ANEMIA

ANEMIA

- Definition
- Cause
- Signs and Symptoms

TREATMENT

- Oral: Vitamin B12, Iron and Acid Folic
- Injections of vitamin B12
- Blood transfusions

NUTRITION

- For daily
- For pregnant women

DEFINITION

- Anemia (An-without,emia-blood)is a decrease in the RBC count, hemoglobin and/or Hematocrit values resulting in a lower ability for the blood to carry oxygen to body tissues .

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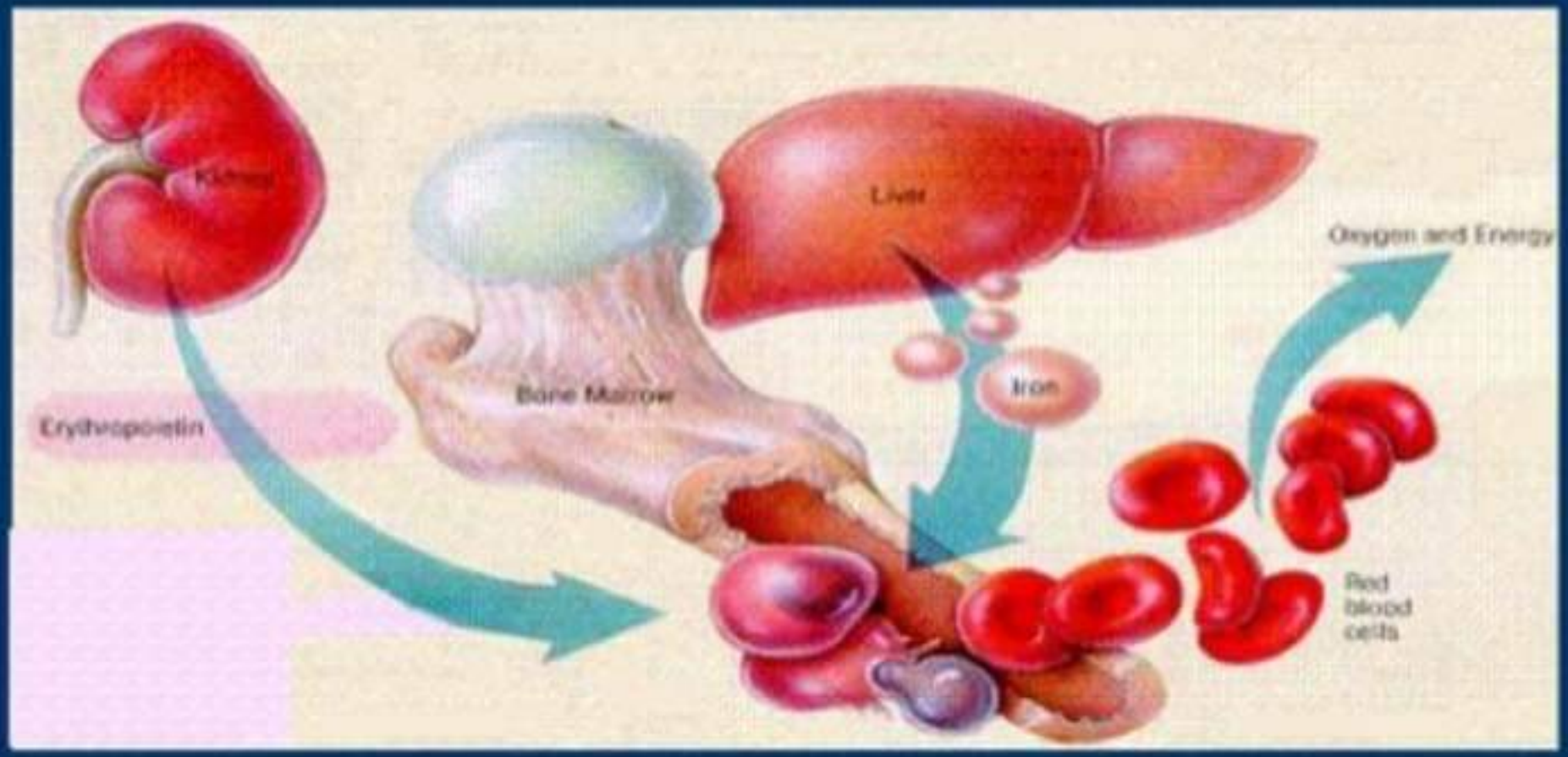
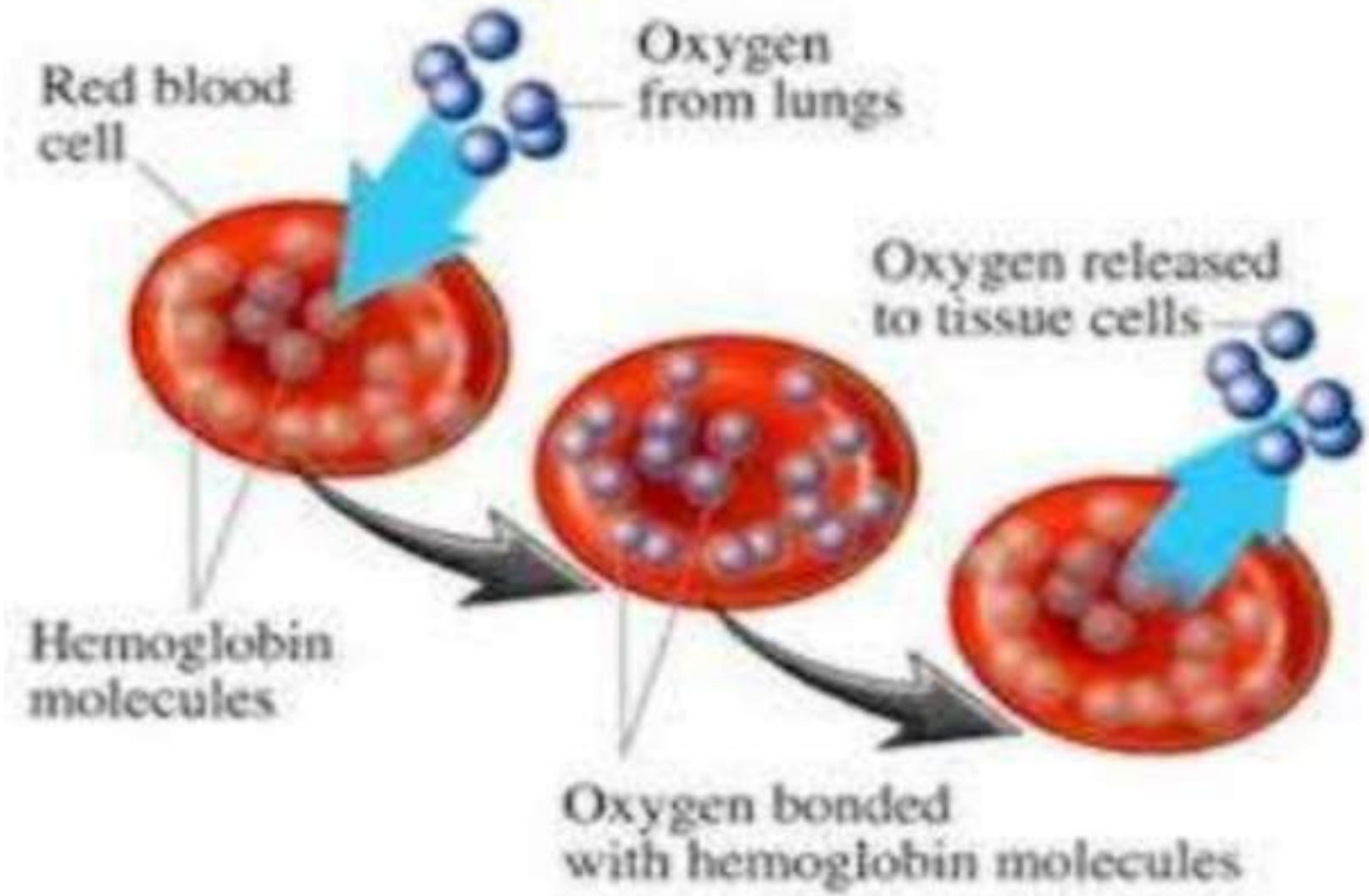
PATHOPHYSIOLOGY

