These two terrorists are doing crime

Behind this

Two things are responsible :

- change of attitude
- change of mind

fppt.com

For this

the fundamental factors are :

- Instinct

And

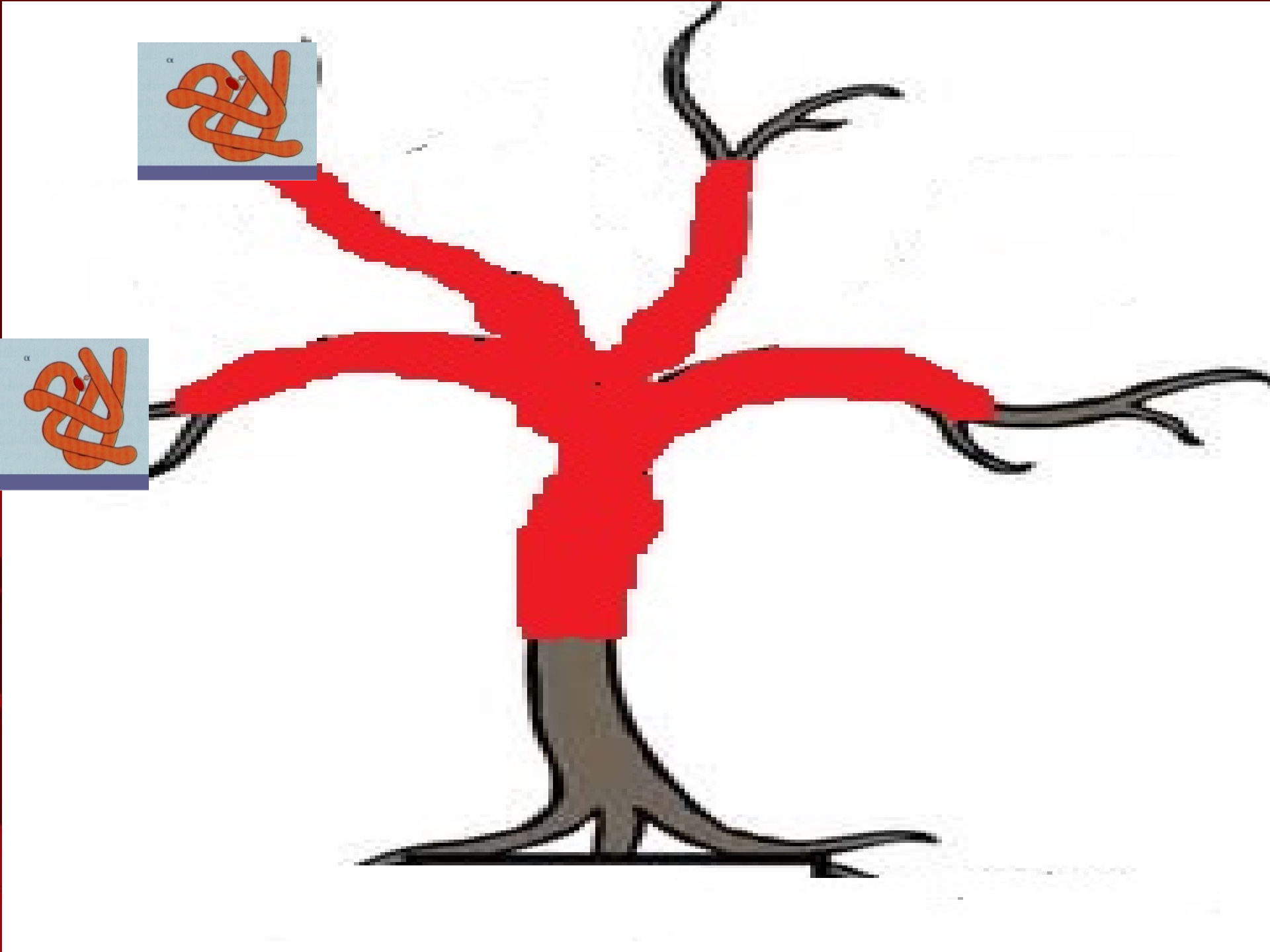
- influence

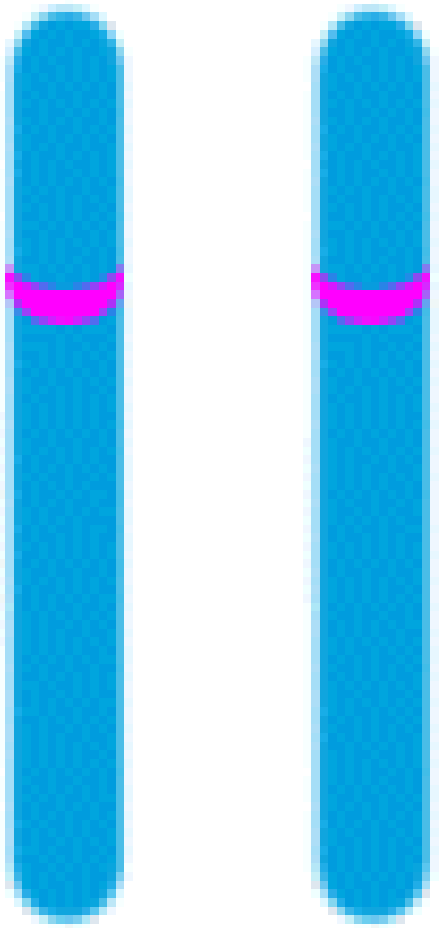
fppt.com

I am a terrorrist doing crime

Life of RBC is target prime

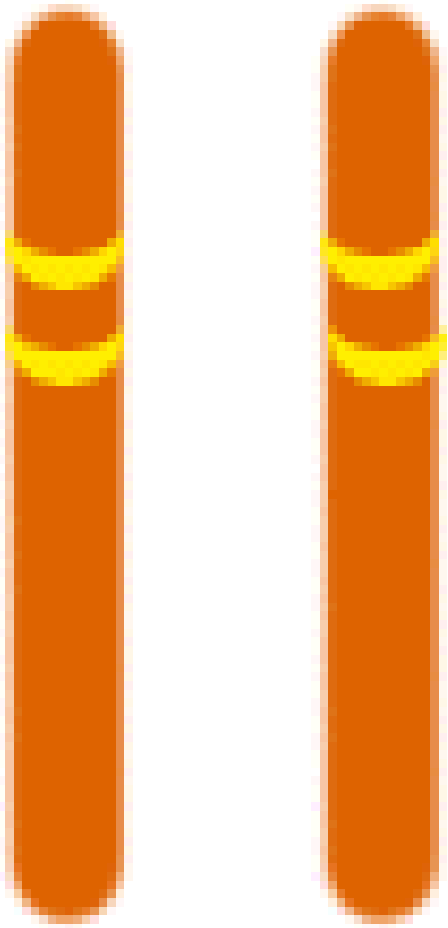
RBC defective
Motive my effective
Human body has to cry
To do this I don't feel shy





Chromosome 11

β globin gene



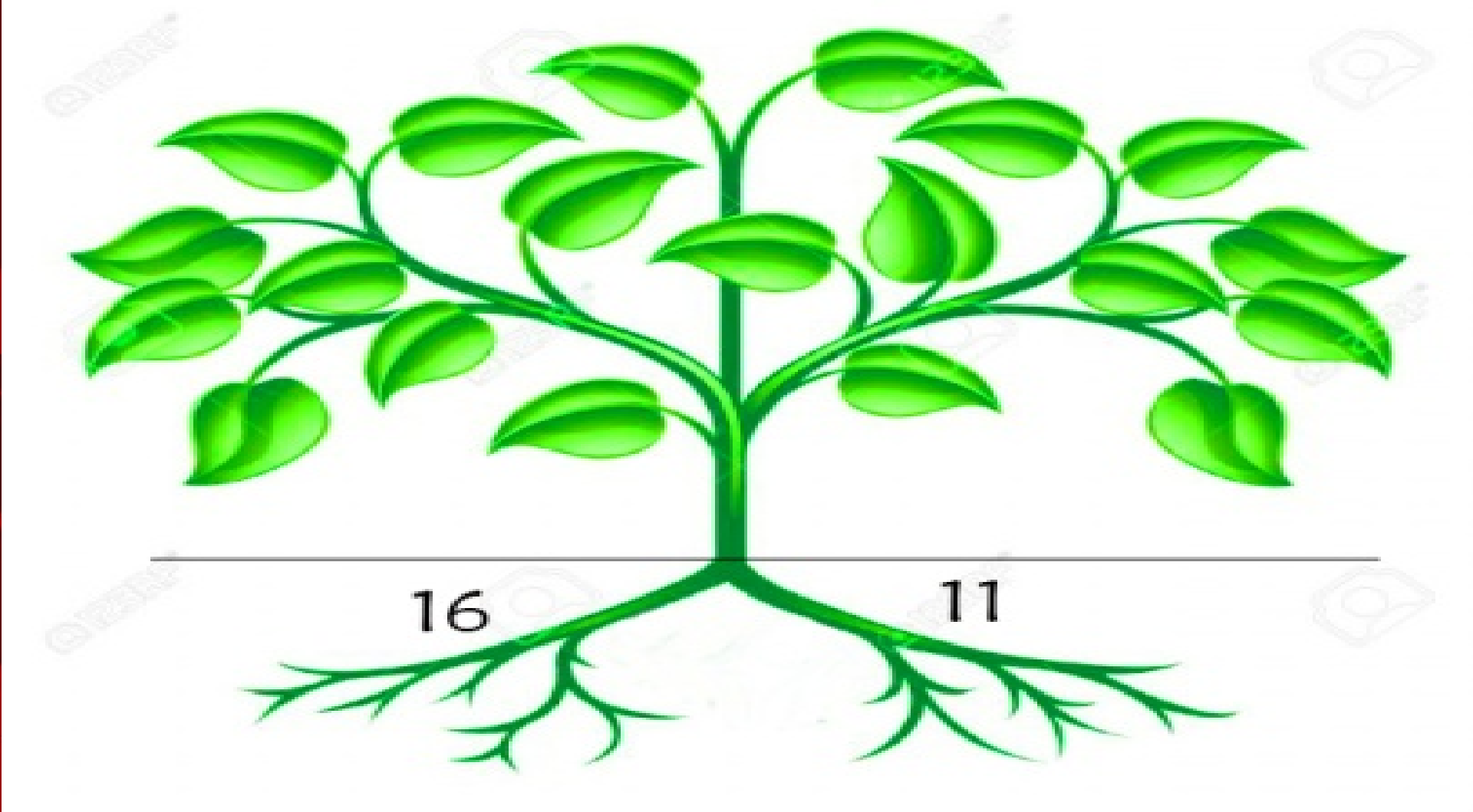
Chromosome 16

Alpha globin gene

I will tell a disease – tale,
Not blue not red only pale.
Reside by sea, but not I born,
why near sea it not yet known.

fppt.com

Thalassaemia
A neglected hematological disorder in developing countries



Prof. Dr. Md. Faizul Islam Chowdhury
Professor of Medicine
Dhaka Medical College & Hospital

What is Thalassaemia

quantitative haemoglobinopathy

belonging to

heterogeneous group of inherited disorder

caused by

genetic lesions involving chromosome 16 & 11

leading to

↓synthesis of either alpha or beta globin chain

resulting in

excessive destruction of red blood cells.

fppt.com

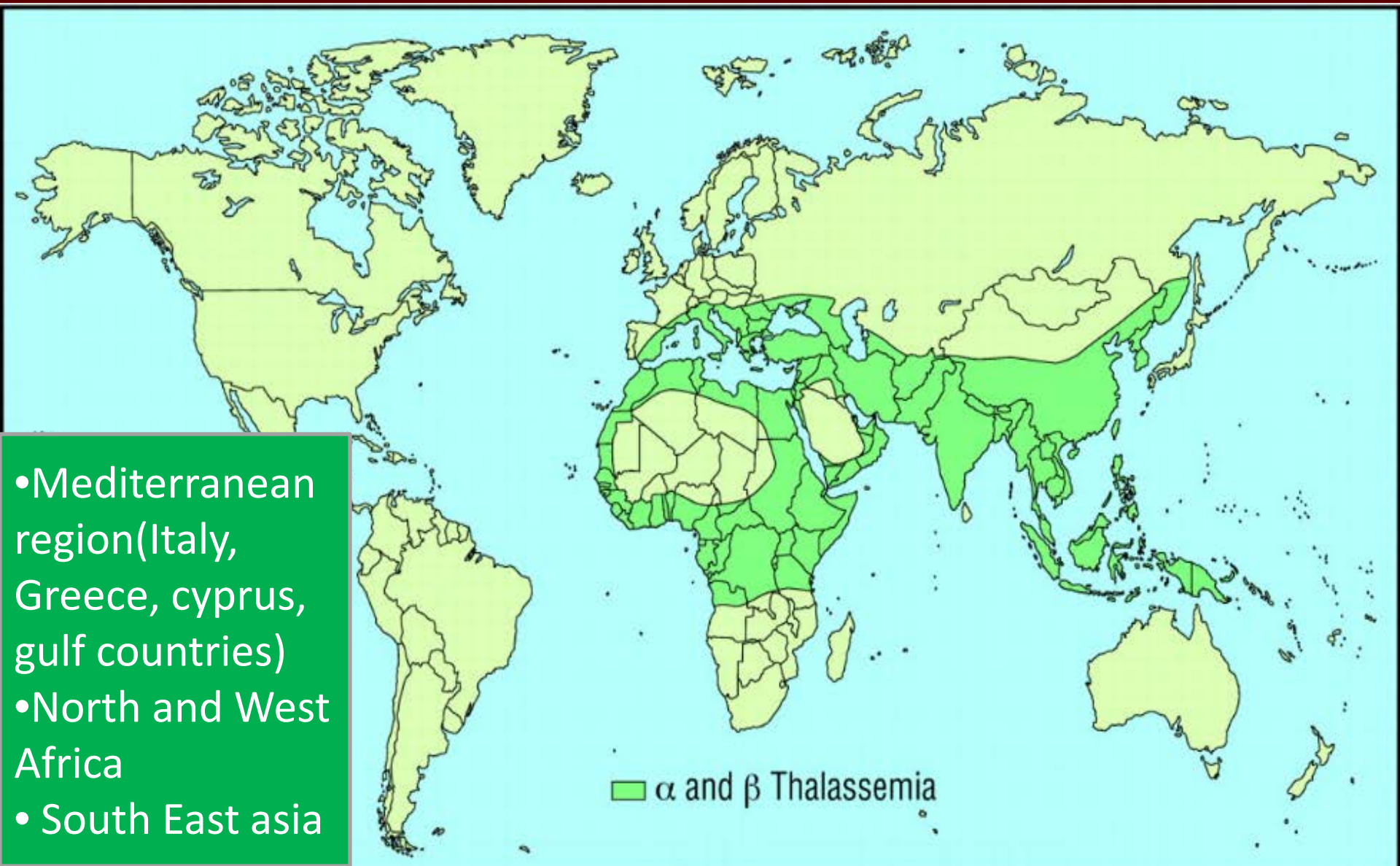
The Thalassaemia and the sea

Swimming swimming swim in sea
Crack our body , you RBC

- **The word thalassaemia came from a Greek word ‘thalassa’ meaning sea**
  G: *thalassa,* the sea, + emia/*haima,* blood)
  as the ancients believed this disease came from sea.
  (Thalassa +emia = thalassaemia)

