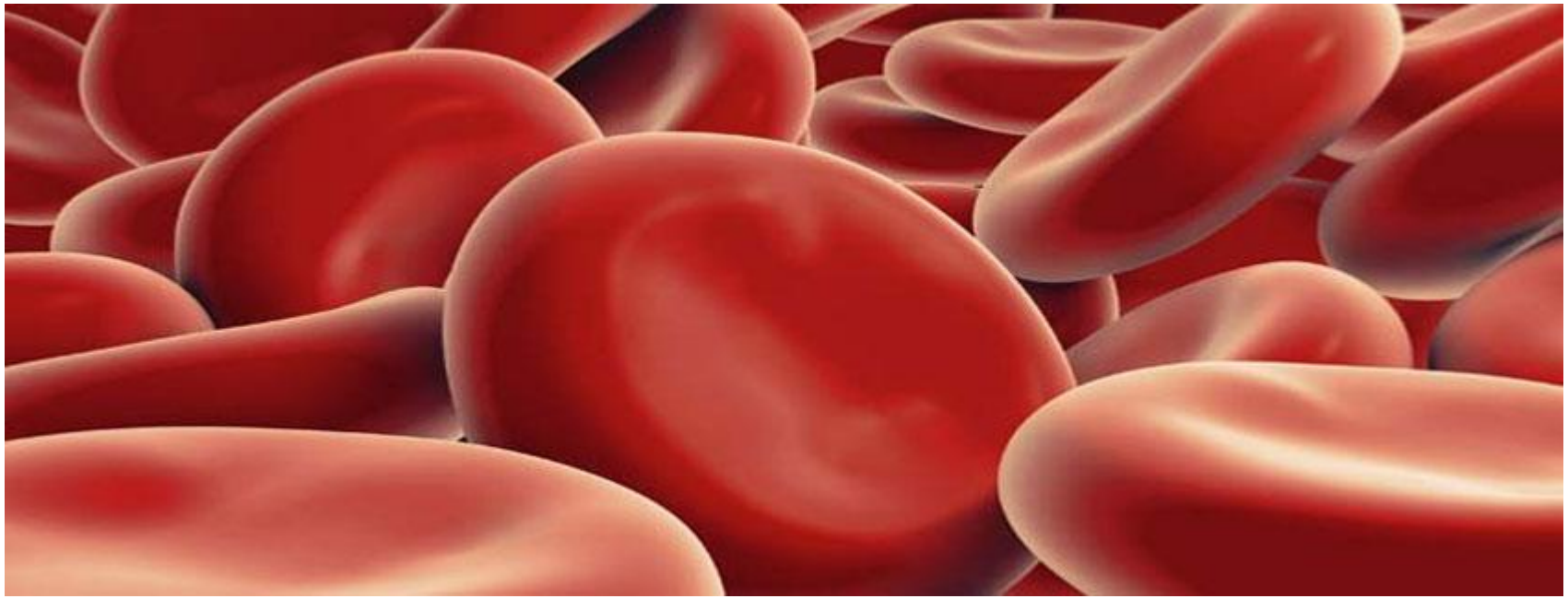
ANAEMIA



By Dr.Pankaj Panchal
Assistant professor
5/5/2022

Anaemia

- Definition:-

  Its a clinical condition /group of disorders in which ***RBC count*** and ***Haemoglobin concentration of blood*** is below the normal range for the age and sex of the subject.

So it will reduce ***oxygen carrying capacity*** of blood.

