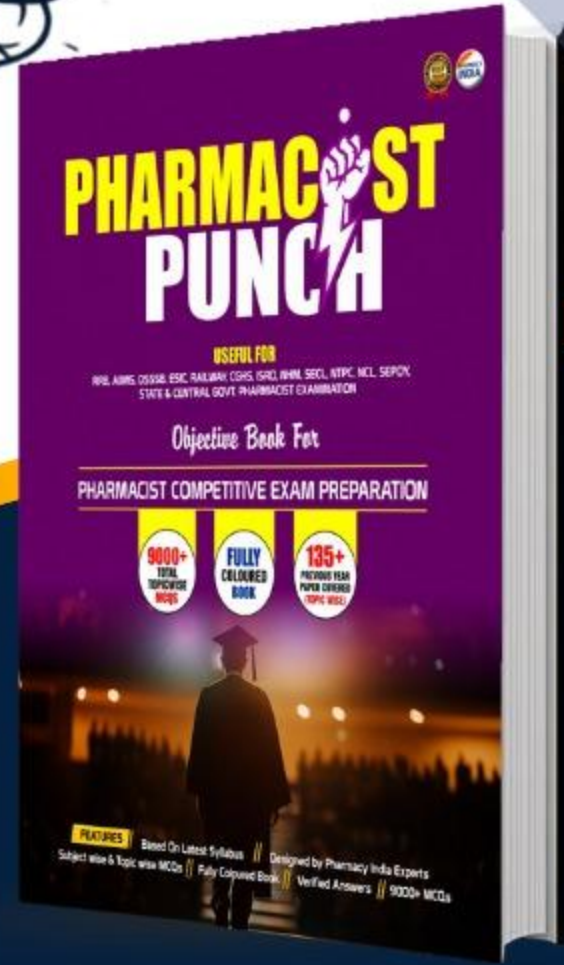
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