



FACULTY OF ENGINEERING & TECHNOLOGY
DEPARTMENT OF BIOTECHNOLOGY

GLASS cDNA MICROARRAYS

□ Glass cDNA microarrays

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□



technology

Patrick Brown and his colleagues at

device which deposits
a coated microscopic

DISADVANTAGES OF Glass on c-DNA Micro array

- Glass cDNA microarray have a few disadvantages such as intensive labour requirement for synthesizing, purifying, and storing DNA solutions before microarray fabrication.
- They may hybridise to spots designed to detect transcript from a different gene.

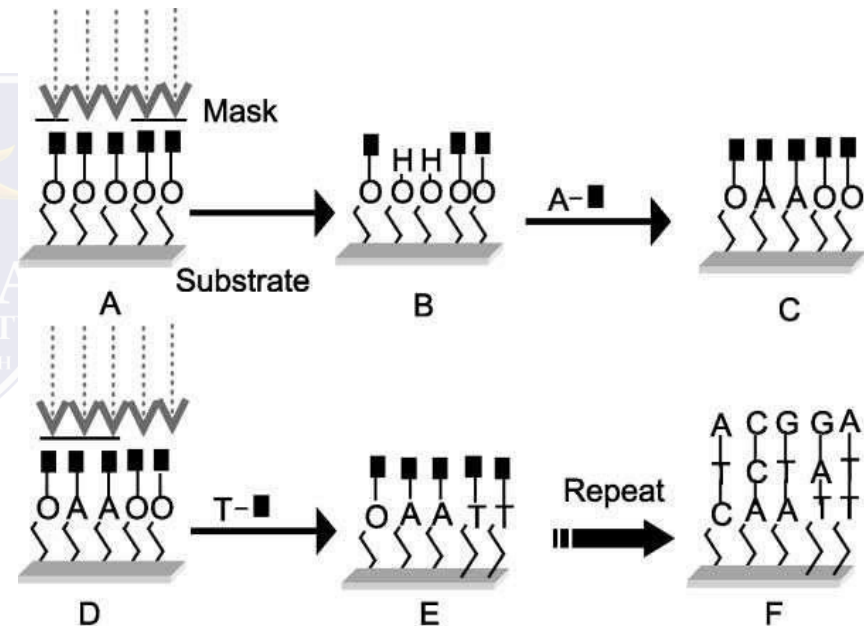
IN-SITU OLIGONUCLEOTIDE ARRAY

- Oligonucleotides are synthesized on the chip.
- Presently, the commercial versions of Affymetrix Gene Chips hold up to 500,000 probes/sites in a 1.28-cm² chip area.
- Due to such very high information content (genes) they are finding widespread use in the hybridisation-based detection and analysis of mutations and polymorphisms, such as single nucleotide polymorphisms.

In situ light-directed oligonucleotide probe array synthesis.

Light is directed through a

- photolithographic mask to specific areas of array surface.
- Activation of areas for chemical coupling. Attachment of A nucleotide containing photolabile protecting group X (MeNPOC).
- Next light is Directed to a different region of the array surface through a new mask.
- Addition of 2nd building block T containing a photolabile protecting group X.



ADVANTAGES OF IN SITU OLIGONUCLEOTIDE ARRAY FORMAT

- Advantages offered by the in situ oligonucleotide array format include speed, specificity and reproducibility.

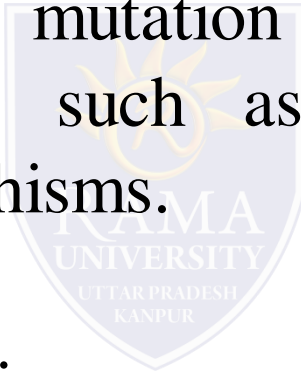
DISADVANTAGES OF IN SITU OLIGONUCLEOTIDE ARRAY FORMAT

- In situ oligonucleotide array formats tend to have expensive specialised equipments e.g. to carry out the hybridisation, staining of label, washing, and quantitation process.
- Short-sequences used on the array have decreased sensitivity/binding compared with glass cDNA microarrays.



MICROARRAY AS A COMPARATIVE GENOMICS TOOL

- Microarray technology have widespread use in comparative gene mutation analysis to genomic alterations such as sequence a nucleotide polymorphisms. nalyse and
- In microbiology microarray gene mutation analysis is directed to characterisation of genetic differences among microbial isolates, particularly closely related species.



DISEASE DIAGNOSIS

- Different types of cancer have been classified on the basis of the organs in which the tumors develop.
- Now, with the evolution of microarray technology, it will be possible for the researchers to further classify the types of cancer on the basis of the patterns of gene activity in the tumor cells.

DRUG DISCOVERY

- Microarray technology has extensive application in Pharmacogenomics.
- Comparative analysis of the genes from a diseased and a normal cell will help the identification of the biochemical constitution of the proteins synthesized by the diseased genes.

TOXICOLOGICAL RESEARCH

- Microarray technology provides a robust platform for the research of the impact of toxins on the cells and their passing on to the progeny.
- Toxicogenomics establishes correlation between responses to toxicants and the changes in the genetic profiles of the cells exposed to such toxicants.
- The microarray permits researchers to examine thousands of different genes in the same experiment and thus to obtain a good understanding of the relative levels of expression between different genes in an organism.