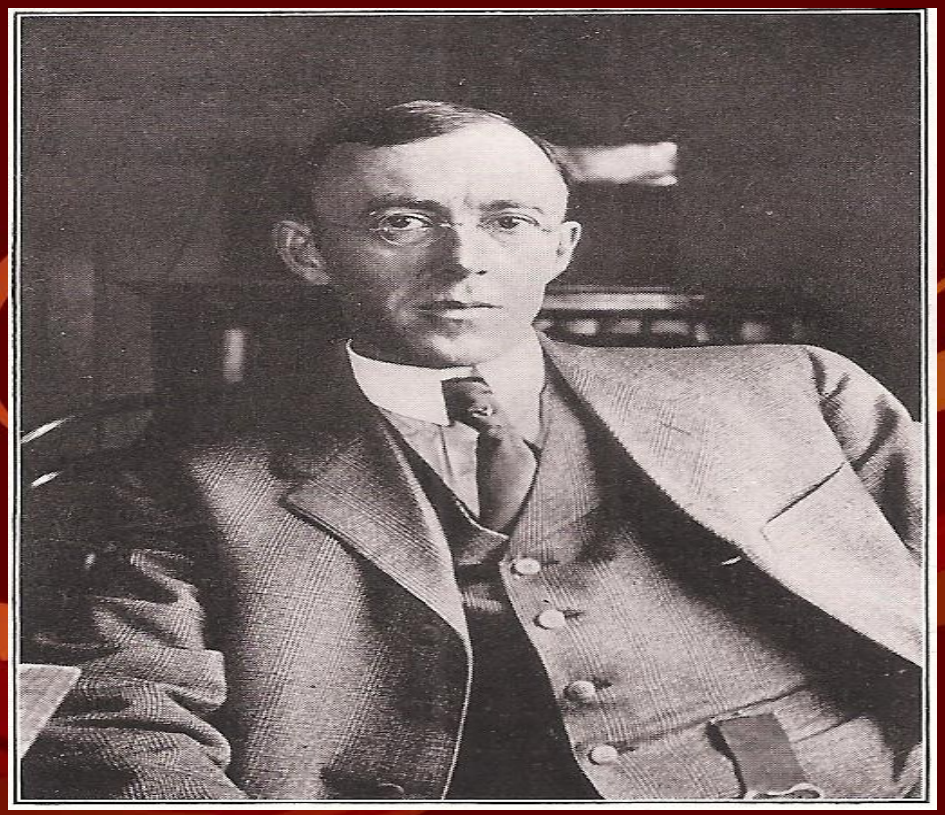
fppt.com

সাগর পাড়ে জনম্ মোর সাগর পাড়ে বড়
কারণ খুঁজে পাইনা আমি থাকি জড়সড়



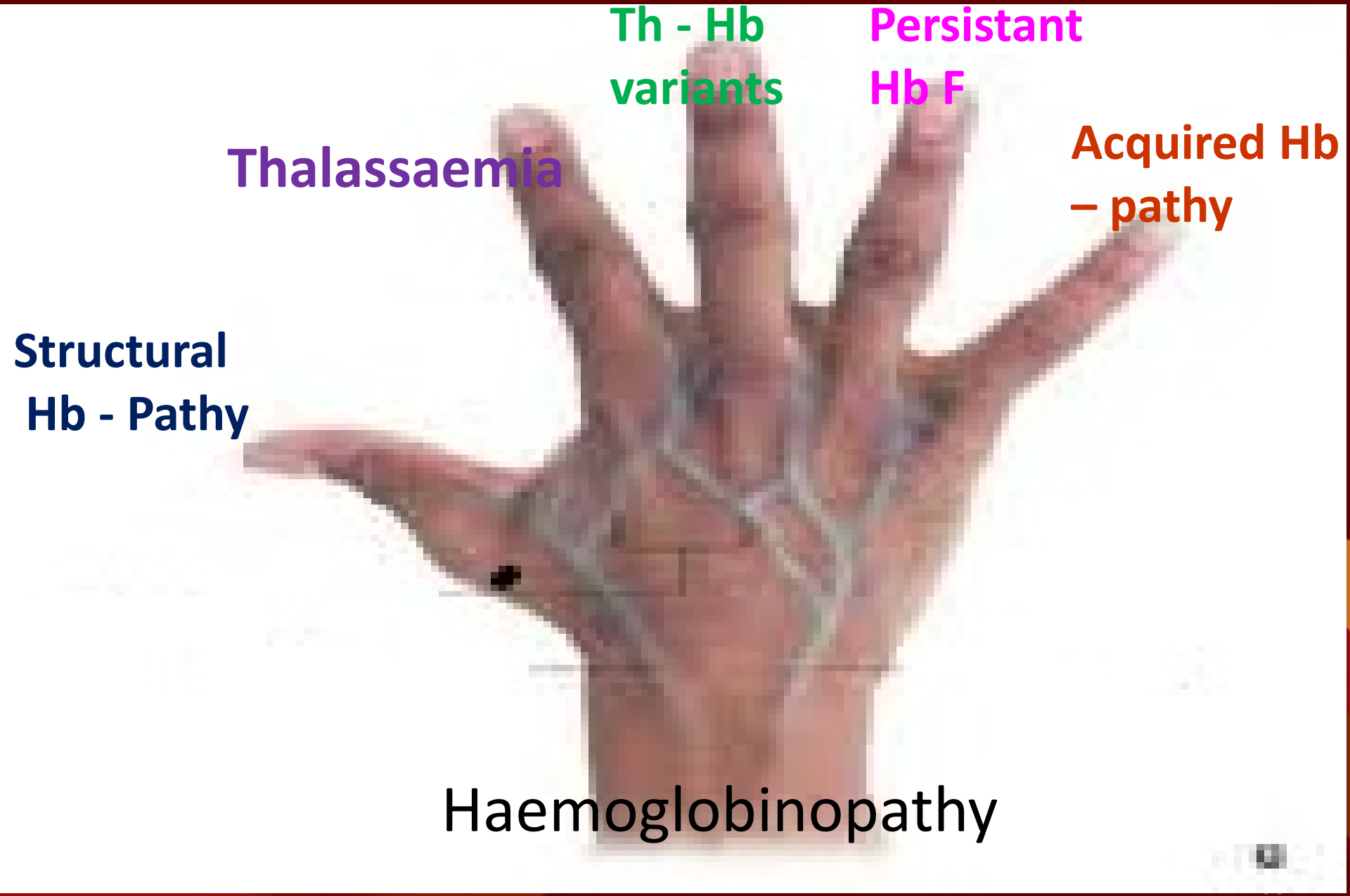
- Mediterranean region(Italy, Greece, cyprus, gulf countries)
- North and West Africa
- South East asia

In 1925, pediatrician Thomas Benton Cooley published a work on thalassaemia. This was the first description of the disorder, and for a long time it became known as Cooley's anemia.



fppt.com

Hemoglobinopathies classification



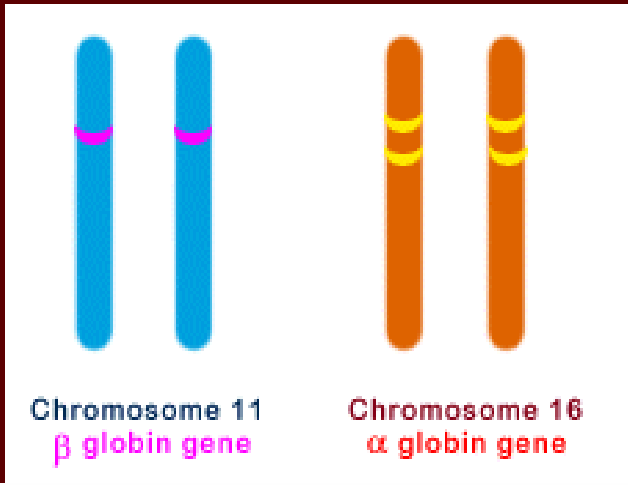
Genetics of thalassaemia

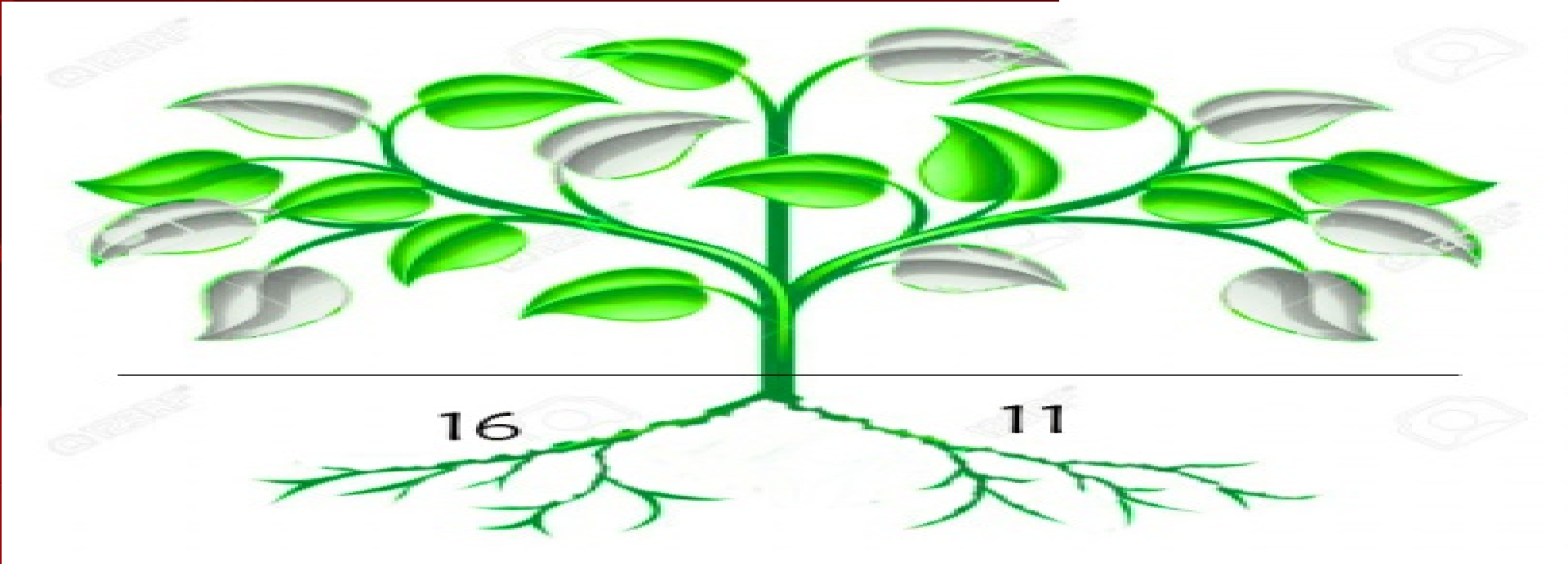
sixteen sixteen

that's our root in

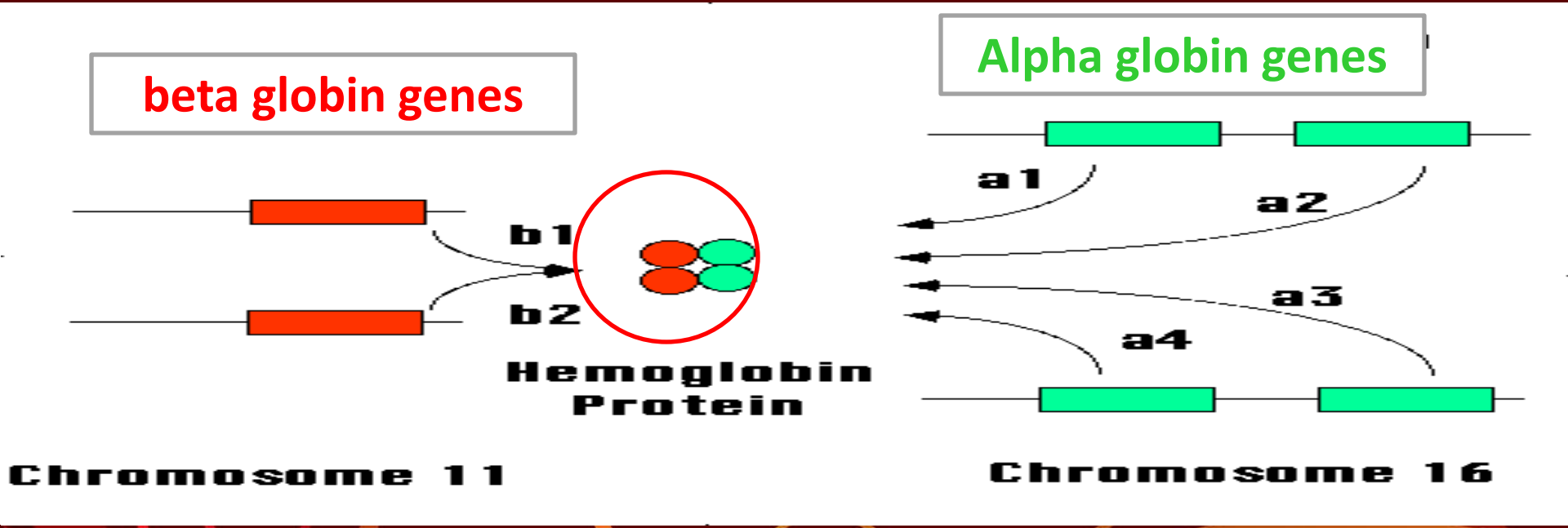
Eleven eleven eleven so

without eleven we can't go





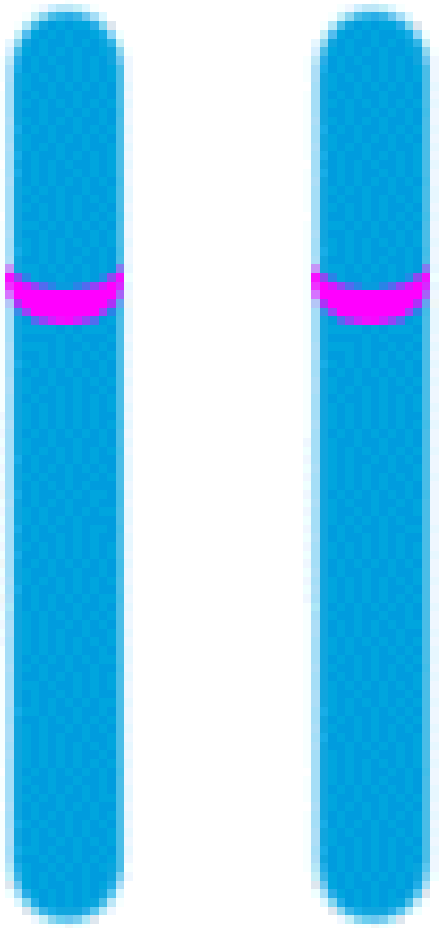
Gene and gene and gene and gene
It’s my source with any mean



