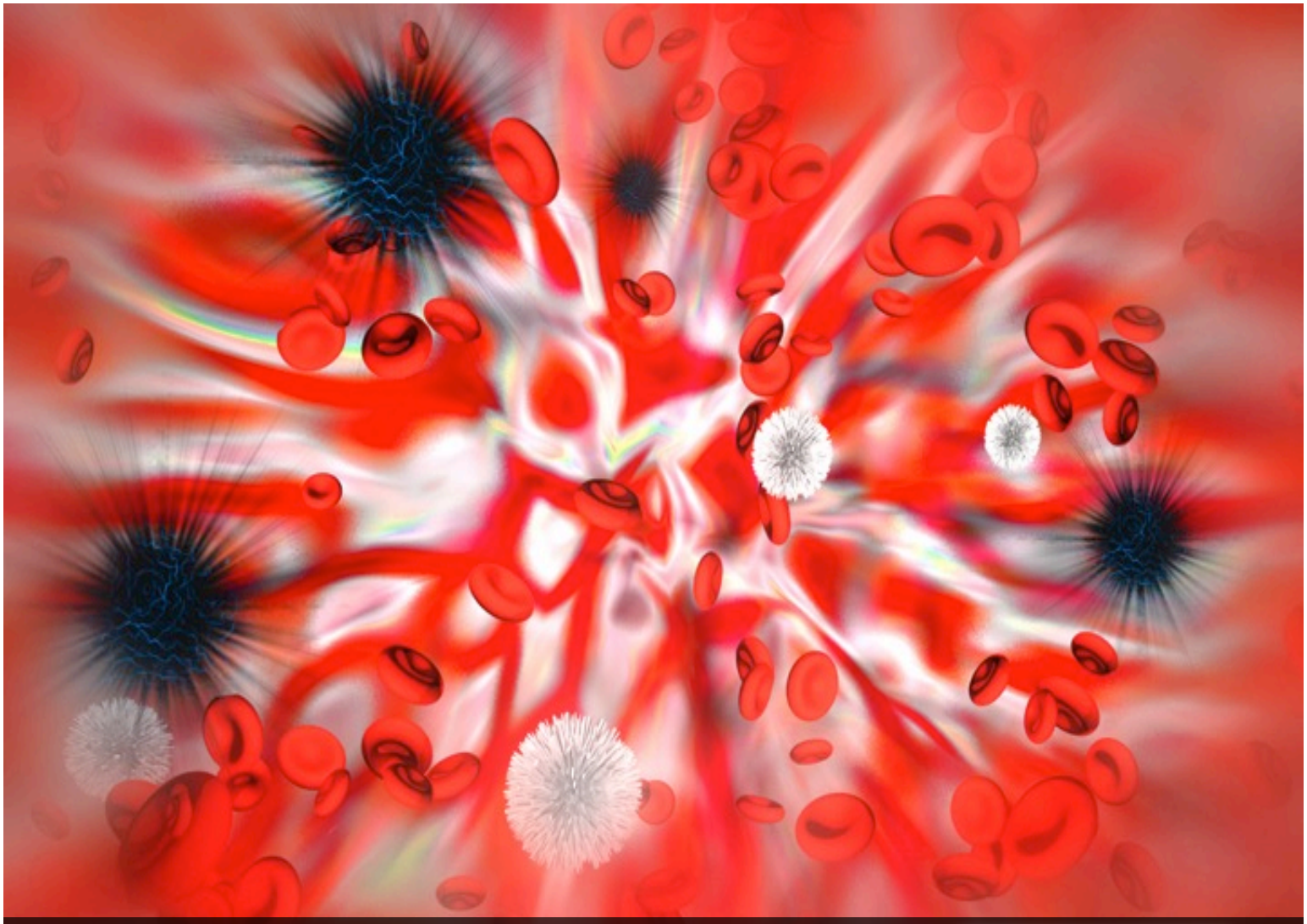


Hematology practical

MED433

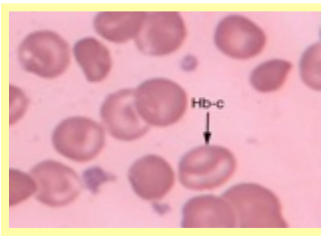
- 5 Questions

❖ FIRST; FOR KNOWLEDGE (READ)

