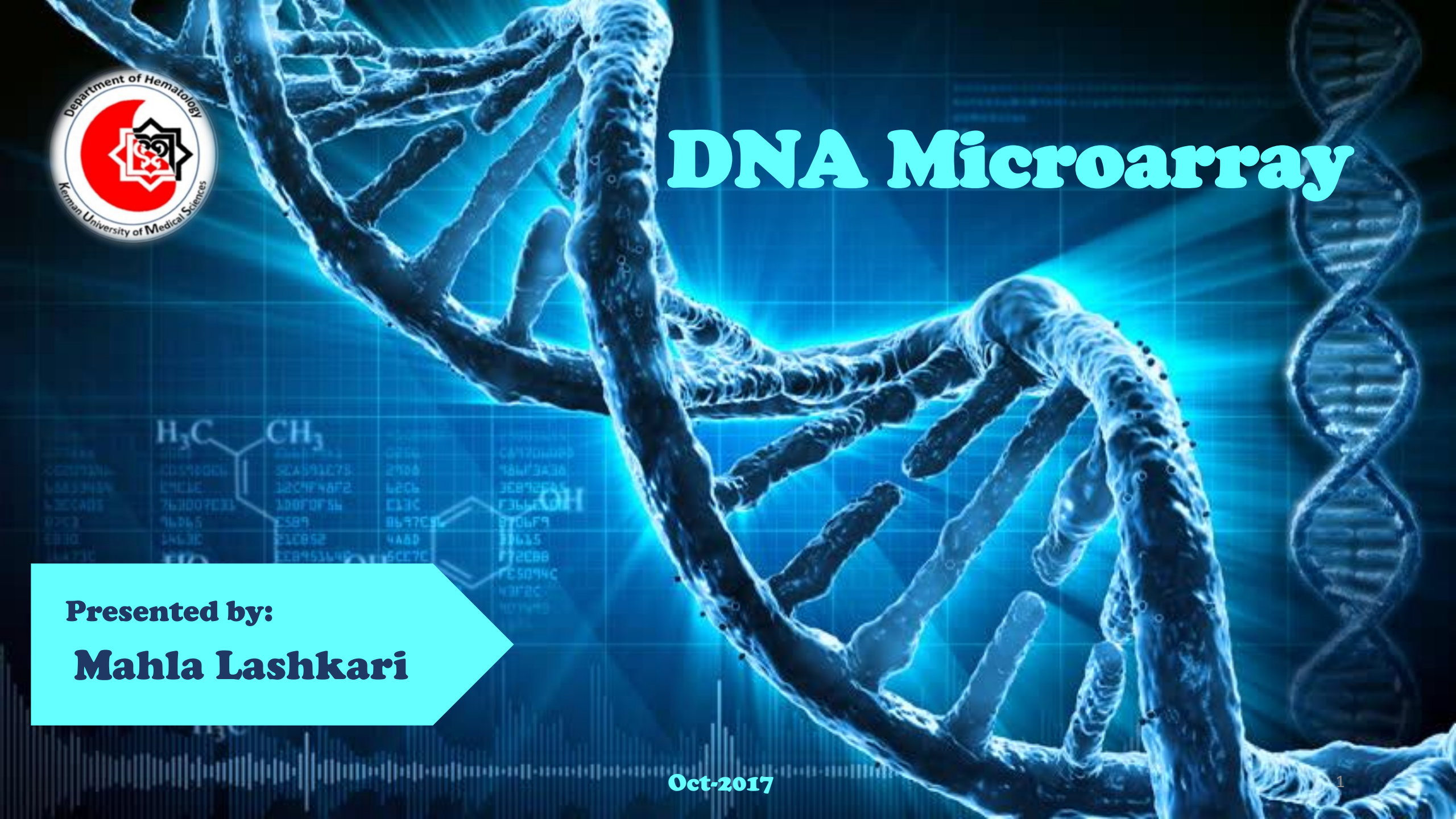


DNA Microarray

Presented by:

Mahla Lashkari

Oct-2017

Contents

- Introduction
- History
- Principle & Method
- Applications
- Advantages and disadvantages
- Conclusion

Introduction

- A microarray is a multiplex lab-on-a-chip have different types:

  - DNA microarrays
  - MMChips
  - Protein microarrays
  - Tissue microarrays
  - Transfection microarrays
  - Antibody microarrays
  - .....

