



Introduction to Haematology Lab

Dr Albert Sin

Laboratory Investigations for Haematological Diseases



- Aim of clinical laboratory investigation
 - Establish diagnosis, predict prognosis, guide treatment, help monitoring



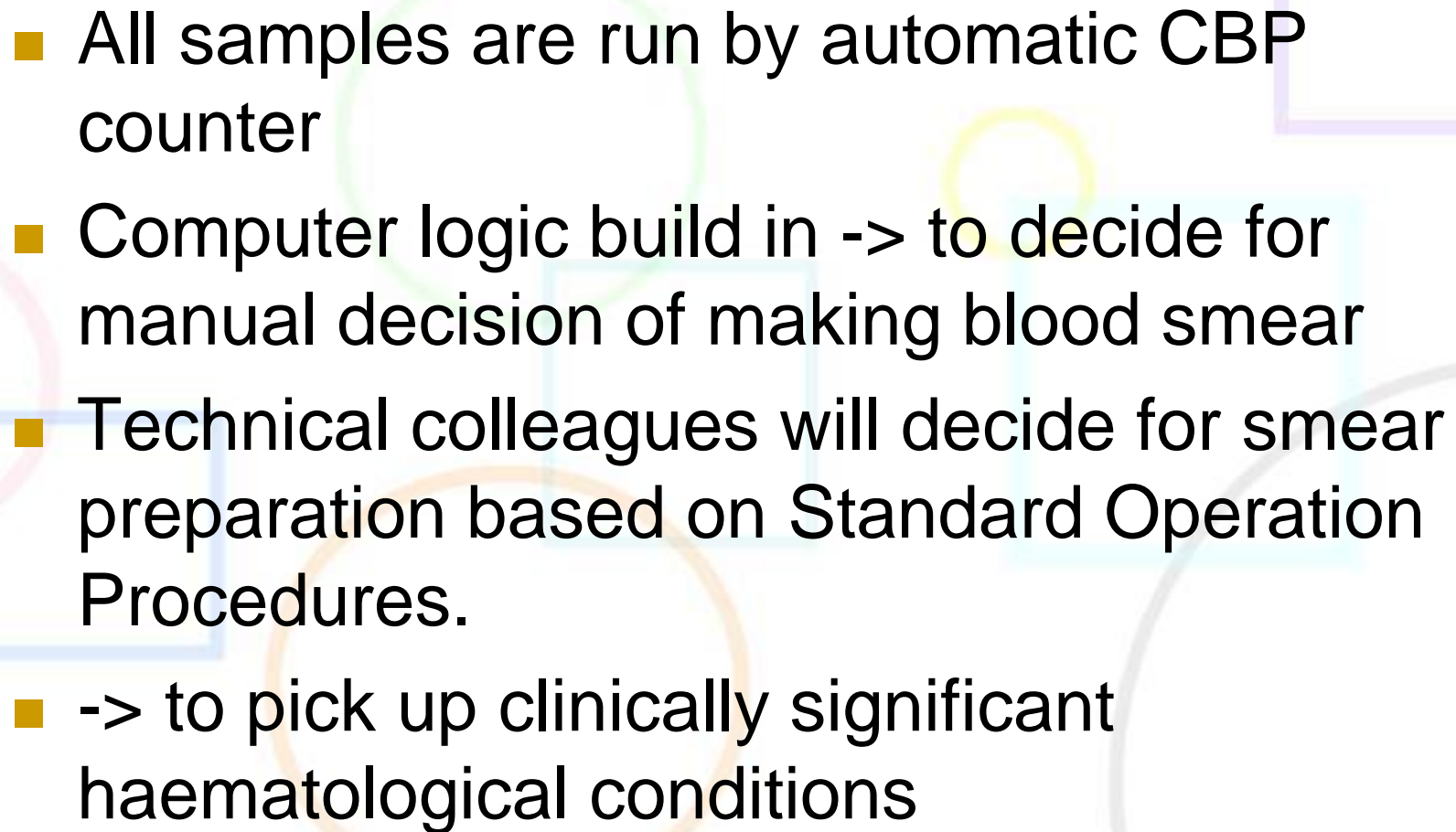
Collect Date : 05/04/03
Collect Time : --:--
Receive Date : 05/04/03
Receive Time : 18:00
Request No. : HN021608
Urgency : URGENT

Complete Blood Count
WBC 8.7
RBC 2.96 L
HGB 8.3 L
HCT 0.248 L
MCV 83.8
MCH 27.9
MCHC 33.3
RDW 13.5
PLT 218
MPV 9.8
Film Review N