Hemoglobin	Distribution
HbD (D-Punjab)	Pakistan – India – sri lanka
HbS	Africa
HbE	Far east (Indonesia – Taiwan – Philippines. etc.
HbC	West Africa
HbO Arab	Arab

EFFECTS OF HAEMOGLOBIN VARIANTS

Variant	Clinical and hematological abnormalities	
HbS	▪ Recurrent painful crises (in adults) ▪ Chronic haemolytic anaemia; Both related to sickling of red cells on deoxygenation	
HbC	▪ Chronic haemolytic anaemia due to reduced red cell deformability on deoxygenation, * ▪ eoxygenated HbC is less soluble than deoxygenated HbA.	▪ $\alpha_2\beta_2$ 6-GLU→ LYS ▪ Many thick target RBCs ▪ Crystal formation inside RBC's



	a) Unstable Haemoglobins	b) Low oxygen affinity haemoglobins	c) Congenital Methaemoglobinaemia	d) Hb iIndianapolis
Genes	1. Hb koln ($\alpha_2\beta_2$-98 VAL → MET) 2. Hb Hammersmith ($\alpha_2\beta_2$ 42 PHE → SER) 3. Hb Hasharon (α_2-47 ASP → HIS β_2).	1. Hb kansas ($\alpha_2\beta_2$102 ASN → THR) 2. Hb Aukland ($\alpha_2\beta_2$ 25 GLY → ASP)	1. Hb M Boston (α_2 58 HIS → TYR - β_2) 2. Hb M Saskatoon (α_2-β_2-63 HIS → TYR) 3. Hb M Hyde park ($\alpha_2\beta_2$ 92 HIS → TYR) 4. Hb M IWATE ($\alpha_2$87 HIS → TYR-β_2)	1. α_2-$\beta_2$112 CYS – ARG
Manifestations	✓ haemolysis ✓ spherocytic haemolytic anaemia ✓ Reticulocytosis	✓ Anaemia ✓ congenital cyanosis ✓ Rare as homozygotes.	✓ Cynosis due to methaemoglobinaemia	✓ haemolytic anaemia and renal failure in severe cases. ✓ Thalassaemia-like syndrome

❖ SECOND; CLINICAL

1 (normal – you have to memorize)

What is this test?

Hemoglobin electrophoresis

The machine does this test:

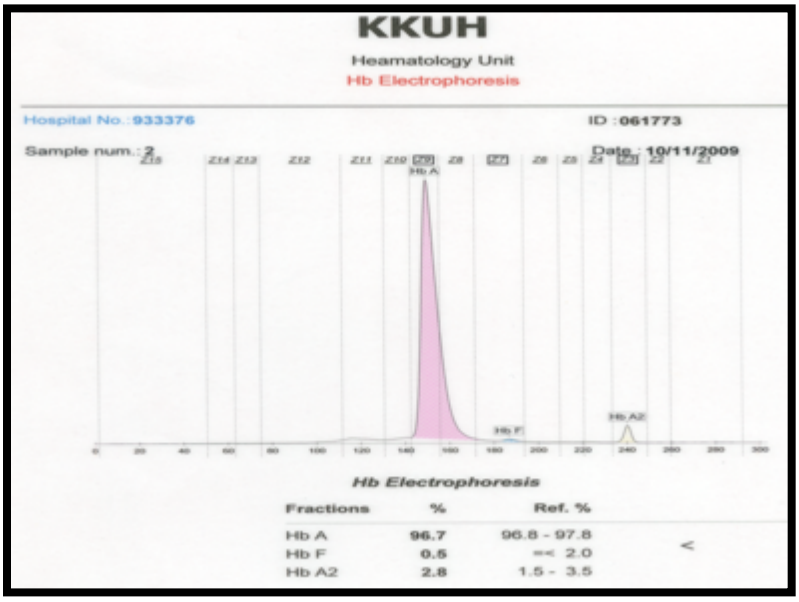
New: High-performance liquid chromatography (HPLC)
Old: gel electrophoresis

Description

Normal Hemoglobin electrophoresis

HbA	96.8 - 97.8 %
HbF	Less than or equal to 2.0%
HbA2	1.5 – 3.5 %

Note: present of HbS → sickle cell
HbA2 if:
More than 3,5% →beta thalassemia
Less than 1.5% → alpha thalassemia



2

What is this test?

