

# 진단의학 도구로서의 DNA칩

## DNA Chip as a Tool for Clinical Diagnostics

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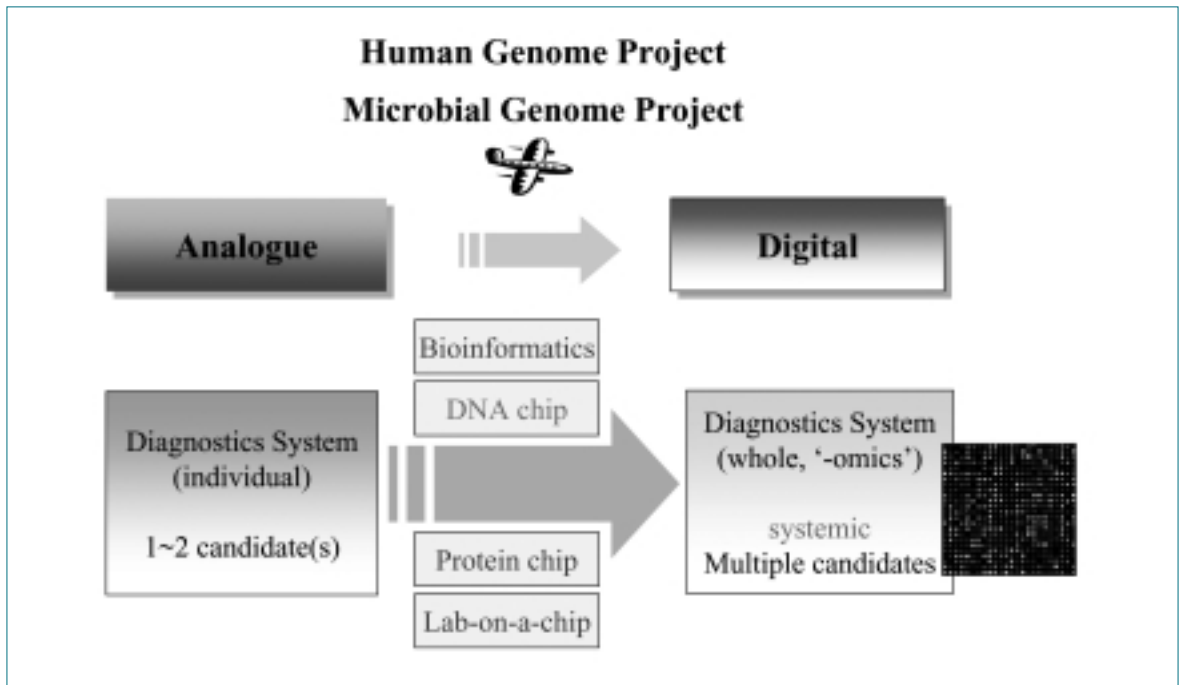
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### Abstract

The identification of the DNA structure as a double - stranded helix consisting of two nucleotide chain molecules was a milestone in modern molecular biology. The DNA chip technology is based on reverse hybridization that follows the principle of complementary binding of double - stranded DNA. DNA chip can be described as the deposition of defined nucleic acid sequences, probes, on a solid substrate to form a regular array of elements that are available for hybridization to complementary nucleic acids, targets. DNA chips based on cDNA clones, oligonucleotides and genomic clones have been developed for gene expression studies, genetic variation analysis and genomic changes associated with diseases including cancers and genetic diseases. DNA chips for gene expression profiling can be used for functional analysis in human cells and animal models, disease - related gene studies, assessment of gene therapy, assessment of genetically modified food, and research for drug discovery. DNA chips for genetic variation detection can be used for the detection of mutations or chromosomal abnormalities in cancers, drug resistances in cancer cells or pathogenic microbes, histocompatibility analysis for transplantation, individual identification for forensic medicine, and detection and discrimination of pathogenic microbes. The DNA chip will be generalized as a useful tool in clinical diagnostics in the near future. Lab - on - a chip and informatics will facilitate the development of a variety of DNA chips for diagnostic purposes.

**Keywords :** DNA chip; Oligo chip; Microarray; Gene expression; Genetic variation

: ; ; ; ; , X -



1.

가

가

DNA ( 1).

가

DNA

1953

DNA

가

, 10

DNA

(genome projects)

100

1. DNA

(genome)