Automated Blood Counting

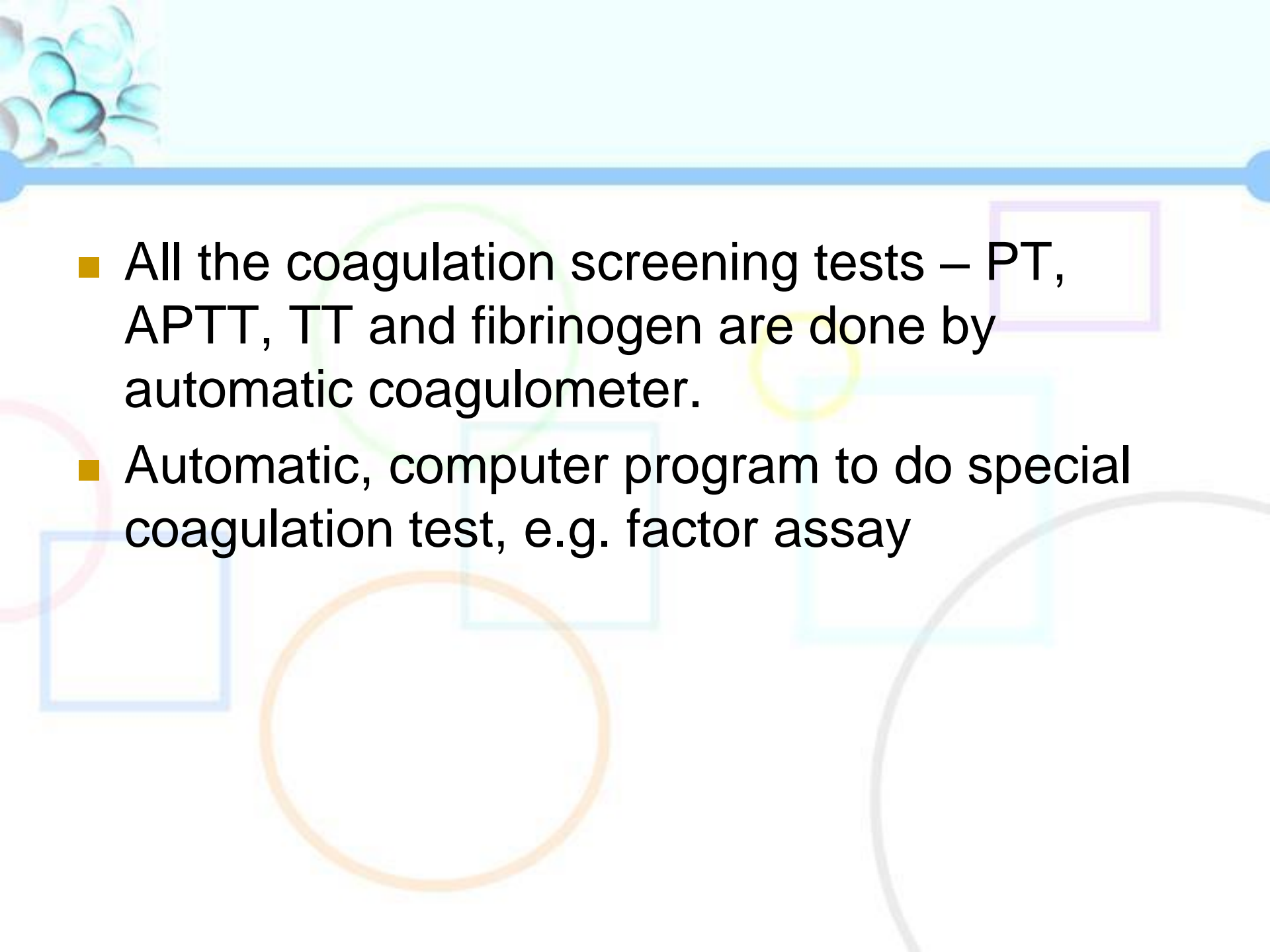


- 
- All samples are run by automatic CBP counter
 - Computer logic build in -> to decide for manual decision of making blood smear
 - Technical colleagues will decide for smear preparation based on Standard Operation Procedures.
 - -> to pick up clinically significant haematological conditions

Bleeding & Thrombosis Investigations

Coagulometers



- 
- All the coagulation screening tests – PT, APTT, TT and fibrinogen are done by automatic coagulometer.
 - Automatic, computer program to do special coagulation test, e.g. factor assay

Haemoglobin Study – How?

- Red cell indices (MCV)
- Detection of Hb H inclusion bodies
- IC strip
- High performance liquid chromatography analysis / capillary electrophoresis
- Conventional electrophoresis
- Genotyping

Red Cell Indices in Complete Blood Count

Collect Date : 05/04/03
Collect Time : --:--
Receive Date : 05/04/03
Receive Time : 18:00
Request No. : HN021608
Urgency : URGENT

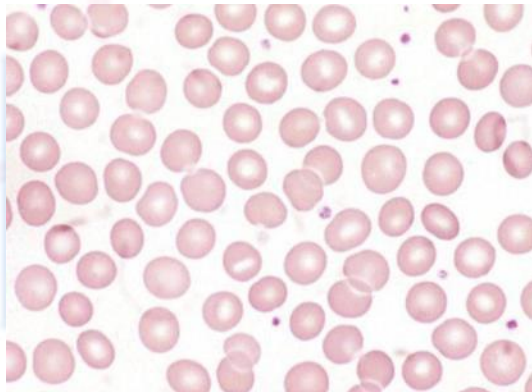
Complete Blood Count

WBC	8.7
RBC	2.96
HGB	8.3
HCT	0.248
MCV	83.8
MCH	27.9
MCHC	33.3
RDW	13.5
PLT	218
MPV	9.8
Film Review	N

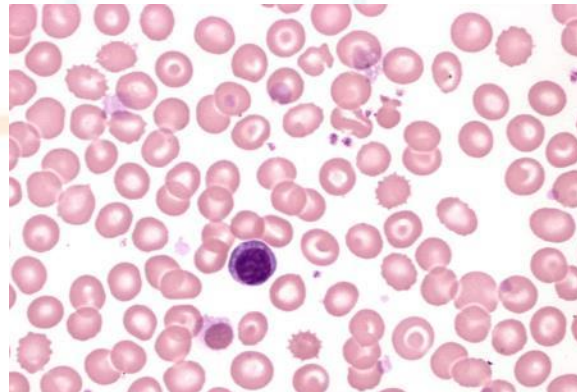


MCV (Mean Cell Volume)

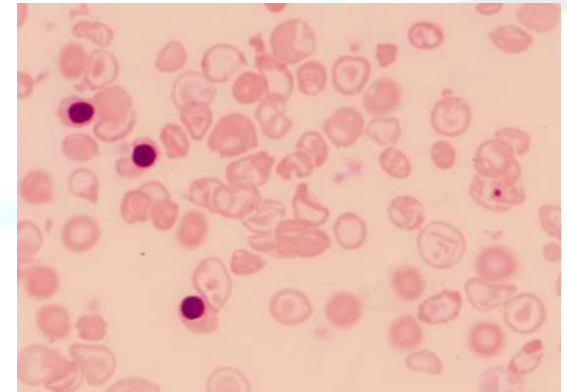
- Measured by an automatic blood cell analyser
- Patients with thalassaemia have low MCV



