Comprehensive coverage with the Agilent SurePrint G3 Exon Microarray system

Product Note

Sensitive detection of low expressors and small-fold changes

Comprehensive and up-to-date content at the exon level

Gene- and exon-level detection from a single sample, on a single microarray

Complete workflow from RNA to validated results

Search for alternatively expressed exons with a comprehensive solution

Agilent's suite of powerful gene expression analysis microarrays has now been extended to include a series of exon microarrays, making it possible to study gene-level and exon-level expression on a single microarray. The new Agilent SurePrint G3 Exon Microarrays combine high sensitivity and broad dynamic range with extended coverage both within genes and across the genome. Most importantly, researchers can easily move beyond gene-level expression analysis by simultaneously measuring alternatively expressed exons. Catalog and custom designs are available for human, mouse, and rat species, while amplification and labeling reagents are available for both one-color and two-color study designs. This flexible platform offers a complete solution, taking you from sample to result while bringing gene expression analysis to the next level.

Sensitive detection of alternatively expressed exons

In recent years, scientists have found that more than 80 percent of the human genome undergoes alternative splicing. During splicing events, a complex process deletes certain exons from the pre-mRNA transcript, resulting in different mRNAs for a given gene. In this way, a single gene can be translated into multiple proteins, each with potentially different or even opposing functions in the cell. Abnormal variations in splicing are implicated in many genetic disorders and are believed to contribute to the development of cancer. Increasingly, scientists are realizing that in order to understand the relevance of expression changes, they must go beyond gene expression profiling and perform their studies at the exon level.

The Agilent SurePrint G3 Exon Microarrays make it easy to transition from standard expression analysis to exon analysis. Probes are designed to target all exons within genes based on well-annotated and up-to-date databases, ensuring both comprehensive and relevant coverage across the genome. Our high-quality 60-mer probes ensure high sensitivity and accuracy for all Agilent gene expression microarrays, including the new exon arrays. The Low Input Quick Amp WT Labeling Kit (LIQA WT) makes amplification and labeling from a low amount of RNA quick and easy. Having been co-developed with these arrays, LIQA WT is optimized to maintain an accurate representation of RNA species, now across whole transcripts. In addition, GeneSpring 11.5 provides new features for the analysis of splicing events along with gene-level expression, lending confidence in the detection of subtle changes now possible with the exon microarrays system.

A flexible and extensive platform

The new Agilent SurePrint G3 Exon Microarrays are available in two formats for catalog designs, 2x400K with two arrays per slide and 4x180K with four arrays per slide (Table 1). While the SurePrint G3 Exon 2x400K Microarrays provide more extensive coverage of known exons in the human, mouse, and rat genomes, the SurePrint G3 Exon 4x180K Microarrays provide an option for higher throughput and lower cost. Custom designs are readily available through Agilent's free online design tool, eArray, or through eArray XD, the desktop version. Probes may be selected from an Agilent database or uploaded into eArray and placed on any of the four SurePrint G3 formats: 8x60K, 4x180K, 2x400K, and 1x1M (Figure 1). Depending on the goals and design of an experiment, samples can be prepared using either a one-color or a two-color approach, making this a truly flexible portfolio.

Complete workflow designed for easy analysis and validation

A comprehensive workflow, including a new sample prep kit, a complete protocol, and analysis that also fits into the full Agilent Gene Expression system, makes studying exon-level gene expression changes both simple and efficient (Figure 2). A straightforward and quick sample preparation process using the LIQA WT requires as little as 25 ng total RNA (50 ng recommended) for RNA labeling and hybridization. Addition of random primers for sample labeling enables single-tube chemistry with no cDNA clean-up step for quick and reliable RNA labeling. Labeling can be performed using Cy3 only, or Cy3 and Cy5, offering both one- and two-color experiment options. Array results can be easily assessed and monitored using Feature Extraction software, which converts the scanned image into processed signals and then provides an extensive QC report to track array performance.

