CHAPTER C — BLOOD PHYSIOLOGY

C1 — The Fatigue During Rehab

A physiotherapy intern observes a post-operative patient struggling with early fatigue during low-intensity gait training. The patient's vitals are stable, but lab data show reduced oxygen-carrying capacity despite normal plasma volume. The intern is asked to reason which blood component change best explains the fatigue without invoking disease diagnosis.

Options

A. Reduced RBC count
B. Increased plasma proteins
C. Elevated platelet count
D. Increased WBC count

Reasoning

- Reduced RBC count lowers hemoglobin → less oxygen delivery → fatigue.
- Plasma proteins (B) affect oncotic pressure, not oxygen transport.
- Platelets (C) affect clotting.
- WBCs (D) are immune-related.

✅ Correct: A

C2 — The High-Altitude Training Puzzle

A physiotherapy student attends a sports camp at high altitude. Athletes initially complain of breathlessness, but after weeks, performance improves. The mentor asks which blood change explains this adaptation.

Options

A. Decreased hemoglobin concentration
B. Increased RBC production
C. Reduced blood viscosity
D. Increased platelet formation

Reasoning

Chronic hypoxia stimulates erythropoietin → increased RBC count → improved oxygen transport.

✅ Correct: B

C3 — The Unexpected Bleeding

During a ward observation, a student notices prolonged bleeding from a small venipuncture site, while clot formation is delayed. Platelet count is normal. The intern must infer the physiological defect.

Options

A. Platelet adhesion failure
B. Coagulation factor deficiency
C. RBC membrane fragility
D. Increased blood volume

Reasoning

Normal platelets with delayed clot → coagulation factor issue.

✅ Correct: B

C4 — The Transfusion Decision

A junior clinician prepares for blood transfusion in a trauma case. The physiotherapy intern is asked why cross-matching is essential beyond ABO typing.

Options

A. To check blood viscosity
B. To prevent plasma protein loss
C. To avoid Rh incompatibility reactions
D. To ensure platelet survival

Reasoning

Rh incompatibility causes hemolytic reactions even if ABO matched.

✅ Correct: C

C5 — The Hemoglobin Curve Debate

During a tutorial, two students debate why oxygen is released more easily in exercising muscle. The tutor asks which physiological factor shifts the oxyhemoglobin dissociation curve rightward.

Options

A. Increased pH
B. Decreased CO_2
C. Increased temperature
D. Reduced 2,3-DPG

Reasoning

Heat, CO_2, acidity shift curve right → enhanced O_2 unloading.

✅ Correct: C

C6 — The Blood Volume Adjustment

A dehydrated athlete shows reduced venous return during physiotherapy assessment. The mentor asks what blood mechanism compensates initially to maintain circulation.

Options

A. Increased plasma protein synthesis
B. Fluid shift from interstitial space to plasma
C. Immediate RBC production
D. Increased platelet activation

Reasoning

Reduced plasma volume pulls interstitial fluid into circulation.

✅ Correct: B

C7 — The Silent Clot Risk

An immobilized patient shows no active bleeding but is at risk of thrombosis. The physiotherapy intern is asked which blood element mainly initiates clot formation under low flow conditions.

Options

A. RBC aggregation
B. Platelet adhesion
C. Plasma proteins
D. WBC margination

Reasoning

Platelets adhere to endothelium → primary hemostasis.

✅ Correct: B

C8 — The Jaundice Observation

A student notices yellowish discoloration in a patient recovering from hemolysis. The tutor asks which physiological process explains this.

Options

A. Increased bile salt synthesis
B. Excess hemoglobin breakdown
C. Reduced albumin production
D. Increased plasma volume

Reasoning

Hemoglobin breakdown → bilirubin → jaundice.

✅ Correct: B

C9 — The Blood Group Emergency

In an emergency, a patient's blood group is unknown. The intern asks which blood type is safest to transfuse temporarily.

Options

A. AB positive
B. AB negative
C. O positive
D. O negative

Reasoning

O negative lacks A, B, and Rh antigens → universal donor.

✅ Correct: D

C10 — The Viscosity Challenge

A physiotherapy student measures increased blood viscosity in a patient undergoing dehydration. The mentor asks what physiological consequence is most likely.

Options

A. Increased cardiac output
B. Reduced peripheral resistance
C. Sluggish blood flow
D. Increased oxygen diffusion

Reasoning

High viscosity → sluggish flow → increased workload on heart.

✅ Correct: C