



FACULTY OF ENGINEERING & TECHNOLOGY  
DEPARTMENT OF BIOTECHNOLOGY

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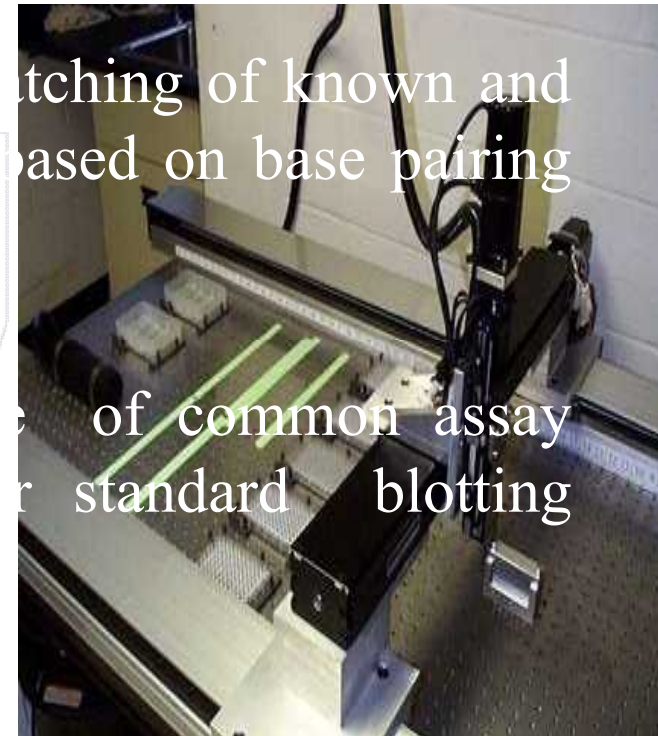
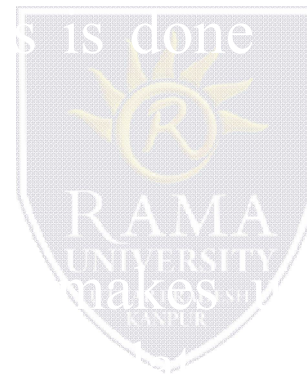
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# INTRODUCTION

- The large-scale genome sequencing effort and the ability to immobilize thousands of DNA fragments on coated glass slide or membrane, have led to the development of microarray technology.
  - A microarray is a pattern of ssDNA probes which are immobilized on a surface called a chip or a slide.
  - Microarrays use hybridization to detect a specific DNA or RNA in a sample.
  - DNA microarray uses a million different probes, fixed on a solid surface.
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# WHAT IS AN ARRAY

An array is an orderly



atching of known and  
s is done based on base pairing  
of common assay  
r standard blotting

## HISTORY

Microarray technology evolved from Southern blotting.

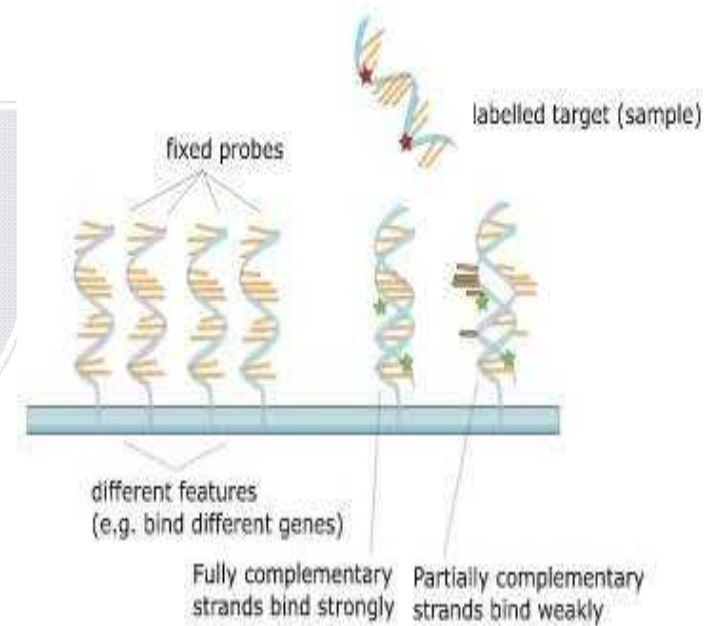
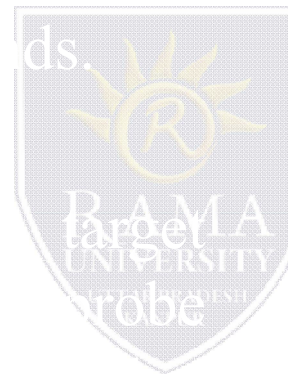
The concept of microarrays was first proposed in the late 1980s by Augenlicht and his colleagues.