normal



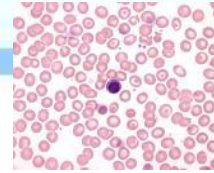
β thalassaemia minor



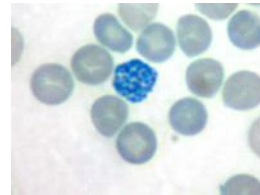
β thalassaemia major

Patient Sample

MCV MCH Screening

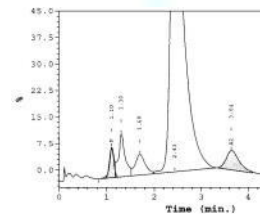


Supravital
Staining/IC strip



α thalassaemia

HPLC / CE



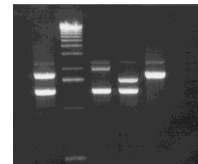
β thalassaemia

Electrophoresis



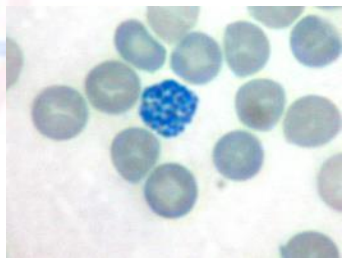
Haemoglobino
-pathies

Genotypic Analysis

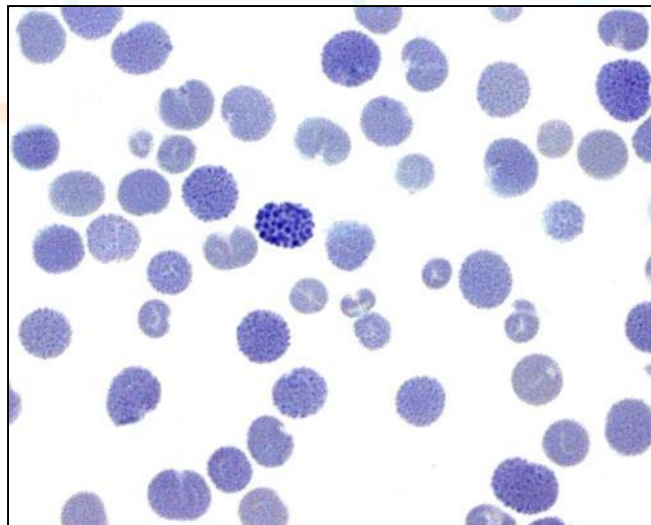


Excess β Chain Production in α Thalassaemia

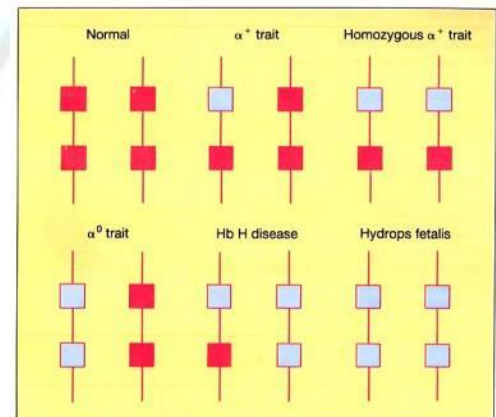
- Supravital Staining for Hb H (β_4) inclusion Bodies



