

CodeLink Rat Whole Genome Bioarray

~34 000 rat gene targets on a single bioarray

CodeLink™ Rat Whole Genome Bioarray offers comprehensive coverage of the rat genome for genome-wide gene expression analysis on a single bioarray (Fig 1). CodeLink™ Rat Whole Genome Bioarray targets ~34 000 transcripts and ESTs, including over 29 000 well substantiated rat genes. This bioarray is fully integrated with the CodeLink™ Expression Bioarray System of optimized reagents, protocols, processing tools, and software for ease of use and superior performance. Key performance features include:

- **Accurate and reproducible biological results.** For best results from every bioarray experiment, ~34 000 quality probes were designed and experimentally tested for performance. In addition, advanced non-contact deposition robots and Six Sigma based manufacturing processes ensure that every CodeLink™ bioarray complies to design and quality specifications.
- **High assay sensitivity and specificity.** An improved and proprietary 3-D aqueous gel matrix ensures enhanced interaction between probe and target simulating liquid phase hybridization kinetics. With this matrix, sensitivity of detection is as low as 1:2 000 000 mass ratio determined by spiking experiments at the cRNA level (Table 1 and Fig 2) for enhanced detection of low abundance transcripts.



Fig 1. CodeLink™ Rat Whole Genome Bioarrays are packaged with a unique Flex Chamber that allows simple setup, easy loading of target, and solution mixing for improved hybridization efficiencies. Optimized matrix chemistry and non-contact deposition robotics results in excellent spot morphology and increased density.

CodeLink™ Whole Genome Bioarray performance

	<i>Typical performance</i>	<i>Benefit</i>
Sensitivity	Mass ratio < 1:1 000 000 with bacterial spiking into cRNA or total RNA level (Fig 2)	Detection of more low abundance transcripts (< 0.3 copies per cell)
Dynamic range	Linear signal response across three orders of magnitude (0.05 pM – 50 pM) (Fig 2)	More usable/accurate data across a broad range of gene expression levels
Specificity	Discrimination of > 2 base mismatches	Better discrimination of highly homologous genes
Signal reproducibility	Typically < 15% total median CV among production batches, all probes included; ~8% median CV among production batches, only probes above noise included	Reproducible differential expression results in every experiment (Fig 3 and Fig 4)
Minimum detectable fold change	> 98% within two-fold change for replicates	Reduced noise for better detection of small changes in gene expression and more usable data per bioarray (Fig 3 and Fig 4)

Table 1. CodeLink™ Whole Genome Bioarray observed performance specifications.

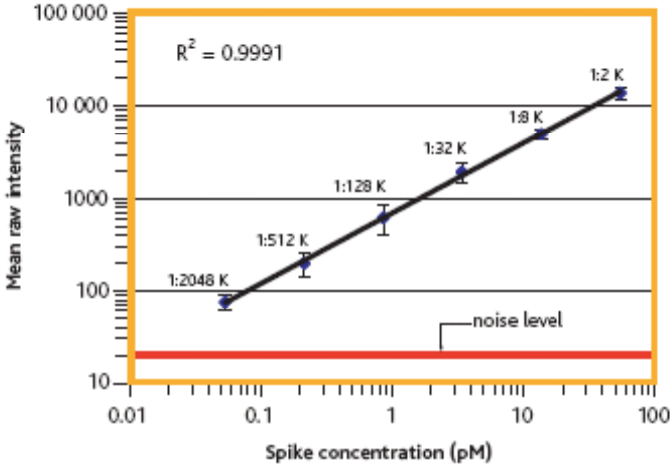


Fig 2. CodeLink™ Whole Genome Bioarrays show sensitivity of detection down to ~1:2 000 000 mass ratio determined by spiking experiments at the cRNA. Total dynamic range shown is 0.05-50 pM spike concentration range.

CodeLink™ Rat Whole Genome Bioarray specifications

Number of arrays in set	1
Number of probes	33 849
Number of transcripts	32 590
Number of discovery genes	29 842*
Positive controls	40
Negative controls	256
Housekeeping genes	~50
Number of probes per gene	One specific & functionally validated probe
Oligonucleotide probe length	30-mer probe
Probe proximity to 3' end	90% within 550 bases; average distance of 289 bases
RNA sample input	0.2–2 µg total RNA
Type of assay	One color
Storage & handling temperature	Room temperature

*Based on unique UniGene IDs.