Globin deficit haemoglobin unfit
RBC get hit

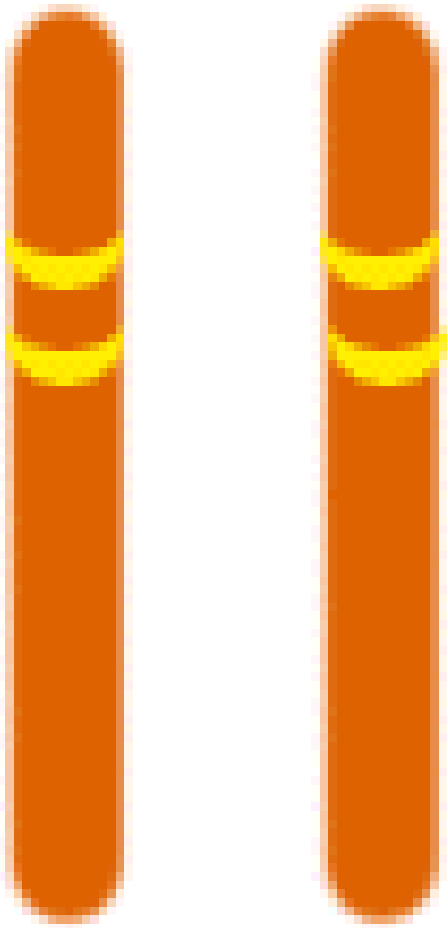
Making pale and making pale
How I describe disease tale

fppt.com



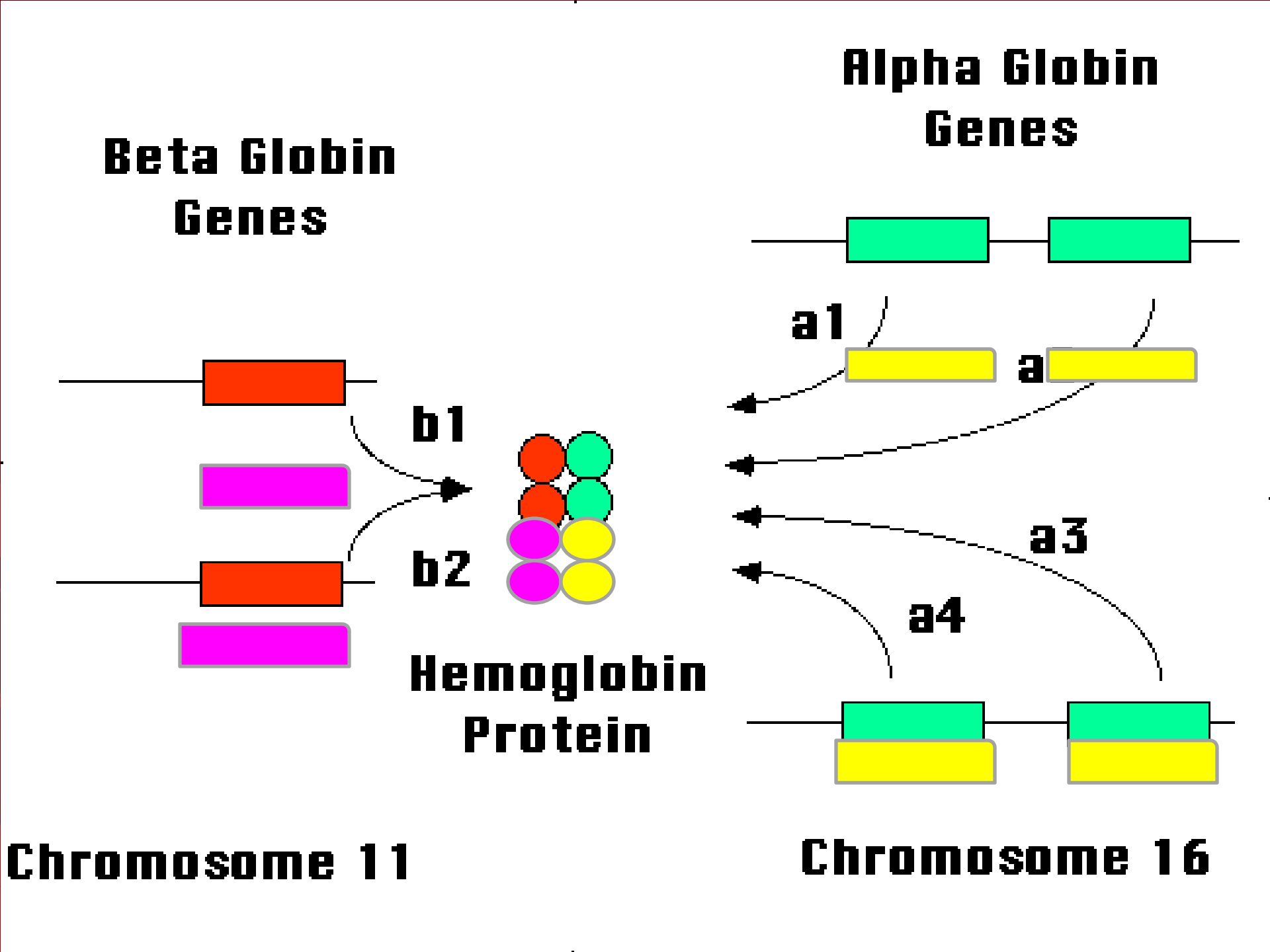
Chromosome 11

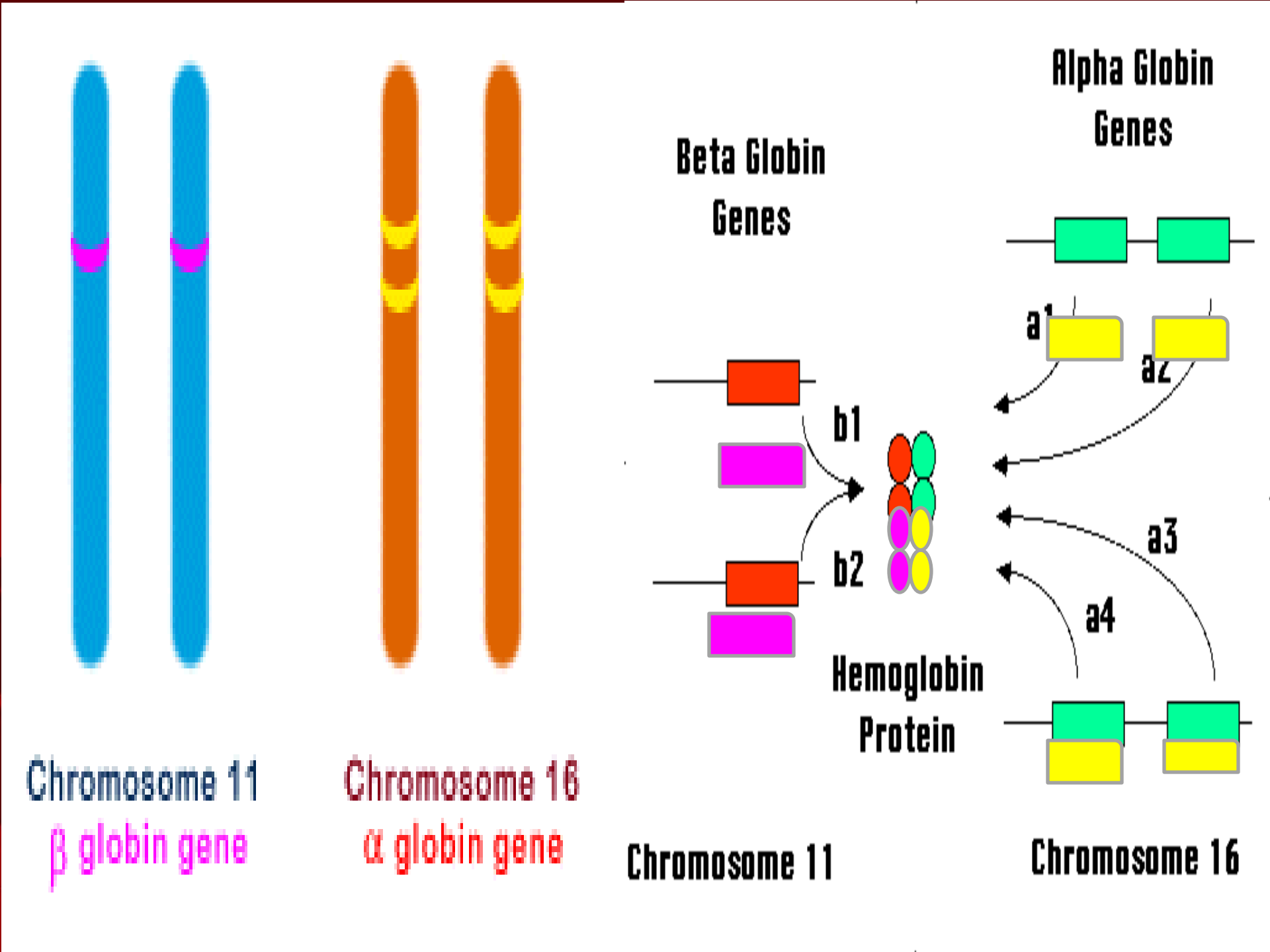
β globin gene



Chromosome 16

Alpha globin gene


Alpha Globin Genes
Beta Globin Genes
a1
a
b1
b2
a3
a4
Hemoglobin Protein
Chromosome 16
Chromosome 11

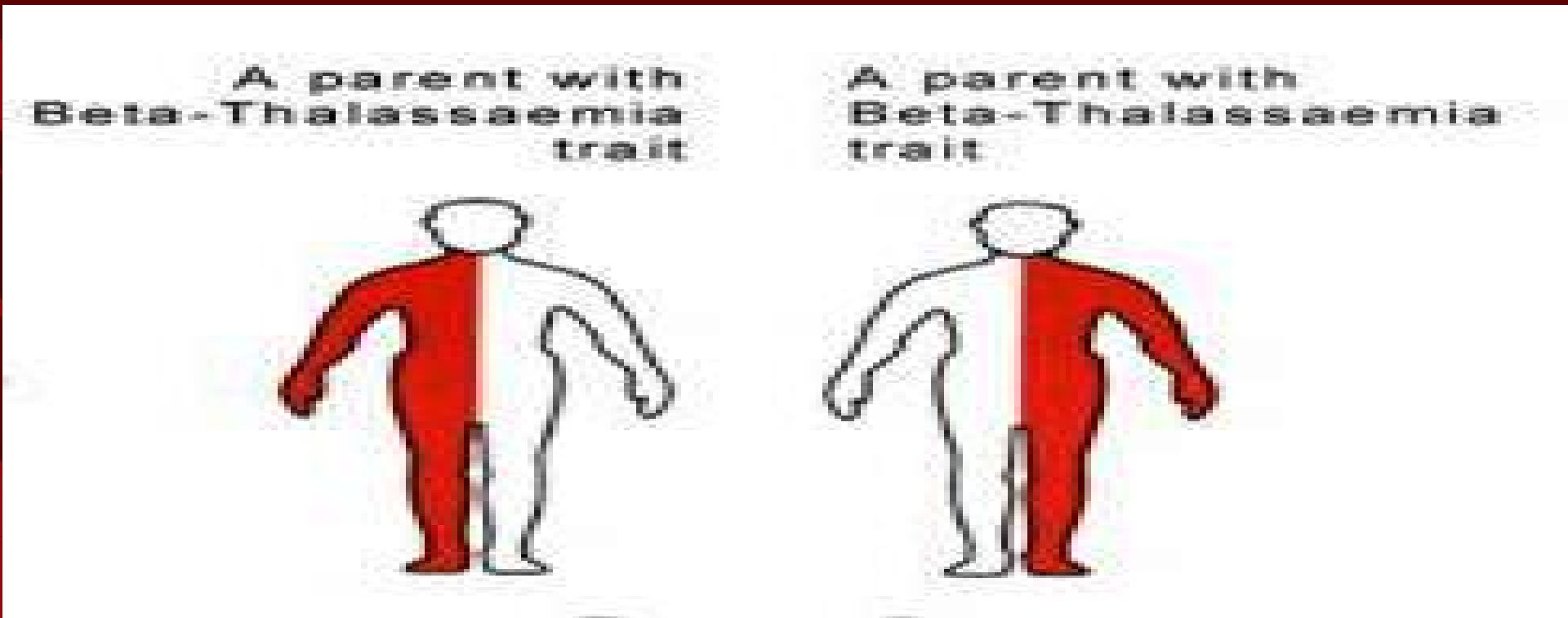

Chromosome 11
β globin gene
Chromosome 16
α globin gene
Beta Globin Genes
Alpha Globin Genes
b1
b2
a1
a2
a3
a4
Hemoglobin Protein
Chromosome 11
Chromosome 16

Inheritance

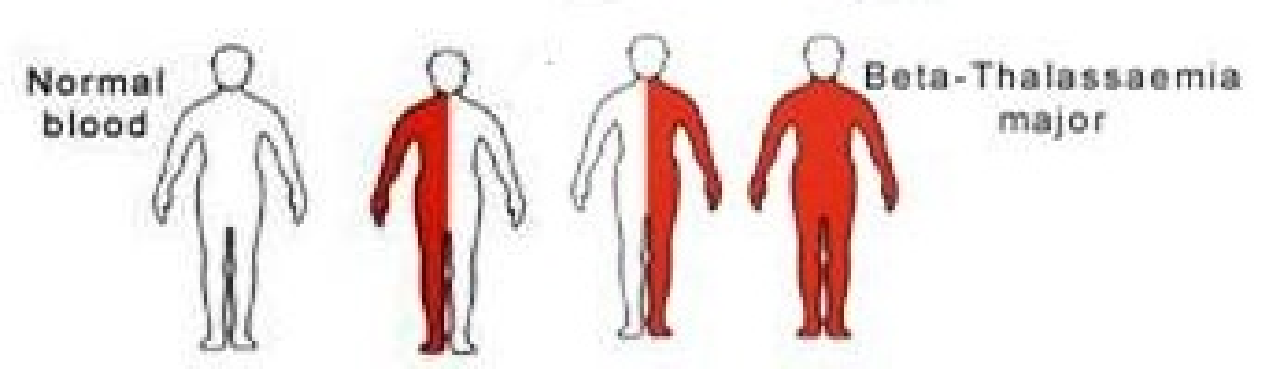
Usually autosomal recessive pattern

Although autosomal dominant cases reported

both parents are traits, three possible outcome :