Hemoglobin electrophoresis

Description

HbA	Absent	Absent
HbF	98.5%	Very High
HbA2	1.5 %	Normal

Findings

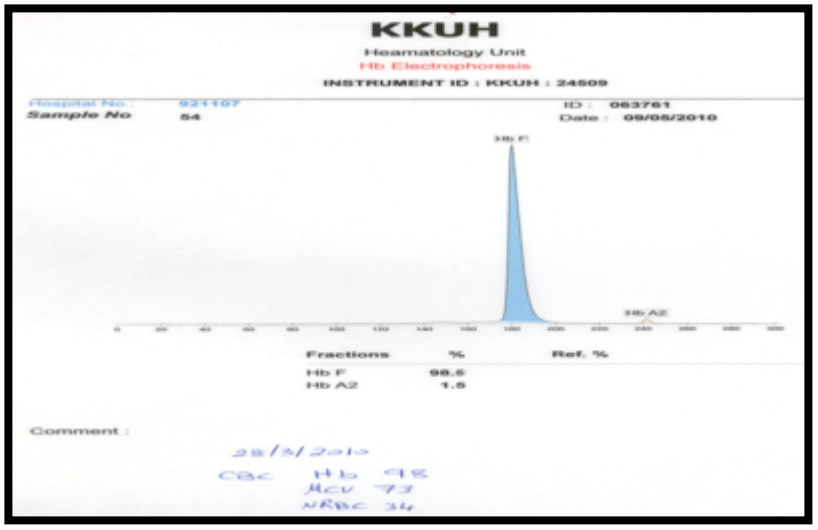
Absent HbA & High HbF

Diagnosis

Hereditary persistent fetal Hemoglobin

Further investigation

Genetic study & family study



3

What is this test?

Hemoglobin electrophoresis

Findings

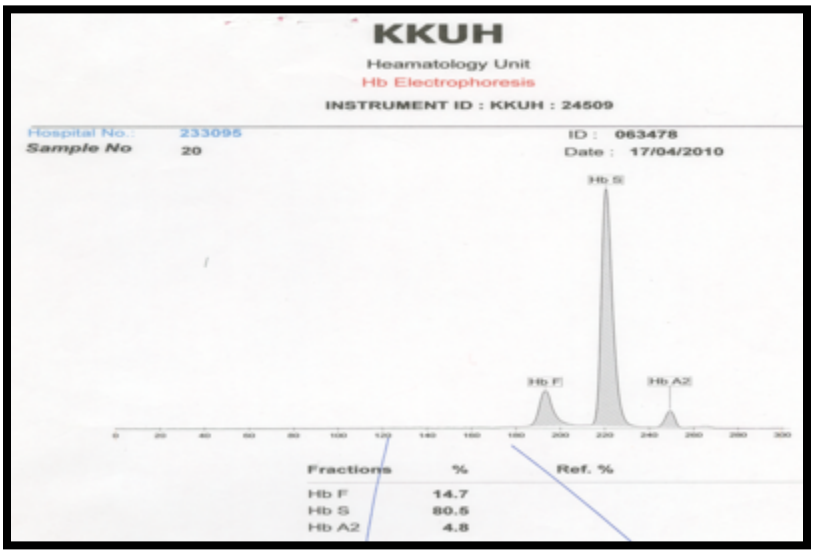
HbA	Absent	Absent
HbF	14.7%	High
Hb S	80.5	Sickle cell disease
HbA2	4.8 %	High

