



SNS COLLEGE OF ALLIED HEALTH SCIENCES
SNS Kalvi Nagar, Coimbatore - 35
Affiliated to Dr MGR Medical University, Chennai



Department of Cardio Pulmonary Perfusion Care Technology

COURSE NAME : Pharmacology Pathology and Clinical Microbiology

2nd year

TOPIC : Haematinics



HAEMATINICS



HAEMATINICS:- These are the agents required in the formation of blood & used for treatment of anemia's.

Etiology:- Anaemia occurs when,

- A. Blood loss (acute or chronic)
- B. Impaired red formation due to;
 - a) Deficiency of iron, vit. B₁₂, folic acid.
 - b) Bone marrow depression.
- C. Increased destruction of RBCs.



Classification:-

1. Iron & it's compound:-
eg:-ferrous succinat, ferrous sulfate, ferrous gluconate etc.
2. Maturation factor:-
eg:-cynocobalamine, Hydroxycynocobalamine.
3. Miscellaneous:-
eg:-copper, cobalt,Riboflavine.



IRON

According to Greek thought MARS is the god of strength & IRON is dedicated to it.

□ Source of iron:-

Rich:- Liver, egg yolk, dry bean, dry fruit.

Medium:- Meat, chicken, fish, banana, apple.

Poor:- Milk & it's product.

□ Daily requirement:-

Adult male :- 0.5-1mg(13 μ g/kg).

Adult female:-1-2mg(21 μ g/kg).

Infant :-60 μ g/kg.

Children :-25 μ g/kg.

Pregnancy :-3-5mg(80 μ g/kg).