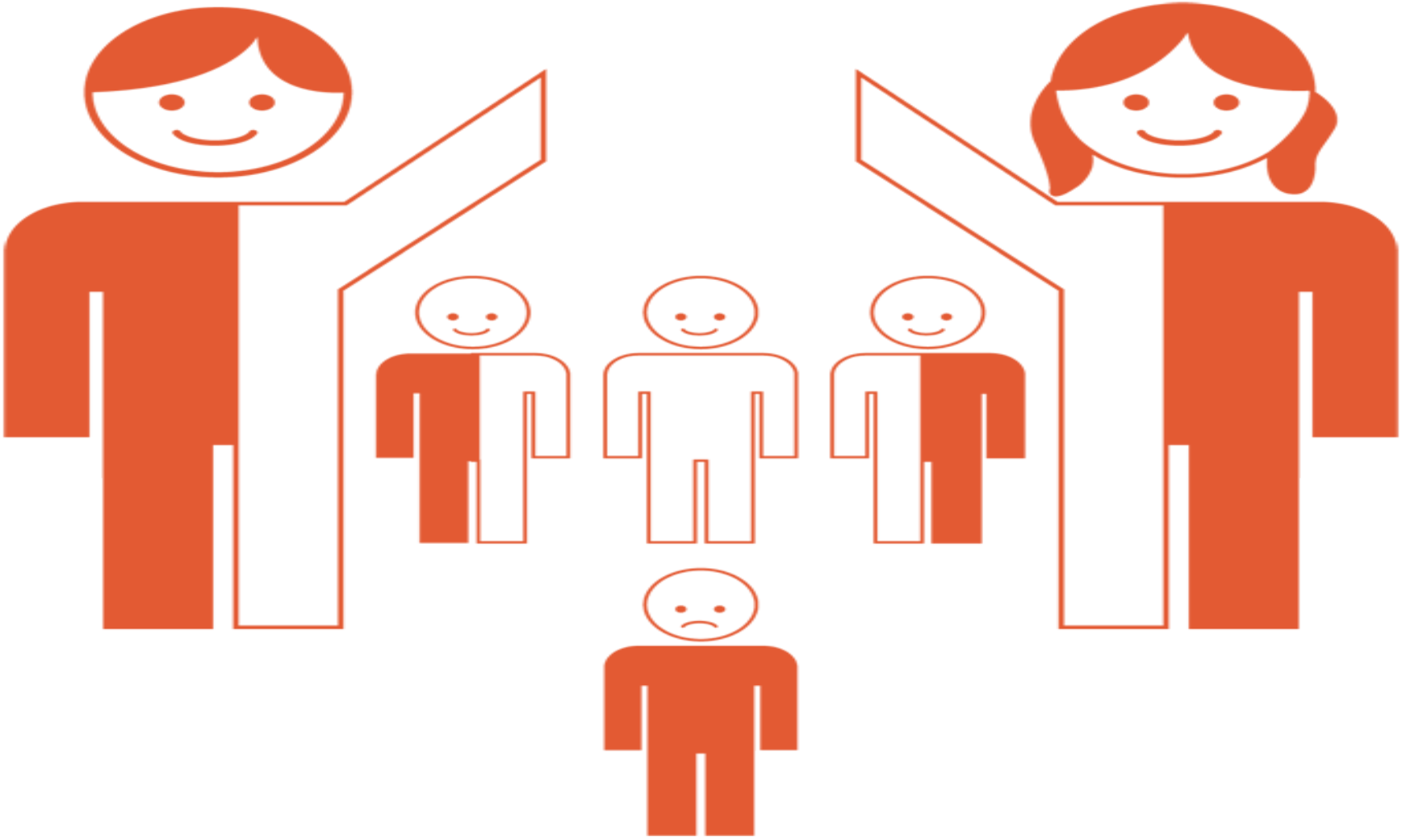


- 25% chance of a child: No trait.
- 50% chance of a child: with a trait
- 25% chance of a child: Thalassaemia Major

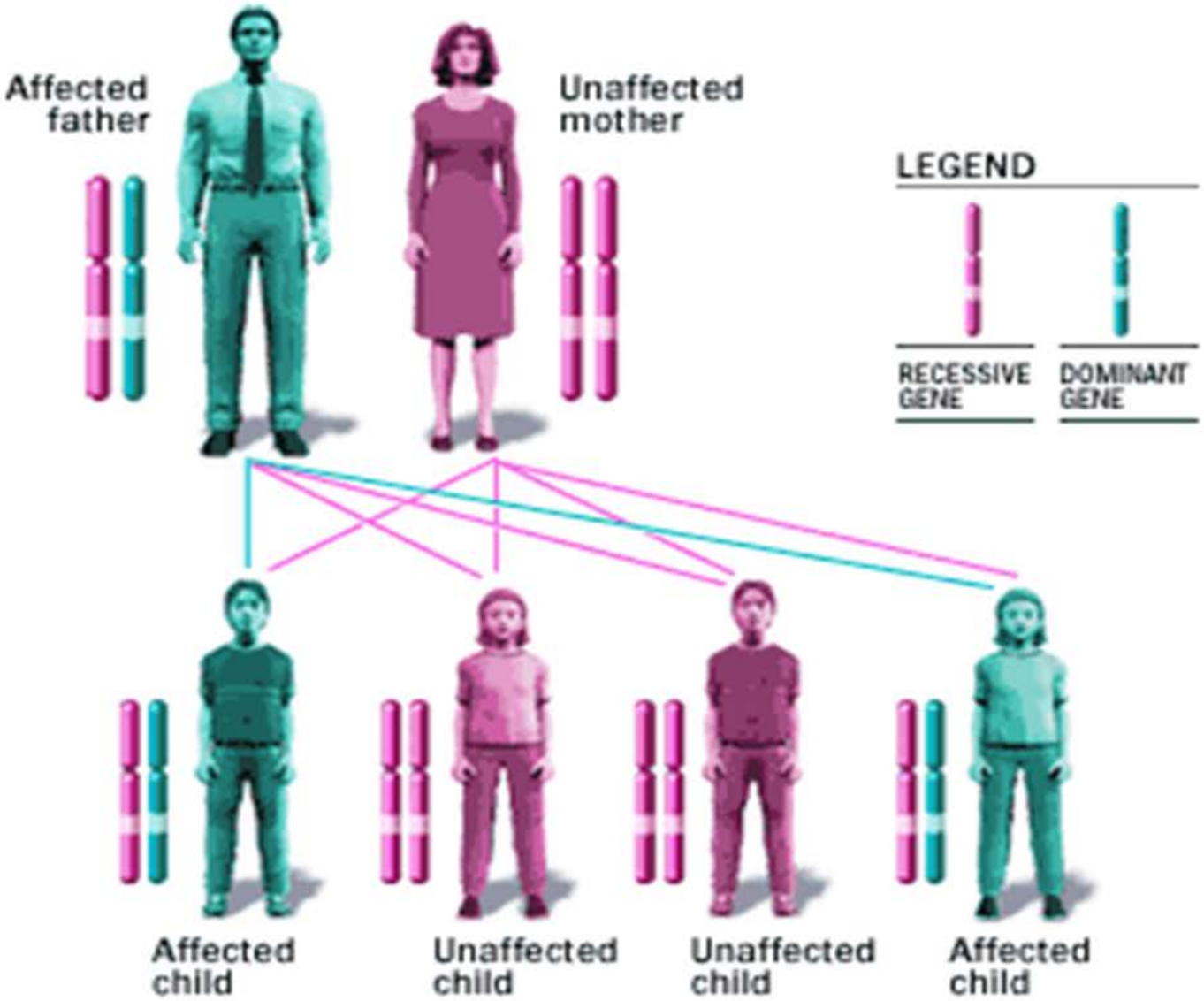


fppt.com

Both parents career



one parent affected and another unaffected



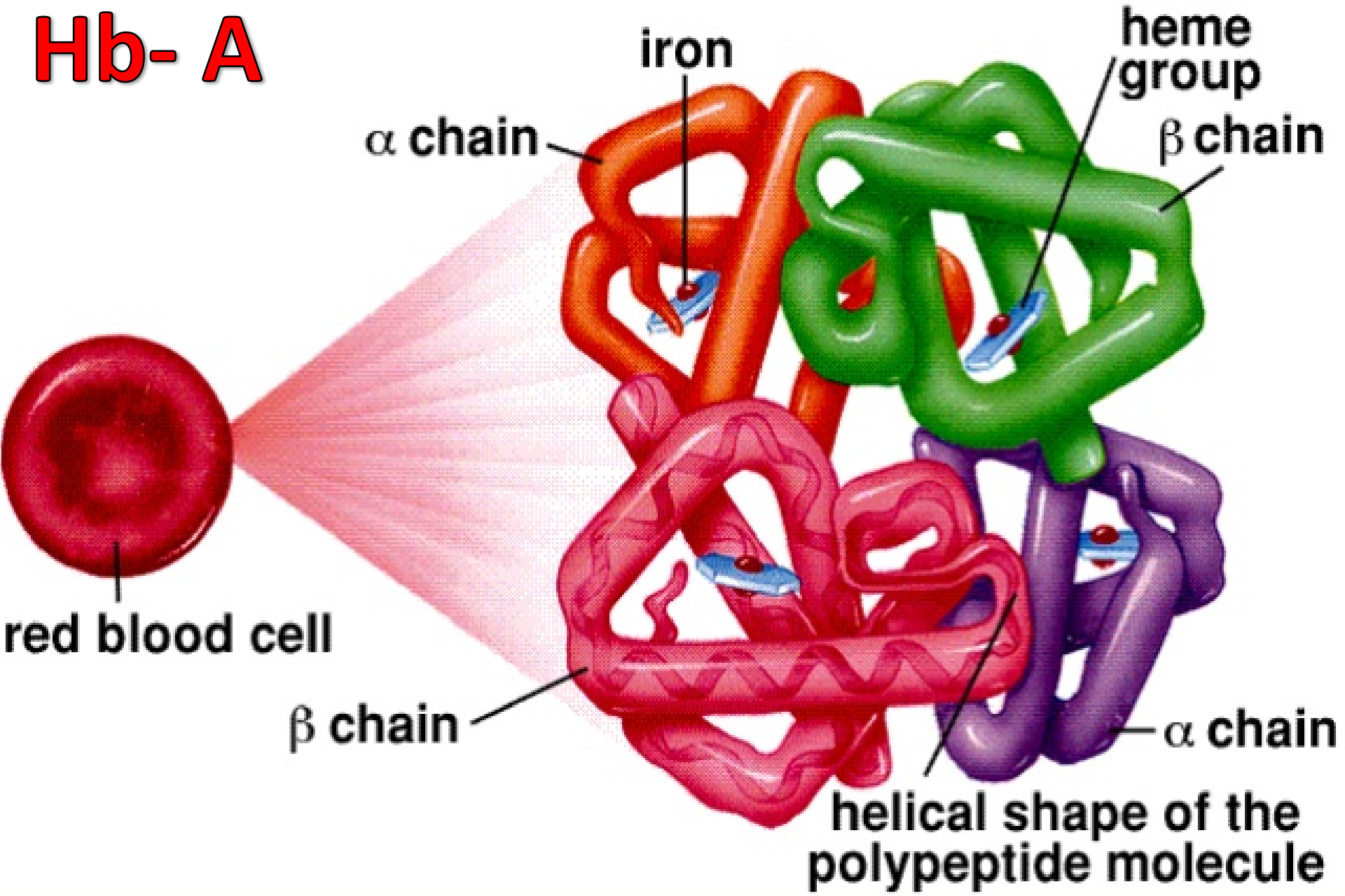
Normal haemoglobin

- HbA - $\alpha_2\beta_2$ (95 to 98 %)
- HbA_2 - $\alpha_2\delta_2$ (2 to 3 %)
- HbF – $\alpha_2\gamma_2$ (0.8 to 2 %)

fppt.com

Hemoglobin Molecule

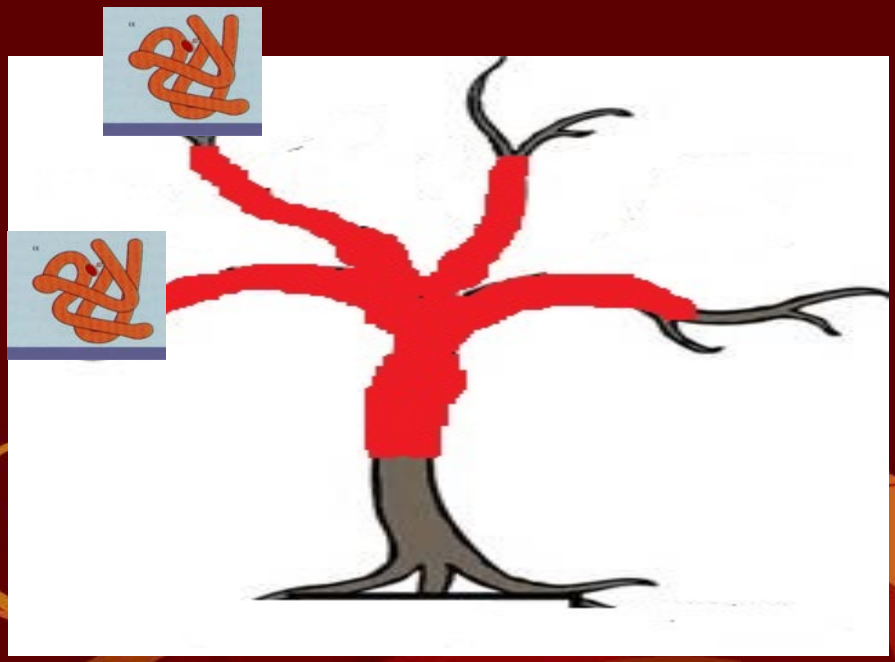
Hb- A



Hb of Beta thalassaemia

gene

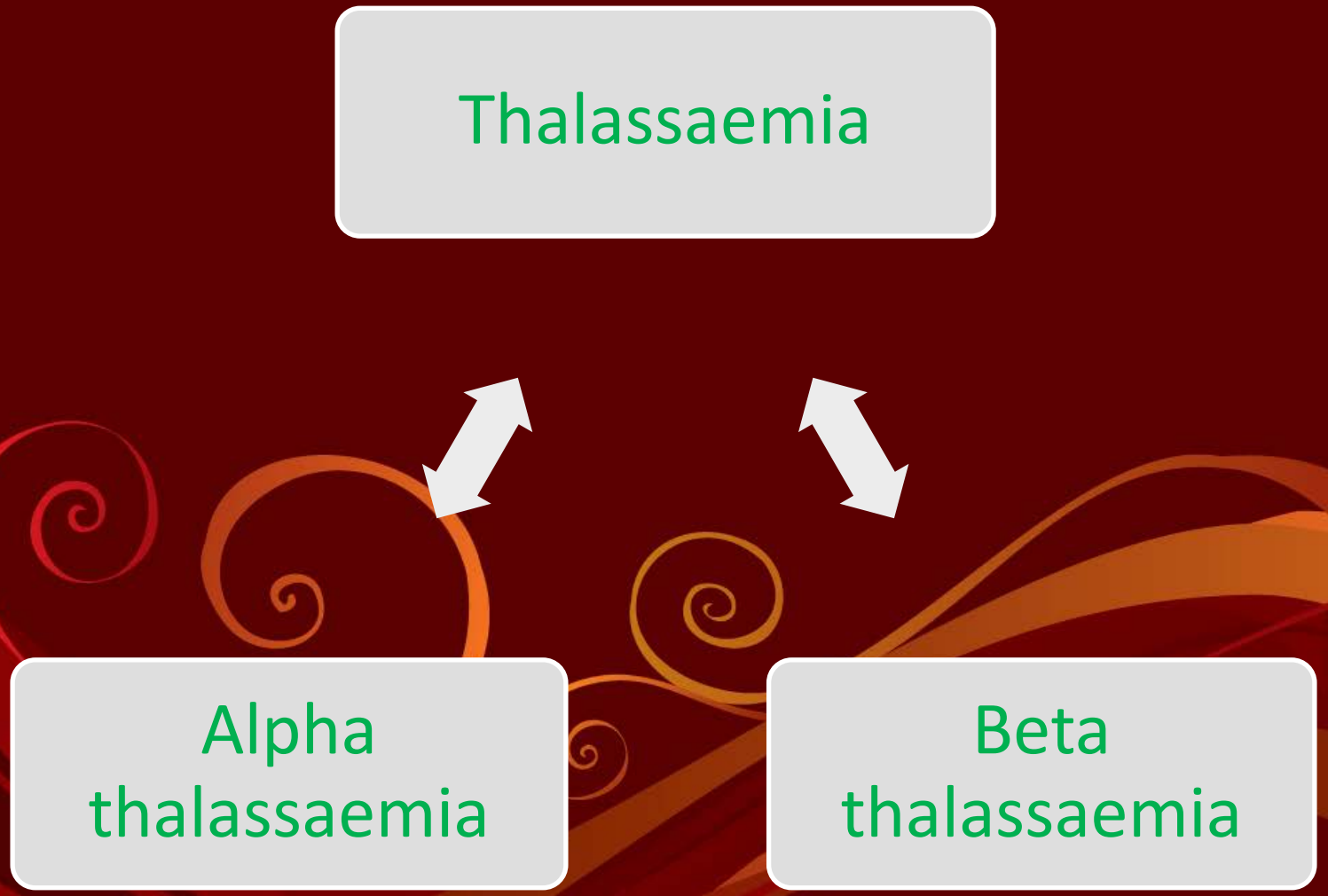
Beta thalassaemia minor



Beta thalassaemia major

fppt.com

Types of thalassaemia



fppt.com

Clinical & genetic classification

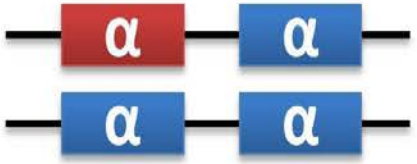
(alpha thalassaemia)

