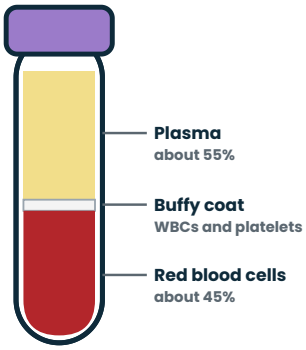
Blood

Study Sheet · Learn It with Prof. Melanie

1 Spun Blood

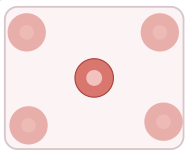


2 Composition

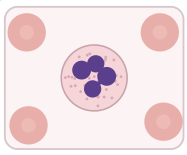
- **Plasma (55%):** about 90–92% water plus albumin (fluid balance), globulins (antibodies), fibrinogen (clotting), electrolytes, nutrients, hormones, wastes
- **Formed elements (45%):** RBCs, WBCs, platelets, made in red bone marrow (hematopoiesis)
- **Serum** = liquid after clotting, no fibrinogen · **Plasma** = from anticoagulated blood
- About 5 L in an adult · pH 7.35–7.45

Hoots' tip: Serum has **spent** its fibrinogen making the clot.

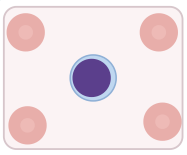
3 Blood Cells



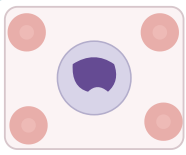
RBC
No nucleus; carries O_2; 120 days



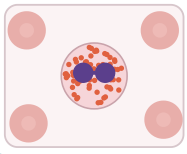
Neutrophil
50–70%; bacteria



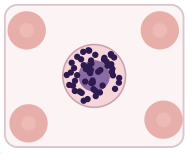
Lymphocyte
20–40%; viruses, antibodies



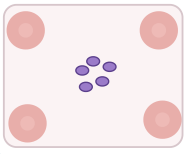
Monocyte
2–8%; becomes macrophage



Eosinophil
1–4%; allergy, parasites



Basophil
<1%; histamine, heparin



Platelets
Clotting; 7–10 days

Never Let Monkeys Eat Bananas = most to least common WBC. Granulocytes: neutrophils, eosinophils, basophils.

4 Approximate Adult Values

Test	Women	Men
RBC	4.0–5.2 million/µL	4.5–5.9 million/µL
Hemoglobin	12–15.5 g/dL	13.5–17.5 g/dL
Hematocrit	36–44%	41–50%
WBC	4,500–11,000/µL	
Platelets	150,000–400,000/µL	

Ranges vary by lab.

5 RBC Facts

- **Hemoglobin** contains iron and carries oxygen
- **EPO** from the kidneys boosts RBC production
- Old RBCs removed by spleen and liver; heme → **bilirubin**
- **Reticulocyte** = young RBC
- Hematocrit ≈ 3 × hemoglobin

6 Quick Compare

Plasma	Anticoagulated; has fibrinogen	**Serum**	Clotted; no fibrinogen
-penia	Too few (leukopenia)	**-cytosis**	Too many (leukocytosis)
Anemia	Low RBCs or hemoglobin	**Polycythemia**	Too many RBCs
PT/INR	Warfarin	**aPTT**	Heparin
Granulocytes	Neutrophils, eosinophils, basophils	**Agranulocytes**	Lymphocytes, monocytes

Blood · Study Sheet

7 Hemostasis

1. Vascular spasm
2. Platelet plug
3. Coagulation: thrombin turns fibrinogen into **fibrin**
4. Clot retraction and repair
5. Fibrinolysis dissolves the clot

Needs calcium and **vitamin K**. **PT/INR** = warfarin · **aPTT** = heparin

8 Blood Types

Type	Antigens	Antibodies	Receives RBCs from
A	A	Anti-B	A, O
B	B	Anti-A	B, O
AB	A and B	Neither	All (universal recipient)
O	Neither	Anti-A, anti-B	O only

Rh+ = D antigen · **O−** universal donor · **AB+** universal recipient · **RhoGAM** for Rh− pregnant patients

9 Blood Disorders

Disorder	Key facts	Disorder	Key facts
Iron-deficiency anemia	Most common anemia	**Leukemia**	Abnormal WBCs; blood cancer
Pernicious anemia	No intrinsic factor; B12	**Hemophilia**	X-linked; factor VIII (A), IX (B)
Sickle cell anemia	Crescent-shaped RBCs	**Thrombocytopenia**	Low platelets; bruising
Aplastic anemia	Marrow failure	**Mononucleosis**	EBV; reactive lymphocytes
Polycythemia	Too many RBCs	**Hemochromatosis**	Iron overload

10 Tests and Tubes

Test	Shows	Tube
CBC with differential	Cell counts, Hgb, Hct, WBC types	Lavender (EDTA); invert 8–10 times
Hemoglobin A1C	Average glucose over about 3 months	Lavender (EDTA)
PT/INR, aPTT	Clotting time	Light blue (citrate); fill to the line (9:1)
ESR	Inflammation	Lavender or black, per lab
Type and crossmatch	ABO, Rh, compatibility	Pink or lavender, per lab

11 Word Parts

Part	Meaning	Part	Meaning
hem/o; -emia	Blood; blood condition	**-poiesis**	Formation
erythr/o	Red	**-penia**	Deficiency
leuk/o	White	**-lysis**	Breakdown
thromb/o	Clot	**-stasis**	Stopping

12 MA Skills

- Standard precautions with every patient
- Correct tube, order of draw, gentle mixing
- Label at the patient's side, 2 identifiers
- Avoid hemolysis: no shaking

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