α thal trait



α thal intermedia

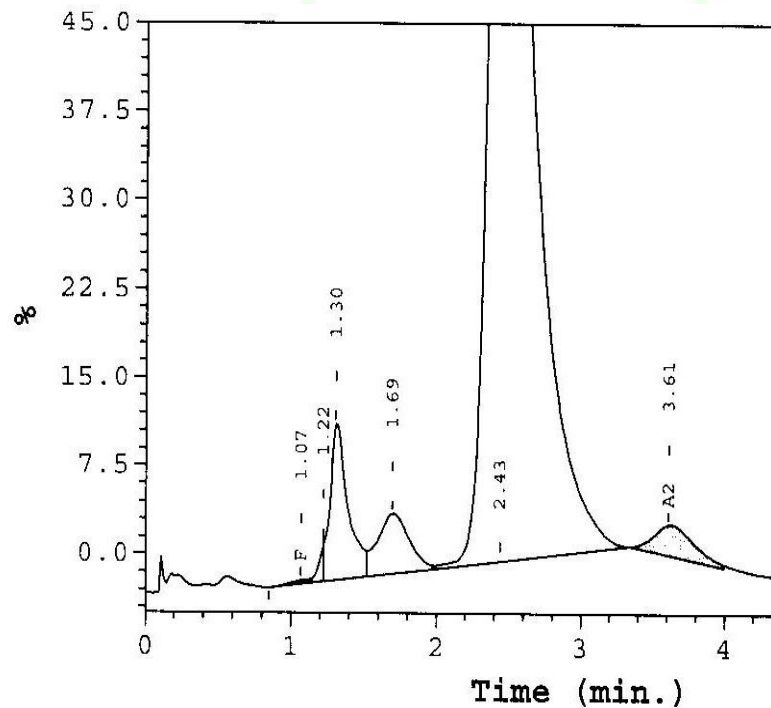




→ Control band
→ Hb Bart's band

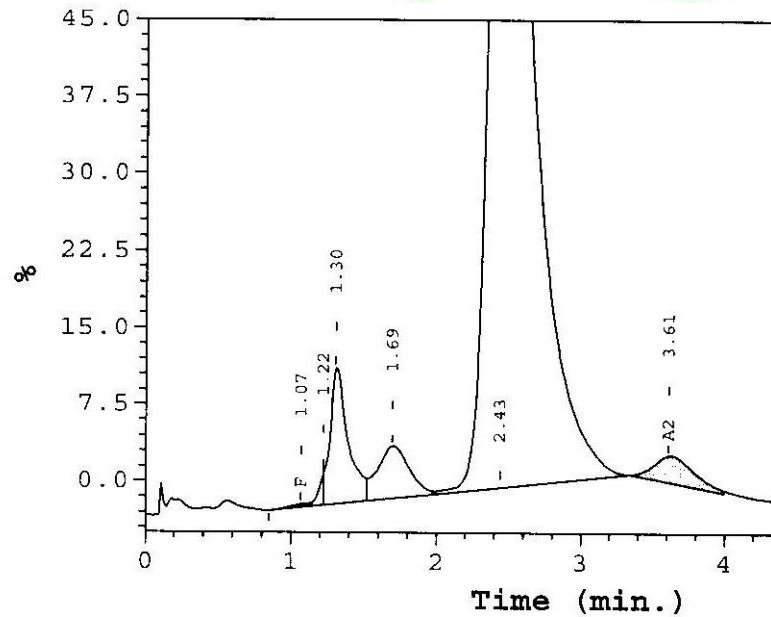
Normal Alpha thalassemia 1
heterozygote

Quantitation of Hb A₂ and Hb F

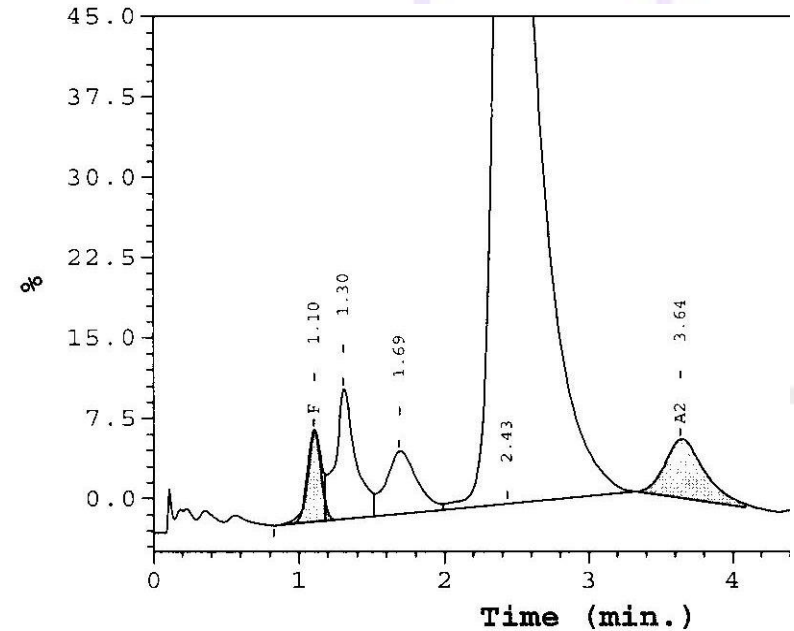
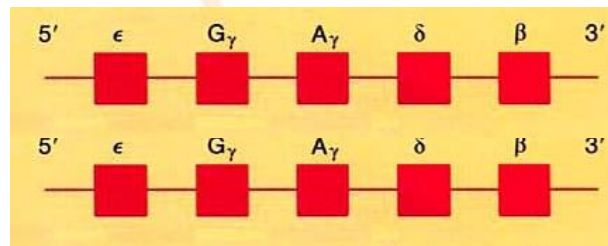


High Performance Liquid Chromatography

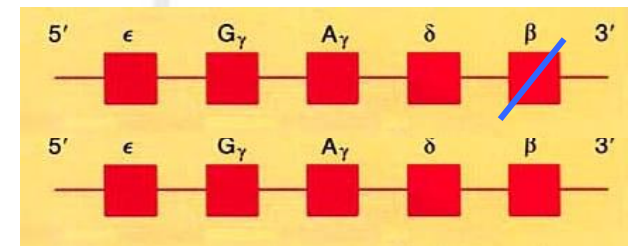
HPLC – β Thalassaemia Trait



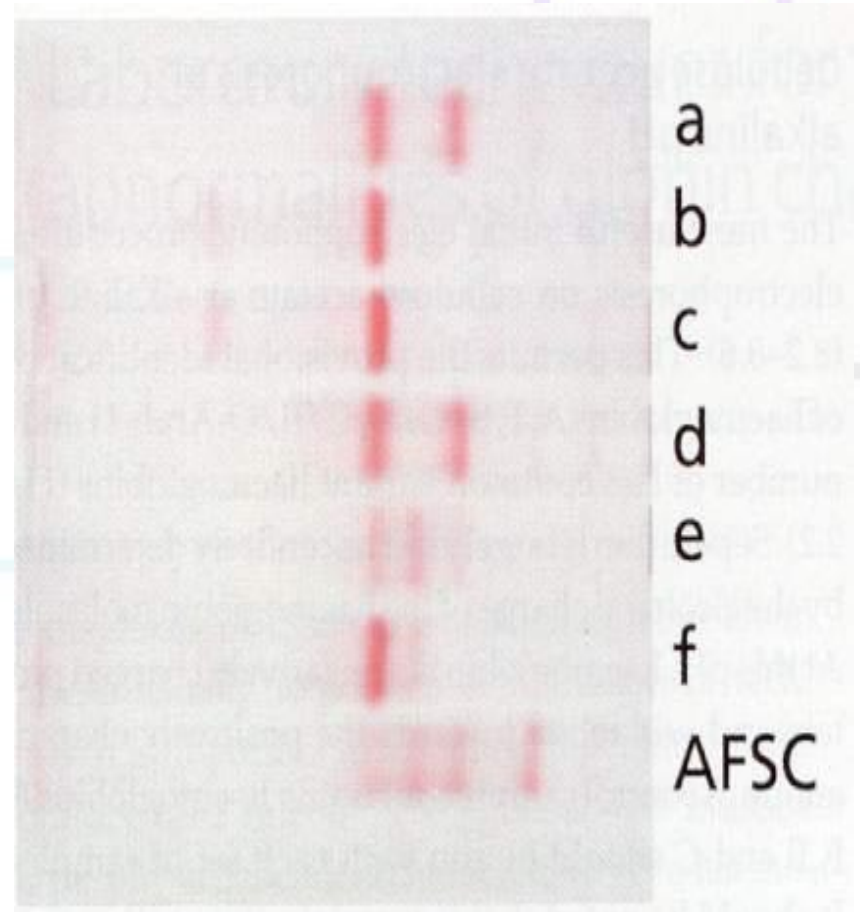
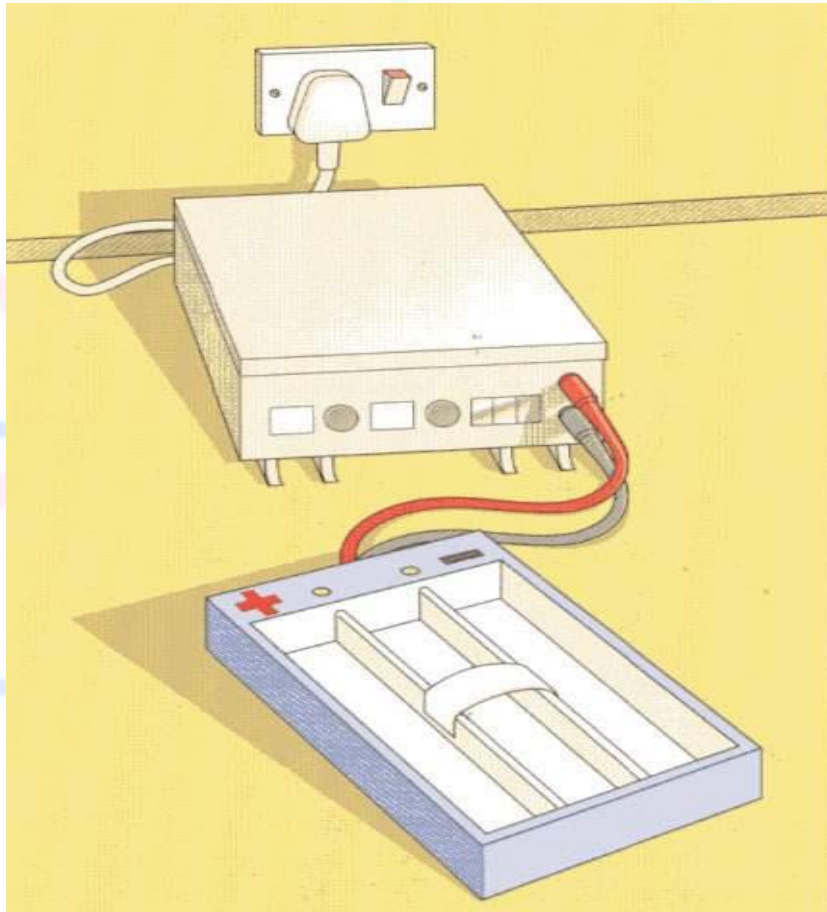
Normal HPLC