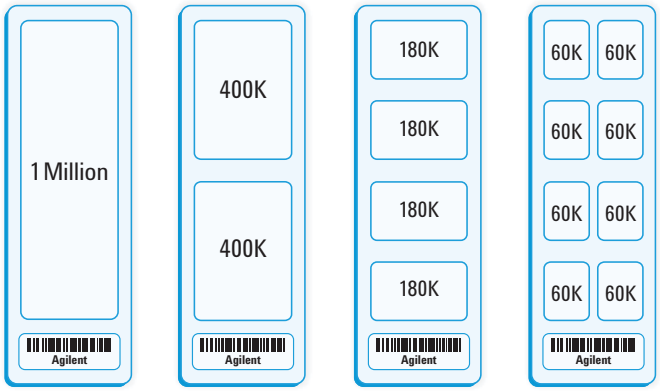

Figure 1. *Agilent SurePrint G3 Exon Microarrays are available in multiple formats and densities for flexibility in throughput, coverage, and cost.*

Species	Array Format	Genes Targeted	No. of Exon Probes	Probes from 8x60K Design	Databases Used for Design
Human	4x180K	20,411	174,458	19,128 (56%)	RefSeq Build 36.3, RSNM only
	2x400K	27,696	233,164	26,873 (78%)	RefSeq Build 36.3 Ensembl Release 52 Unigene Build 216 (Apr 2009) GenBank mRNA (Apr 2009)
Mouse	4x180K	23,215	165,984	19,203 (49%)	RefSeq Build 37, RSNM only
	2x400K	33,795	235,714	31,608 (80%)	RefSeq Build 37 Ensembl Release 55 Unigene Build 176 (Apr 2009) GenBank mRNA (Apr 2009) RIKEN 3
Rat	4x180K	20,483	160,141	23,444 (50%)	RefSeq Build 36.2, RSNM only
	2x400K	26,276	214,270	31,948 (72%)	RefSeq Build 36.2 Ensembl Release 55 Unigene Build 177 (Oct 2008) GenBank mRNA (Jan 2009)

Table 1. *Additional features specific to the 2x400K catalog versions (as compared to the 4x180K versions) include: (1) contains probes targeting exons from 35 to 60 bp, and (2) targets 5′ and 3′ UTRs in addition to gene exons.*

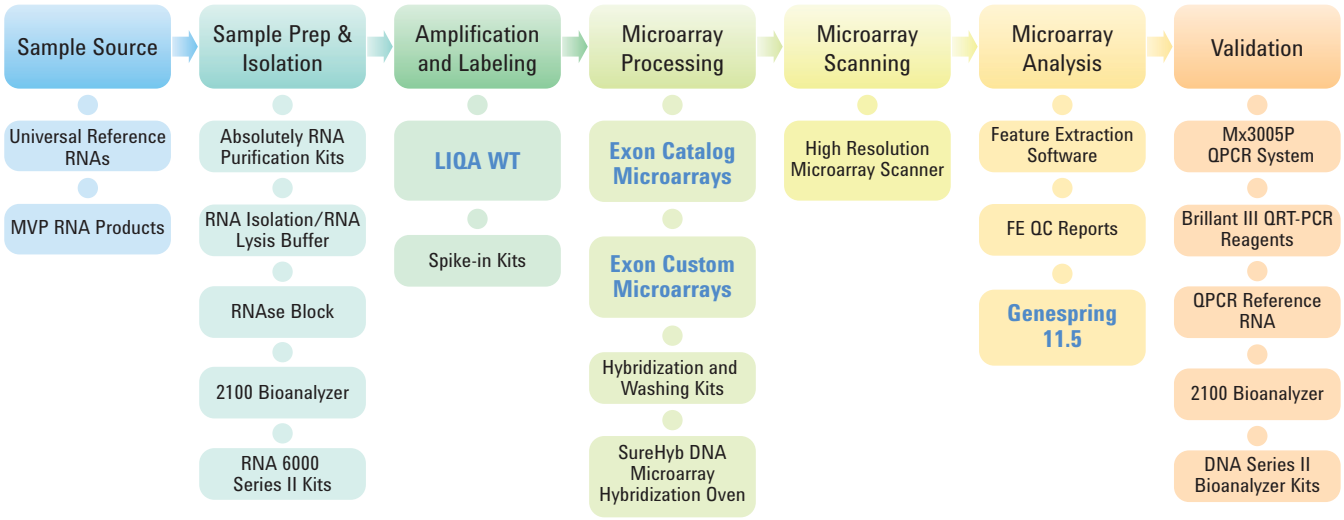

Figure 2. *The SurePrint G3 Exon Microarrays system provides tools for RNA processing, from sample through analyzed and validated results.*

Powerful, easy-to-use GeneSpring exon data analysis

Agilent's GeneSpring software provides powerful, easy-to-use statistical tools for the visualization and analysis of the transcriptome, the genome, the proteome, and the metabolome all within one common interface. Designed specifically for the needs of biologists, GeneSpring offers an interactive desktop computing environment that promotes investigation and enables understanding of microarray data within a biological context. GeneSpring 11.5 incorporates a new workflow, statistical routines, and a host of enhanced visualizations specifically created for the analysis of Agilent exon arrays (Figure 3). These new features leverage the new exon-level content to promote deeper understanding of the transcriptome. GeneSpring 11.5 also marks the introduction of true "multi-omic" analysis with the ability to analyze traditional array data in the context of mass spectrometry experiments. Underlying this new capability is GeneSpring's traditional strength in cross-platform and cross-species translation, ontology and pathway analysis, and data management.