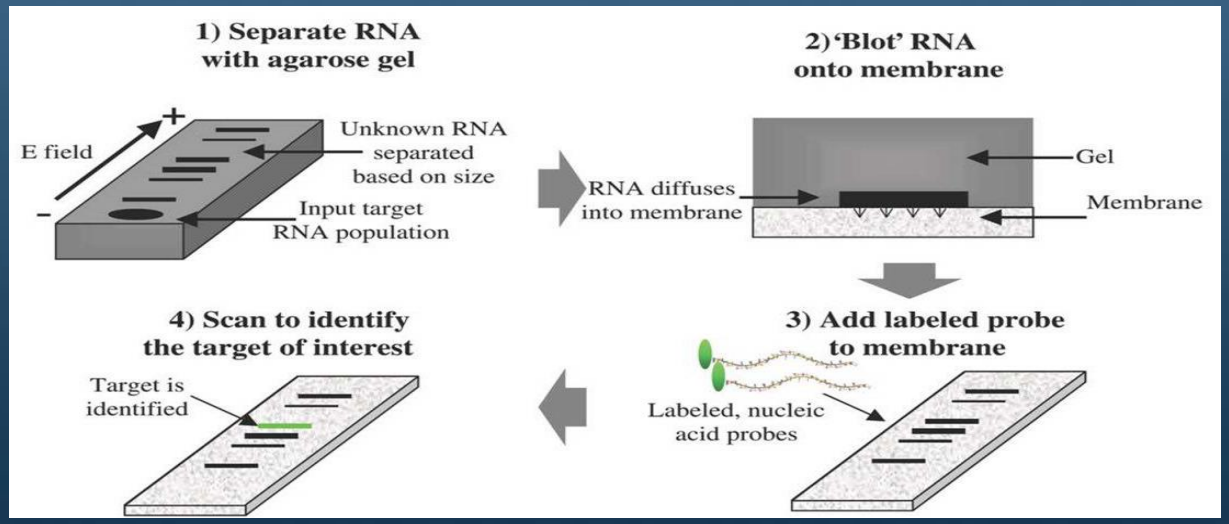
Introduction

- DNA microarrays are:
  - one of the latest technological advancement for multi-gene detection
  - typically composed of DNA probes are bound to solid substrate

- The basis of DNA microarrays is hybridization to detect a specific sample

History

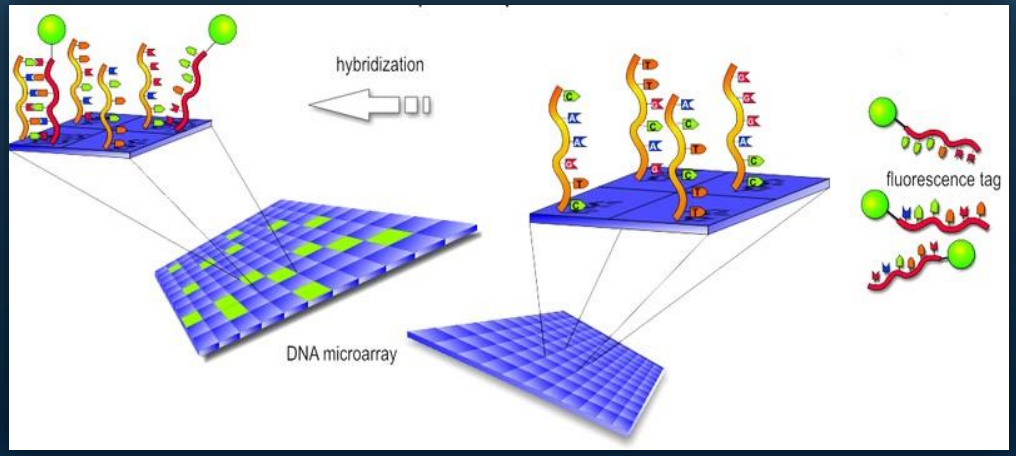
- DNA microarray technology evolved from Northern blotting



