Common and Pathologically Significant Anaemias in Bangladesh

Presented by –

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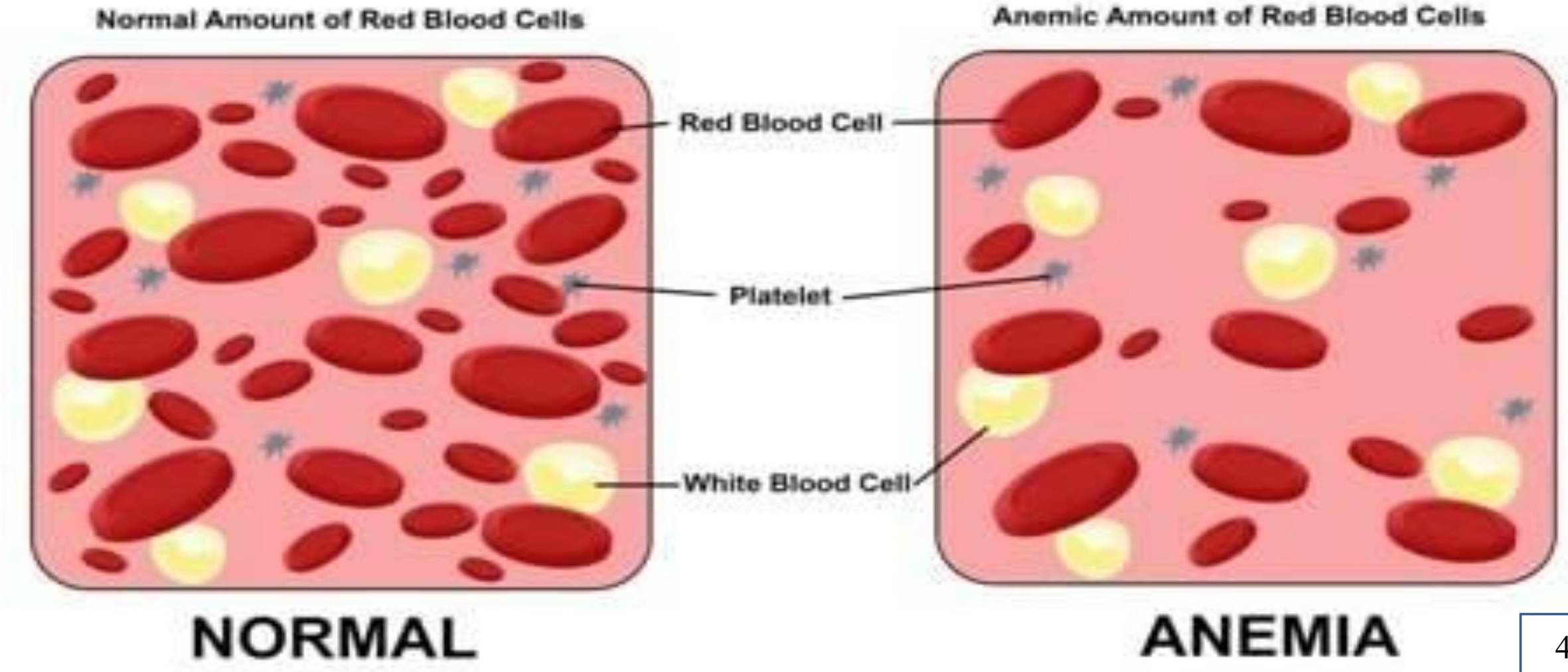
Learning Objectives

- Definition and types of Anaemia
- Common anaemias of Bangladesh
- Iron deficiency anaemia
- Thalassemia
- Some other types
- Prevention and awareness

Anaemia

It is a clinical condition characterized by pale colouration of skin & mucous membrane when hemoglobin level in blood is reduced below the lower extreme of normal in respect of age & sex of the individual.

ANEMIA


Normal Amount of Red Blood Cells
Anemic Amount of Red Blood Cells
Red Blood Cell
Platelet
White Blood Cell
NORMAL
ANEMIA

Normal Hemoglobin Level

- Male= 15-18 g/dl
- Female=12-16 g/dl
- Newborn =14-24 g/dl

Epidemiology

- Prevalence of anaemia in women

30.7% of women aged 15-49 years suffered from anaemia in 2023

- Prevalence of anaemia in pregnant women

35.5% of pregnant women aged 15-49 years suffered from anaemia in 2023

- Prevalence of anaemia in non-pregnant women

30.5% of non-pregnant women aged 15-49 years suffered from anaemia in 2023

- Prevalence of anaemia in children

39.8% of children 6-59 months in the world were affected by anaemia in 2019

(WHO global anaemia estimate 2025 edition)

Prevalence in Bangladesh

46% of pregnant women,

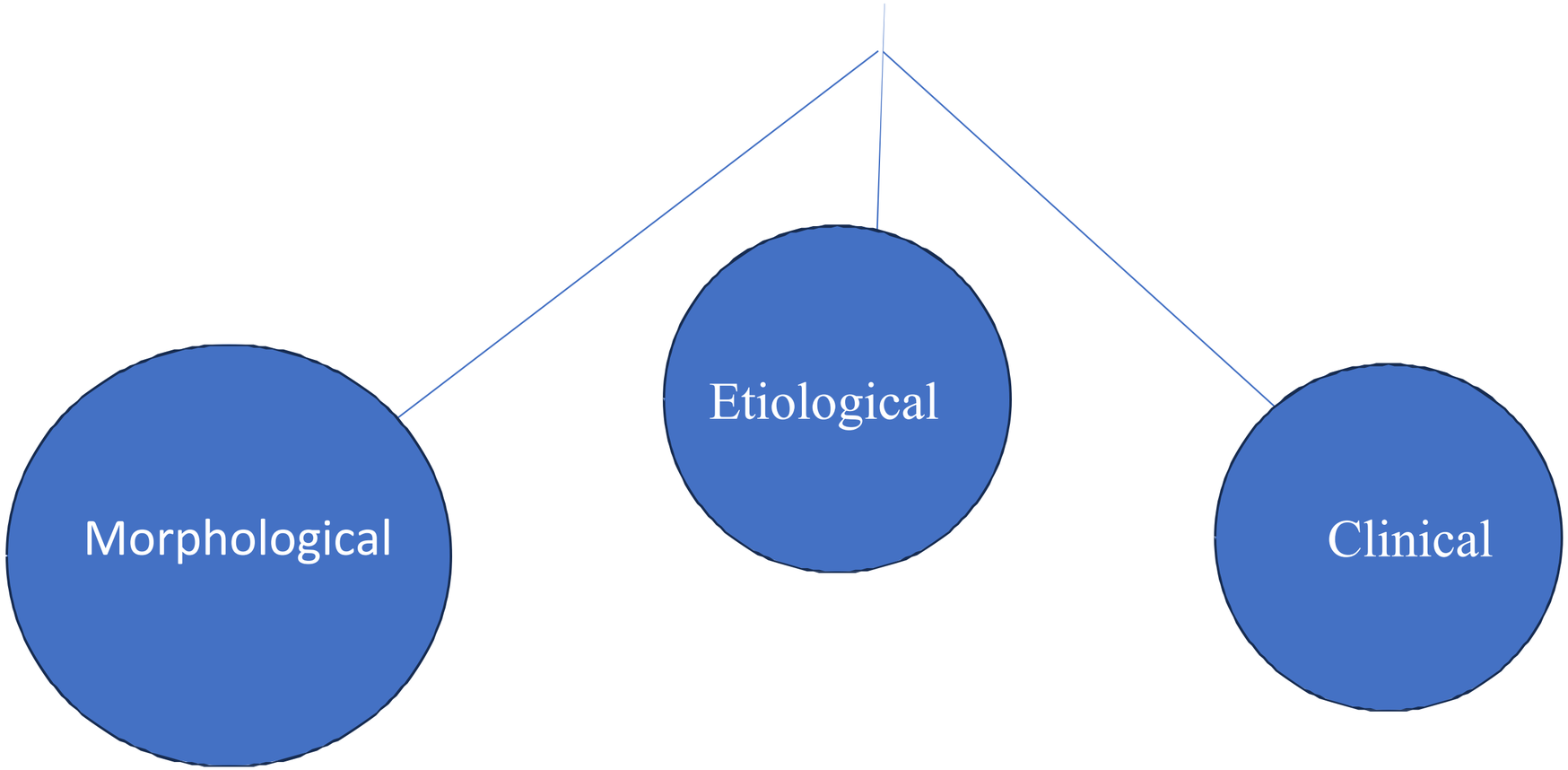
37% of women of reproductive age

64% of children aged 6-23 months

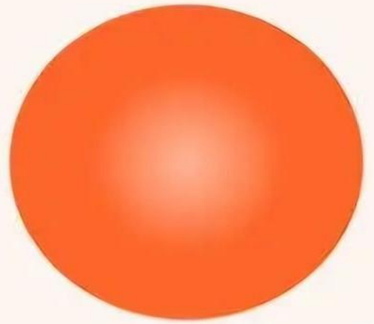
42% of children aged 24-59 months

(National Nutrition Service Bangladesh)

Types of Anaemia



Morphological Classification of Anemia



Morphology	Microcytic	Normocytic	Macrocytic
MCV (fL)	<80	80 - 100	>100
Disorders	**T**halassemia **A**nemia of chronic disease **I**ron deficiency anemia **L**ead poisoning **S**ideroblastic anemia	**H**emolytic anemia **A**nemia of chronic disease **R**enal disease **A**cute blood loss **B**one marrow failure **A**plastic anemia	**M**egaloblastic anemia **A**lcoholism **L**iver disease **M**yelodysplasia

Aetiological Classification

Haemorrhagic anemia:

Acute haemorrhage: Trauma, surgery.

Chronic haemorrhage:

- GIT lesion- Peptic ulcer, hookworm infestation, piles.
- Gynaecological cause- Menorrhagia.

Cont...

Hemolytic anemia:

- Intracorpuscular defect- Thalassaemia.
- Extracorpuscular defect- Hemolytic disease of newborn.

Cont...

Dyshaemopoietic anemia:

Due to deficiency of essential elements of erythropoiesis:

- Iron deficiency anemia.
- Megaloblastic anemia.
- Nutritional anemia in PEM.
- Anemia with scurvy.

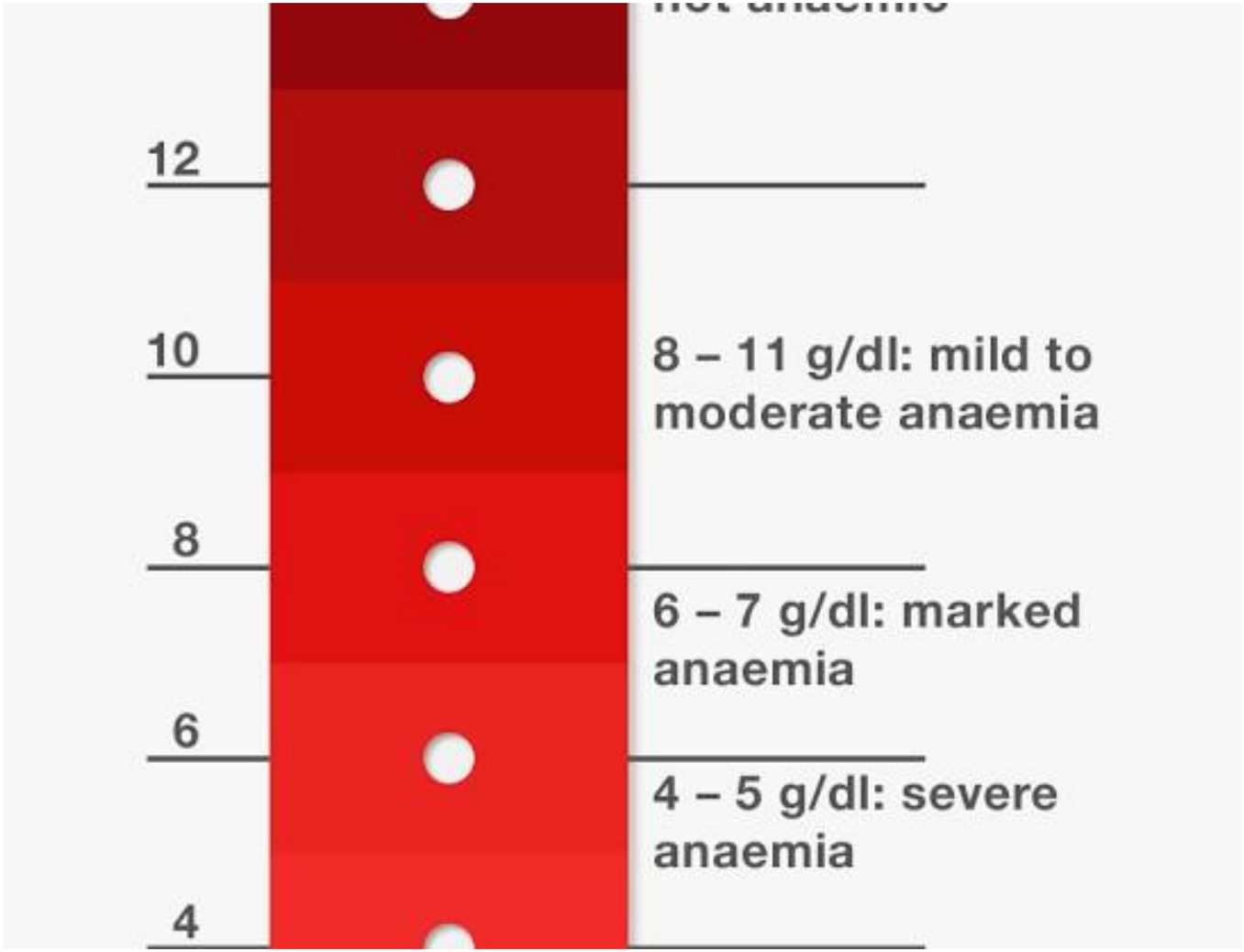
Cont..

