Agilent 2100 bioanalyzer

Application compendium

Agilent Technologies

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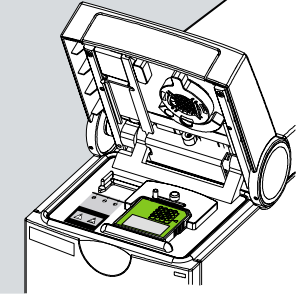
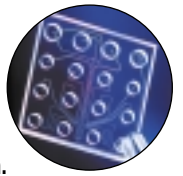
Agilent 2100 bioanalyzer

Agilent Technologies is a leading provider of life science and chemical analysis solutions. We offer systems for the acquisition and interpretation of genetic and chemical information – from sample handling, to analysis, data management and reporting. Let us provide you with the right solution for your success.

Whatever your life science needs, Agilent Technologies has the solution. We are committed to providing you with superior technology designed for maximum productivity and cost effectivenes.





The 2100 bioanalyzer is a unique analysis tool capable of handling nucleic acids, proteins and cells on one platform. When combined with any one of our LabChip® kits, developed by Caliper Technologies Corporation, lab-on-a-chip technology can revolutionize your laboratory.

One of the many benefits the 2100 bioanalyzer has over conventional bioanalytical methods is the elimination of time consuming procedures - you enjoy standardized handling and interpretation of data. And as our portfolio of LabChip kits continues to expand, you will benefit from the wide range of applications to which the technology can be used. LabChip kits simplify the process of data gathering and analysis down to three quick and easy steps:

Load sample, run analysis, view data.

The 2100 bioanalyzer utilizes micro-fabricated chips with up to 12-wells requiring minimum sample consumption, in the low µl-range. Prepackaged reagents included with the LabChip kits help to speed up the entire process.

The 2100 bioanalyzer with lab-on-a-chip technology will increase the efficiency of your analysis and the productivity of your day.

- With it's single, compact system architecture the 2100 bioanalyzer integrates sample handling, separation, detection and data analysis, all in the name of speed.

- Eliminate potential mistakes that can occur while interpreting and storing data. The 2100 bioanalyzer automatically incorporates steps some researchers might otherwise ignore in the interest of time.

- The 2100 bioanalyzer helps to optimize PCR reactions for gene expression, sequencing, cloning and typing. When used in conjunction with the **DNA LabChip** kits, it provides higher sensitivity, improved sizing accuracy and automated, reproducible quantitation, crucial for RT-PCR and any type of multiplex PCR.

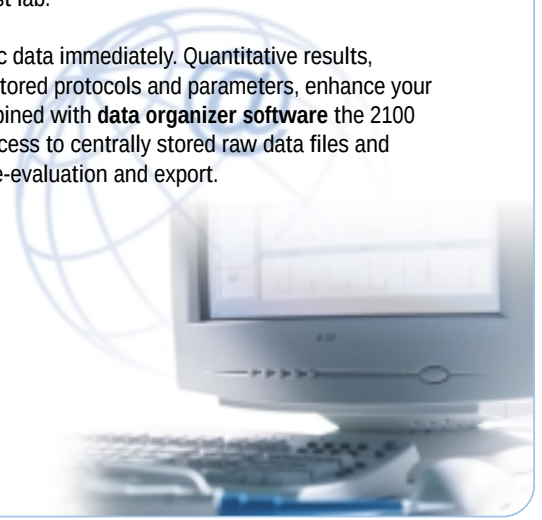
- Catch RNA degradation with sample amounts as low as 200 pg of total RNA and automatically detect ribosomal RNA contamination in mRNA using the **RNA 6000 Pico LabChip kit**. The **RNA 6000 Nano LabChip kit** is the industry standard for sample QC in the context of microarray analysis.

- DNA and RNA LabChip kits enable you to check the quality of probes and targets in your **microarray gene expression analysis**. Agilent also provides the full solution for gene expression analysis with its high performance microarray scanner and the suite of off-the-shelf microarrays.

- The **Protein 200 Plus LabChip** kit is a fast and reliable assay capable of analyzing a multitude of different protein samples. Used with the 2100 bioanalyzer it can analyze ten, 4 µl samples in less than 30 minutes.

- Agilent offers an add-on pressure cartridge, cell fluorescence software and **Cell LabChip kit** for multiple types of cell assay applications. Combined with the 2100 bioanalyzer, this makes performing simple flow cytometric analyses a reality, even for the smallest lab.

- Network and share electronic data immediately. Quantitative results, in addition to electronically stored protocols and parameters, enhance your lab's QA/QC practices. Combined with **data organizer software** the 2100 bioanalyzer provides easy access to centrally stored raw data files and analysis results for review, re-evaluation and export.



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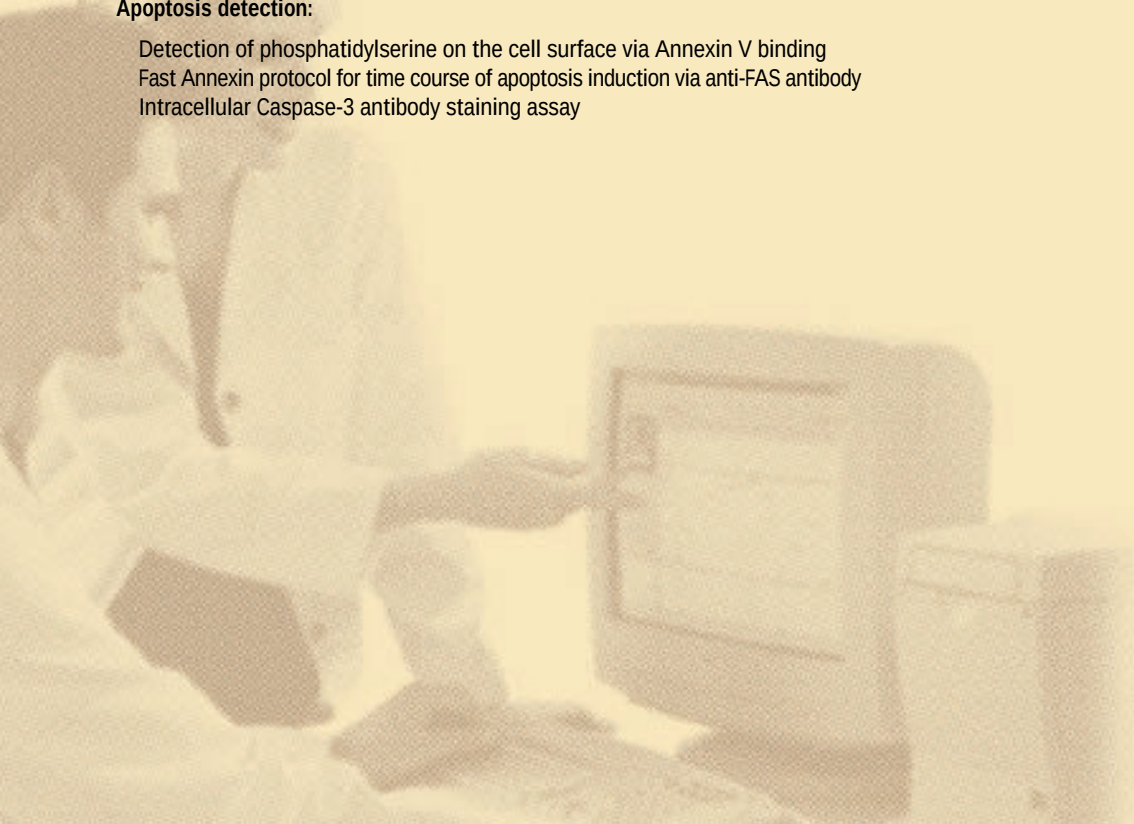
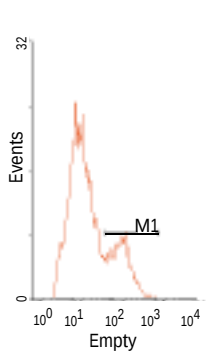


