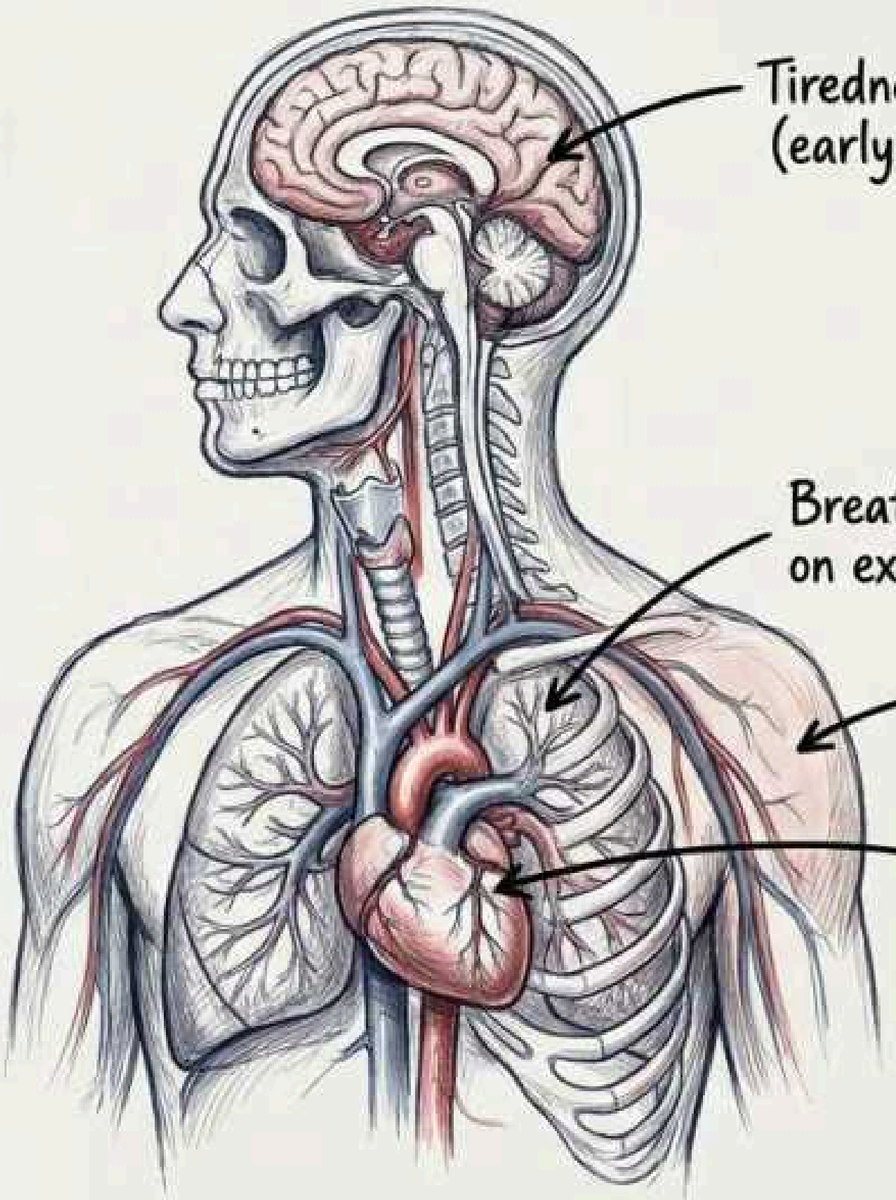


Tiredness & Weakness (early signs)

Breathlessness on exertion

Pallor / Pale skin

Tachycardia (fast heart rate) & Chest pain (severe cases)

Anaemia = [Hb] < Normal Limit → ↓ O_2 Capacity

Reduced haemoglobin concentration limits oxygen-carrying capacity.

Clinical Caveat: Slow onset allows for physiological adaptation—often masking symptoms entirely until severity peaks.

Gemini Notebook

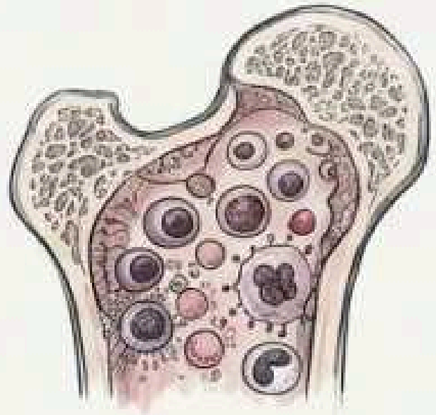
Anaemia is a Sign, Not a Diagnosis

¶ 2.2

ANAEMIA

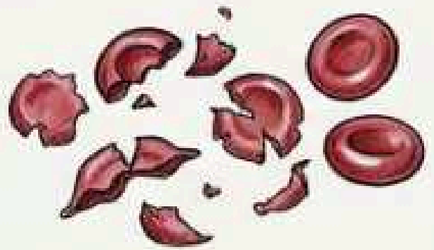
1. ↓ Production

The bone marrow is failing to make enough red cells.