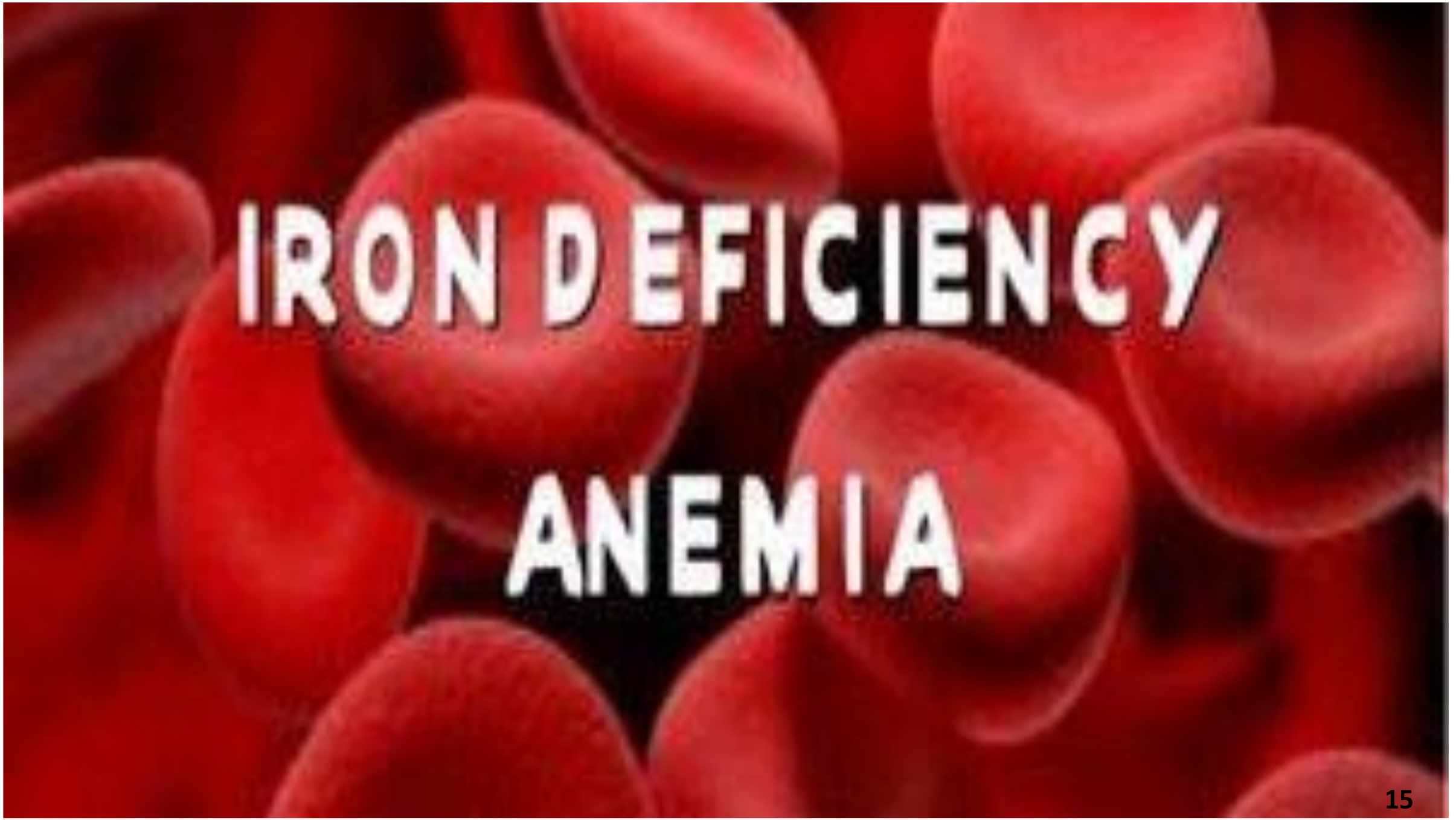
Due to bone marrow disturbance:

- Aplastic anemia.
- Sideroblastic anemia.
- Anemia with renal failure.
- Anemia with endocrine disorders.

Clinical Classification

Mild: 12-09 g/dl
Moderate: 09-06 g/dl
Severe: <06 g/dl




IRON DEFICIENCY
ANEMIA

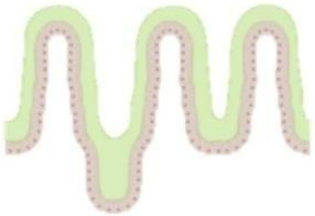
Causes of iron deficiency

Inadequate dietary intake

- Vegetarian/ vegans
- Exclusive breast milk feeding
- Milk diet

Hypoacidity

- Gastric bypass
- Atrophic gastritis
- H. pylori infection
- Antacids/ PPI use

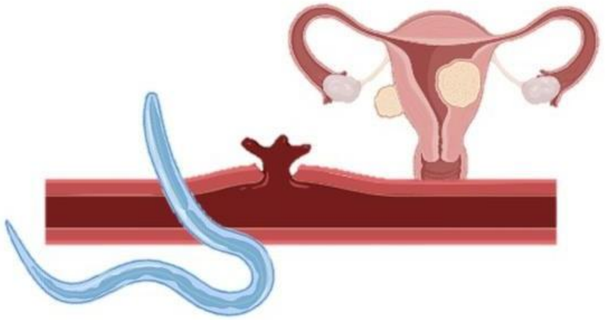


Impaired absorption and delivery

- Coeliac disease
- Functional IDA secondary to chronic disease/ malignancy
- Iron refractory IDA

Increased demands

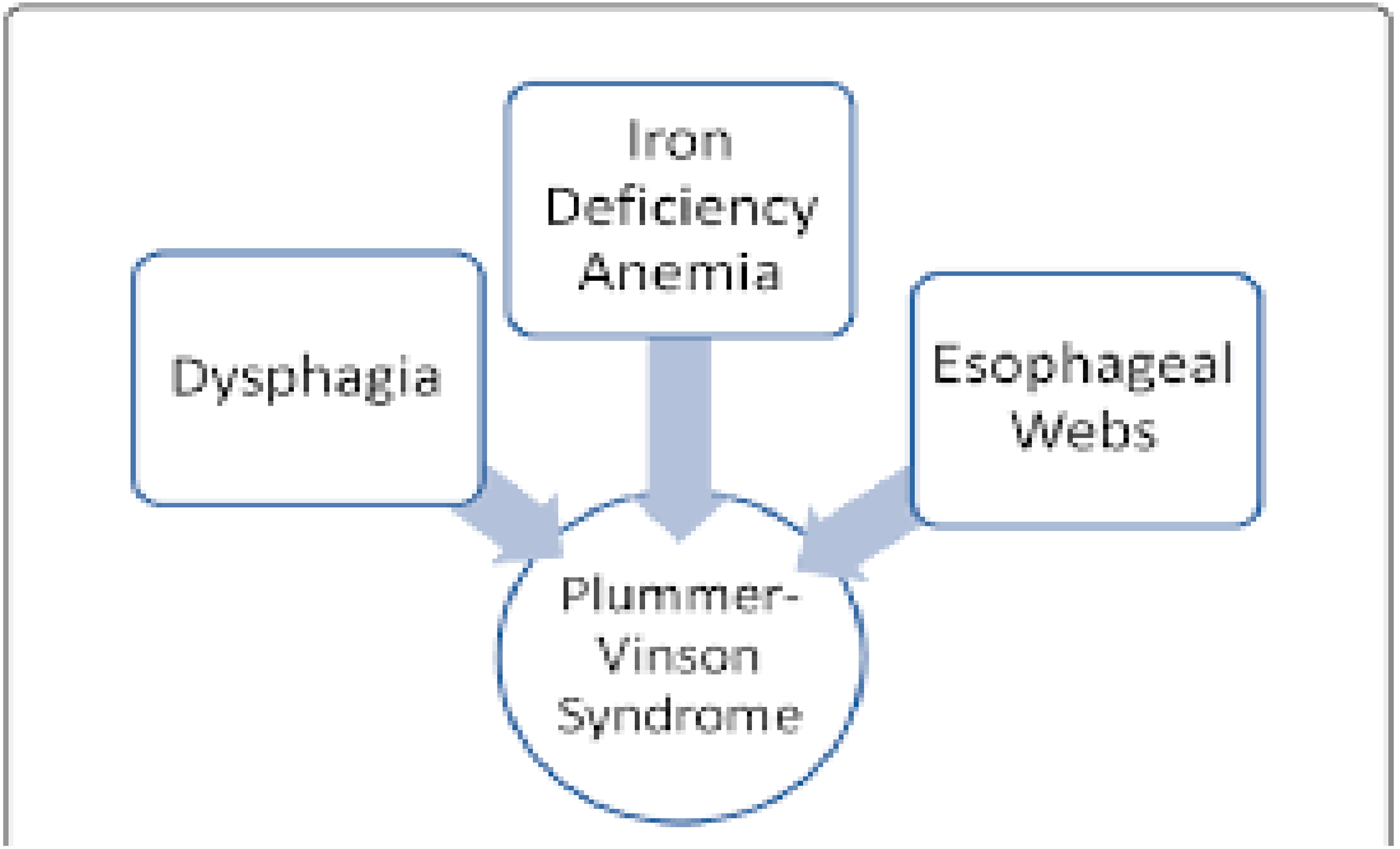
- Pregnancy
- Preterm babies
- Infancy
- Adolescence
- Malignancies

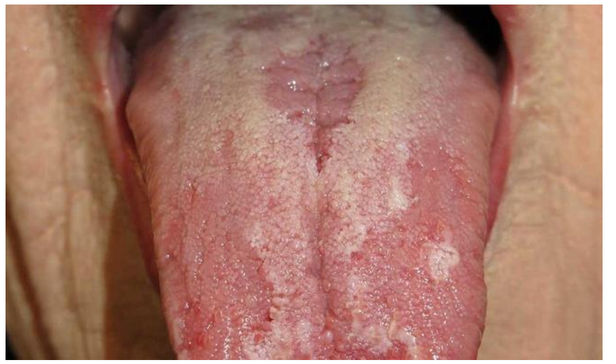


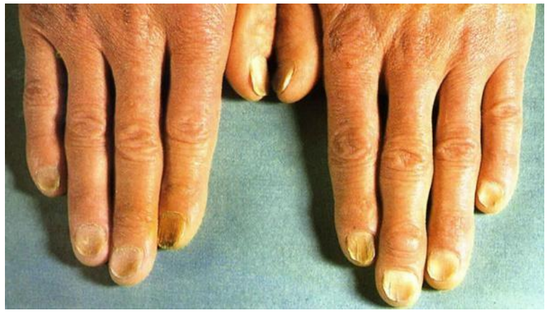
Blood loss

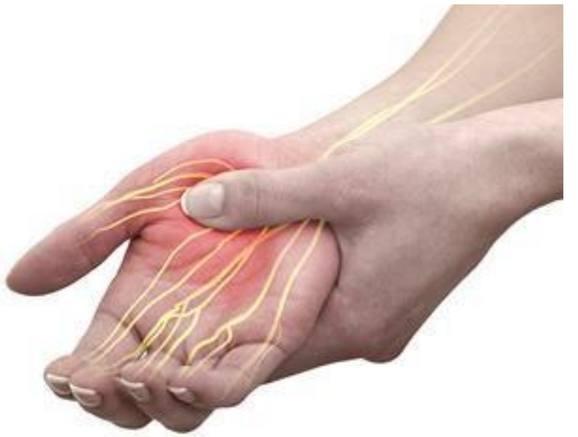
- Peptic ulcer disease
- Gastrointestinal malignancies
- NSAID abuse
- Haemorrhoids
- Inflammatory bowel disease
- Hookworm infestation
- Menorrhagia
- Chronic haemoglobinuria
- Frequent blood donation or blood taking

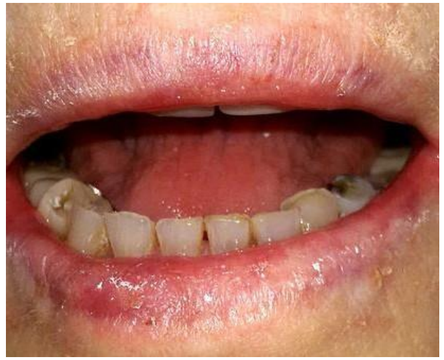
Clinical features of IDA


Iron Deficiency Anemia
Dysphagia
Esophageal Webs
Plummer-Vinson Syndrome









Lab diagnosis of IDA

CBC:

✓Hb: Reduced

✓RBC: Decreased

✓Red cell indices: All are reduced

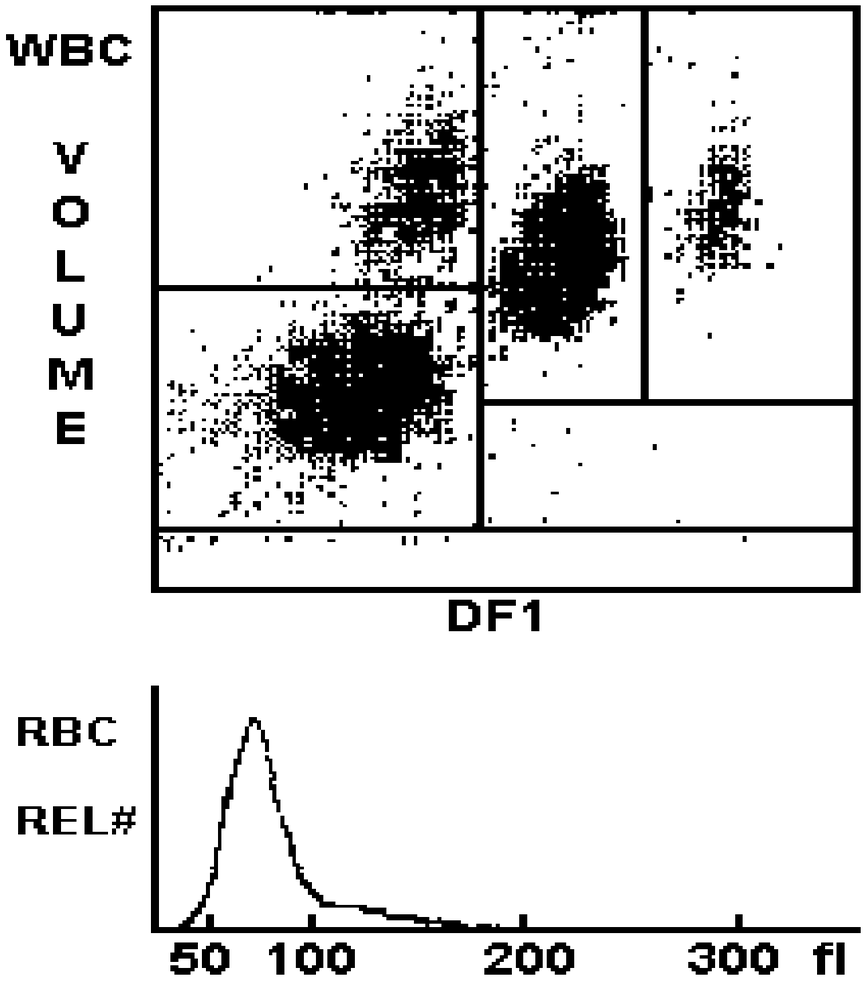
Lab diagnosis of IDA

PBF:

Microcytic hypochromic RBC with anisocytosis & poikilocytosis.