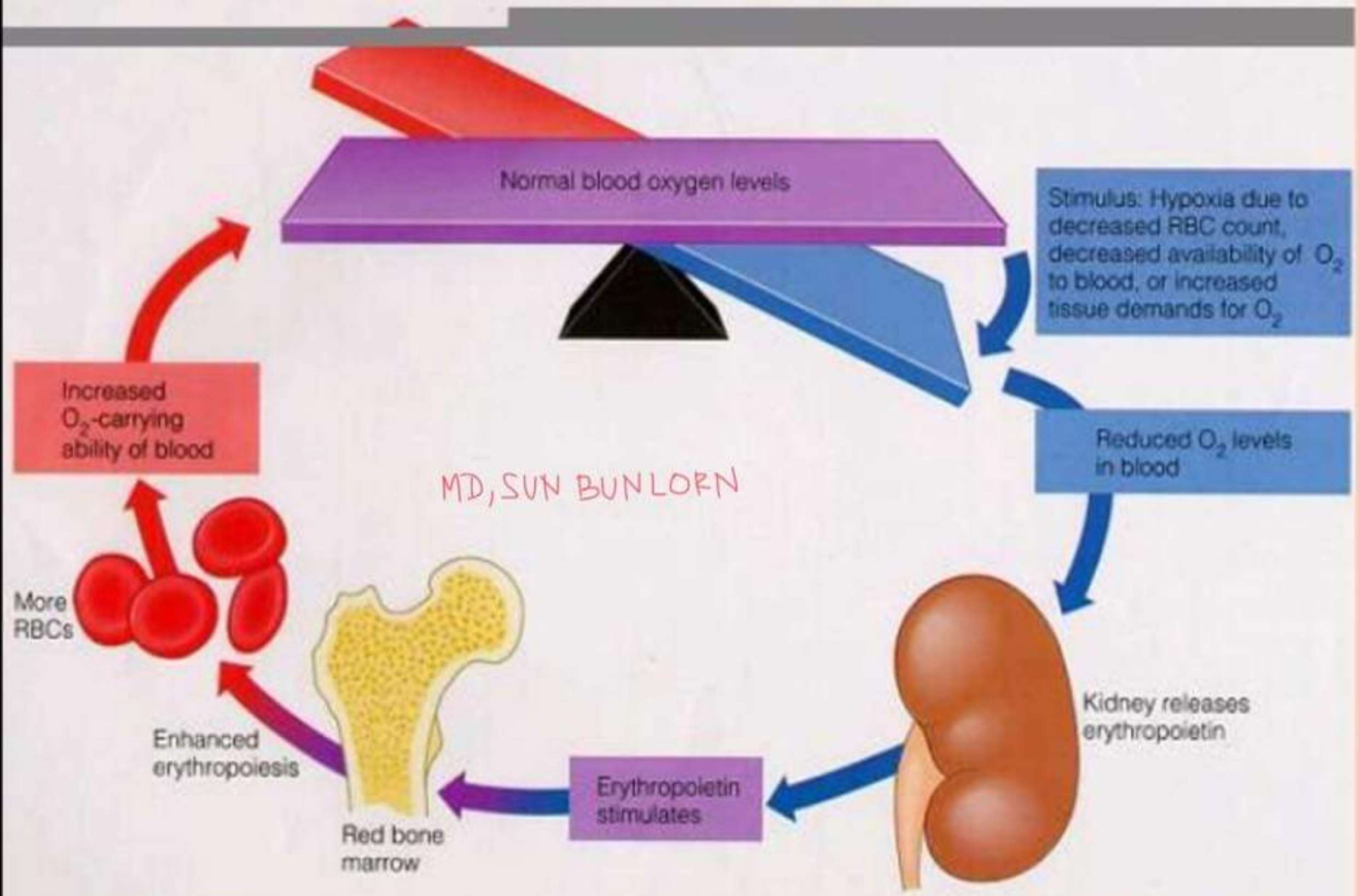
Normal Erythropoiesis



Adapted from Schott et al. US Pharmacist, 1997;22:HS5-HS12


Red blood cell
Oxygen from lungs
Oxygen released to tissue cells
Hemoglobin molecules
Oxygen bonded with hemoglobin molecules

Erythropoietin mechanism for regulating the rate of erythropoiesis (Figure 18.6)



