

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

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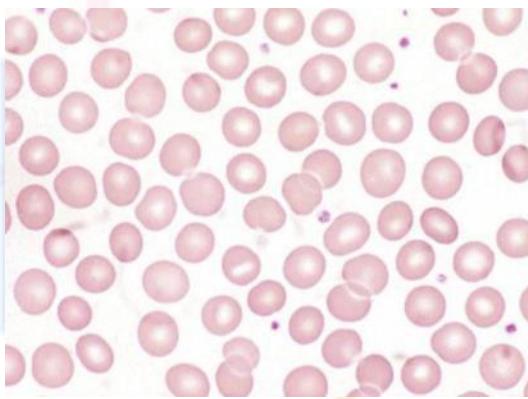
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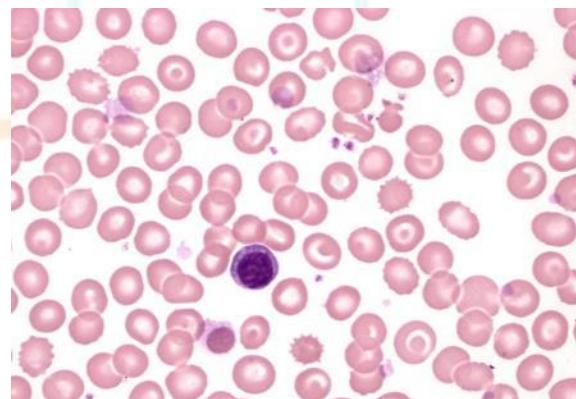


MCV (Mean Cell Volume)

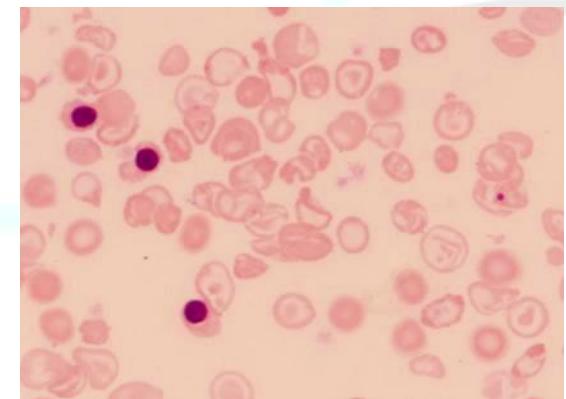
- Measured by an automatic blood cell analyser
- Patients with thalassaemia have low MCV



normal



β thalassaemia minor



β thalassaemia major

Patient Sample



MCV MCH Screening



Supravital
Staining/IC strip



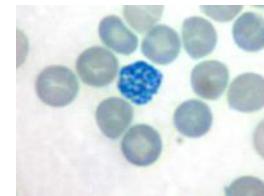
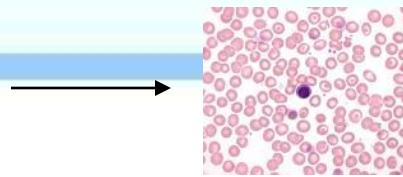
HPLC / CE



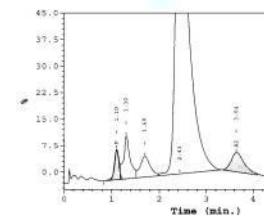
Electrophoresis



Genotypic Analysis



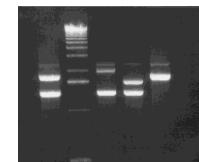
α thalassaemia



β thalassaemia



Haemoglobin
-pathies

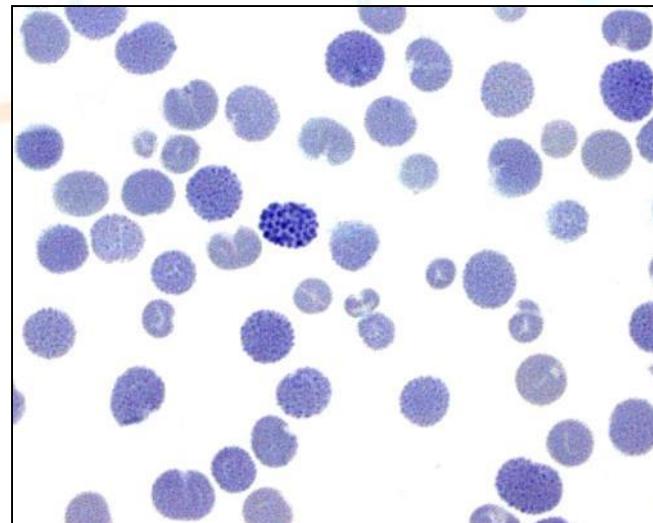


Excess β Chain Production in α Thalassaemia

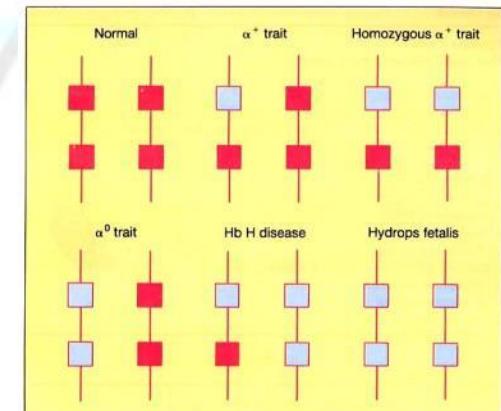
- Supravital Staining for Hb H (β_4) inclusion Bodies