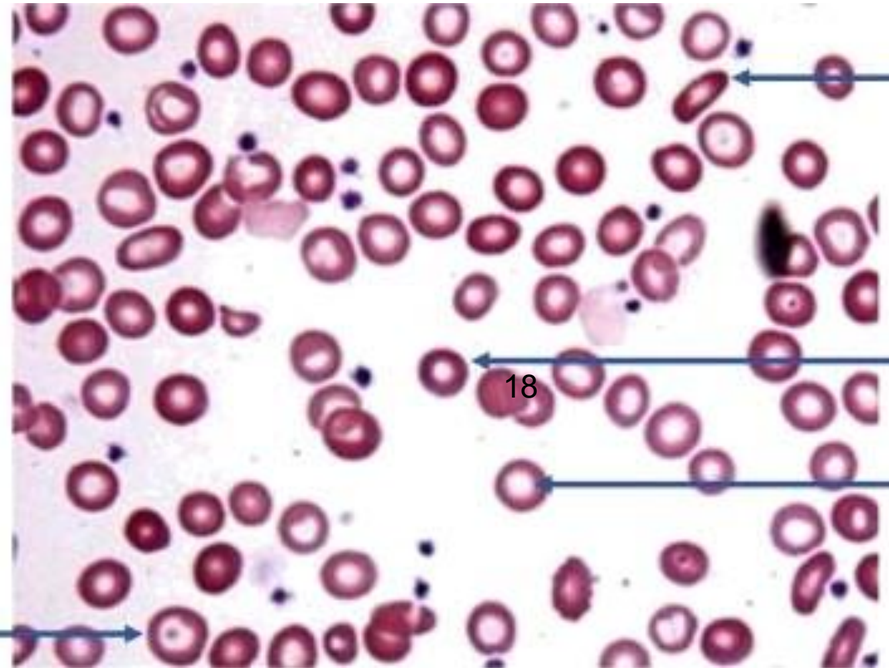
Pencil cells, tear drop cells and occasionally target cells are found.

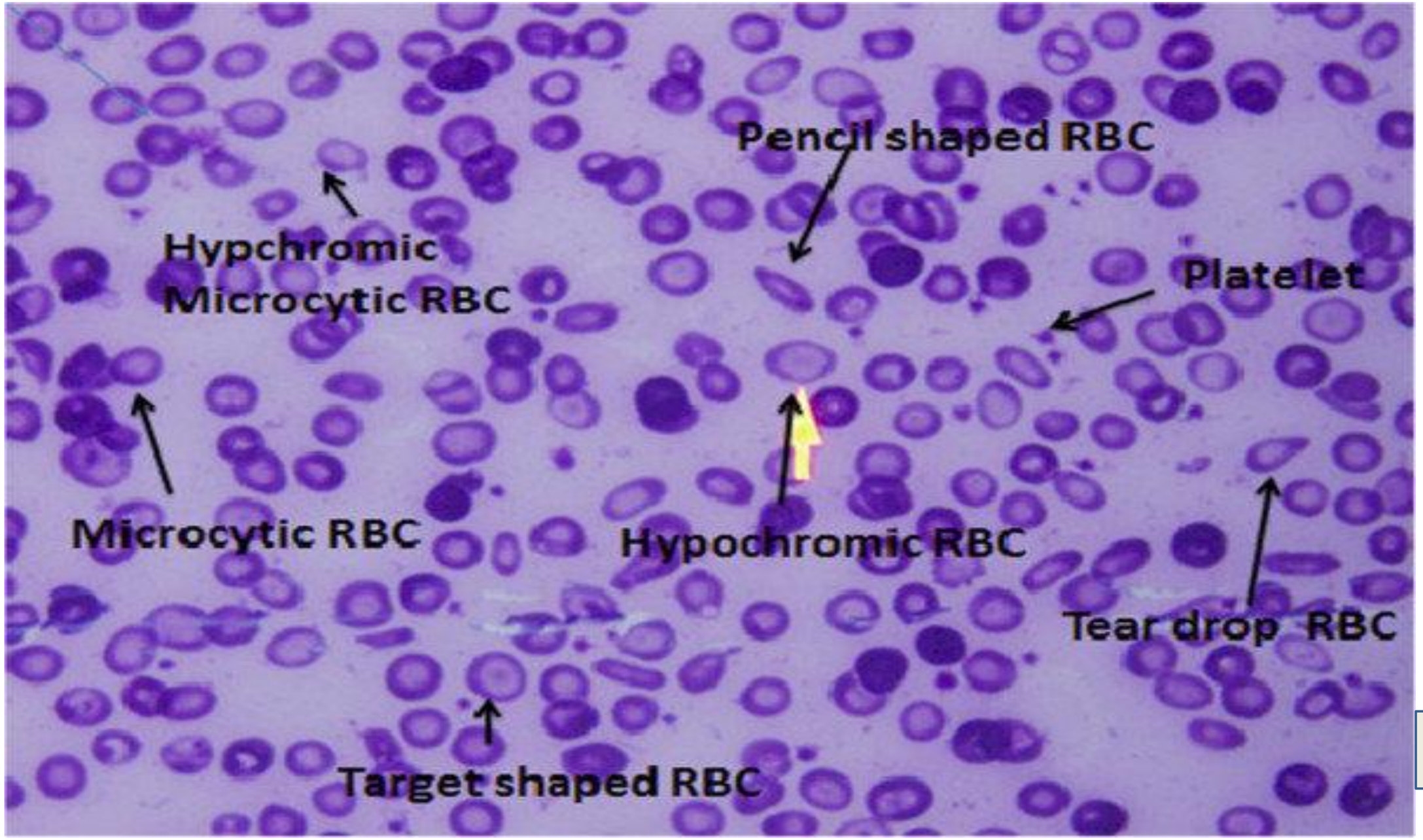
Blood Picture Of IDA



WBC	5.5		
	%		#
NE	54.7		3.0
LY	34.1		1.9
MO	7.5		0.4
EO	3.0		0.2
BA	0.7		0.0
RBC	4.28	L	
HGB	9.7	L	
HCT	29.9	L	
MCV	69.7	L	
MCH	22.6	L	
MCHC	32.4	L	
RDW	18.4	H	
PLT	331		
MPV	8.8		

Typical features of iron deficiency anaemia on a peripheral blood film

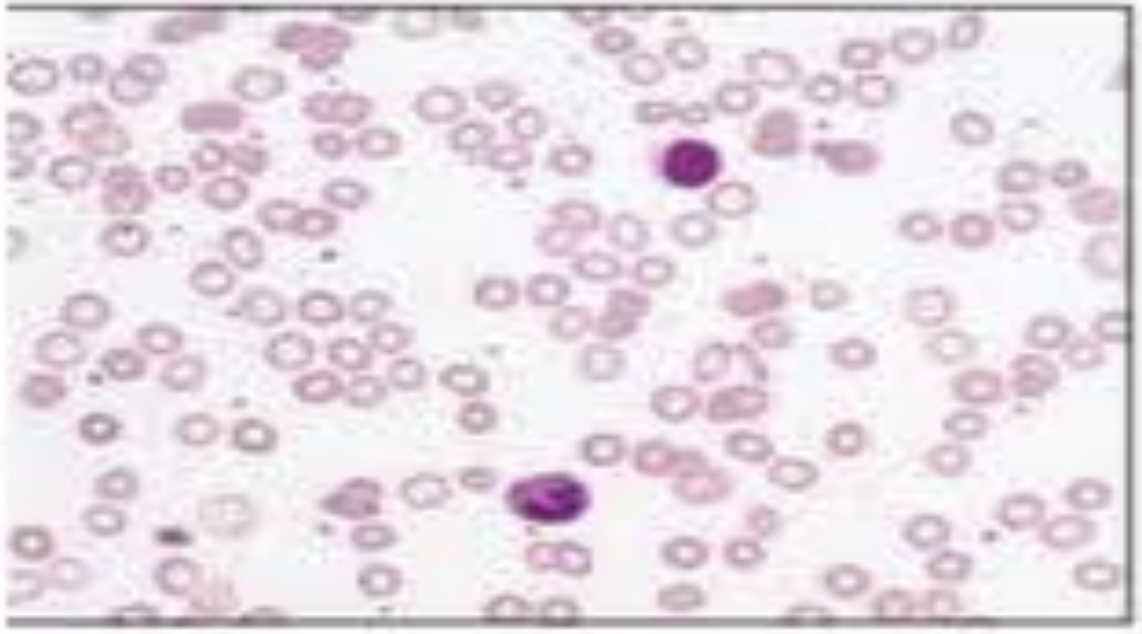



Pencil shaped RBC
Hypchromic
Microcytic RBC
Platelet
Microcytic RBC
Hypochromic RBC
Tear drop RBC
Target shaped RBC

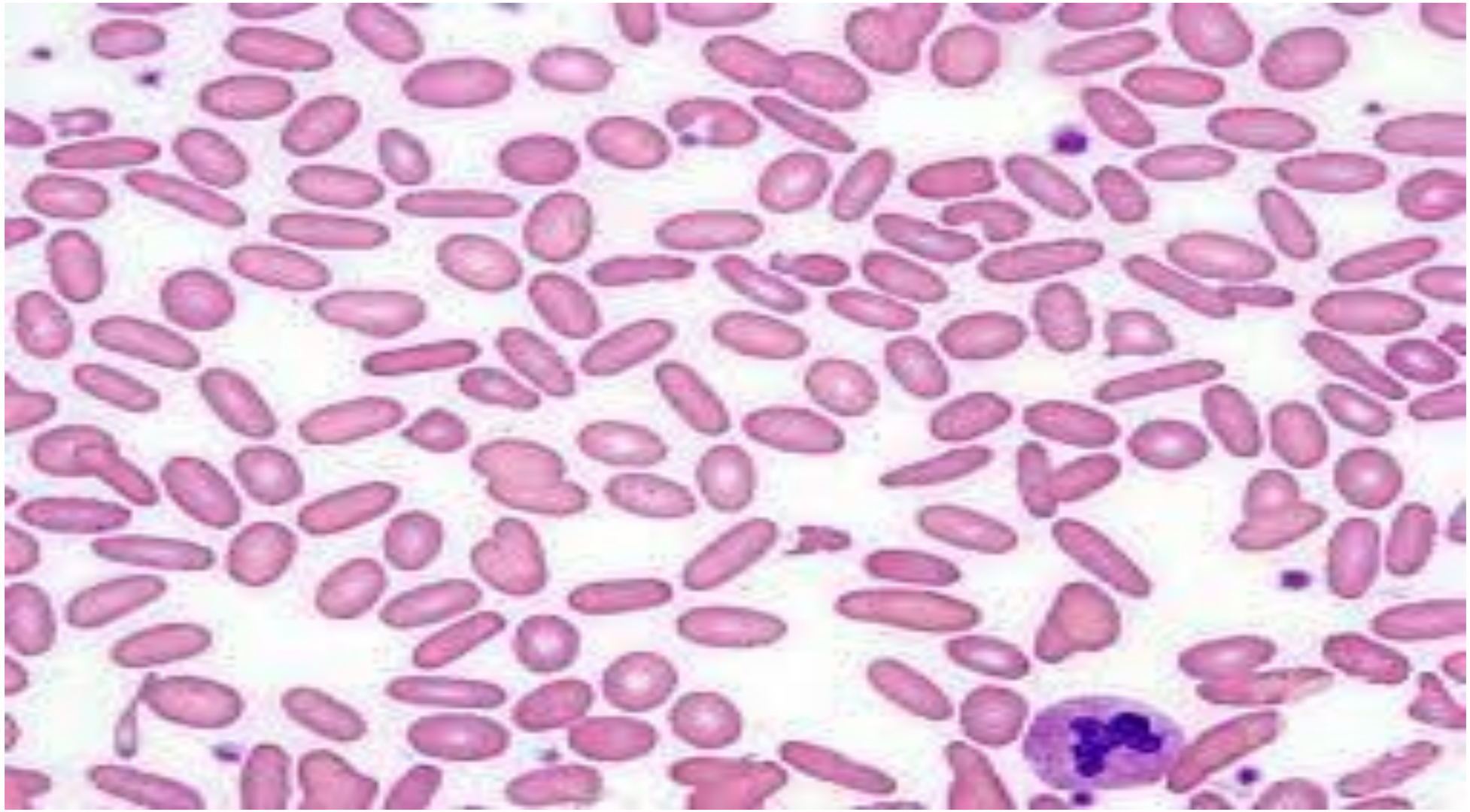
Hypochromic

- Dcrease in Hemoglobin content of RBC
- increase in central pallor(>1/3rd)
- Decrease in MCH and MCHC
- Seen in Iron Deficiency anemia
- thalassaemia