- The concept of microarrays was first proposed in the late 1980s
- In the late 90's and 2000's, DNA array technology progressed rapidly

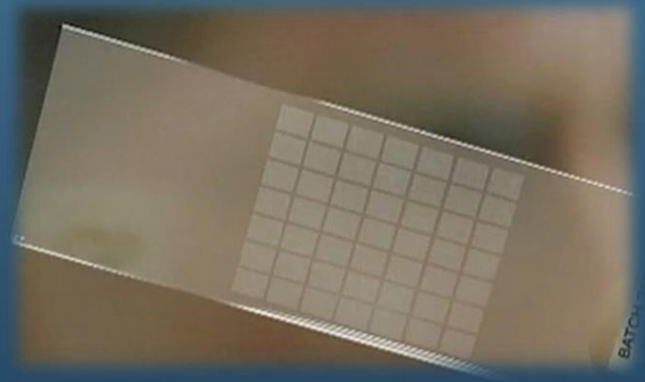
Principle

- Based on hybridization between two DNA strands
- Uses a million different but known probes that fixed on a solid surface
- Target sequences are labeled with fluorescent
- CY5 (red) and CY3 (green)

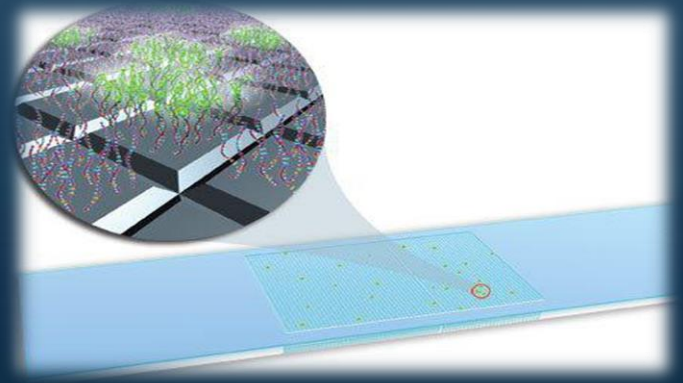


Principle

- Micro chip (gene chip) & slide



- Solid surface
- Collection of microscopic DNA spots
- The known probe DNA are coated into each spot
- Manufactured by different company