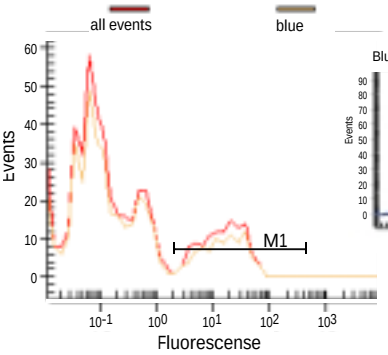
Protein expression monitoring

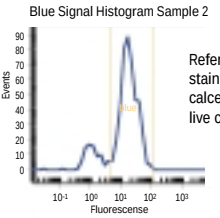
Cell surface antibody staining - CD4 in CCRF CEM T-cells

Flow cytometer
(10,000 Events)

2100 bioanalyzer
(500 Events)







Reference staining on calcein blue live cells

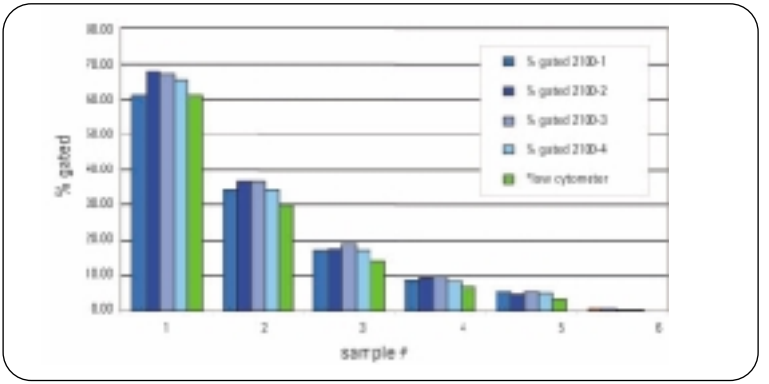
Kit: Cell fluorescence LabChip kit
Assay: Antibody staining assay
Application: CCRF-CEM cells were stained with hCD4-APC labeled antibodies and calcein live dye. 65% of all CCRF-CEM live cells (yellow curve) are expressing CD4 protein which is good in comparison to conventional flow cytometer results.

Corresponding application note: 5988-4322EN

Protein expression monitoring

Cell surface antibody staining - CD3 in T-cell leukemia

Averaged data per instrument



Mean % CD3+ cells				
2100-1	2100-2	2100-3	2100-4	Flow cyt.
60.9	67.8	66.6	65.0	60.9
34.4	36.7	36.7	34.3	29.8
17.3	17.8	18.7	17.2	13.8
8.9	9.4	9.9	8.3	6.5
5.1	4.4	5.3	4.9	3.2
0.8	0.6	0.3	0.3	0.0

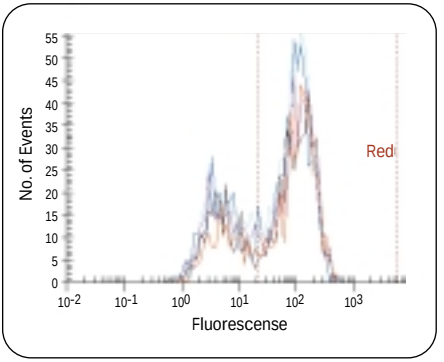
Kit: Cell fluorescence LabChip kit
Assay: Antibody staining assay
Application: Jurkat (T-cell leukemia) cells were stained with calcein alone or with calcein and APC-labeled anti-CD3 antibody. To mimic different subpopulation sizes, mixtures of both populations were prepared at various ratios.
Samples were analyzed with four 2100 bioanalyzer instruments on 5 chips and compared to a flow cytometer reference instrument. Interestingly, small subpopulations (like 10 - 20%) could be analysed with good accuracy and reproducibility.

Corresponding application note: 5988-4322EN

Protein expression monitoring

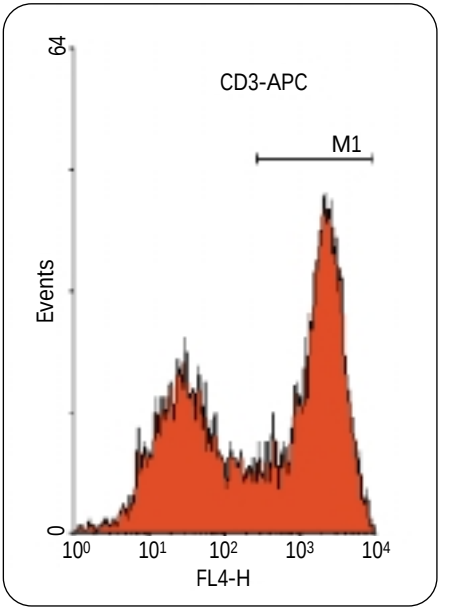
CD3 expression in T-cell leukemia via on-chip staining

A. On-chip 2100 bioanalyzer



Sample	% of Gated	Sample	% of Gated
1	-	4	64.6
2	66.9	5	66.7
3	67.2	6	72.0

B. Conventional flow cytometry



Kit: Cell fluorescence LabChip kit
Assay: Antibody staining assay
Application: Jurkat cells were stained on-chip with anti hCD3-APC prediluted 1:5.5 in cell buffer and Calcein (1:50 in cell buffer). After an incubation time of 25 minutes in the chip, samples were measured in the Agilent 2100 bioanalyzer. The faster and easier on-chip staining procedure has the advantage here of reducing cell consumption 17 fold and antibody reagent costs 80 fold.

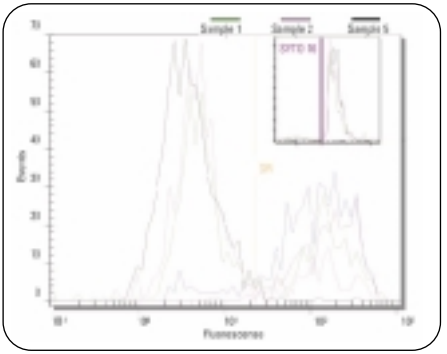
A) Overlay of representative histograms of calcein and antibody treated cells.
B) Comparison between on-chip staining data and data obtained by measuring cells stained by conventional staining on a flow cytometer.

Corresponding application note: 5988-7111EN

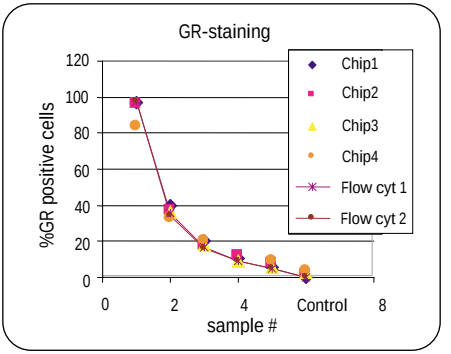
Protein expression monitoring

Intracellular glucocorticoide receptor (GR) antibody staining in H4 hepatocytes

Chip histogram overlay from 700 cells/sample



Correlation of chip vs. flow cytometer results



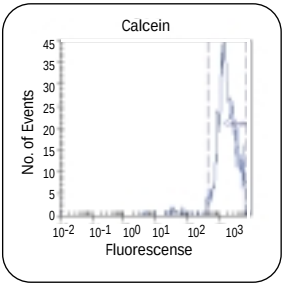
Kit: Cell fluorescence LabChip kit
Assay: Generic assay
Application: H4 hepatocytes cells were stained with SYTO16 DNA dye alone or with SYTO16 and GR primary antibody. After washing both cell preparations were stained with APC-labeled secondary antibody. Mixtures of both populations were prepared at various ratios.
The insert in the left picture shows the overlay of all six cell samples in the blue reference color. The black histogram represents data from the control sample, no GR detected.
All other 5 samples have significant staining above marked fluorescence intensity in the red. Good chip to chip reproducibility and comparison to flow cytometer is demonstrated.