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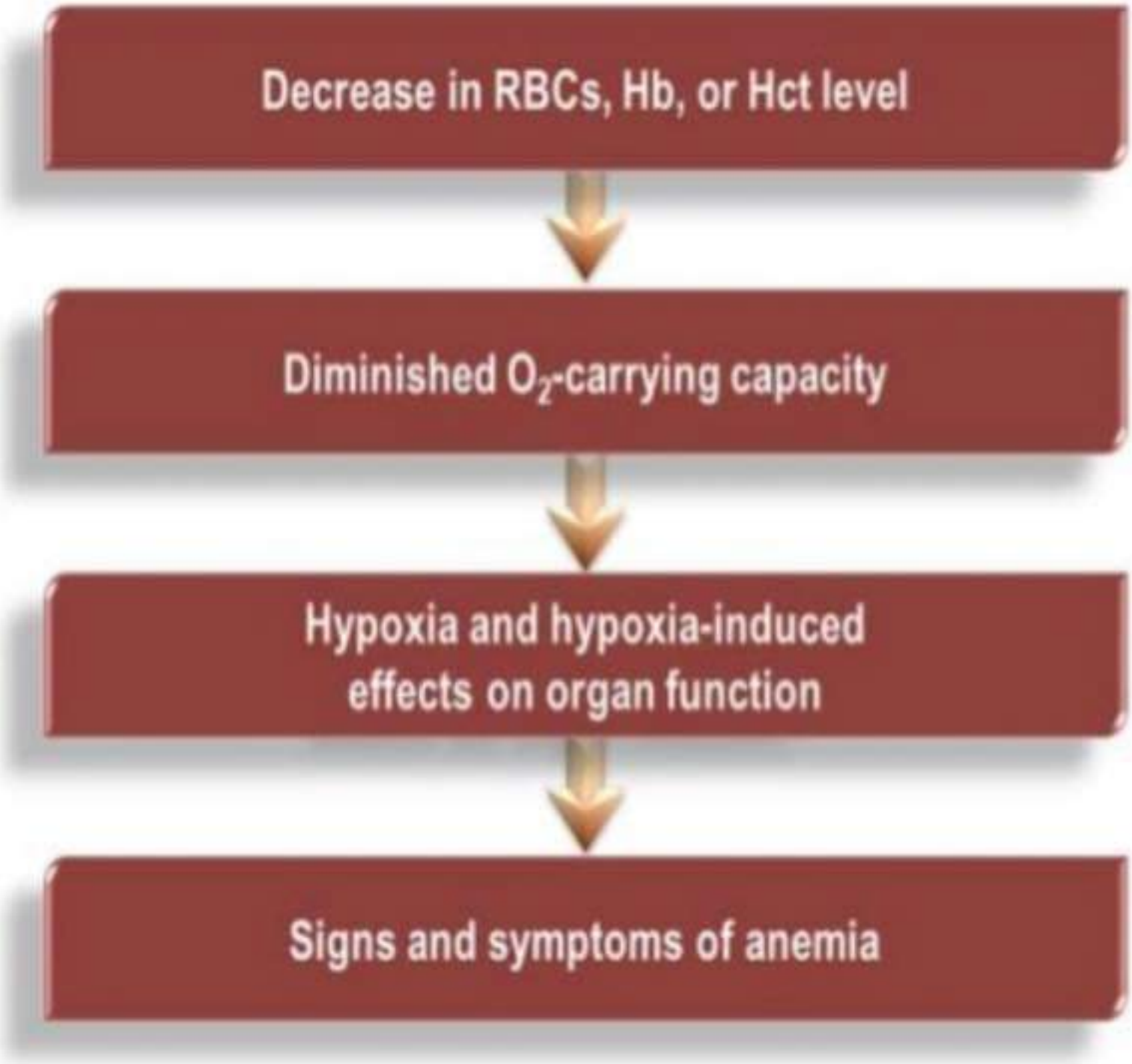
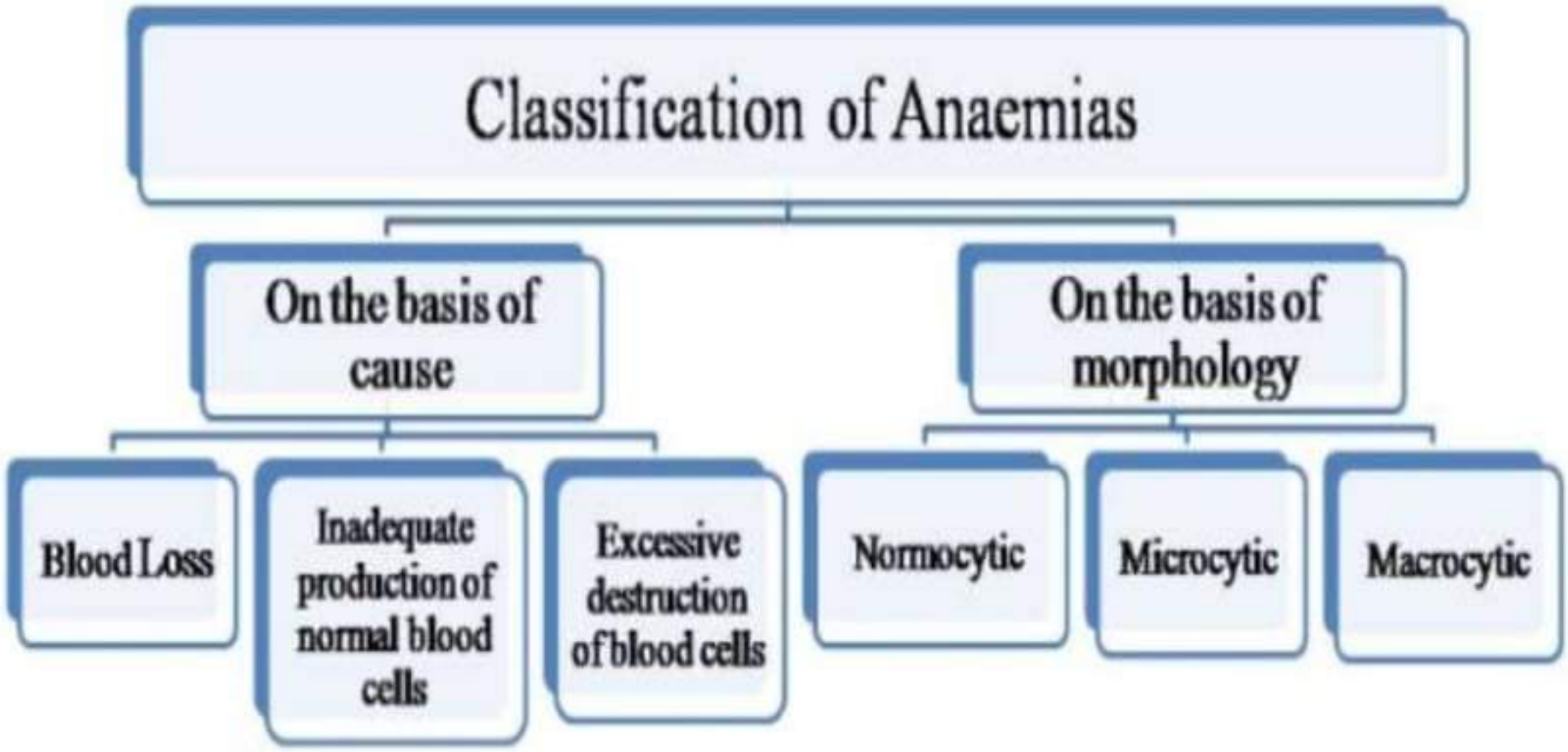
PATHOPHYSIOLOGY



