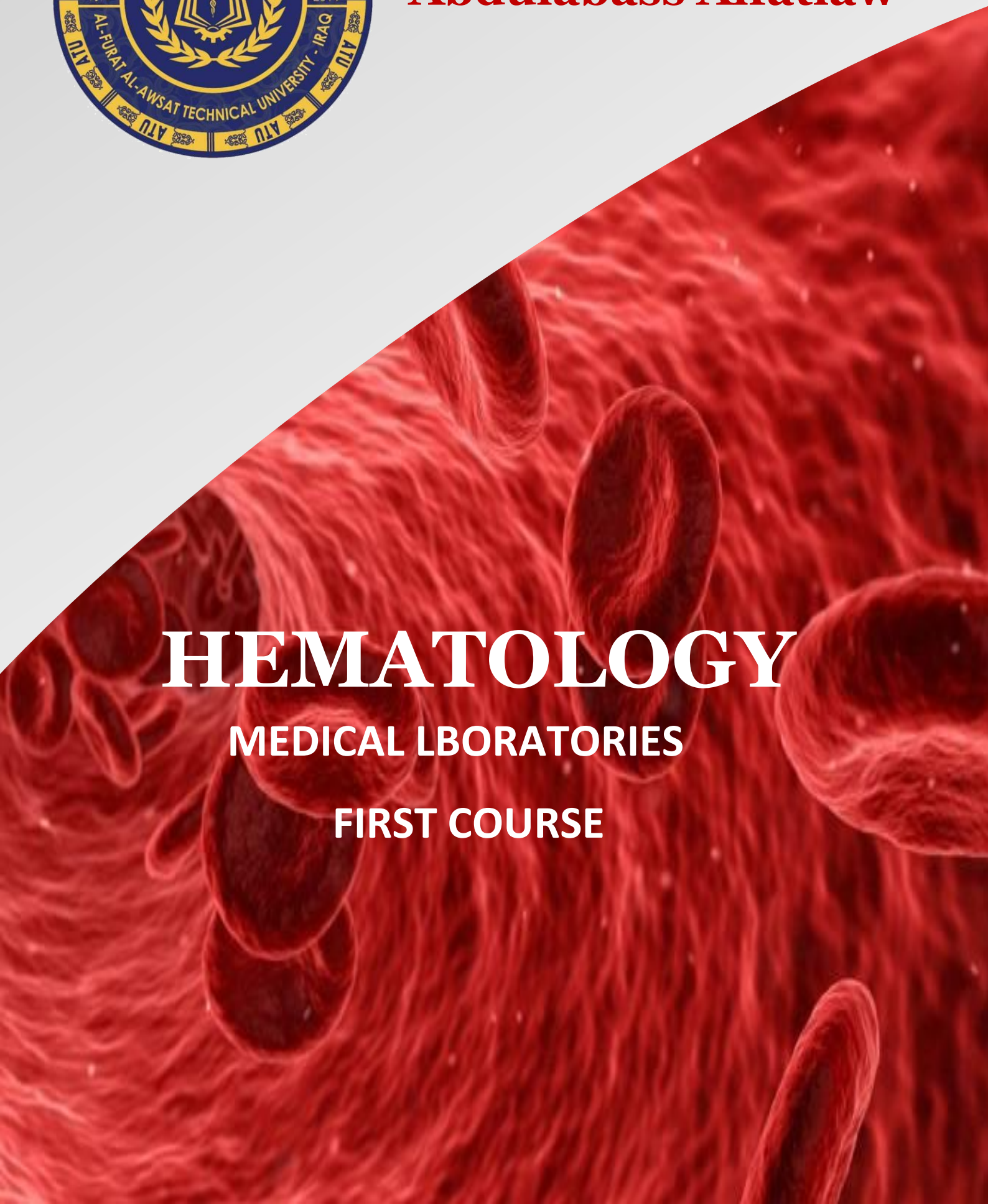
Assis.proff. Dr. Haki Abdulabass Alfatlaw



HEMATOLOGY

MEDICAL LBORATORIES

FIRST COURSE

Lec: 1

Hematology

is a science which study all types of blood

the total of blood in the body is about 6-7 litters or the 7-8%Of the body weight

It composed of the formed 45% elements WBC,RBC,platelet,55% plasma.

Approximely 90% of plasma is water and remained 10% protein [albumin, globulin, and fibrinogen also found carbohydrates, vitamins, hormones, enzyme and salts

The formation of blood

There are 2 theories host in formation of blood

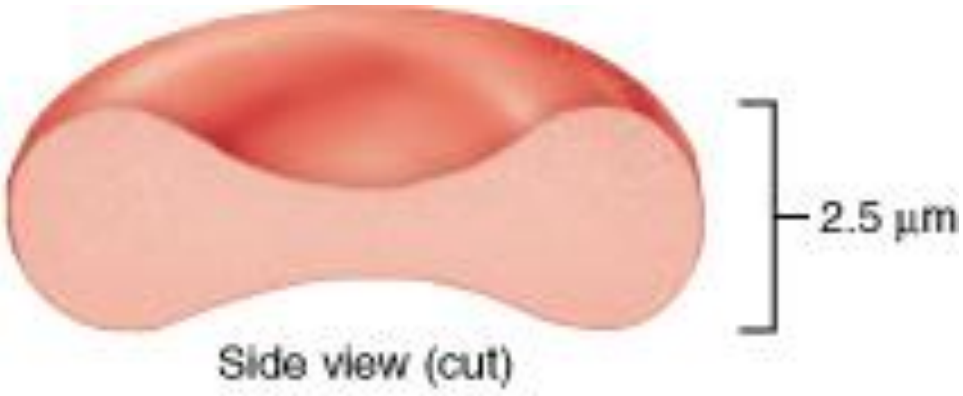
A-first theory is(monophyletic theory) say that single mother produces all types of blood

B-The second is(polyphyletic theory) say that several mothers cells and each one produce the specific according to stimulation factor which produce like:-

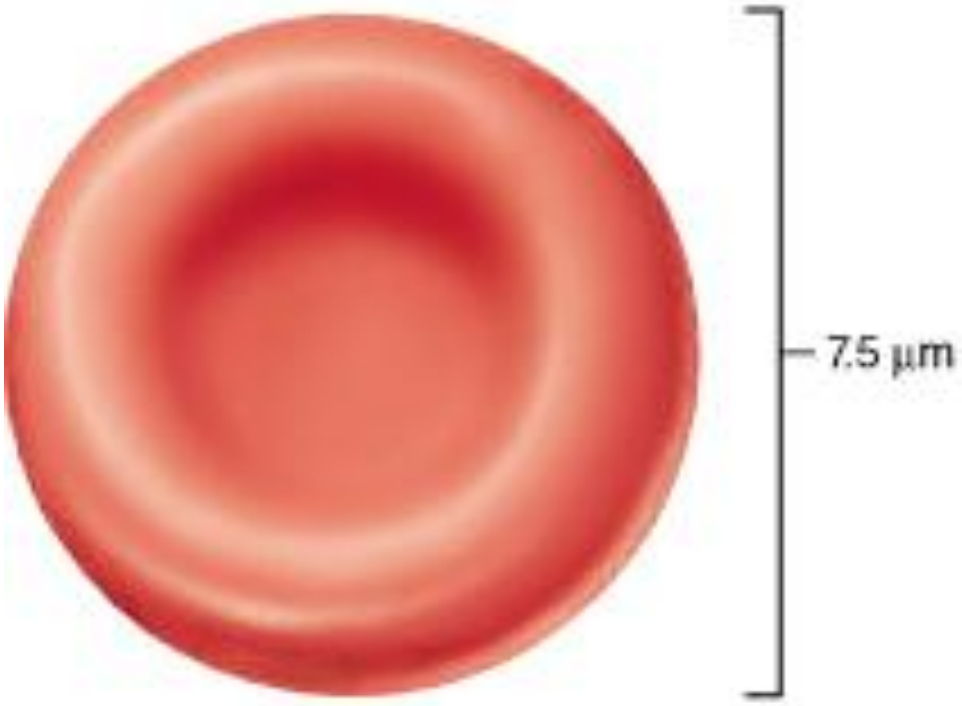
1- Erythropoietin

2-Thrombopoeitien

3-Colony stimulant factor



Side view (cut)



Top view

The Composition of Blood

- Blood is the body's fluid tissue only.
- It is composed of liquid plasma and elements.
- Formed elements include:
  - Erythrocytes, or red blood corpuscles'(RBCs)
  - Leukocytes, or white blood cells (WBCs)
  - Platelets (thrombocytes)
  - Hematocrit - the percentage of RBCs out of the total blood volume

.

Components of Whole Blood

- Hematocrit – the percentage of RBCs out of the total blood volume

Sites of blood cells formation

Haemopoiesis :-it means the formation of all types of blood from bone morrow

A- haemopoiesis in embryo (fetus)

1-mesoblastic haemopoiesis

is start in 2weeks after fertilization in the mesoderm at the yolk sac and stopped months(4months)

2-haepatic haemopoiesis

Is start in the four month until few weeks before delivery in this phase the liver is responsible for haemopoiesis.

3-medullary phase

it starts few weeks before delivery until end of life.

In this phase the bone marrow is responsible for haemopoiesis

B-in adults (normal haemopoiesis)

Only bone marrow is responsible for haemopoiesis. In disease condition other organs are produce RBCs like liver and lymph nodes.