Anaemia

❖Anaemia is labelled when **Hb concentration** is less than:

- 13 gm/dl in males
- 11.5 gm/dl in females
- 15 gm/dl in newborn
- 9.5 gm/dl at 3 months of age

❖**RBC count** less than 4 million/cumm of blood

Anaemia

Grading of anaemia: depends upon Hb level

- Mild – Hb: 8-10 gm/dl
- Moderate – Hb: 6-8 gm/dl
- Severe –Hb: <6 gm/dl

Classification of anaemia

- ***Morphological(Wintrobe's):-***

Anaemia	Normochromic	Hypochromic
Normocytic	Acute haemorrhage -Haemolytic anaemia(except thalassemia) -Aplastic anaemia	After chronic haemorrhage
Macrocytic	Megaloblastic anaemia due to def. Of Vit. B12, folic acid or intrinsic factor	Secondary to liver disease
Microcytic	-chronic infections	-Iron deficiency anaemia -Thalassemia

Classification of anaemia

- **Etiological (Whitby's): According to cause**

1. Haemorrhagic anaemia
2. Haemolytic anaemia
3. Nutritional deficiency anaemia(iron, folic acid & Vitamin B12)
4. Dyshaemopoietic anaemia(Aplastic anaemia)
5. Anaemia due to chronic disease

Classification of anaemia

- **Three main types of anemia:**

1. due to blood loss,
2. due to decreased red blood cell production, and
3. due to increased red blood cell breakdown

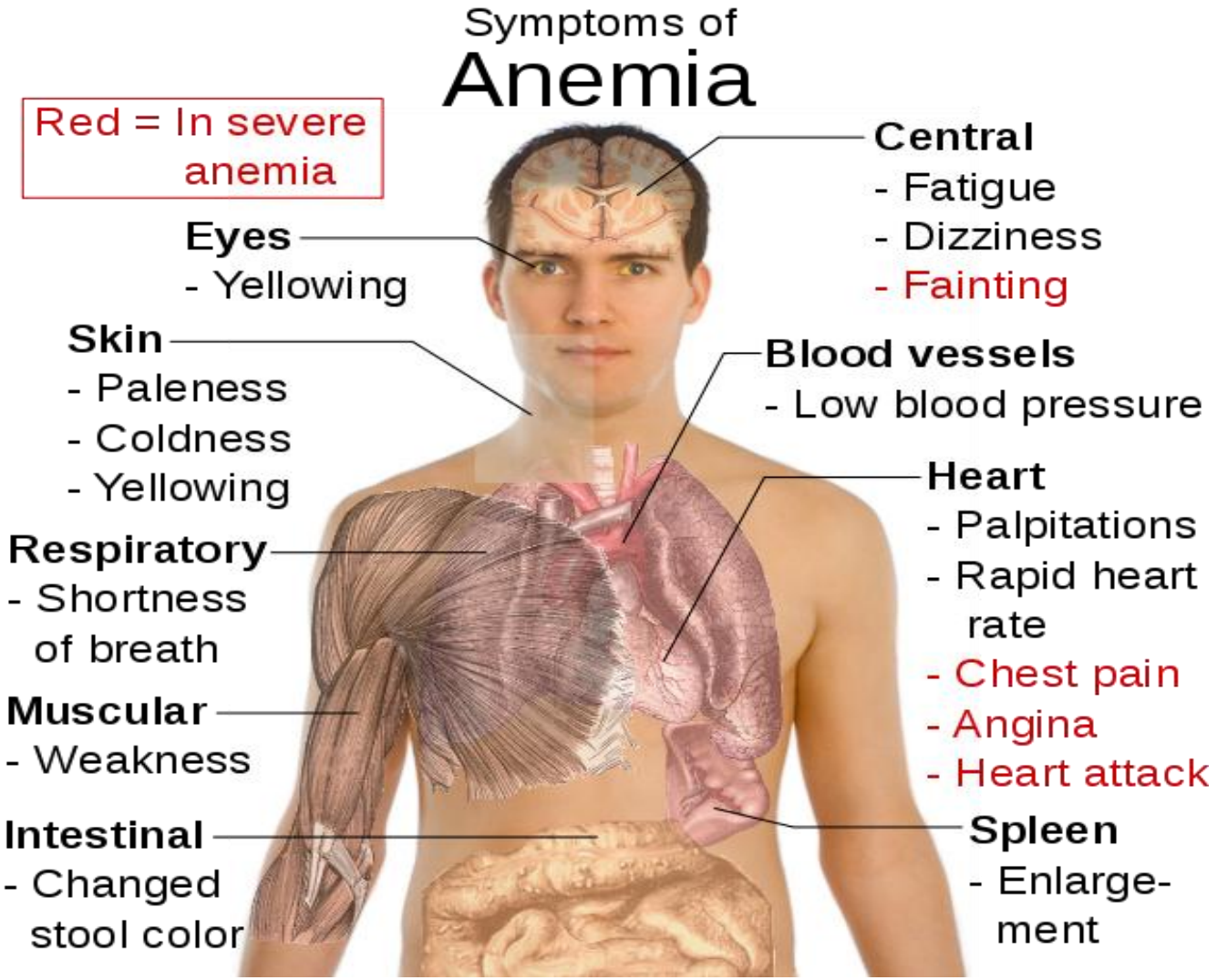
Type of Anemia	Cause	Morphological Characteristics of RBCS	Red Blood Cell Indices
Hemorrhagic Anemia	**Acute Blood Loss**— after accident **Chronic Blood Loss**— due to peptic ulcer, hemophilia, prolonged external and internal bleeding	Normocytic, Normochromic Microcytic, Hypochromic (due to iron deficiency)	MCV, MCHC: within normal range MCV and MCHC less than normal