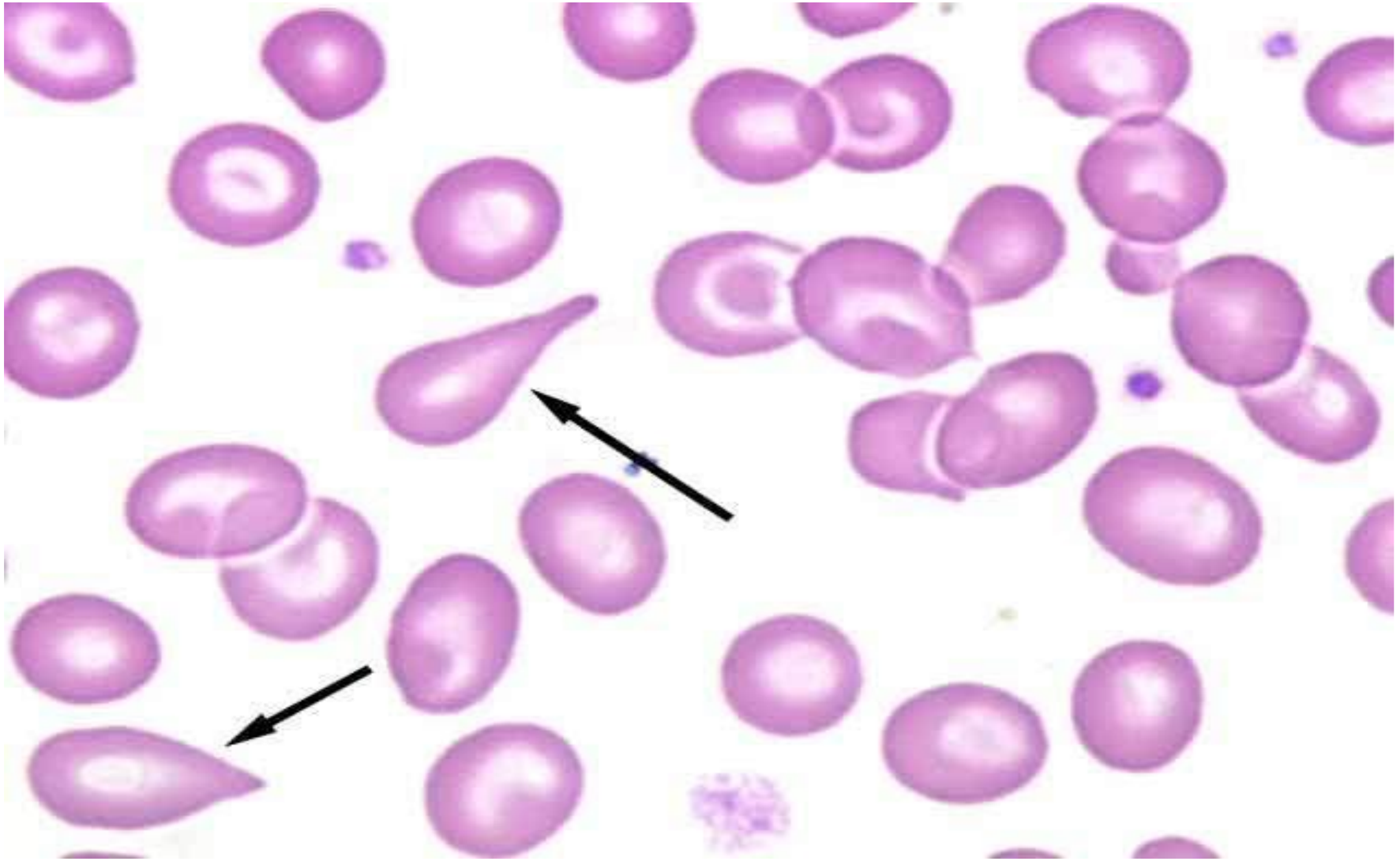
- hypochromia



Pencil Shaped Cells



Tear Drop Cells



C) Serum iron profile

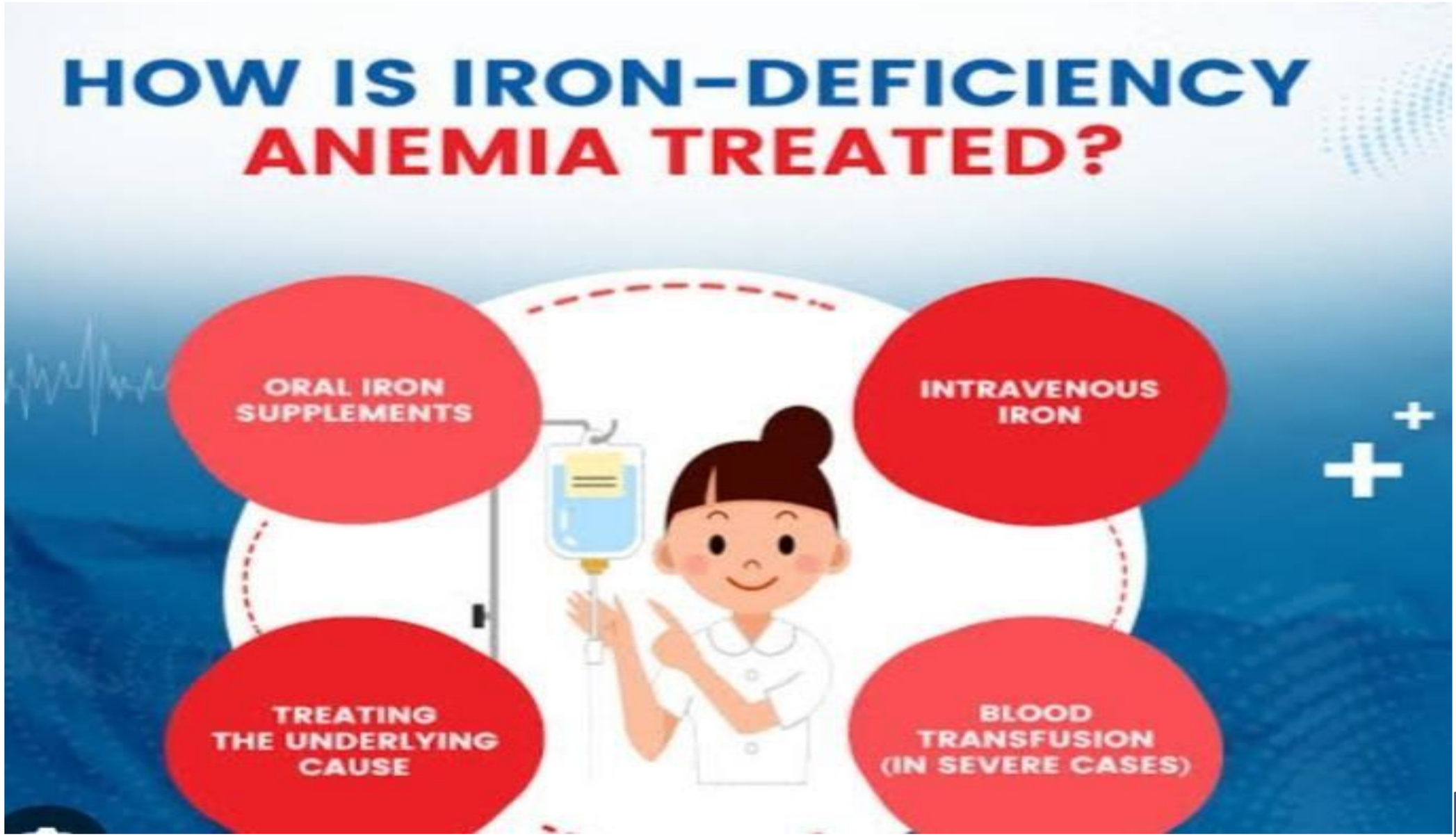
- ✓ Serum iron: reduced
- ✓ Serum ferritin: reduced
- ✓ Percent saturation: decreased
- ✓ Total iron binding capacity : increased

	Normal range	*Value in IDA*
Serum ferritin	15–300 µg/L	<15 µg/L
Serum iron	50–150 µg/dL	10–15 µg/dL
Serum transferrin saturation	30–40%	<15%
Total plasma iron-binding capacity (TIBC)	310–340 µg/dL	350–450 µg/dL

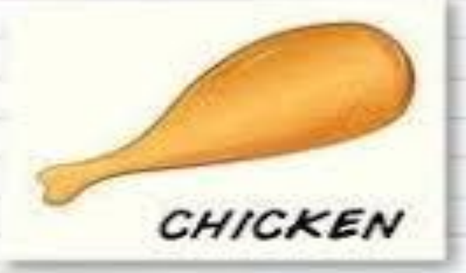
Investigations according to cause:

- ✓ Upper GI endoscopy: if bleeding peptic ulcer is suspected
- ✓ Stool examination : for occult blood & ova of hookworm.
- ✓ Urine examination : for microscopic haematuria.

HOW IS IRON-DEFICIENCY ANEMIA TREATED?



IRON RICH FOOD:


CHICKEN


LIVER


BROCCOLI


DRIED BEANS/ GREEN PEAS


PORK


BEEF


POTATOES WITH SKIN


SPINACH


EGG YOLK


CLAMS

IRON FORTIFIED CEREALS

RAISINS


SHRIMP


DRIED APRICOT


WATERMELON

Oral iron supplementation

- ✓ Ferrous sulphate:200 mg bd/tds(120mg of elemental iron per day),continued for 3-6 months to replete iron stores.
- ✓ Ferrous gluconate:if the patient is intolerant of ferrous sulphate.

Dose:300 mg bd(70mg of elemental iron per day)


PHARMACY MEDICINE
KEEP OUT OF REACH OF CHILDREN
Maltofer®
Syrup
Iron polymaltose
370mg/10mL
equivalent to 100mg/10mL
elemental iron
Oral Iron
For the treatment of iron deficiency where the use of ferrous iron supplements is not tolerated, or otherwise inappropriate
For the prevention of iron deficiency in patients at high risk where the use of ferrous iron supplements is not tolerated, or otherwise inappropriate
150mL | ORAL LIQUID
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PHARMACY MEDICINE
KEEP OUT OF REACH OF CHILDREN
Maltofer® Tablets
Iron polymaltose 370mg equivalent to 100mg of elemental iron per tablet
Oral Iron
For the treatment of iron deficiency - in adults and adolescents where the use of ferrous iron supplements is not tolerated, or otherwise inappropriate.
For the prevention of iron deficiency - in adults and adolescents at high risk where the use of ferrous iron supplements is not tolerated, or otherwise inappropriate.
✓ Favourable tolerability versus ferrous iron supplements
✓ Can be taken with food
30 | FILM COATED TABLETS
PHARMACY MEDICINE
KEEP OUT OF REACH OF CHILDREN
Maltofer® Tablets
Iron polymaltose 370mg equivalent to 100mg of elemental iron per tablet
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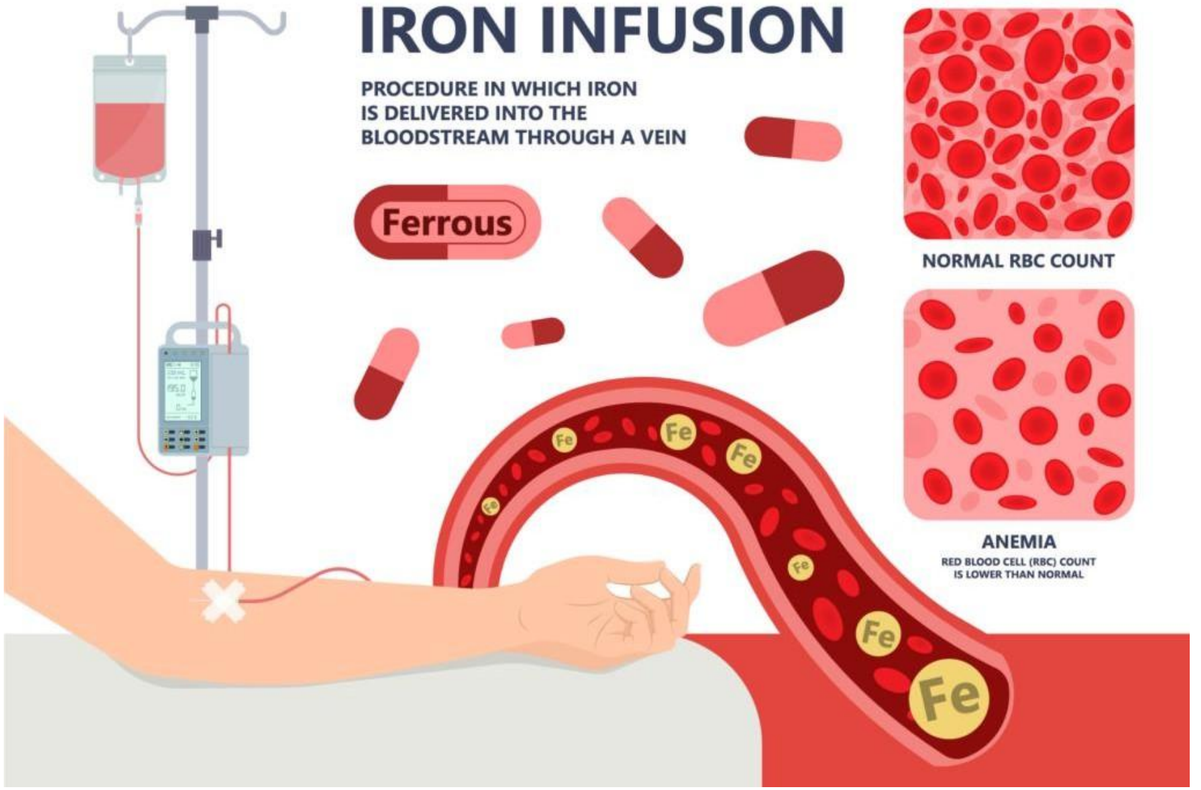
✓ Can be taken with food
100 | FILM COATED TABLETS
AUST R 229647

Parenteral iron therapy:

- Indication:
  >Malabsorption
  >Chronic gut disease
  >Inability to tolerate oral iron.



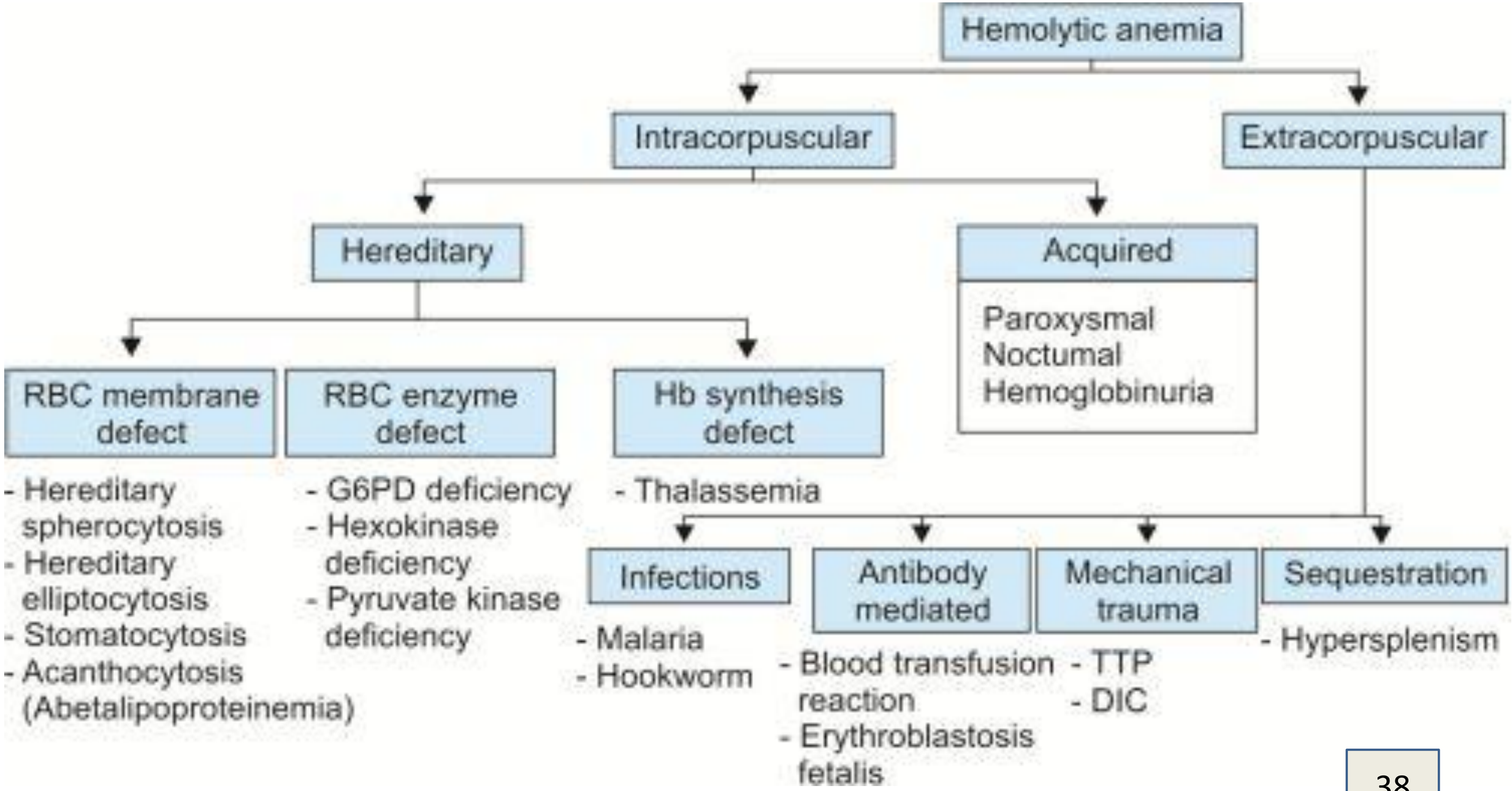
Previously iron dextran or iron sucrose was used but now a days iron iso-maltose & iron carboxy-maltose are preferred due to their fewer allergic effects.


