
HAEMATOLOGY
CARD DECK
TEACHING
EMERGENCY DOCTORS
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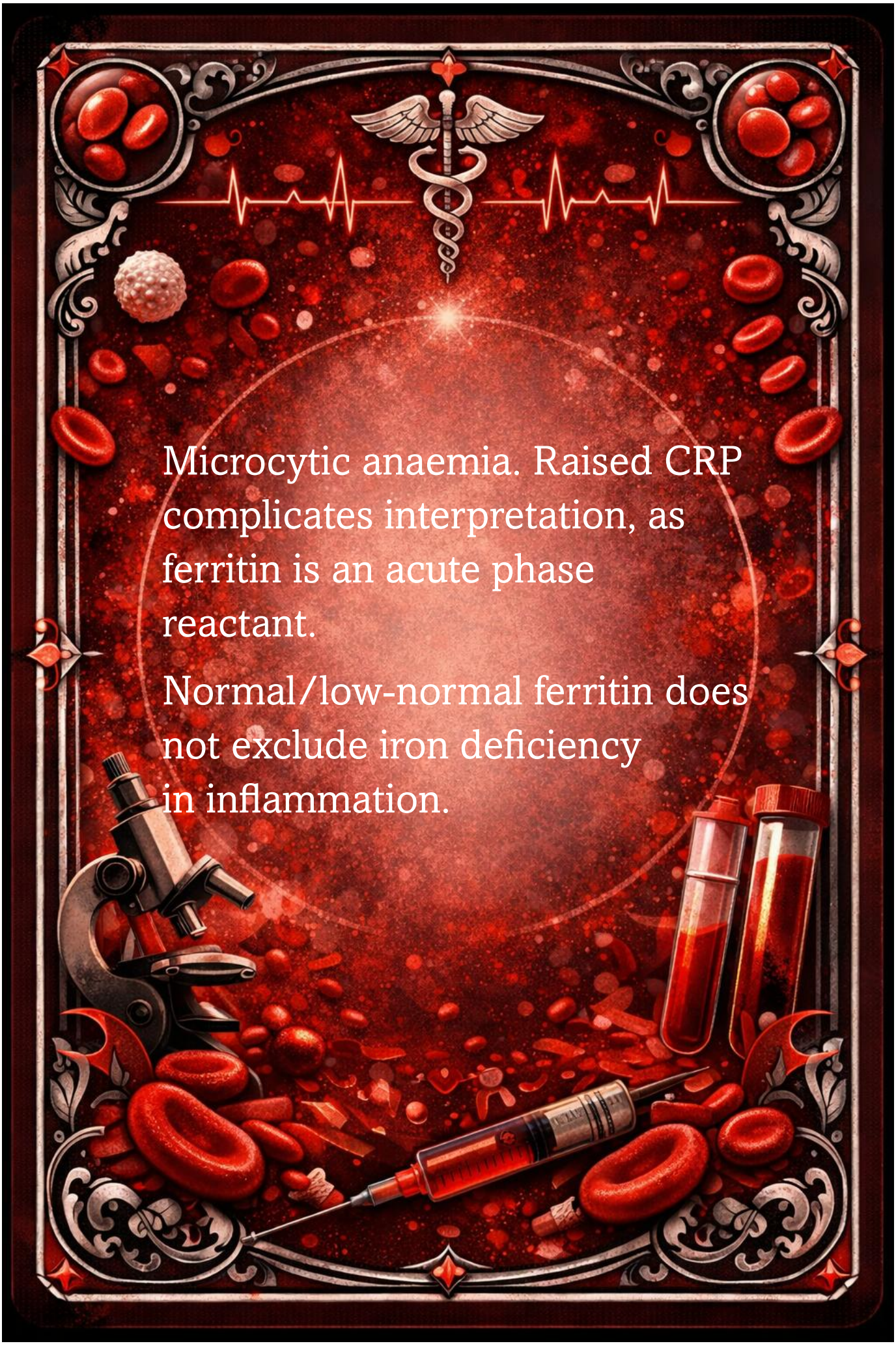
A 45-year-old female presents to ED with fatigue and mild dyspnoea. She has a history of rheumatoid arthritis.

Hb: 92 g/L (120–160)
WCC: 8.5 x10^9/L (4–11)
Platelets: 420 x10^9/L (150–400)
MCV: 72 fL (80–100)
Hct: 0.30 (0.36–0.46)
Iron: 6 µmol/L (10–30)
Ferritin: 50 µg/L (30–300)
Transferrin sat: 10% (20–45)
CRP: 45 mg/L (<5)


Microcytic anaemia. Raised CRP complicates interpretation, as ferritin is an acute phase reactant.
Normal/low-normal ferritin does not exclude iron deficiency in inflammation.

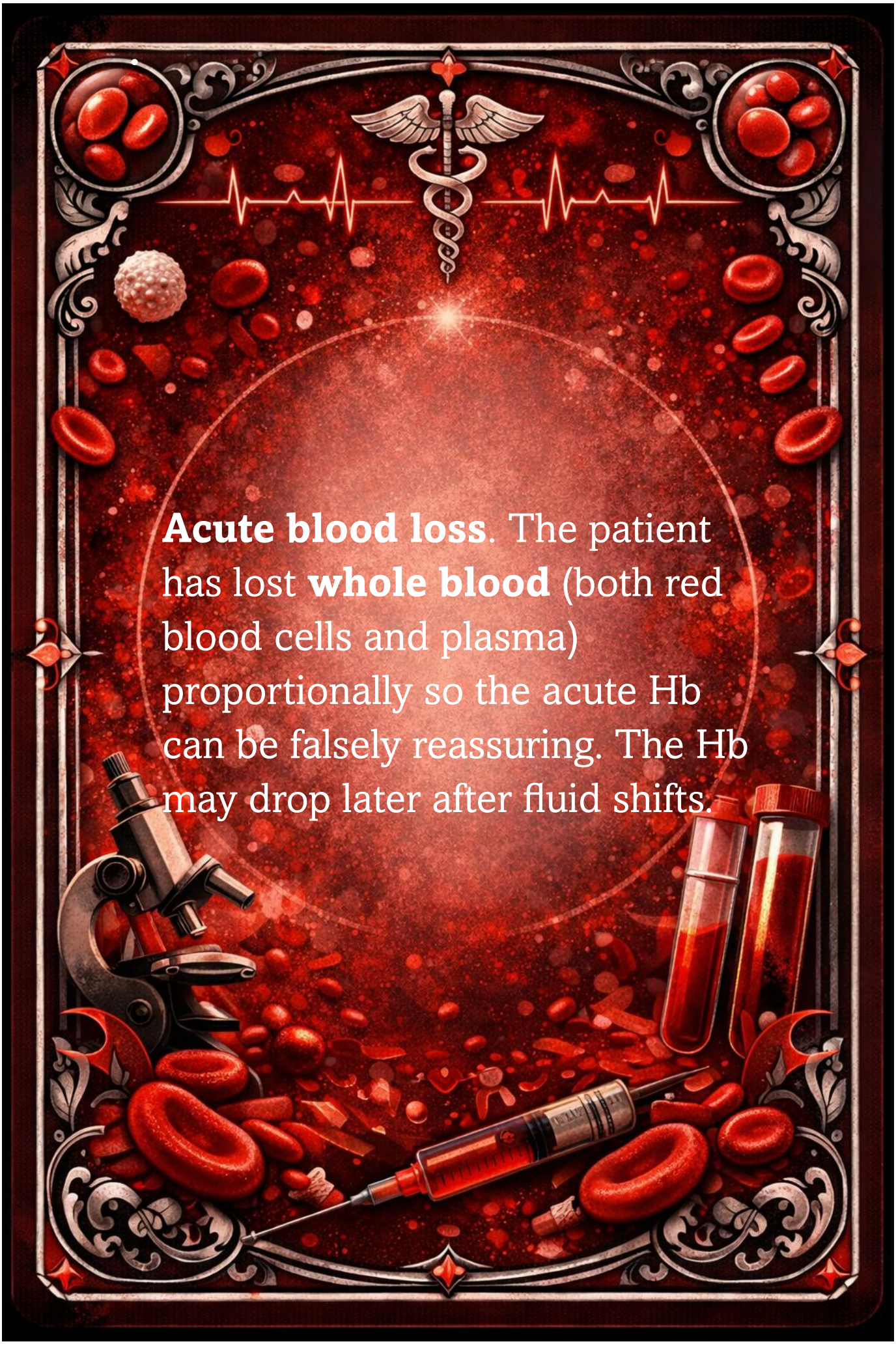
A 28-year-old woman presents with fatigue. Heavy menstrual bleeding. Walking around, haemodynamically stable.

Hb: 65 g/L (120–160)
WCC: 6.5 $x10^9$/L (4–11)
Platelets: 480 $x10^9$/L (150–400)
MCV: 70 fL (80–100)
Hct: 0.22 (0.36–0.46)


Severe **iron deficiency anaemia,** physiological compensation.

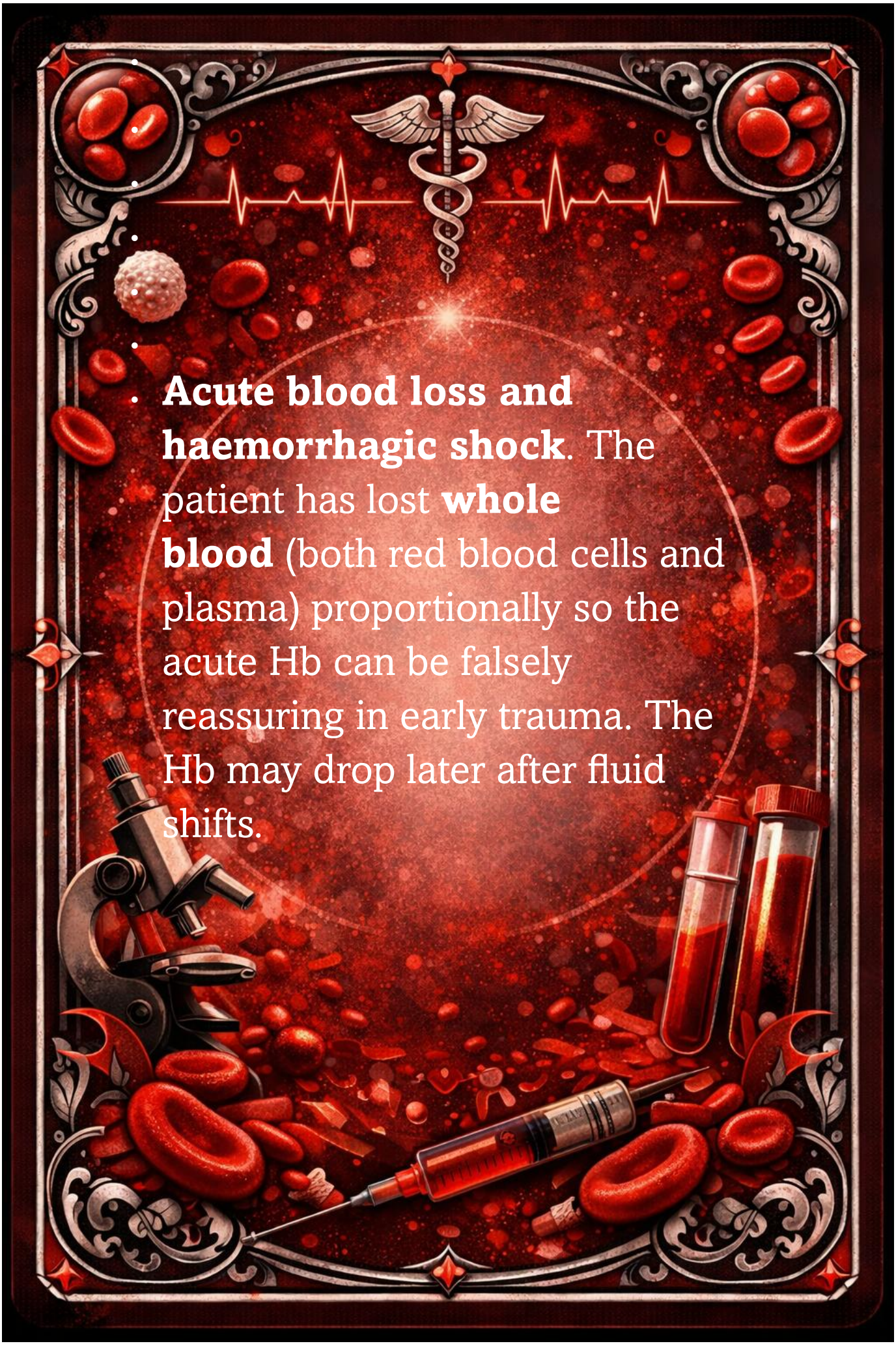
A 70-year-old male presents with ongoing rectal bleeding and dizziness on standing.