Type of Anemia	Cause	Morphological Characteristics of RBCS	Red Blood Cell Indices
Hemolytic Anemia (destruction of RBCS)	Extrinsic (due to external factors) 1. Liver Failure 2. Renal disorder 3. Burns 4. Infections (hepatitis, malaria) 5. Drugs (penicillin) 6. Lead Poisoning	Normocytic Normochromic	MCV and MCHC values within normal range
	Intrinsic (abnormal RBC shape) 1. Sickle Cell Anemia 2. Thalassemia	Sickle Shape, Normocytic Microcytic, Hypochromic	MCV values are normal MCV and MCHC values are less

Type of Anemia	Cause	Morphological Characteristics of RBCS	Red Blood Cell Indices
Nutrition Deficiency Anemia	Iron Deficiency Vitamin B-12 (Pernicious Anemia) Folic Acid (Megaloblastic anemia)	Microcytic, hypochromic Macrocytic, hypochromic Macrocytic, normochromic	MCV and MCHC less MCV more, MCHC less MCV more, MCHC within normal range
Aplastic Anemia	Bone marrow aplasia due to i. Radiation ii. Toxic Chemicals	Normocytic, normochromic	MCV and MCHC normal, RBC count less

Type of Anemia	Cause	Morphological Characteristics of RBCS	Red Blood Cell Indices
Anemia of Chronic Diseases	a. Noninfectious inflammatory diseases—rheumatoid arthritis b. Chronic infections c. Chronic Renal failure d. Neoplastic disorders—Hodgkin's disease	Microcytic, normochromic	Decreased MCV, MCHC normal

Clinical manifestations of anaemia



Iron deficiency anaemia

- Commonest nutritional deficiency disorder throughout the world.
- In India, iron deficiency is the commonest cause of anaemia
- It is more common in *women b/w 20-45 years* than in men and during *active growth period* in infancy, childhood.

Iron deficiency anaemia

❖**Daily requirement of iron:**

- In adult males : 5-10 mg/day
- In adult females : 10-20 mg/day

❖From food only 10% of iron absorbed from duodenum & upper jejunum (*Fe^{+2} absorbable* form)

❖In plasma binds with ***transferrin***

❖Stored in cells in the form of **ferritin**

❖If excess iron store then converted into **hemosiderin**

Symptoms and signs

Characteristic features

❑***Blood examination:-*** RBC count –

- RBC- Microcytic hypochromic (MCV,MCHC reduced)
- WBC & platelets- normal

❑***Bone marrow examination***:- normoblastic hyperplasia

❑***Serum iron*** – reduces (normal: 60-160 ugm/dL)