Malboler
Sodium Chloride

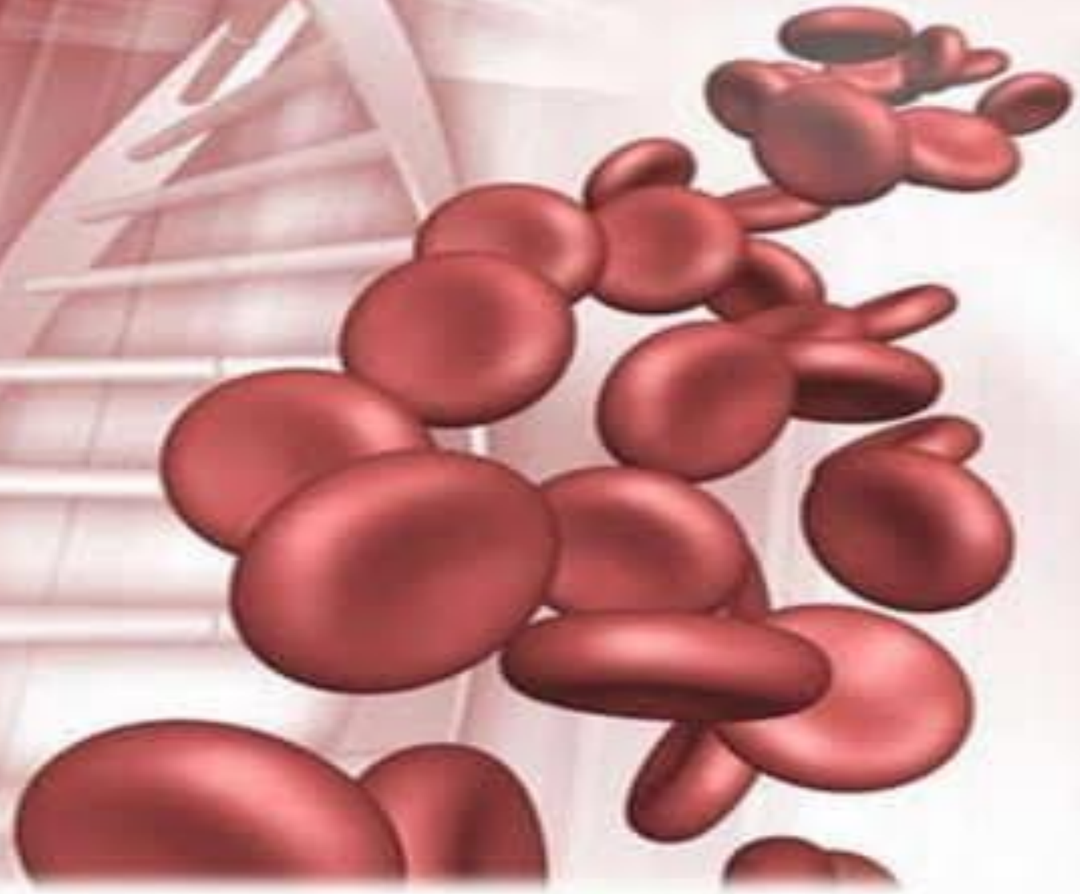
Target Hb level: The Hb should rise by 1gm/dl every 7-10 days

Reticulocytosis response will be evident by 1 week.

Hemolytic anaemia

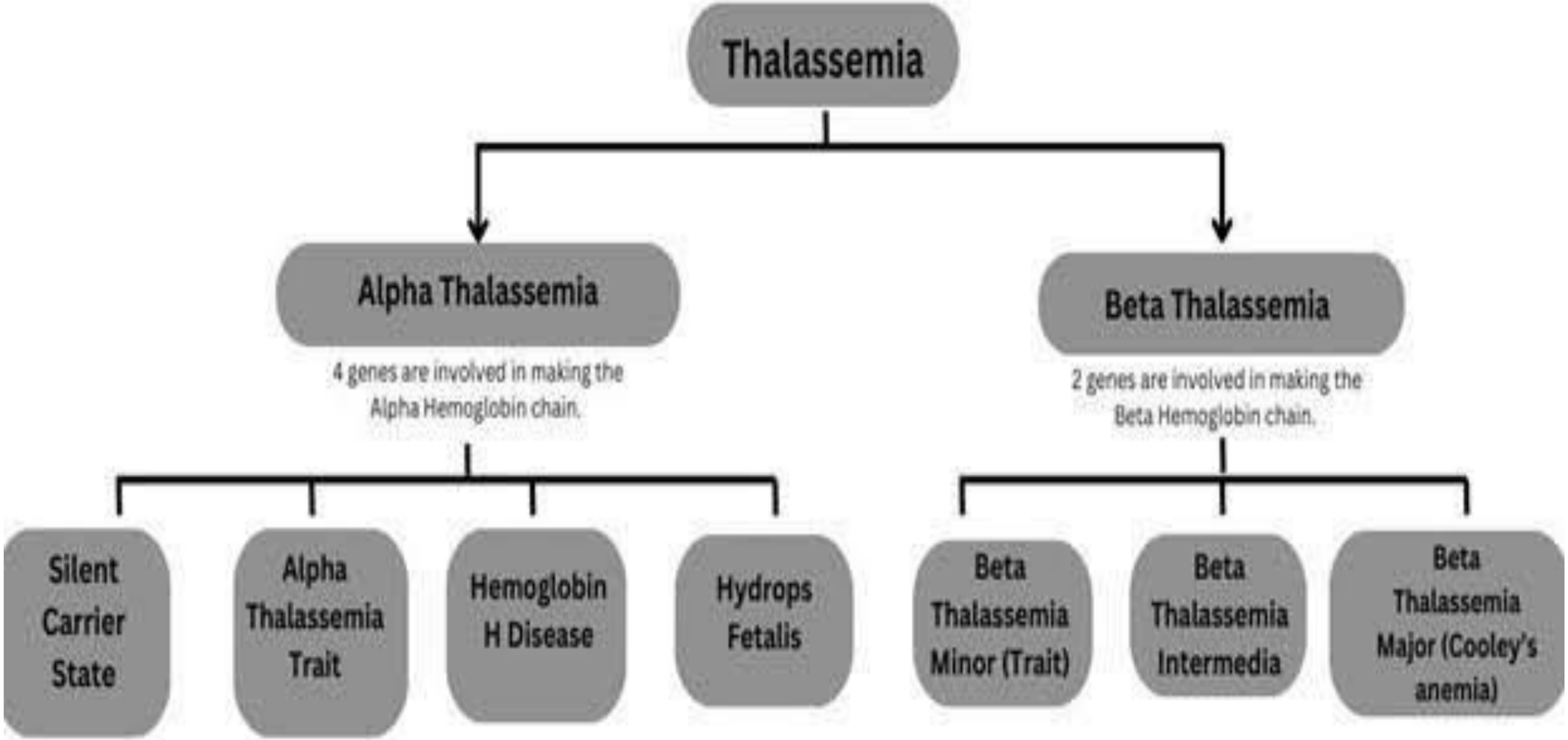

Hemolytic anemia
Intracorpuscular
Extracorpuscular
Hereditary
Acquired
Paroxysmal
Noctumal
Hemoglobinuria
RBC membrane defect
RBC enzyme defect
Hb synthesis defect
- Hereditary spherocytosis
- Hereditary elliptocytosis
- Stomatocytosis
- Acanthocytosis (Abetalipoproteinemia)
- G6PD deficiency
- Hexokinase deficiency
- Pyruvate kinase deficiency
- Thalassemia
Infections
Antibody mediated
Mechanical trauma
Sequestration
- Malaria
- Hookworm
- Blood transfusion reaction
- Erythroblastosis fetalis
- TTP
- DIC
- Hypersplenism

THALASSEMIA



Definition

Thalassemia is defined as a group of autosomal recessive disorders caused by reduction or absent production of one or more of globin chains that make up the hemoglobin molecule.

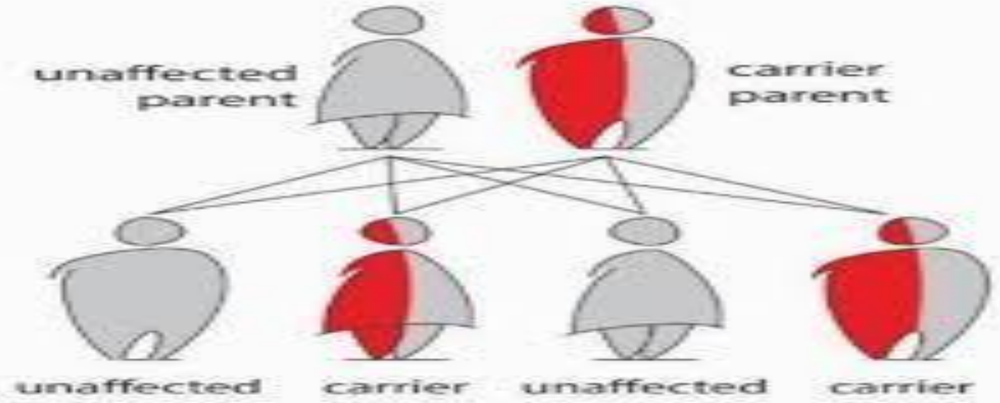

Thalassemia
Alpha Thalassemia
4 genes are involved in making the Alpha Hemoglobin chain.
Beta Thalassemia
2 genes are involved in making the Beta Hemoglobin chain.
Silent Carrier State
Alpha Thalassemia Trait
Hemoglobin H Disease
Hydrops Fetalis
Beta Thalassemia Minor (Trait)
Beta Thalassemia Intermedia
Beta Thalassemia Major (Cooley's anemia)

Causes of Thalassemia

	Descition
Inherited Genetic Disorder	Passed from parents to children via autosomal recessive inheritance
Gene Involved	**Alpha Thalassemia:** Mutation/deletion in α-globin gene (Chromosome 16) **Beta Thalassemia:** Mutation in β-globin gene (Chromosome 11)
Imbalance in Globin Chains	Reduced or absent synthesis of one globin chain → excess of the other chain
Ineffective Erythropoiesis	Unstable globin chains damage red blood cells → anemia & hemolysis
Geographic Prevalence	Higher incidence in Mediterranean, Middle Eastern, African, and Asian regions
Protective Evolutionary Role	Carrier state may provide resistance to malaria (natural selection)

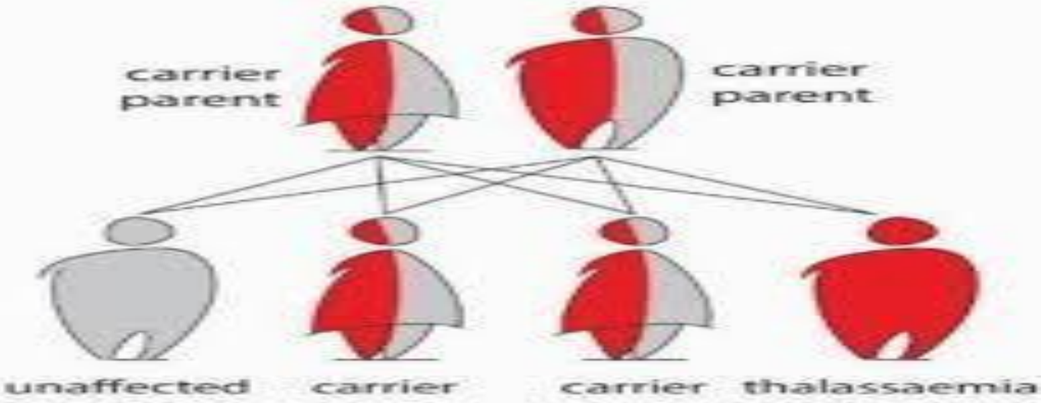
When one parent is a carrier

Risk of a child:
having thalassaemia – 0%
becoming a carrier – 50%



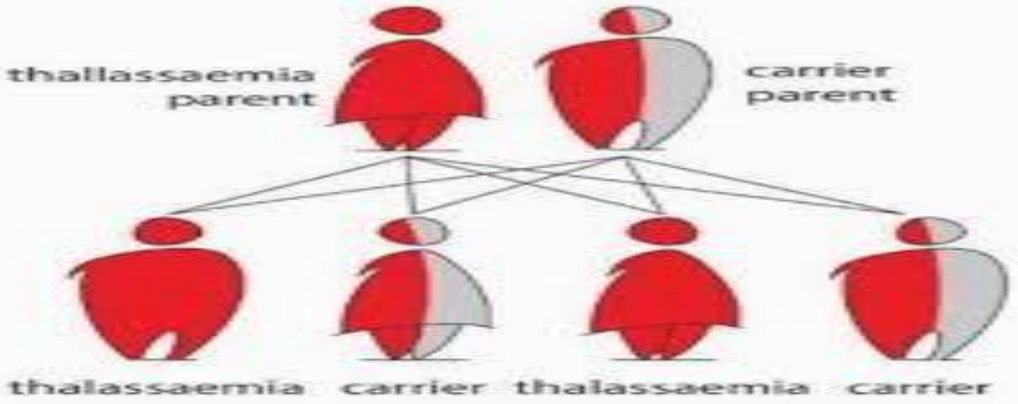
When both parents are carriers

Risk of a child:
having thalassaemia – 25%
becoming a carrier – 50%



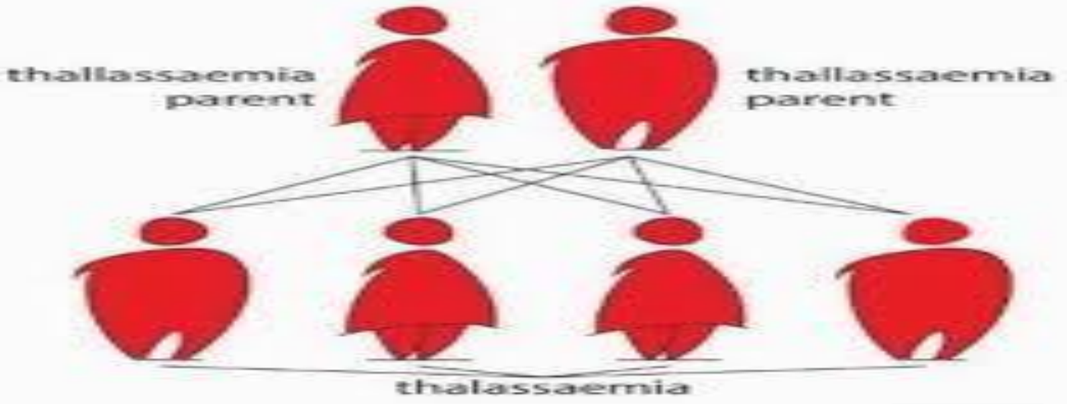
When one parent has thalassaemia and the other is a carrier