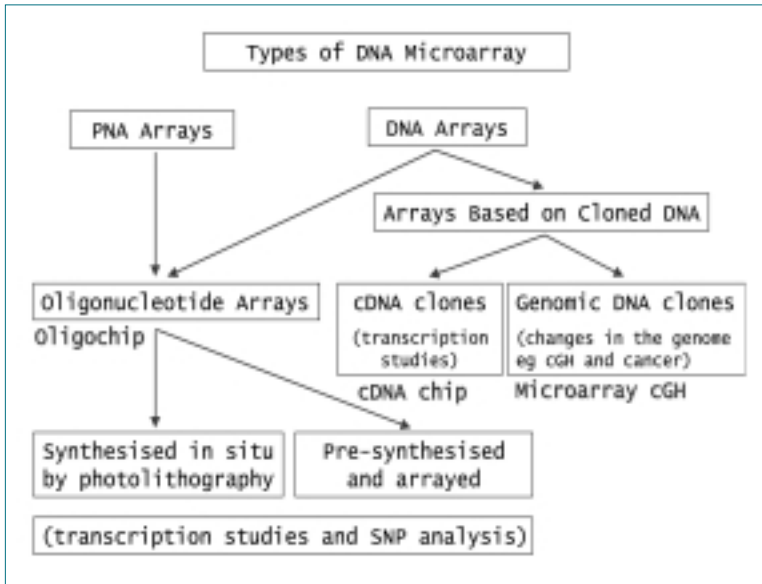
DNA

(reverse hybridization)

'South-

가 ern blot hybridization'

DNA



2. DNA ( : Briefings in Functional Genomics & Proteomics 2003 ; 2 : 8)

가

'DNA'

'DNA'

'DNA'

'DNA array'

'DNA microarray'

'cDNA'

'oligonucleotide'

'BAC'

'oligonu-

probe

cleotide

(oligo chip)

oligonucleotide

cDNA probe

target spot

(mRNA DNA PCR DNA) ray

(hybridization)

가 probe spot

array

100 spot

'microarray'

500 spot

300  $\mu$ m spot

(2).

'DNA'

Affymetrix 'GeneChip'

가 'gene'

(gene chip)'

가

'genome chip'

'gene array'

'BAC'

'DNA'

### 3. DNA

DNA

(cDNA, BAC

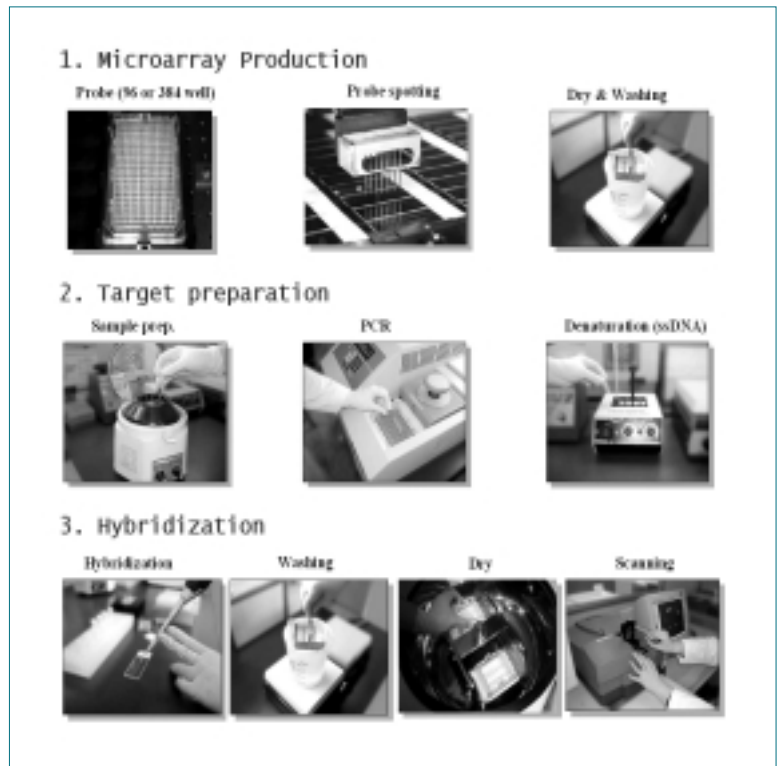
oligo-

nucleotide)

nucleotide

oligonucleotide

in situ



3. oligo

### DNA

가

cDNA

BAC

15~70 mer

oligonu-

#### 1. DNA

DNA

cleotide

oligo

(gene expression profiling)'

(gene-

( 3).

tic variation detection)'