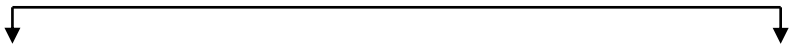
When blood formed in bone marrow is call ((modularly haemopoiesis))

But when other parts of the which form the blood is called (extra medullar haemopoesis)

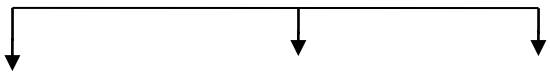
Formation of blood from bone marrow

Pluropoitent stem cell { p.p.s.c }

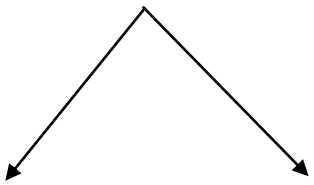
unipoitent stem cell {u.p.s.c}



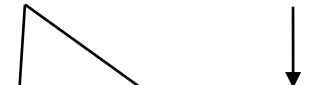
myeloid stem cell lymphoid stem cell



Leukocyte progenitor erythroid progenitor megakar

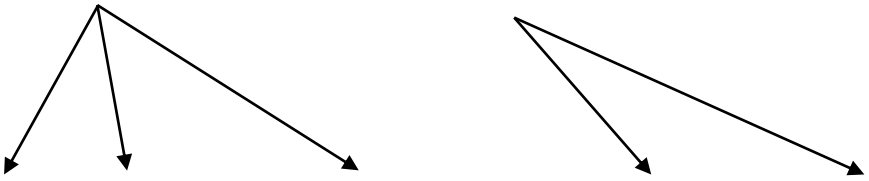


T- Lymphocyte B-lymphocyte

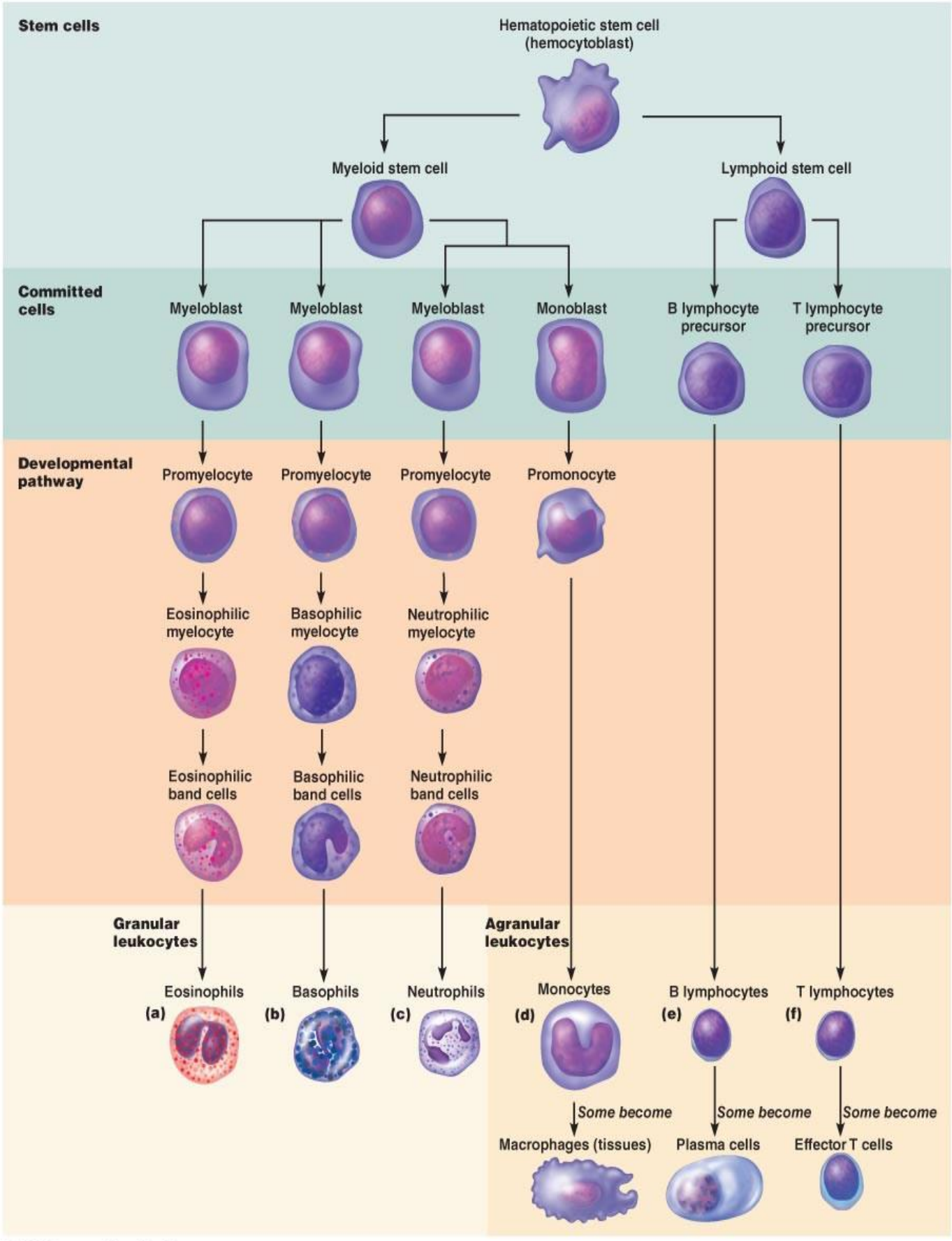


RBCs platelets

Granulocyte A granulocyte



Neutrophile , Eosinophile , Basophile , Monocytes , Lymphocytes



Lec:2

Pluropoitent stem cell(p.p.s.c)

Mother of the blood cells characterized by:

1-slowly dividing.

2-is ability to produce all types of blood cell.

3-it can he to renew itself .

Unipoitentstem cell(u.p.s.c)

mother can be produce one type of cell under effecting specific stimulation hormone like:

1-thrombopoitine H. which inhens to formation

Thrombocytes (platelets).

2- Erythropoietin H. which inhens to formation R.B.C.

3-colony stimulating factor to formation W.B.C

The bone marrow consist from :

a- fatty part b- haemopoesis part

Thrombopoitin Hormone

It is protein substance produce from non salt materials in liver stimulant to production of platelets from haemopoesis part of bone marrow

Erythropoietin hormone

Is a hormone produce in the liver by combination of renal factor with plasma protein(globulin) .This hormone stimulant by O_2tension on the tissue at kidney

Colony Stimulant factor (c.s factor)

Is glucose and protein combination forming from macrophage stimulant WBCs formation……..

The blood formation occurs in two stage in bone marrow

A-proliferation stage characters by

1 - occur in B.M

2 -have large nucleus with large cell

3-deep blue cytoplasm cover to high blue nuclei

B- maturation stage

1-in blood

2-no have any nucleus

3-pinkn Hb

Erythropoiesis

The Formation of RBC. Differentiated By:

1-dimination in cell size

2-smollar in size of nuclei

3-the hemoglobin releasing in stat of the cytoplasm of the cell

What is the function of Erythropoietin hormone ?

1-increase the number of stem cell

2-increase the synthesis of red cell precursors

3-decrease maturation time of RBC

4-Relesing reticulocyte cell in the periphery blood at eailer stag than normal

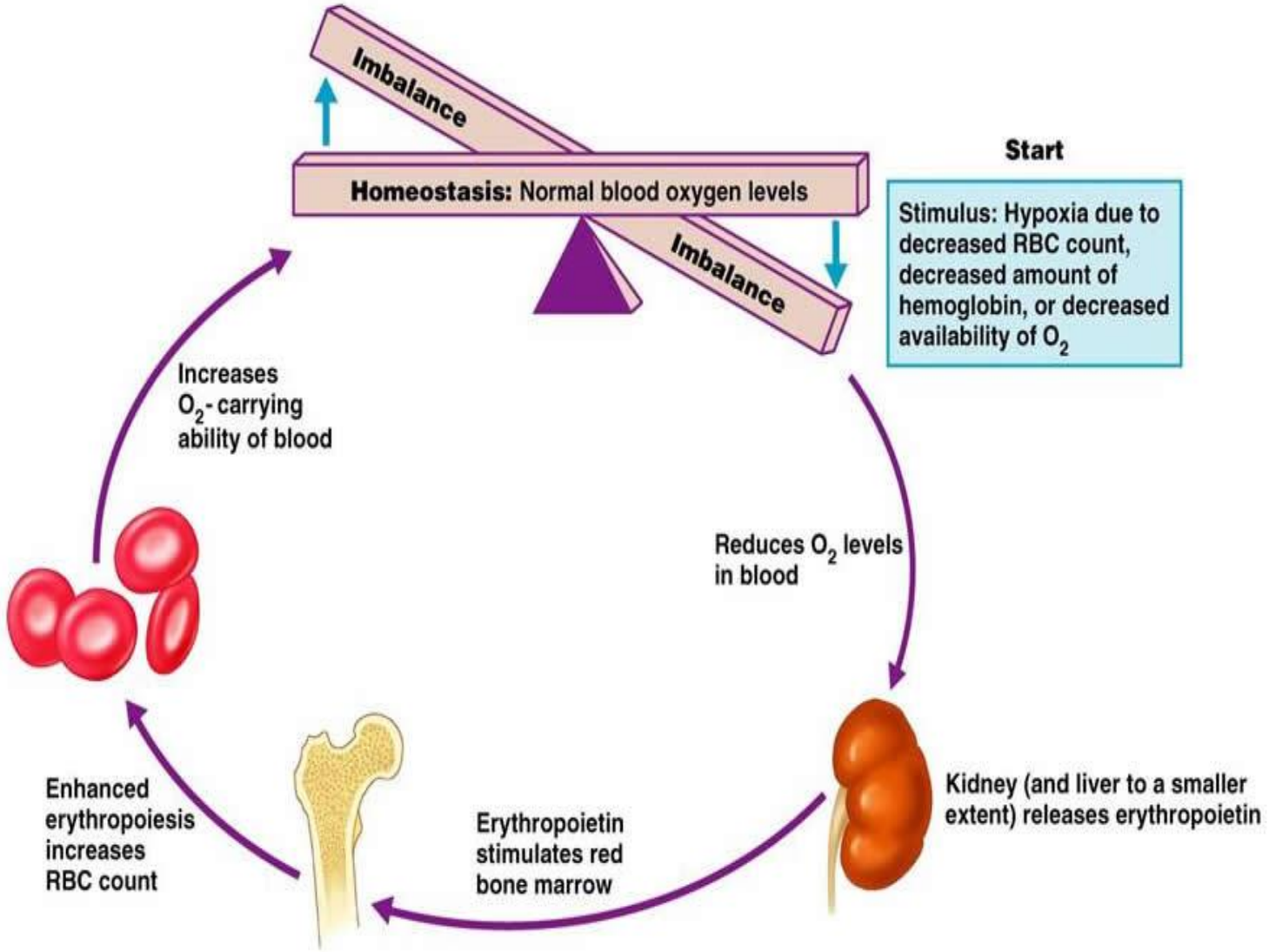
the formation of RBC in B.M need important substance such as:-