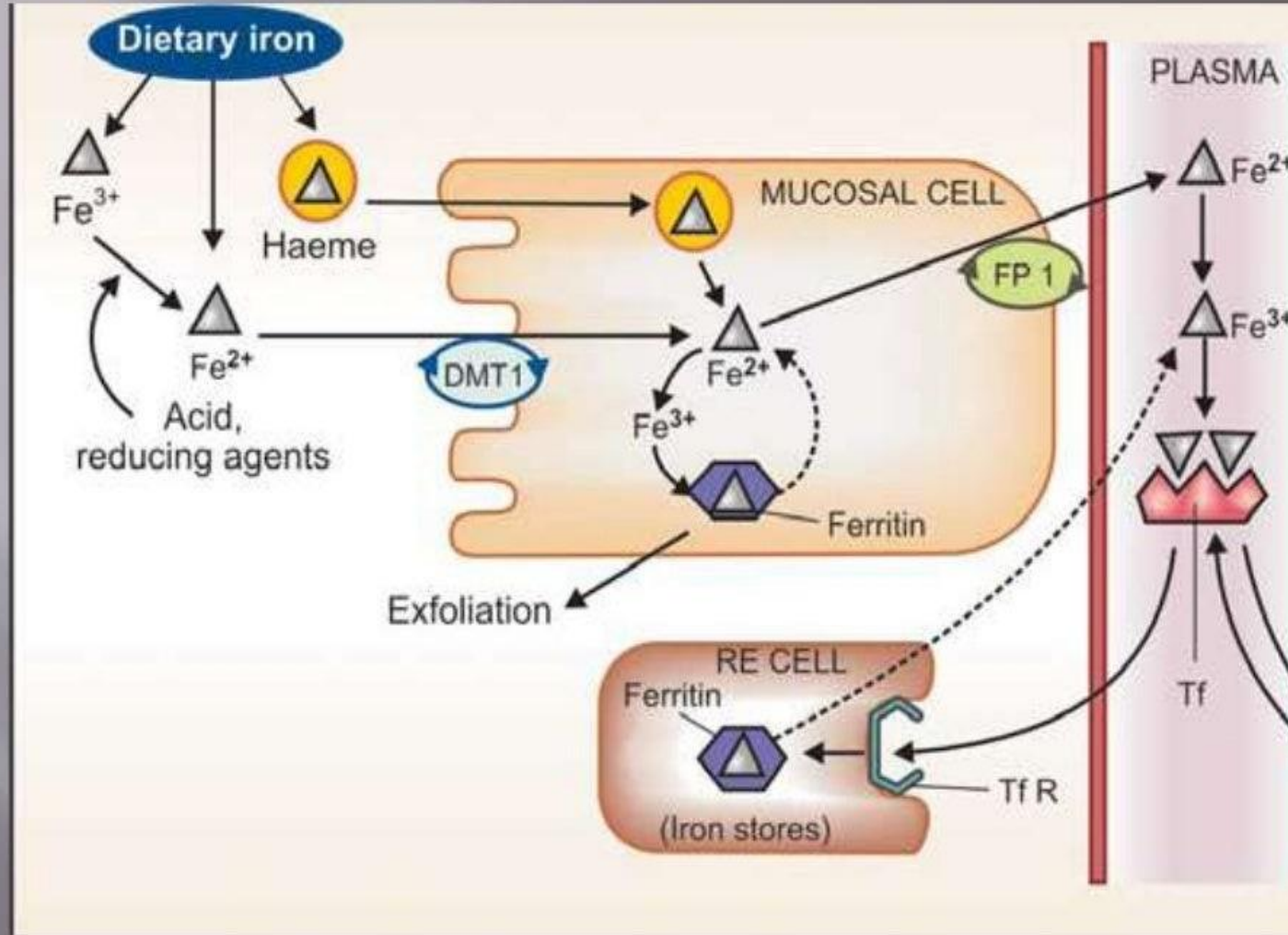


Iron absorption

- Its absorption occurs all over the intestine.
- In the stomach containing HCL & reducing agent are converted to ferrous.
- Two separate iron transporters in the intestinal mucosal cells function to effect iron absorption.
- At the luminal membrane the divalent metal transporter 1 (DMT1) carries ferrous iron into the mucosal cell.
- The ferroportin are bound with ferrous iron & pass through mucosal cell directly into the blood stream.

Factor affecting absorption:-

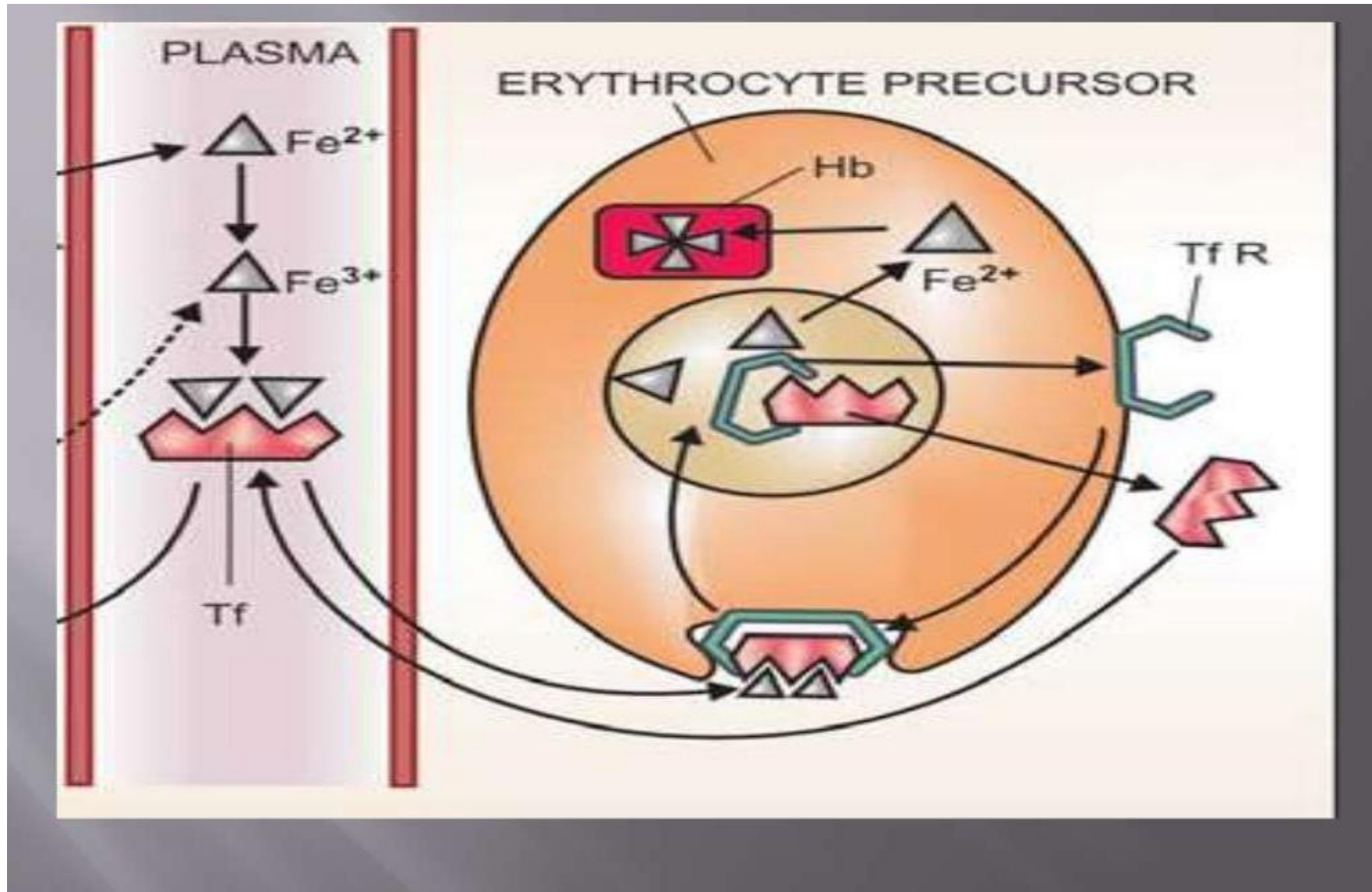
1. Achlorhydria
2. Alkaline pH
3. Presence of food in stomach
4. Complex with tetracycline & phosphate