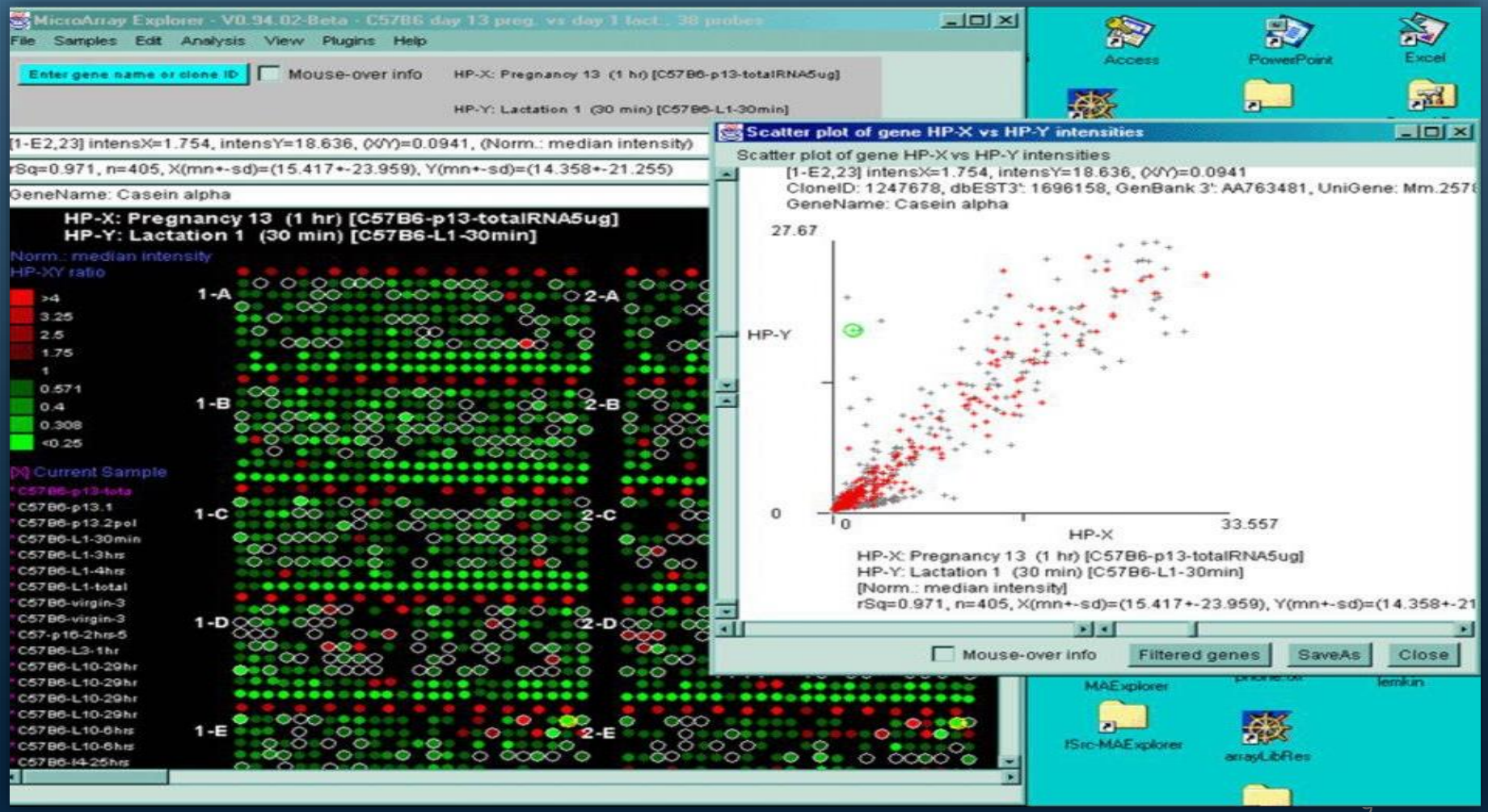
Principle

Affymetrix

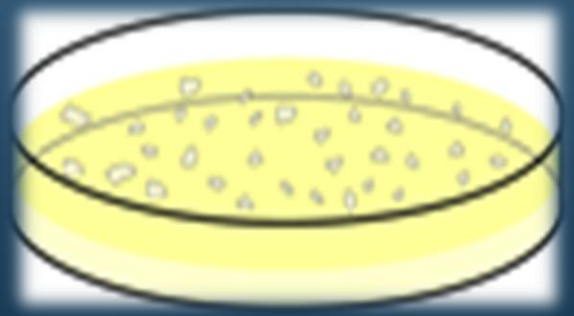
Agilent

Principle

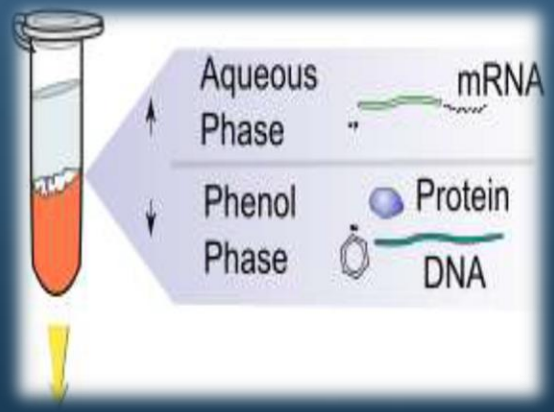
- **result:**



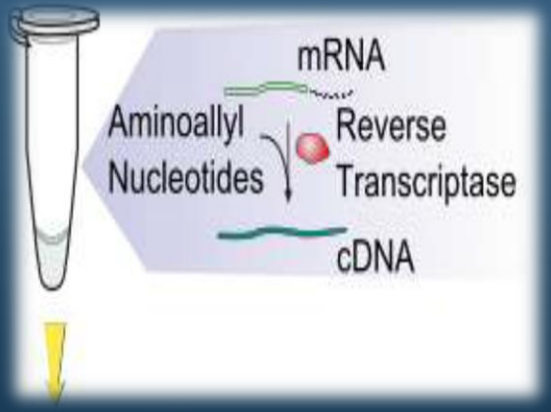