1-meterials (iron and cabal)

2-vitamin (B12,C,E,B6)

3-amino acid

And the life Spain of RBC is about 120 day


Imbalance
Homeostasis: Normal blood oxygen levels
Imbalance
Start
Stimulus: Hypoxia due to decreased RBC count, decreased amount of hemoglobin, or decreased availability of O_2
Reduces O_2 levels in blood
Kidney (and liver to a smaller extent) releases erythropoietin
Erythropoietin stimulates red bone marrow
Enhanced erythropoiesis increases RBC count
Increases O_2-carrying ability of blood

HAEMOGLOBIN

Is iron and protein soluble inside RBC, reminded from cytoplasm of pyknic and reticulocyte phases which instead to Hb as development of it in bone marrow. hemoglobin is very important to all the body tissue to holding CO2 and O2 intra and extra cellular portion

The formation Hb need essential materials like

1-iron

2-Protoprophyrine

3-amino acid

4-R.N.A

The combined iron and protoprophrine to from hem at 4% -While combined amino acid and RNA to from globins at 96%.

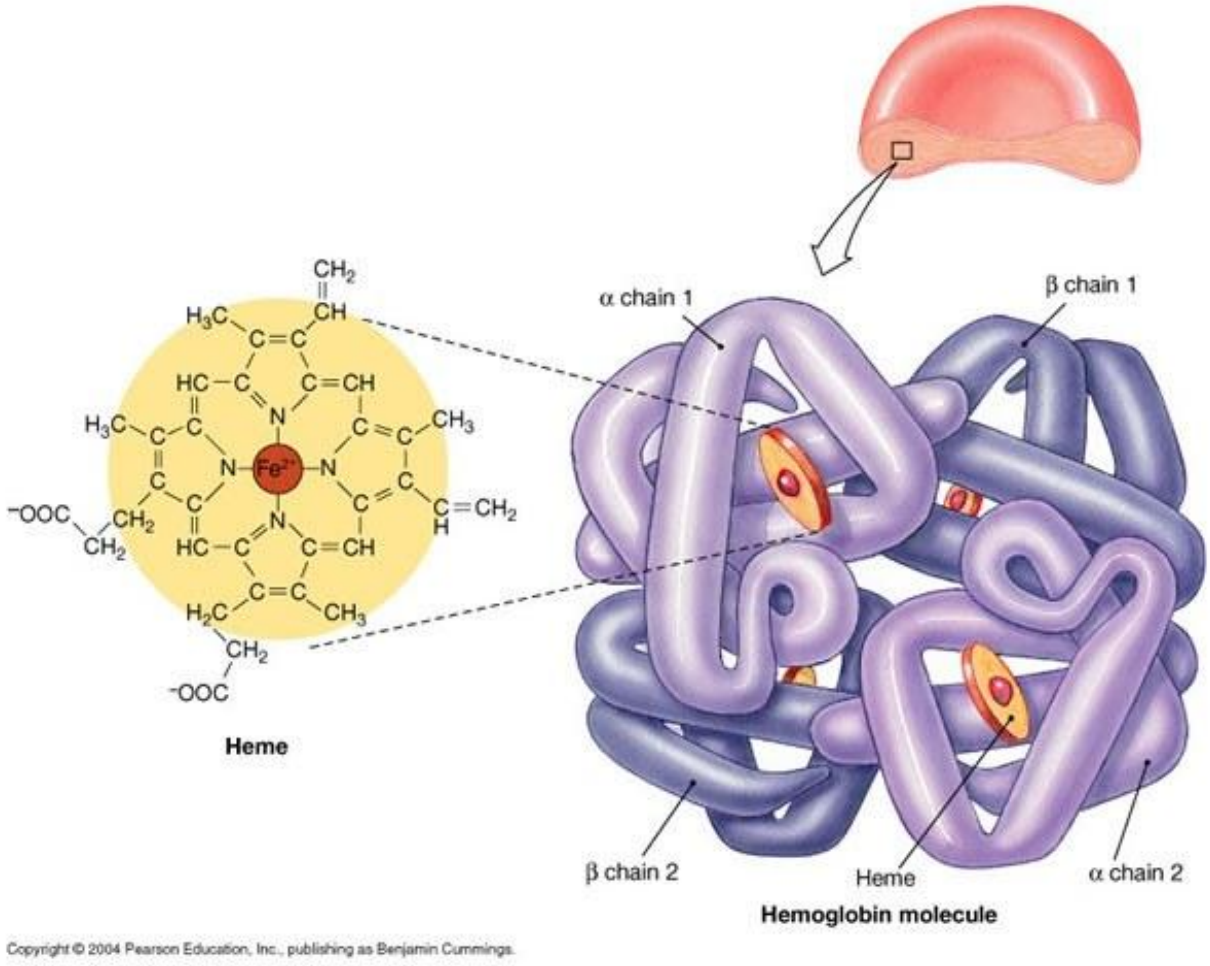
Conjoined hem and globins at present enzyme and vitamin B12 form hemoglobin after 7days in bone marrow

(2/3) of Hb is mostly water.

HEAM : is known as a hemtin or a pigment of red cell contain iron .make 4% from molecular of red cell.

GLOBIN: is a colorless protein is make 96% of molecular

of red cell



Structure of Hemoglobin

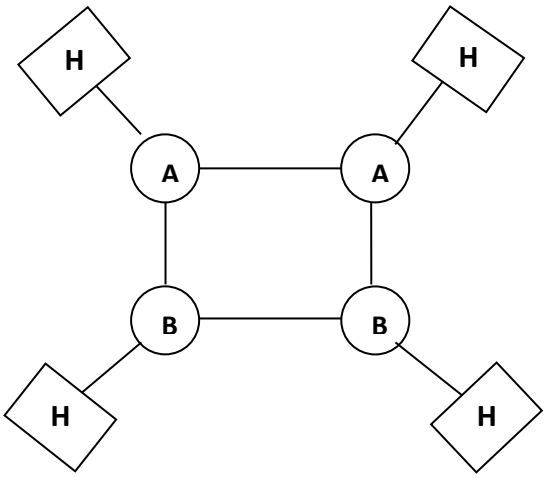
Lec:3,4

Normal Hemoglobin

There are found only 3 types of normal Hb in a person from a fetus tell the end of his life in meals and females

a- HbA

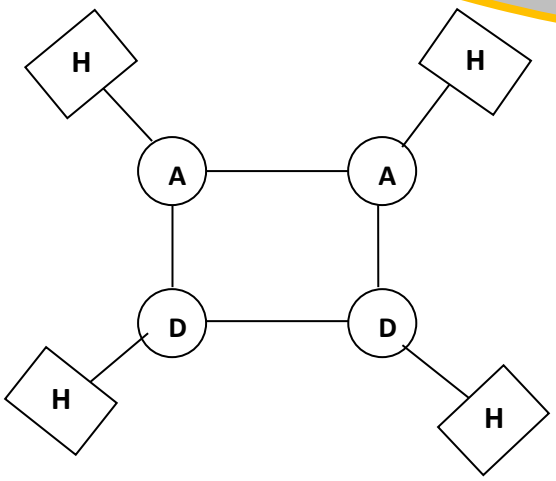
Is the normal Hb in adults the molecular formed from two alpha globins and two beta globins each of this conjugated with one group of hem. Is found as anomaly in adult blood



b- HbA2

Is the miner of Hb .found in stillbirth .the molecular

synthesis from 2 alpha globins and 2 delta globins each of them conjugated with one group of hem

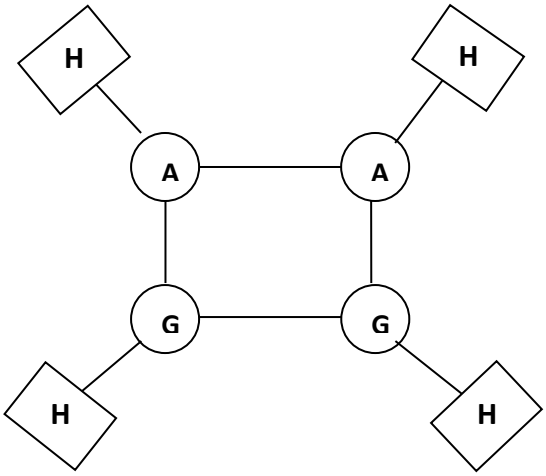


The Percentage in normal Blood is about 1.5 - 3.5%

c- Hbf

Is the normal of fetal hemoglobin the molecular of it synthesis from 2 alpha globins and 2 gamma globins each of them linked with

One group of hem as following



(Hbf) is a normal Hb which found in early age of the person inside the red cell (fetus and new net), but when it found in a child and adults lead to severe anemia and it is abnormal condition.

