The CytoScan® HD Array exceeds the performance recommendations for cytogenetic arrays outlined by the American College of Medical Genetics (ACMG)\(^1\).

Affymetrix created the CytoScan HD Array by empirically selecting probes from a pool of over 20 million probes and then further screening them with greater than 3,000 samples to choose the highest performing probes for whole-genome cytogenetic applications.

The image below illustrates the importance of including two different probe types (SNP and non-polymorphic probes) on a whole-genome array. The competing array shown detects only SNPs. Since the gene FANCB, for example, does not contain SNPs, the technology is unable to effectively interrogate the region. With the CytoScan HD Array, every gene in the genome is covered with SNP and non-polymorphic probes based on the structure of the genome to ensure high-resolution coverage of all genes.


### CytoScan® HD Cytogenetics Solution

designed by cytogeneticists for cytogeneticists

Traditional cytogenetics techniques such as karyotyping and fluorescent in situ hybridization (FISH) have been used to study chromosomal abnormalities for decades. These techniques are limited to only providing low-resolution copy number information based on qualitative visualization. Designed to empower next-generation cytogenetic studies, the CytoScan® HD Cytogenetics Solution provides a genome-wide approach that enables high-resolution DNA copy number analysis to detect gains, losses, loss of heterozygosity (LOH), regions identical-by-descent, and uniparental isodisomy (UPD) on a single array.

The most comprehensive and relevant coverage of constitutional and cancer genes on a single array

coverage of all 36,000 RefSeq genes including 12,000 OMIM, all ISCA constitutional regions, and Sanger cancer genes

High-density genotype-able SNPs

for low-level mosaicism visualization, loss of heterozygosity (LOH) detection, copy number change confirmation, and genotypes

Performance that exceeds community guidelines

specificity, sensitivity, and resolution across the genome

Complete solution that saves time and money

streamlined protocols, optimized assay performance, bundled reagents, easy-to-use software, DVD and laboratory-based training

Proven ChAS Software with genotypes

intuitive, graphical, and streamline analysis software

Highest performance with the broadest range of sample types

blood, bone marrow, buccal saliva, fresh and frozen tissue, fresh and cultured cells, and more

### Results that exceed community standards

for cytogenetic arrays—reliable performance and high-quality data

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The image below illustrates the importance of including two different probe types (SNP and non-polymorphic probes) on a whole-genome array. The competing array shown detects only SNPs. Since the gene FANCB, for example, does not contain SNPs, the technology is unable to effectively interrogate the region. With the CytoScan HD Array, every gene in the genome is covered with SNP and non-polymorphic probes based on the structure of the genome to ensure high-resolution coverage of all genes.


The high-density CytoScan HD Array includes 2.67 million markers for copy number (CN) analysis, approximately 750,000 common and rare genotype-able SNP probes, and 1.9 million non-polymorphic probes for whole-genome coverage.

- 100% Sanger cancer gene coverage
- 100% ISCA constitutional gene coverage
- 12,000 DMR genes
- 36,000 RefSeq genes

Unlike other arrays, which are restricted in their ability to deliver true whole-genome coverage due to probe density and probe placement limitations, the CytoScan HD Array offers the highest resolution gene-level coverage for all constitutional, cancer, X-chromosome, and RefSeq genes.
The gene-centric design of the CytoScan HD Array allows the highest resolution across the entire genome, which enables the detection of exon-level changes.

The figure above illustrates a 41 kb single-exon deletion of the MBD5 gene.

This CLL sample has many educational aberration types. Chromosome 11 illustrates a mosaic loss and a mosaic copy neutral LOH event.

Example of hemizygous loss and gain: This example illustrates copy number 1, 2, and 3 on chromosome 8.

These copy number changes were all FISH confirmed.

Regions identical-by-descent (detailed view of chromosome 2): This is an example of two blocks of LOH >10 Mb on chromosome 2. There is also a hemizygous loss on this chromosome illustrated by the red segment.

Trio analysis: SNPs allow for parent-of-origin genotype analysis to detect UPD and confirm copy number changes. Maternal UPD for chromosome 7 is shown above with a corresponding trio analysis genotype summary table.

The CytoScan® HD Array includes more than 2.67 million copy number markers of which 1.9 million are non-polymorphic probes and 750,000 are SNP probes that genotype with 99% accuracy. The high-density SNP array enables analysis of regions identical-by-descent and enhanced low-level mosaicism detection. CytoScan HD Array offers confident breakpoint determination (often with exon-level resolution) throughout the whole genome and genotype-able SNPs for parent-of-origin studies.