NORMAL VALUES

Category Values	Reference
Men	>13 g/dl
Women	>12 g/dl
Pregnant women	>11g/dl
Infants from 2 to 6 months	>9.5 g/dl
Children from 6 months to 24 months	>10.5 g/dl
2yrs to 11 yrs	>11.5 g/dl
Children from 12 years	>12 g/dl

CLASSIFICATION



TYPES OF ANEMIA

Based on clinical picture-

- Iron deficiency anemia.
- Megaloblastic anemia.
- Pernicious anemia.
- Hemorrhagic anemia.
- Hemolytic anemia.
  - -Thalassemia anemia
  - -Sickle cell anemia
- Aplastic anemia

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TYPES OF ANEMIA

- Iron deficiency anemia

♣ excessive loss of iron .

♣ Women are at risk. ---- For menstrual blood and growing fetus.

- Megaloblastic anemia

♣ Less intake of vitamin B 12 and folic acid.

♣ Red bone marrow produces abnormal RBC.

e.g cancer drugs

- Pernicious anemia

♣ Inability of stomach to absorb vitamin B 12 in small intestine.

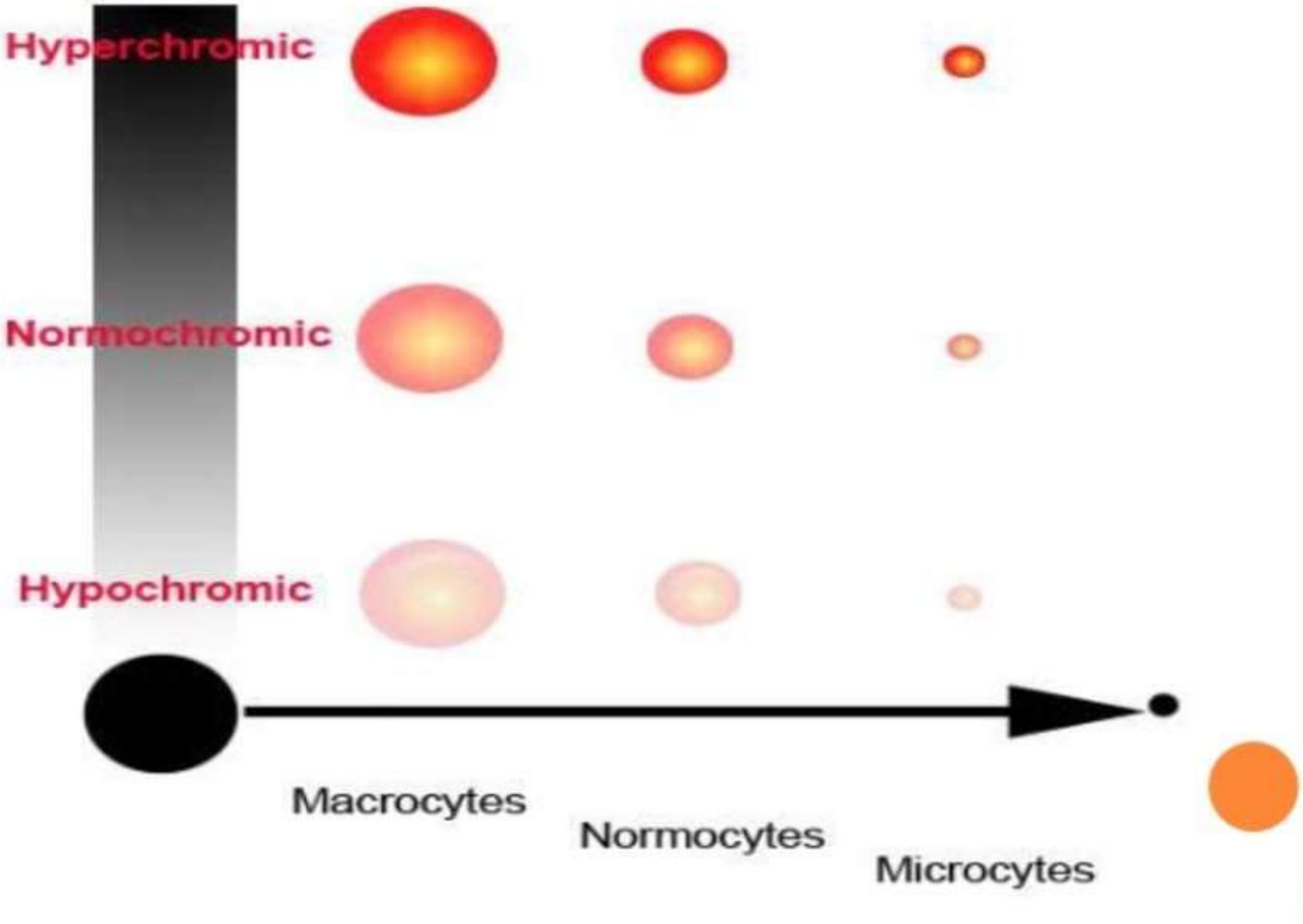
TYPES OF ANEMIA

- Hemorrhagic anemia
- ♣ Excessive loss of RBC through bleeding,stomach ulcers,menstruation
- Hemolytic anemia
- ♣ RBC plasma membrane ruptures.
- ♣ may be due to parasites,toxins,antibodies.
- Thalassemmia
- ♣ Less synthesis of hemoglobin .Found in population of Mediterranean sea.
- Sickle cell anemia
- ♣ Hereditary blood disorder, characterized by red blood cells that assume an abnormal, rigid, sickle shape.
- Aplastic anemia
- ♣ destruction of red bone marrow .
- ♣ caused by toxins,gamma radiation.

TYPES OF ANEMIA

- **Normochromic, normocytic anemia (normal MCHC, normal MCV).**These include:
  - anemias of chronic disease
  - hemolytic anemias (those characterized by accelerated destruction of rbc's)
  - anemia of acute hemorrhage
  - aplastic anemias (those characterized by disappearance of rbc precursors from the marrow)