2. ↑ Destruction

Red cells are being destroyed too quickly.



3. Blood Loss

Haemorrhage is actively depleting the red cell volume.

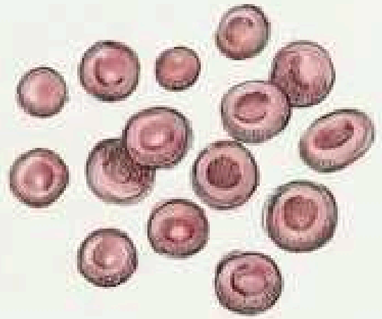
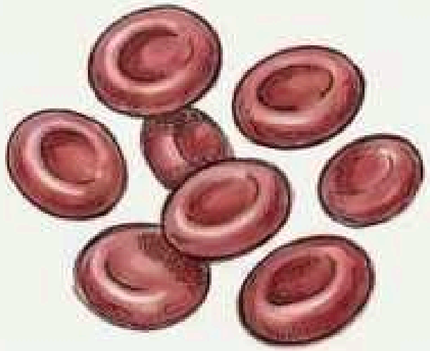
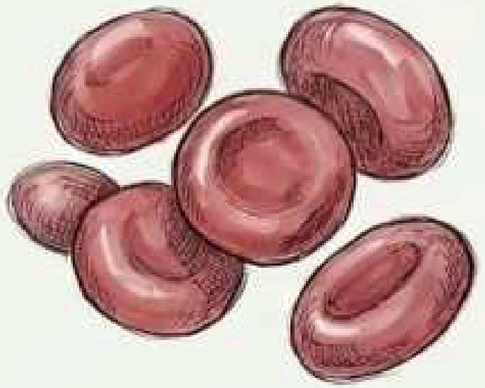


Finding the root cause is the essential clinical task.

Gemini Notebook

The First Sorting Tool: Mean Cell Volume (MCV)