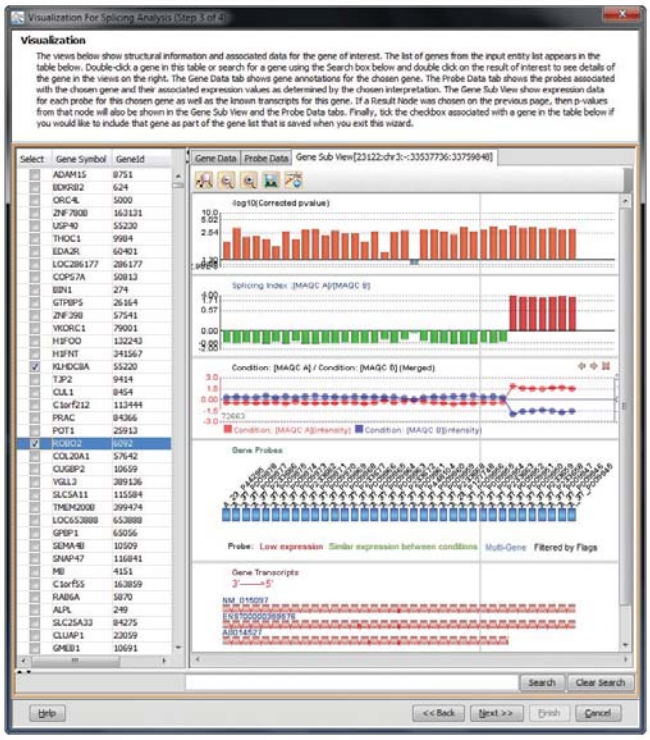

Figure 3. *GeneSpring 11.5 makes it easy to align probe p-values with splicing indexes and sample signals to quickly identify regions of alternative splicing.*

Agilent SurePrint G3 Exon Microarrays

Description	Slides/Kit	Part Number
SurePrint G3 Human Exon 4x180K Kit	3	G4832A
SurePrint G3 Mouse Exon 4x180K Kit	3	G4833A
SurePrint G3 Rat Exon 4x180K Kit	3	G4834A
SurePrint G3 Human Exon 2x400K Kit	3	G4848A
SurePrint G3 Mouse Exon 2x400K Kit	3	G4849A
SurePrint G3 Rat Exon 2x400K Kit	3	G4850A
SurePrint G3 Custom Exon 8x60K	1	G4863A
SurePrint G3 Custom Exon 4x180K	1	G4864A
SurePrint G3 Custom Exon 2x400K	1	G4865A
SurePrint G3 Custom Exon 1x1M	1	G4866A

Required Processing Components

Description	Part Number
Low Input Quick Amp WT Labeling Kit, no dye	5190-2942
Low Input Quick Amp WT Labeling Kit, One-Color	5190-2943
Low Input Quick Amp WT Labeling Kit, Two-Color	5190-2944
Low Input Quick Amp WT Labeling Kit, Cy5	5190-3386
Two-color RNA Spike-in Kit	5188-5279
One-color RNA Spike-in Kit	5188-5282
Gene Expression Hybridization Kit	5188-5242
Gene Expression Wash Buffer Pack	5188-5327
Stabilization and Drying Solution	5185-5979

Description	Academic Part Number	Commercial Part Number
GeneSpring GX Standalone 1 year license	G3784AA	G3778AA
GeneSpring GX Concurrent 1 year license	G3783AA	G3777AA
GeneSpring GX Standalone 2 year license	G3782AA	G3776AA
GeneSpirng GX Concurrent 2 year license	G3781AA	G3775AA
GeneSpring GX Standalone 3 year license	G3780AA	G3774AA
GeneSpring GX Concurrent 3 year license	G3779AA	G3773AA
GeneSpring Workgroup Server 1 year license	G1754AA	G1771AA

www.agilent.com/genomics/exon

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