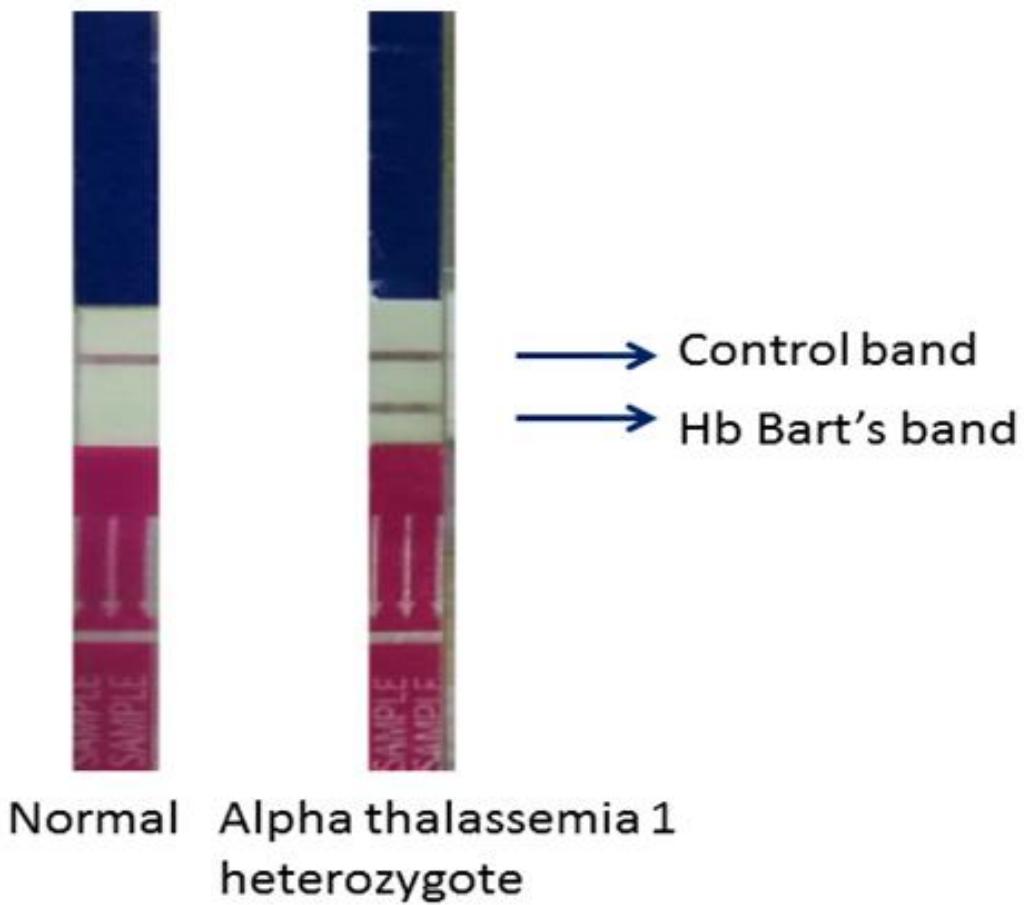


α thal trait

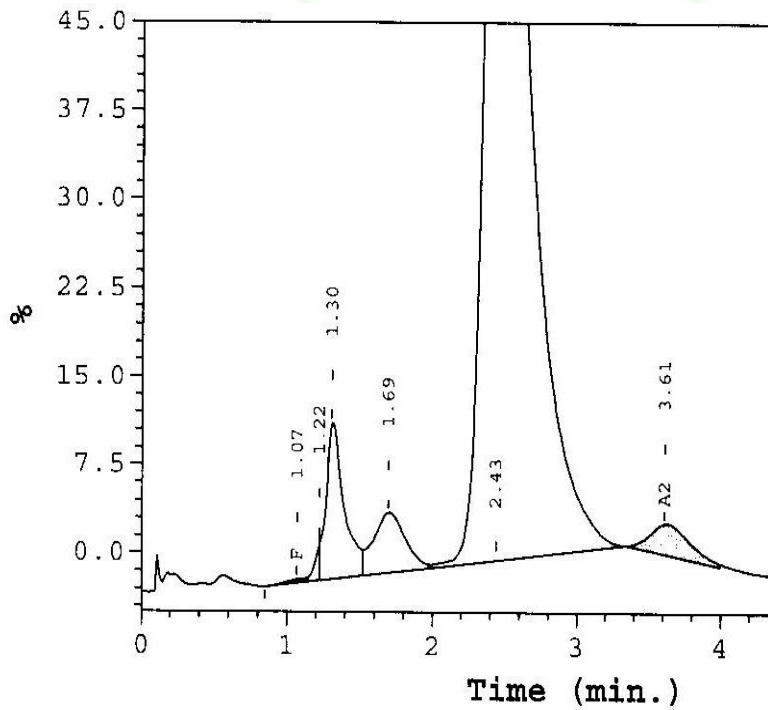


α thal intermedia