Hb: 90 g/L (130–180)
WCC: 9.0 $x10^9$/L (4–11)
Platelets: 250 $x10^9$/L (150–400)
MCV: 88 fL (80–100)
Hct: 0.30 (0.40–0.52)
Lactate: 3.5 mmol/L (<2)


Acute blood loss. The patient has lost **whole blood** (both red blood cells and plasma) proportionally so the acute Hb can be falsely reassuring. The Hb may drop later after fluid shifts.

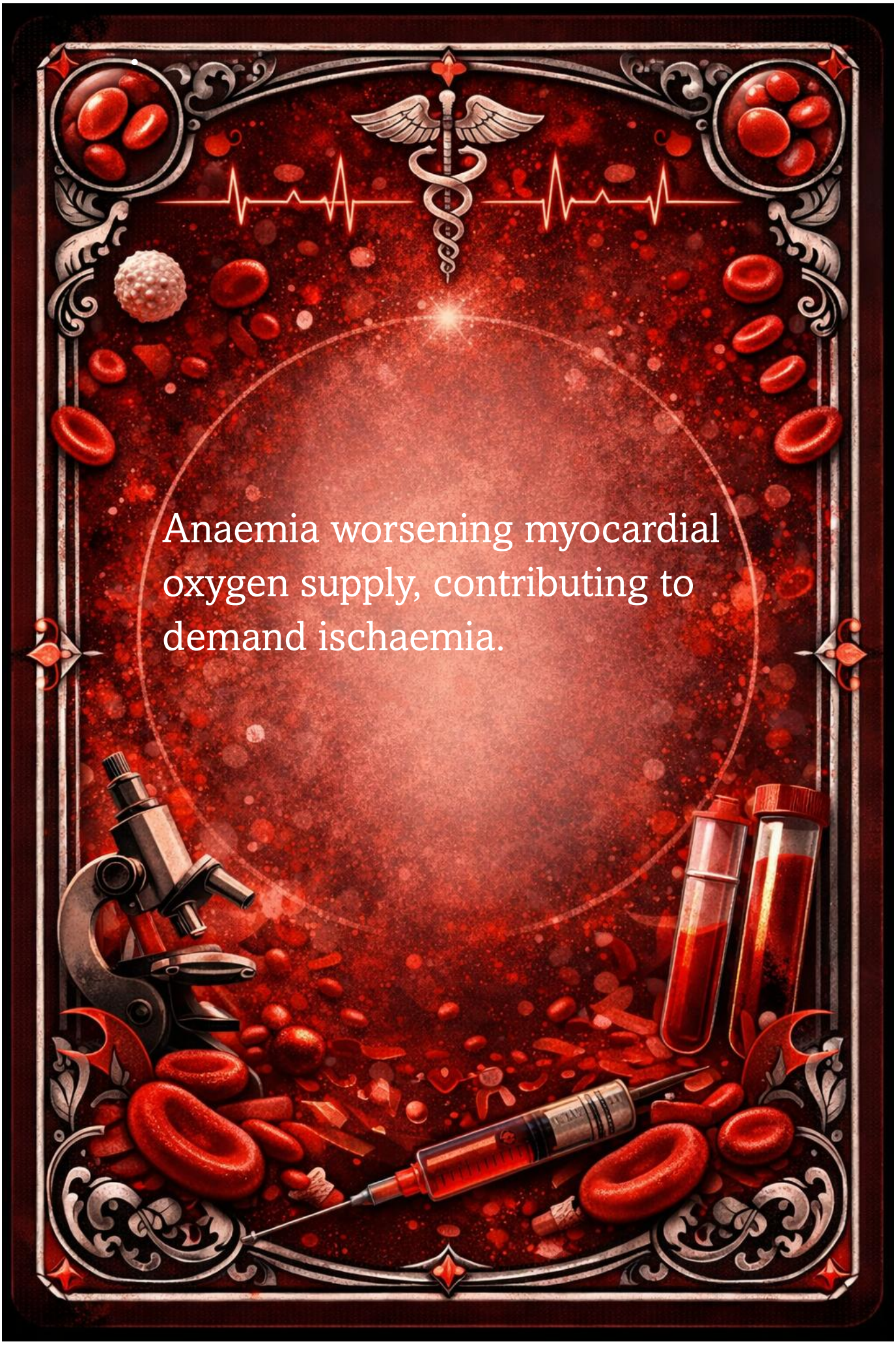
A 35-year-old male presents after major trauma with hypotension and tachycardia.

Hb: 100 g/L (130–180)
WCC: 12.5 x10^9/L (4–11)
Platelets: 210 x10^9/L (150–400)
MCV: 90 fL (80–100)
Hct: 0.32 (0.40–0.52)
Lactate: 5.0 mmol/L (<2)


Acute blood loss and haemorrhagic shock. The patient has lost **whole blood** (both red blood cells and plasma) proportionally so the acute Hb can be falsely reassuring in early trauma. The Hb may drop later after fluid shifts.

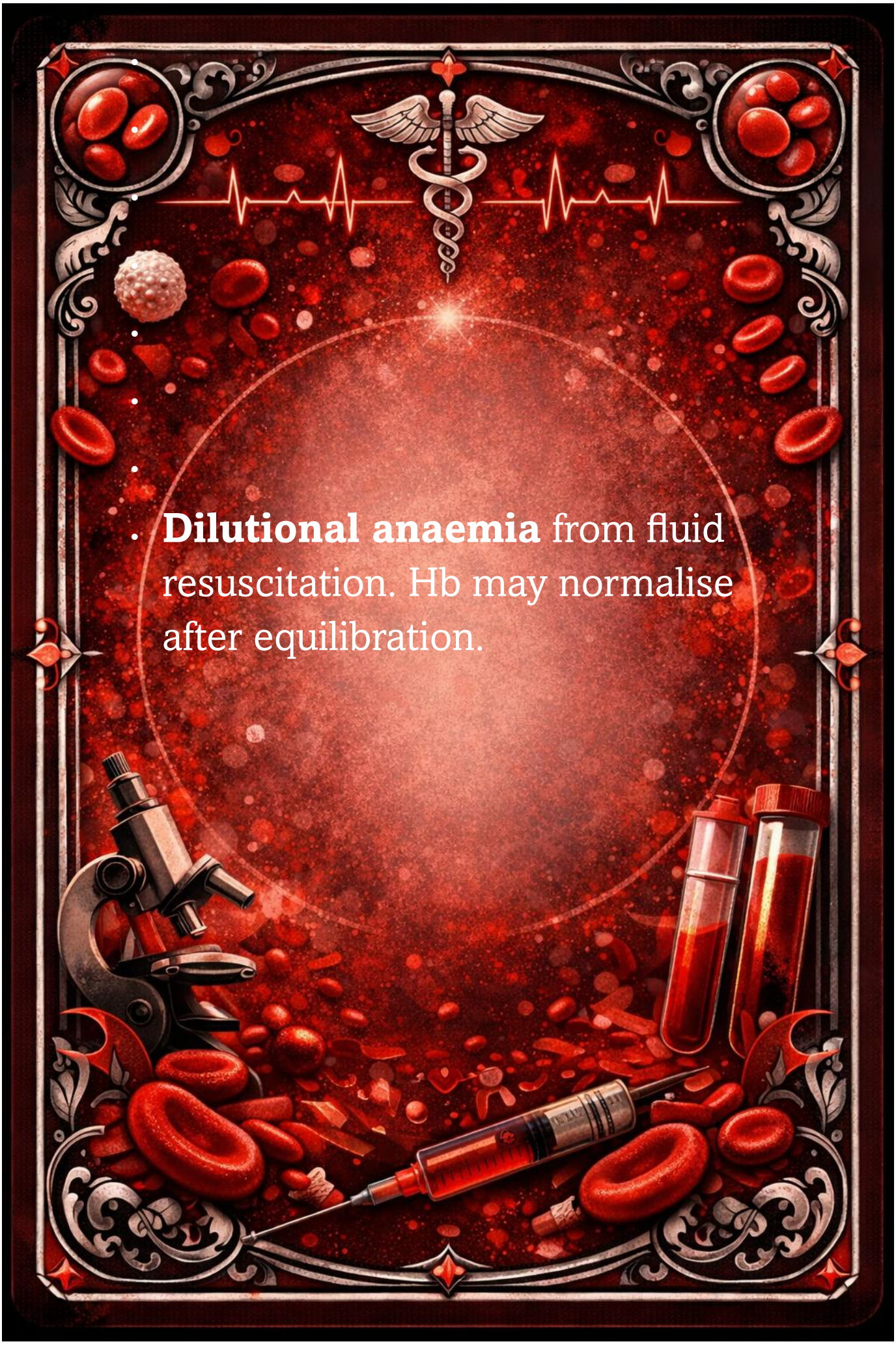
78-year-old male with known IHD, unstable angina and now chest pain on minimal exertion.

Hb: 80 g/L (130–180)
WCC: 7.0 $x10^9$/L (4–11)
Platelets: 260 $x10^9$/L (150–400)
MCV: 88 fL (80–100)
Hct: 0.27 (0.40–0.52)
Troponin: 45 ng/L (<14)


Anaemia worsening myocardial oxygen supply, contributing to demand ischaemia.

A 32-year-old athlete presents after a triathlon and has received IV fluids for dehydration.

Hb: 115 g/L (120–160)
WCC: 7.5 x10^9/L (4–11)
Platelets: 230 x10^9/L (150–400)
MCV: 90 fL (80–100)
Hct: 0.34 (0.36–0.46)
Urea: 5.5 mmol/L (2.5–7.0)
Creatinine: 80 µmol/L (60–110)


Dilutional anaemia from fluid resuscitation. Hb may normalise after equilibration.