Risk of a child:
having thalassaemia – 50%
becoming a carrier – 50%



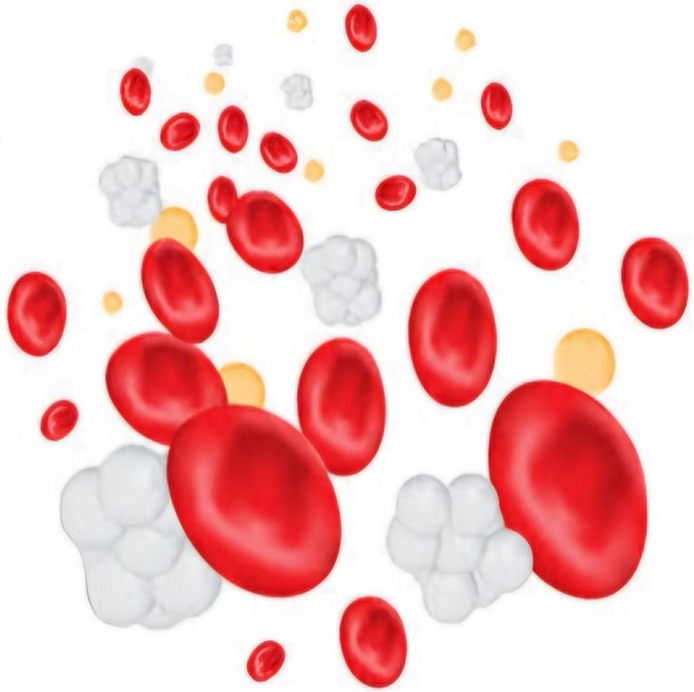
When both parents have thalassaemia

Risk of a child:
having thalassaemia – 100%
becoming a carrier – 0%

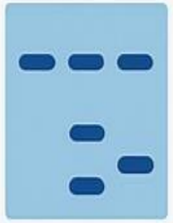
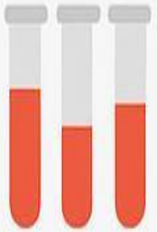
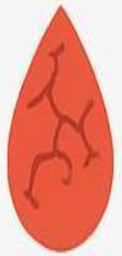
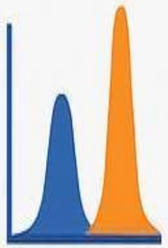


Thalassemia signs and symptoms can include:

- Fatigue
- Weakness
- Pale or yellowish skin
- Facial bone deformities
- Slow growth
- Abdominal swelling
- Dark urine



Laboratory Diagnosis of Thalassemia

Test	Findings / Purpose
 **Complete Blood Smear**	Microcytic, hypochromic anemia ↓ MCV, ↓ MCH, normal/increased RBC count
 **Peripherai Blood Smear**	Target cells, tear-drop celis, nucleated RBCs basophilic stippling
 **Hemoglobin Electro-phoresis**	↑ HbA_2 (in beta-thalassemia trait) ↑ HbF (in beta-thalassemia major)
 **Iron Studies**	Normal or ↑ serum iron and ferritin (to rule out iron deficiency anemia)
 **Genetic Testing**	Identifies specific globin gene mutations/deletions
 **Osmotic Fragility Test**	May show decreased fragility in thalassemia (not specific)
 **Bone Marrow Examination**	Shows erythroid hyperplasia (done in selected cases)

CBC report of a thalassemia patient

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প্রধান শাখা ঃ বাড়ী নং-১৬, রাস্তা নং-২, ধানমন্ডি, ঢাকা। হটলাইন ঃ ০৯৬১৩৭৮৭৮০১, ০৯৬৬৬৭৮৭৮০১। ওয়েবসাইট ঃ www.popudiagnostic.com

LABORATORY SERVICES

ent Name	Md. Abid Iqbal	Lab No	50493638
ID	500400250	Sample Collection Date	26/08/2024 9:48AM
:/Gender	1 Yrs/Male	Receiving Dates	26/08/2024 11:06AM
ferred By	Asstt. Prof. Dr. Mrinal Kanti Das, MBBS, DCH (Dhaka), FCPS (Pediatric) #RAJ291	Report Date	26/08/2024 9:11PM
		Report Status	Final

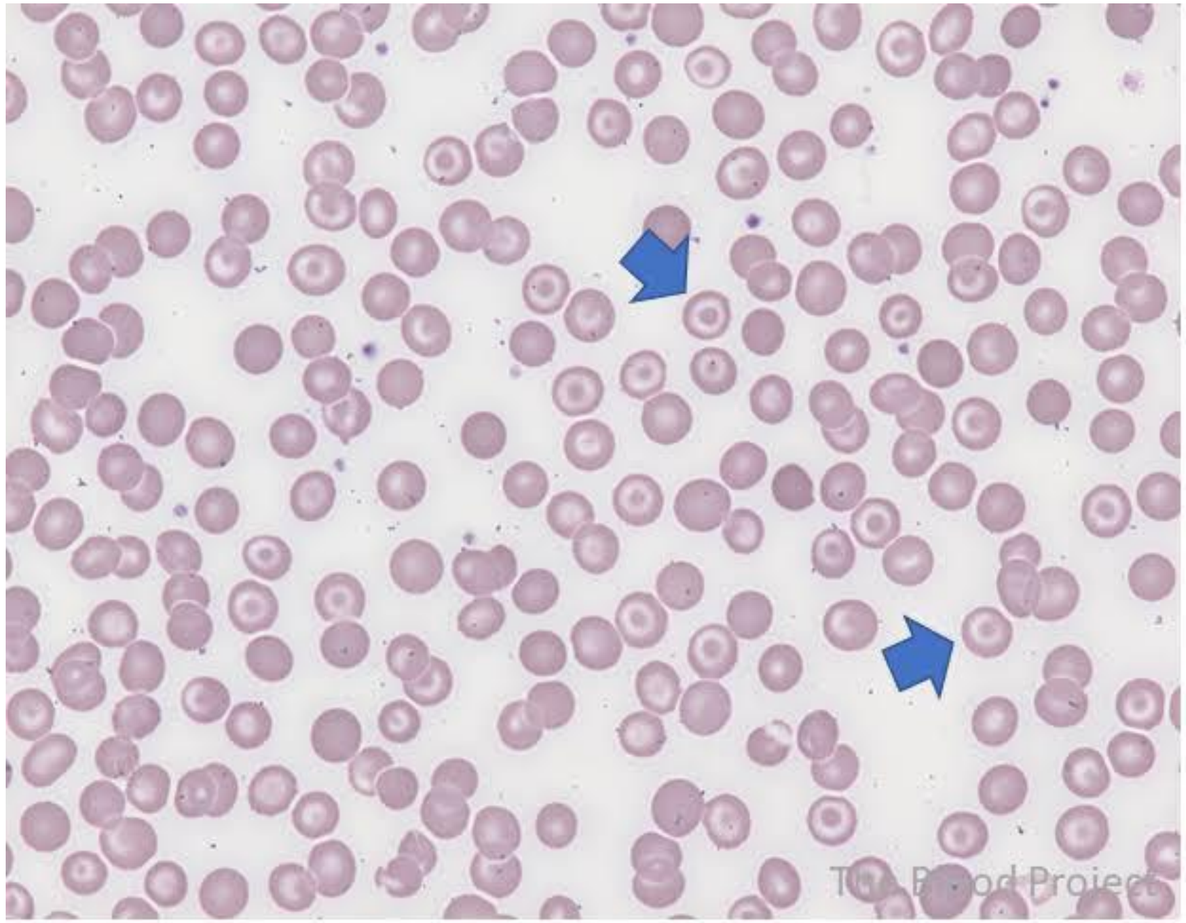
Test Name	Result	Unit	Reference Range
HAEMATOLOGY REPORT			
CBC WITH BLOOD FILM			Sample: WHOLE BLOOD
Total Count			
White Blood Cells	**20.40**	K / µL	5.00 - 15.00
Neutrophils	5.51	K / µL	2.50 - 6.40
Lymphocyte	**10.40**	K / µL	2.30 - 5.50
Monocyte	0.82	K / µL	0.40 - 2.00
Eosinophil	**3.67**	K / µL	0.00 - 0.30
Differential Leucocyte Count			
Neutrophil%	**27**	%	31.70 - 75.40
Lymphocyte%	51	%	15.00 - 67.00
Monocyte%	04	%	4.00 - 8.00
Eosinophil%	**18**	%	1.00 - 5.00
Basophil%	00	%	<1-2
Red Blood Cells	**3.85**	million/µl	4.00 - 5.20
Haemoglobin	**7.00**	g/dL	10.40 - 12.50
HCT	**24.80**	%	31.50 - 36.80
MCV	**64.4**	fl	76 - 83
MCH	**18.2**	pg	26 - 29
MCHC	**28.2**	g/dL	34 - 35
RDW-CV(%)	**29.0**	%	14 - 16
Platelets	**150**	K / µL	200 - 490
Film/Cell Morphology			

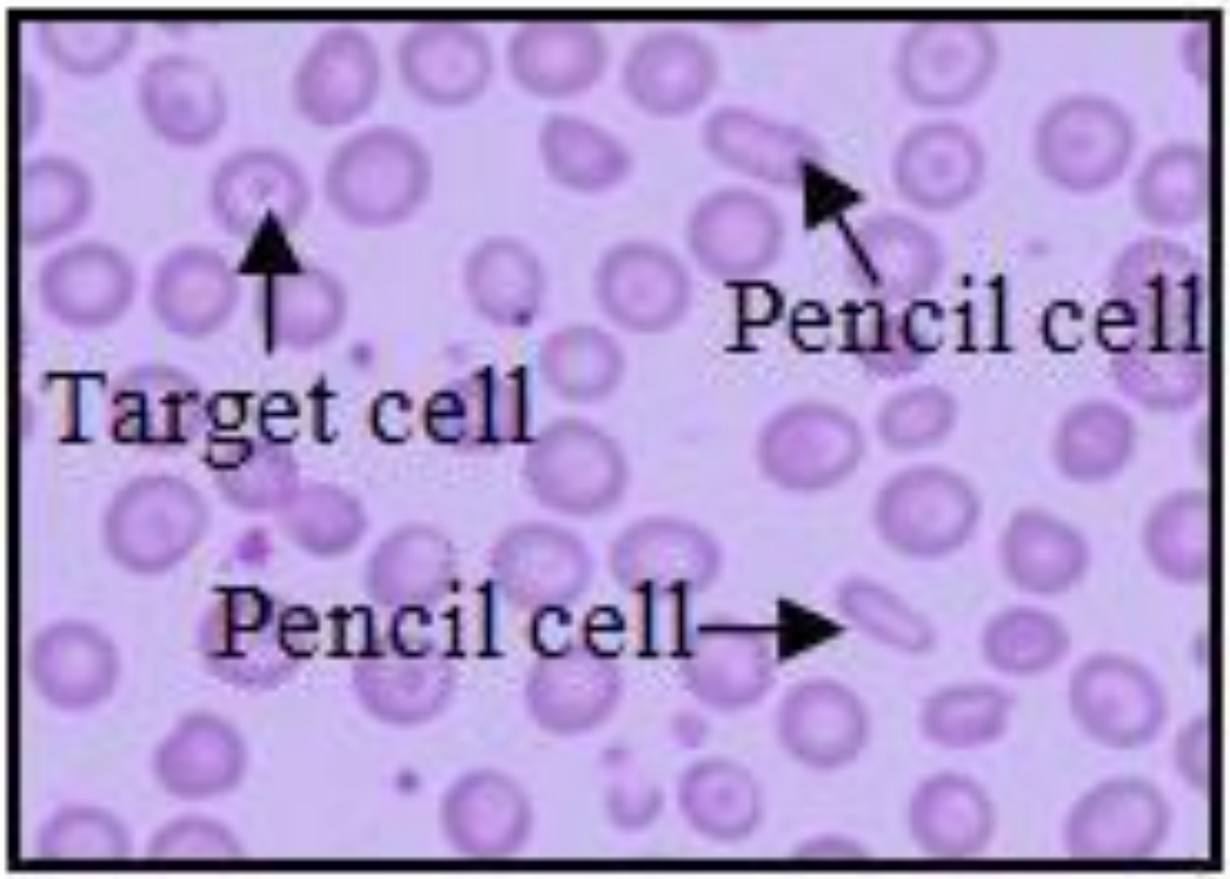
Dr. M Morsed Zaman Miah
MBBS, MCPS, FCPS (Haematology), Assistant Professor, Department of Hematology
Rajshahi Medical College, Rajshahi

pared By: SALIM REZA | Printed By: GOLAM.R | Printed at 26/08/2024 21:18 | Page: 1 Of 2

P.T.O

Peripheral blood film report of a thalassemia patient





Hb electrophoresis report

পপুলার ডায়াগনস্টিক সেন্টার লিঃ
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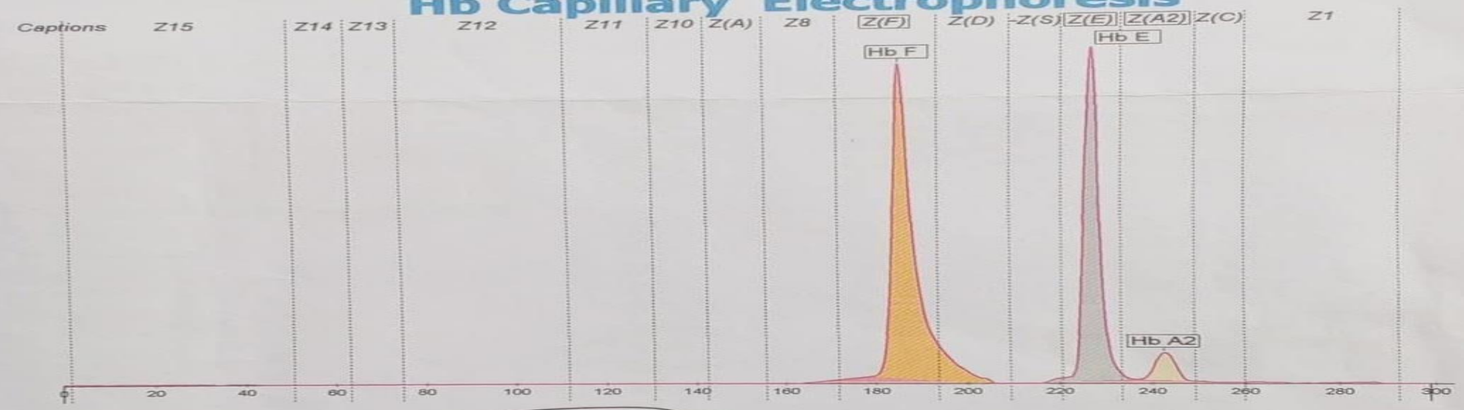
ID :50493638
Name : MD. ABID IQBAL
Ref.By : AST.PRF.DR.MRINAL KANTI DAS
Degree : MBBS,DCH,FCPS.