Method



Sample preparation

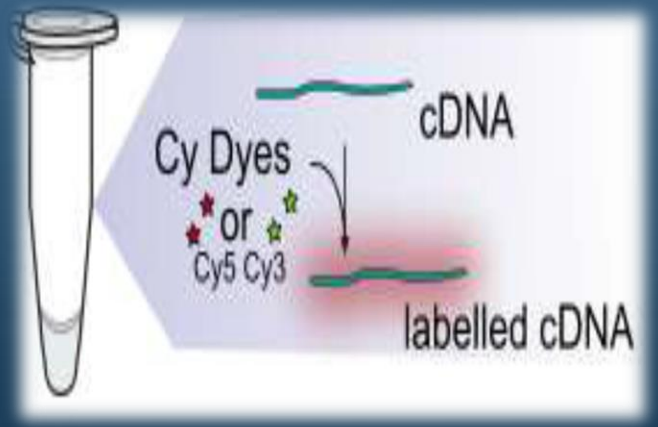


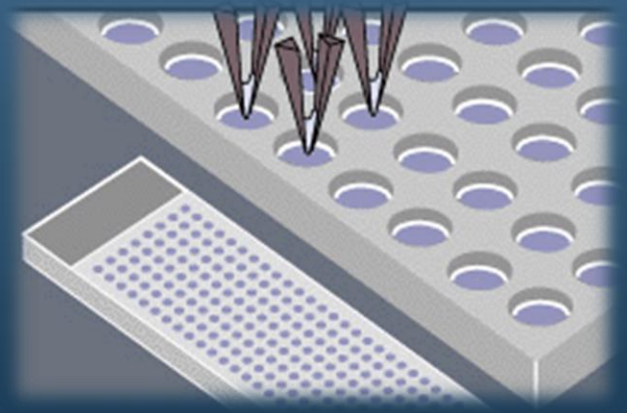
RNA extraction

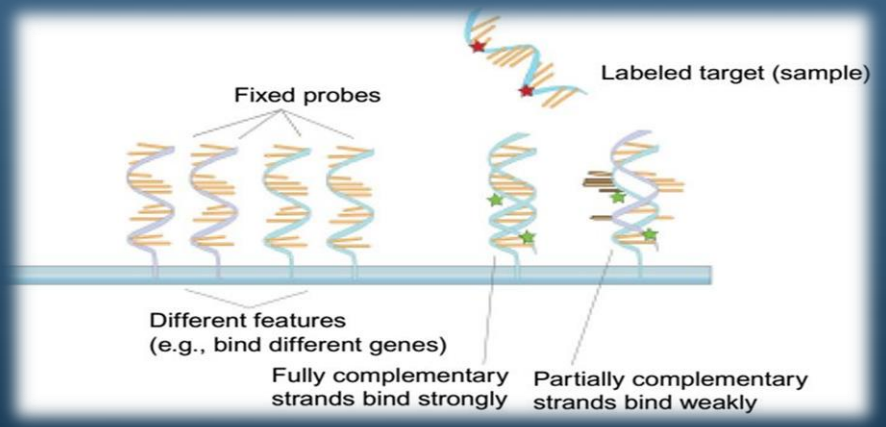


Reverse Transcription