Alpha Thalassemia	α genes	Globin Chains	Hemoglobin	Anemia
Normal	αα/αα	$\alpha_2\beta_2$	A	None
Silent Carrier	αα/α-	$\alpha_2\beta_2$	A	None
Trait	α-/α- --/αα	$\alpha_2\beta_2$	A	Mild
Hb H disease	--/-α	$\alpha_2\beta_2$, β_4	A, H	Intermediate
Hydrops fetalis	--/--	γ_4, $\zeta_2\gamma_2$	Barts Portland	Lethal

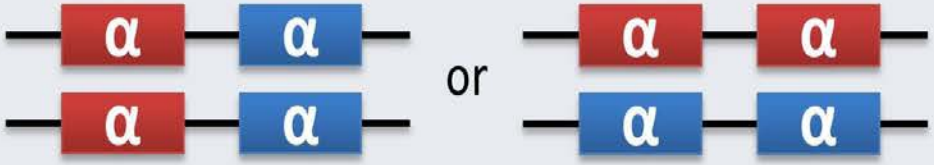
Alpha-thalassemia Genetics and Clinical Consequences

Normal

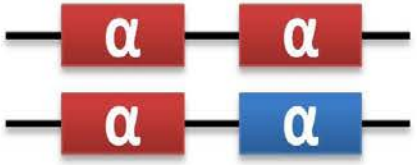
Carrier: Asymptomatic
No abnormalities



α-thal minor: Asymptomatic
Mild microcytic anemia



Hb H Disease: Symptomatic
Hemolytic and Microcytic anemia
Splenomegaly



Incompatible with Life
Hydrops Fetalis

Clinical & genetic classification
(beta thalassaemia)

Beta Thalassemia	β genes	Globin Chains	Hemoglobin	Anemia
Normal	β/β	$\alpha_2\beta_2$	A	None
Thalassemia minor / thalassaemia trait	β^+/β β^o/β	$\alpha_2\beta_2$, $\alpha_2\beta_2$, δ_2 , $\alpha_2\gamma_2$ $\alpha_2\beta_2$, $\alpha_2\beta_2\delta_2$, $\alpha_2\gamma_2$	A, A_2, F	Mild
Thalassemia major	β^+/β^+ β^o/β^o	$\alpha_2\beta_2$, $\alpha_2\delta_2$, $\alpha_2\gamma_2$ $\alpha_2\gamma_2$, $\alpha_2\delta_2$	A, A_2, F F, A_2	Severe Severe

fppt.com

Pathogenesis

Genetically determined

Heterogeneous group of disorder

Reduced synthesis of one or more types of normal haemoglobin polypeptide chain

Reduced haemoglobin involving affected chain

fppt.com

Each goblin chain have separate genetic control

α – Thalassaemia affect α-chain synthesis

β –Thalassaemia affect β -chain synthesis

fppt.com

Pathophysiology of β-Thalassaemia

Various mutation in β-gene

Complete or partial absence of β-chain

Decreased adult HbA

α-chain synthesis remain normal

Free complementary α-chain – unstable and precipitate within normoblasts as insoluble inclusions

Cell membrane damage & impaired DNA synthesis →apoptosis i.e. ineffective erythropoeisis

fppt.com

Broken RBC

Clinical feature

Anemic pale I anemic pale
Will I disclose globin's tale

Fatigue feel I, I feel tired
Life is to me not with cheer

Shortened height and shortened life
Its my blood and its my type

FATIGUE

PALOR

TIREDNESS

ANAEMIA

ANHEDONIA

GROWTH RETARDATION

DECRESED LIFE EXPECTANCY

fppt.com

Blood is pale my blood is pale
Disrupt organ bone and nail

Hard and soft- are all- victim
Heart is also target theme

Nose is depressed frontal bosses
Abs my larger spleen huges

Make me make me bizarre shape
Oh my globins oh my fate

Broken nail

Pericardial effusion

Heart failure

Frontal bossing

Depressed nasal bridge

Hepatosplenomegaly

Clinical features

- Thalassaemia minor is usually associated with mild anaemia.
- Features of thalassaemia major usually appears within first two years of life.
    - Fatigue & weakness
    - Pale skin or jaundice
    - Protruded abdomen with organomegaly.

fppt.com

Clinical features (con..)

- Abnormal facial bones and poor growth
- Poor appetite
- There may be delayed puberty.

fppt.com

Mechanism of anaemia in thalassaemic patient

Under Hemoglobinization
(Imbalance in α and β chain synthesis)

- diminished β chain synthesis ,
- excess of α chain
- Creating inclusion bodies .
- damage the cell membrane
- increased apoptosis
- ineffective erythropoiesis .

Diminished red cell and its precursor's survival

- deficit in Hb-A synthesis
- hypochromic microcytic cell
- subnormal oxygen transport capacity

fppt.com

How anaemia change the body morphology

ANAEMIA

Hemolysis

blood transfusion

systemic iron overload

secondary haemochromatosis

Tissue hypoxia

erythropoietin increased

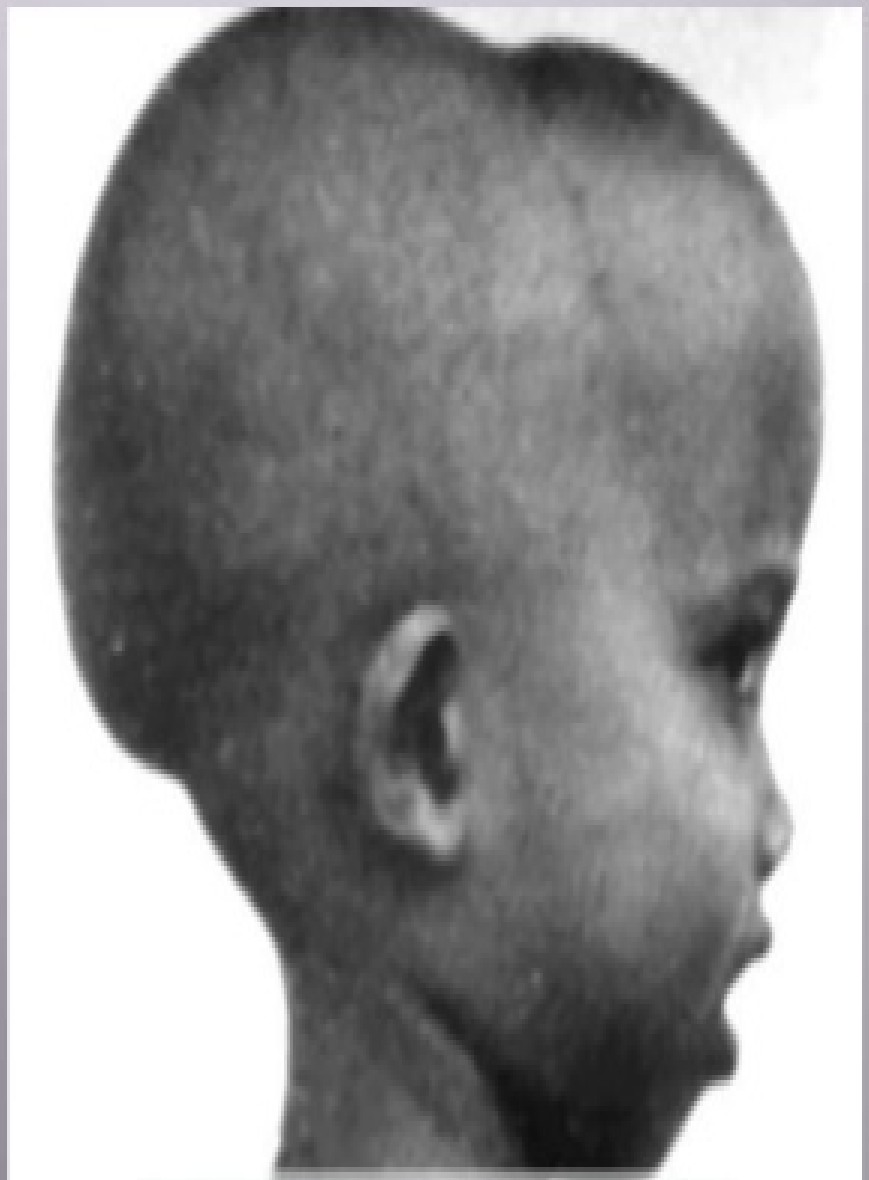
marrow expansion

Skeletal deformities

fppt.com

Thalassaemic facies

Frontal bossing



Splenomegaly

fppt.com

Clinician finds…

- Chipmunk Facies
- Facial Pallor
- Icterus
- Hepatosplenomegaly

Thalassaemia major

Cooley's face

Hairy Skull

↑Haemolysis →↑demands of phagocytic function → hyperplasia of phagocytes →Hepatosplenomegaly

To compensate anaemia extramedullary haemopoiesis in liver, spleen & brain →Organomegaly

fppt.com

Much of organ you have rate
Born with see with disgrace fate

Belly don’t cry (poor appetite) mind is also dry
Look like childish(delayed puberty) always   feel shy .

Immunity immunity   immunity much low (infection)
Urine skin eye my yellow

Lethargy weakness sorrow follow
Life is to me darkened hollow (depression)

-
-

Appetite

weakness

Infection

Jaundice

Depression

fppt.com

Investigations routine

- Complete blood count with PBF
- X - ray chest p/a view
- Urine for routine and microscopic examination
-

fppt.com

investigations
specific

- Skeletal imaging : X - ray skull (both view)
- Osmotic fragility test
- Hb electrophoresis
- USG of whole abdomen
- ECG and Echocardiograpy
- Bone marrow study
- Chromosome analysis

fppt.com

Complete blood count

- Hb concentration – Decreased
- ESR – Mild increased
- WBC – Neutrophilic leucocytosis or normal
- RBC count – Markedly decreased
- PCV – Markedly decreased
- MCV, MCH, MCHC – reduced
- Reticulocyte count – Increased
- Platelet count – May be increased

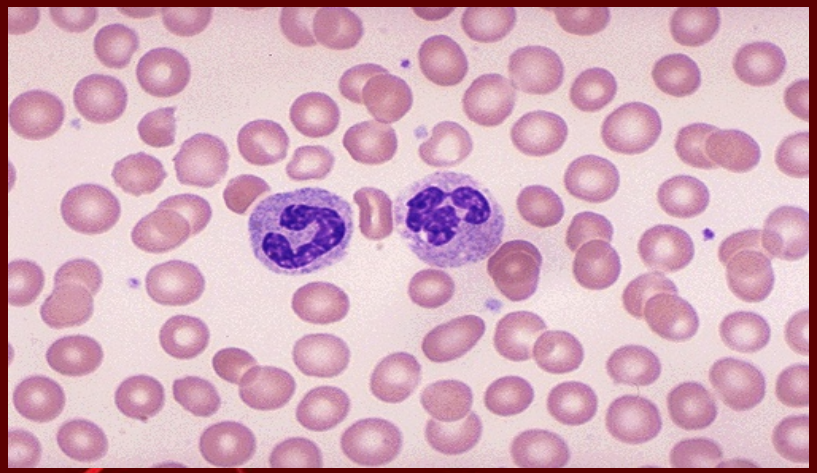
fppt.com

Peripheral blood film

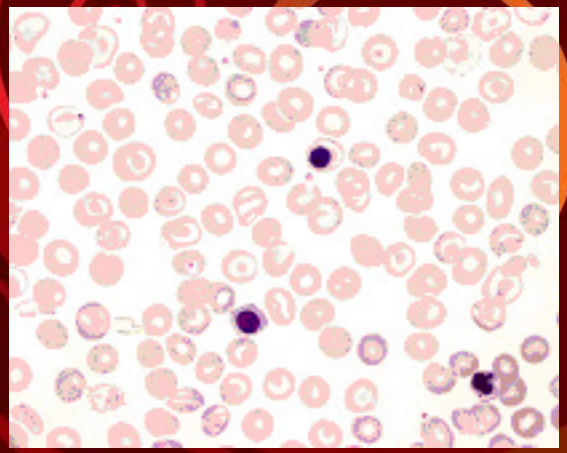
- RBC
  - Marked anisocytosis, polikilocytosis,
  - microcytosis, polychromatic macrocytes
  - frequent target cells, basophilic stippling,
  - fragmented cells or schistocytosis,
  - nucleated cells
- WBC
  - Within normal or neutrophilic leucocytosis
- Platelets
  - Normal or increased