Table 2. CodeLink™ Rat Whole Genome Bioarray specifications.

~34 000 Rat transcripts represented in a single experiment

Rats exhibit high similarity to many human biological pathways, making it a key model system for human physiological and toxicological studies in drug discovery applications. CodeLink™ Rat Whole Genome Bioarray is designed to interrogate approximately 34 000 transcripts representing most of the known and predictive genes of the rat genome, as it is described today in the public domain. Each transcript is represented by a 30-mer probe which is designed to conserved exons across the transcripts of targeted genes (Table 2). The probe sequences, representing well annotated, full length and partial rat gene sequences, were designed based on sequences selected from the NCBI UniGene build #129, RefSeq database (April 1, 2004 release) and dbEST database (March 20, 2004 release) (Table 3).

Well-annotated mRNA or coding sequences were chosen to ensure usefulness for a large range of applications in basic research, biotechnology, and drug development. Each sequence was carefully screened to ensure high-quality, specific probe design, and to reduce redundancy of gene targets. All of the probes designed to these sequences were functionally tested, and over 95% were functionally validated against 10 rat tissues to ensure best representation of the gene and biologically relevant results.

CodeLink™ Rat Whole Genome Bioarray probe distribution

Unique NCBI accession numbers	32 590
Unique UniGene IDs	29 842
Unique RefSeq IDs	4212
Unique locus link Ids	12 449
Ensembl genes	4000

Table 3. CodeLink™ Rat Whole Genome Bioarray content source and representation of public databases.

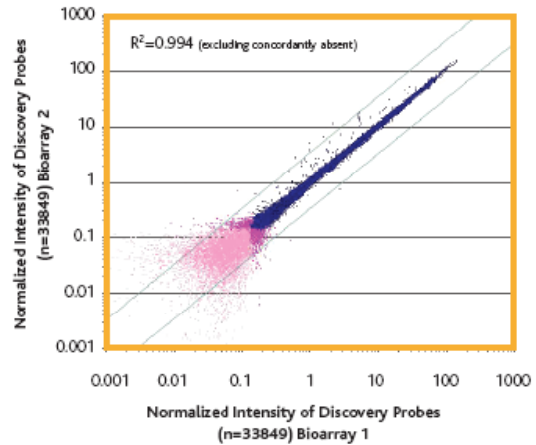


Fig 3. CodeLink™ Rat Whole Genome Bioarrays exhibit excellent array-to array signal intensity reproducibility. The plotted normalized probe signals from two independent CodeLink™ Rat Whole Genome Bioarrays—each run with 10 µg of the same labeled brain cRNA target—are shown here. Between these two bioarrays, 99.6% of all probes with “good” signals were within two-fold of each other. The dark blue data points represent the concordantly “good” probes (G); the bright pink data points represent the non-concordantly “good” probes (G and L); and the light pink data points represent the concordantly “absent” probes (L). The two-fold lines are shown in gray.

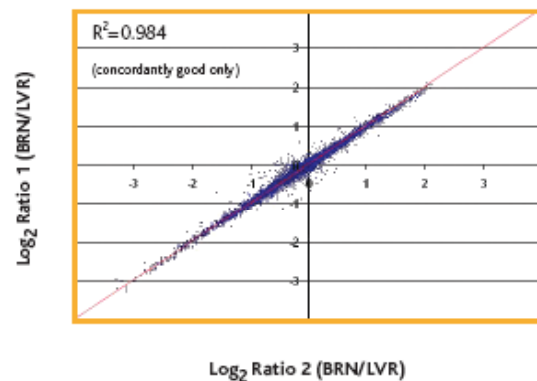


Fig 4. CodeLink™ Rat Whole Genome Bioarrays ensure high differential expression ratio reproducibility for robust expression profiling. The normalized probe signals from four independent CodeLink™ Rat Whole Genome Bioarrays—two run with 10 µg of brain and two run with 10 µg of liver cRNA target—were used to calculate two separate data populations of brain:liver expression ratios. The log₂ of those ratios are shown here. The dark blue data points represent the ratios generated from only concordantly “good” probes (G) on all of the bioarrays (n=21 347 ratios). The red line illustrates a slope of 1.