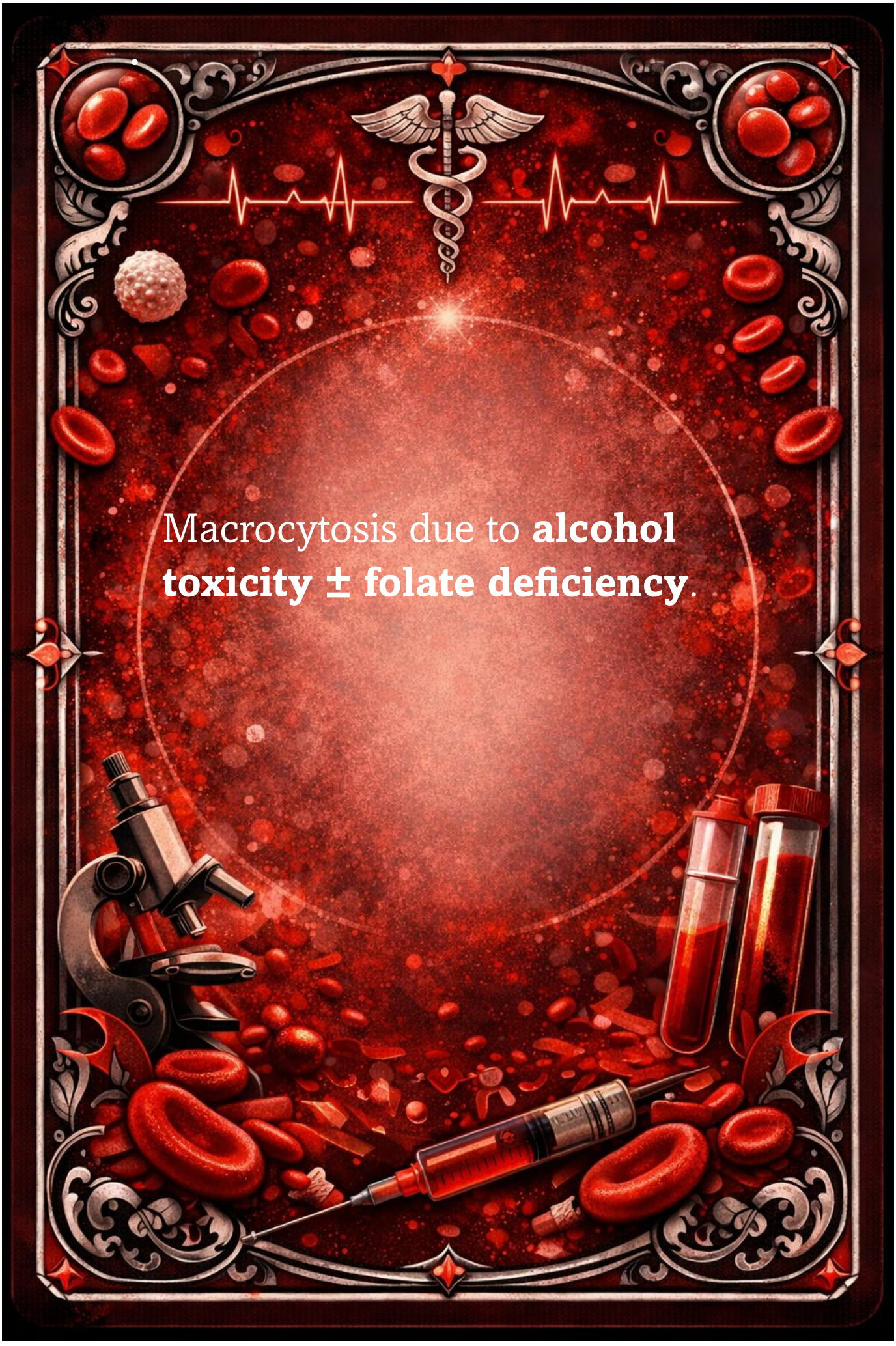
An 82-year-old patient presents with confusion.

Hb: 105 g/L (120–160)
WCC: 6.0 x10^9/L (4–11)
Platelets: 300 x10^9/L (150–400)
MCV: 65 fL (80–100)
Hct: 0.33 (0.36–0.46)
Iron: 15 µmol/L (10–30)
Ferritin: 120 µg/L (30–300)
Transferrin saturation: 30% (20–45)


Microcytosis with preserved
RBC count, **thalassaemia trait**.

A 55-year-old male with heavy alcohol use presents with fatigue.

Hb: 110 g/L (130–180)
WCC: 5.5 x10^9/L (4–11)
Platelets: 180 x10^9/L (150–400)
MCV: 105 fL (80–100)
Hct: 0.34 (0.40–0.52)
GGT: 180 U/L (<60)


Macrocytosis due to **alcohol toxicity ± folate deficiency**.

A 40-year-old female with prior gastric bypass presents with paraesthesia.

Hb: 95 g/L (120–160)
WCC: 5.0 x10^9/L (4–11)
Platelets: 200 x10^9/L (150–400)
MCV: 110 fL (80–100)
Hct: 0.30 (0.36–0.46)
B12: 90 pmol/L (150–700)


Megaloblastic anaemia due to B12 deficiency. Neurological deficits may be irreversible if delayed.

A 65-year-old male on dialysis presents with dizziness post-session.

Hb: 85 g/L (130–180)
WCC: 6.5 $x10^9$/L (4–11)
Platelets: 220 $x10^9$/L (150–400)
MCV: 90 fL (80–100)
Hct: 0.28 (0.40–0.52)
Creatinine: 650 µmol/L (60–110)


Normocytic anaemia, DDx CKD with EPO deficiency, vs acute bleeding…

A 68-year-old male post femoral CVC insertion for sepsis remains tachycardic after 2U PRBC transfusion.

Pre-transfusion Hb: 68 g/L
Post-transfusion Hb: 70 g/L
WCC: 14.0 $x10^9$/L (4–11)
Platelets: 200 $x10^9$/L (150–400)
MCV: 88 fL (80–100)
Hct: 0.22 → 0.23
Lactate: 4.2 mmol/L (<2)


Failure of Hb to rise suggests **ongoing blood loss** (occult). In this case: **retroperitoneal bleed from femoral line**.

An 89-year-old female nursing home resident presents with fatigue and recurrent anaemia.

Hb: 74 g/L (120–160)
WCC: 7.0 x10^9/L (4–11)
Platelets: 240 x10^9/L (150–400)
MCV: 88 fL (80–100)
Hct: 0.25 (0.36–0.46)
Iron: 9 µmol/L (10–30)
Ferritin: 40 µg/L (30–300)
Transferrin saturation: 15% (20–45)


Chronic anaemia in frailty.
Transfusion decision is
symptom + goals-of-care based, not just Hb.

A 52-year-old male admitted for unrelated issues has iron studies performed.

Iron: 32 µmol/L (10–30)
Ferritin: 900 µg/L (30–300)
Transferrin saturation: 65% (20–45)


Pattern suggests **iron overload (haemochromatosis)**.

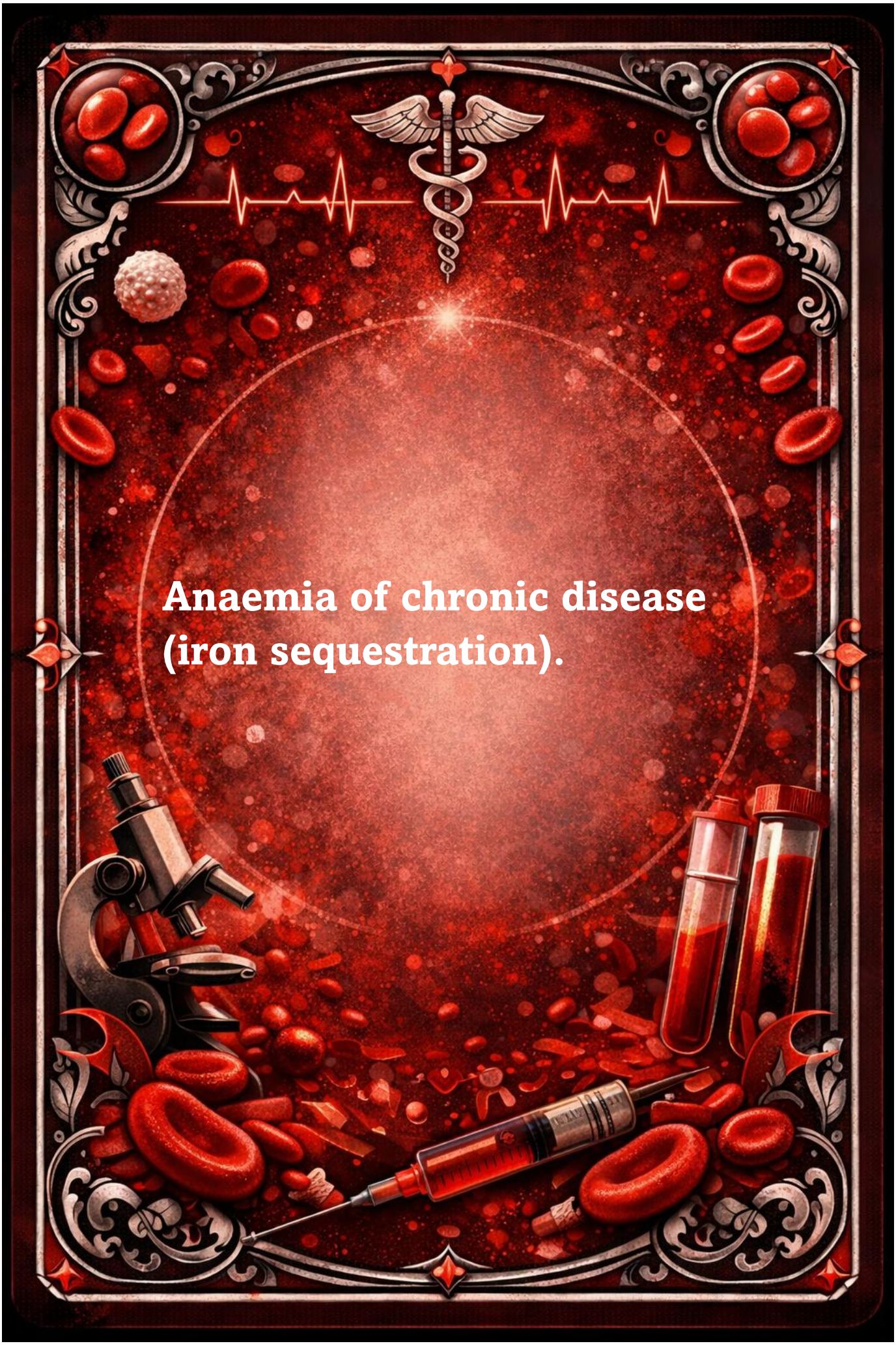
A 35-year-old female presents with fatigue and heavy menstrual bleeding.

Hb: 88 g/L (120–160)
WCC: 6.8 x10^9/L (4–11)
Platelets: 410 x10^9/L (150–400)
MCV: 72 fL (80–100)
Hct: 0.29 (0.36–0.46)
Iron: 5 µmol/L (10–30)
Ferritin: 8 µg/L (30–300)
Transferrin saturation: 8% (20–45)


Classic **iron deficiency anaemia**.

A 60-year-old male with a chronic diabetic foot infection presents with fatigue.

Hb: 95 g/L (120–160)
WCC: 11.5 x10^9/L (4–11)
Platelets: 300 x10^9/L (150–400)
MCV: 85 fL (80–100)
Hct: 0.31 (0.40–0.52)
Iron: 7 µmol/L (10–30)
Ferritin: 150 µg/L (30–300)
Transferrin saturation: 12% (20–45)


Anaemia of chronic disease
(iron sequestration).