The normal distribution of Hbf, HbA2 ,HbA at life.

	Hbf	HbA_2	HbA
Fetus	100%	-------	-------
Birth	80%	20%	-------
At 4-month	10%	90%	-------
Adult	-------	0 - 3.5%	96.5 - 100%

ABNORMAL HB

It is hereditary disease which caused by a differ of molecular structure from normal Hb . . .

Example for abnormal Hb

Hbs:- is substation of amino acid valine for glutamic acid in position 6 at the beta chain
This will be cause the hemoglobin to become insoluble and forms crystals when exposed to low oxygen tension so the red cells become crescent or sickle shaped

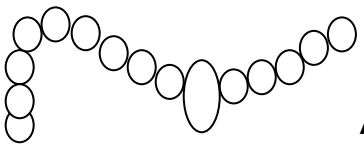
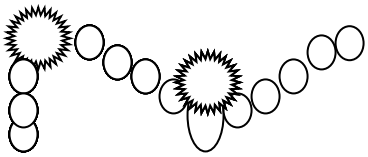
Hbc:- it is also abnormal Hb which substation of lysine for glutamic acid in the position 6 of beta globins chain this mutated form reduce the normal plasticity of red cell

Thalassemia :- is a group of congenital disorders is a defect in the synthesis of one or more the globins chains of Hb (beta and alpha

globins) , if the disorder on chromosome no.11 it cause beta thalassemia , will the disorder on chromosome

no.16 it cause alpha thalassemia.

. **Hbs differ from HbA as following**

HbA		**HbS**
	Amino acid	
Glutamic acid		valin acid
Normal Hb		Abnormal Hb

at six portion of amino acid chain the

.valine acid instate of glutamic acid lead to abnormal Hb

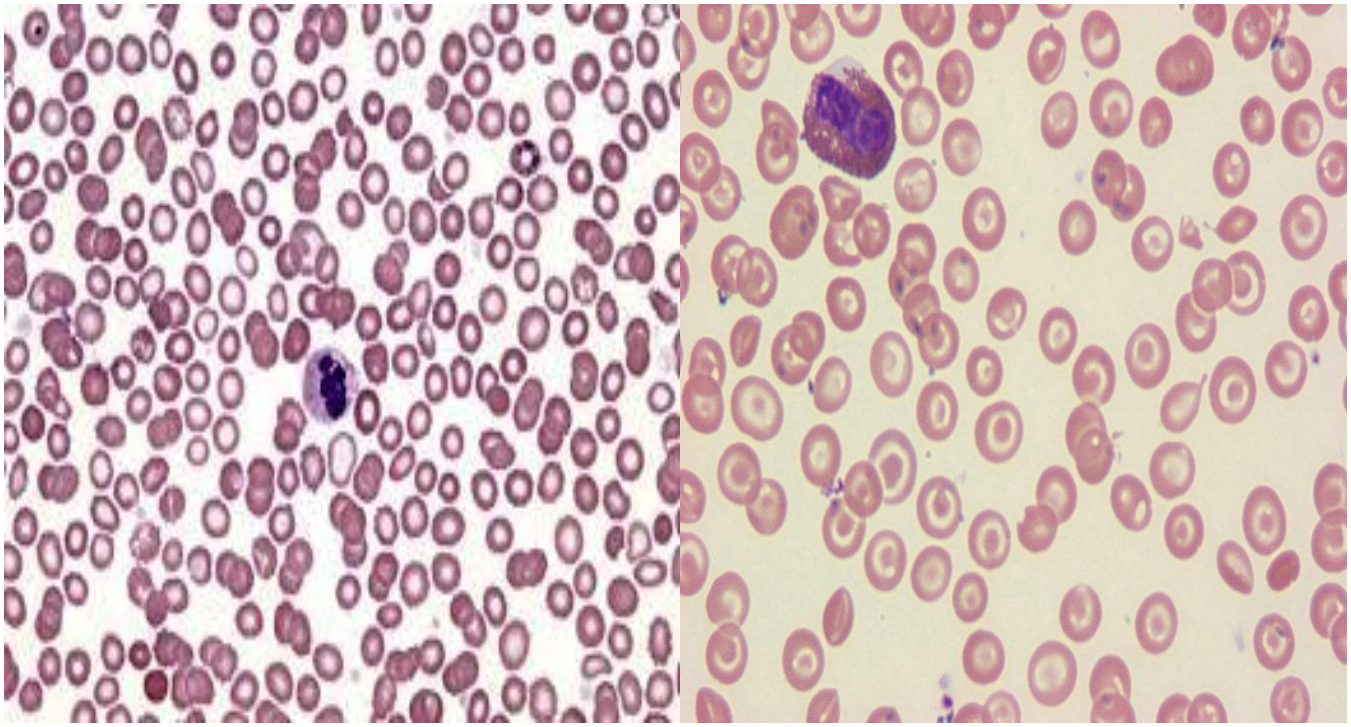
Today we have found over 100 abnormal Hb but the important abnormal are Hb_s , Hb_c , Hb_d , Hb_e , Hbh , ...

All abnormal are genetically transmitted

if a person inherits a gene of HbA from one parent and agene of Hbs (abnormal) from other parent the hemoglobin at him is(HbsA) is called ((heterozygous)). (HbsA is a trait condition).

But the person inherits a gene of Hbs from both parents the hemoglobin at him is Hbss and called (homozygous)) . (Hbss as sever condition)

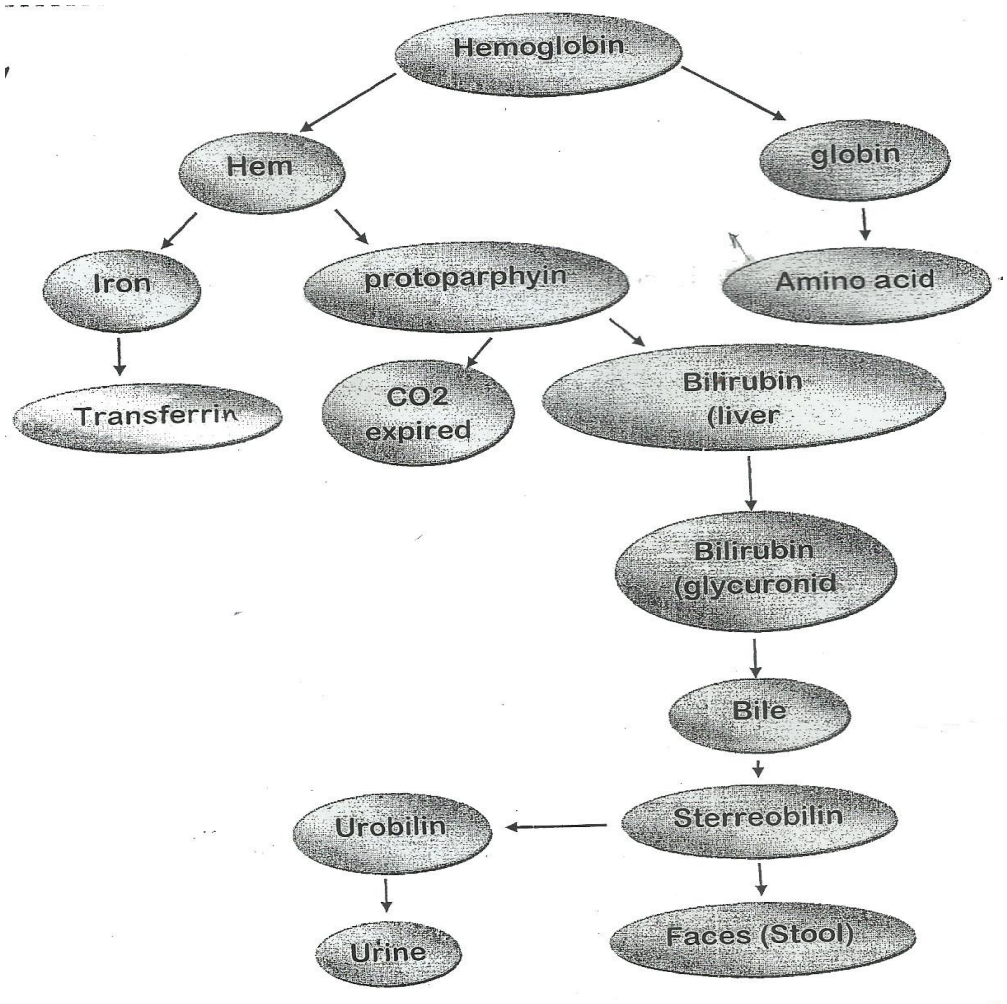
We can determine the normal and abnormal Hb by (Hb. electrophoresis separation instrument).