Method



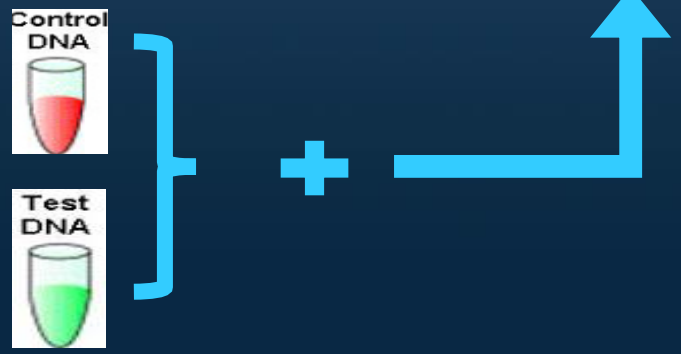




Labeling

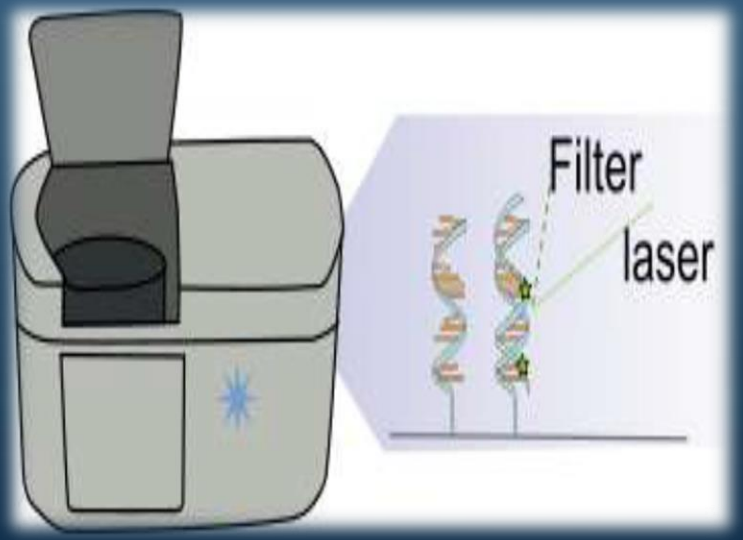
Use Cy5 for control (red)

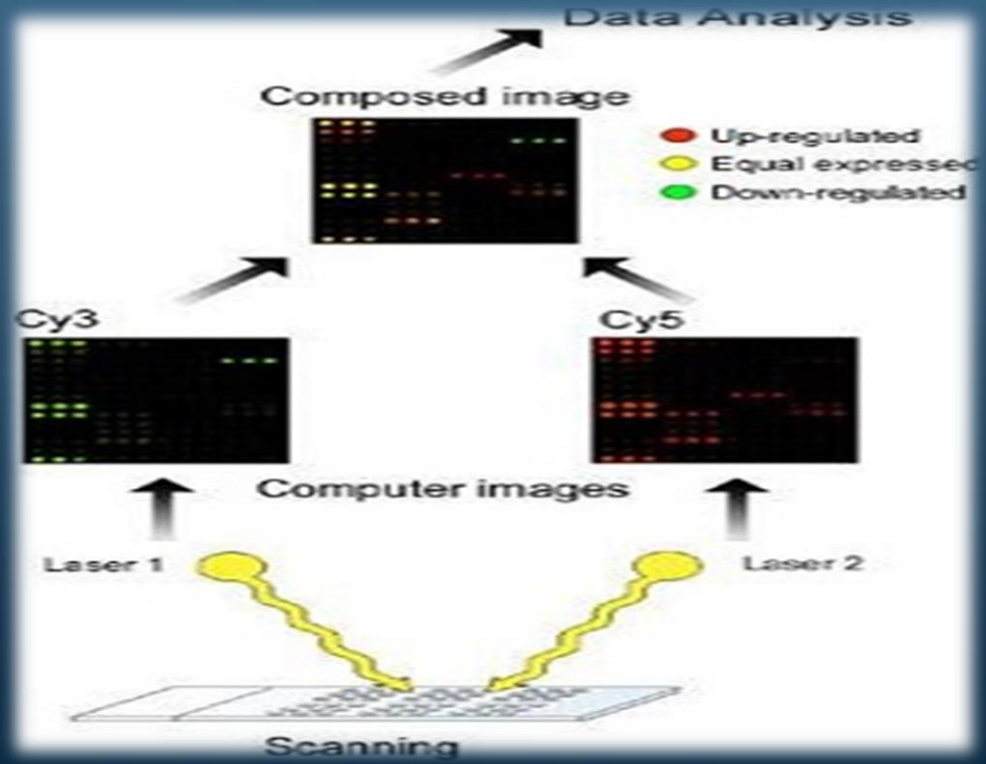
Use Cy3 for patient (green)