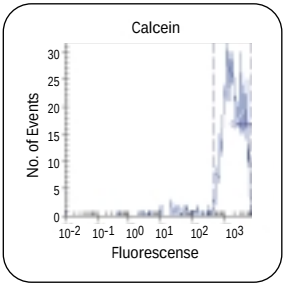
Corresponding application note: 5988-4322EN

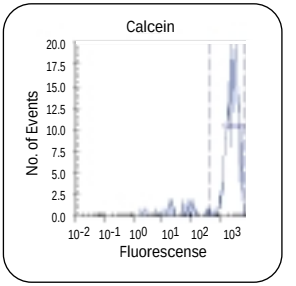
Protein expression monitoring

Expression analysis in few or precious cells

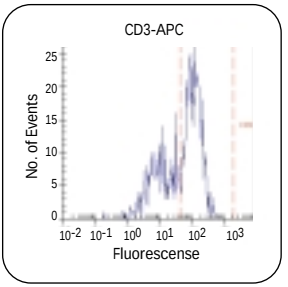
Calcein

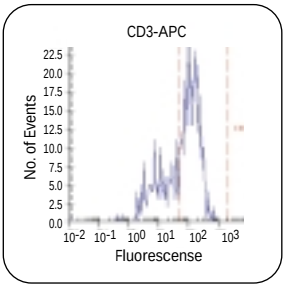


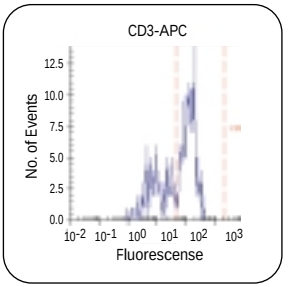




CD3-APC







25,000 cells / sample
61.1 % CD3 positive

12,500 cells / sample
58.3 % CD3 positive

6,250 cells / sample
61.1 % CD3 positive

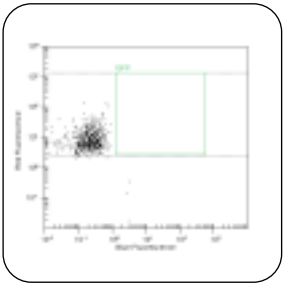
Kit: Cell fluorescence LabChip kit
Assay: Antibody staining assay
Application: Jurkat cells were stained with Calcein and anti CD3 antibodies (APC-labeled). The chip was analyzed without washing the samples. The stained cells were loaded in decreasing numbers onto the chip. Each sample was measured 240 sec.
Here it is demonstrated that even samples with few cells (eg. 6250 cells) gave a good histogram and comparable result.

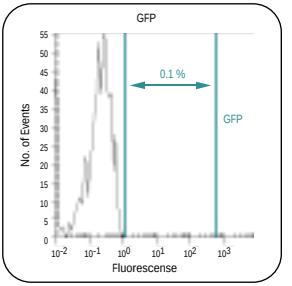
Corresponding application note: data not published

Transfection efficiency monitoring

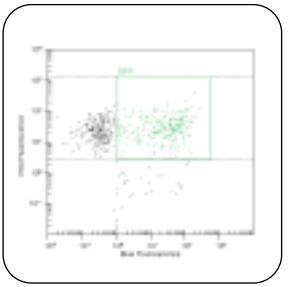
Green fluorescent protein in CHO cells

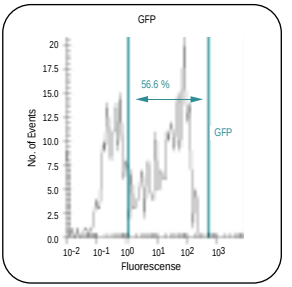
Mock transfected cells

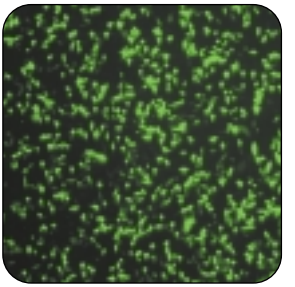




GFP transfected cells





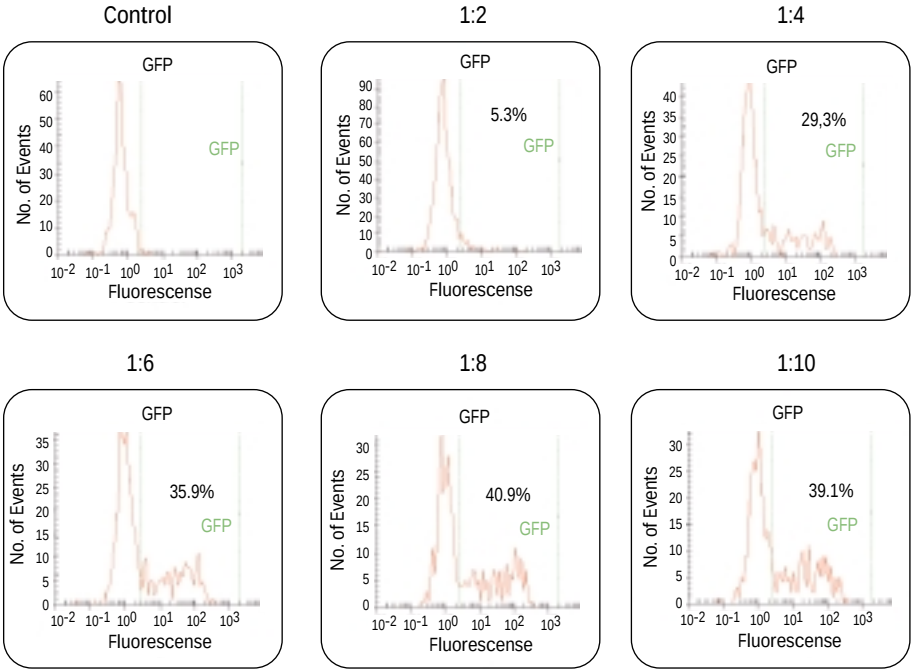


Kit: Cell fluorescence LabChip kit
Assay: GFP assay
Application: Chinese hamster ovary (CHO-K1) cells were transfected with EGFP DNA by a lipofection method. Upper panel shows the control mock transfection, cells don't express GFP. Examples for data evaluation in dotplot view and histogram view are shown in comparison to the microscopy view. For analysis on the 2100 bioanalyzer cells were stained with a red dye for live cells (reference stain). The transfection efficiency of 56% can be easily determined with the 2100 bioanalyzer.