β thalassaemia trait



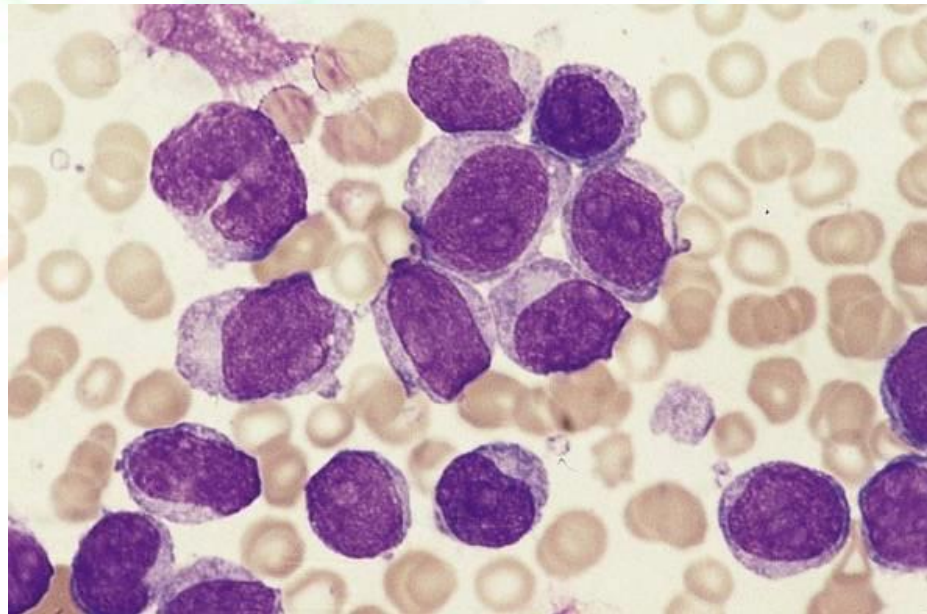
Conventional Electrophoresis – Detection of Hb Variant