Diagnosis

Sickle cell Anemia with Beta thalassemia, and increase HbF

Further investigation

Genetic study & family study

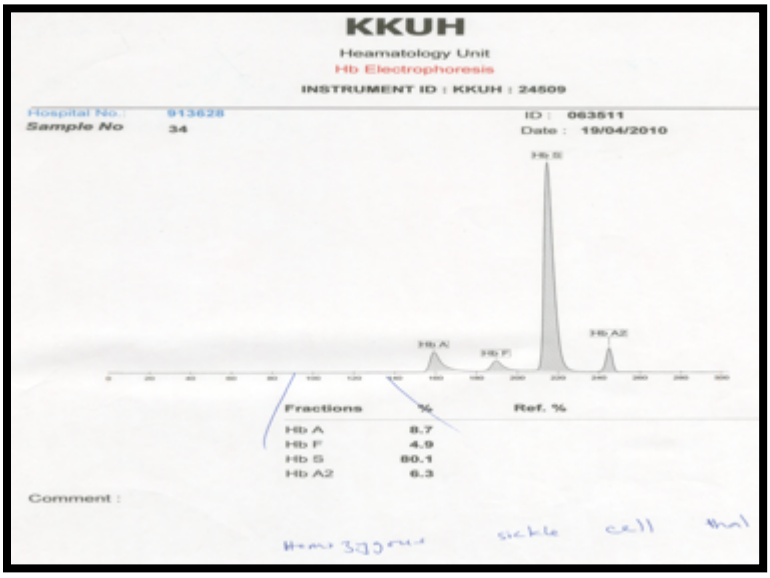


The different between sickle cell trait and sickle cell disease (anemia):

- ✓ HbS = 45 or less → sickle cell trait
- ✓ HbS ABOVE 45 → sickle cell disease

4

What is this test?		
Hemoglobin electrophoresis		
Findings		
HbA	8.7	Present & Low
HbF	4.9	High
HbS	80.1	Sickle cell anemia (above 45)
HbA2	6.3	Very High
Diagnosis		
Sickle cell Anemia with Beta thalassemia, increase HbF, with HbA(1)		
Further investigation		
Genetic study & family study		