cDNA oligo

1

oligo BAC

photolithography

DNA

가 가

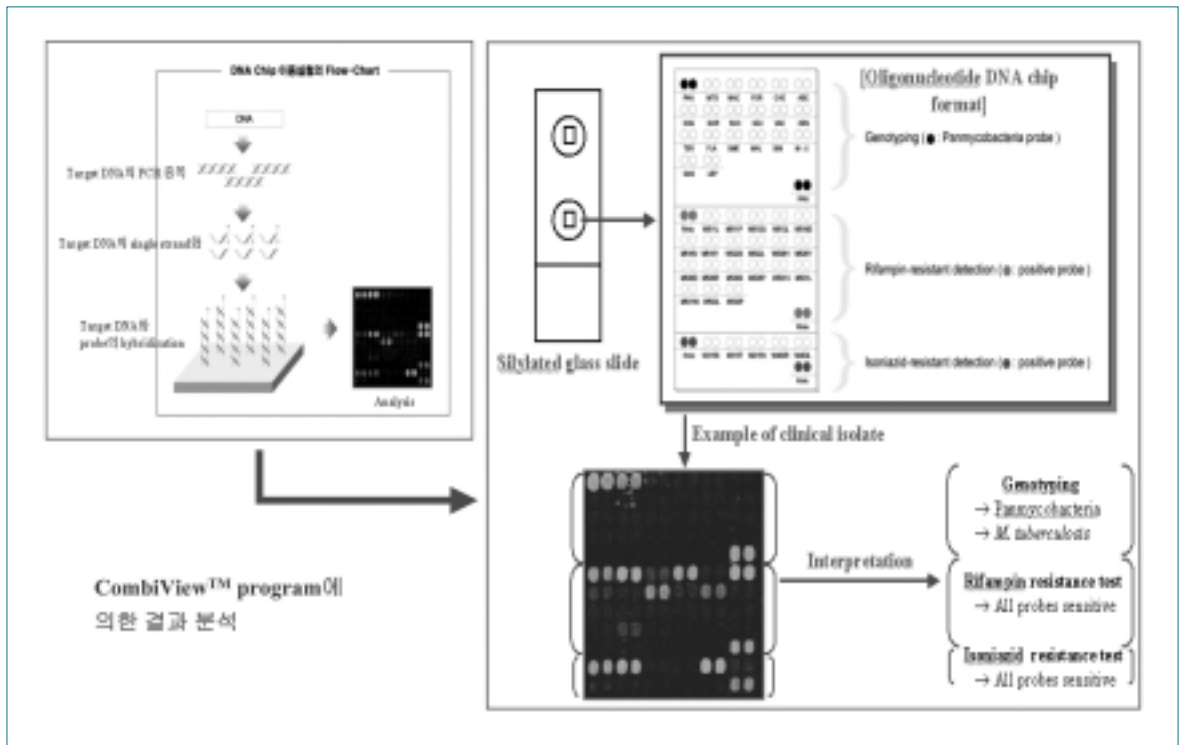
가

probe

DNA		DNA	
cDNA , oligo		oligo , BAC	
• , ,		• ( ,	
		)	
•		•	
• 가		•	
•			
•		•	
		•	

## 2. DNA

DNA	100~200 mg, poly(A) <sup>+</sup> RNA	5 mg	가
가			
	mRNA	cDNA	T7
	polymerase	poly(A) <sup>+</sup> RNA	



4. oligo

RNA 가

가 가

DNA 가

DNA 가

가 ,

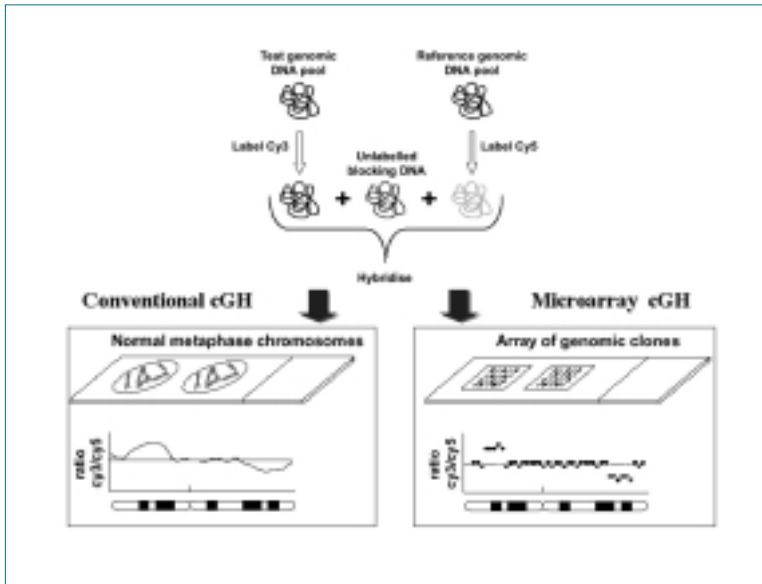
가 가

가

‘focused

array’가 kit DNA kit

kit , kit



5. ' CGH ' ' microarray CGH '

가  
.  
가  
(single  
nucleotide polymorphism, SNP)

SNP

가  
.  
가  
cystic fibrosis  
CFTR  
SNP,  
B C (HBV, HCV) p53 BRCA1  
(HPV) DNA 가 ApoE SNP가  
HBV DNA , SNP consortium  
가  
가 oligo 가 oligo  
.  
HPV 'BAC'  
, HBV , probe ( kb) BAC  
, (deletion)  
(MODY) , (duplication) (amplification)  
rifampin, isoni- CGH(comparative genome hybridization)  
azid, pyrazinamide 'microarray CGH'  
90% 가 ( 4). ( 5). 가  
oligo

(translocation)

가 ,

DNA

ATGC 4

가

, DNA

DNA

가 ,

2002  
technology road map)

가 (national

DAN

가

2006

, 가

, DNA

가

가

DNA

가

가

가

‘LOC(lab - on - a chip)’

가

가 ‘ (integration)’

가

가

DAN

(phenotype)

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| 2. | 7.  |
| 3. | 8.  |
| 4. | 9.  |
| 5. | 10. |