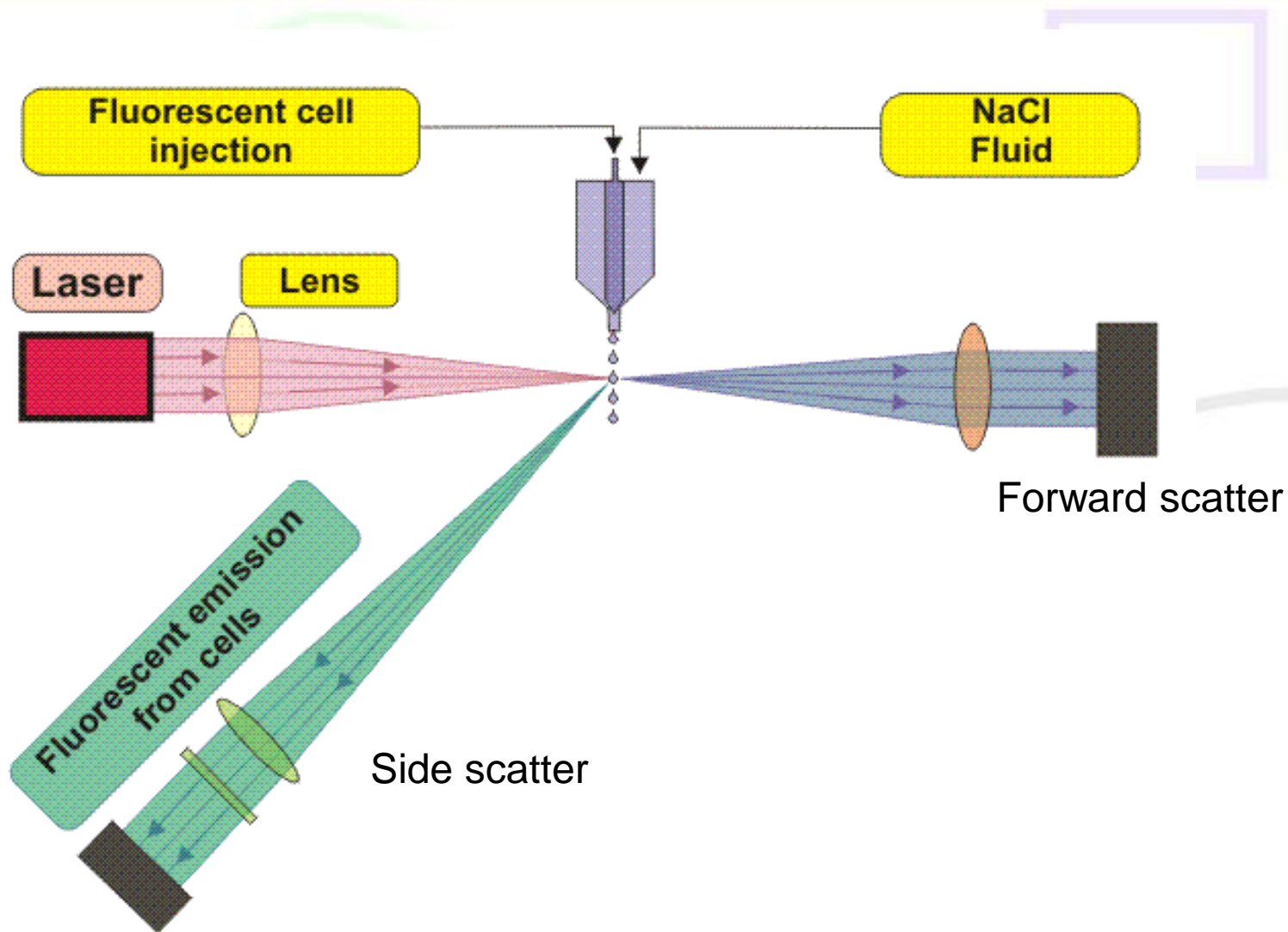
Bone Marrow Examination



- Provide optimal material for further special investigations in malignant cases

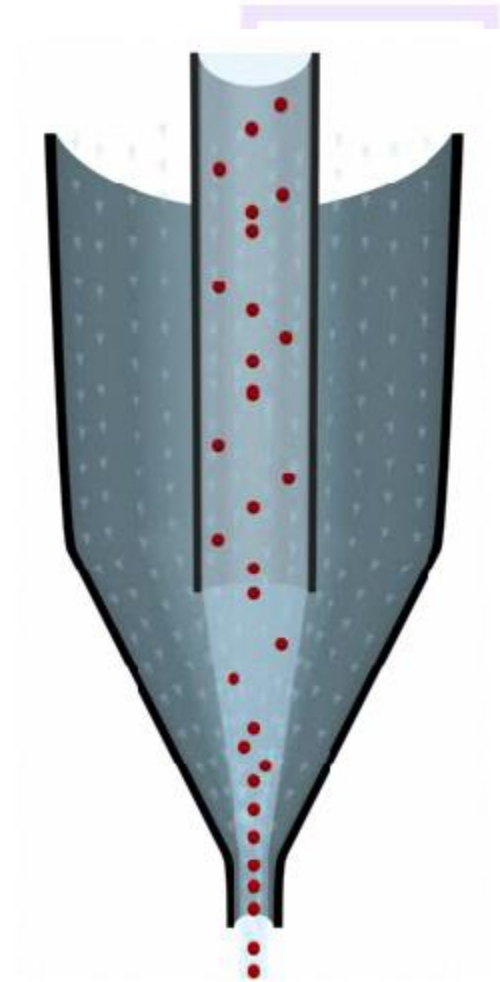


Principle of flow cytometry

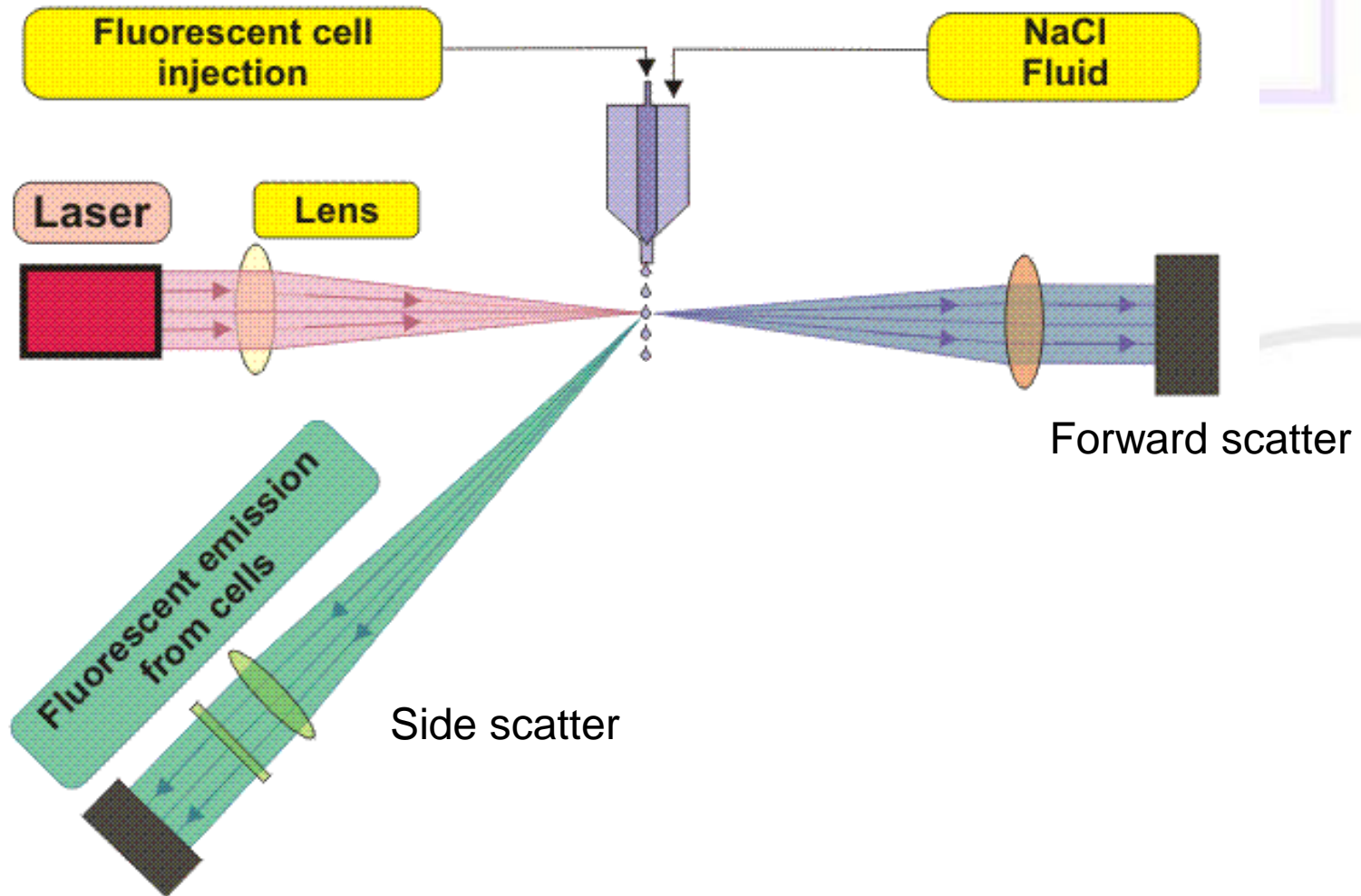


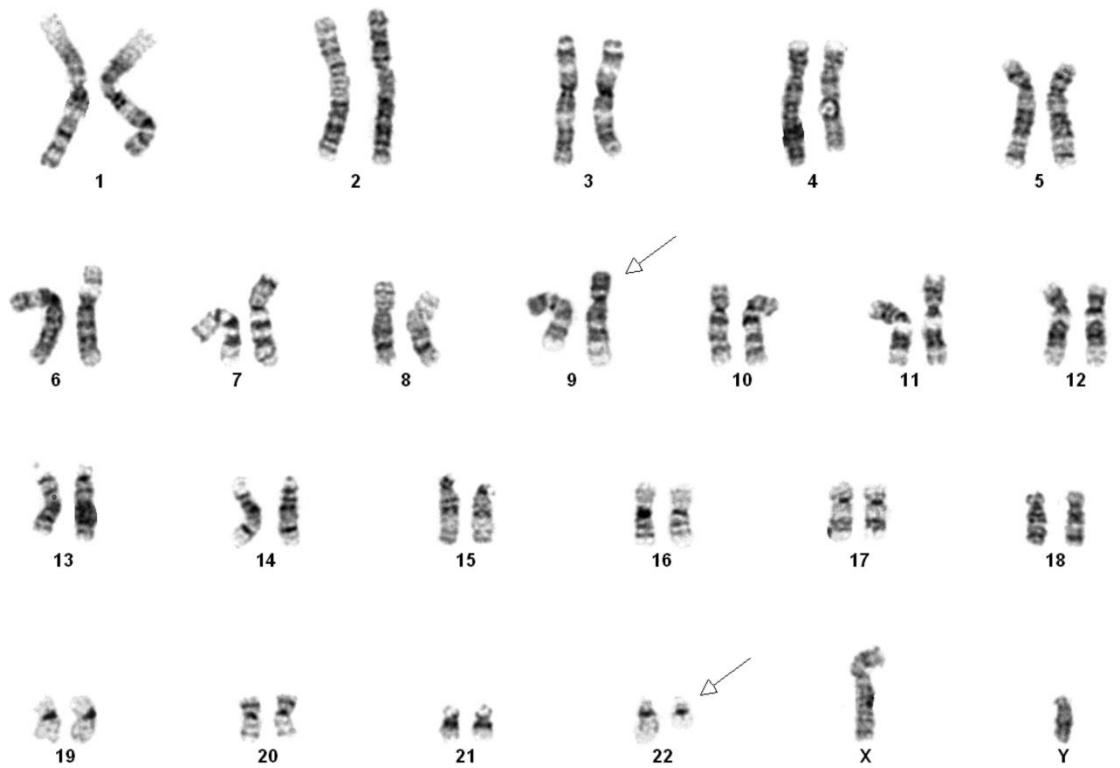
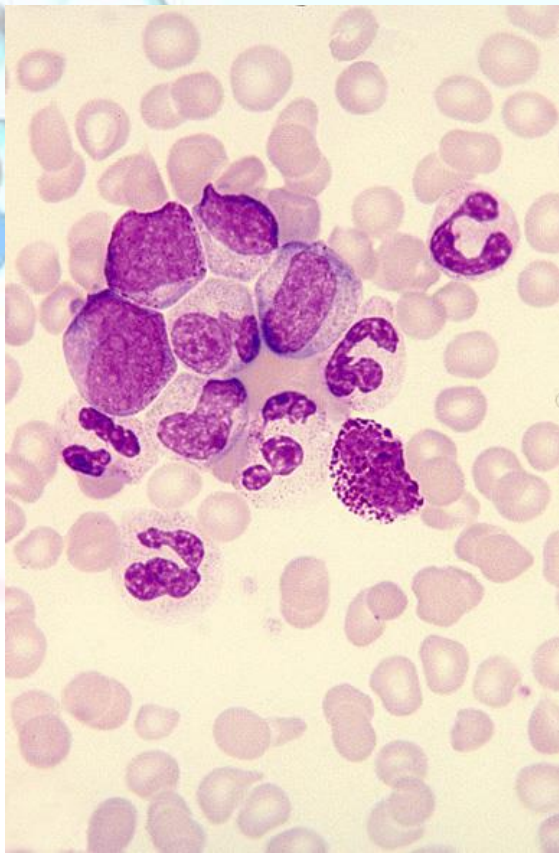
FLUIDICS

- cells pass through the laser beam in single suspension
- Cells injected into a flowing stream of saline solution
- **Allows single cells to be interrogated by the laser**



Principle of flow cytometry





Distribution of Public Hospitals and Institutions 公立醫院及機構的分布

HONG KONG WEST 港島西

- △ Duchess of Kent Children's Hospital at Sandy Bay 太后醫院公費大人兒童醫院
- △ MacLehose Medical Rehabilitation Centre 麥理浩復康院
- △ Queen Mary Hospital 瑪麗醫院
- △ Tian Yuk Hospital 贊育醫院
- △ Tung Wah Group of Hospitals Pung Yiu King Hospital 東華三院馮海敬醫院