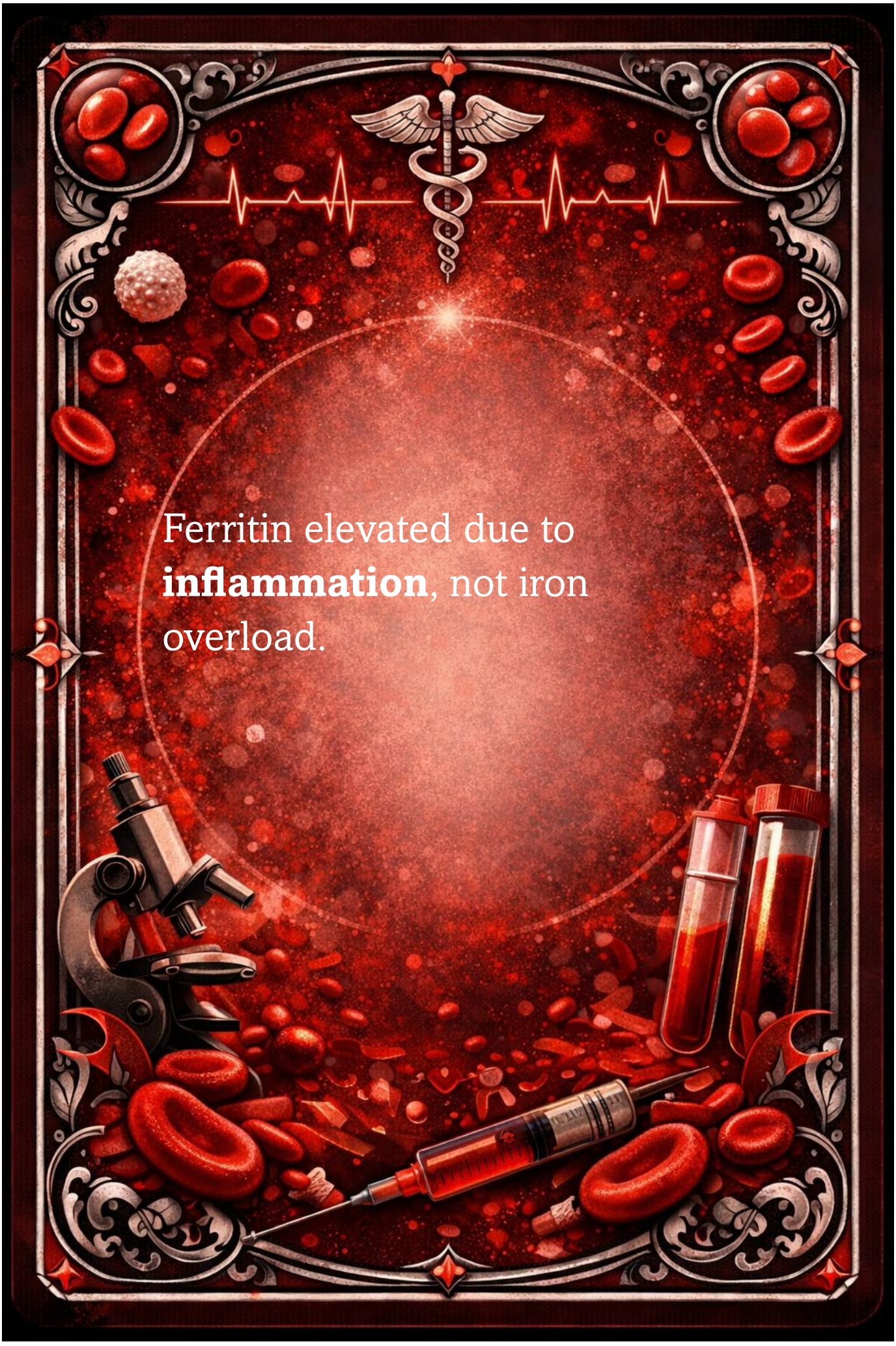
A 70-year-old male with malignancy and poor nutrition presents with fatigue.

Hb: 85 g/L (120–160)
WCC: 8.0 x10^9/L (4–11)
Platelets: 280 x10^9/L (150–400)
MCV: 80 fL (80–100)
Hct: 0.28 (0.40–0.52)
Iron: 6 µmol/L (10–30)
Ferritin: 60 µg/L (30–300)
Transferrin saturation: 10% (20–45)


Mixed iron deficiency and
anaemia of chronic disease.

A 50-year-old male presents with sepsis.

Iron: 8 µmol/L (10–30)
Ferritin: 1200 µg/L (30–300)
Transferrin saturation: 18% (20–45)
CRP: 200 mg/L (<5)


Ferritin elevated due to
inflammation, not iron
overload.

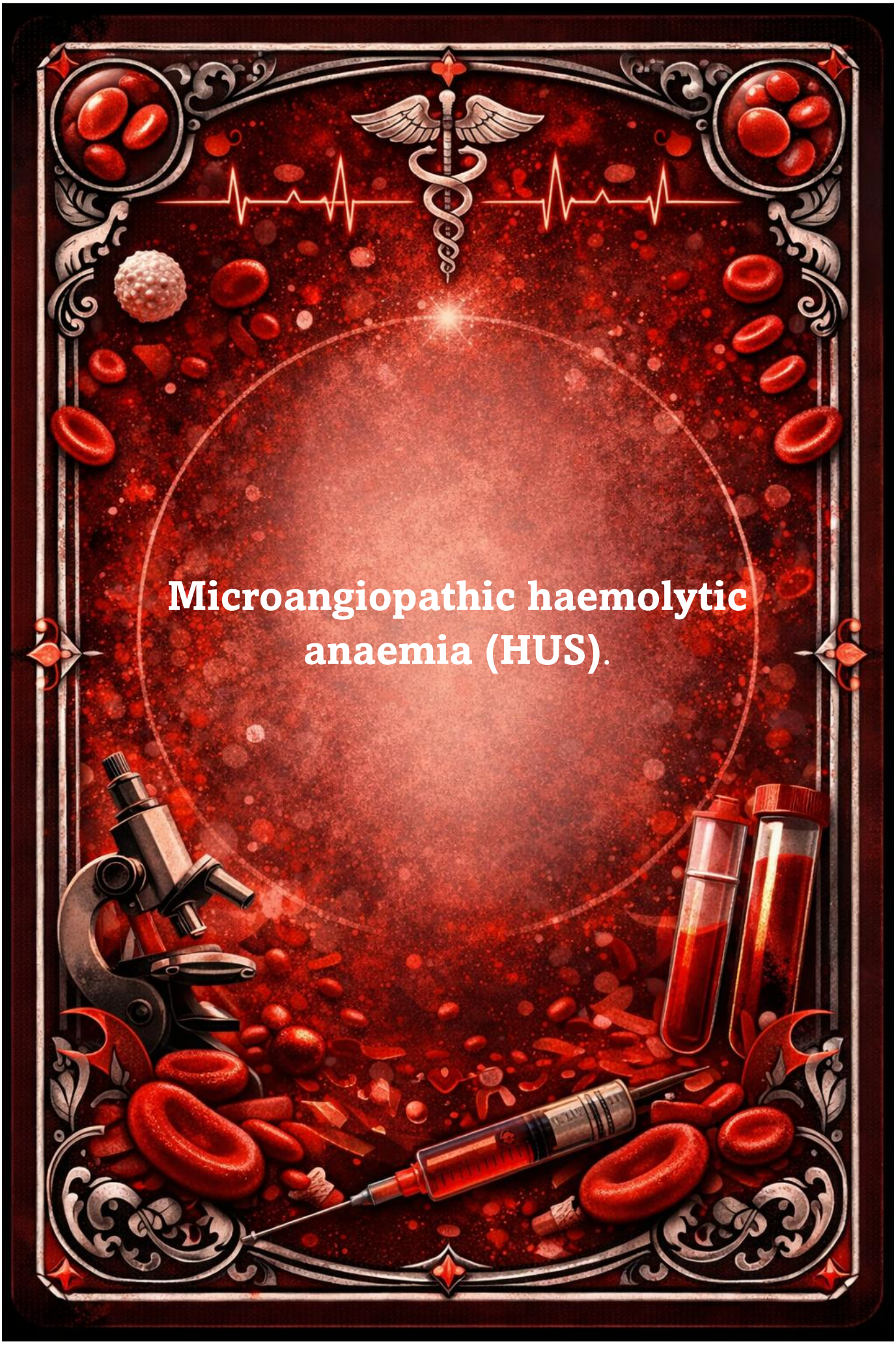
A 65-year-old malnourished patient presents with fatigue.

Hb: 90 g/L (120–160)
WCC: 5.5 x10^9/L (4–11)
Platelets: 200 x10^9/L (150–400)
MCV: 88 fL (80–100)
Hct: 0.29 (0.36–0.46)
RDW: 18% (11–15)
Iron: 6 µmol/L (10–30)
Ferritin: 10 µg/L (30–300)
Transferrin saturation: 10% (20–45)
B12: 100 pmol/L (150–700)


Dual deficiency (iron + B12)
with normal MCV due to
averaging.

A 4-year-old child presents with diarrhoea and reduced urine output.

Hb: 85 g/L (110–140)
WCC: 12.0 $x10^9$/L (5–15)
Platelets: 60 $x10^9$/L (150–400)
MCV: 85 fL (75–90)
Hct: 0.26 (0.33–0.39)
Creatinine: 180 µmol/L (20–70)
LDH: 900 U/L (100–250)


Microangiopathic haemolytic anaemia (HUS).

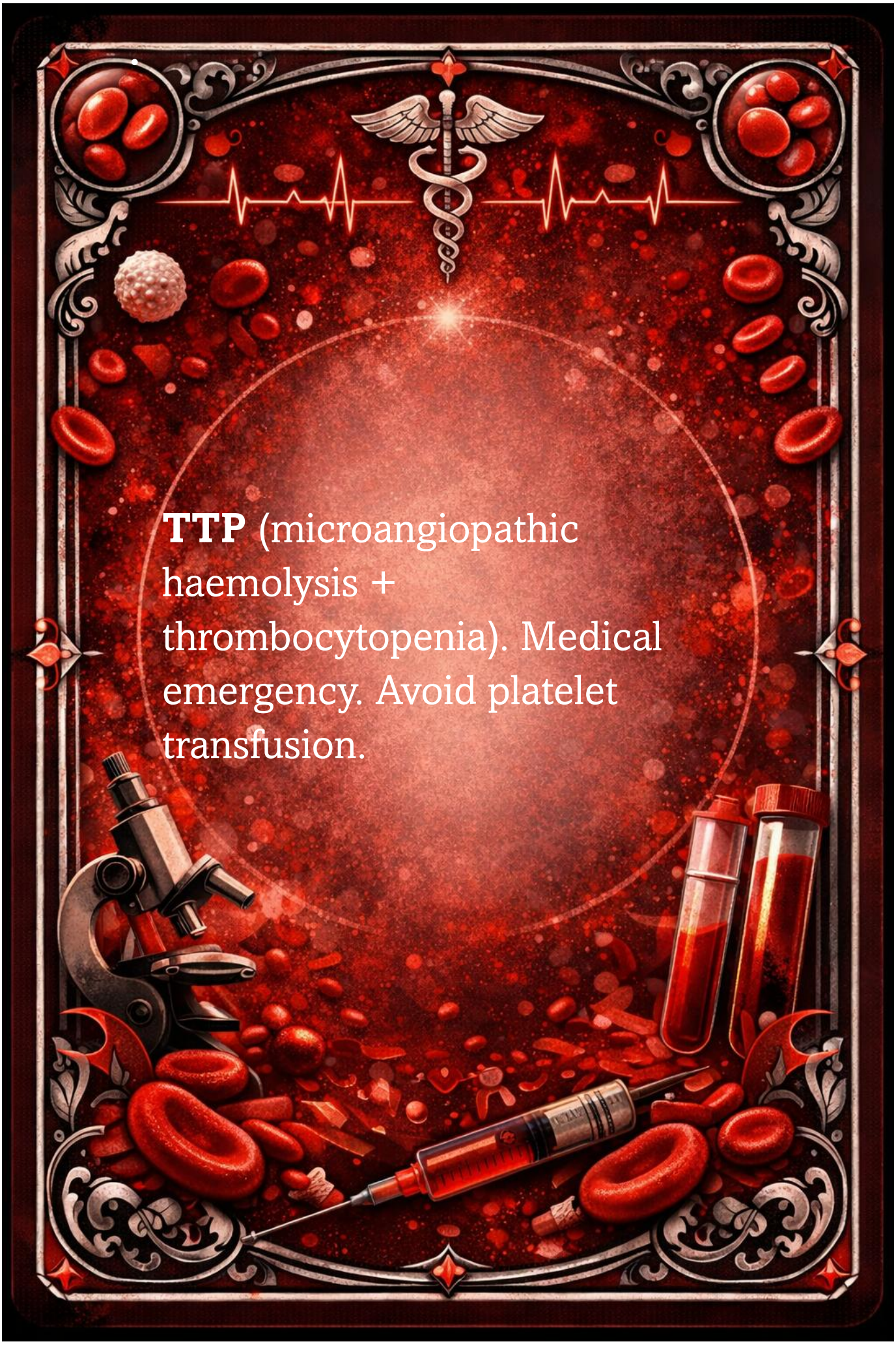
A 48-year-old male presents with jaundice and fatigue.