- **Hypochromic, microcytic anemia (low MCHC, low MCV).**These include:
  - iron deficiency anemia
  - thalassemias
  - anemia of chronic diseases
- **Normochromic, macrocytic anemia (normal MCHC, high MCV).**These include:
  - vitamin B_{12} deficiency
  - folate deficiency

TYPES OF ANEMIA



RISK FACTORS

- Poor socio economic class
- Multiparity
- Teenage pregnancy
- Menstural problem

CAUSES

Increased Requirements	• Menstruating females • Pregnancy • Lactation • Growing infants and children • Erythropoietin treatment
Increased Loss	• GI bleeding • Menorrhagia • Persistent hematuria • Intravascular hemolytic anemias • Regular blood donors • Parasitic infections
Decreased Intake	• Vegetarian diet • Socioeconomic factors
Decreased Absorption	• Upper GI pathology (eg: Celiac and Crohn's disease) • Gastrectomy • Medications (antacids, Zantac)

SIGNS&SYMPTOMS

SYMPTOMS

Common symptoms of anemia

- Easy fatigue and loss of energy
- Unusually rapid heart beat, particularly with exercise
- Shortness of breath and headache, particularly with exercise
- Difficulty concentrating
- Dizziness
- Pale skin
- Leg cramps
- Insomnia

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Anemia Caused by Iron Deficiency

People with an iron deficiency may experience these symptoms:

- A hunger for strange substances such as paper, ice, or dirt (a condition called pica)
- Upward curvature of the nails, referred to as koilonychias
- Soreness of the mouth with cracks at the corners

Anemia Caused by Vitamin B12 Deficiency

People whose anemia is caused by a deficiency of Vitamin B12 may have these symptoms:

- A tingling, "pins and needles" sensation in the hands or feet
- Lost sense of touch
- A wobbly gait and difficulty walking
- Clumsiness and stiffness of the arms and legs
- Dementia
- Hallucinations, paranoia, and schizophrenia