- △ Tung Wah Hospital 東華醫院
- △ Grantham Hospital 葛量洪醫院

HONG KONG EAST 港島東

- ⊞ Cheshire Home, Chung Hom Kok 新曉角康氏護養院
- ⊞ Pamela Youde Nethersole Eastern Hospital 東區尤德夫人那打東醫院
- ⊞ Ruttonjee & Tang Shiu Kin Hospital 伊敦治醫院及譚卓能醫院
- ⊞ St. John Hospital 聖約翰醫院
- ⊞ Tung Wah Eastern Hospital 東華東院
- ⊞ Wong Chuk Hang Hospital 黃竹坑醫院

KOWLOON CENTRAL 九龍中

- ⊞ Hong Kong Buddhist Hospital 香港佛教醫院
- ⊞ Kowloon Hospital 九龍醫院
- ⊞ Queen Elizabeth Hospital 伊利沙伯醫院
- ⊞ Hong Kong Red Cross Blood Transfusion Service 香港紅十字會輸血服務中心
- ⊞ Hong Kong Eye Hospital 香港眼科醫院
- ⊞ Rehabilitation Centre 復康專科及查核中心

KOWLOON WEST 九龍西

- ⊞ Kwong Wah Hospital 廣華醫院
- ⊞ Our Lady of Maryknoll Hospital 聖母醫院
- ⊞ Tung Wah Group of Hospital - Wong Tai Sin Hospital 東華三院黃大仙醫院
- ⊞ Caritas Medical Centre 聖愛醫院
- ⊞ Kowai Chung Hospital 香港醫院
- ⊞ Princess Margaret Hospital 瑪嘉烈醫院
- ⊞ Yan Chai Hospital 仁濟醫院