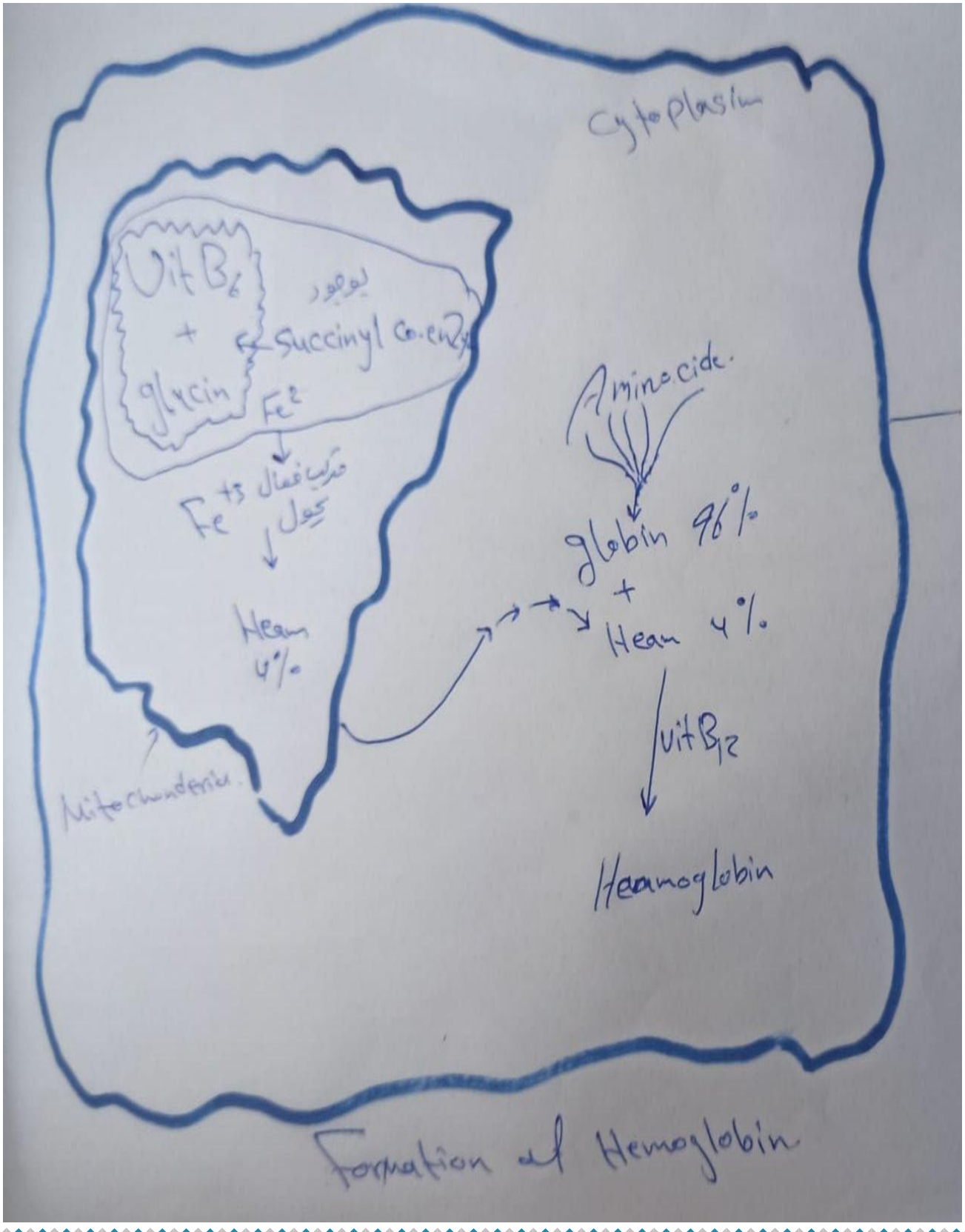


Major & Minor Thalassemia

Function of blood

1. Carrier O_2 from the lung to other of body
2- Carrier Co_2 and west product from lung to excretion out of the body
3- Carrier nutrient to all parts of body.
4- Regulates body temperature.
5- Defend to body against infection.





Formation of Hemoglobin

Lec:5

Polycythemia

It increase in the number of RBC above the normal value(6.0 $\times 10^6$ c/cm in males , 5.5$\times 10^6$ c/cmm in females) according to the age and sex of patient.

Increased in the RBC accompanied by an increase in Hb (19.5 g/dl in males) .(17.5 g/dl in female) and pcv 60%in males

.55%female

Classification of polycythemia

Generally we can classified to:

A- True polycythemia (absolute)

B- Relative polycythemia.

A- True polycythemia "absolute poly"

Divided in to:

1- primary polycy. "idiopathic polycy." "neoplasm's

It is a neoplasm's and fatal disease in which increase in total production elements of blood (RBC,WBC,and platelets) caused by hyperplasia of bone marrow.

Clinical finding

1-headeach
2-sweating at night
3-splenomegall in two thirds patients
4-haemorrhage
5-gout disease due to raised uric acid production
6-dyspnea

7-hypertention in one thirds of patients

8-server gastric pain with acidosis

Laboratory diagnoses

1- RBC,Hb,PCV, increase and platelets is very high
2- A neutrophil leukocytosis are seen

2-Secondary polycythemia "erythrocytosis"

It is increase in total number of RBC only cause due to lower in arterial O2 capacity of the blood by:

1- Hypoxia cases

A- chronic pulmonary disease because of increased erythropoietin hormone
B- living at high altitudes
C- Congenital and congestion heart disease (CHD).

2-kidney disease (hydroniphrosis and hydroniphritis.

Clinical finding:

Same in primary poly. but the important signs is very synopsis degree.

Lab. diagnosis:

1-RBC,PCV,Hb are increase

2-WBC is normal

3-the smear of bone marrow is hyper cellular with predominant proerythroblast cells.

B- Relative polycythemia

Relative polycythemia also known as "stress" polycy. or pseudo-polycy . is a result of plasma volume is abnormal .this condition occurs normally particularly in middle aged of human being and may be associated with cardiovascular problems due to the following :

1-dehydration (plasma loss due to burns)

2-redisterbance of fluid in the body (water deprivation or vomiting)

Prognosis of polycythemia

Thrombosis and hemorrhage are common which causes of death.

Treatment

Treatment aimed at maintaining a normal blood count the blood donation is partially useful to reduction of red cell volume and other relative material also PCV should be less than 50%.

Lec:6

Abnormal erythrocyte

When we read or identification any type of anemia and the abnormal erythrocytes we must depend on the following :

1-variation in color of erythrocyte

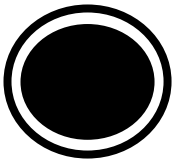
2-variation in the size

3- variation in the shape

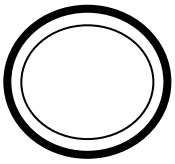
4-variation in the structure

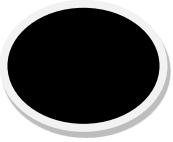
1---Variation in color of erythrocyte

1- normal erythrocytes . "normal (MCH,MCV , MCHC)



2-hypochronic . center area which free from pigment .(Hb) large



3-hyperchromic. center area is low 

2--Variation in size (anesocytosis)

Microcyte

normocyte

macrocyte

.

Anesocytosis:

it is marked variation in the size of erythrocyte caused by abnormal development of red cell may occurs in leukemia and anemia.

Macrocytosis:

Increase in the size of RBC it found normally as a healthy condition in new born ,infant and pathogenic in pernicious anemia caused by deficiency in materials needed to made RBC

Microcytosis:

Is decrees in the size of RBC occur in iron deficiency anemia.

The variation in size and color are very important to determined or limited the type of anemia and according there variation found three readers to anemia .

* microcytic hypochromic found in I.D.A

* macrocytic normochromic = in pernicious anemia

* normocytic normochromic = in a plastic. anemia

3--Variation in shape (poikilocytosis)

It is variation in shape of erythrocyte caused by losses or defect in the formation of red cell seen in iron deficiency anemia as following :