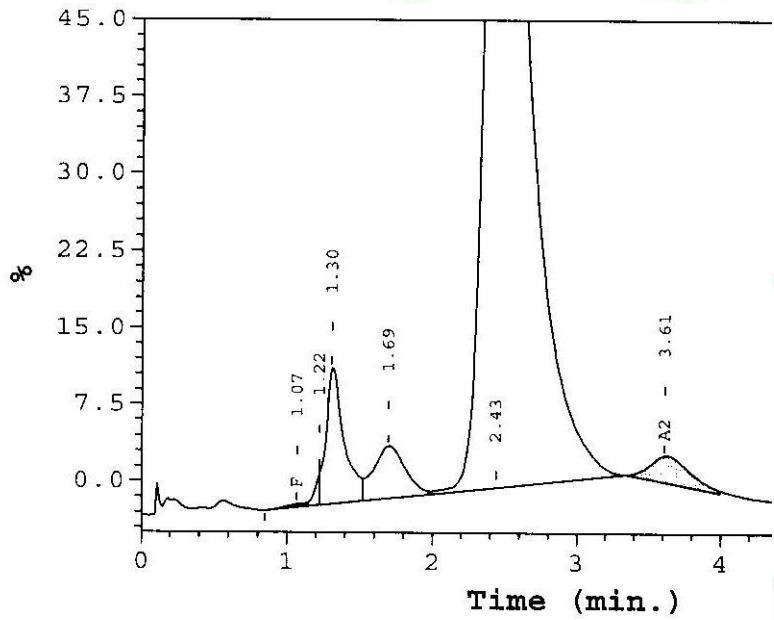


Quantitation of Hb A₂ and Hb F

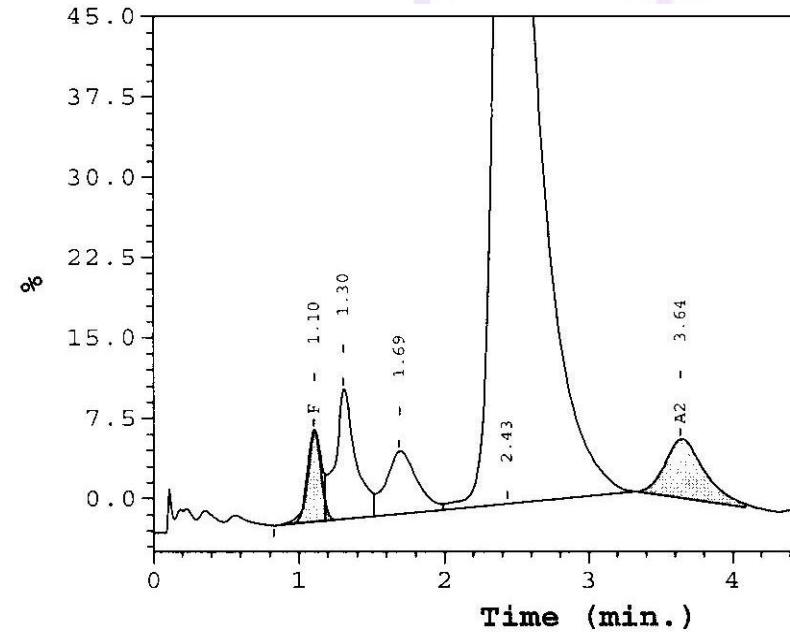
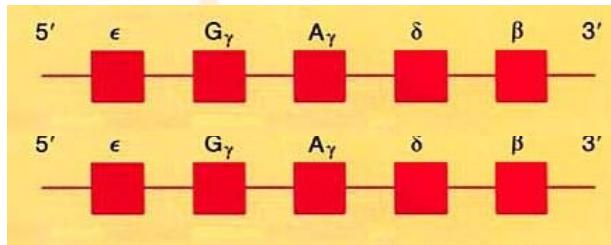