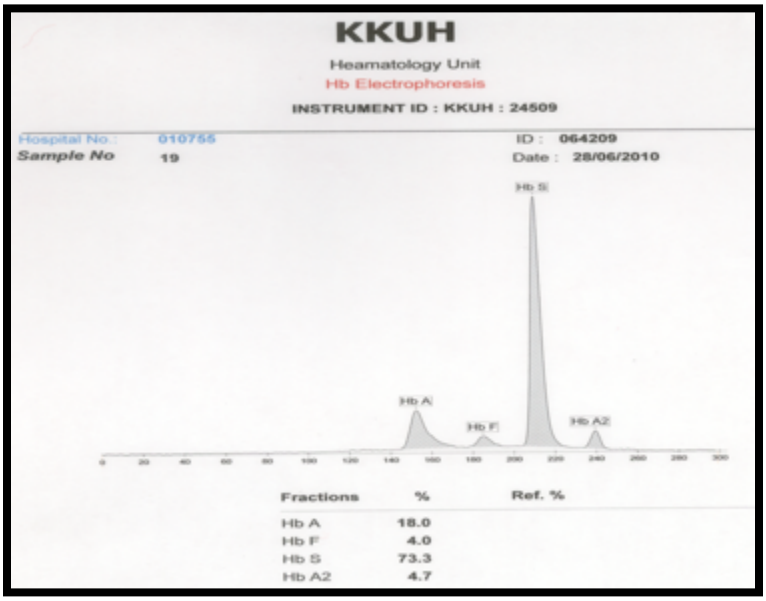


(1) Note that normally in sickle cell anemia

- HbA is absent, but its present due to blood transfusion
- HbF (5-15%) raised

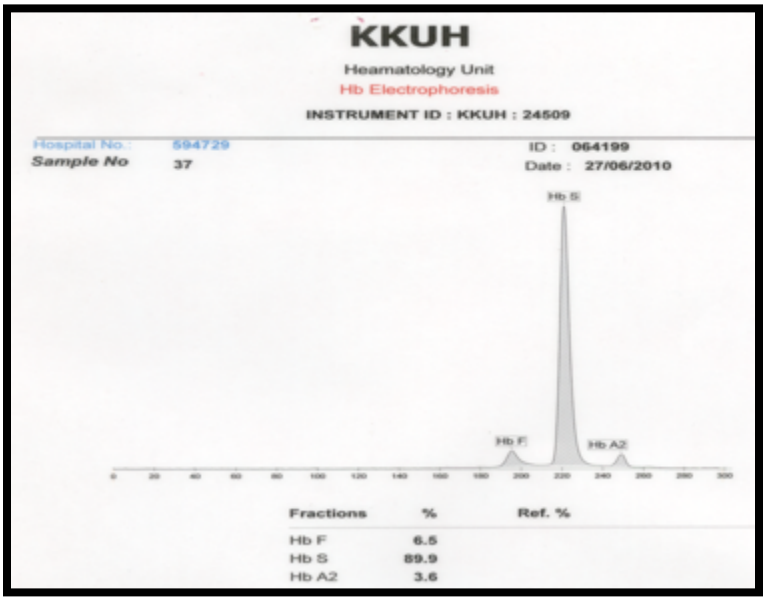
5

What is this test?		
Hemoglobin electrophoresis		
Findings		
HbA	18.0	Present & Low
HbF	4.0	High
HbS	73.3	Sickle cell anemia (above 45)
HbA2	4.7	High
Diagnosis		
Sickle cell Anemia with Beta thalassemia, increase HbF, with HbA(1)		
Further investigation		
Genetic study & family study		



6

What is this test?		
Hemoglobin electrophoresis		
Findings		
HbA	Absent	Absent
HbF	6.5	High
HbS	89.9	Sickle cell anemia (above 45)
HbA2	3.6	Normal (3.5 -3.7%)
Diagnosis		
Sickle cell Anemia		
Further investigation		
Genetic study & family study		



7

What is this test?

Hemoglobin electrophoresis

Findings

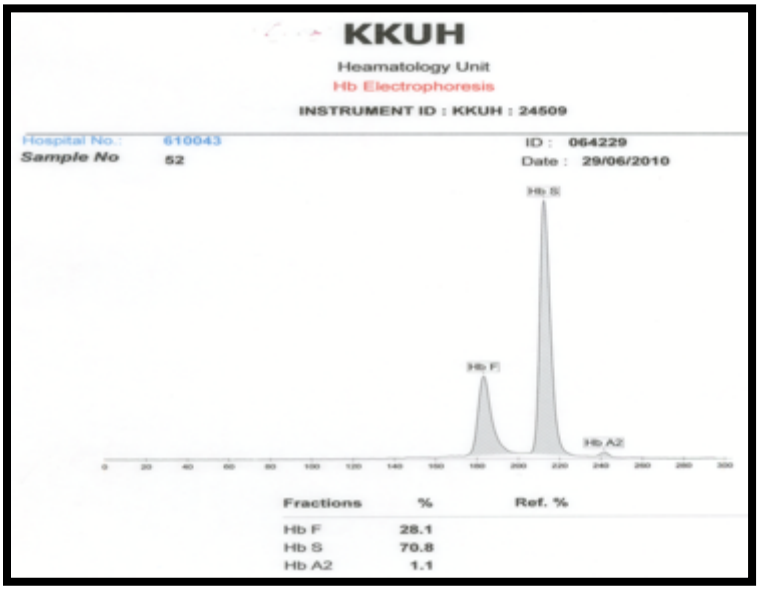
HbA	Absent	Absent
HbF	28.1	High
HbS	70.8	Sickle cell anemia (above 45)
HbA2	1.1	Low

Diagnosis

Sickle cell Anemia with alpha thalassemia, increase HbF

Further investigation

Genetic study & family study



8

What is this test?