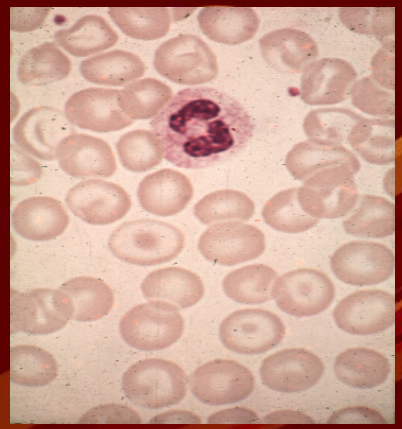
fppt.com

Partial or lack of HbA synthesis →↓MCHC & MCH →Hypochromia & microcytosis



Normal

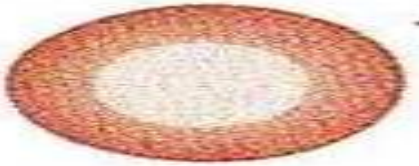
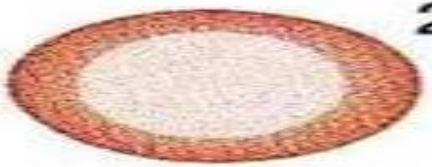
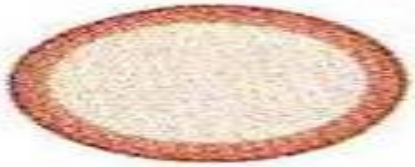
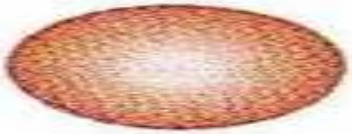
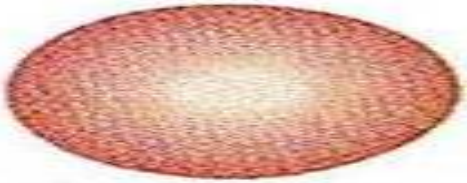
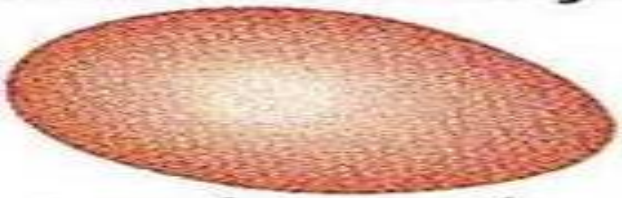
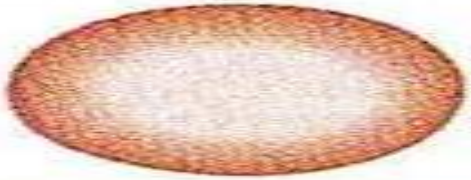




Thalassaemia

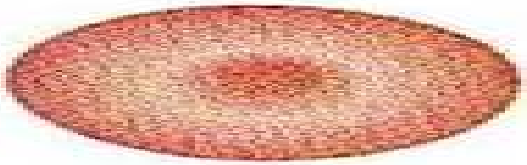
fppt.com

Basophilic stippling commonly occurs due to medical conditions such as thalassemia, hemoglobin diseases, iron deficiencies, or lead poisoning.

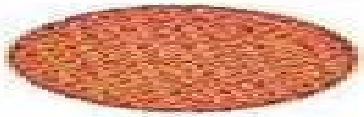
Size variation	Hemoglobin distribution
Normal	Hypochromia  1+  2+  3+ 4+
Microcyte 	
Macrocyte 	
Oval macrocyte 	
Hypochromic macrocyte 	Polychromasia (Reticulocyte)

Shape variation

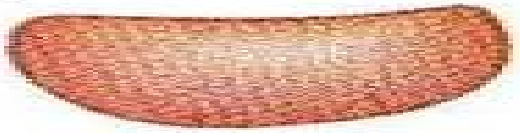
Target cell



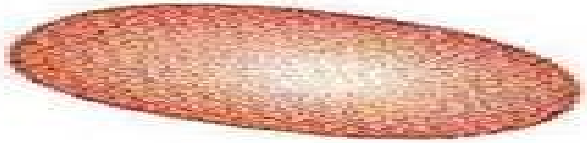
Spherocyte



Helmet cell
(fragmented cell)

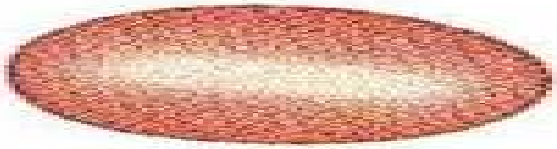


Ovalocyte



Schistocyte
(fragmented cell)

Stomatocyte

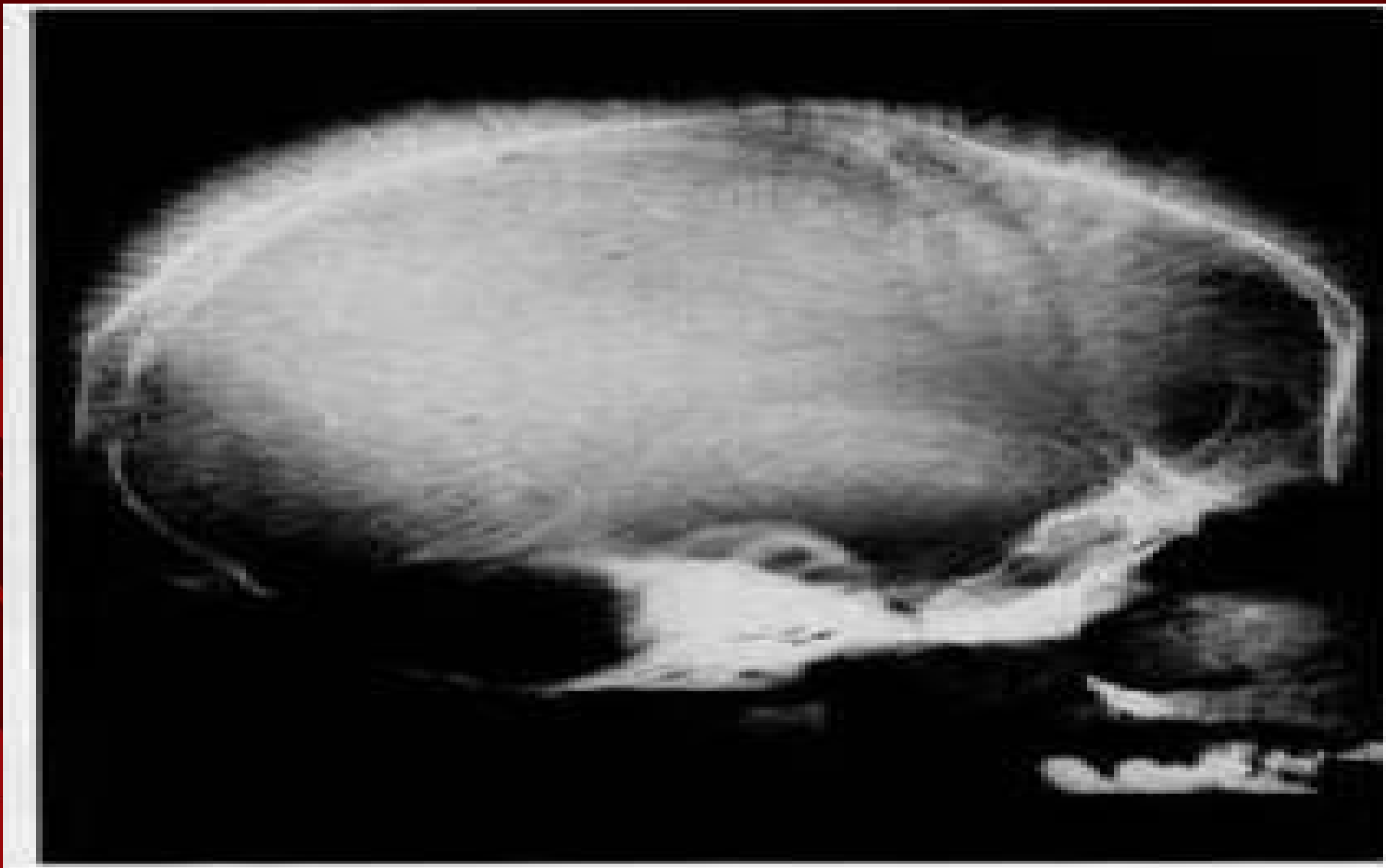


Tear drop

X – rays in Thalassaemia

fppt.com

Hairy skull

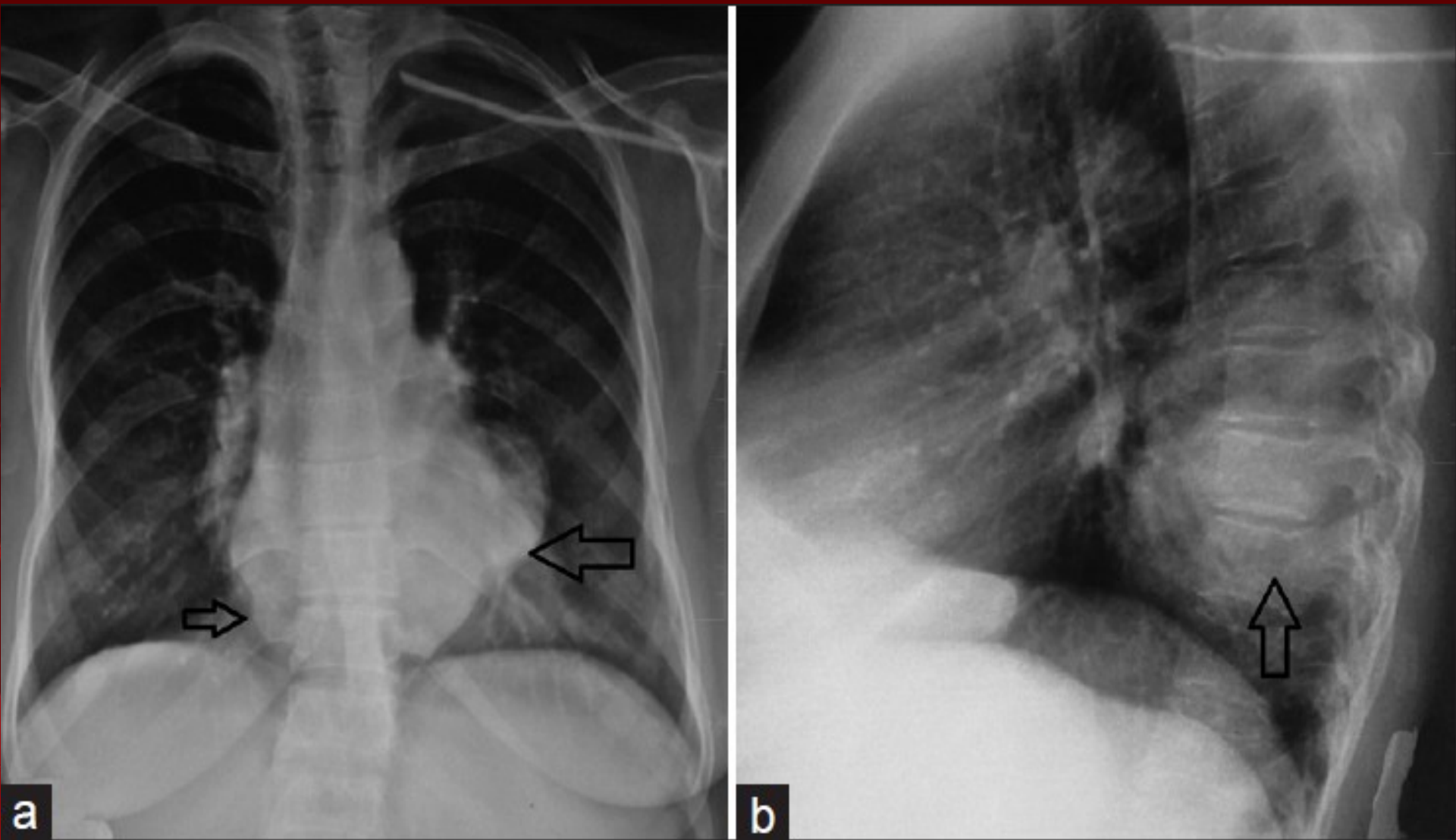


Chest X – ray P/A view

Extra medulary Haematopoiesis in Thalassaemia

fppt.com

X-ray Chest P/A and Lateral view shows well defined mediastinal masses manifesting as increased retro cardiac paravertebral soft tissue density



Thalassemia

Decreased bone density with coarse trabeculae

Wide medullary cavity with thin cortex

Normal for comparison

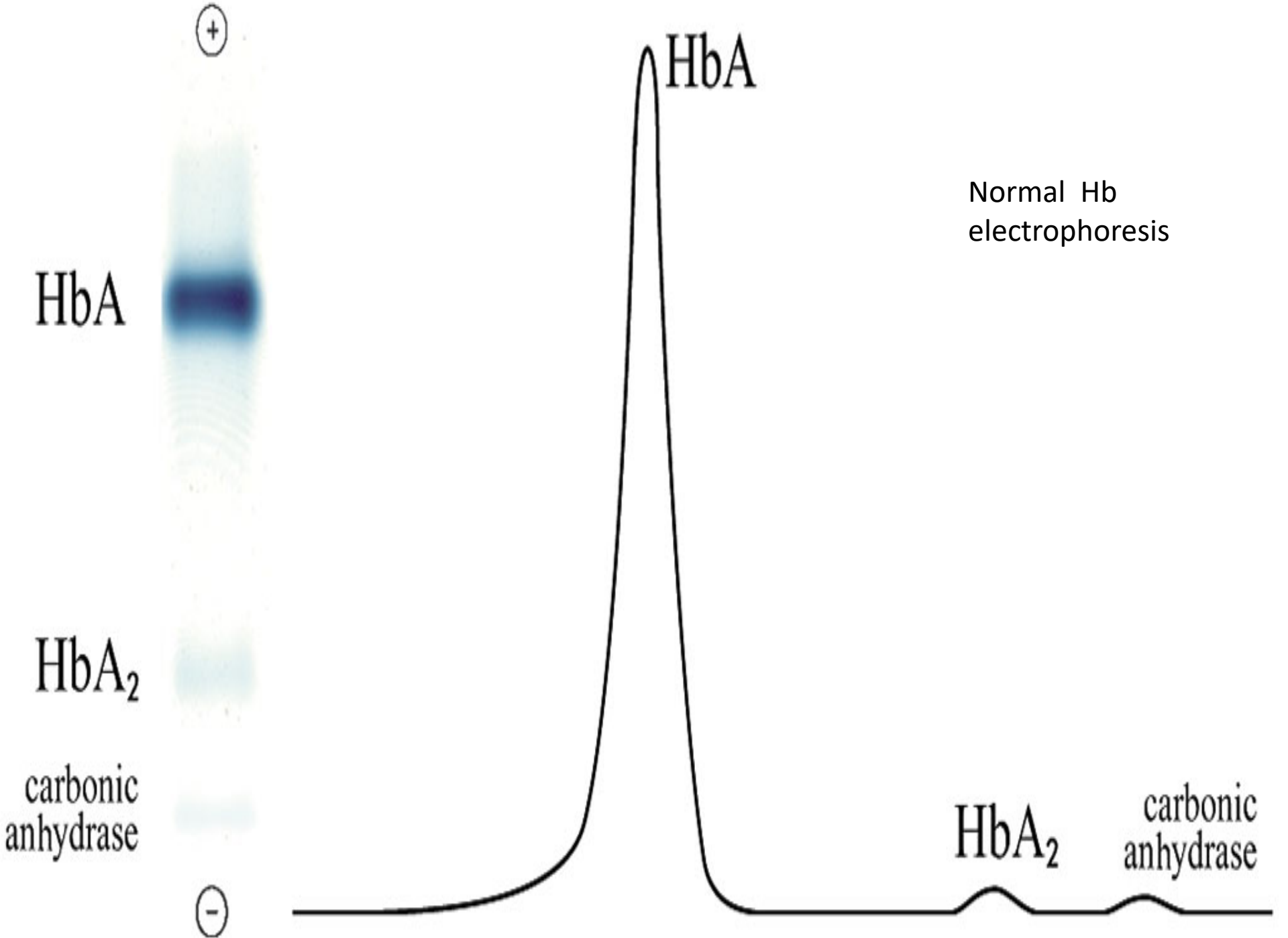
Anteroposterior radiograph of the lumbar spine

Osteopenia is present; note striated appearance of the vertebral bodies resulting from preservation and thickening of the vertical trabeculae. Clips from a previous cholecystectomy are present.