They spotted 4000 cDNA sequences on nitrocellulose membrane and used radioactive labeling to analyze differences in gene expression patterns among different types of colon tumors in various stages of malignancy.

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# PRINCIPLE

The core principle behind




## DNA Micro Array Technology

DNA microarray technology may be defined as a high-throughput and versatile technology used for parallel gene expression analysis for thousands of genes of known and unknown functions.

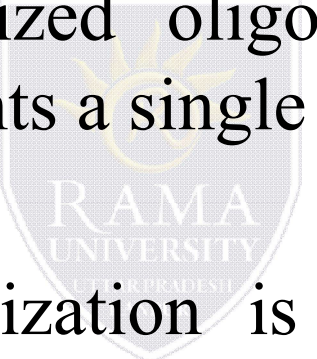
Used for detection of polymorphisms and mutations in genomic DNA

A DNA microarray is a collection of microscopic DNA spots on solid surface. Each spot contains picomoles of a specific DNA sequence, known as probes or reporters.



Each identified sequenced gene on the glass, silicon chips or nylon membrane corresponds to a fragment of genomic DNA, cDNAs, PCR products or chemically synthesized oligonucleotides of up to 70mers and represents a single gene.

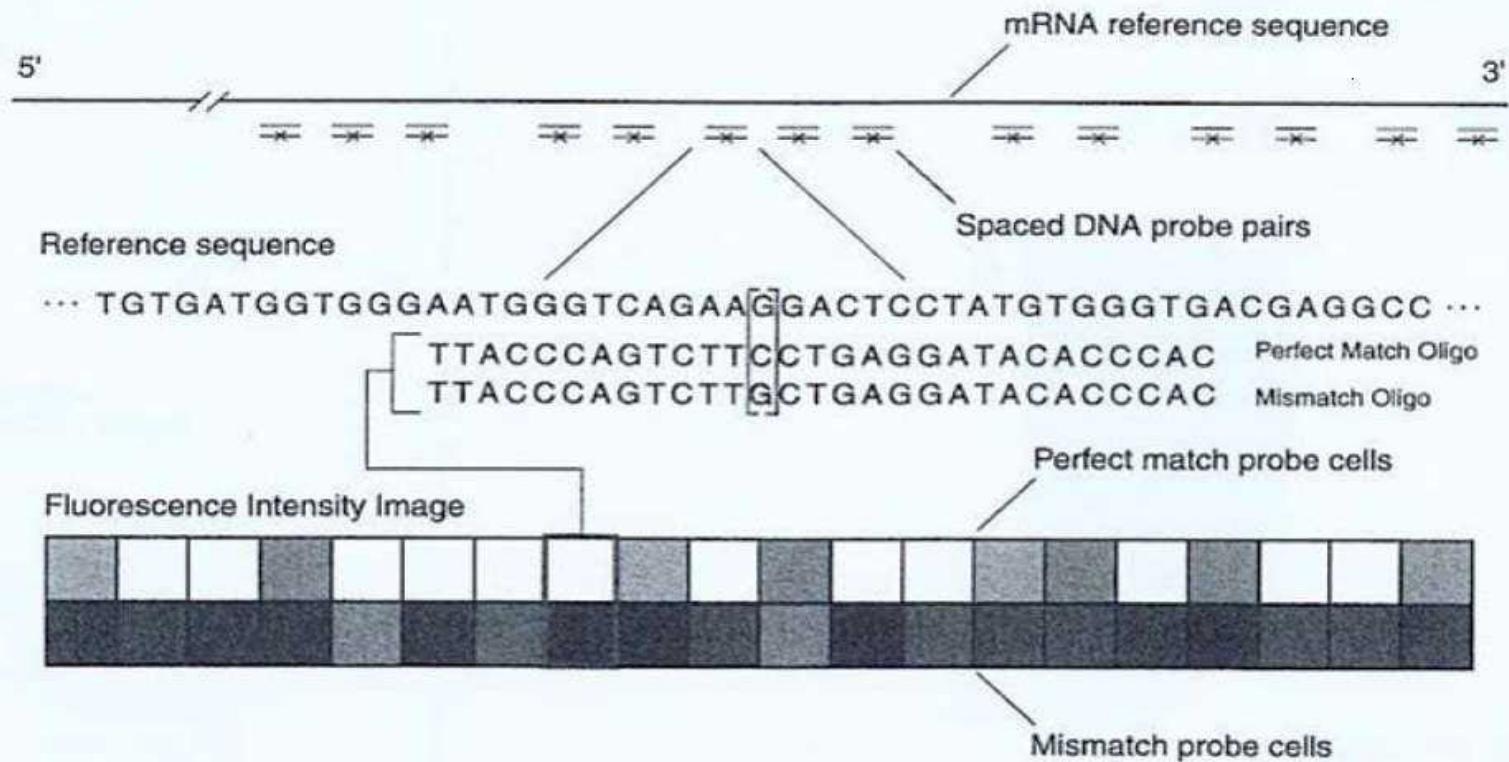
Probe-target hybridization is usually detected and quantified by detection of fluorophore, silver, or chemiluminescence labeled targets to determine relative abundance of nucleic acid sequences in the target.