Date : 8/26/2024
Age : 1 Y
Sex : M

Hb Capillary Electrophoresis



Conc : 7 g/dl

Name	%	Normal Values %
Hb F	55.6	= <2.0
Hb E	40.1	
Hb A2	4.3	2.2 - 3.2

Comment: Suggestive of Hb E Beta thalassaemia.
Advice : Genetic Analysis.

MD.MAHBUB ALAM
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Biochemistry & Moleculer Biology (CU)
Jr.Consultant
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TREATMENT PROTOCOL OF THALASSEMIA

Treatment	Indication	Notes
Blood Transfusions	Thalassemia Major	Every 2–5 weeks
Iron Chelation	Ferritin >1000 ng/mL	Oral or subcutaneous
Folic Acid	All symptomatic patient	1 mg/day
Splenectomy	Hypersplenism	Pre-op vacc. required
HSCT	Young with wih donor	Curative
Gene Therapy	Selected patients	Emerging treatment

Prevention of Thalassemia

CARRIER SCREENING
(PREMARITAL OR PRECONCEPTION)

A blood test to determine carrier status

GENETIC COUNSELING

Assess risk and provide reproductive advice

PRENATAL DIAGNOSIS

Determine if the fetus has thalassemia

IN VITRO FERTILIZATION (IVF) WITH PREIMPLANTATION GENETIC DIAGNOSIS (PGD)

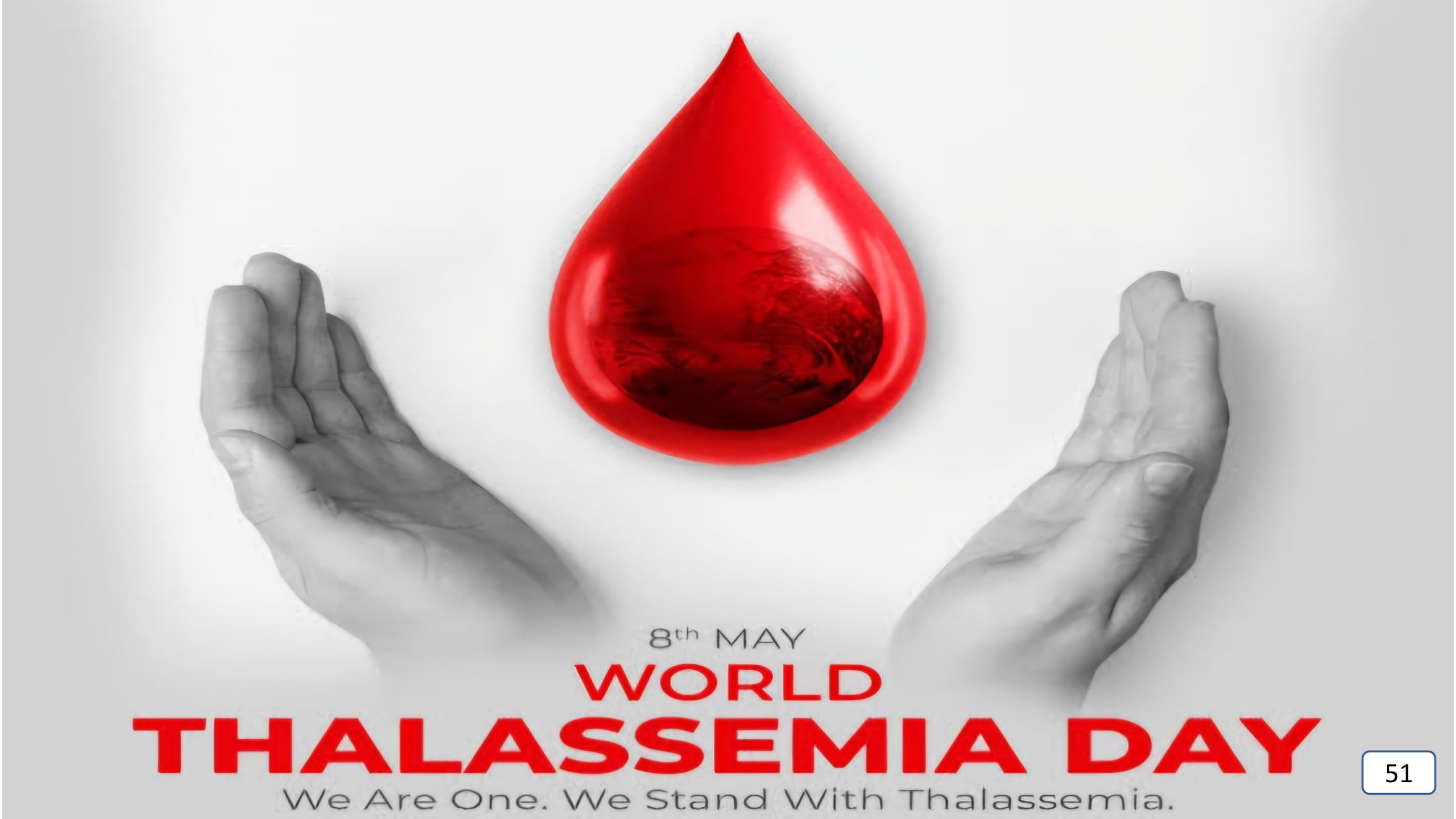
Test embryos for thalassemia before implantation

PUBLIC AWARENESS & EDUCATION

Inform people about thalassemia and screening

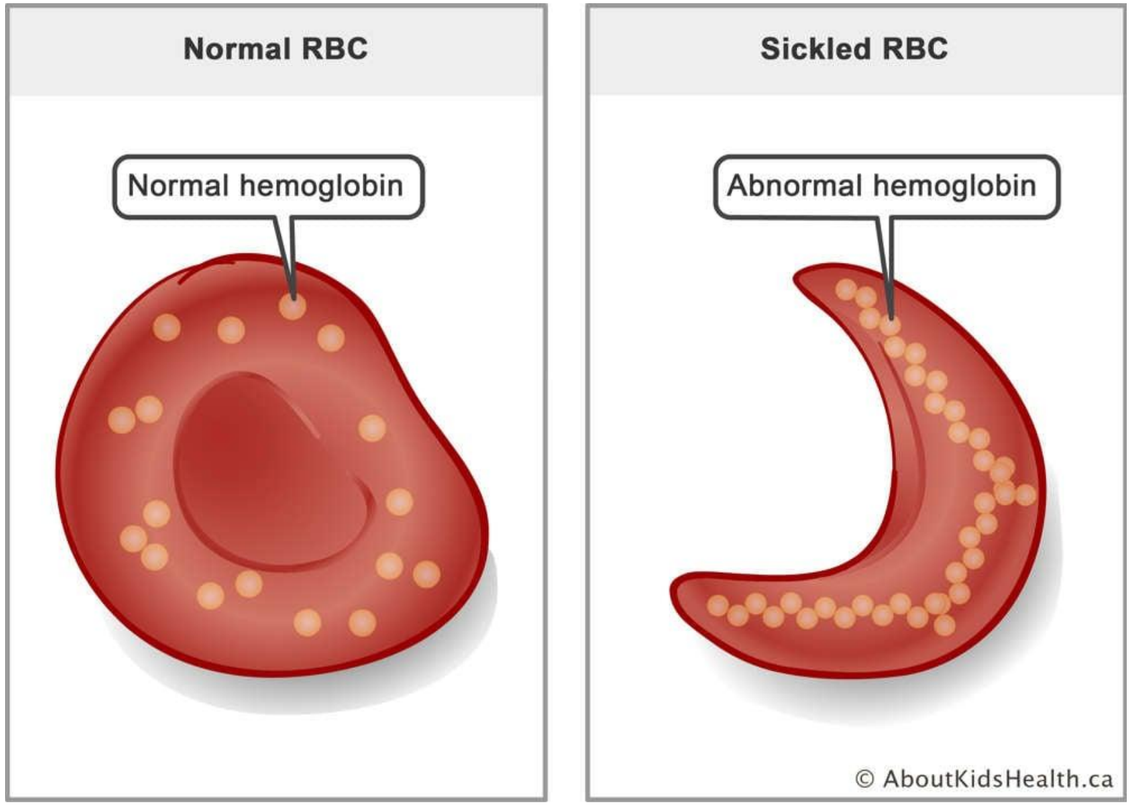
NATIONAL PREVENTION PROGRAMS

Implement population-level prevention


8th MAY
WORLD
THALASSEMIA DAY
We Are One. We Stand With Thalassemia.

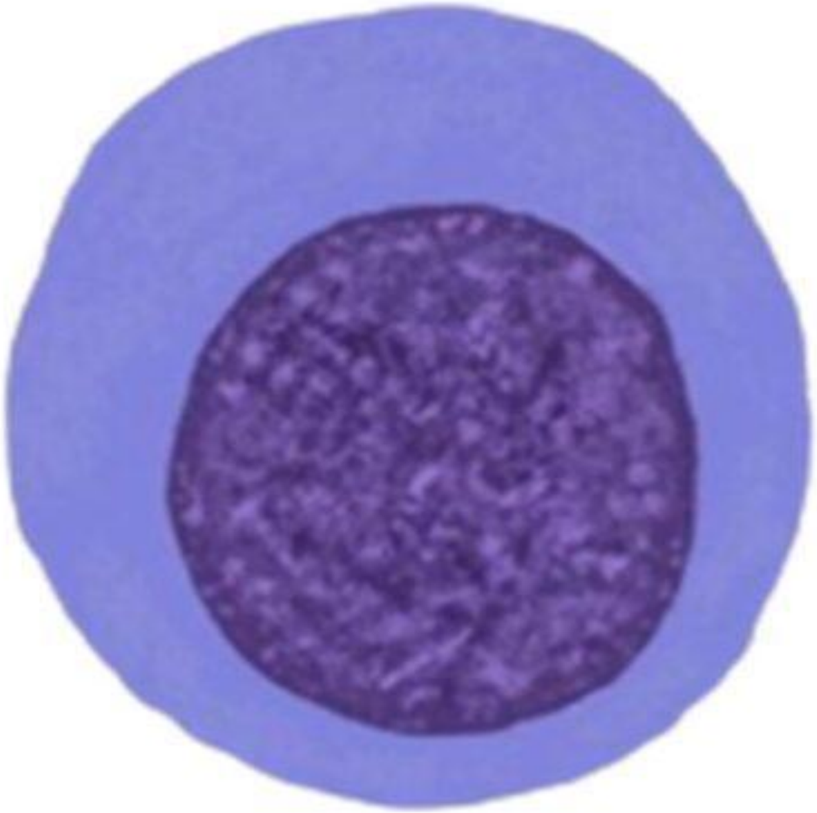
Haemoglobinopathies

- It is a kind of genetic defect that results in abnormal structure of one of the globin chains of hemoglobin molecule.
- Abnormal Hb: Hb-S(common), Hb-C, Hb-E(common in our country), Hb-D Punjab.
- Sickel cell anaemia contains Hb-S.



Megaloblastic Anaemia – At a Glance

Category	Key Points
Definition	Macrocytic anaemia due to impairel DNA synthesis
Causes	-Vitamin B12 deficiency -Folate (B9) deficiency
B12 Deficiency	-Pernicious anaemia (autoimmune) -Malabsorption (Crohn's, gastrectomy)
Symptoms	-Fatigue, pallor, glossitis -Pregnancy, haemyolysis
Blood Smear	-Macrocytosis (↑ MCV >100 fL) -Hypersegmented neutrophils



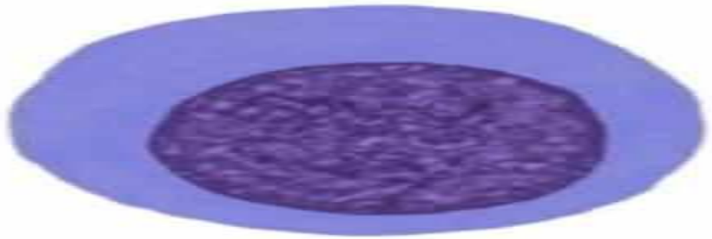
NORMOBLAST

MEGALOBLAST

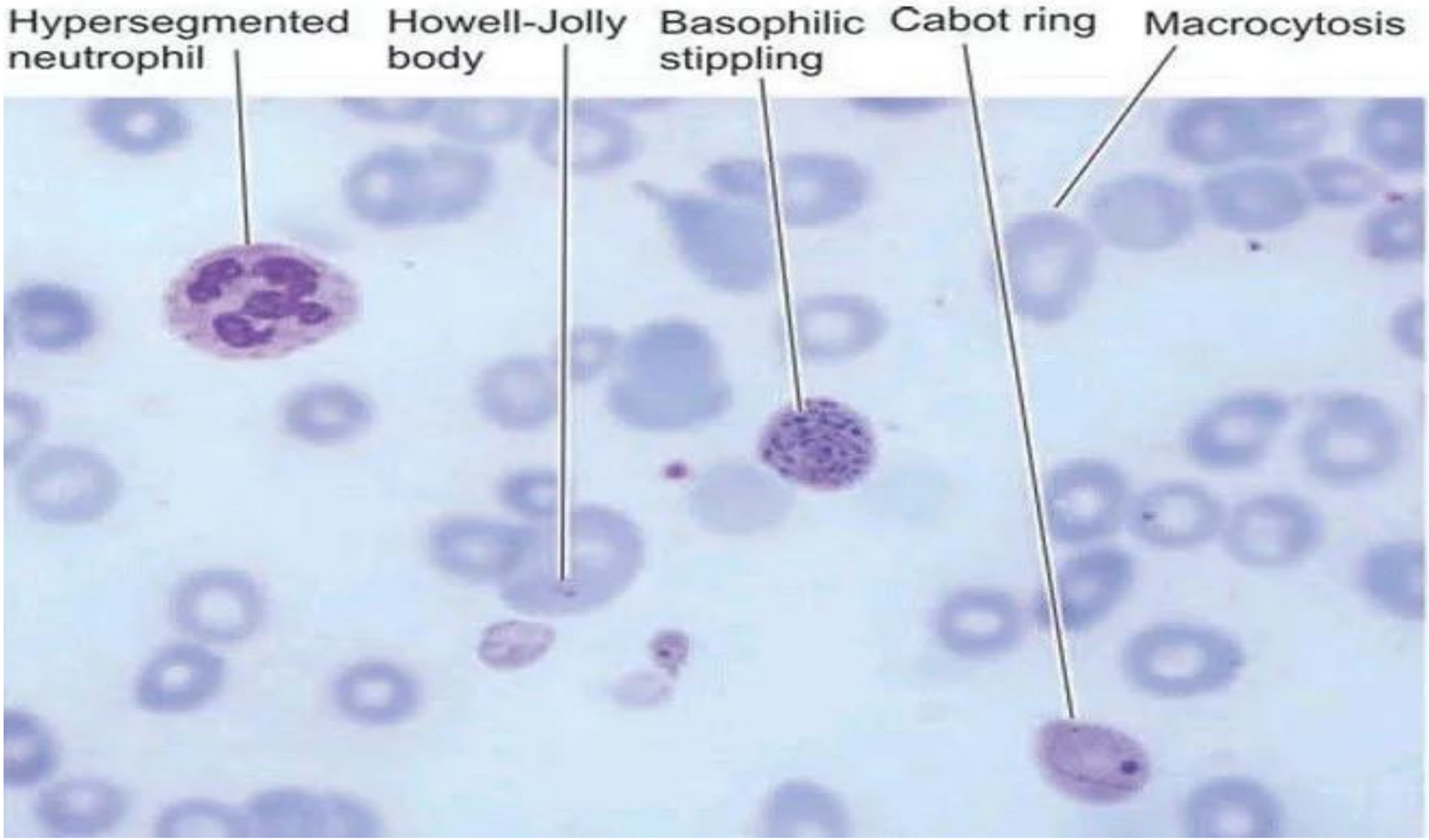
Characteristic	Normoblast	Megaloblast
Size	Smaller	Larger
Nucleus	Intense blue staining	Enlarged, Sieve like chromatin
Nucleus-to-cytoplasm ratio	Higher	Lower
Cytoplasm	Less abundant	More abundant
Shape	Regular	Irregular
Maturation	Normal	Abnormal
		There is nuleocytoplasmic -asynchrony.