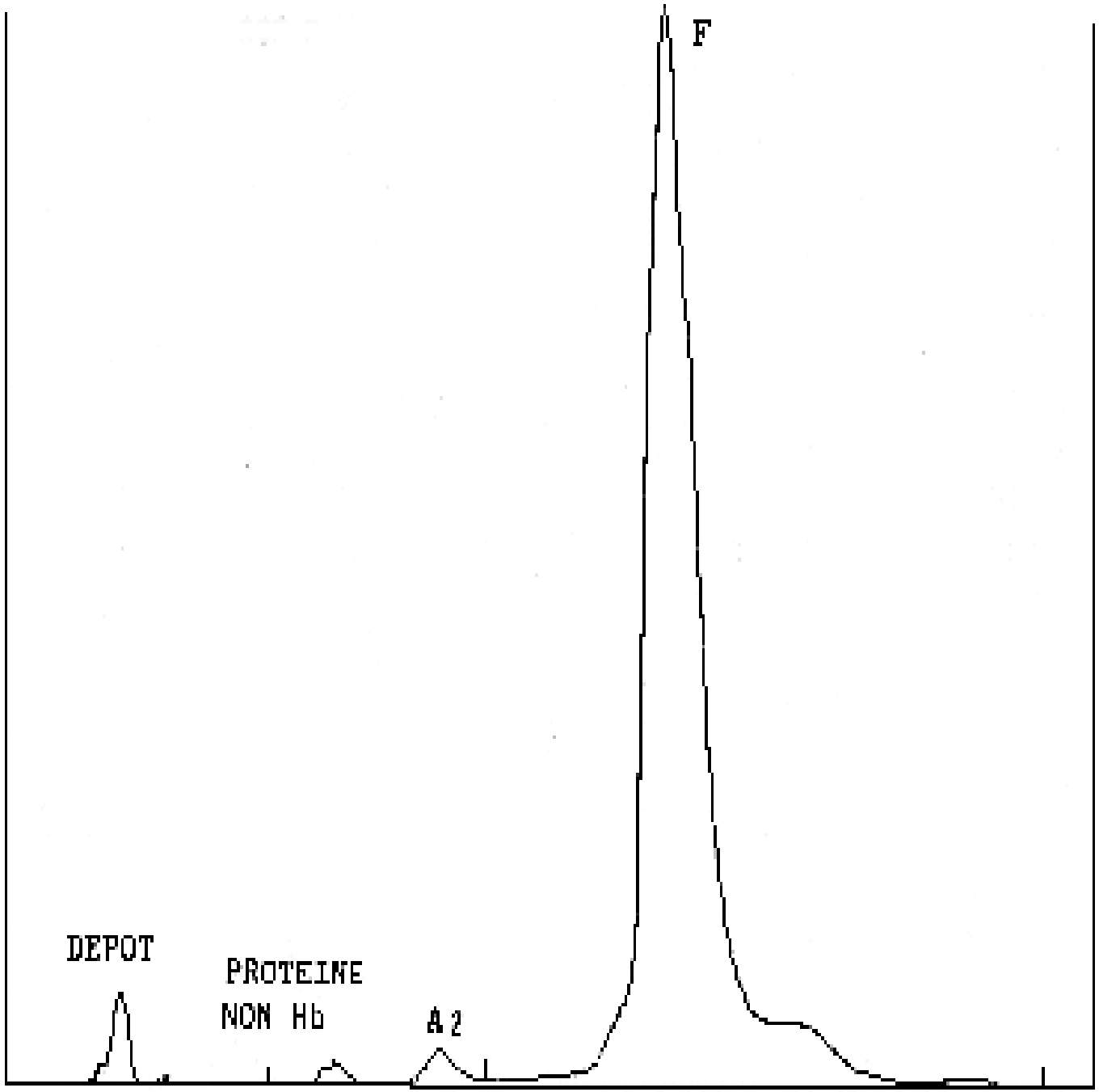
Haemoglobin Electrophoresis

- Different types of haemoglobins contain different surface charge which determine the elecrtrophoretic mobility and gives a specific bands on the electrophoretic papers when haemolysate is undergone eletrophoresis.
- HbF, HbA, HbA2, HbC, HbE, HbD, HbS, HbH and Hb Bart can be measured accurately by electrophoresis

fppt.com



Normal Hb electrophoresis

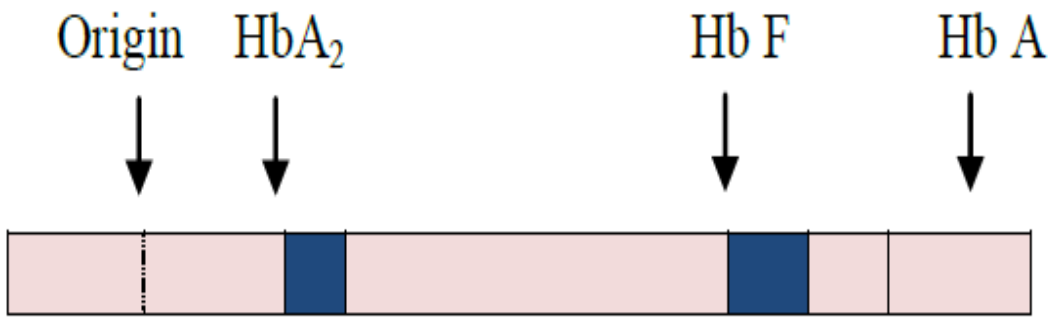
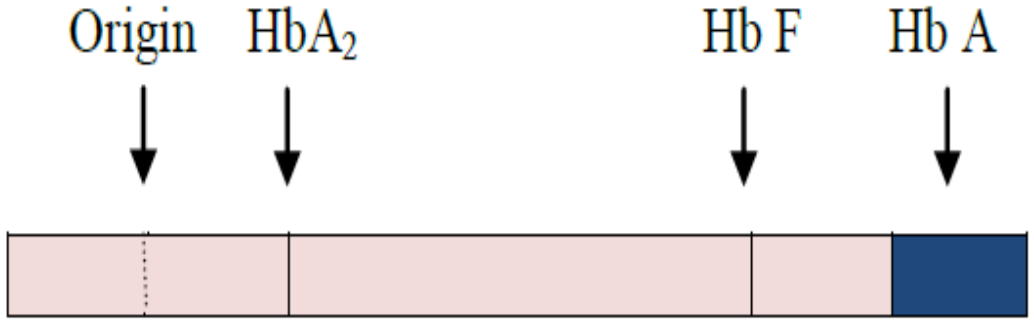
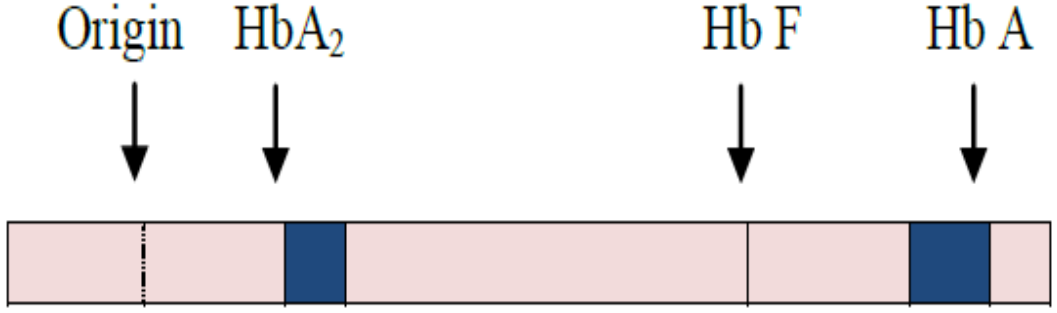


Hb F 98.8 %

Hb A2 01.2 %

Hb A 0 %

B° HOMOZYGOTE

Beta Thalassaemia Major	
Normal	
Beta Thalassaemia Trait	

Management

Prevention , screening and counseling and treatment

- Supportive treatment
  - To raise the Hb level
  - To chelate the iron excess
  - Treatment of infection
  - Maintenance of nutrition
  - Surgical intervention
- Specific treatment
  - Allogenic hematopoietic transplantation
  - Gene therapy

fppt.com

Treatment

- Supportive treatment
  - To raise the Hb level
  - To chelate the iron excess
  - Treatment of infection
  - Maintenance of nutrition
  - Surgical intervention
- Specific treatment
  - Allogenic hematopoietic transplantation
  - Gene therapy

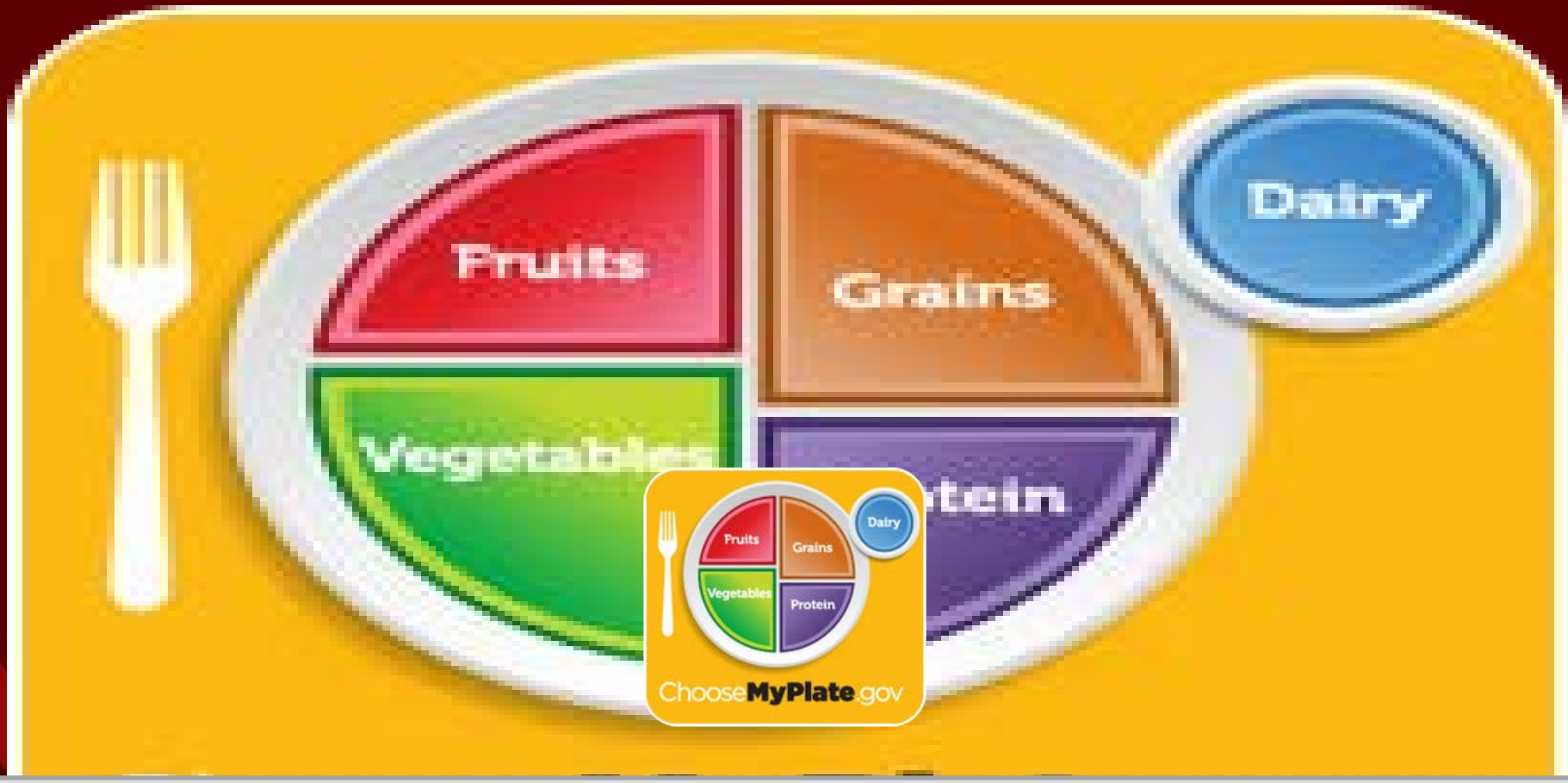
fppt.com

Diet in thalassaemia

Three Simple Suggestions for a Healthy Diet

- **Eating Around the Rainbow :**colorful fruits and vegetables
- **My plate :** Smaller portions, More Vegetables and Fruit
- **Eat Food Not Supplements :** to get all nutrients through food

fppt.com



Diet aim : ¼ for protein, ¼ for grain/carbohydrates and ½ of the plate set aside for fruits & vegetables

Diet in thalassaemia

More harb less carb

Slim and superb

more move less eat

Make your body fit

Less fat less meat

Be a super hit

Less fat more fruit

Tender silhouette

More fruit more gym

Tender skin

Treatment con..