High Performance Liquid Chromatography

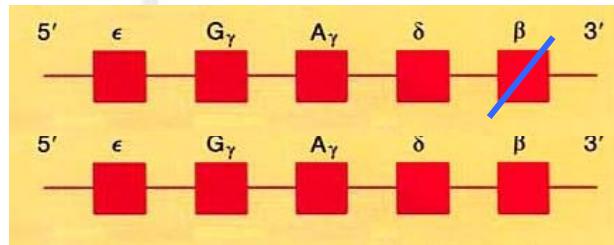
HPLC – β Thalassaemia Trait



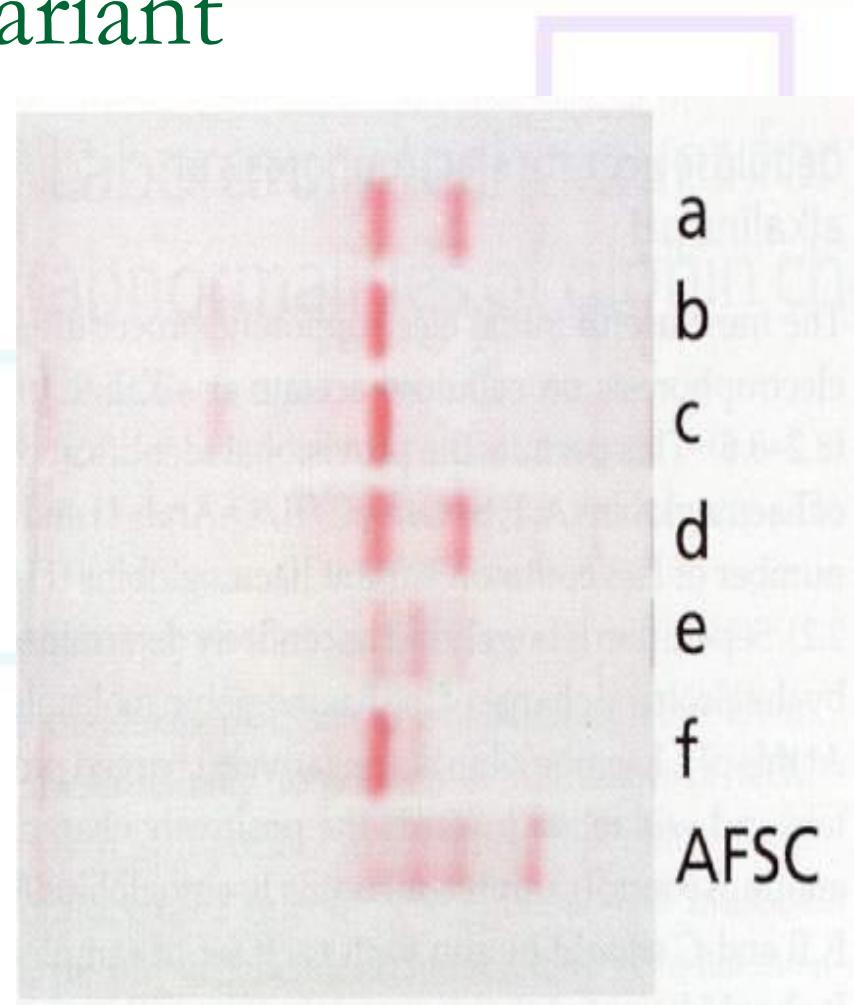
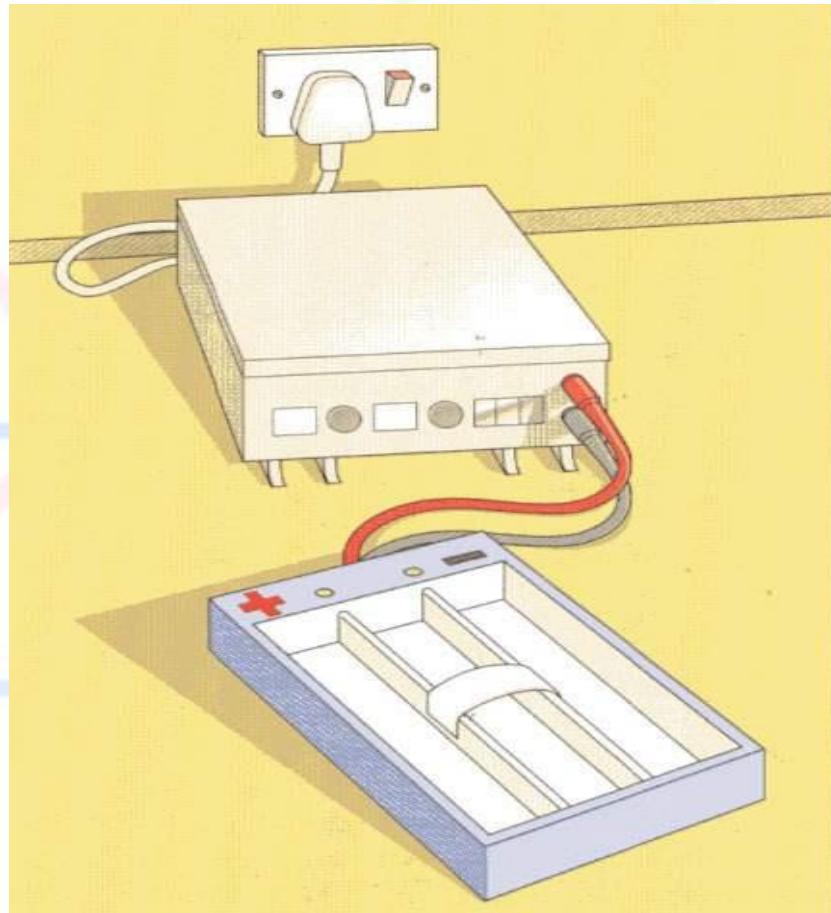
Normal HPLC



β thalassaemia trait



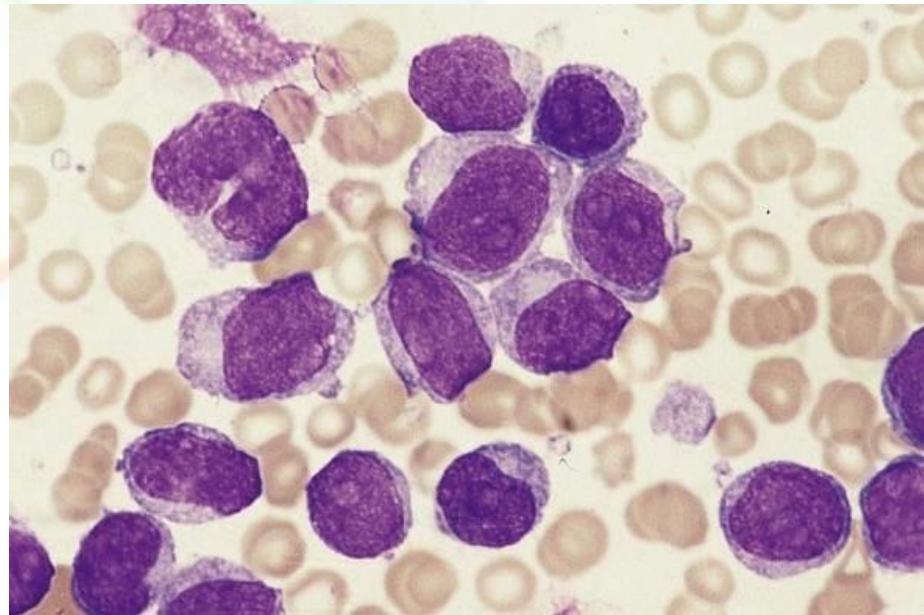
Conventional Electrophoresis – Detection of Hb Variant