Corresponding application note: 5988-4320EN

Transfection efficiency monitoring

On-chip staining of GFP expression for optimizing transfection conditions with different DNA:lipid ratios



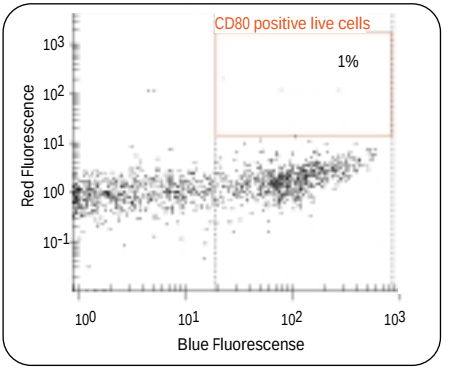
Kit: Cell fluorescence LabChip kit
Assay: On-chip GFP assay
Application: Chinese hamster ovary (CHO-K1) cells were transfected with EGFP DNA by a lipofection method. Optimization of transfection conditions were done on one chip. Several DNA:Lipofectamine ratios were tried. A ratio of 1:8 gave the best transfection efficiency with 40.9%. All cells were reference stained with a red live dye. On-chip staining was applied, minimizing the staining time, reagent usage and cell consumption.

Corresponding application note: 5988-7296EN

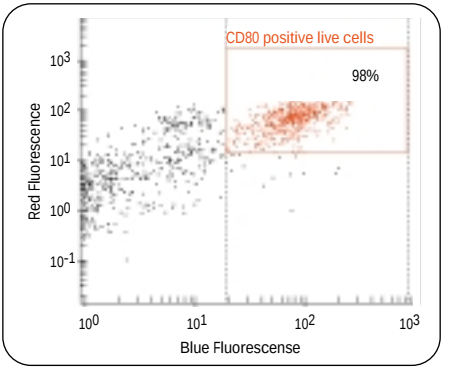
Transfection efficiency monitoring

Verification of stable transfected cell clones by on-chip antibody staining

Hek 293 control cells



CD 80 stable clone



Kit: Cell fluorescence LabChip kit
Assay: On-chip antibody staining assay
Application: Verification of CD80 protein expression in stable transfected Hek 293 cells with the 2100 bioanalyzer.
Control (left dot plot) and CD80 transfected cells (right) are stained on-chip with blue calcein live dye and anti-CD80-CyChrome antibody. Red region marks CD80 protein expressing 293 cells within live cell population - confirming expression in the CD80 stable clone Hek 293 cells.

Corresponding application note: 5988-7111EN

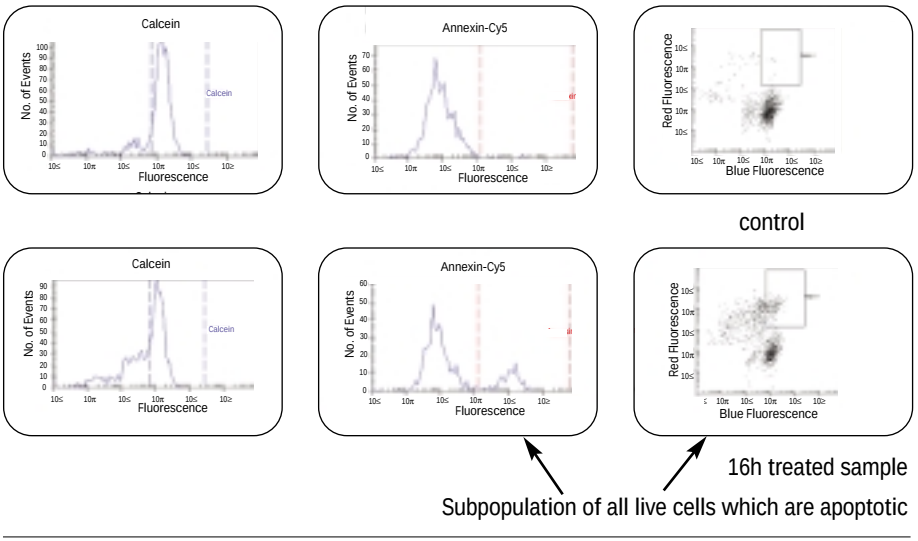
Apoptosis detection

Detection of phosphatidylserine on the cell surface via Annexin V binding

2100 bioanalyzer histogram: blue channel (Calcein)

2100 bioanalyzer histogram: red channel (Annexin-Cy5)

2100 bioanalyzer dot plot: events from both channels



Kit: Cell Fluorescence LabChip kit

Assay: Apoptosis assay

Application: Apoptosis (programmed cell death) in Jurkat cells was induced with camptothecin. Cells treated for 16 hours and untreated cells were stained with calcein and Annexin-Cy5. Annexin-V binds to phosphatidylserine - a membrane lipid which is kept to the inner leaflet of the cell membrane of intact cells. Exposure of phopshatidylserine on the outer leaflet is an early indicator of apoptotic processes. Annexin-V binding is made detectable by Cy5 staining of the Annexin-V via a biotin-streptavidin interaction. Calcein staining of cells is used as a live control to distinguish living and apoptotic cells from dead cells. Calcein enters the cell via the membrane as a non-fluorescent ester. The ester is cleaved inside the cell which results in fluorescence.

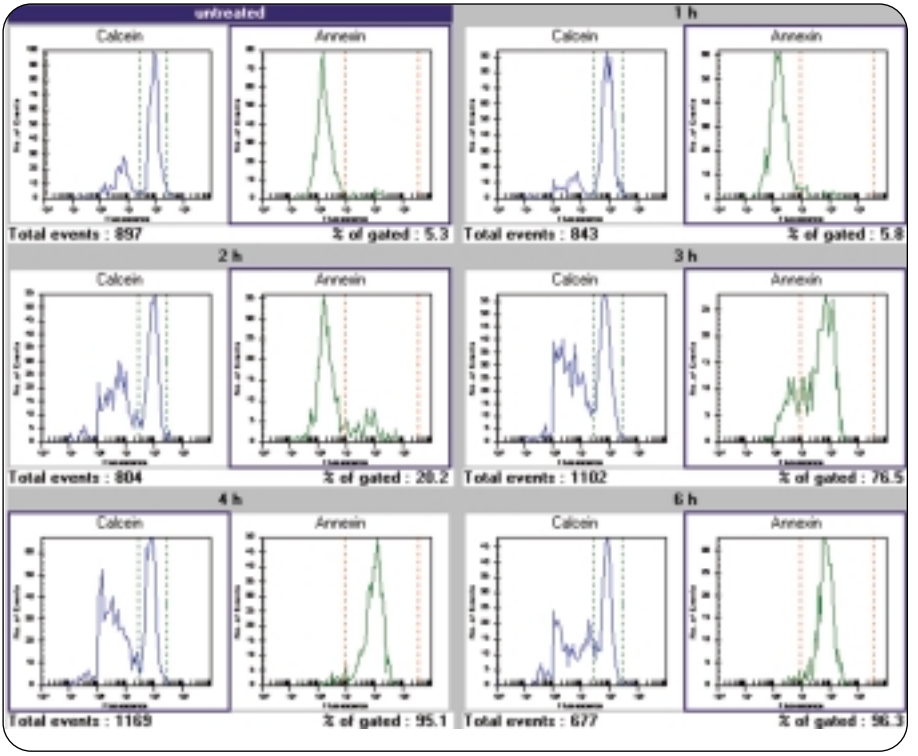
The histograms on the left show the number and intensity value of all events which generated a signal in the blue channel, corresponding to calcein-stained cells. The histograms on the right shows all events which generated a signal in the red channel, corresponding to Annexin-V binding to apoptotic cells. While the control shows only low intensity values (background noise), the treated sample shows high intensity values (within the red markers) corresponding to apoptotic cells. The dot plot of the treated sample nicely shows the subpopulation of all live cells which are apoptotic.