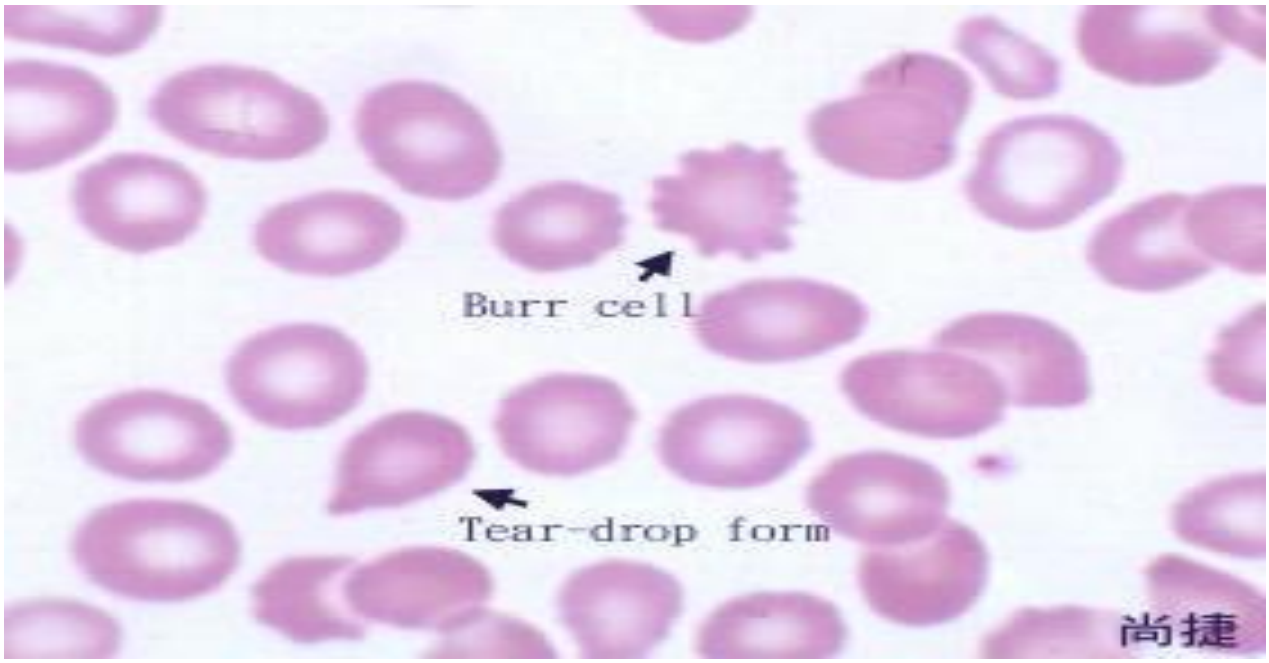
1-spherocytosis

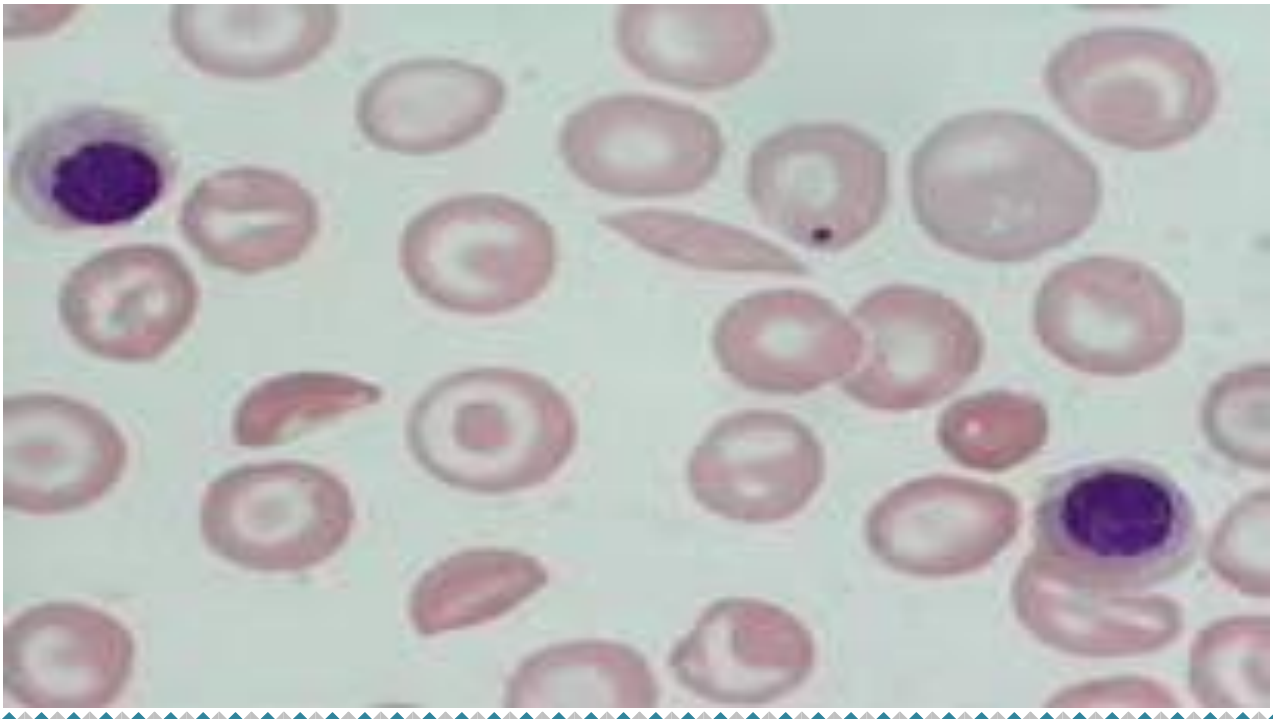
2-ovalocytosis

3-target cell

4-sickle cell

5-burr cell and " bland projections " in uremia and a canthocyte " sharp projection " in enteritis





RED BLOOD CELL MORPHOLOGY

Size variation	Hemoglobin distribution	Shape variation		Inclusions	Red cell distribution
Normal	Hypochromia	Target cell	Acanthocyte	Pappenheimer bodies (siderotic granules)	Agglutination
Microcyte	1+	Spherocyte	Helmet cell (fragmented cell)	Cabot's ring	
Macrocyte	2+	Ovalocyte	Schistocyte (fragmented cell)	Basophilic stippling (coarse)	Rouleaux
Oval macrocyte	3+	Stomatocyte	Tear drop	Howell-Jolly	
Hypochromic macrocyte	4+	Sickle cell	Burr cell	Crystal formation	
	Polychromasia (Reticulocyte)			HbSC HbC	

6-rolex

7-crenate

8-tear drop

9-stomatocyte

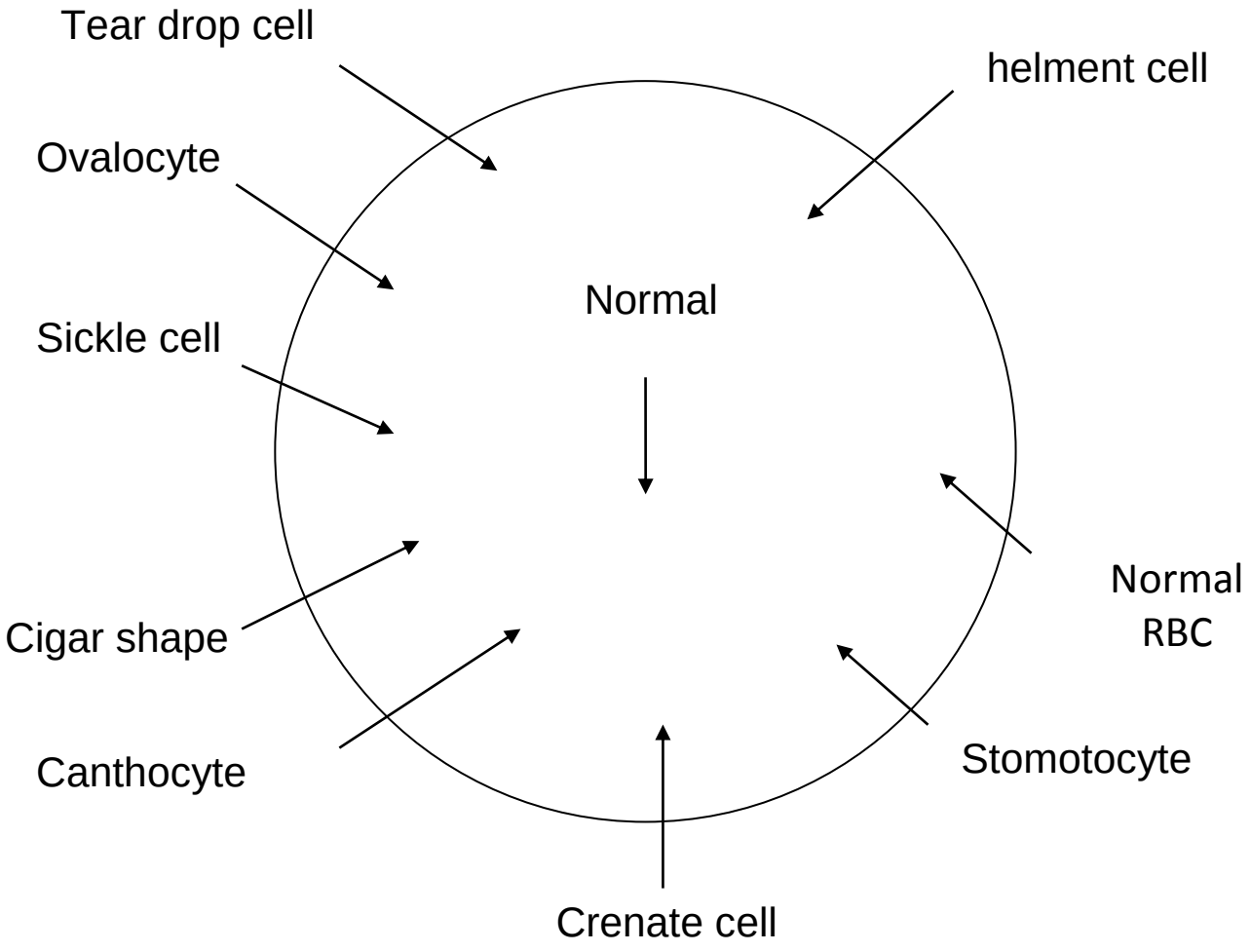
10-cigar shape

11-helment cell

12-schistocyte

13-Lptocyte

14-ellebtocyte



4--Variation in structure

Or

Variation in content

1-basophilic stippling : coarse granulation in the RBC blue ,gray or brown indicate the presence of denatured RNA

Seen in poisoning & leukemia

2-howell – jolly bodies : it is a single or double dots on RBC are blue purple or reddish caused by DNA remnant in RBC seen in sever anemia

3-Sidrocytes: RBC containing free iron in hemolytic anemia

4-heinz bodies : with methyl stain a deep purple particles usually lie near the edge of RBC seen in severe anemia

5- malaria parasites

Lec:7

Anemia

A daises characterized physiologically by insufficient circulating hemoglobin and clinically by reduced exercise tolerance and pale mucous membrane . it is due to decreased production or increased destruction of red cells this condition in which Hb concentration in the blood is less than 10.5 gm% in male and less than 10 gm% in female. This reduction extending for long period from the age of 3 months up till end life.

