Agilent's SurePrint G3 CGH+SNP Microarray Platform

Product Note

Superior copy number change detection

Added LOH/UPD detection increases efficiency and reduces cost

Complete workflow from a single supplier

Easily customizable to design your own array

Search for more types of chromosomal aberrations on a single array

The power of the Agilent SurePrint G3 Human Comparative Genomic Hybridization (CGH) Platform has been extended to allow simultaneous detection of copy number and copy-neutral changes on the same array, increasing efficiency without sacrificing quality. Identification of copy-neutral changes, such as loss of heterozygosity (LOH) and uniparental disomy (UPD), is enabled by the addition of a set of SNP probes to Agilent's widely used CGH array, followed by data analysis using a novel algorithm implemented within Agilent's Genomic Workbench software. Available in a variety of formats using catalog-content or customized probe sets, Agilent's SurePrint G3 CGH+SNP Microarray Platform moves your research quickly to answers you can trust.

More effective, high-resolution detection of chromosomal variation

Accurate detection of chromosomal variation is the key to understanding the cytogenetic basis underlying a number of developmental disorders. Comparative genomic hybridization (CGH) analysis has revolutionized the field of cytogenetics by providing accurate identification of copy number variations at greater than 1000-fold resolution compared to traditional karyotyping. Until recently, however, detection of copy-neutral chromosomal changes—such as LOH or UPD—required additional experimentation. The Agilent SurePrint G3 Human CGH+SNP Platform adds SNP detection to Agilent's robust and highly regarded CGH platform, allowing you to rapidly and reliably identify both copy number variations and copy-neutral aberrations in a single microarray assay.

Using the identical high-throughput workflow as the SurePrint G3 CGH-only microarrays, the CGH+SNP arrays can be quickly incorporated into your cytogenetics research. Available in catalog or custom formats (Figure 1), the array offers maximum flexibility, while the Agilent 60-mer probes enable high-confidence characterization of copy number and copy-neutral chromosomal aberrations.

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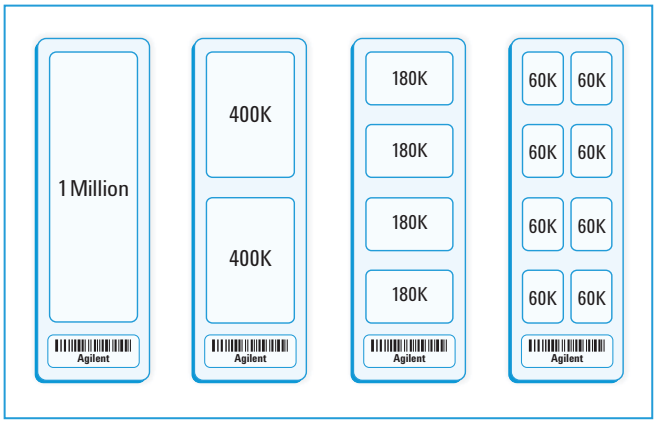

Figure 1. *Agilent's SurePrint G3 CGH+SNP catalog and custom microarrays are available in multiple formats and feature amounts.*

A customizable platform for simultaneous detection of copy number and copy-neutral variation

Expanding the current SurePrint G3 selection, Agilent's SurePrint G3 CGH+SNP arrays are available in both catalog (Table 1) and custom design formats. The catalog 2x400K SurePrint G3 CGH+SNP array contains approximately 300,000 CGH probes and 120,000 SNP probes. Genotypes are measured using two SNP probes per SNP, providing the highest call rate and accuracy per SNP, and resulting in ~5–10 Mb resolution for LOH/UPD detection across the entire genome. The CGH probes are gene- and exon-biased, focusing coverage to the most important regions of the genome.

The catalog 4x180K SurePrint G3 CGH+SNP array contains approximately 120,000 CGH probes and 60,000 SNP probes. Genotypes on this array are measured using one SNP probe per SNP, providing ~5–10 Mb resolution for LOH/UPD detection across the entire genome. The CGH probes consist of the entire ISCA (International Standards for Cytogenomic Arrays) Consortium (http://isca.genetics.emory.edu) 8x60K version probe set and an additional 60,000 backbone probes. The ISCA 8x60K probe set has an even backbone probe coverage of 60 Kb and high-density coverage of ~500 targeted regions with the spacing of 5 Kb per probe or at least 20 probes per gene region. These targeted regions include telomere and unique centromere FISH clone regions, microdeletion/duplication regions, genes of known haploinsufficiency, and regions associated with X-linked mental disorders.