Hybridization

Method



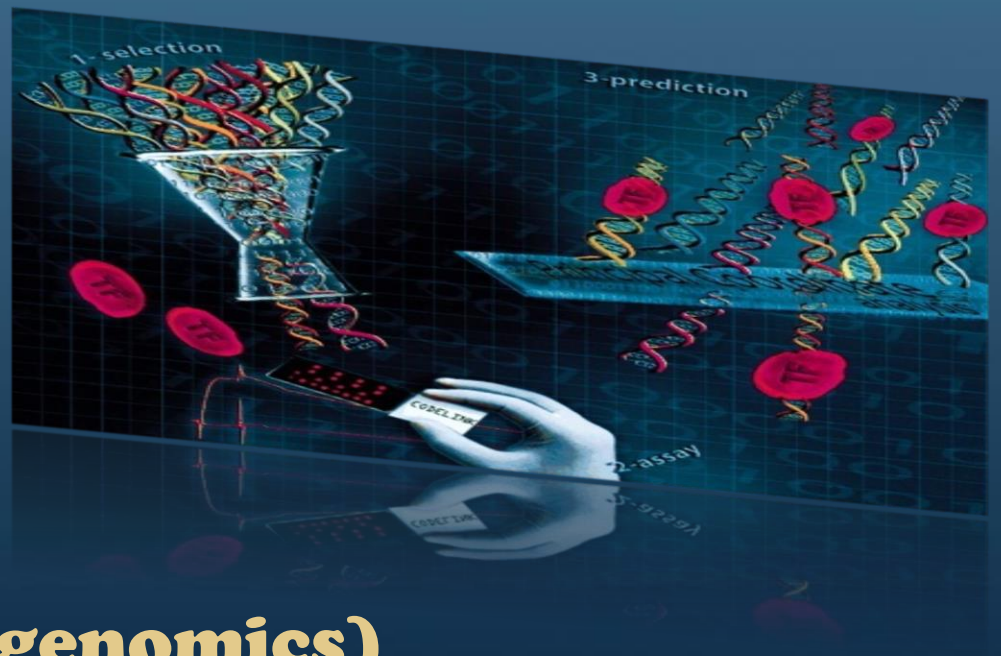


scanning

Data analysis

Application

- Gene expression analysis
- Disease diagnosis
- Drug discovery
- Toxicological research (Toxicogenomics)