The reduction of Hb in blood is accompanied by a fall of RBC count and decreased PCV

In acute blood loss anemia is not immediately appearance it might take 2 days after accident and generally the appearance of clinical signs in the patient are slowly

The clinical features of anemia on the patient depend on :

1-The speed of anemia onset…

2-the severity of it …

3-The age of patient…

4- the Hb oxygen dissociation curve…

Symptoms(clinical features)of anemia

the symptoms of anemia divided in to:

A- general symptoms include

1-difficulty in breath mainly in exercise

2-weaknees and headaches

3-in older patient symptoms of failure (coma) and tachycardia

4-pale of mucous membrane in mouth ,eyes, nose and all the skin body

B- specific symptoms : they are very important to determined the types of anemia like…

*spooning of nails in I.D.A

*jaundice and lemon face in hemolytic anemia

*bleeding mucous membrane of nasal and rectal in a plastic anemia

Classification of anemia

In ancient time the classification of anemia is according to causes behead it weather due to the RBC production excess losses or excess distraction , but today we depending on the irregularity of blood indices .

((MCV.MCH.MCHC))

MCV 80-90 FL/L

MCH 30-35 pic. gram

MCHC 32-36 gm/d

And according these irregularities of indices found three reading for anemia .

*microcytic hypochromic

*macrocytic normochromic

*normocytic normochrom

Laboratory investigation of anemia

To determined any type of anemia we must be testing the :

1-Hb conc. (decrease)

2- RBC index (MCV,MCH ,MCHC) (decrease)

3- P.C.V (decrease)

4-reticulocyte count (increase)

5-blood film and bone marrow film.

Types of anemia

1- anemia of decreased RBC production (nutrition anemia) occur due to deficient folic acid ,DNA and vit. B12 which cause decrease in erythroid mitosis.

2- anemia of decreased hemoglobin production (deficient hem synthesis occur due to

-copper and iron deficiency

-vitB6 loss

-globins' material deficiency

3-anemia due to loss of abnormal red cell ..

A- deficient enzyme G6PD from edge RBC
B- immune mediated anemia
C- hemolytic disease of newborn .

4- anemia due to loss of normal red cell by

A - abnormal spleen (splenomegale)

B -action of bacteria,plant,chemical or physical agents

C-external bleeding (wounds,surgical,truma,utrien bleeding….

D-external parasites


SYMPTOMS OF ANEMIA
Fainting and fatigue
Respiratory
Shortness of breath
Heart
Angina and heart attack
Digestion
Change in stool color
Spleen
Enlargement
Muscle
Pain
Skin
Yellowing

Lec:8

IRON DEFICINCY ANAEMIA I.D.A

This type of anemia happen due to lack of supply or absorption of iron or due to continuous blood loss. In iron[I. D.A] all the three RBC indices (mcv, mcH, mcHc) are reduced and the blood film shows microcytic hypochromic cells.

iron requirement

The body has limited ability to absorber iron which occurs through duodenum and less through the jejunum of small intestine, and the Hb inside the RBC running about 2/3 of the body is iron the body gains iron from the diet and the daily requirement varies either age and sex it is highest in pregnancy and menstruation of females, generally the requirement is::

-1mg in male

-2mg in female

2.5mg in pregnancy -

Note .

No all iron which ingested in diet is absorption, only about 5-10% of diet iron is absorbed and uses ,thus a diet containing 10-20 mg of iron is usually sufficient in healthy adults .

Causes of I.D.A

A-blood loss it comes from

1-uterine bleeding

2-gastro intestinal tract (G.I.T) bleeding like (partial gastroctomy, hook carcinoma of stomach or cecum..... act)

B-malabsorbtion due to gastroctomy and celiac disease

C-poor diet

D-increased demands due to (thoroughly) growth ,prematurity requirement.

Clinical symptoms

1-headch and weakness (general).

2-difficultin breathing.

3-prittle"spoon" finger nail. (specific).

4-fissuresof the corner mouth .

5-glossitis and dysphasia.

6-hear and skin are dry.

laboratory findings:

1-the red blood indices are progressive fall (decrease) (MCV, MCH, MCHC)

2-the blood film show microcytic hypochromic cells with and heavy anisocytosis

3-the platelets count is often raised in I.D.A particularly when hemorrhage is containing

4-the serum iron falls also.

TRETMENT

1-correct the iron def. in diet.

2-treated the causes

Notes

1-the administration of iron must be before meal to absorbing completely

2-gives vit. **C** to patient to enhance obsorbetion Iron.

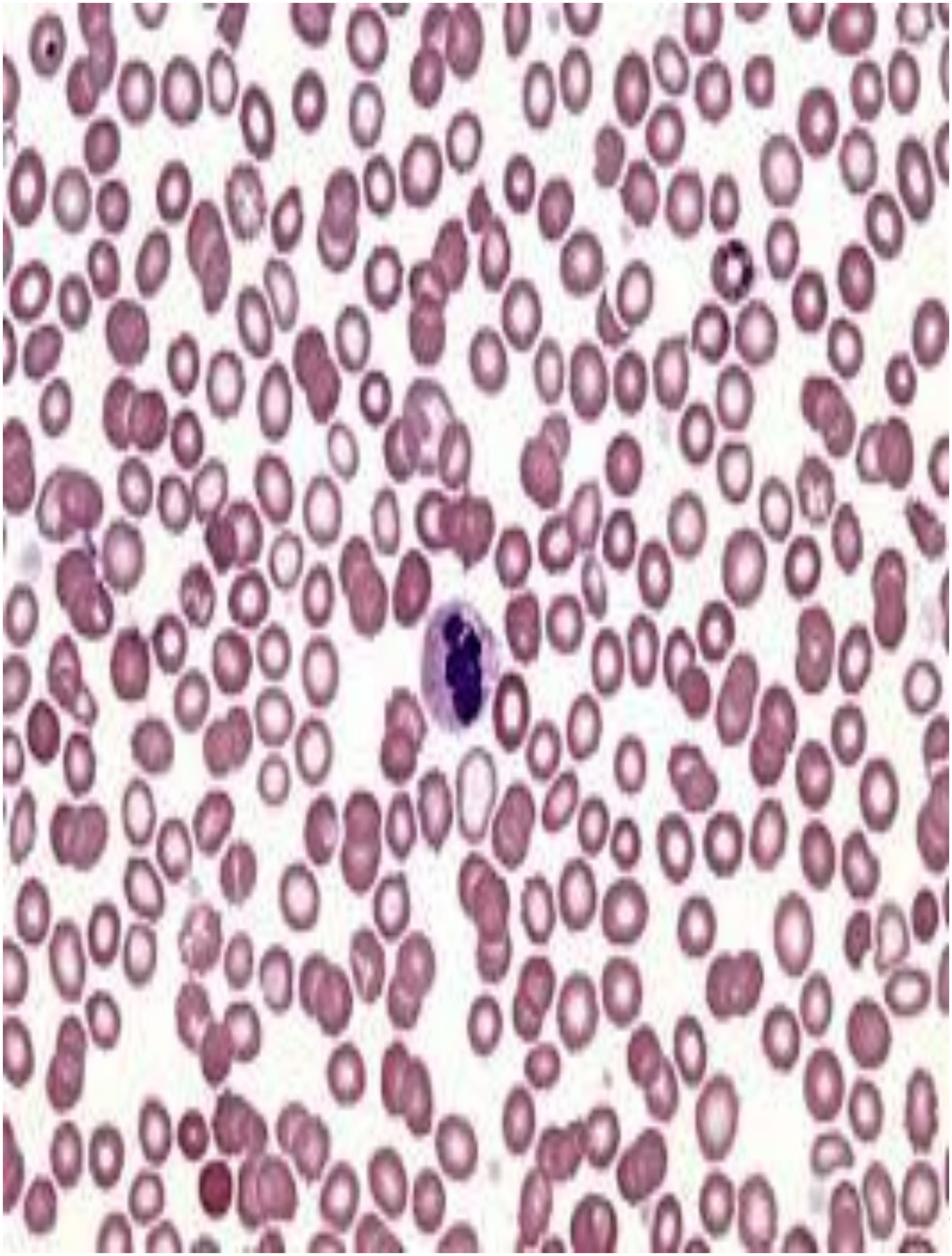
3-theropy must be continues till the patient is recovery.

4-the iron in the body store as hemosiderin and ferritin in RES.

Side effect of treated:

Nausea, abdominal pain ,vomiting and either constipation

or diarrhea.