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One platform. Powerful applications. Outstanding resolution and enriched whole-genome coverage for cancer and constitutional genes—on a single array.

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Two samples visualized in parallel: hemizygous loss and mosaic loss: The sample at the top represents a full hemizygous loss on chromosome 11. The sample at the bottom represents a mosaic loss in the same region.

Both were confirmed with interphase FISH with the mosaic at 20 percent.

Exon-level resolution: The gene-centric design of the CytoScan HD Array allows the highest resolution across the entire genome, which enables the detection of exon-level changes.

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Outstanding resolution and enriched whole-genome coverage for cancer and constitutional genes—on a single array.

One platform. Powerful applications. Outstanding resolution and enriched whole-genome coverage for cancer and constitutional genes—on a single array.
ChAS Software designed by cytogeneticists for intuitive visualization and fast results

The Affymetrix Chromosome Analysis Suite (ChAS) v1.2 Software has been tailored to cytogenetic research analysis and reporting. By using the high-resolution CytoScan® HD Array with ChAS Software, it is easy to distinguish between aberrations and artifacts.

- Get results quickly with a streamlined analysis workflow
- Summarize chromosome aberrations across the genome
- Focus analysis on specific regions of known significance
- Analyze the genome at different levels of resolution
- Create, modify, and upload annotation files and flag regions for focused analysis
- Streamline the interpretation process with full genotype reporting functionality
- Directly access external databases such as NCBI, UCSC Genome Browser, Ensemble, and OMIM

*The Chromosome Analysis Suite v1.2 Software is available free of charge as part of the complete CytoScan® HD Solution to all GeneChip® data users. Please visit www.affymetrix.com/chas to download the complimentary ChAS v1.2 Software and all related array-specific files.

Streamlined CytoScan® Assay workflow completed in under three days

The CytoScan® HD Solution includes an optimized and streamlined assay and all-inclusive reagent kit. The assay protocol makes it easy to obtain consistent and high-quality results with processes aligned with laboratory workflow requirements. The CytoScan® Reagent Kit is designed to save time and money, reduce operator error, and deliver the highest performance.

- Long contiguous stretches of homozygosity (LCSH) indicating regions identical by descent
- Each LCSH segment is summarized, and individual thresholds can be selected by the user
- Quantification and summary of the total LCSH across the genome in tabular format
- This bone marrow sample has 55 Mb of copy neutral LOH on chromosome 11q.
The GeneChip® System 3000 Instrumentation Platform
flexible, proven, powerful

This industry-recognized instrumentation combined with innovative assays provide a fully integrated system for all your genetic analysis needs. The CytoScan® HD product may be run on either the GeneChip® System 3000 or the GeneChip® System 3000Dx v.2.

The GeneChip® System (GCS) 3000Dx v.2 is FDA-cleared and includes the GeneChip® Scanner 3000Dx v.2 with AutoLoaderDx, GeneChip® Fluidics Station 450Dx v.2, and Workstation with Affymetrix Molecular Diagnostic Software (AMDS). The GeneChip® Hybridization Oven 645 is also required. A Data Transfer Server is required to process RUO products on the GeneChip System 3000Dx v.2. With this complete platform, you have everything you need for hybridizing, washing, staining, and scanning of microarrays.

- Easy-to-use, integrated system for rapid adoption of both RNA and DNA applications
- Automated processing for increased data reproducibility and reduced hands-on time
- Cost-effective approach for multiple applications through a single flexible system
- Easy-to-follow workflow

### GeneChip® System 3000Dx v.2 assay menu

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<th>RUO*</th>
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<tr>
<td>Whole-transcript expression analysis</td>
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<tr>
<td>Custom assays</td>
<td>✓</td>
<td>✓</td>
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</tbody>
</table>

* Each "Research Use Only" (RUO) array requires an array-specific Assay Software Module (ASM). A custom ASM can be developed for any GeneChip® Array. A Data Transfer Server (DTS) is required to export .CEL files.

** FDA-cleared, IVD or CE-marked test developed by a third-party company on the Affymetrix® GCS 3000Dx platform.

### World-class support

Affymetrix offers an expanding portfolio of customer support and services—from training and instrument maintenance to consulting and compliance—led by our world-class team of multilingual technical experts, field application scientists (FAS), and regional field service engineers (FSE). For more information please visit www.affymetrix.com/service.

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