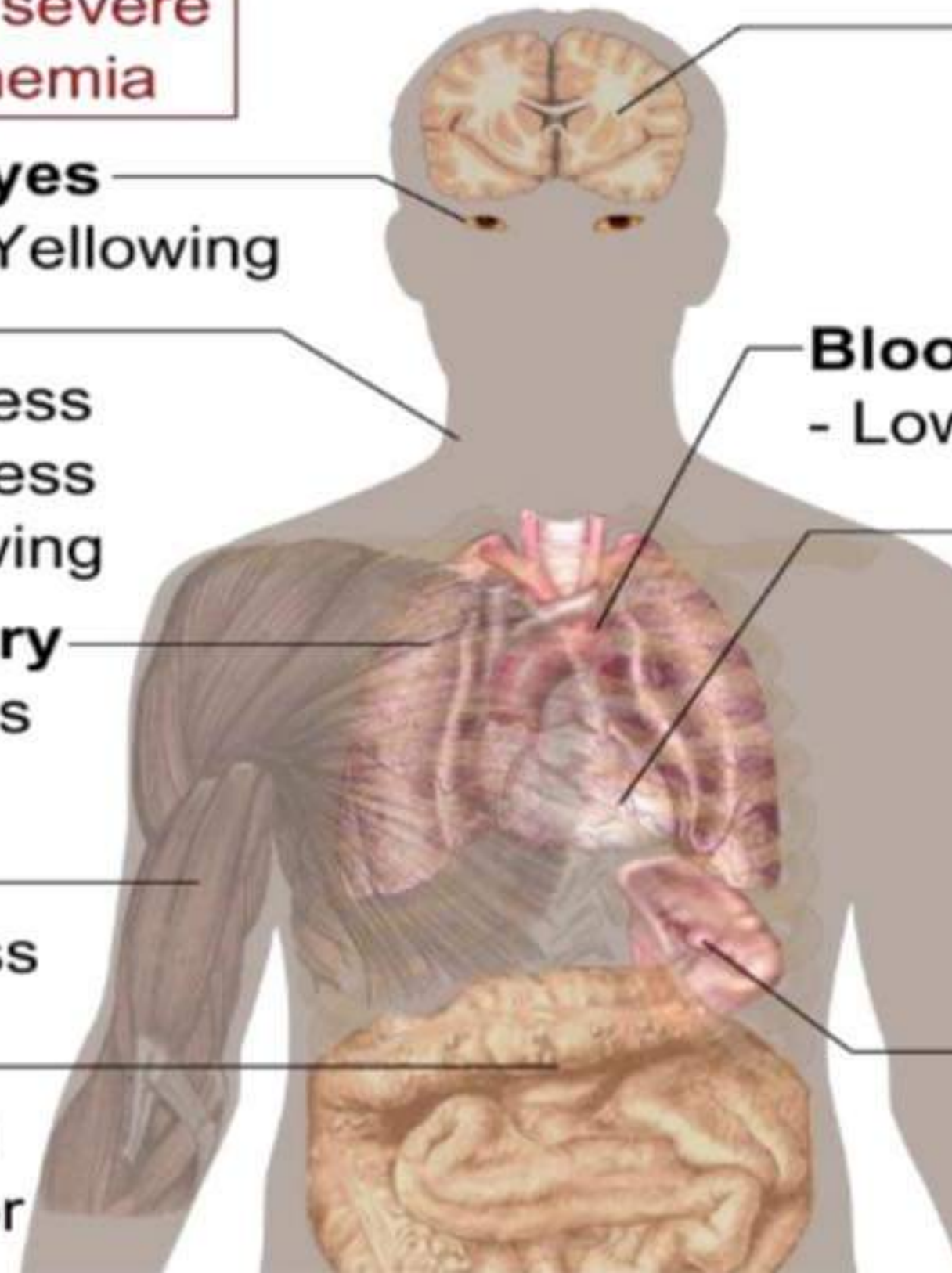
SIGNS OF ANAEMIA

- Brittle nails
- Koilonychia (spoon shaped nails)
- Atrophy of the papillae of the tongue
- Angular stomatitis
- Brittle hair
- Dysphagia and Glossitis
- Plummer vinson/kelly patterson

SYMPTOMS&SIGNS

Symptoms of Anemia

Red = In severe anemia



Central
- Fatigue
- Dizziness
- Fainting

Eyes
- Yellowing

Skin
- Paleness
- Coldness
- Yellowing

Blood vessels
- Low blood pressure

Heart
- Palpitations
- Rapid heart rate
- Chest pain
- Angina
- Heart attack

Respiratory
- Shortness of breath

Muscular
- Weakness

Intestinal
- Changed stool color

Spleen
- Enlarge-ment

INVESTIGATIONS

The red cell population is defined by

1.Quantitative parameters:

- Volume of packed cells i.e. the hematocrit
- Hemoglobin concentration
- Red cell concentration per unit volume.

2.Qualitative parameters:

- Mean corpuscular volume
- Mean corpuscular hemoglobin
- Mean corpuscular hemoglobin concentration.

INVESTIGATIONS

- Hematocrit (Packed cell volume): It is the proportion of the volume of blood sample that is occupied by RBCs.
  - Men -42-52%
  - Women -36-48%

- Cell Volume Hemoglobin Concentration: It is the amount of hemoglobin per unit volume of blood.(Gms/Dl)
  - Women - 12-16gms/dl
  - Men - 14-17 gms/dl

- Red Cell Count: Total number of Red Cells per unit volume of blood sample. [No.of RBC/ cu.mm]
  - Men - $4.2\text{-}5.4*10^{6/}/mm^3$
  - Women- $3.6\text{-}5.0* 10^6/mm^3$

INVESTIGATIONS

- Mean Corpuscular Volume: It is the average volume a RBC. [fL]
  - Normal 82-98mm^{3}or 82-98fL

- Mean Corpuscular Hemoglobin: It is the average hemoglobin content per RBC.
  - Normal value is 27 to 31 pL

- Mean Corpuscular Hemoglobin Concentration: It is the average concentration of hemoglobin in a given Red Cell Volume. [Gms/ dL]
  - Normal 32-36 g/Dl

MANAGEMENT

Care Objectives

- **Determine the Cause of Iron Deficiency**
  - The etiology is often multifactorial; even when there is an obvious cause, investigation of serious underlying causes (e.g.cancer in adults) is recommended.
- **Aim of Treatment**
  - Normalize hemoglobin levels and red cell indices; replenish iron stores.
  - Individualize disease-specific management depending on underlying cause.
- **Lifestyle Management**

It is recommended that patients with iron deficiency receive dietary advice .