As a result of their high-quality probe content and design, CodeLink™ Rat Whole Genome Bioarrays can be reliably used for many applications, including genome-wide analysis of gene expression, transcriptional profiling of disease, discovery of new target genes, and analysis of pathways related to metabolism and development. For instance, using CodeLink™ Rat Whole Genome Bioarrays, one can identify genomic biomarkers that may predict with great precision the potential toxicological, mechanistic, and side effects of a drug candidate, thus significantly reducing the cost of drug development in the clinic.

Back-compatible data

For flexibility and data preservation, CodeLink™ Rat Whole Genome Bioarrays are compatible with lower density CodeLink™ rat bioarrays. This means that existing data from CodeLink™ UniSet™ Rat 10K Bioarrays can be continuously used in future studies along with newly generated data from CodeLink™ Rat Whole Genome Bioarrays (Fig 5).

CodeLink™ Expression Bioarray System

As part of the CodeLink™ Expression Bioarray System (Fig 6), CodeLink™ Rat Whole Genome Bioarrays are compatible with existing instruments, reagents, software, and accessories.

- CodeLink™ iExpress Assay Reagent Kit provides the required reagents and easy-to-follow protocol for target preparation, including cDNA synthesis and in vitro transcription. This high yield reagent kit produces sufficient amplified material for multiple replicate experiments from as little as 0.2-2 µg total RNA.
- New CodeLink™ Expression Analysis v5.0 software supports all current CodeLink™ bioarrays, including new CodeLink™ Whole Genome Bioarrays. This latest software version provides accurate data extraction and integrates manufacturing quality control information and gene information with spot-

finding and primary data analysis. Data generated with CodeLink™ Gene Expression Analysis v5.0 software is back-compatible with data generated with previous software versions.

- A complete line of accessories, including parallel processing and hybridization tools, is available for use with CodeLink™ Rat Whole Genome Bioarray.

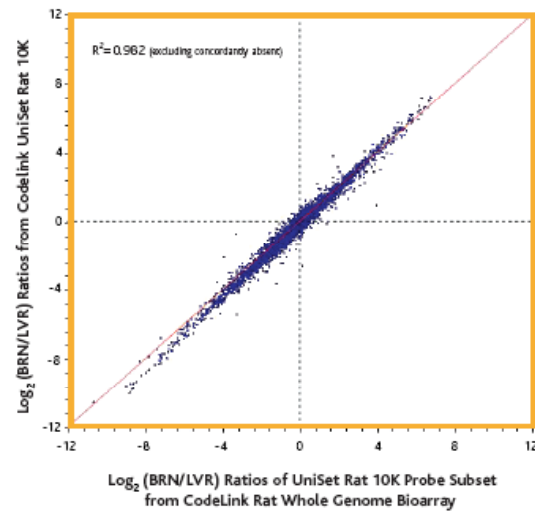


Fig 5. CodeLink™ Rat Whole Genome Bioarrays generate data that is back-compatible to corresponding data from CodeLink UniSet Rat 10K Bioarrays. The differential expression ratios of brain to liver show high concordance between the two CodeLink™ Bioarray platforms. The normalized probe signals from three bioarrays of each CodeLink™ product and of each cRNA target (brain and liver) were averaged separately. The brain:liver ratios of these mean normalized signals were then calculated for each product: CodeLink™ Rat Whole Genome Bioarray and CodeLink™ UniSet Rat 10K Bioarray. The log₂ of those ratios from the two products' overlapping subset of probes are shown here. The dark blue data points represent the ratios generated from only concordantly "good" probes (G) on all of the bioarrays (n=6627 ratios). The red line illustrates a slope of 1.



Fig 6. CodeLink Rat Whole Genome Bioarray is fully integrated with the CodeLink Bioarray System.

Ordering information

Description	Size	Code number
CodeLink Rat Whole Genome Bioarray	6/pack	300031-6pk
CodeLink iExpress Assay Reagent Kit	24 reactions	67601000
Universal Shaker Kit	12 slides	310031
Expression Parallel Processing Kit	12 slides	310010
Cy™5-Streptavidin for Microarrays	1 mg	28900224
CodeLink™ Gene Expression Analysis v5.0 software		310035

For further information, please contact the Applied Microarray, Inc. sales office below

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