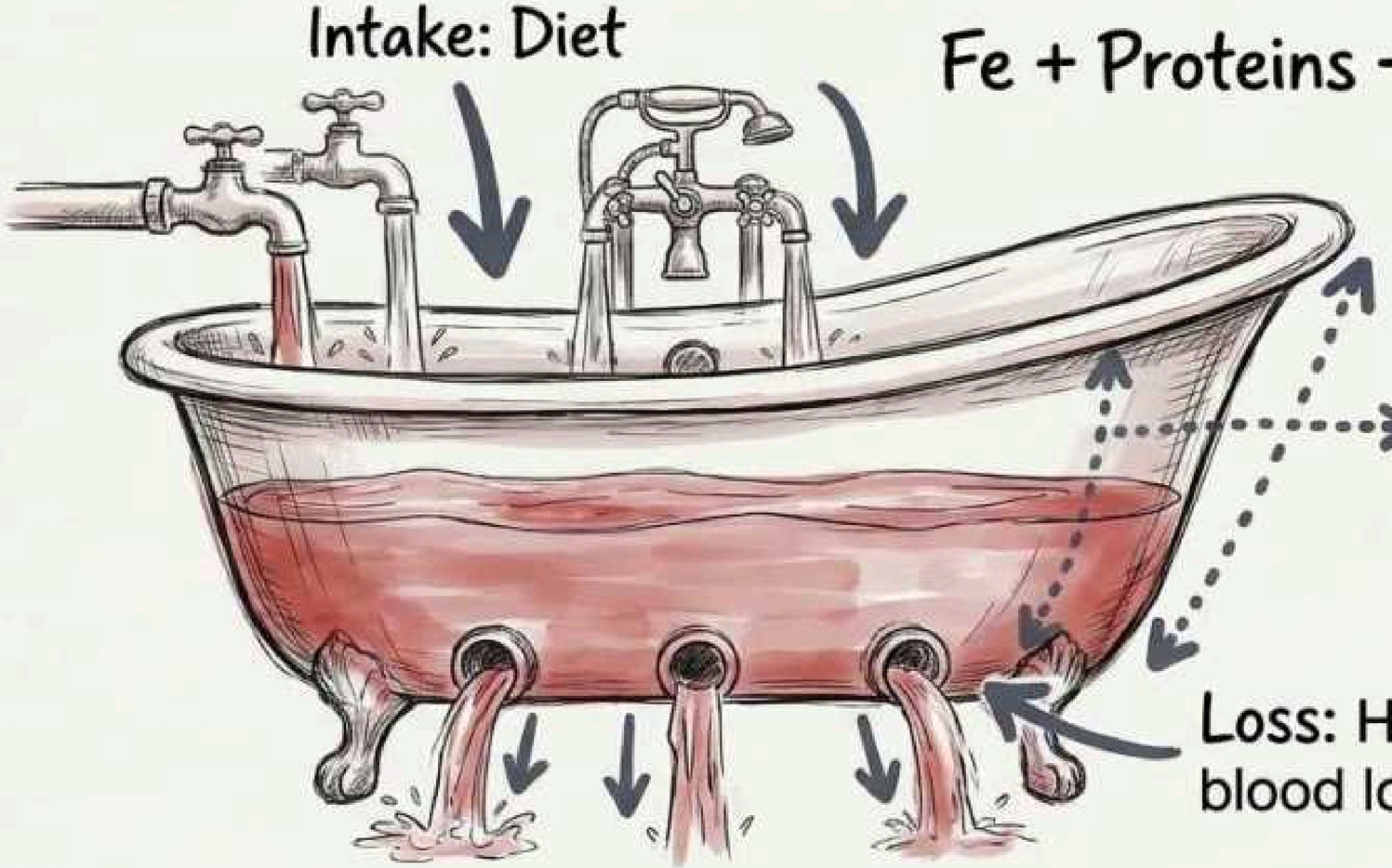
¶ 2.3

Microcytic	Normocytic	Macrocytic
		
Implicates: Haemoglobin production failure. **Primary Suspect:** Iron deficiency.	**Implicates:** Broad systemic issues. **Primary Suspects:** Blood loss, chronic disease, kidney failure, or direct marrow problems.	**Implicates:** DNA synthesis failure. **Primary Suspects:** Vitamin B12 or Folate deficiency.

Gemini Notebook

Iron Deficiency: The Global Leader

¶ 2.4



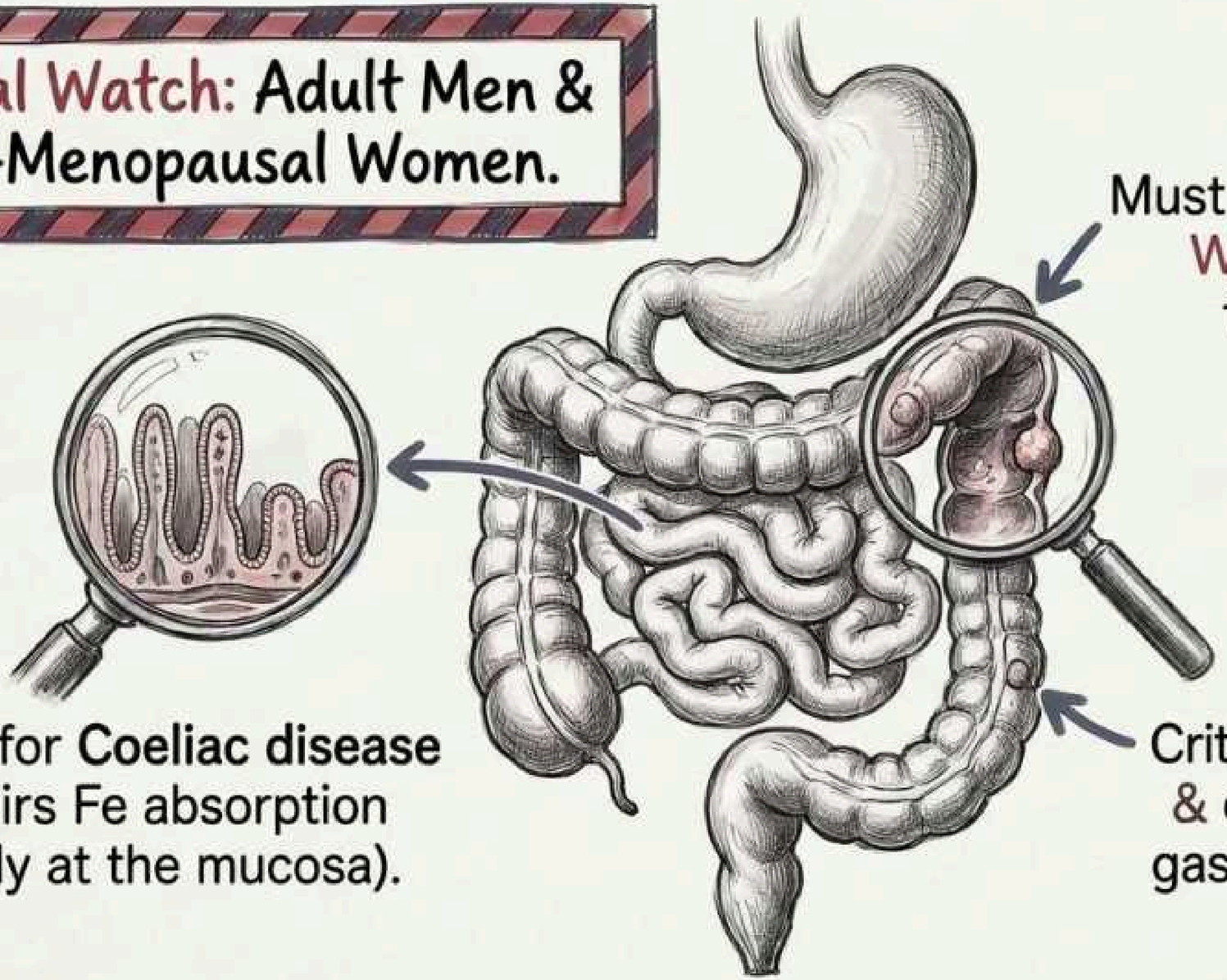
[Limited absorption + Almost zero active excretion
= Balance hinges entirely on intake vs. loss.]