Custom SurePrint G3 CGH+SNP microarrays can also be readily designed in eArray, a free web-based application, or eArray XD, the desktop version of eArray. The eArray database houses more than 28 million CGH probes and approximately 65,000 probes for SNPs. Multiple microarray formats allow for maximum flexibility while 60-mer probes enable high-confidence characterization of chromosomal variation.

Table 1. Comparison of SurePrint CGH+SNP 2x400K and 4x180K catalog microarrays

	Catalog 2x400K CGH+SNP	Catalog 4x180K CGH+SNP
Number of CGH probes	~300,000	~120,000
Median CGH probe spacing	~7 Kb	~25 Kb
ISCA content	none	ISCA 8x60K version
Exon biased	yes	no
Number of SNP probes	~120,000	~60,000
Number of SNP probes per SNP	2	1
Copy-neutral LOH resolution	~5–10 Mb	~5–10 Mb

Easy workflow designed for high-quality CGH+SNP detection

A simple, efficient sample preparation process starts from as little as 500 ng DNA and uses enzymatic restriction digestion followed by Klenow-based enzymatic labeling (Figure 2).[1] The new CGH+SNP microarrays are still printed on 1 in. x 3 in. glass slides and are compatible with Agilent's standard hybridization gaskets and chambers. Microarrays are scanned at 3 microns using the Agilent SureScan Microarray Scanner (G4900DA).

Novel and powerful algorithmic analysis detects regions of copy-neutral LOH or UPD (Figure 3). With high-quality DNA samples, the SNP call rate is greater than 95% with a greater than 99% accuracy.[2] The number and quality of copy number aberrations detected on the SurePrint G3 CGH+SNP microarrays is comparable to detection using G3 CGH-only microarrays,[2] with the added benefit of simultaneous identification of copy-neutral aberrations as small as 5 Mb. The new SurePrint G3 CGH+SNP array enables efficient, high-quality discovery of chromosomal aberrations that cannot be detected in a single assay using any other method.

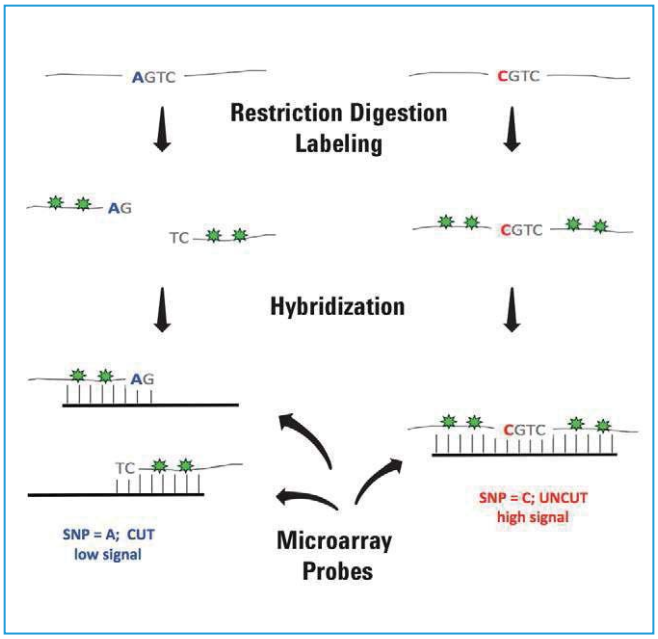

Figure 2. *The SurePrint G3 CGH+SNP microarrays use the same Agilent CGH workflow as the SurePrint CGH-only arrays. Restriction digestion of genomic DNA allows genotyping of SNPs located in the enzymes' recognition sites.*