Hb: 100 g/L (130–180)
WCC: 7.0 x10^9/L (4–11)
Platelets: 220 x10^9/L (150–400)
MCV: 90 fL (80–100)
Hct: 0.32 (0.40–0.52)
Bilirubin: 60 µmol/L (<20)
LDH: 600 U/L (100–250)
Haptoglobin: <0.1 g/L (0.3–2.0)


Haemolysis.

A 42-year-old female presents with confusion, petechiae and fever.

Hb: 85 g/L (120–160)
WCC: 9.5 x10^9/L (4–11)
Platelets: 18 x10^9/L (150–400)
MCV: 90 fL (80–100)
Hct: 0.27 (0.36–0.46)
LDH: 850 U/L (100–250)
Creatinine: 120 µmol/L (45–90)


TTP (microangiopathic haemolysis + thrombocytopenia). Medical emergency. Avoid platelet transfusion.

A 30-year-old female presents after incidental blood test showing low platelets. No bleeding.

Hb: 130 g/L (120–160)
WCC: 6.0 x10^9/L (4–11)
Platelets: 8 x10^9/L (150–400)
MCV: 88 fL (80–100)
Hct: 0.40 (0.36–0.46)


Severe thrombocytopenia, high risk of **spontaneous intracranial bleed**.

A 65-year-old male presents with sepsis from pneumonia, clinically deteriorating.

Hb: 110 g/L (130–180)
WCC: 14.0 $x10^9$/L (4–11)
Platelets: 90 $x10^9$/L (150–400)
MCV: 88 fL (80–100)
Hct: 0.34 (0.40–0.52)
INR: 1.4 (0.9–1.2)
APTT: 38 s (25–35)


Early DIC, consumption
starting. Platelets often fall first.

A 70-year-old male in septic shock in resus.

Hb: 100 g/L (130–180)
WCC: 18.0 x10^9/L (4–11)
Platelets: 40 x10^9/L (150–400)
MCV: 90 fL (80–100)
Hct: 0.30 (0.40–0.52)
INR: 2.0 (0.9–1.2)
APTT: 60 s (25–35)
Fibrinogen: 0.8 g/L (2.0–4.0)


Overt DIC. Consumption of clotting factors.

A 45-year-old male presents well but has an unexpected low platelet count.

Hb: 140 g/L (130–180)
WCC: 7.5 x10^9/L (4–11)
Platelets: 25 x10^9/L (150–400)
MCV: 90 fL (80–100)
Hct: 0.42 (0.40–0.52)

Blood film: platelet clumping


Lab artifact (EDTA-induced clumping).
Pseudothrombocytopenia.

A 50-year-old male has routine bloods taken. He is asymptomatic.

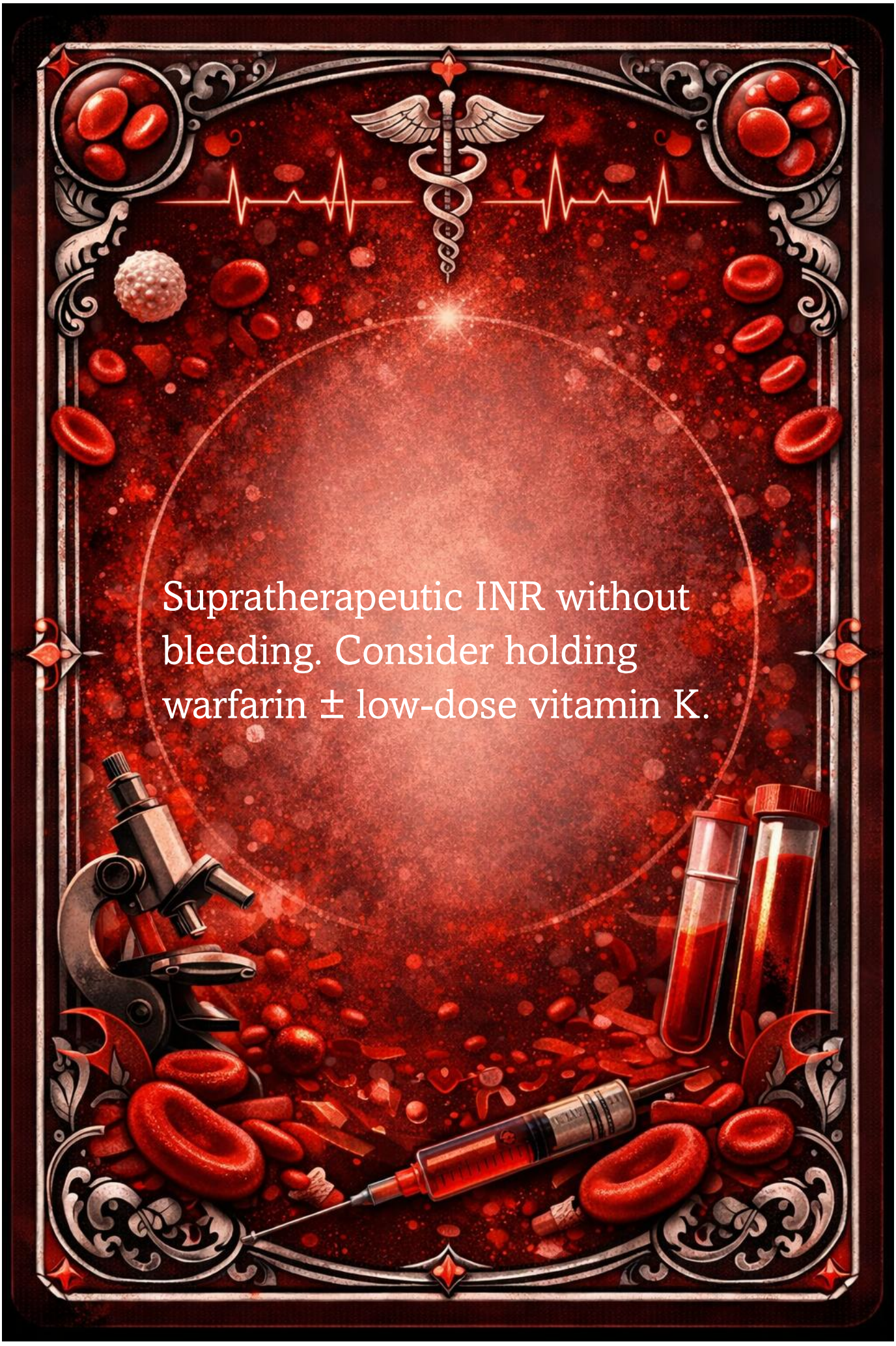
Hb: 140 g/L (130–180)
WCC: 6.5 x10^9/L (4–11)
Platelets: 250 x10^9/L (150–400)
MCV: 90 fL (80–100)
Hct: 0.42 (0.40–0.52)
K^+: 6.5 mmol/L (3.5–5.0)

. Hb (VBG): 75


False hyperkalaemia due to haemolysis.

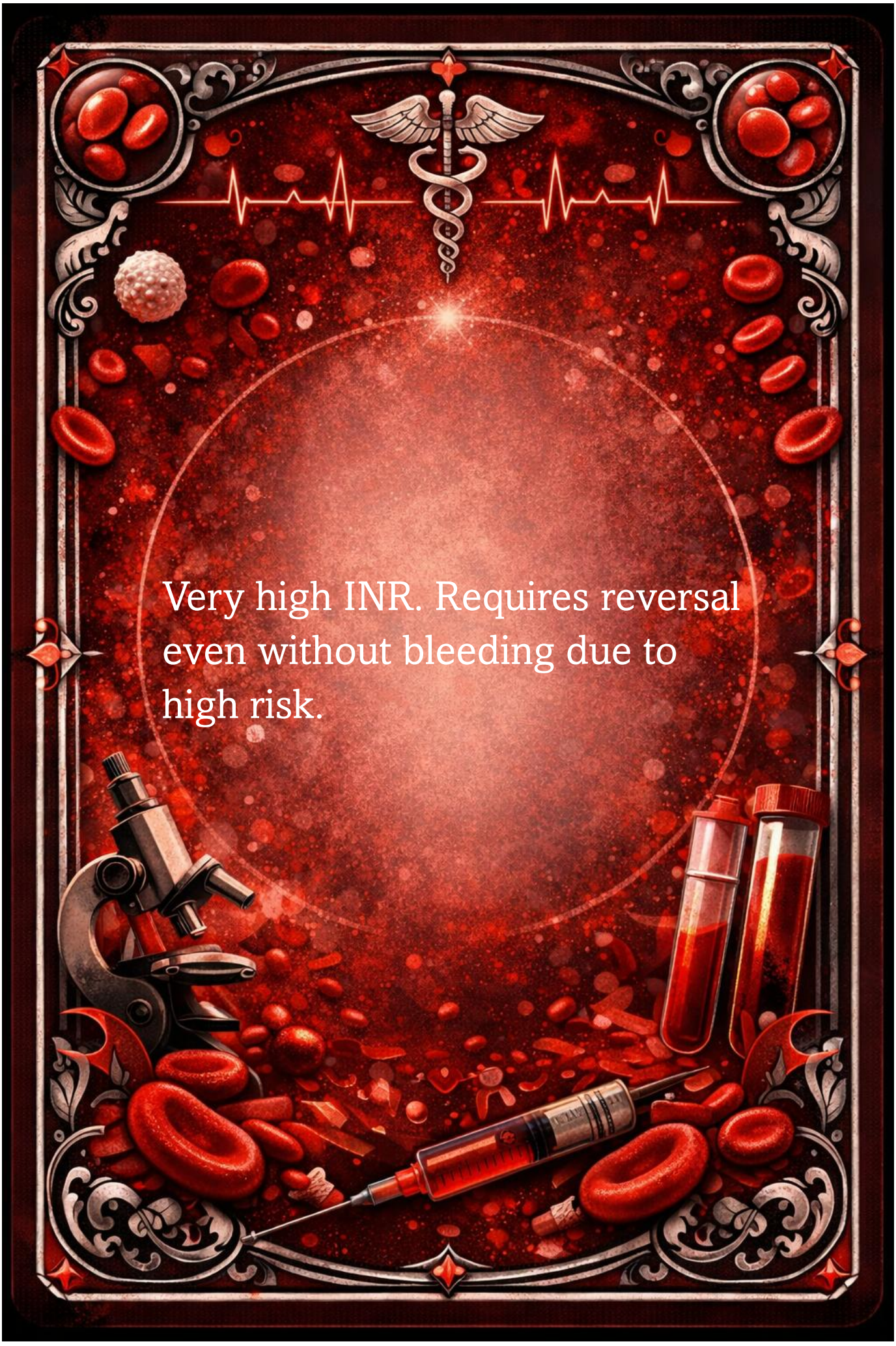
An 82-year-old female on warfarin presents after a fall with no injuries.