Hemoglobin electrophoresis

Findings

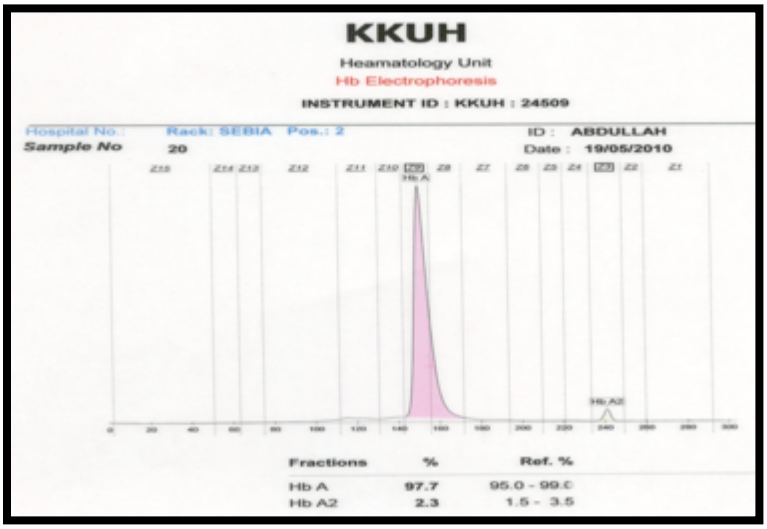
HbA	97.7	Normal
HbF	Absent	Absent (< 2 is normal)
HbA2	2.3	Normal

Diagnosis

Normal Hemoglobin electrophoresis

Further investigation

Genetic study & family study



6

What is this test?

Hemoglobin electrophoresis

Findings

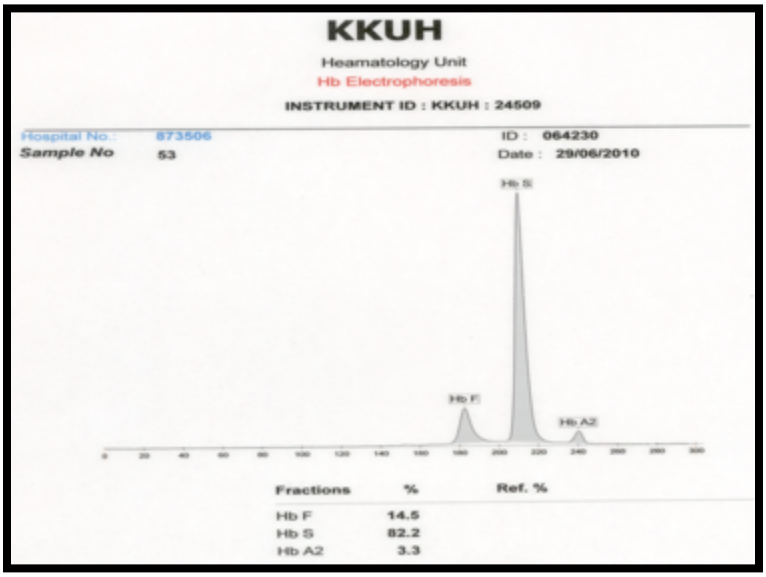
HbA	Absent	Absent
HbF	14.5	High
HbS	82.2	Sickle cell anemia (above 45)
HbA2	3.3	Normal