Corresponding application note: 5988-4319EN

Apoptosis detection

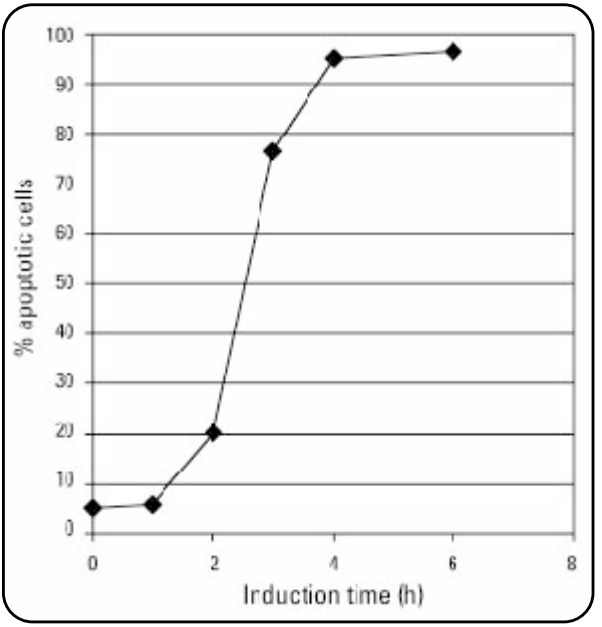
Fast Annexin protocol for time course of apoptosis induction via anti-FAS antibody

A



Kit: Cell fluorescence LabChip kit
Assay: Apoptosis assay
Application: Apoptosis (programmed cell death) in Jurkat cells was induced with anti-FAS antibody. Cells treated for 0,1,2,3,4 and 6 hours were stained with calcein and Annexin-Cy5. Annexin-V binds to phosphatidylserine - a membrane lipid which is kept to the inner leaflet of the cell membrane of intact cells. Exposure of phopshatidylserine on the outer leaflet is an early indicator of apoptotic processes. Annexin V binding is detectable by Cy5 staining of the Annexin-V via a biotin-streptavidin interaction. Calcein staining of cells is used as a live control to distinguish living and apoptotic cells from dead cells. Calcein enters the cell via the membrane as non-fluorescent ester. The ester is cleaved inside the cell which results in fluorescence and indicates apoptosis.

B



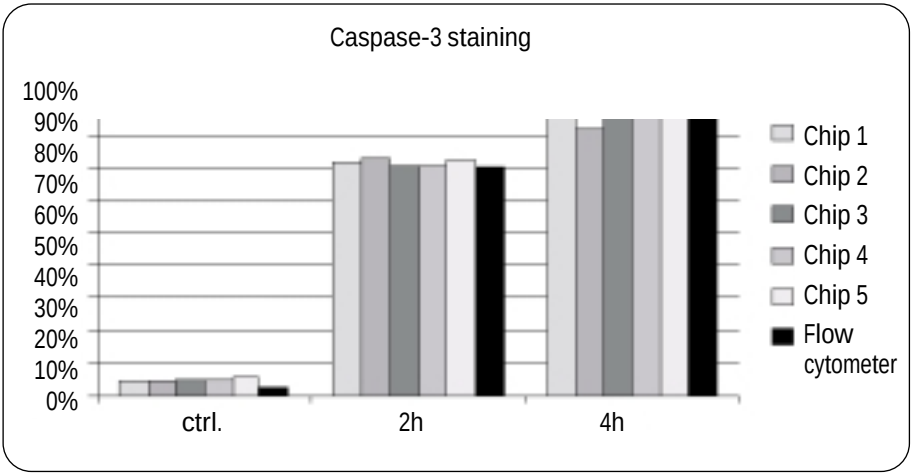
The histograms on the left (A) show the number and intensity value of all events which generated a signal in the blue channel, corresponding to calcein-stained cells.
The histograms on the right shows all events which generated a signal in the red channel, corresponding to Annexin-V binding to apoptotic cells. While the control shows only low intensity values (background noise), the treated sample shows high intensity values (within the red markers) corresponding to apoptotic cells.
(B) Time course of the induction of apoptosis by anti-FAS antibody in Jurkat cells. Apoptosis is detectable in a significant amount of cells after 2hours. Following a treatment of 4 hours, approximately 95% of the cells are apoptotic.

Corresponding application note: 5988-4319EN

Apoptosis detection

Intracellular Caspase-3 antibody staining assay

A



Kit: Cell fluorescence LabChip kit
Assay: Generic assay
Application: Induction of apoptosis in Jurkat cells was done with anti-FAS antibody treatment. Intracellular staining with specific antibodies against 'active' Caspase-3 were performed. Reference staining was done with Syto16 DNA dye. Good chip to chip reproducibility and good comparison to conventional flow cytometer results were obtained.

Corresponding application note: 5988-4319EN

II. DNA analysis

Restriction digest analysis
- Sizing range exemplified by the separation of Adenovirus 2/Dra I
- Detection of single base mutations (I)
- Detection of single base mutations (II)

PCR product analysis
- Separation of 3 different mixtures of PCR products
- Determination of PCR product impurity
- Multiplex PCR analysis of bacteria in chicken

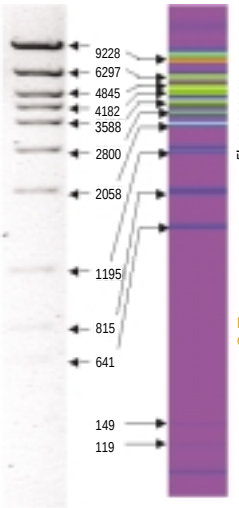
Gene expression analysis
- mRNA expression study by comparative multiplex PCR
- Multiplex RT-PCR of 6 mouse inflammatory genes
- Standardized end-point RT-PCR
- Co-amplification of α and β-globin
- Co-amplification of GAPDH and hsp72
- Co-amplification of GAPDH and hsp72 - response curves
- Competitive PCR

GMO detection
- Development of a multiplex assay for GM
- GMO quantitation based on certified reference materials
- DNA stability during food processing

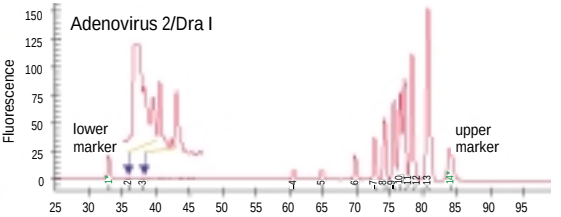
Meat speciation
- Development of meat specific assays (I)
- Development of meat specific assays (II)

Restriction digest analysis

Sizing range exemplified by the separation of Adenovirus 2 / *Dra* I



agarose gel



Peaks not detected on agarose gel

Peak Nummer	Actual size (bp)	Chip result (bp)	% Error
2	119	110	-7.6
3	149	149	0
4	641	643	0.3
5	815	818	0.4
6	1195	1230	2.9
7	2058	1960	-4.8
8	2800	2622	-6.4
9	3588	3426	-4.5
10	4182	4191	0.2
11	4845	4745	-2.1
12	6297	5850	-7.1
13	9228	8594	-6.9

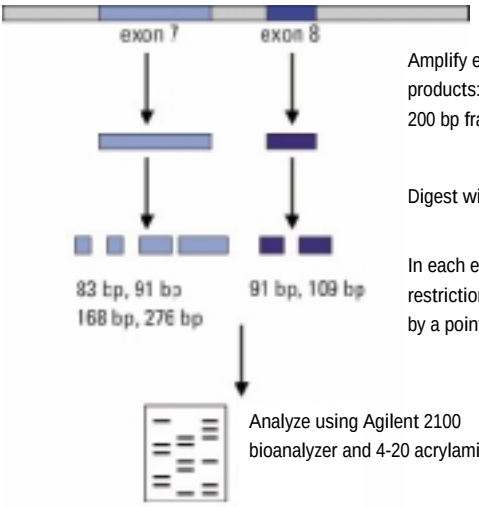
Agilent 2100 bioanalyzer data

Kit: DNA 12000 LabChip kit
Assay: DNA 12000 assay
Application: Restriction digest analysis of Adenovirus 2 / *Dra* I. For restriction fragment analysis the large linear dynamic range of the lab-on-a-chip approach is very advantageous. Analyzing samples with large and short fragments on slab gels can be difficult because of bands running off the gel and insufficient staining (or over-staining) of bands.