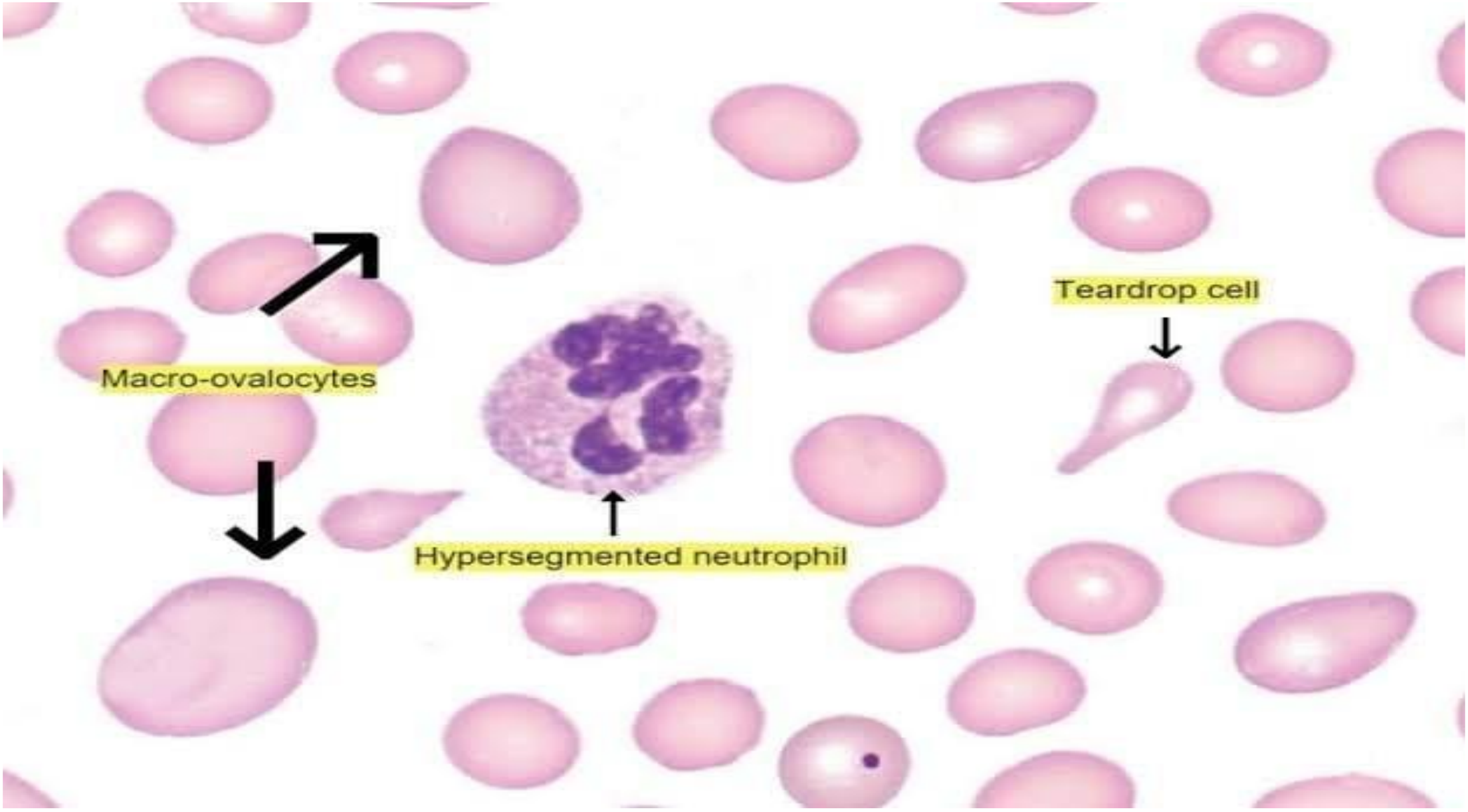
Showing 1 to 7 of 7 entries Previous Next

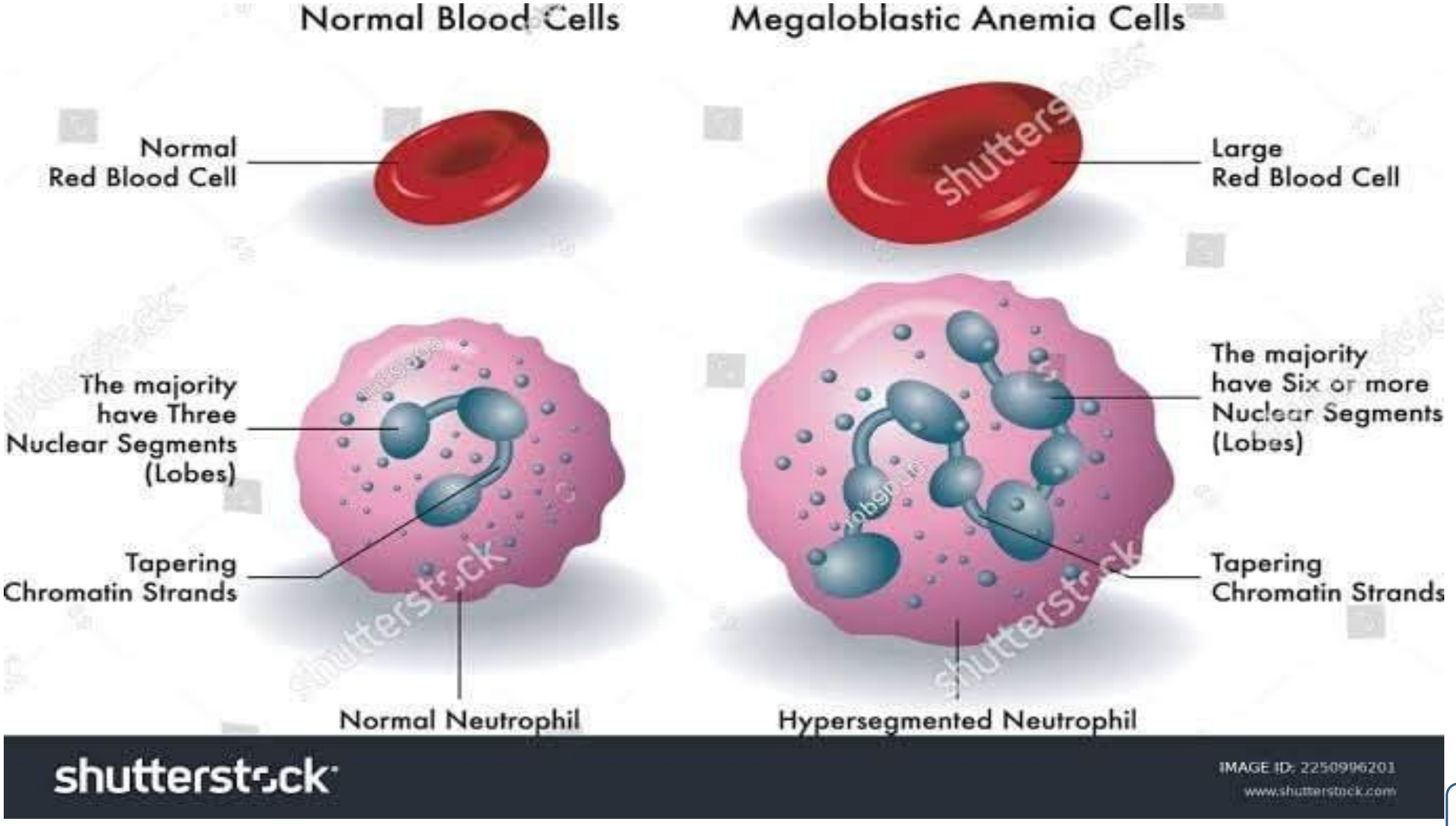
NORMOBLAST



MEGALOBLAST


Hypersegmented neutrophil
Howell-Jolly body
Basophilic stippling
Cabot ring
Macrocytosis


Macro-ovalocytes
Hypersegmented neutrophil
Teardrop cell


Normal Blood Cells
Megaloblastic Anemia Cells
Normal
Red Blood Cell
Large
Red Blood Cell
The majority
have Three
Nuclear Segments
(Lobes)
The majority
have Six or more
Nuclear Segments
(Lobes)
Tapering
Chromatin Strands
Tapering
Chromatin Strands
Normal Neutrophil
Hypersegmented Neutrophil
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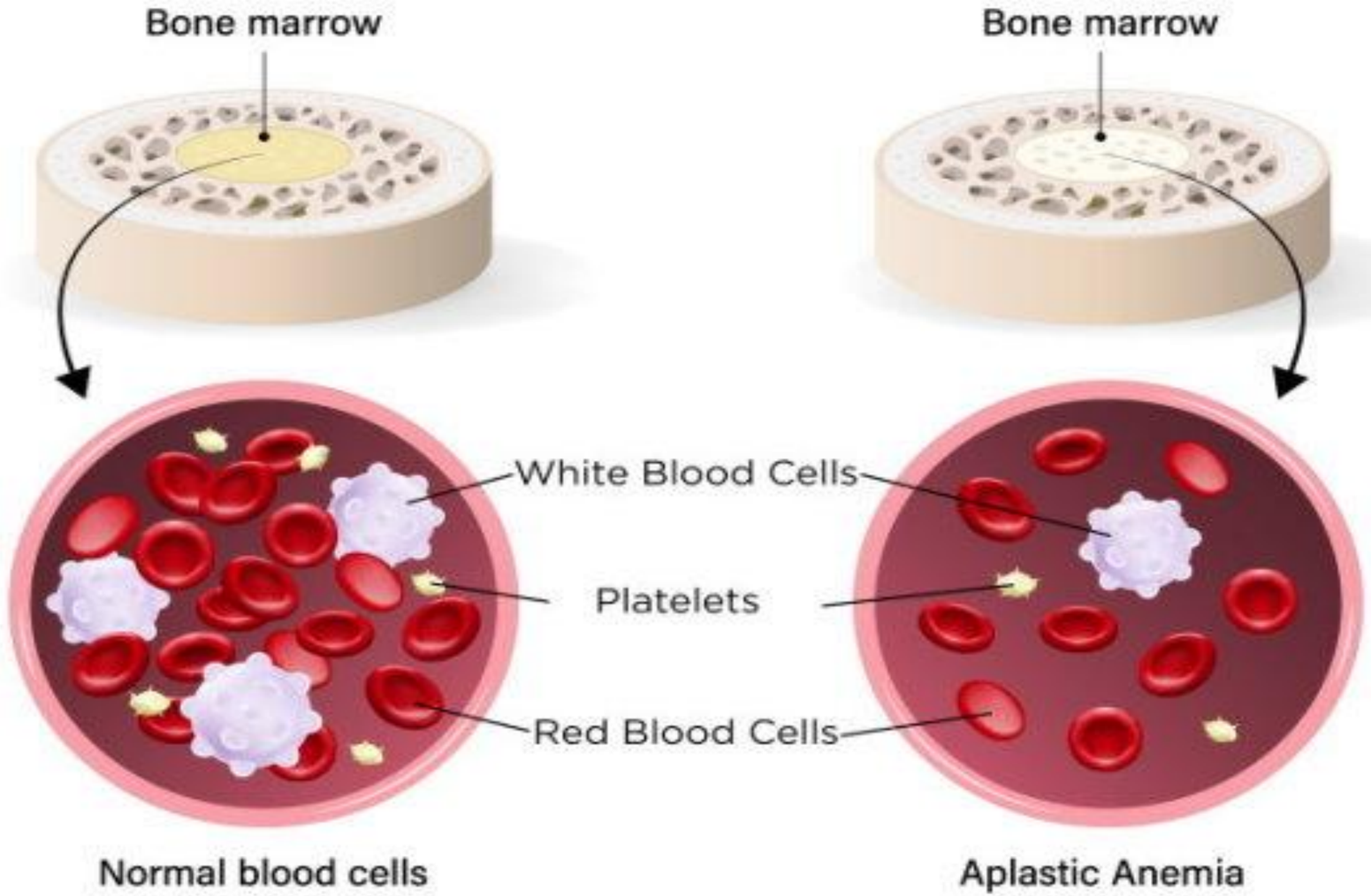
Aplastic anaemia

It is a disorder of unknown aetiology characterized by anaemia, leukopenia and thrombocytopenia resulting from aplasia of bone marrow.

Causes:

- ✓ Primary: idiopathic
- ✓ Secondary:
- ✓ Drugs
- ✓ Chemicals
- ✓ Radiation
- ✓ Viral hepatitis
- ✓ Pregnancy


Bone marrow
Bone marrow
White Blood Cells
Platelets
Red Blood Cells
Normal blood cells
Aplastic Anemia


Thank you