

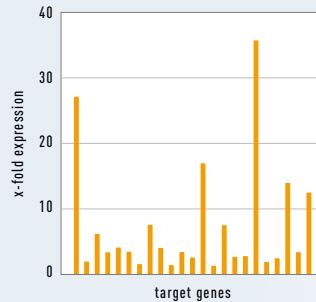
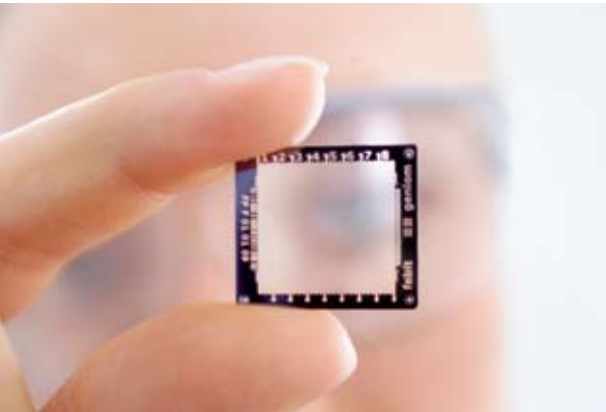


READ, WRITE, UNDERSTAND THE CODE OF LIFE

# RNA Expression Profiling

GENE ACTIVITY IN SPECIFIC DISEASES, PATHWAYS & ORGANISMS





Example of the development of a Geniom biomarker signature array for the analysis of human FFPE samples. Probes for a selection of 23 specific target genes were designed and validated, and signature gene expression profiles were detected in FFPE-derived human RNA samples with highest sensitivity.

## Discover Gene Expression Signatures

The transcriptome represents the collection of all RNAs produced in a cell or tissue at a defined time in development. Within biological systems it provides the critical link in the flow of information between genes and disease. Therefore, identifying gene expression changes that are reacting to or causing disease promises to significantly enhance our understanding of common disorders.

Microarrays represent a powerful tool for the analysis of RNA expression – from pathway specific gene expression signatures to genome-wide patterns of gene activity. When applied to samples representing diseased and normal states, microarray-based expression profiling can identify differentially expressed genes that may play a role in the disease and predict progression or severity.

Array-based methods are making substantial contributions to the discovery of disease biomarkers and sets of signature markers. Microarrays accommodate the growing requirement of multiplex testing for disease diagnosis and treatment, promising to improve disease staging, risk stratification and treatment decisions.

Furthermore, RNA expression profiling plays a fundamental role in other research fields such as developmental biology, stem cell research along with virology and microbiology. Substantial knowledge is being generated looking into transcriptional processes and biological mechanisms from many different organisms.

Meeting the requirements of modern genomic research, febit offers a wide range of predesigned Geniom Biochips for a variety of organisms and molecular pathways. Additionally, customized Biochips can be easily designed and quickly synthesized according to experimental needs.

### KEY BENEFITS OF THE GENIOM TECHNOLOGY

- **A WIDE RANGE OF CATALOG GENIOM BIOCHIPS FOR ALL STANDARD ORGANISMS**
- **FLEXIBLE CUSTOMIZATION OF ARRAYS FOR YOUR SPECIFIED RNA EXPRESSION ANALYSIS**
- **RELIABLE AND ACCURATE GENE EXPRESSION PROFILING, INDEPENDENT FROM SAMPLE SOURCE**
- **MINIMAL SAMPLE AMOUNT REQUIRED (EUKARYOTES 500 ng, PROKARYOTES 3 µg OF TOTAL RNA)**
- **MICROFLUIDICS ENABLE AUTOMATION OF MICROARRAY PROCESSING FOR LESS HANDS-ON TIME, REDUCED COSTS, AND CONSISTENT HYBRIDIZATION CONDITIONS**
- **EXCELLENT ARRAY-TO-ARRAY REPRODUCIBILITY**

Geniom Biochips can be dedicated to a given species, or specific genetic variants. Furthermore, intergenic regions and the transcription of long non-coding RNAs can be addressed to keep the pace with the growing knowledge in the field of transcriptomics.