Corresponding application note: 5968-7501EN

Restriction digest analysis

Detection of single base mutations (I)



Amplify exons 7 and 8 (resulting products: 618 bp fragment and 200 bp fragment)

Digest with Hpa II

In each example one of the restriction sites can be deleted by a point mutation

Analyze using Agilent 2100 bioanalyzer and 4-20 acrylamide gel

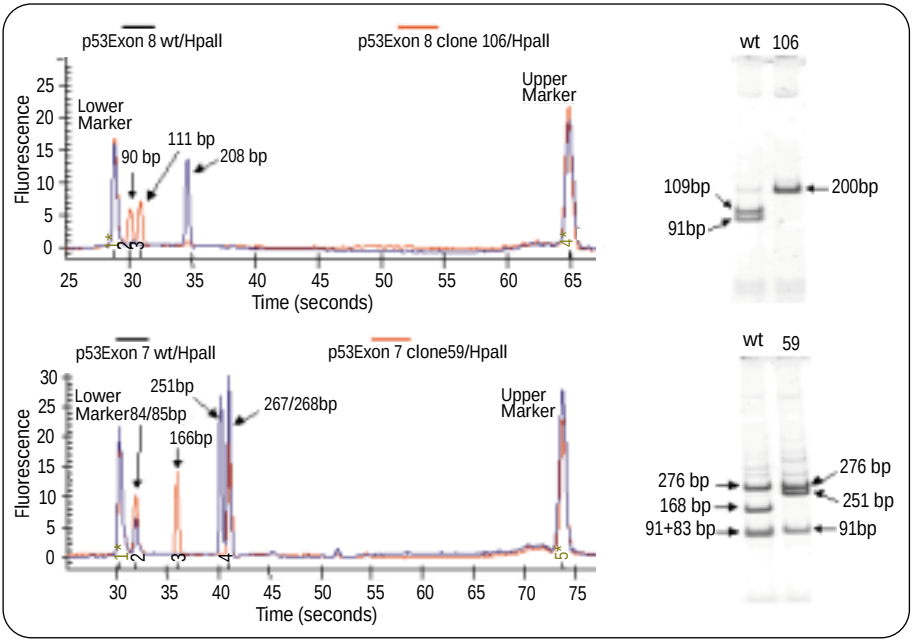
---

Kit: DNA 7500 LabChip kit
Assay: DNA 7500 assay
Application: Mutation detection by RFLP highlights the use of the 2100 bioanalyzer. Two different regions of the p53 gene were amplified with specific primers and digested with *Hpa* II, which cuts in a location that is prone to mutations. In the presence of a point mutation, the enzyme *Hpa* II does not cleave the DNA, leaving larger fragments that can be revealed by gel electrophoresis or by analysis with the DNA 7500 LabChip kit (see next page).

Corresponding application note: data not published

Restriction digest analysis

Detection of single base mutations (II)

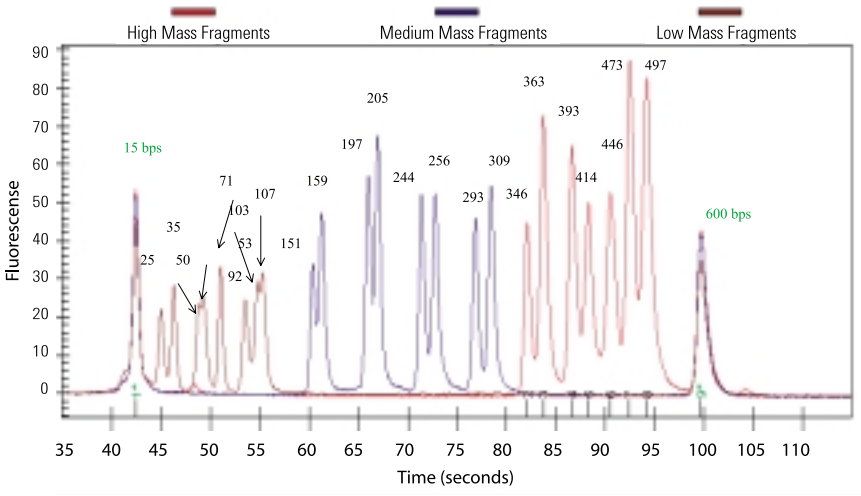


Kit: DNA 7500 LabChip kit
Assay: DNA 7500 assay
Application: Analysis on the chip showed an identical pattern of digest fragments as seen on the slab gel for the wildtype and exon 7 & 8 PCR products.
Comparison of the calculated sizes of the bands shows 1-2% variance with the LabChip assay, which allows fast and accurate detection of point mutations.

Corresponding application note: 5968-7496EN

PCR product analysis

Separation of 3 different mixtures of PCR products

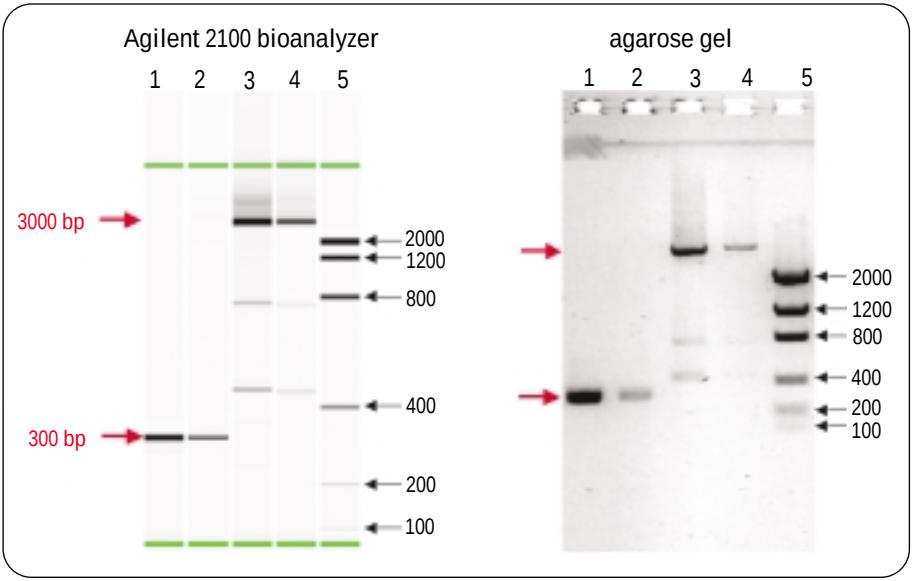


Kit: DNA 500 LabChip kit
Assay: DNA 500 assay
Application: Overlay of three different electropherograms, which are mixtures of PCR samples ranging from 25 to 500 base pairs in size. The two closest eluting bands (50 bp and 53 bp) are partially separated and identified by the software as two separate peaks. The DNA 500 assay achieves a resolution of five base pairs from 25 to 100 base pairs and a 5% resolution from 100 to 500 base pairs where the sizing error is less than 10% over the entire size range.