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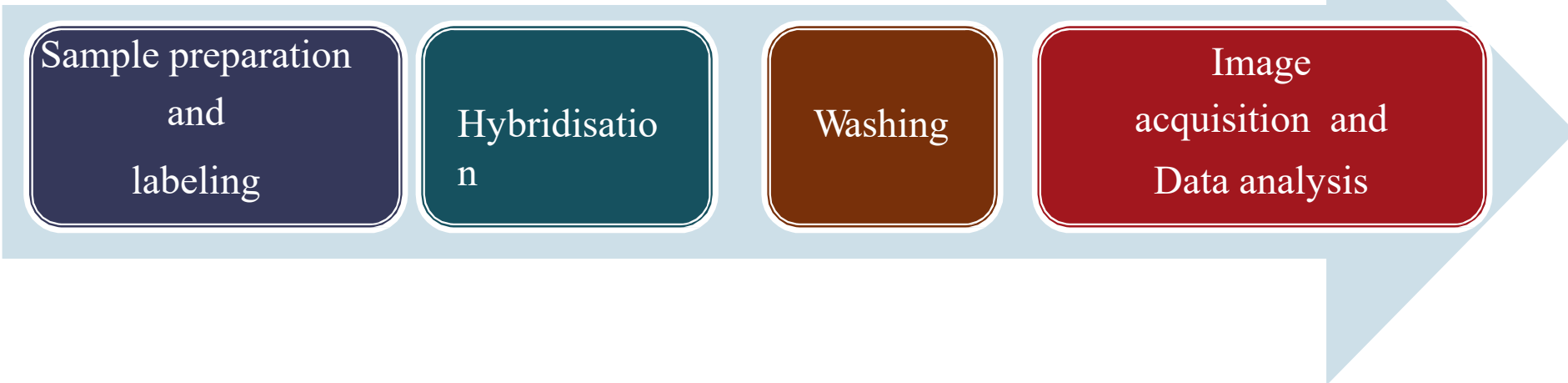
# GeneChip® Expression Array Design



# PRINCIPLE OF DNA MICRO ARRAY TECHNOLOGY

The principle of DNA microarray technology is based on the fact that complementary sequences of DNA can be used to hybridise, immobilised DNA molecules.

There are four major steps in performing a typical microarray experiment.



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graph LR; A[Sample preparation and labeling] --> B[Hybridisation]; B --> C[Washing]; C --> D[Image acquisition and Data analysis];
```

Sample preparation  
and  
labeling

Hybridisation

Washing

Image  
acquisition and  
Data analysis

# CONCLUSION

Microarray is a recently developed functional genomics technology that has powerful applications in a wide array of biological medical sciences, agriculture, biotechnology and environmental studies. Since many universities research institutions and industries have established microarray based core facilities and services, microarrays have become a readily accessible, widely used technology for investigating biological systems.