#### GENIOM® BIOCHIPS FACTS

- Microfluidic Biochip with precise fluid control for reproducible hybridization and washing conditions
- Closed compartment eliminates evaporation and enables high temperature hybridization conditions
- 8 separate microchannels each with up to 15.624 features
- 124.992 features per Biochip
- Enables parallel hybridization of 8 different samples

## Versatile Microarrays for Precise Profiling of Any Gene

The heart of the Geniom Technology is the microfluidic Biochip. Predesigned catalog Geniom Biochips are available with validated and optimized probe design covering a variety of species, diseases and pathways. This includes whole genome expression profiling arrays that can be picked from an evergrowing list of species, along with Biochips covering specific signal transduction pathways or human cancer genes.

Optionally, probe content can easily be customized with proprietary sequences to optimize individual experiments. Based on the microfluidic microarray technology and light directed *in situ* synthesis of the capture probes, the Geniom Biochips offer the required flexibility to be instantly adapted to new sequence information. Capture probes are directly synthesized within the microchannels of the biochip, enabling on-the-fly production of up-to-date microarrays.

**Geniom Biochips for RNA expression profiling are useable with febit's Analytical Services or on your Geniom RT Analyzer**

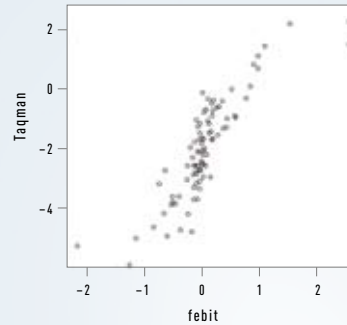
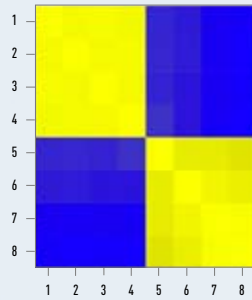
#### Full RNA profiling service provided by febit

- From sample to ready-to-publish data
- Fast and flexible Biochip customization with up-to-date sequence data from any organism
- Project consulting
- Sample quality control
- Sample labeling
- Microarray hybridization and read out
- Comprehensive data analysis and easy-to-understand bioinformatics report

#### RNA Profiling with Geniom RT Analyzer in your lab

- Fully automated microarray processing for your fast and easy analysis
- Intuitive software and short hands-on time
- Flexible biochip design and instant adaption to new sequence information
- Bioinformatics support

**Analysis of RNA expression profiles – from pathway specific gene expression signatures to genome-wide patterns of gene activity**



mRNA expression profiling of mouse cortex and retina tissue. The correlation heatmap on the left displays highest reproducibility of the replicates. Quantitative RT-PCR results show excellent correlation (yellow) of gene expression results.

# Automated Sample Testing

## MULTIPLEX ANALYSIS ON THE GENIOM RT ANALYZER

Studies comprising many samples, for example large patient groups or extensive case-control studies require a quick and easy to handle high-throughput technology that is offered by febit's Geniom RT Analyzer platform.

### THE GENIOM® RT ANALYZER TECHNOLOGY INTEGRATES HIGH PRECISION MICROFLUIDICS WITH AUTOMATED MICROARRAY PROCESSING

- AUTOMATED SAMPLE LOADING
- DYNAMIC TEMPERATURE CONTROL
- LOW VOLUME ACTIVE MOTION HYBRIDIZATION (20 µl)
- AUTOMATED WASHING
- AUTOMATED DYNAMIC IMAGING

It is due to the microfluidic nature of the Geniom Biochips that full control of the experiment is gained and complete automation of microarray processing is enabled. This leads to very consistent hybridization conditions and highly reproducible results along with a rapid turn-around time.

The typical sample throughput is 8–16 samples per day, depending on the application and required hybridization times. Phycoerythrin and Cy3 are fluorescent dyes typically used for experiments on the Geniom RT Analyzer; however, established protocols applying other dyes are available.

Researchers have the option to apply Geniom biochips for RNA profiling on the Geniom RT Analyzer platform in their own lab or to explore febit's full expression profiling service.

Rapid service from sample submission to ready-to-publish data guarantees highest quality gene expression profiles and a detailed bioinformatics report that includes a comprehensive and easy-to-understand analysis of the results.