Gemini Notebook

Clinical Red Flags: Searching the Digestive Tract

¶ 2.5

Critical Watch: Adult Men & Post-Menopausal Women.



Must seach for GI bleeding. Warning: May be the first sign of bowel cancer.

Assess for **Coeliac disease** (impairs Fe absorption directly at the mucosa).

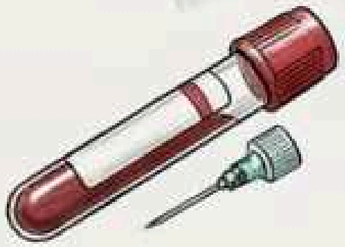
Critical lanɯllanormen & down-indemintal gastrointestinal tract.

Gemini Notebook

¶ 2.6

Confirming and Restoring Iron Stores

Diagnosis (Dx)



Blood test reveals Low Ferritin (the primary Fe storage protein).

Core Action



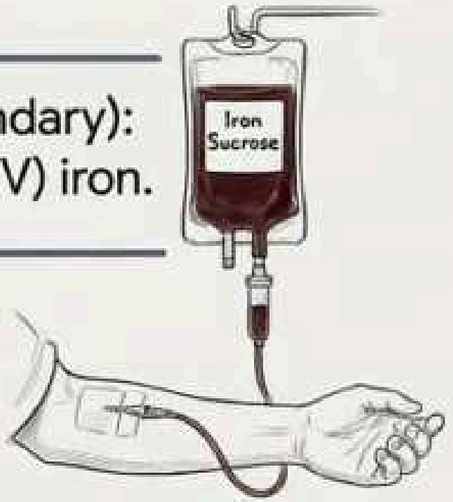
Find and correct the underlying cause.

Treatment Path (Tx)

Path A (Primary): Oral iron (Tablets by mouth).



Path B (Secondary): Intravenous (IV) iron.

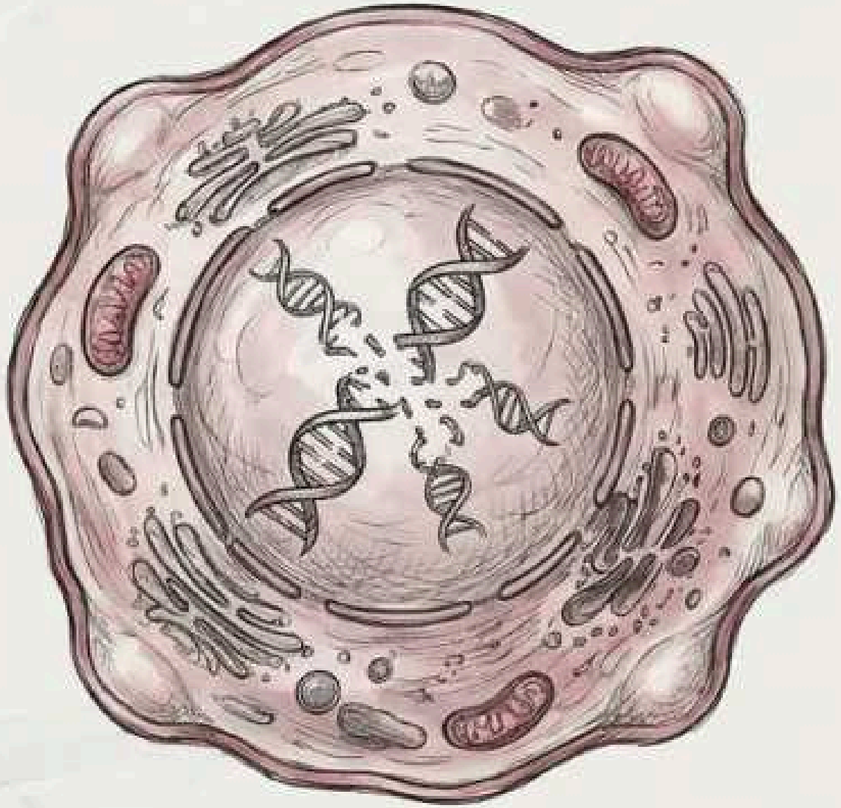


Used only when oral tablets are not tolerated or not absorbed.