KOWLOON EAST 九龍東

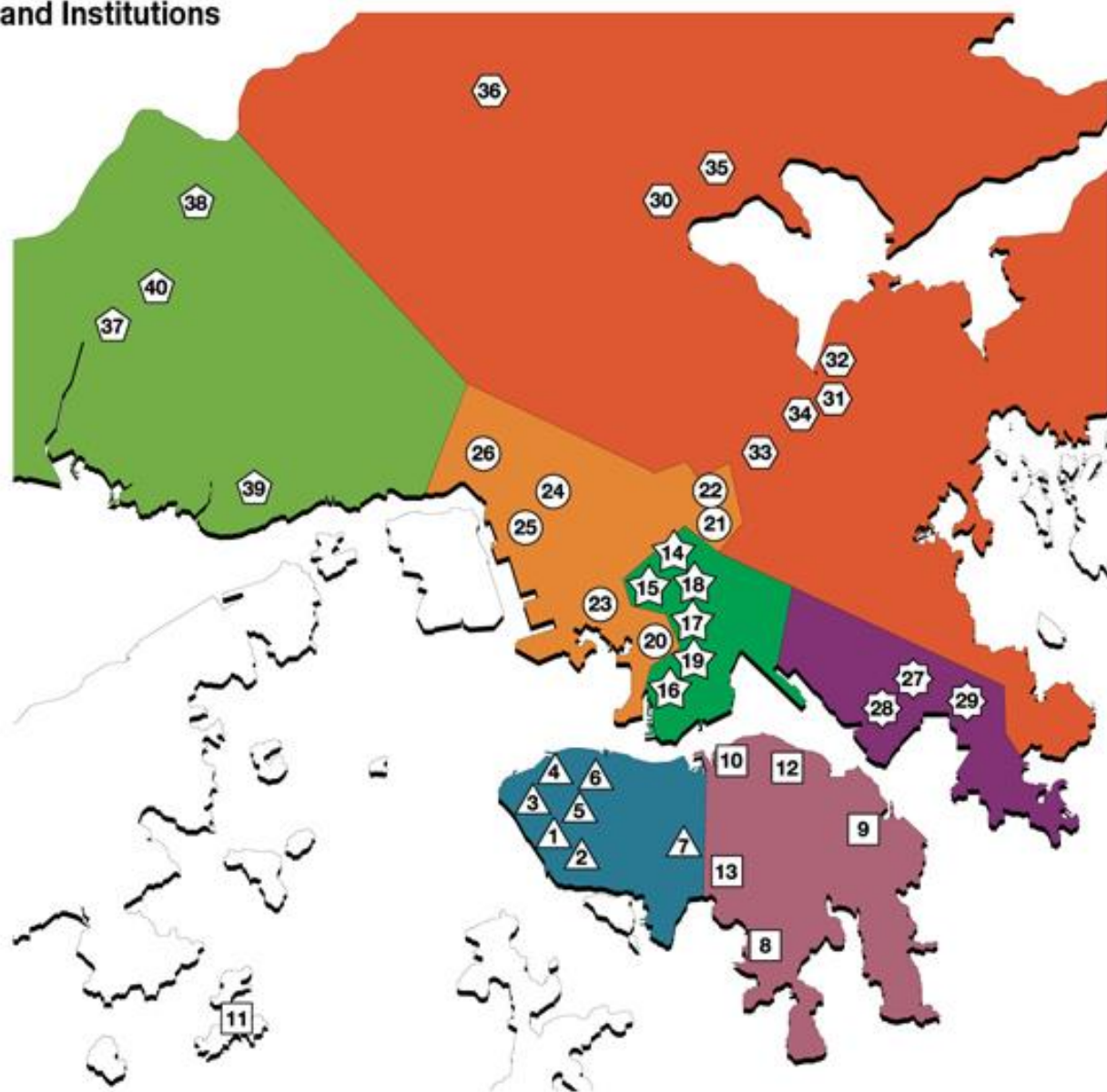
- ⊞ Haven of Hope Hospital 慈恩醫院
- ⊞ United Christian Hospital 基督教聯合醫院
- ⊞ Tseung Kwan O Hospital 將軍澳醫院

NEW TERRITORIES EAST 新界東

- ⊞ Alice Ho Miu Ling Nethersole Hospital 瑪麗氏何妙齡那打東醫院
- ⊞ Bradbury Hospice 白普理寧養中心
- ⊞ Cheshire Home, Shatin 沙田康氏護養院
- ⊞ Prince of Wales Hospital 威爾斯親王醫院
- ⊞ Shatin Hospital 沙田醫院
- ⊞ Tai Po Hospital 大埔醫院
- ⊞ North Districts Hospital 北區醫院

NEW TERRITORIES WEST 新界西

- ⊞ Castle Peak Hospital 青山醫院
- ⊞ Pak On Hospital 博愛醫院
- ⊞ Shu Lam Hospital 小欖醫院
- ⊞ Tuen Mun Hospital 屯門醫院





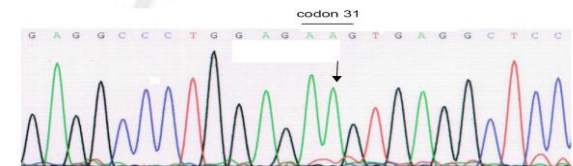
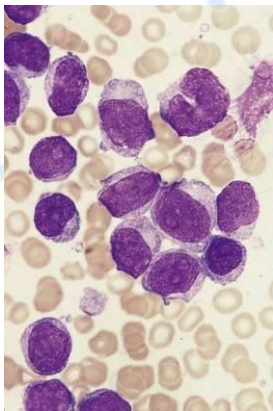
Only 3 designated centers to do cytogenetics in HA...

- QMH
- QEH
- PWH
- No cytogenetics service in private

Genetic Testing for Malignant Haematological Diseases



- Molecular genetic tests
 - Classification, prediction of prognosis and MRD monitoring
 - Use sensitive molecular techniques to determine lineage of abnormal cells, gene mutation and gene fusion



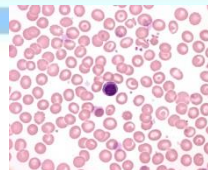
Clinical Suspicion



Blood Counts & Smear Morphology

Collect Date : 05/04/03
Collect Time : 11:00
Receive Date : 05/04/03
Receive Time : 18:05
Request No. : HND21608
Urgency : URGENT

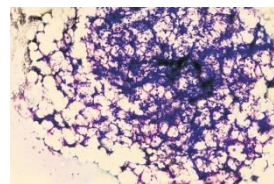
Complete Blood Count
WBC 8.7
RBC 2.96 L
HGB 8.3 L
HCT 0.248 L
MCV 81.8
MCH 27.9
MCHC 33.3
RDW 13.5
PLT 218
MPV 9.8
Film Review N



Blood Tests



Bone Marrow Morphology



Non-malignant Dx



Cytochemistry / Immunophenotyping



Cytogenetics / Molecular Tests



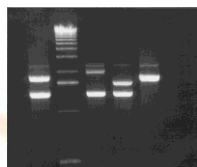
Malignant Dx

treatment



Immunophenotyping / Molecular Tests

MRD
Detection



Quality Assurance



- The goal: to provide accurate, precise results in a timely manner
- Pre-analytical
- Analytical: Quality control (both internal and external)
- Post-analytical
- Rigorous quality framework
- Accreditation