Alpha thalassaemia

- Usually alpha thalassaemia patient are not symptomatic or there may be mild symptoms.
- They usually require no treatment.
- They may be misdiagnosed as iron deficiency.
- Folic acid supplementation might be given. Iron supplementation is usually avoided.

fppt.com

Treatment of Beta thalassaemia

- Long term transfusion therapy
- Iron chelation
- Surgical interventaion
- Allogenic hematopoietic transplantation
- Supportive measures

fppt.com

Chronic transfusion therapy

fppt.com

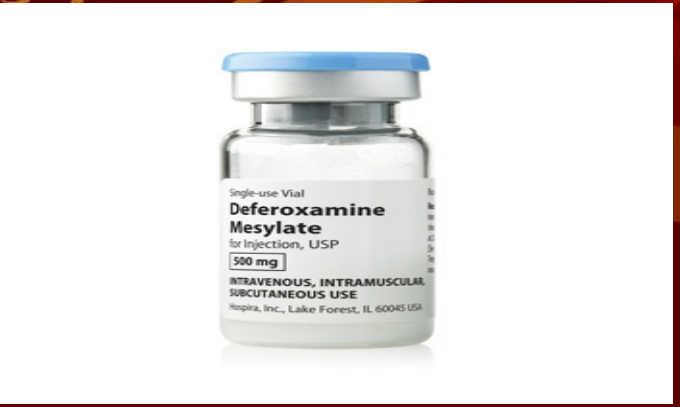
Chronic transfusion therapy

- Maintain Hb 9-10 gm/dl.
- Suppress enhanced erythropoiesis.
- Suppress skeletal change.

fppt.com

Iron chelation

- Avoid complications of iron overload.
- Usually needed for patients going through chronic transfusion therapy.
- Parental: Deferoxamine
- Oral: Deferasirox, deferiprone



fppt.com

Surgical intervention

- Splenectomy
  - decrease transfusion requirement
  - Prevents extramedullary haematopoiesis
  - Vaccination against pneumococcus, meningococcus and influenza virus is needed.
  - Post operative penicillin prophylaxis for lifelong.
- Cholecystectomy
  - pt with bilirubin gall stones

fppt.com

Allogenic hematopoietic transplantation

- Curative option
- Done from HLA compatible siblings.
- First successful transplantation was done in 1982.

fppt.com

Supportive measure

- Avoidance of iron containing food.
- Tea: decrease iron absorption
- Vitamin C: increase iron excretion

fppt.com

Gene therapy in Thalassaemia

- Retroviral vector–mediated gene transfer into hematopoietic stem cells provides a potentially curative therapy for severe β-thalassemia .The technology is based on delivery of a lentiviral vector to improve gene transcription and translation, and boost levels of β-globin production

fppt.com

Prevention , screening and counseling

fppt.com

prevention

- Prevention includes awareness and screening
  - awareness for the doctor
  - Awareness for the patient

fppt.com

Screening methods

❖clue based screening

- Suspicion by body dimorphism
- Non febrile unexplained splenomegaly
- Microcytic hypchromic anaemia not responding to standard therapy
- Microcytic hypchromic anaemia with favourable features in PBF

fppt.com

➢ Target screening (sospa ?)

- **S**ibling : if a pt is thalassaemic then his siblings , offspring's and parents should be screened
- **O**ffspring : if one of the two parents is thalassaemic then offspring's should be screened
- **S**pouse : if one spouse is thalassaemic then another spouse should be screened
- **P**remarital : this should be done because thalassaemia is autosomal recessive or sometimes dominant
- **A**nte natal screening

fppt.com

Premarital screening

fppt.com

No need blue blood
I need pure blood
I need I need I need so
Love I discard wealth also

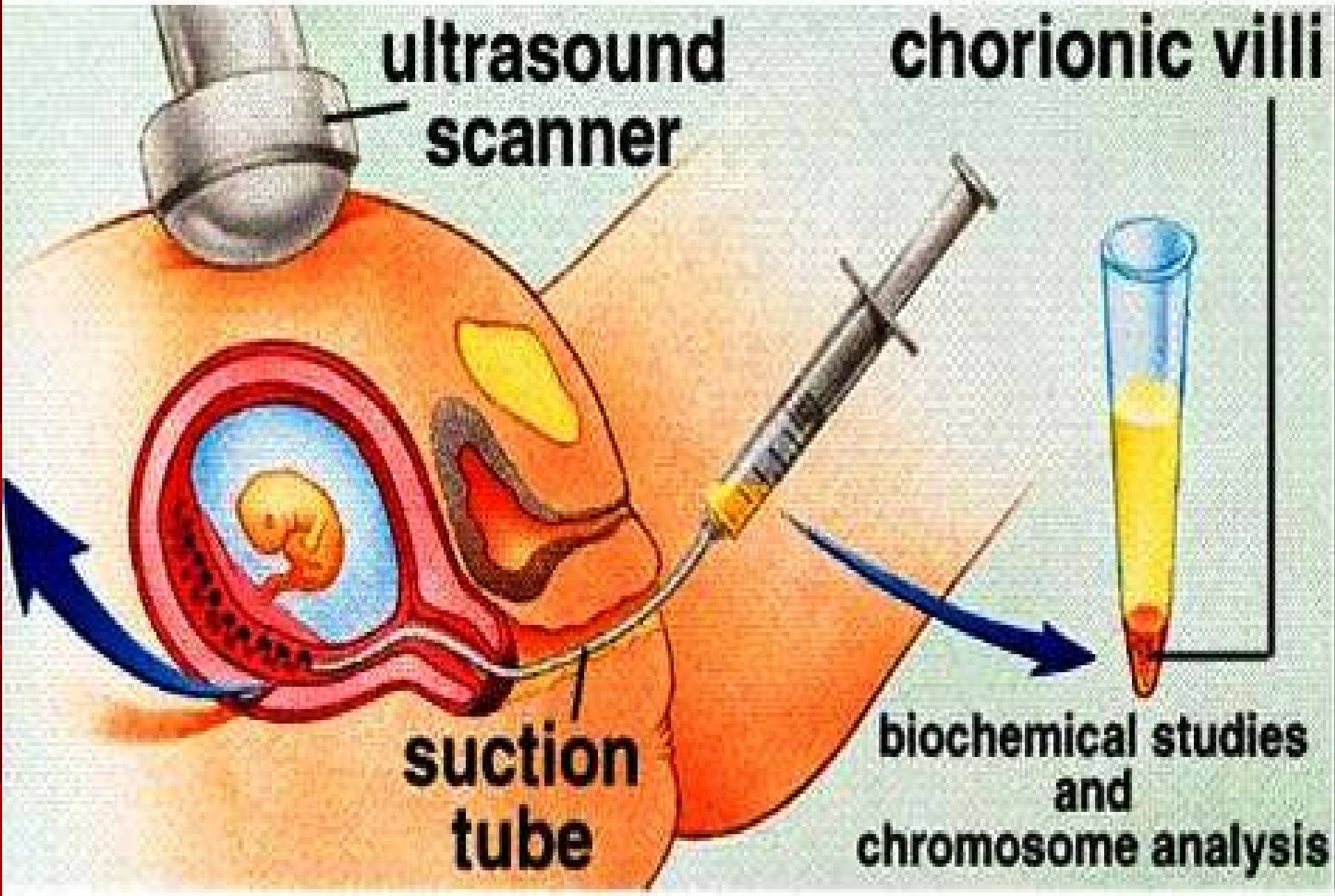
PREMARITAL SCREENING IS ESSENTIAL

Partner need I
life partner need
don't I have any
Thalassa kid

Ante natal screening

fppt.com

Ante natal screening



counseling

- Recommendations :

➢ Proper counseling of the patients

➢ Pre marital counseling

➢ Counseling about consanguineous marriage if one has got the thalassaemia trait of disease

fppt.com

Thalassaemia situation in Bangladesh

- World Health Organization (WHO) report
  - 3.0% of populations carriers of Beta Thalassemia
  - 4.0% are carriers of Hb-E
- which means
  - 3.6 millions carriers of beta thalassemia
  - 4.8 millions carriers of Hb-E .

fppt.com

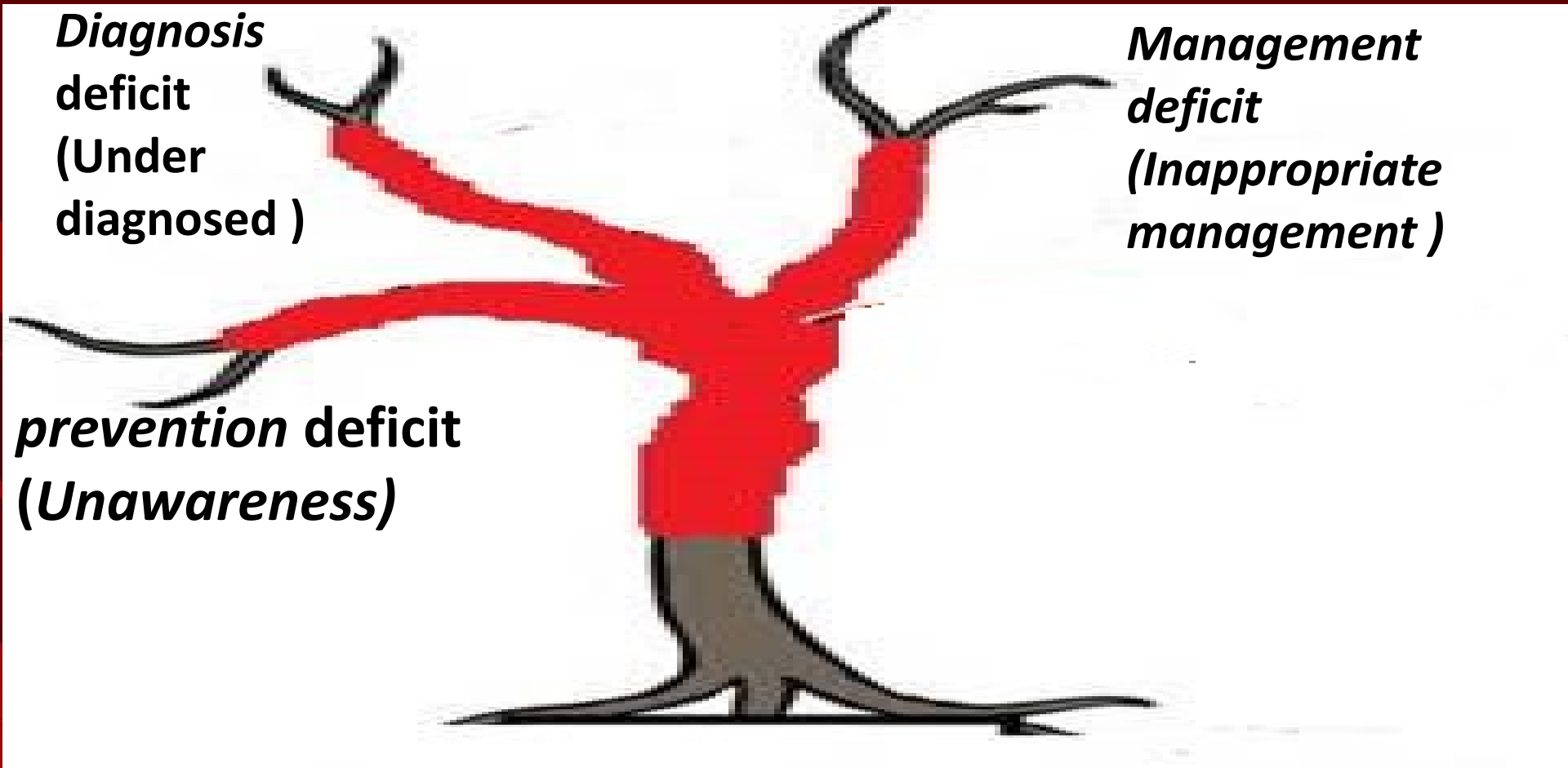
Number of thalassaemia patient is increasing day by day

WHY ?

fppt.com

In Bangladesh this is an neglected hematological disorder

thee dimentional disregards



In my conclusion :

We must control thalassaemia so that family, society and the nation will get benefit

And it will help to increase our economic goal and we can reach SDG and become a middle income country sooner .

Lastly I will end my lecture with this slogan --

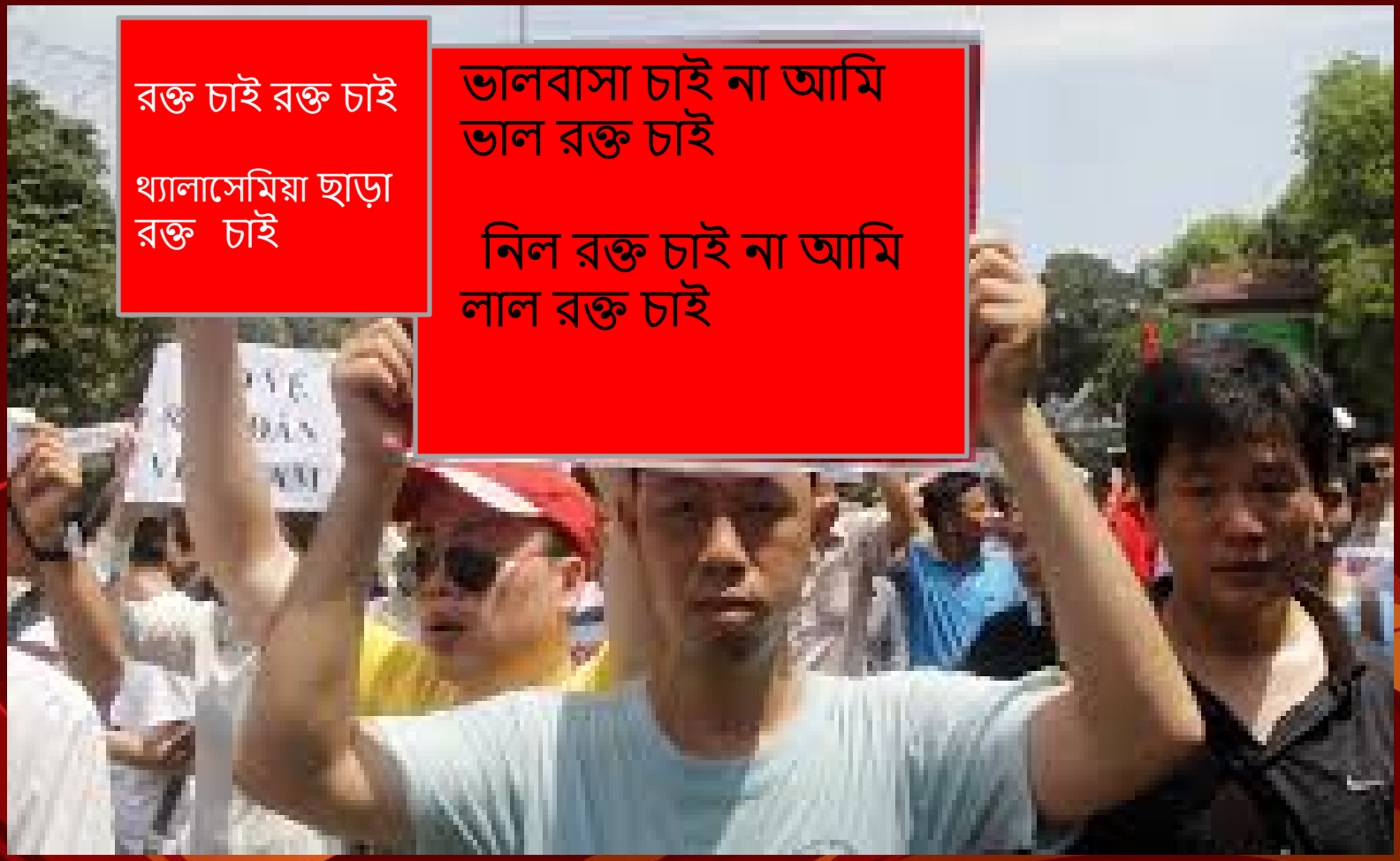
fppt.com

রক্ত চাই রক্ত চাই

থ্যালাসেমিয়া ছাড়া রক্ত চাই

ভালবাসা চাই না আমি ভাল রক্ত চাই

নিল রক্ত চাই না আমি লাল রক্ত চাই



fppt.com

ধন ধান্যে পুষ্পে ভরা
আমাদের এই বসুন্ধরা
থ্যালাসেমিয়া এবার পড়বে ধরা
ছুটবে মানুষ বাধন হারা
ফল্‌গু ধারায় দেশের ধারা

Full of wealth with herb and carb

This time thalassaemia far away far

People run when problem burn

We all rise and rise in turn

THANK YOU