¶ 2.7

Folate & B12: The DNA Synthesis Engine

↓ Folate/B12 → Faulty DNA Synthesis → Precursors cannot divide → Large/Immature Cells (Macrocytic)



Folate Details

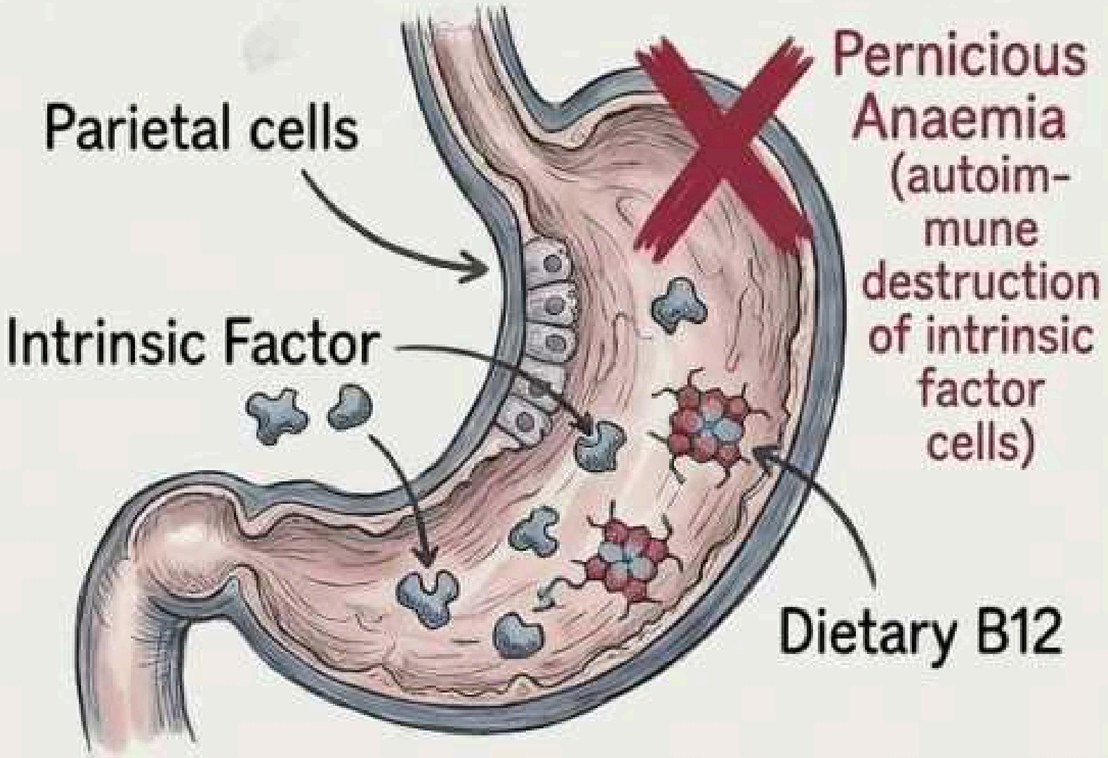
- Causes: Poor diet or increased demand (e.g., Pregnancy).
- Clinical Impact: Folate supplements during pregnancy critically prevent fetal spinal defects.

Gemini Notebook

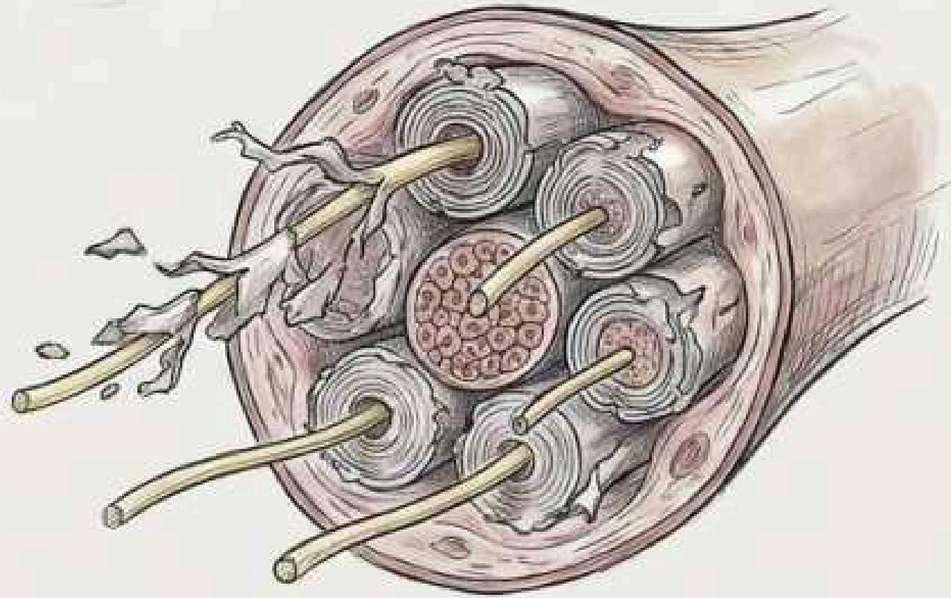
¶ 2.8

B12, Intrinsic Factor, and the Nervous System

Absorption



Neurology



B12 deficiency damages nerves
→ Numbness & Balance difficulty.