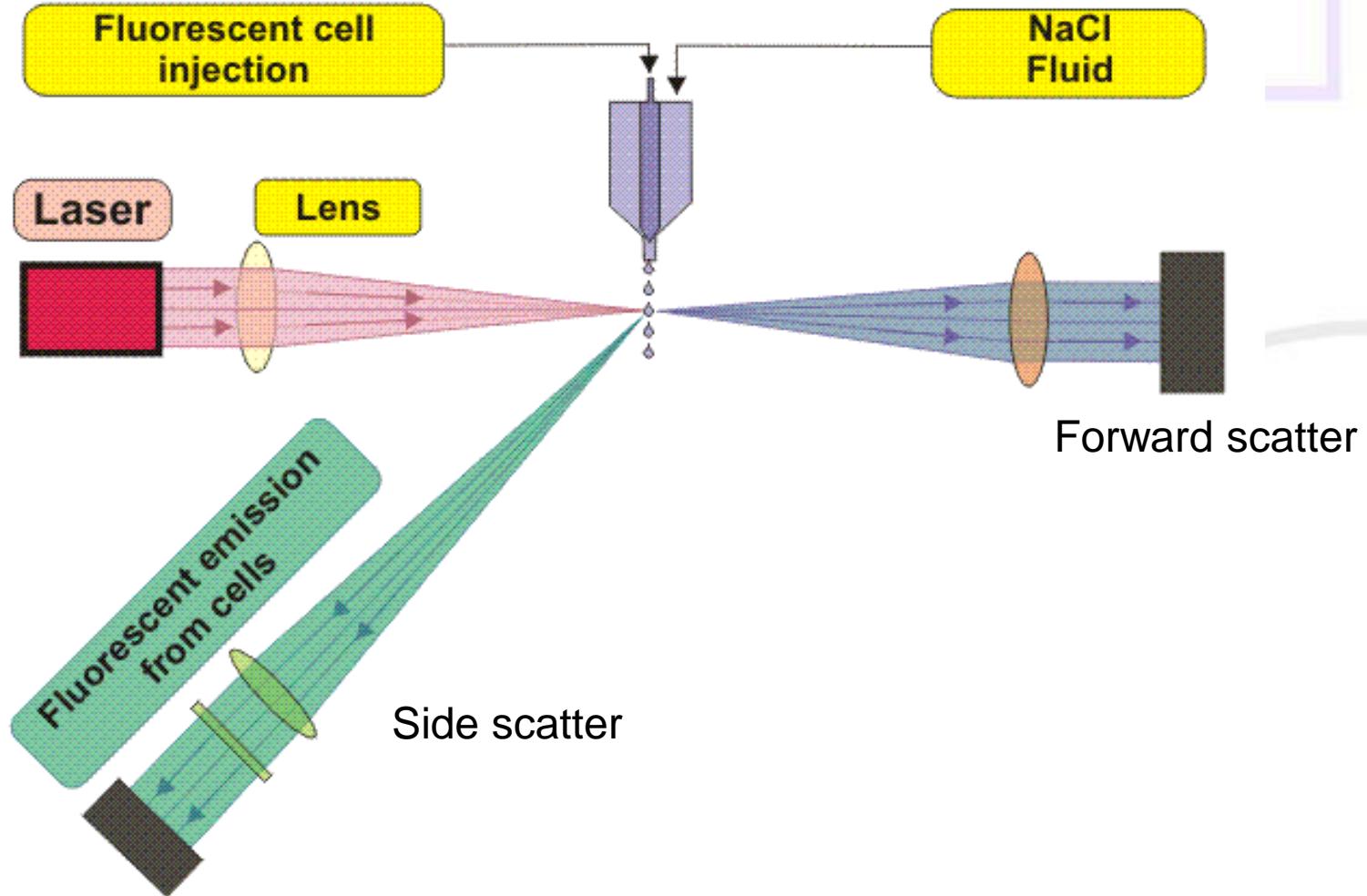


Bone Marrow Examination

- Provide optimal material for further special investigations in malignant cases

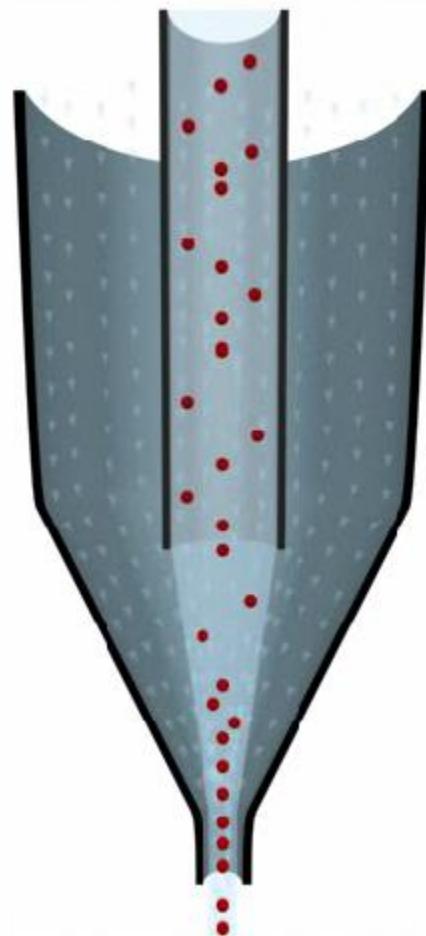


Principle of flow cytometry

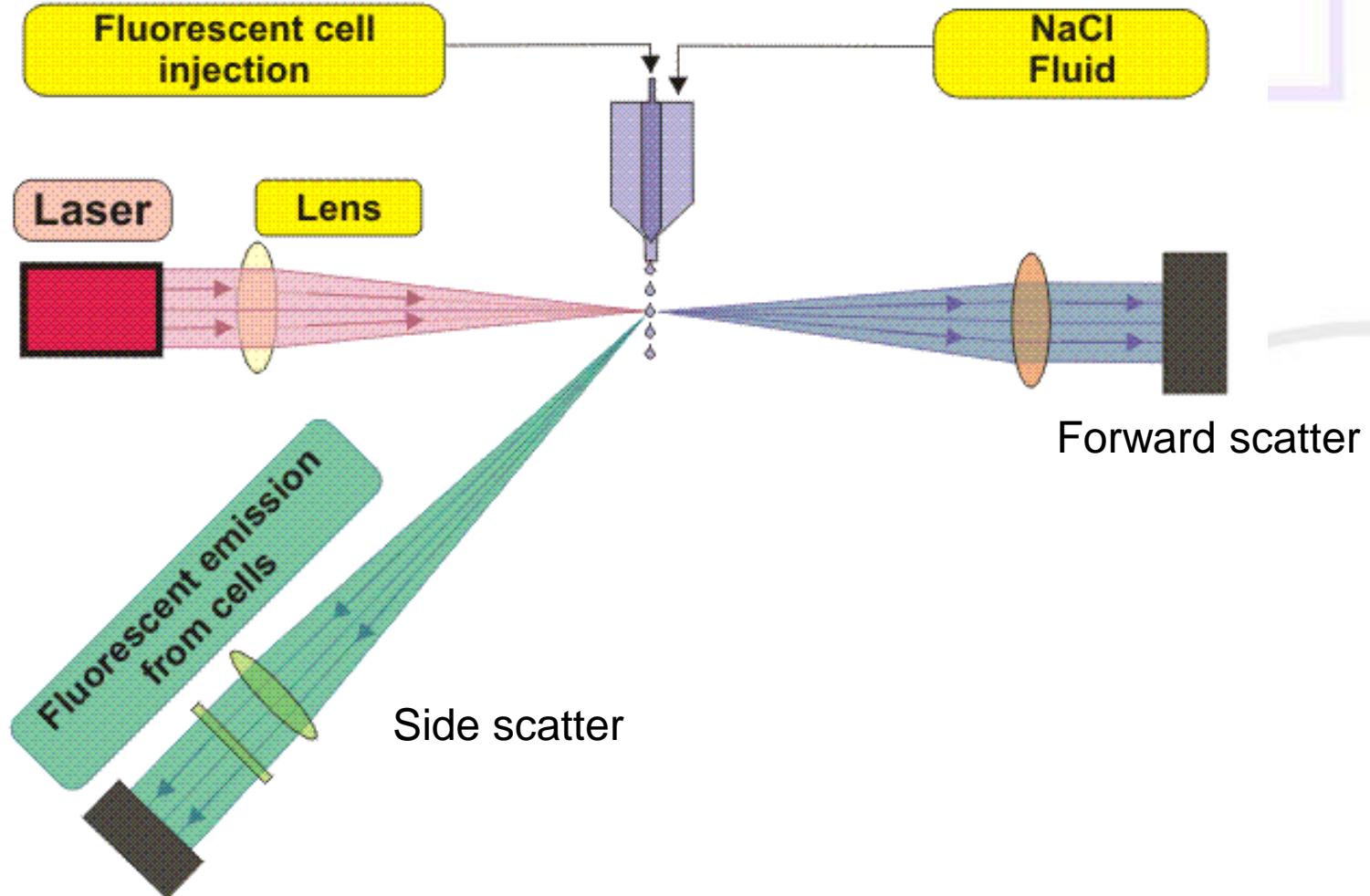


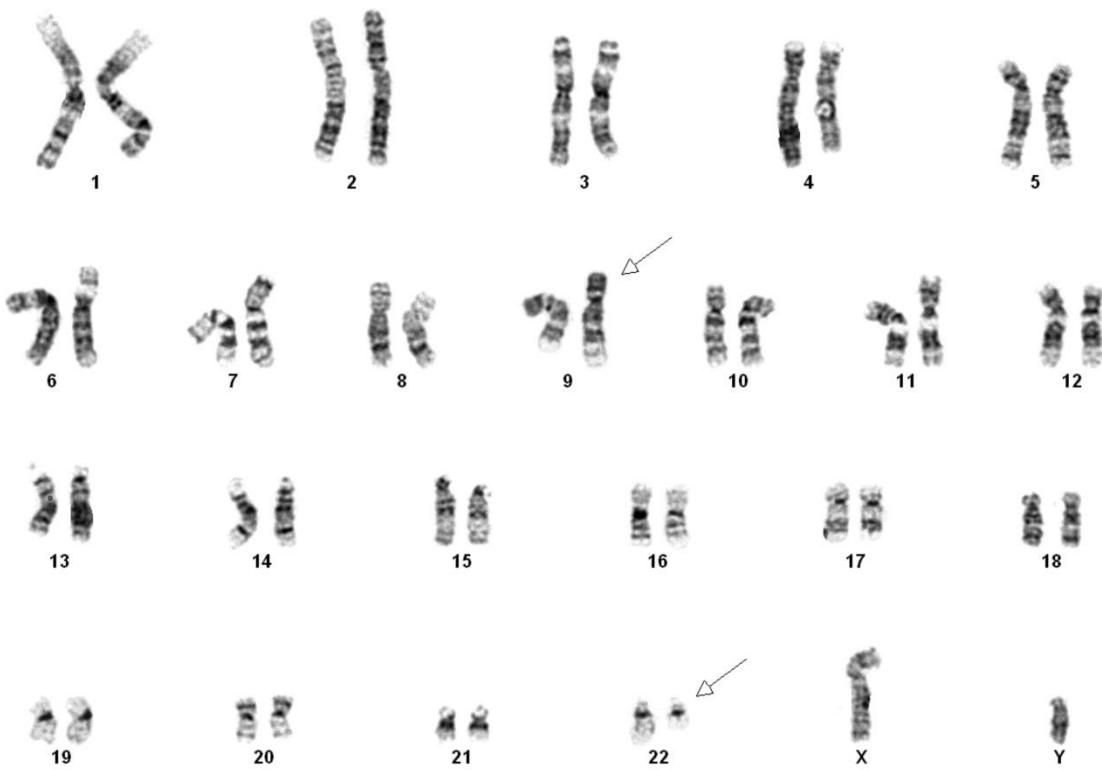
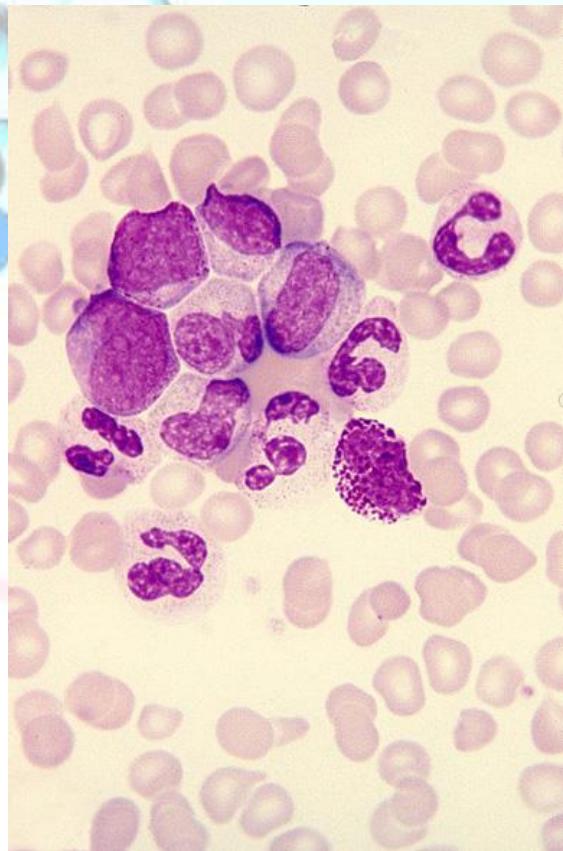
FLUIDICS

- 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 滙島西