Diagnosis

Sickle cell Anemia

Further investigation

Genetic study & family study



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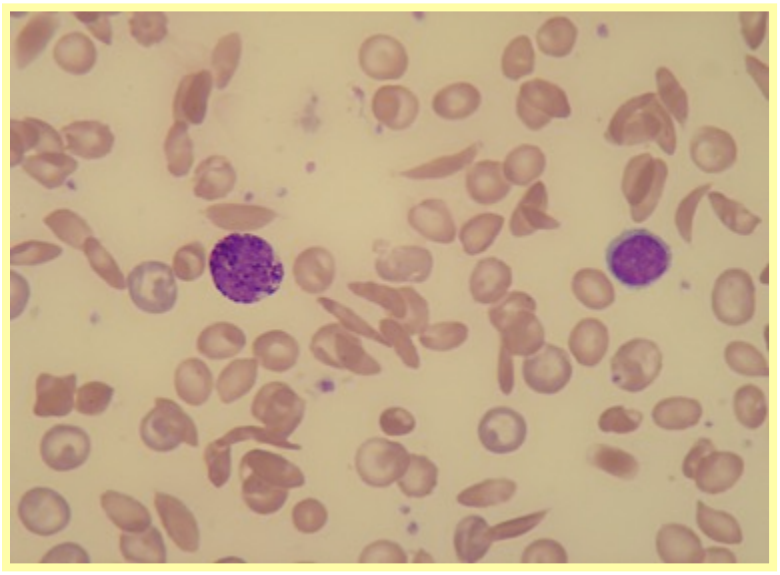


What is this test?

Blood film

Findings (Abnormalities)

- ✓ Sickle cells RBC's
- ✓ Target cells

Normally

- ✓ Lymphocytes
- ✓ Basophils

Diagnosis

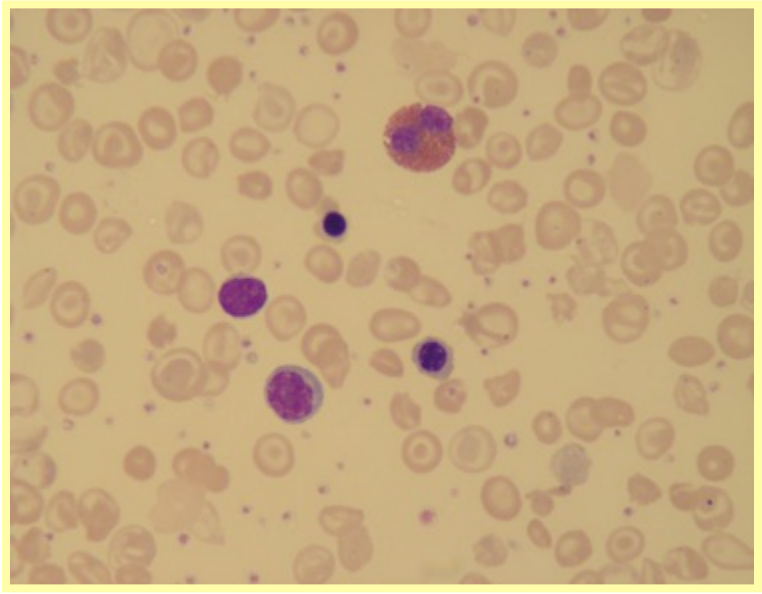
Sickle cell anemia

Further investigation

Hemoglobin electrophoresis → (case 3)

Genetic study & family study

11



What is this test?

Blood film

Findings (Abnormalities)

- ✓ **Nucleated (immature) RBC's**
- ✓ **Target cells**
- ✓ **Hypochromic, microcytic cells**
- ✓ **Anisocytosis**
- ✓ **Poikilocytosis**