Corresponding application note: 5988-3041EN

PCR product analysis

Determination of PCR product impurity

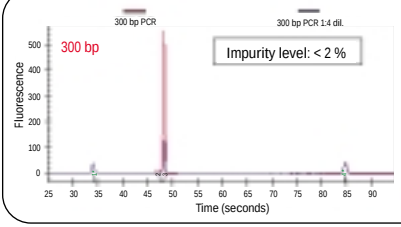


Kit: DNA 7500 LabChip kit
Assay: DNA 7500 assay
Application: Comparison between the analysis of two PCR reactions (300 and 3000 bp products) using the DNA 7500 LabChip kit vs. an agarose gel. Two different concentrations are shown side by side for each PCR reaction (undiluted and 1:4 dilution). The 2100 bioanalyzer shows superior performance in locating impurities over a broader concentration range than the gel.
The 300bp fragment appears to be uncontaminated in both the gel and on the 2100 bioanalyzer. The 3000bp fragment shows little impurities on the gel, which become invisible at the 1:4 dilution. These impurities, can easily be detected with the Agilent 2100 bioanalyzer.

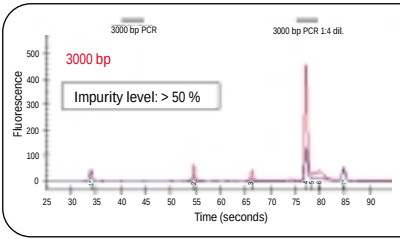
Corresponding application note: 5968-7496EN

PCR product analysis

Determination of PCR product impurity



Sample	c (DNA)	main peak
300 bp PCR	41.4 ng/ul	40.7 ng/ul
300 bp PCR 1:4	9.6 ng/ul	9.6 ng/ul



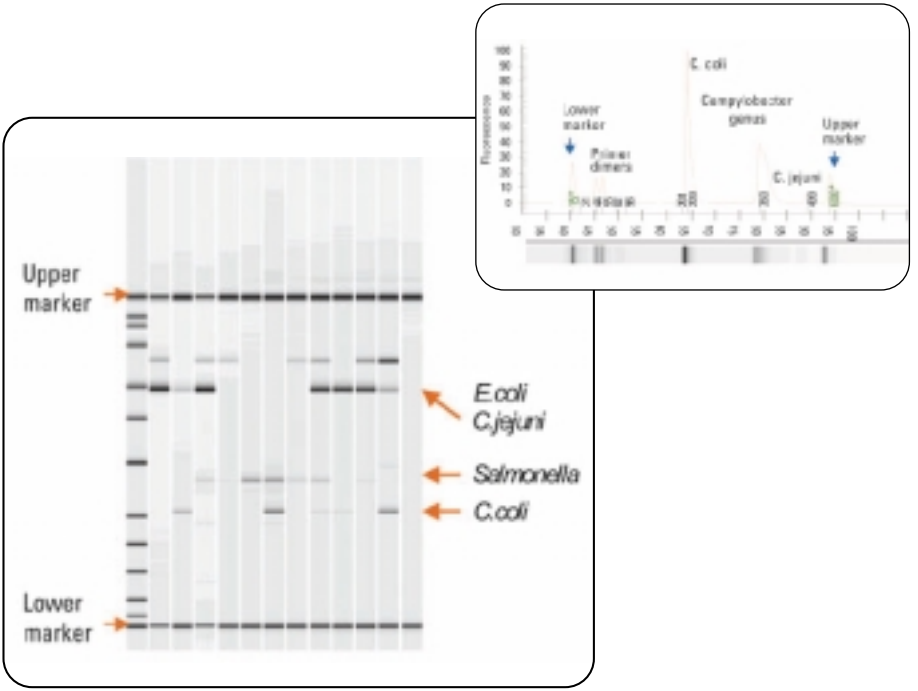
Sample	c (DNA)	main peak
3000 bp PCR	61.9 ng/ul	40.7 ng/ul
3000 bp PCR 1:4	14.8 ng/ul	9.8 ng/ul

Kit: DNA 7500 LabChip kit
Assay: DNA 7500 assay
Application: The quantitative data generated by the 2100 bioanalyzer indicate the amount of impurity or non-specific products in the PCR reactions from the previous page. Even in the 300 bp fragment a small impurity can be detected, while the 3000 bp fragment shows more than 50% impurities.

Corresponding application note: 5968-7496EN

PCR product analysis

Multiplex PCR analysis of bacteria in chicken



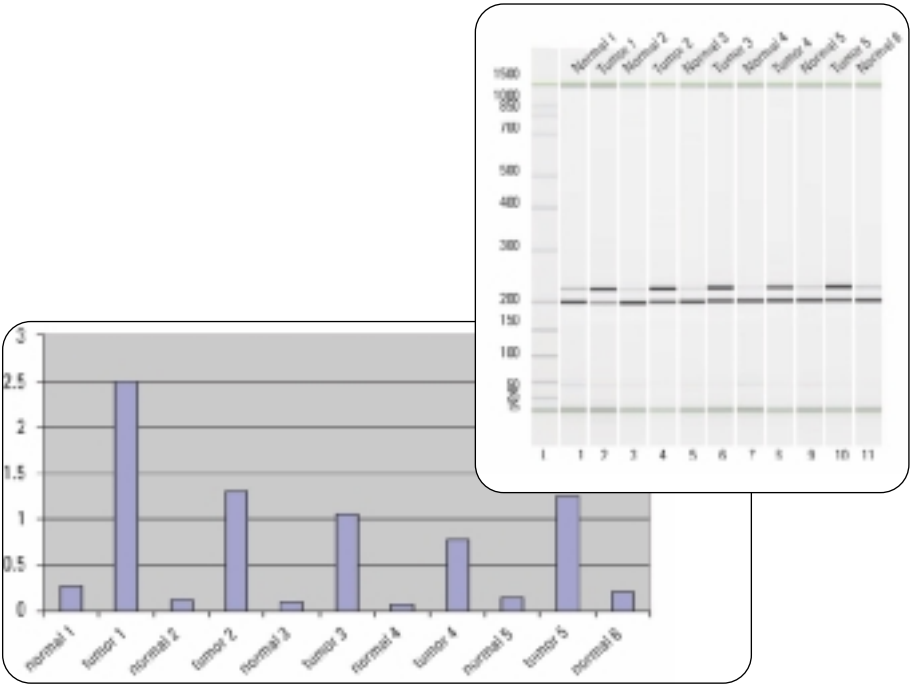
Data kindly provided by GenPoint, NL

Kit: DNA 500 LabChip kit
Assay: DNA 500 assay
Application: Multiplex PCR with four primer pairs, each one specific for a certain DNA sequence from one of the 4 bacteria to be tested for. Total DNA was extracted from chicken and subjected to PCR. The gel like image shows traces from different chicken samples with bands showing up when an amplicon could be detected. The electropherogram is one example where bacterial DNA from two species of the *Campylobacter* genus could be detected.