INR: 5.0 (0.9–1.2)


Supratherapeutic INR without bleeding. Consider holding warfarin ± low-dose vitamin K.

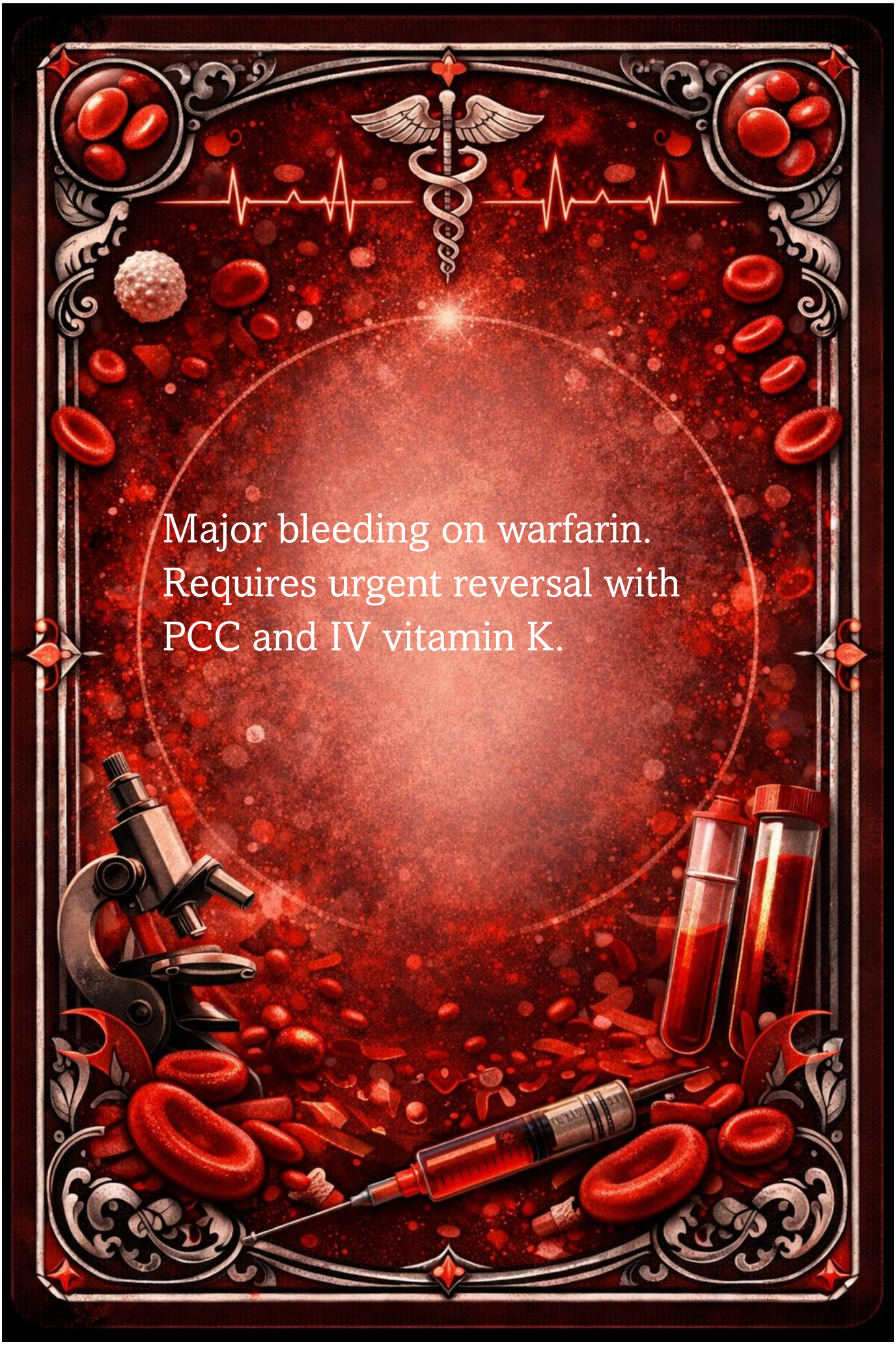
An 80-year-old male on warfarin presents after a fall with no injuries.

INR: 10.0 (0.9–1.2)


Very high INR. Requires reversal even without bleeding due to high risk.

A 75-year-old male presents with melaena while on warfarin.

Hb: 85 g/L (130–180)
WCC: 9.0 x10^9/L (4–11)
Platelets: 220 x10^9/L (150–400)
MCV: 88 fL (80–100)
Hct: 0.28 (0.40–0.52)
INR: 4.5 (0.9–1.2)


Major bleeding on warfarin.
Requires urgent reversal with
PCC and IV vitamin K.

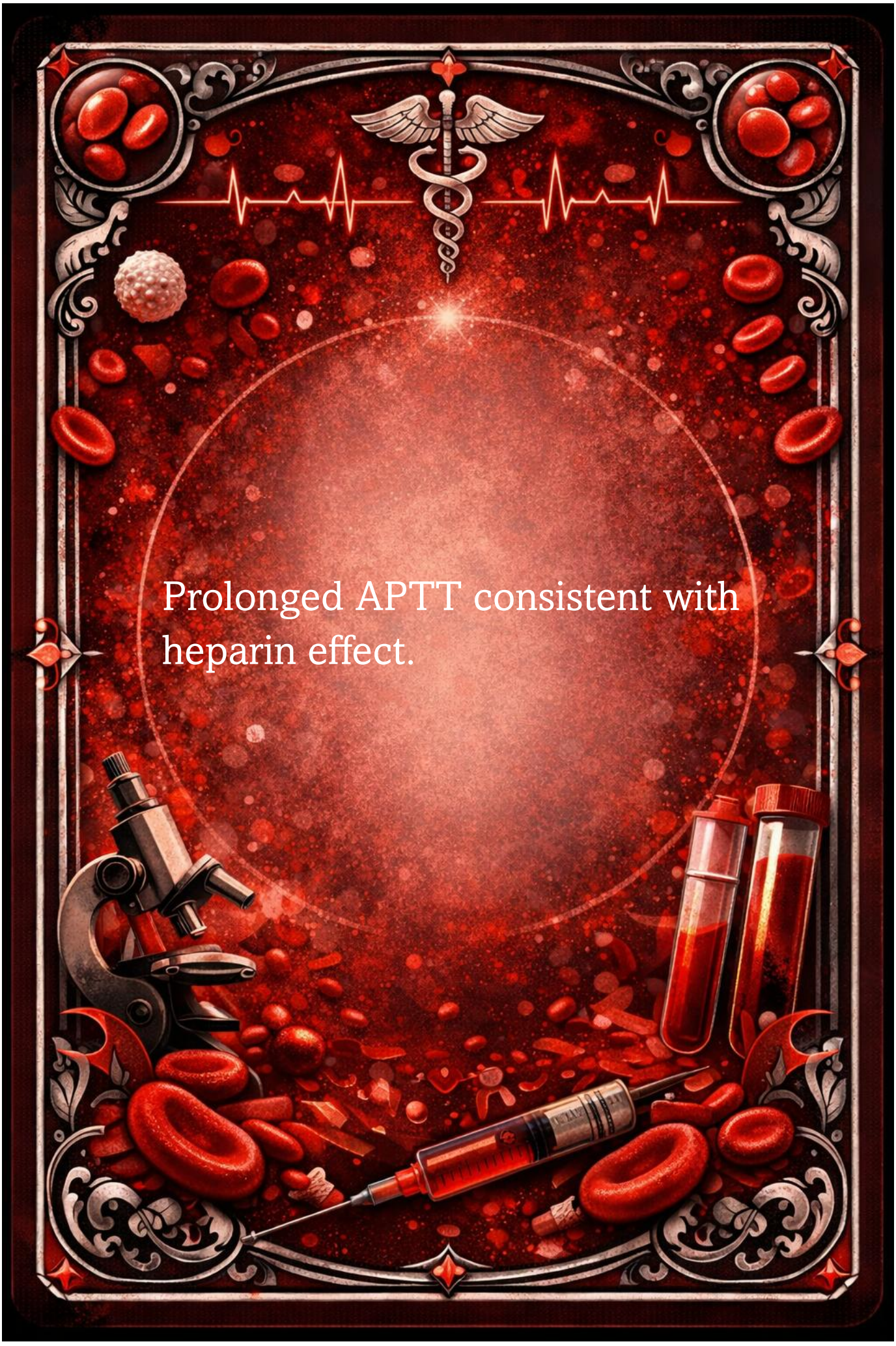
A 60-year-old male with chronic liver disease presents with jaundice.

Hb: 105 g/L (130–180)
WCC: 6.5 $x10^9$/L (4–11)
Platelets: 90 $x10^9$/L (150–400)
MCV: 95 fL (80–100)
Hct: 0.32 (0.40–0.52)
INR: 1.8 (0.9–1.2)
APTT: 50 s (25–35)


Liver disease coagulopathy due to reduced clotting factor synthesis.