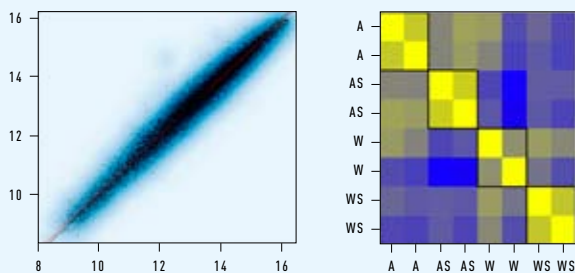
Additionally, febit's bioinformatics support service offers complete project consultation including microarray design and comprehensive analysis of experimental data to all users.



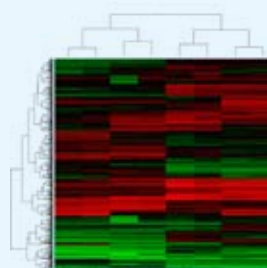
# Validated Arrays for Any Model Organism and Beyond

Whether your research is focused on biomedical approaches in humans, analyses of classic model organisms such as mouse or *Drosophila*, or if you are aiming to characterize prokaryotes: Geniom Biochips enable RNA expression profiling in any species. Febit provides a comprehensive list of predesigned microarrays

to pick from. It comprises pro- and eucaryotic whole genome expression arrays, signal transduction pathway as well as miRNA target gene Biochips. Their flexible adoption in combination with excellent reproducibility of the results guarantee you get reliable answers to the questions you address.



*Aspergillus fumigatus* mRNA expression profiling, measuring eight samples and four different conditions. The scatterplot of replicates on the left as well as the correlation matrix on the right show the excellent reproducibility of the gene expression profiling results. Correlation of replicates is 0.985.



Downstream analysis of *Aspergillus fumigatus* mRNA expression profiling. Clustering of probes and samples shows that replicates cluster together and show unique fingerprints of gene expression, revealing deregulated genes involved in key networks.

# febit's RNA Expression Profiling Service

YOUR BENEFITS	SAMPLE ANALYSIS REQUIRES MINIMAL ...	FEBIT'S FULL SERVICE INCLUDES	BIOINFORMATICS DATA SERVICE
<ul style="list-style-type: none"> <li>- Fast service from sample to ready-to-publish data</li> <li>- Validated arrays for any model organism and beyond</li> <li>- Flexible and fast biochip design for custom biochips</li> <li>- Comprehensive analysis report of your results</li> </ul>	<ul style="list-style-type: none"> <li>- <b>TIME</b> from sample submission to data results report in 2-3 weeks</li> <li>- <b>SAMPLE AMOUNT</b> only 0,5-1 µg total RNA for Eukaryotes and 3 µg total RNA for Prokaryotes</li> </ul>	<ul style="list-style-type: none"> <li>- Project consulting</li> <li>- Sample quality control</li> <li>- Sample labeling</li> <li>- Microarray hybridization and read out</li> <li>- Comprehensive data analysis and easy-to-understand bio-informatics report</li> </ul>	<ul style="list-style-type: none"> <li>- Customized design and data analysis</li> <li>- Detailed data interpretation and an easy-to-understand analysis report</li> <li>- Personal support by febit's experienced in-house experts</li> <li>- Validation and development of biomarker signatures</li> </ul>

## Catalog Order Numbers

<b>GENIOM® RT ANALYZER</b> - Instrument, software package, PC, screen, installation, training, service package	P0001
<b>STANDARD mRNA SCREENING</b>	S0003
<b>CUSTOM mRNA SCREENING</b>	S0006
<b>CUSTOM GENIOM® BIOCHIP DESIGN SERVICE</b> - Design Service (From RNA sequences to Geniom® Biochip design; up to 5 MBases) - Please inquire for genomes or target sequences exceeding 5 MBases	S0050
<b>CUSTOM GENIOM® BIOCHIP SYNTHESIS SERVICE</b> - Synthesis Service 30nt (30nt-Probe design and Geniom® Biochip-Synthesis) - Synthesis Service 60nt (Probe synthesis 30-60 nt according to your specifications)	S0060 S0061
<b>GENIOM® DATA BIOINFORMATICS SERVICE</b> - Bioinformatics Service Geniom® Data (From raw data to analysis and bioinformatics report within 2-4 weeks)	S0070

Please refer to febit's Product Catalog to see the complete list of catalog Biochips.

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\*Note: This number is only toll-free for callers inside of the US and Canada.