- Duchess of Kent Children's Hospital at Sandy Bay 大口環扶德公爵夫人兒童醫院
- MacLehose Medical Rehabilitation Center 麥理浩復康院
- Queen Mary Hospital 喬治女院
- Tuen Yuk Hospital 葵青醫院
- Tung Wah Group of Hospitals Pung Yiu King Hospital 東華三院葵涌醫院
- Tung Wah Hospital 東華醫院
- Grantham Hospital 格林英皇醫院

HONG KONG EAST 滙島東

- Cheshire Home, Ching Hom Kok 基德內慈氏護養院
- Pamela Youde Nethersole Eastern Hospital 來源尤德夫人那打素醫院
- Ramsey & Tang Shiu Kin Hospital 雷氏治喪及鄒肇基醫院
- S. 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 癢康專科及營養中心

KOWLOON WEST 九龍西

- Kwong Wah Hospital 錦華醫院
- Our Lady of Mercy Hospital 聖母醫院
- Tung Wah Group of Hospital - Wong Tai Sin Hospital 東華三院黃大仙醫院
- Cantons Medical Centre 可連醫療中心
- Kwai Chung Hospital 錦綉醫院
- Princess Margaret Hospital 帕麗西瑪醫院
- Yan Chai Hospital 仁濟醫院