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Pernicious anemia:

-Addison disease

-megaloblastic anemia

-vit. B12 dif. anemia

This a type of anemia caused duo to lack in Vit.B12 and folic acid, characterize by difficult in development of erythrocyte production which result greatly in large erythrocyte with normal hemoglobin.

Vit. B12 is absorbed through illume of intestine ,and folic is absorption after completely conversion to methyl tetra hydro foliate (methyl THF) in acidity medium, call intrinsic factor(IF)

Cause of megaloblastic anemia:

1-poor dietary intake of folic acid that very important to synthesis of DNA.

2-malabsorption due to vit Bl2 deficiency in blood

3-stomach disturbance (gastroctomy or gastric atrophy) Which case lack of internal factor (I.F) that very important to absorption vit B12 due to illume

4-excess urinary foliate loss active liver disease and C.H.F (congestive heart failure)

5-excess foliate utilization due to pregnancy lactation ,inflammation

Symptoms:

Generally notes on patient.

1-headach ;diarrhea ,difficult in walking and dysphasia.

2-fatgu dizziness ,weight loss and dyspnea.

3-tachicardia with increase in heart output.
4-peripherial extremity nerve degeneration feeling numbness due to degeneration the axon of spinal cord (SCDSC)

SCDSC:-sub acute companied degeneration of spinal cord :is disease cause from pernicious anemia or megaloblastic anemia that lead to peripheral extremities nerve degeneration and cause the degeneration axon of spinal cord and the important signs is numbness which end paralyses.

And the specific symptom are

1-sore tongue

2-lemon skin

Laboratory diagnosis:

1-macrocytic normochromic RBCs with Basophilic stippling and ovalocytosis.

2-m.c.v increased > 95 FL

3-hypersegmented of neutrophil with 6 or more lobes

4-Anisocytosis and poikilocytosis.

5-Bone marrow show hyper cellular and the large erythroblast.

TREATMENT

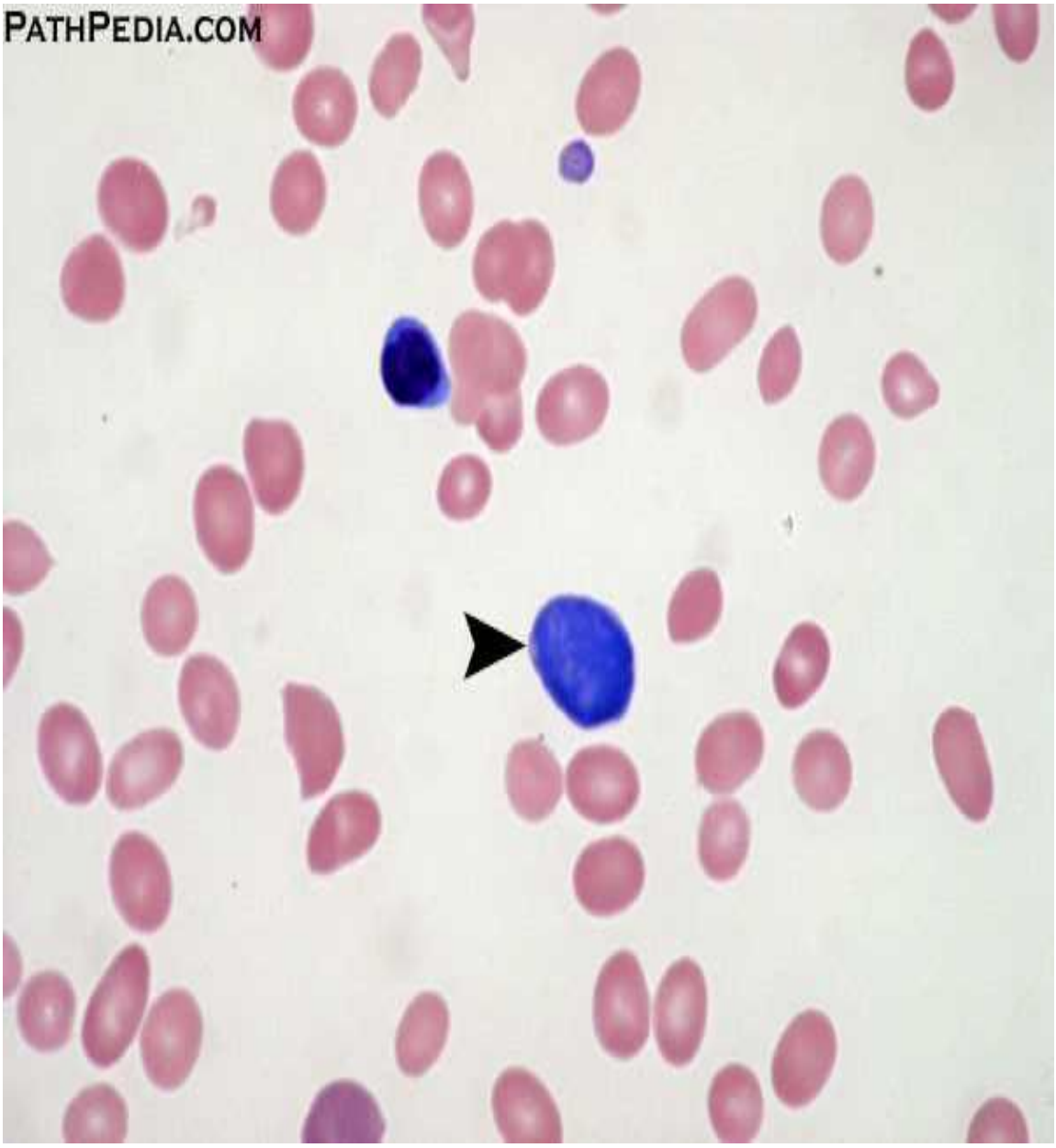
Most cases only need therapy with vit B12 and foliate (folic acid).

CAUSES OF MACROCYTOSIS OTHER THAN MEGALOPLASTIC ANEMIA:

Including:

1-liver disease

2-reticulocytosis
3-cytotoxic drugs
4-pregnancy
5-respirotory failure
6-new natal



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APLASTIC ANEMIA

A plastic anemia is a sever type of anemia characterized by a plastic bone marrow and Failure to produce the normal numbers of RBC,WBC ,platelets.

CLASSIFICATION AND CAUSES:

We can classify a plastic anemia in to

A -primary A-A caused by genie

B - secondary A-A caused by:-

1 -drugs(sulfonamide and chloramphenicol

2-chemical like arsenic ,benzene

3-raddiation due to X ray

4- infection disease e.g. .infectious hepatitis and other viral infection.

Clinical finding

The specific including:

1-ulcaration of mouth .

2-bleeding the mucous membrane of nasal and rectal.

3-fatigue.

4-prolong infection.

Laboratory diagnosis

A- Blood film show

1- normocytic normochromic with anise .and poikiocytosis

2-decrease WBC. RBC. Platelets.

B- Hb. decrease than normal value.

C- B.T and C.T are increase .

Pancytopenia

This term to describe peripheral blood picture when the three formed elements of blood are decrease This is mean when Is combination of anemia leukocytopenia and thrombocytopenia

The blood film (picture) show

1 -platelet less than 1500 plat./cum

2- WBC less than 2000 c/cum

3- RBC less than 2000000 c/cum

4- H.b very decrease in

- male less than 10.5 mg%

-Female less than 9.5 gm%

- Infant less than 10 gm%

Hemolytic anemia

It is a type anemia resulting by an increase RBC distraction.

in general the life Spain of RBC is about 120 day while in hemolytic anemia survive at few days in maximum about 4-10 days.

we can classification hemolytic anemia in two groups:-

a--Extra corpuscular H.A

b—Intra corpuscular H.A

Extra corpuscular H.A

1- cause by slaving the G6PD enzyme which covering the RBC and lead to destruction the RBC like in food sensitivity
2- is acquired caused
3- the distraction is outside the RBC as isoimmune or autoimmune diseases

Intra corpuscular H.A

1- caused by damage the hemoglobin by metabolism synthesis then rupture the membrane of RBC
2- is aherditry disease
3- in side RBC damage like abnormal hemoglobin or blood parasite.

Laboratory diagnosis

1- increase in bilirubin value "N.V" 0.3—l mg/dl
2- turbid plasma
3- the blood film show decreased RBC count and normal WBC are increase
4- Hb,PCV,ESR are decrease

The important specific finding is hemoglobin urea and jaundice skin and face.

Sickle cell anemia

It is type of anemia caused by an abnormal hemoglobin gets from two branch

A) sickle cell anemia (as sever)

1- is an a hereditary disease which gets from path parents each one has Hbs and cause (Hbss) , (Hbs+Hbs)=Hbss called homozygous.
2- the percentage of Hbs in blood Is 90% while HbA 10%
3- the patient die before reach to 30 year.

B) sickle cell anemia (triad)

1- is an a hereditary disease gets from two parents one of them has Hbs and other has HbA lead to HbsA

2- the percentage of Hbs is 35% while HbA 65%

3-the patient stile live

The person which has Hbss from one parents and HbsA from other (Hbs +HbA= HbsA) is call heterozygous.

Symptoms

1- Sever pain in stomach ,legs, arms.
2- the patient feel tiered and nervous.
3- ulceration in lower part of legs.
4- long fit Height or(Extortions) arms and legs

Laboratory diagnosis

1-WBC ,RBC are decrease

2-the blood film show ,anisocyte ,poikilocyet cells and severe ovalocyte with predominant sickle cell