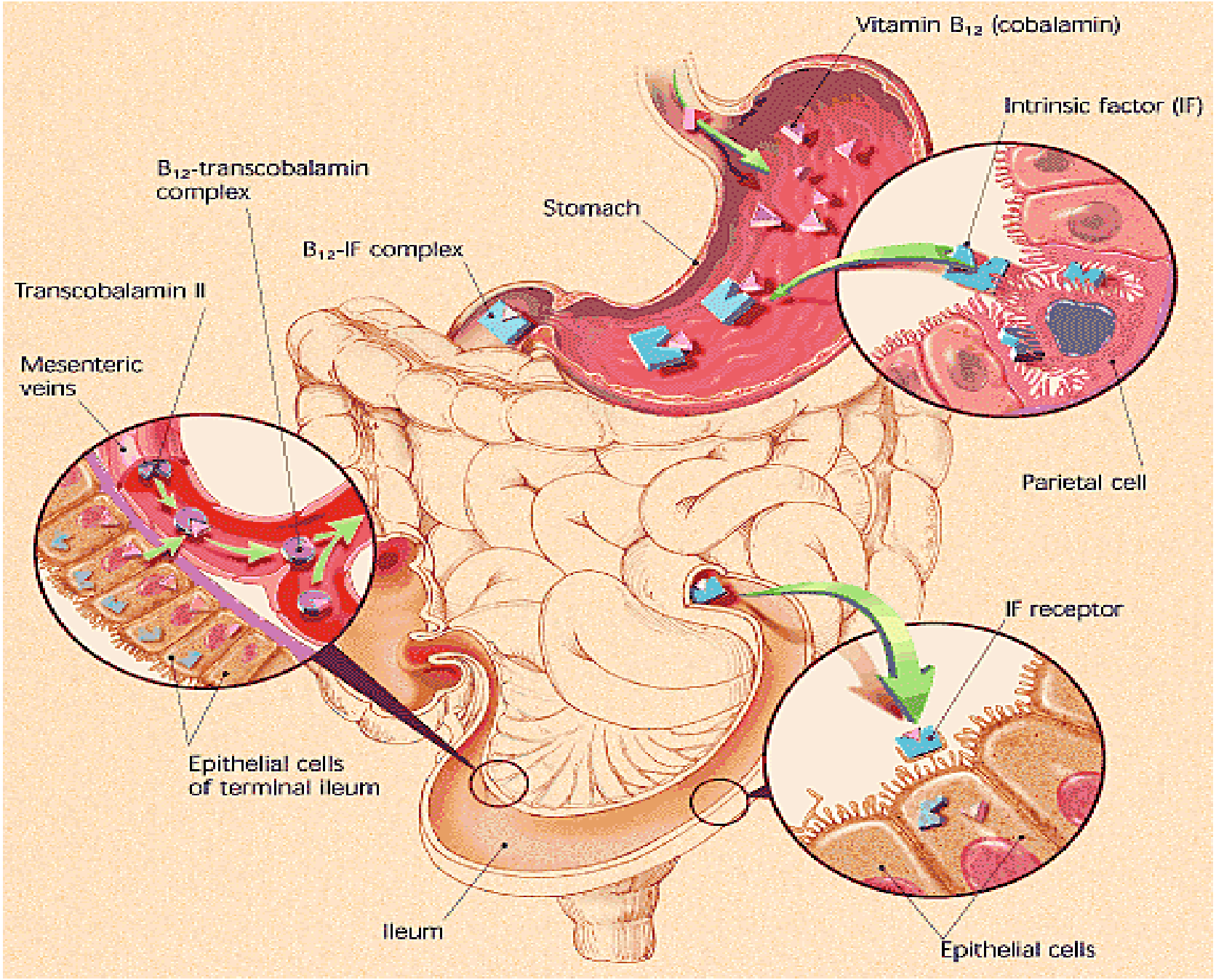
❑***Total iron binding capacity(TIBC***)- increases (normal: 150-350 ugm/dL)