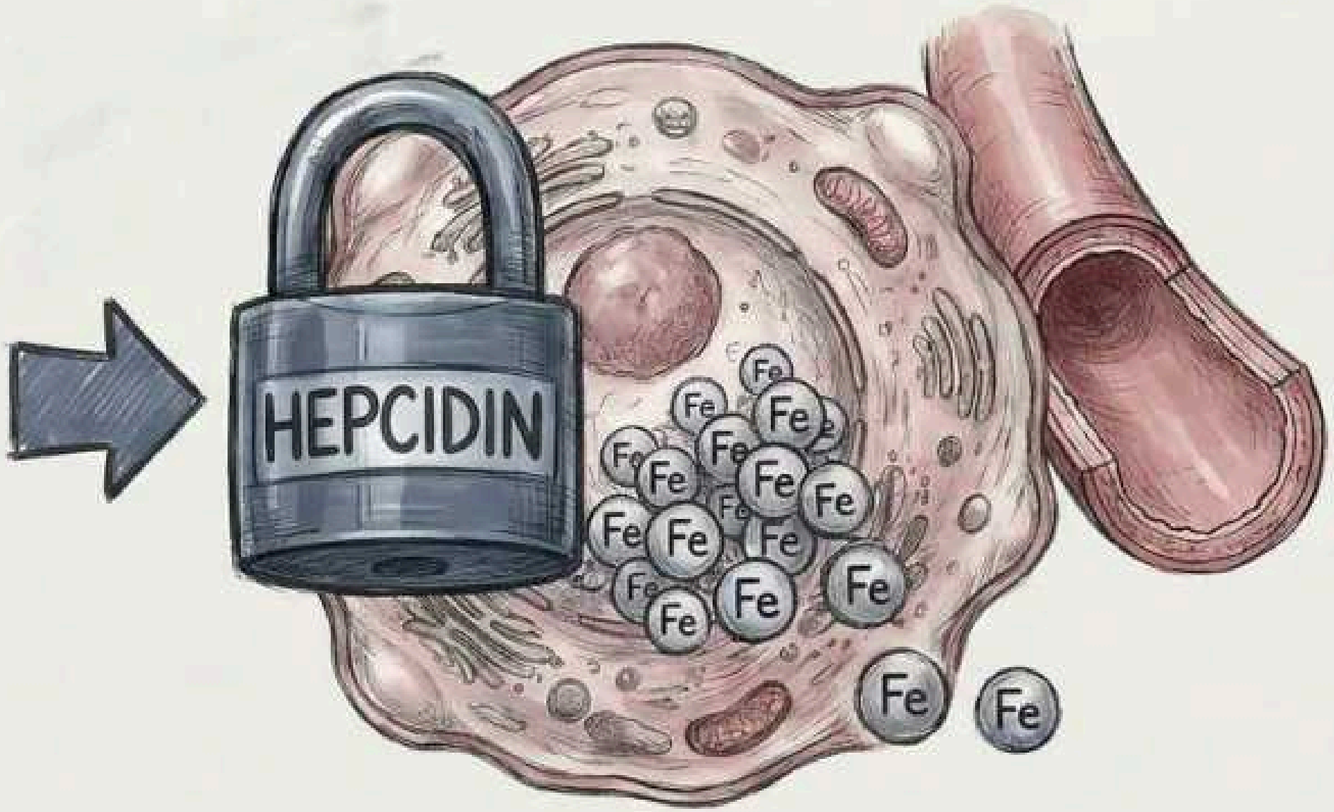
If untreated, nerve damage can be permanent. Treat with B12 injections or high-dose tablets.

Gemini Notebook

¶ 2.9

The Hepcidin Blockade: Anaemia of Inflammation

Triggers: Long-standing infections, inflammatory diseases, cancer.



Inflammation

↓

↑ Hepcidin hormone

↓

Locks iron in storage AND reduces new absorption.

(Body has plenty of iron, but marrow cannot access it).