Transport, utilization, storage and excretion

- As such, on entering plasma it is immediately converted to the ferric form and complexed with a glycoprotein transferrin (Tf).
- Iron is transported into erythropoietic and other cells through attachment of transferrin to specific membrane bound transferrin receptors (TfRs).
- The complex is engulfed by receptor mediated endocytosis.
- Iron dissociates from the complex at the acidic pH of the intracellular vesicles.
- the released iron is utilized for haemoglobin synthesis or other purposes.
- Tf and TfR are returned to the cell surface to carry fresh loads.





Storage:-

1. Reticulo endothelial cell in liver.
2. Spleen
3. Bone marrow
4. hepatocytes and myocytes

Excretion:-

- Daily excretion in adult male is 0.5–1 mg, mainly g.i. mucosal cells, some RBCs and in bile from faeces.
- Other routes are skin, very little in urine and sweat.
- In menstruating women, monthly menstrual loss may be averaged to 0.5–1 mg/day.



Adverse effects :-

1. Epigastric pain.
2. heartburn.
3. nausea, vomiting.
4. staining of teeth.
5. metallic taste.
6. Constipation.

Preparations and dose:-

1. Ferrous succinate
2. Iron choline citrate
3. Ferric ammonium citrate
4. Ferric gluconate
5. Ferrous fumarate



Parenteral iron:-

Iron therapy by injection is indicated only when:

1. Oral iron is not tolerated: bowel upset is too much.
2. Failure to absorb oral iron: malabsorption.
3. Non-compliance to oral iron.
4. In presence of severe deficiency with chronic bleeding.
5. Along with erythropoietin

preparations for parenteral use are:

- (i) Iron- dextran.
- (ii) Iron-sorbitol-citric acid



Therapeutic use:-

1. *Iron deficiency anaemia.*
2. *Megaloblastic anaemia.*
3. *As an astringent :- Ferric chloride is used in throat paint.*



Miscellaneous:-

Copper :-

- Haeme synthesis is interfered in copper Deficiency.
- Dose 0.5–5 mg of copper sulphate.

Cobalt:-

It stimulates erythropoiesis transiently, probably by inducing tissue hypoxia → increased erythropoietin production.

Riboflavin :- Hypoplastic anaemia occurs in riboflavin deficiency



MATURATION FACTORS

□ VITAMIN-B12 (*Cyanocobalamin*)