NON PHARMOCOLOGICAL MANAGEMENT:

- Tea and coffee inhibit iron absorption when consumed with a meal or shortly after a meal.

- Vitamin C (ascorbic acid) is also a powerful enhancer of iron absorption from nonmeat foods when consumed with a meal. The size of the vitamin C effect on iron absorption increases with the quantity of vitamin C in the meal.

- Germination and fermentation of cereals and legumes improve the bioavailability of iron by reducing the content of phytate, a substance in food that inhibits iron absorption.

- Promote and support exclusive breastfeeding for about 6 months followed by breastfeeding with appropriate complementary foods, including iron-rich through the second year of life.

RECOMMENDED DIETARY ALLOWANCE	Mg/DAY
Men Adult	8 mg
Women Adult (age 50 on)	8 mg
Adult (ages 19 to 50)	18 mg
Pregnant	27 mg
Lactating	9 mg to 10 mg
Adolescents (ages 9 to 18) Girls Boys	 8 mg to 15 mg 8 mg to 11 mg
Children (birth to age 8) Ages 4 to 8	10 mg
Infants (7 months to 1 year) Infants (birth to 6 months)	11 mg 0.27 mg


New Patient
Workup to determine anemia etiology
IDA?
Yes
No
Deworming
Further evaluation of etiology
Tests for anemia often include:
• CBC
• MCV
• Reticulocyte count
• Serum ferritin
• TIBC
• TSAT
Treat with iron[b]
Oral Iron
IV Iron
No
Meeting goals for efficacy and compliance?
Yes
Monitor iron status and readminister treatment as necessary

MANAGEMENT

Complimentary parasite control measures

- Anti-helminthic therapy with 400 mg of single dose of albendazole is given to eliminate hook worms before the initiation of iron and folic acid therapy.
- Child -

  <2yrs-200mg/day single dose

- Pregnancy-

  Albendazole is contraindicated in first trimester, can be administered in second or third trimester.

TREATMENT FOR 6-24 MONTHS

Dosage	Birth-weight category	Duration
12.5 mg iron + 50 ug folic acid daily	Normal Low birth weight (<2500 g)	6-24 months of age 2-24 months of age

TREATMENT OF MILD &MODERATE

GROUP	DOSAGE/day
Children 2-5 years	20-30 mg iron
Children 6-11 years	30-60 mg iron
Adolescents and adults	60 mg iron

- Anemia will correct within 2 to 4 months if appropriate iron dosages are administered and underlying cause of iron deficiency is corrected.
- Continue iron therapy an additional 4 to 6 months (adults) after the hemoglobin normalizes to replenish the iron stores.

TREATMENT OF SEVERE ANEMIA

AGE GROUP	DOSE	DURATION
<2 years	25 mg iron + 100-400 ug folic acid daily	3 months
2-12 years	60 mg iron + 400 ug folic acid daily	3 months
Adolescents and adults, including pregnant women	120 mg iron + 400 ug folic acid daily	3 months

- After completing 3 months of therapeutic supplementation, pregnant women and infants should continue preventive supplementation program

TREATMENT OF PREGNANT WOMEN

Prevalence of anemia in pregnancy	Dose	Duration
>40 % in population	60 mg iron + 400 ug folic acid daily	6 months in pregnancy, and continuing to 3 months postpartum

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- Iron absorption may be decreased by antacids or supplements containing aluminum, maganesium, calcium, zinc, proton pump inhibitors.
- Space administration apart by at least 2 hours.
- Oral iron preparations may cause nausea, vomiting, dyspepsia, constipation, diarrhea or dark stools.
- Strategies to minimize these effects include: start at a lower dose and increase gradually over 4 to 5 days; giving divided doses or the lowest effective dose, or taking supplements with meals
- Although sustained release iron preparations tend towards less gastrointestinal side effects, they may not be as effective as standard film coated products due to reduced/poor iron absorption.[15]

BENEFITS OF THERAPY

POPULATION GROUP	BENEFITS
Children	Improved behaviour and cognitive development Where anaemia is common, improved child survival
Adolescents	Improved cognitive development In girls, better iron stores for later pregnancies
Pregnant women and their infants	Decreased low birth weight Where severe anaemia is common, decreased maternal mortality and obstetrical complications
All individuals	Improved fitness and work capacity Improved cognition