Normally

- ✓ Lymphocytes
- ✓ Eosinophil's

Diagnosis

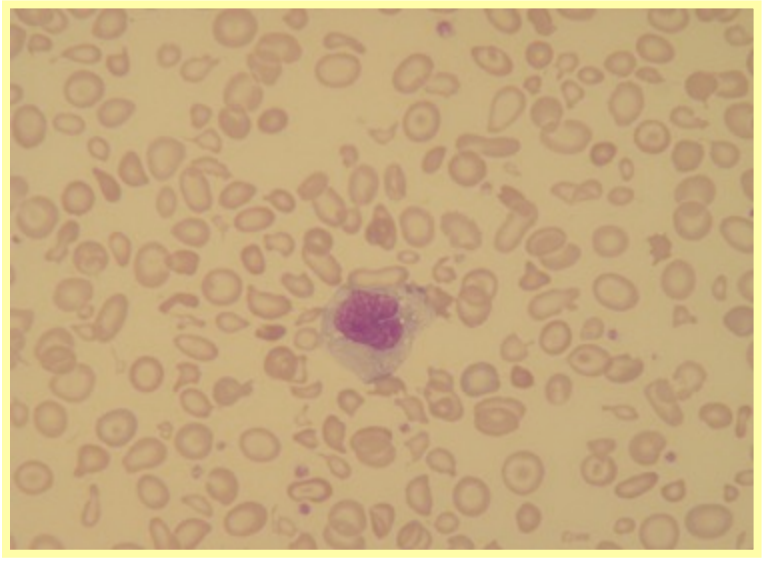
Beta Thalassaemia Major

Further investigation

Hemoglobin electrophoresis

Genetic study & family study

12



What is this test?

Blood film

Findings (Abnormalities)

- ✓ **Target cells**
- ✓ **Hypochromic, microcytic cells**
- ✓ **Anisocytosis**
- ✓ **Poikilocytosis**

Diagnosis

Alpha Thalassaemia

Further investigation

Hemoglobin electrophoresis

Genetic study & family study

13

What is this test?

Blood film with supra vital stain (supra vital brilliant crystal blue)

Findings (Abnormalities)

✓ Golf ball appearance

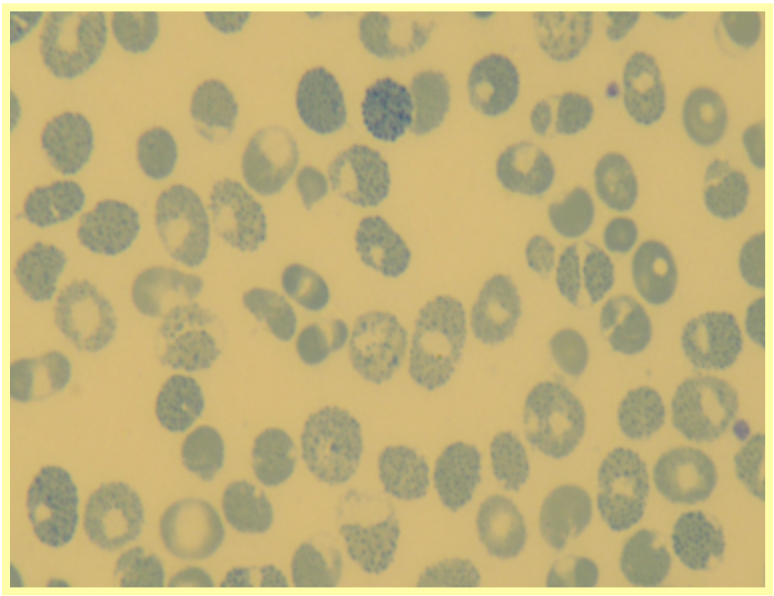
Diagnosis

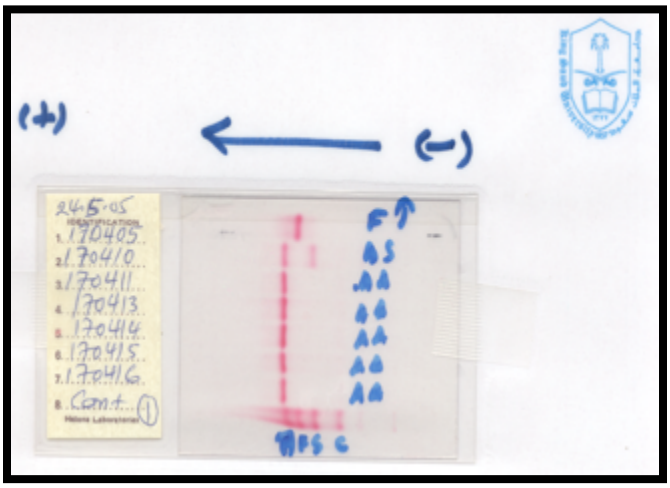
Haemoglobin H Disease (alpha thalassemia - 3 α thalassemia chin deletion)

Further investigation

Hemoglobin electrophoresis

Genetic study & family study





NAME THIS TEST?

GEL ELECTROPHORESIS TEST

* Not important