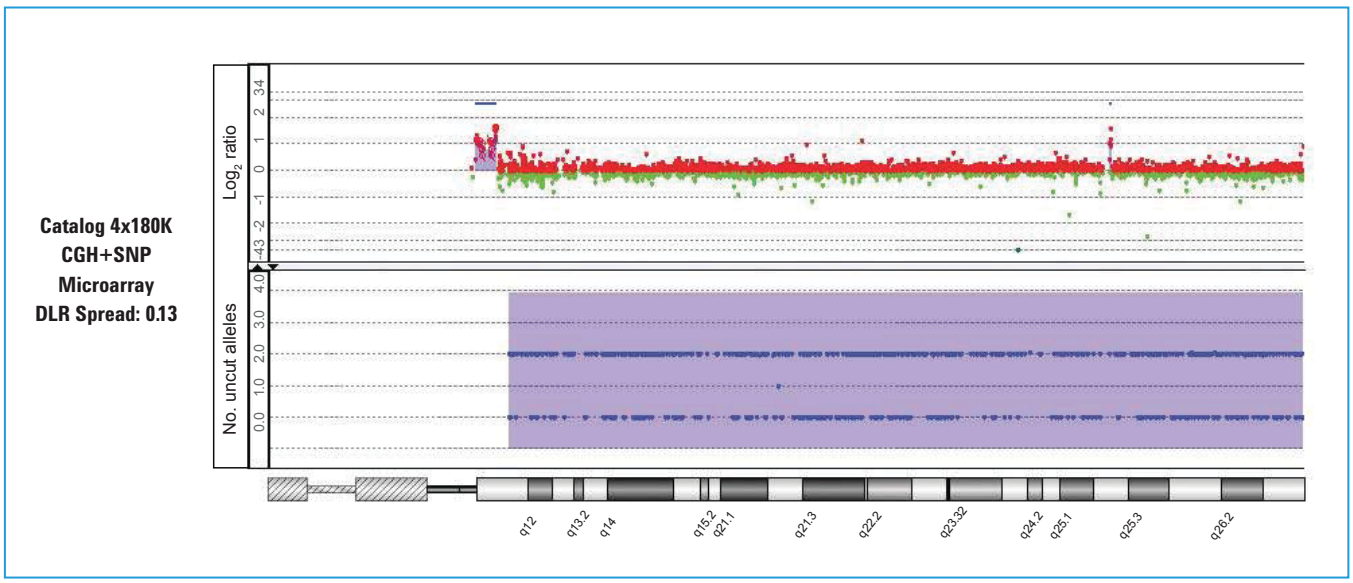

Figure 3. *Agilent Genomic Workbench view of SNP data (number of uncut alleles, bottom panel), and CGH data (log_2 ratios, top panel) from a CGH+SNP array shows UPD of the entire chromosome 15. Settings for CGH aberration calling: ADM-2, threshold 5, minimum of 3 probes ≥ 0.25 log_2 ratio.*

Powerful data analysis capabilities for both CGH and SNP detection

Agilent's Genomic Workbench software for CGH+SNP array analysis employs a novel algorithm to measure the total copy number of CGH probes and allele-specific copy numbers of SNP probes. Copy number aberration calls are determined entirely by non-SNP oligonucleotides maximizing signal-to-noise ratio. A SNP call is made from the (log) ratio of the signal of the sample to the signal of a genotyped internal reference. Regions of copy-neutral LOH or UPD are then located by identifying genomic regions with a statistically significant scarcity of heterozygous SNP calls. The Agilent Genomic Workbench software enables concurrent analysis of CGH and SNP data alongside QC metrics, allowing you to evaluate your data with confidence.

Agilent SurePrint G3 CGH + SNP Microarrays

Description	Number of Arrays/Slides	Number of Slides/Kits	Part Number
SurePrint G3 Human CGH+SNP Microarray 2x400K	2	5	G4842A
SurePrint G3 Human CGH+SNP Microarray 4x180K	4	3	G4890A
SurePrint G3 Custom CGH+SNP Microarray 1x1M	1	1	G4882A
SurePrint G3 Custom CGH+SNP Microarray 2x400K	2	1	G4883A
SurePrint G3 Custom CGH+SNP Microarray 4x180K	4	1	G4884A
SurePrint G3 Custom CGH+SNP Microarray 8x60K	8	1	G4885A

Note: Microarrays are shipped with foil seal. After breaking the foil, store microarrays at room temperature, in the dark, under a vacuum desiccator or in a nitrogen purge box. Do not expose microarrays to open air during storage.

Requires Agilent CGH Processing Components

Description	Part Number
SureTag Complete DNA Labeling Kit	5190-4240
Human Cot-1 DNA	5190-3393
Agilent Oligo aCGH Hybridization Kit (25) or (100)	5188-5220 or 5188-5380
Agilent Oligo aCGH Wash Buffer 1 and 2 Set	5188-5226
Hybridization Chamber, Stainless	G2534A
Hybridization Chamber Gasket Slides	Varies by array format and quantity
Hybridization Oven	G2545A
Hybridization Oven Rotator Rack	G2530-60029
SureScan Microarray Scanner	G4900DA
Agilent Cytogenomics	G1662AA–G1667AA

References

1. Manual: Agilent Oligonucleotide Array-Based CGH for Genomic DNA Analysis, Enzymatic Labeling for Blood, Cells, or Tissues (with a High-Throughput Option) manual, version 6.3. (G4410-90010)
2. Application Note: Simultaneous detection of copy number and copy-neutral LOH using a single microarray. (5990-6274EN)

For a more comprehensive list of peer-reviewed publications and research reviews, please visit www.agilent.com/genomics

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