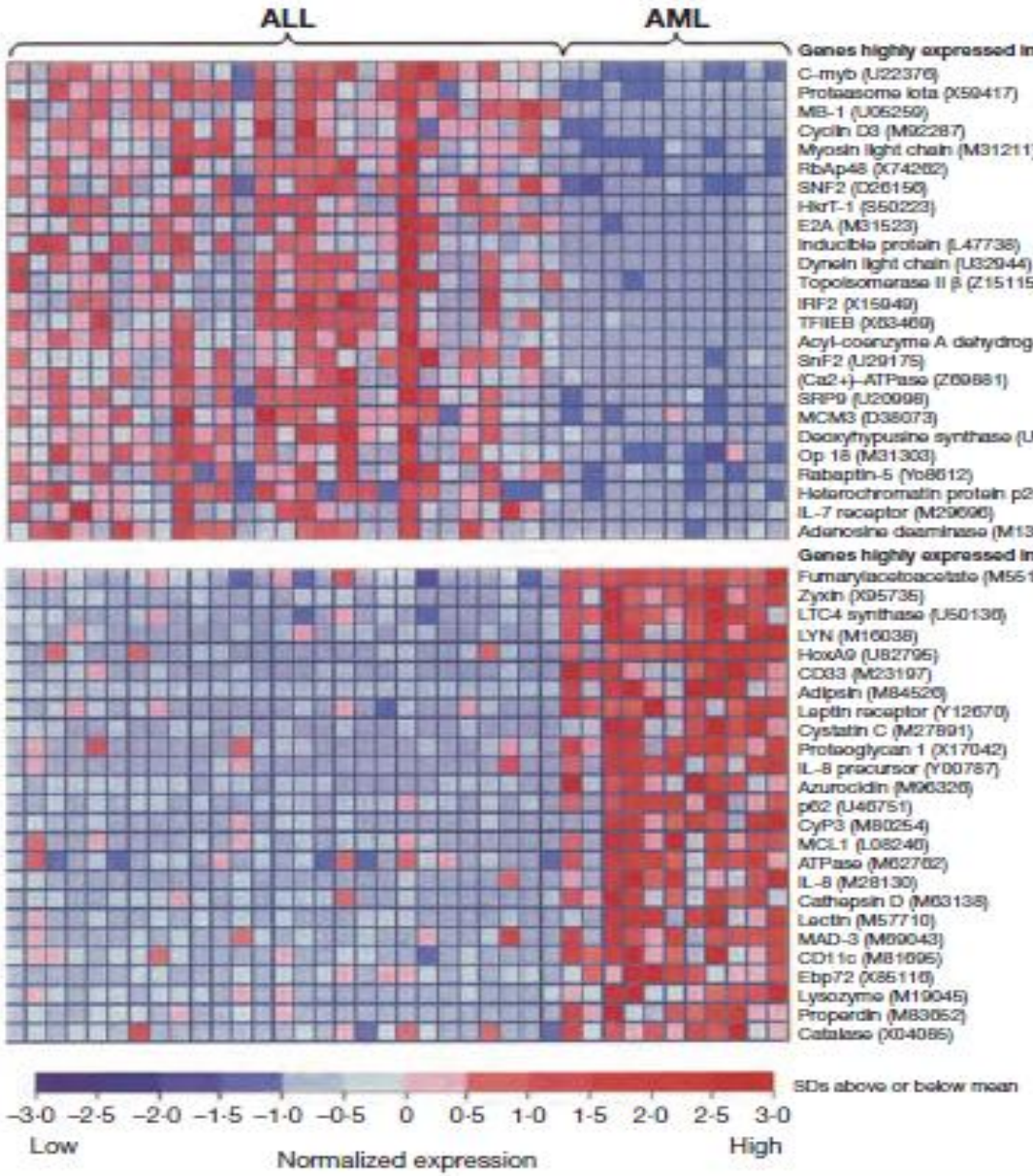


Figure 11.13 Microarray analysis of genes distinguishing acute lymphoblastic leukaemia (ALL) from acute myeloid leukaemia (AML). The 50 genes most highly correlated on gene-expression microarrays with each of these leukaemias are shown. Each row corresponds to a gene; each column corresponds to the expression value in a particular sample. Expression for each gene is normalized across the samples such that the mean is 0 and the SD is 1. Expression greater than the mean is shaded in red, and that below the mean is shaded in blue. Although the genes as a group appear correlated with the type of leukaemia under study, no single gene is uniformly expressed across the class, illustrating the value of a multigene prediction method. Source: Reproduced courtesy of Golub and colleagues.

Advantages

- Provides data for thousands of genes
- One experiment instead of many
- Fast and easy to obtain results
- Huge step closer to discovering cures for diseases and cancer
- Different parts of DNA can be used to study gene expression

Disadvantages

- DNA chips are expensive to create
- The production of too many results at a time requires long time for analysis
- The DNA chips do not have very long shelf life

Conclusion


Thanks for your attention...