KOWLOON EAST 九龍東

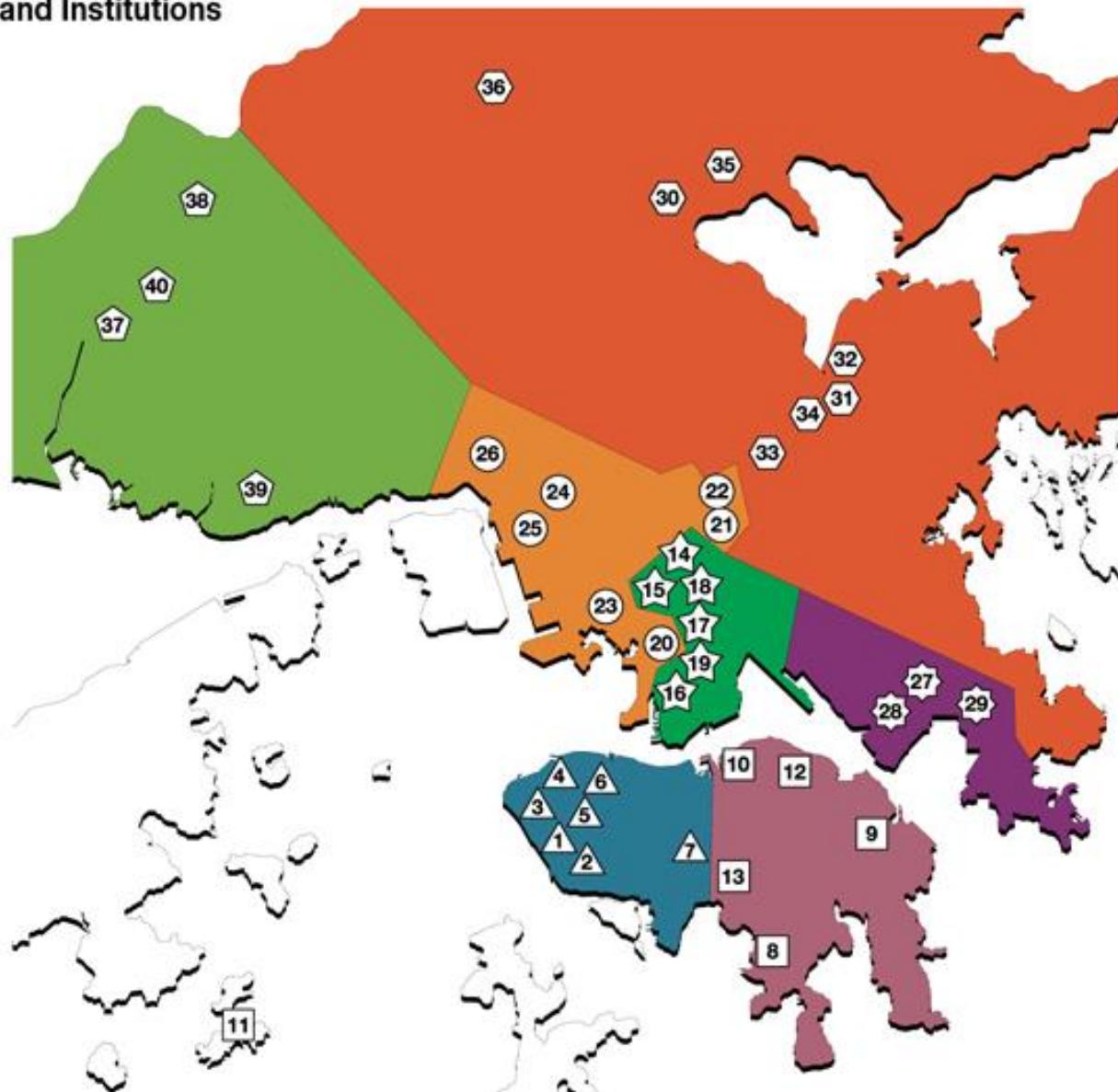
- Haven of Hope Hospital 寶安醫院
- United Christian Hospital 基督教聯合醫院
- Tsung Kwan O Hospital 清完醫院

NEW TERRITORIES EAST 新界東

- Alice Ho Mui Ling Nethersole Hospital 霍震霆何妙齡那打素醫院
- Bethany Hospice 白普寧安養中心
- Chester House, Shatin 沙田樂民護養院
- Prince of Wales Hospital 鮑爾斯紀王醫院
- Shatin Hospital 沙田醫院
- Tai Po Hospital 大埔醫院
- North District Hospital 北區醫院

NEW TERRITORIES WEST 新界西

- Castle Peak Hospital 城門醫院
- Pak Oi Hospital 寶愛醫院
- Siu Lam Hospital 小瀝源醫院
- Tuen Man Hospital 屯門醫院



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

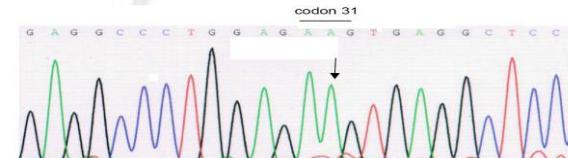
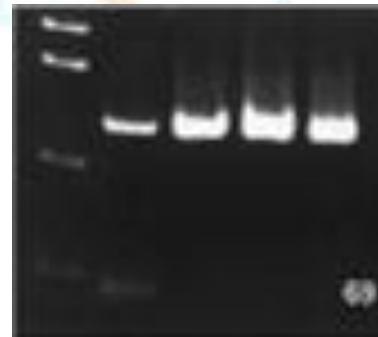
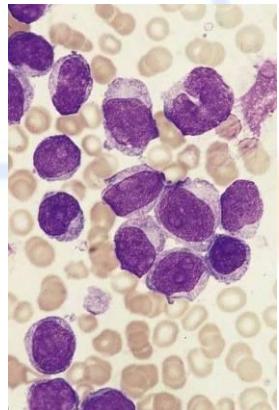
- QMH
- QEH
- PWH
- No cytogenetics service in private

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



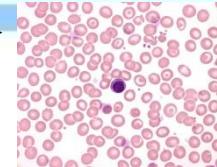
Clinical Suspicion

Blood Counts & Smear Morphology

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Request No. : HEMO 12109
Urgency : URGENT

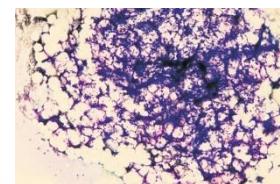
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Blood Tests

Bone Marrow Morphology

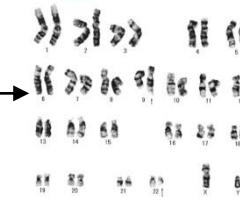


Non-malignant Dx

Cytochemistry / Immunophenotyping

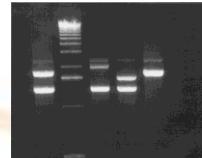


Cytogenetics / Molecular Tests



Malignant Dx

MRD Detection



Immunophenotyping / Molecular Tests

treatment



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