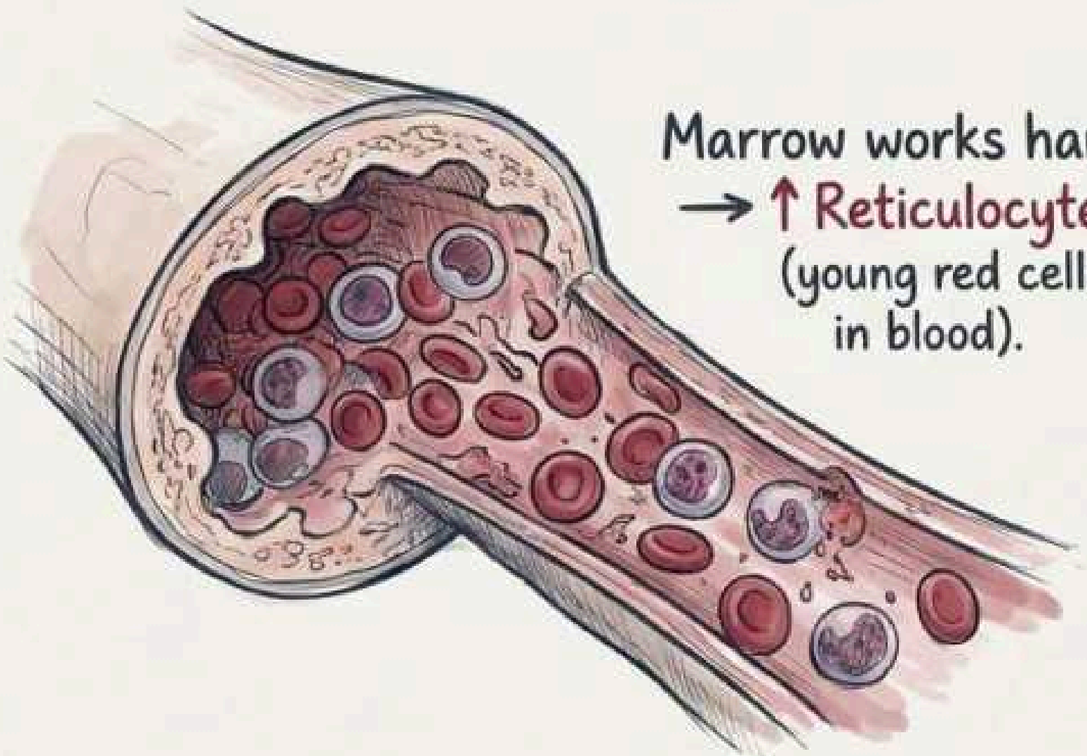
[Complicating Factor: Chronic Kidney Disease (CKD) compounds the issue by adding a shortage of Erythropoietin (EPO).]

Gemini Notebook

Haemolysis: Premature Red Cell Destruction

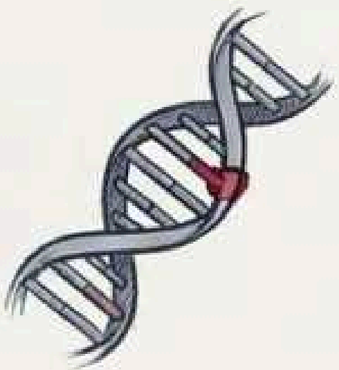
¶ 2.10

Destroyed RBCs → Released Haemoglobin → ↑ Bilirubin → Jaundice

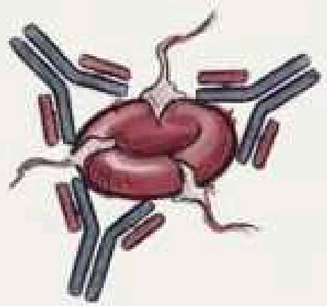


Marrow works harder
→ ↑ Reticulocytes
(young red cells
in blood).

Causes of Destruction:



1. Inherited defects of the red cell.



2. Immune system attacks.



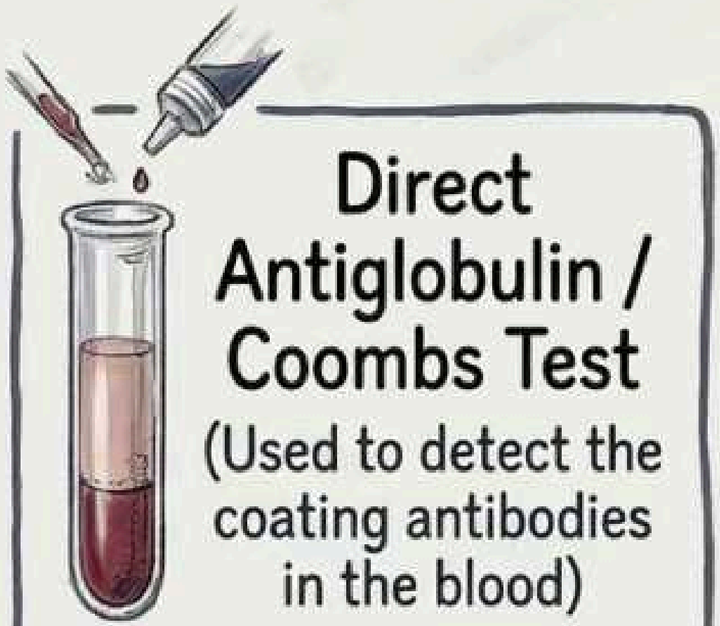
3. Mechanical shearing.