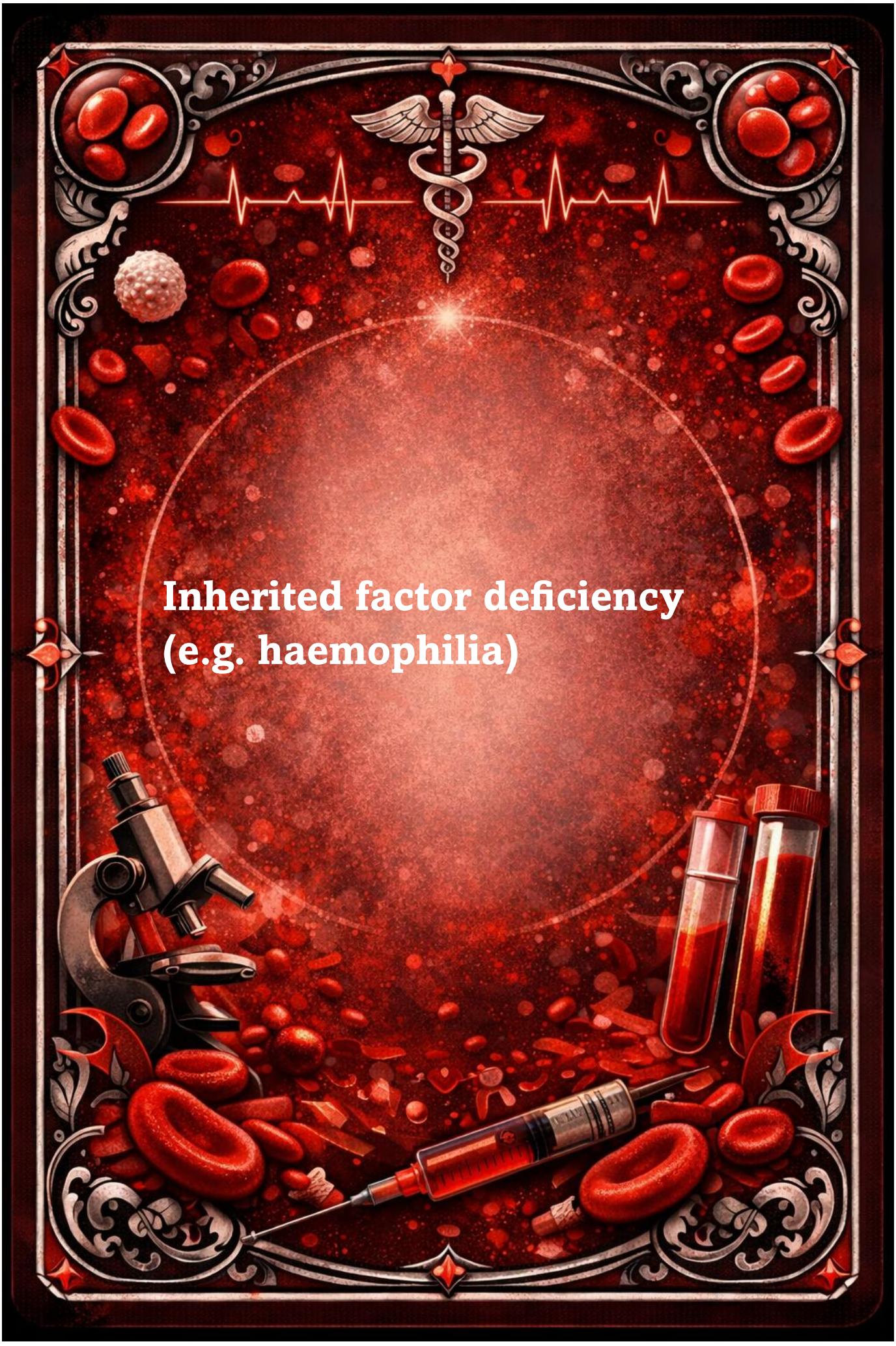
A 68-year-old male admitted with NSTEMI is on an IV heparin infusion.

INR: 1.0 (0.9–1.2)
APTT: 75 s (25–35)


Prolonged APTT consistent with heparin effect.

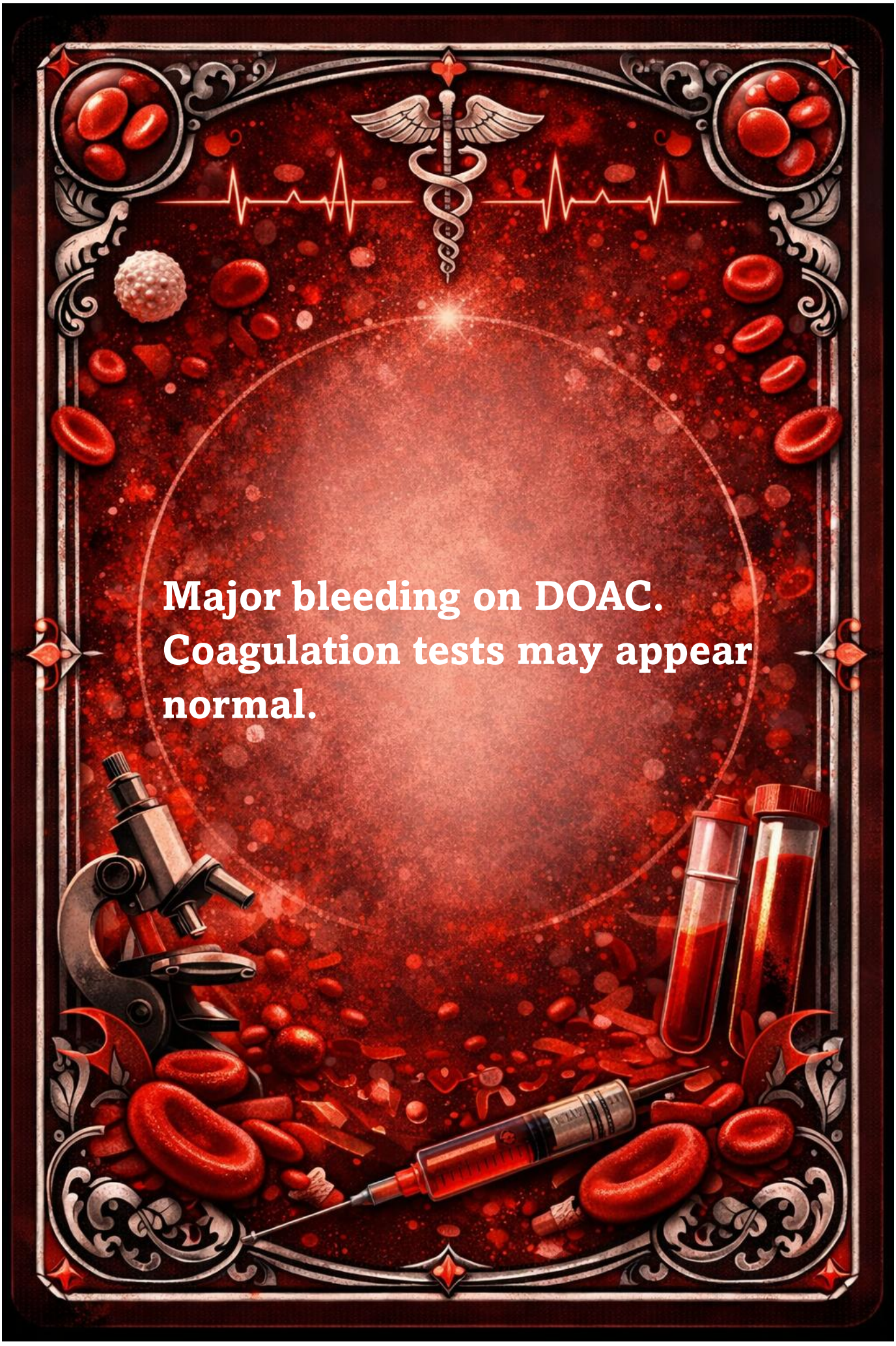
A 22-year-old male presents with prolonged bleeding after minor trauma.

INR: 1.0 (0.9–1.2)
APTT: 65 s (25–35)


Inherited factor deficiency
(e.g. haemophilia)

An 84-year-old female presents after a fall. She is on apixaban.

CT brain: intracranial haemorrhage
INR: 1.1 (0.9–1.2)
APTT: 32 s (25–35)


Major bleeding on DOAC.
Coagulation tests may appear normal.

A 70-year-old male on heparin infusion has two APTT results appear on the system within 10min of each other.

APTT #1: >150 s (25–35)

APTT #2: 40 s (25–35)


Falsely elevated APTT due to heparin contamination of sample.

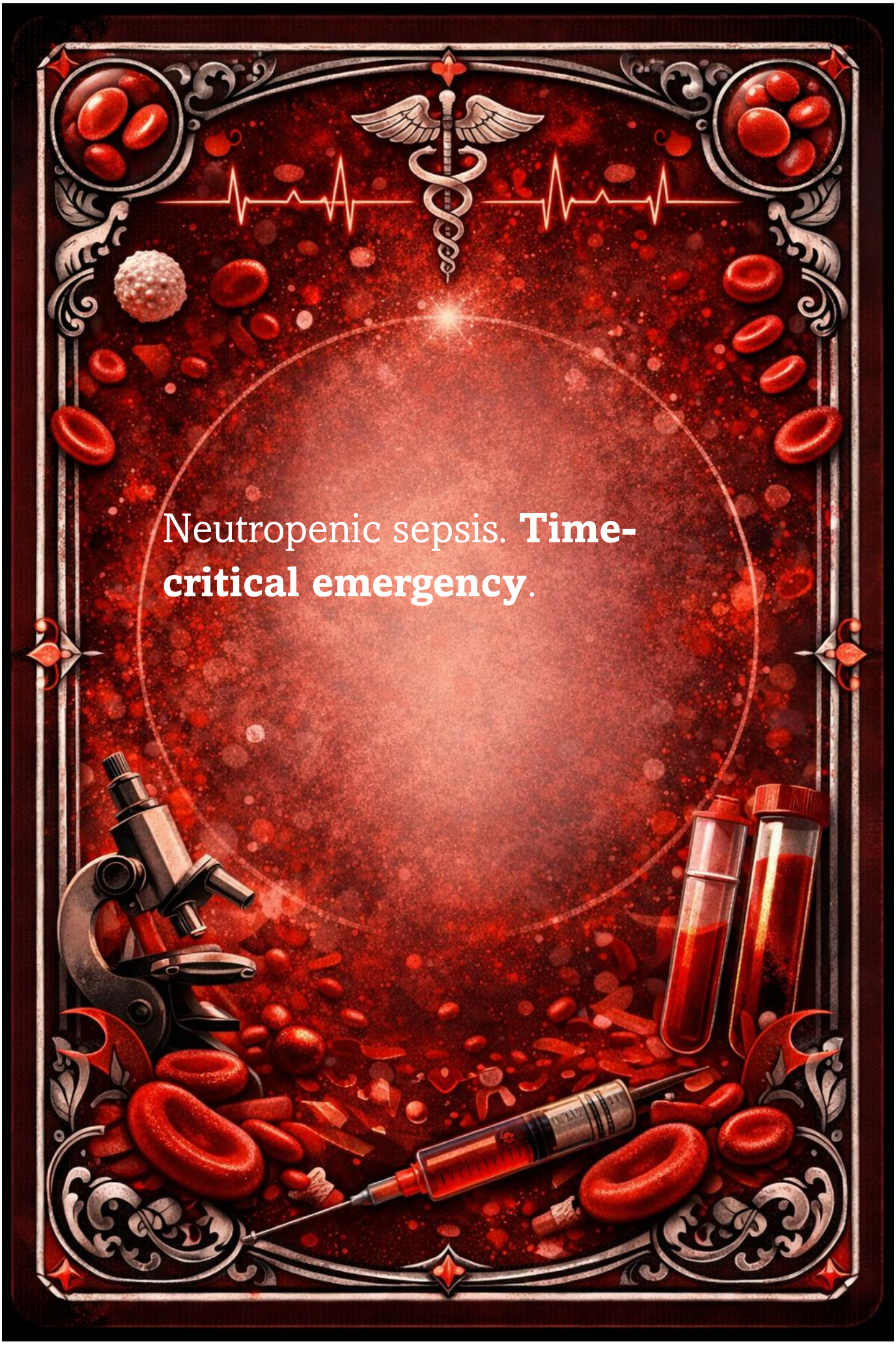
A 55-year-old male presents with fatigue, bruising and weight loss.

Hb: 75 g/L (130–180)
WCC: 120 x10^9/L (4–11)
Platelets: 40 x10^9/L (150–400)
MCV: 92 fL (80–100)
Hct: 0.24 (0.40–0.52)


Suspicious for **acute leukaemia**. Risk of leukostasis.

A 60-year-old female presents with fever after recent chemotherapy.