Treatment

- Intake of iron rich food (green leafy vegetables)
- Iron supplements
- Cut off excess tea, coffee consumption
- avoiding smoking and alcohol
- treatment targeted towards cause

Pernicious anaemia

- Pernicious means destructive/injurious
- Due to lack of intrinsic factor of castle with subsequent failure of *Vit. B12(extrinsic factor)* absorption.
- Atrophy of gastric mucosa (oxyntic cells which secretes HCL).

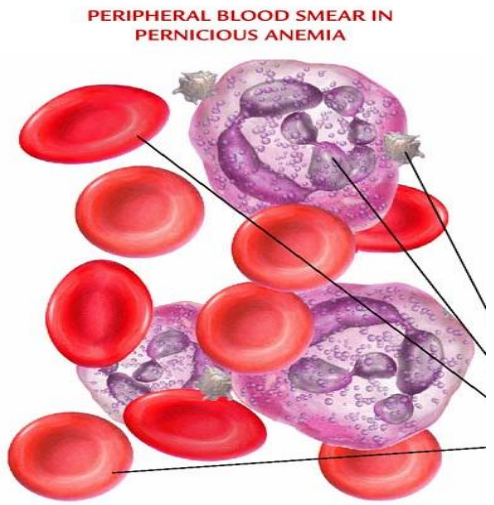

Vitamin B_{12} (cobalamin)
Intrinsic factor (IF)
B_{12}-transcobalamin complex
Stomach
B_{12}-IF complex
Transcobalamin II
Mesenteric veins
Parietal cell
IF receptor
Epithelial cells of terminal ileum
Ileum
Epithelial cells

Characteristic features:

- **Blood examination**: RBC count –decreases markedly

RBC- Macrocytic Normochromic

Reticulocyte count- increases



- **Bone marrow** – Megaloblastic hyperplasia

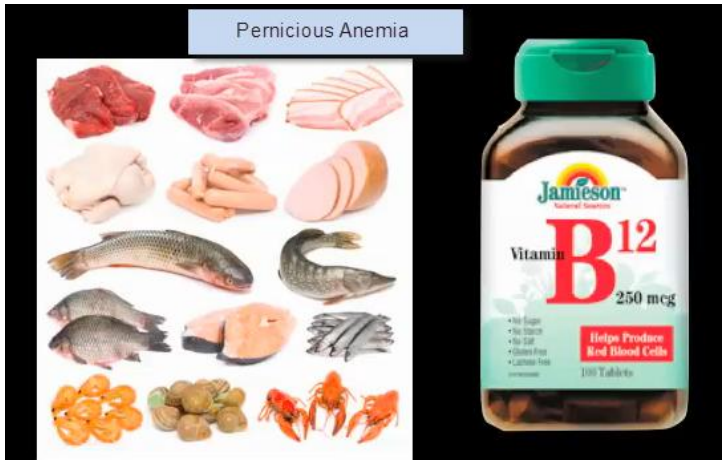
- **GIT**: achlorhydria

Sore & inflamed tongue, Loss of appetite & apathy, Diarrhoea

- **CNS:** tingling & numbness of hands & feet (due to demyelination of spinal cord tracts- subacute combined degeneration of spinal cord)

Treatment

- Intake of vitamin B12 rich foods (Non-veg)
- Vitamin B12 supplements
- Treatment prevents progression of CNS lesion but can’t reverse damage already done ***that's why this anaemia is called pernicious .***



Megaloblastic anaemia

- Due to deficiency of Vitamin B12 and/ or folic acid
- RBC: Megaloblastic Normochromic
- Causes: reduced intake, poor absorption & increased demand of vitamin B12 & folic acid
- Specific symptoms: mouth ulcers, stomatitis, angular cheilitis, numbness & tingling sensation
- Treatment of cause