Gemini Notebook

Autoimmune Haemolytic Anaemia (AIHA)

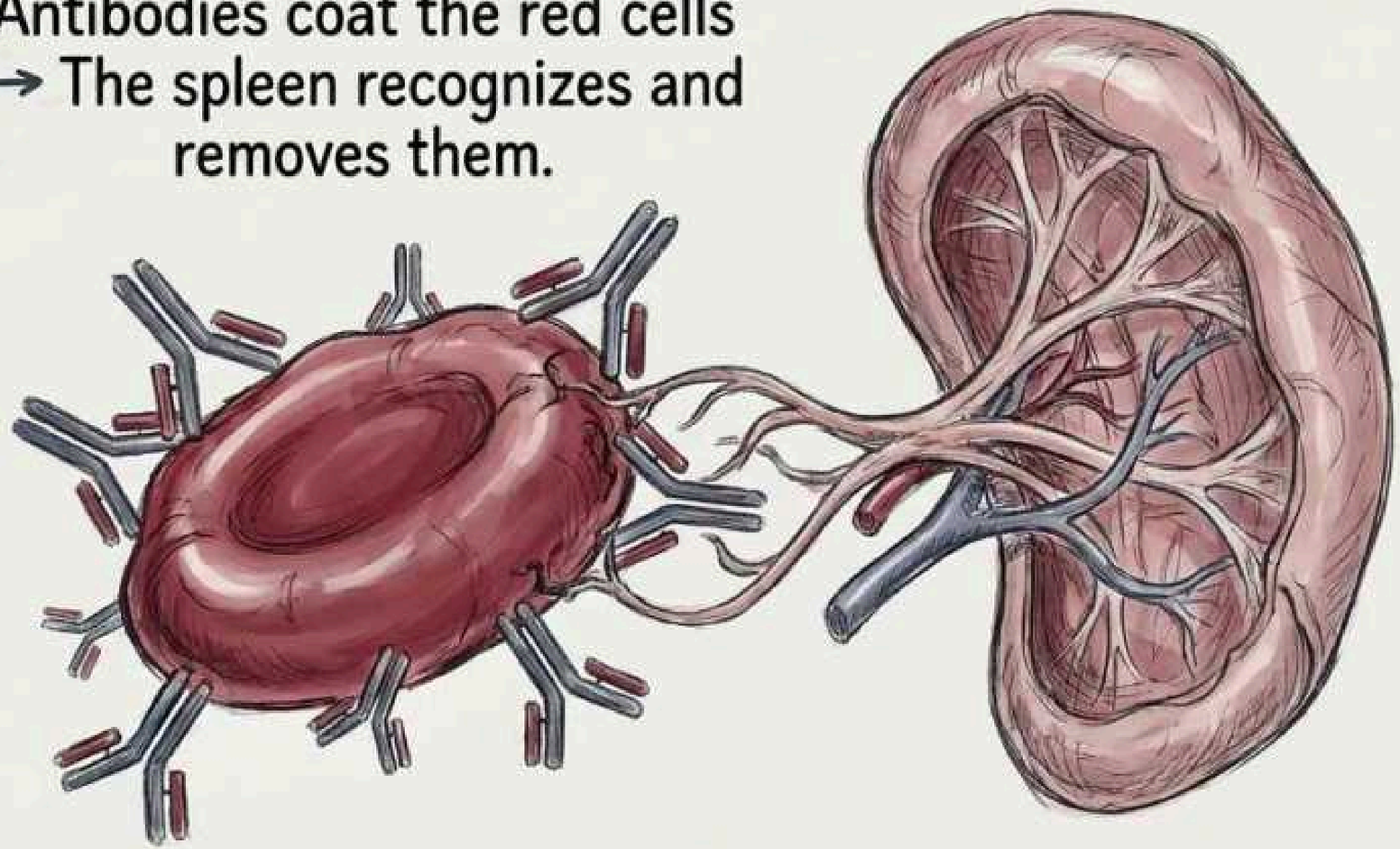
¶ 2.11

Antibodies coat the red cells
→ The spleen recognizes and removes them.



Direct Antiglobulin / Coombs Test

(Used to detect the coating antibodies in the blood)



*Primary treatment involves drugs that suppress the immune system.

Gemini Notebook

Synthesis: The Anaemia Algorithm

¶ 2.12

Acknowledge → Anaemia is a sign, not a diagnosis.

Sort by Size (MCV) → Microcytic vs. Normocytic vs. Macrocytic.



Match to Mechanism
→ Production Failure, Destruction (Haemolysis), or Loss (Bleeding).







Isolate Specific Cause → (e.g., Iron deficiency, B12, Chronic Disease)



Iron deficiency

B12



Chronic Disease



Next Lecture turns to inherited diseases of haemoglobin (among the commonest genetic disorders in the world).

Gemini Notebook