Hb: 105 g/L (120–160)
WCC: 0.8 x10^9/L (4–11)
Neutrophils: 0.3 x10^9/L (2–7)
Platelets: 150 x10^9/L (150–400)
MCV: 90 fL (80–100)
Hct: 0.32 (0.36–0.46)


Neutropenic sepsis. **Time-critical emergency**.

A 25-year-old male presents with viral symptoms.

Hb: 140 g/L (130–180)
WCC: 3.5 x10^9/L (4–11)
Platelets: 200 x10^9/L (150–400)
MCV: 88 fL (80–100)
Hct: 0.42 (0.40–0.52)
Lymphocytes: 0.8 x10^9/L (1.0–4.0)


Lymphopenia consistent with viral illness.

A 50-year-old female presents with fatigue and recurrent infections.

Hb: 85 g/L (120–160)
WCC: 2.5 x10^9/L (4–11)
Platelets: 70 x10^9/L (150–400)
MCV: 95 fL (80–100)
Hct: 0.27 (0.36–0.46)


Pancytopenia. Bone marrow problem until proven otherwise. Drugs, infection, malignancy all possible.

A 45-year-old male with lymphoma presents post-chemotherapy.

K^+: 6.2 mmol/L (3.5–5.0)
Phosphate: 2.5 mmol/L (0.8–1.5)
Calcium: 1.9 mmol/L (2.1–2.6)
Uric acid: 0.8 mmol/L (0.2–0.4)


Tumour lysis syndrome.

A 60-year-old male presents with anaemia and renal impairment.

Hb: 90 g/L (130–180)
WCC: 8.0 x10^9/L (4–11)
Platelets: 100 x10^9/L (150–400)
MCV: 90 fL (80–100)
Hct: 0.28 (0.40–0.52)

Blood film: schistocytes


Microangiopathic haemolysis
(TTP, HUS, DIC).

A 55-year-old female presents with fatigue and bruising.

Hb: 80 g/L (120–160)
WCC: 30 x10^9/L (4–11)
Platelets: 60 x10^9/L (150–400)
MCV: 92 fL (80–100)
Hct: 0.25 (0.36–0.46)

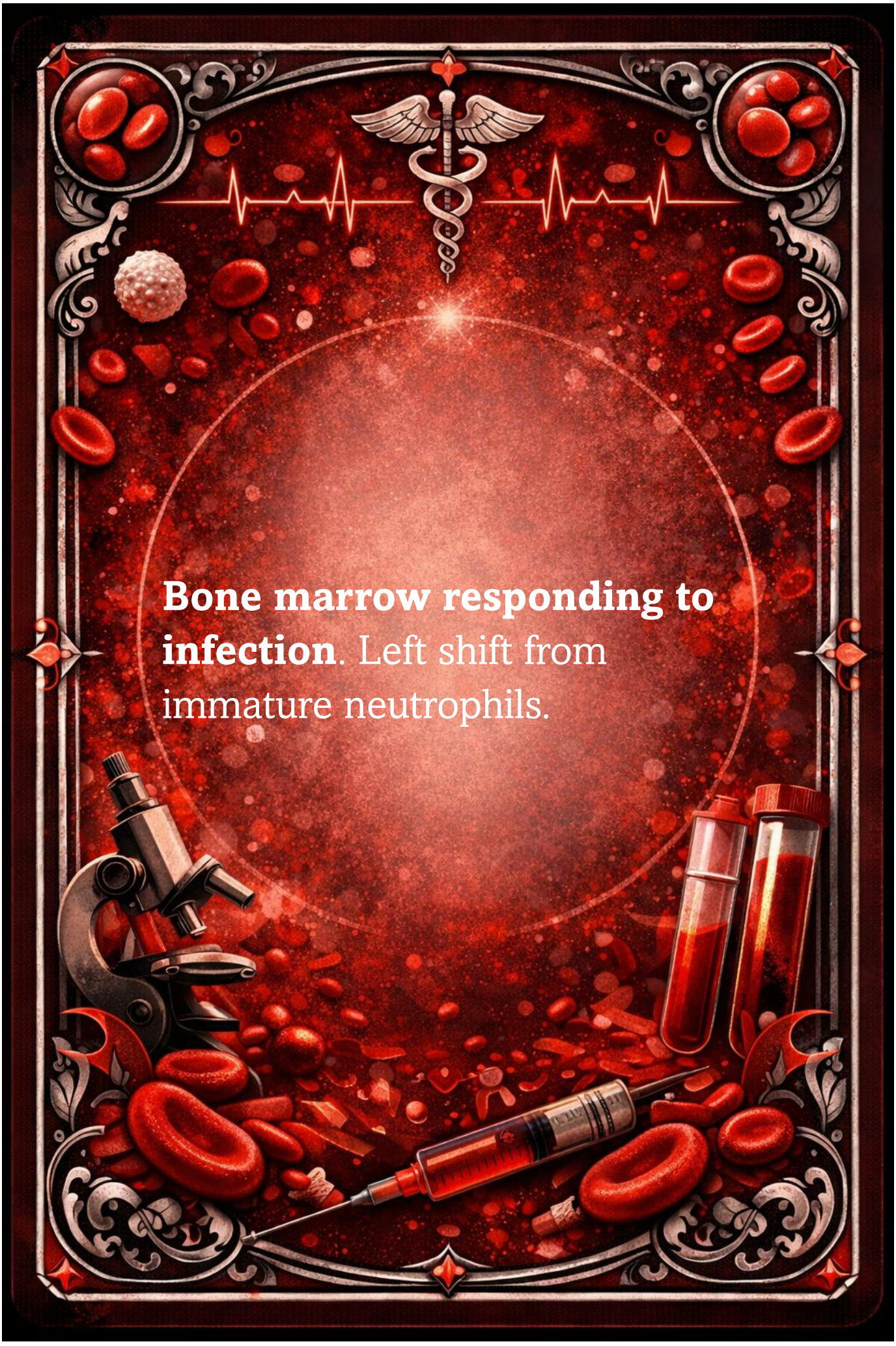
Blood film: blast cells


Suggests **acute leukaemia**.

A 65-year-old male presents with sepsis.

Hb: 120 g/L (130–180)
WCC: 18 x10^9/L (4–11)
Platelets: 250 x10^9/L (150–400)
MCV: 88 fL (80–100)
Hct: 0.36 (0.40–0.52)

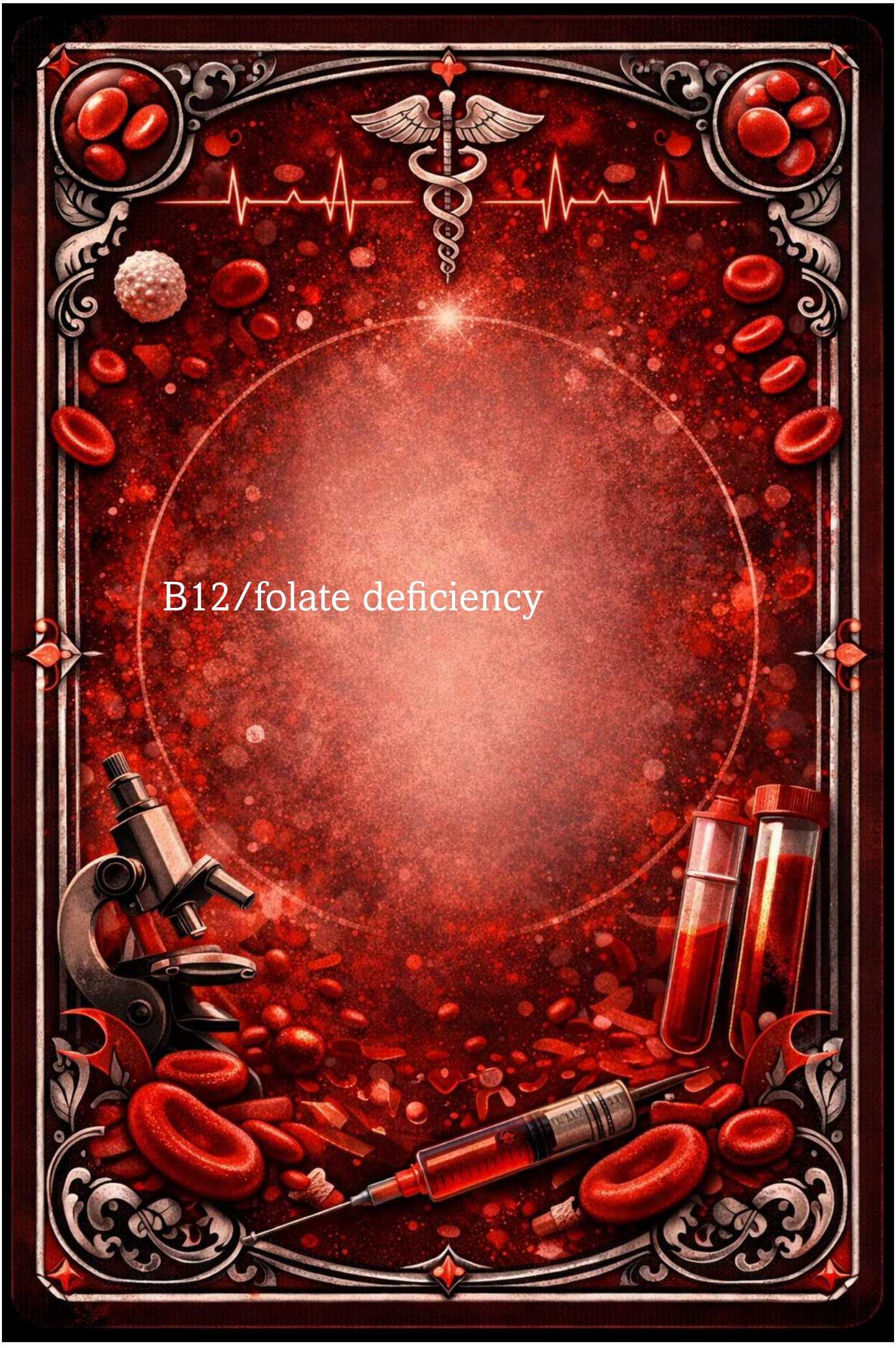
Blood film: left shift


Bone marrow responding to infection. Left shift from immature neutrophils.

A 58-year-old female with malabsorption presents with fatigue.

Hb: 95 g/L (120–160)
WCC: 5.0 x10^9/L (4–11)
Platelets: 200 x10^9/L (150–400)
MCV: 110 fL (80–100)
Hct: 0.30 (0.36–0.46)

Blood film: hypersegmented neutrophils. Right shift.


B12/folate deficiency

A 30-year-old male presents cyanotic after intentional sodium nitrite ingestion.

SpO_2: 85%
PaO_2: 95 mmHg (80–100)
MetHb: 25% (<2%)


Methaemoglobinemia.
Blood may appear chocolate-brown.

A 40-year-old female presents after house fire exposure.

SpO_2: 99%
COHb: 20% (<2%)


Carbon monoxide poisoning.
Pulse oximetry may be misleading.

A 65-year-old male has a blood gas taken from a fresh recently flushed IV line.

Hb (gas): 90 g/L (130–180)
Na^+: 150 mmol/L (135–145)
K^+: 3.0 mmol/L (3.5–5.0)
Cl^-: 115 mmol/L (95–110)


Dilutional artefact from saline contamination.

A 70-year-old female has discordant results between ED blood gas and lab FBC.

Hb (gas): 120 g/L
Hb (lab): 90 g/L (120–160)


Gas machine doesn't detect
haemolysis/interference.