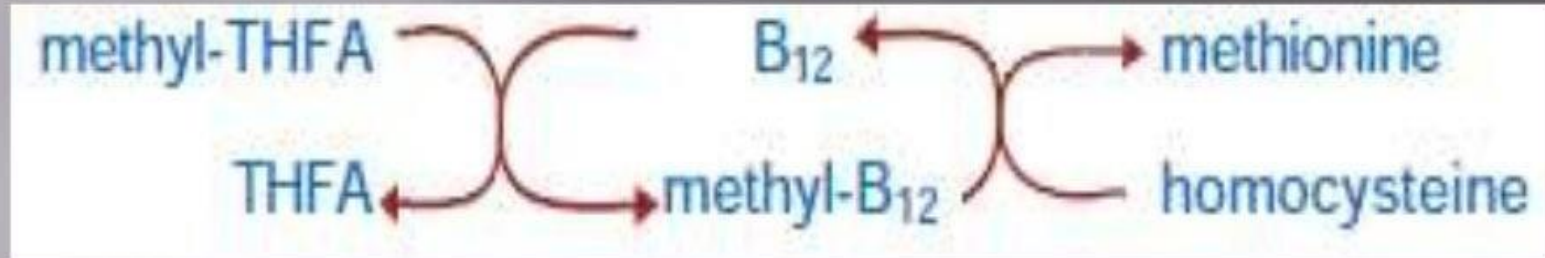
1. Vit B12 occurs as water soluble, thermostable red crystals.
2. It is synthesized in nature only by microorganisms; plants and animals acquire it from them.

Dietary sources :- Liver, kidney, sea fish, egg yolk, meat, cheese.

Daily requirement: 1–3 μg , pregnancy and lactation 3–5 μg .

Metabolic functions:-

- Vit B12 is essential for the conversion of homocysteine to methionine.



- Purine and pyrimidine synthesis .



- Now it appears that interference with the reaction:-



- Vit B12 is essential for cell growth and multiplication.



Utilization of vit B₁₂ :-

- Intrinsic factor secreted by stomach forms a complex with B12 attaches to specific receptors present on intestinal mucosal cells and is absorbed by active carrier mediated transport.
- Vit B12 is transported in blood in combination with a specific β globulin transcobalamin II (TCII).
- Vit B12 is especially taken up by liver cells and stored about 2/3 to 4/5 of body's content (2-8 mg) is present in liver.
- Vit B12 is not degraded in the body. It is excreted mainly in bile (3-7 $\mu\text{g}/\text{day}$); all but 0.5-1 μg of this is reabsorbed – considerable entero-hepatic circulation occurs.



- the absence of intrinsic factor or when there is malabsorption.
- From parenteral rout (i.m/s.c) is mainly excreted via urin.

Deficiency:-

- Pernicious anaemia.
- Other cause of gastric mucosal damage.
- Malabsorption.
- Nutritional deficiency

Manifestations of deficiency are:-

- Megaloblastic anaemia
- g.i. disturbances
- Neurological degeneration.



▣ Preparations, dose, administration:-

Cyanocobalamin:- MACRABIN 35 μg /5ml

Hydroxocobalamin: -REDISOL-H,

Methylcobalamin:-METHYLCOBAL 0.5 mg tab.

Therapeutic use:-

- Pernicious anaemia.
- Malabsorption syndroms.
- Nutritional deficiency.
- Neurological condition.
- Psychitric disorder.

Adevrs drug reaction:-

Allergic reactions have occurred by injection



FOLIC ACID

Folic acid (Pteroyl glutamic acid) is a member of the B complex group of vitamins.

Dietary sources:-

Liver, green leafy vegetables (spinach), egg, meat, milk.

Daily requirement:- 0.2 mg/day



Utilization:-

- Folic acid is present in food as poly-glutamates
- The additional glutamate residues are split off primarily in the upper intestine before being absorbed.
- Reduction to DHFA and methylation also occurs at this site.
- It is transported in blood mostly as methyl-THFA which is partly bound to plasma proteins.
- Small, physiological amounts of folate are absorbed by specific carrier-mediated active transport in the intestinal mucosa.
- Folic acid is rapidly extracted by tissues and stored in cells as polyglutamate.
- Liver takes up a large part and secretes methyl-THFA in bile & again reabsorbed by enterohepatic cycle
- 50-90% of adose may be excreted in urin.

Metabolic functions

1. Conversion of homocysteine to methionine:
2. Generation of thymidylate, an essential constituent of DNA:



3. Conversion of serine to glycine.
4. Purine synthesis.
5. Histidine metabolism.



Deficiency & menifestation:-

1. Megaloblastic anaemia.
2. Nutritional deficiency.
3. Malabsorption.
4. Epithelial damage.
5. Weight loss.

Therapeutic use:-

1. Megaloblastic anaemia.
2. Improve absorpton.
3. Protect epithelial cell.
4. Groth factor.



Adverse effects:-

Hypersensitivity reaction occur by injection.

Preparations and dose

1. Folic acid: -liquid oral.
2. Injectabile.
3. Folinic acid:-CALCIUM LEUCOVORIN 3 mg/ml inj.



THANK YOU