Corresponding application note: 5988-4069EN

Gene expression analysis

mRNA expression study by comparative multiplex PCR



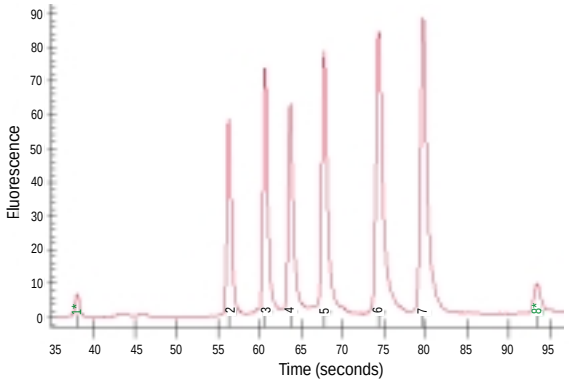
Data kindly provided by the Roy Castle Centre

Kit: DNA 1000 LabChip kit
Assay: DNA 1000 assay
Application: Two genes were co-amplified in this study. A tumor specific gene (upper band) along with a housekeeping gene (lower band). The up-regulation of the tumor gene is visualized via analysis on the 2100 bioanalyzer. Building the ratio of the concentration values obtained from the 2100 bioanalyzer, numerical values are obtained that are normalized with regard to the RT-PCR amplification efficiency. This way tumor tissue can be distinguished more unambiguously from normal tissue.

Corresponding application note: data not published

Gene expression analysis

Multiplex RT-PCR of 6 Mouse inflammatory genes



(1) lower marker
(2) mINF1G-TNF : 351 bp
(3) mINF1G-IL1 : 294 bp
(4) mINF1G-IL6 : 453 bp
(5) mINF1G-GMC : 200 bp
(6) mINF1G-TGF : 249 bp
(7) mINF1G-GAP : 532 bp.
(8) upper marker

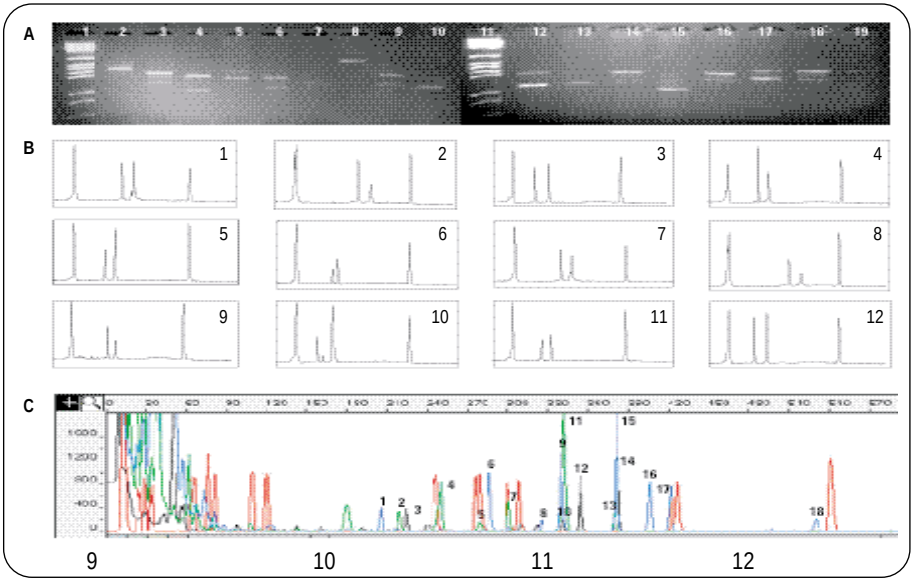
Data kindly provided by Maxim Biotech

Kit: DNA 1000 LabChip kit
Assay: DNA 1000 assay
Application: Example of a multiplex RT-PCR reaction created with Maxim Biotech's proprietary multiplex kits. Primers are developed that are specific for mouse inflammatory genes.

Corresponding application note: data not published

Gene expression analysis

Standardized end-point RT-PCR



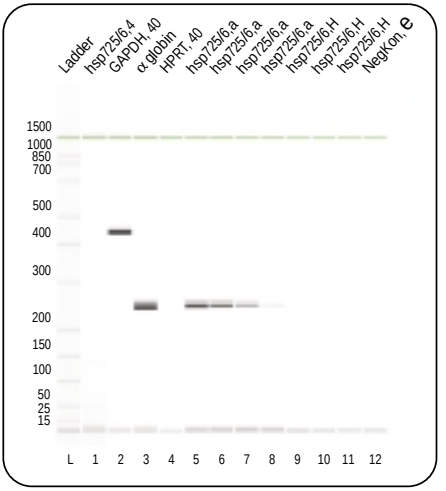
Data kindly provided by the Medical College of Ohio

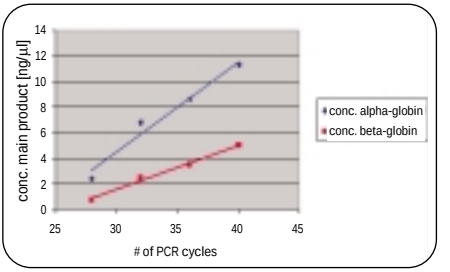
Kit: DNA 7500 LabChip kit
Assay: DNA 7500 assay
Application: Representative results of three electrophoresis methods. For A - C, aliquots of BEC 17378, cDNA were StaRT-PCR amplified with primers for different genes. In the current study the reproducibility of the 2100 bioanalyzer results was higher than with the competitive techniques. The analysis can be performed at the end-point of PCR without need for real-time measurement at each cycle of PCR.

Corresponding application note: 5988-3674EN

Gene expression analysis

Co-amplification of α and β-globin





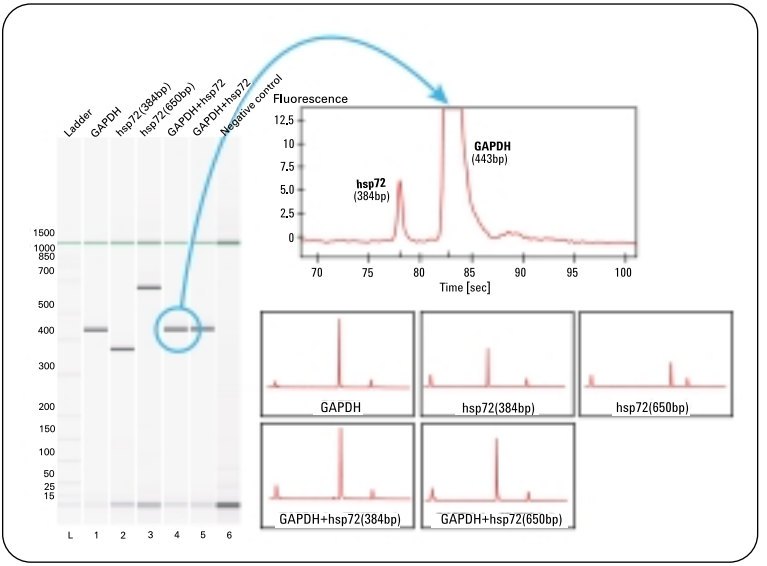
Data kindly provided by the Forschungszentrum Karlsruhe

Kit: DNA 1000 LabChip kit
Assay: DNA 1000 assay
Application: Alpha and beta globin were co-amplified in one single PCR reaction tube (50 µl volume). 1 µl samples are analyzed after various cycle numbers. Both reaction products can be seen, which is indicative for the good resolution of the assay and the linear amplification from 28 to 40 cycles is confirmed.

Corresponding application note: data not published

Gene expression analysis

Co-amplification of GAPDH and Hsp72



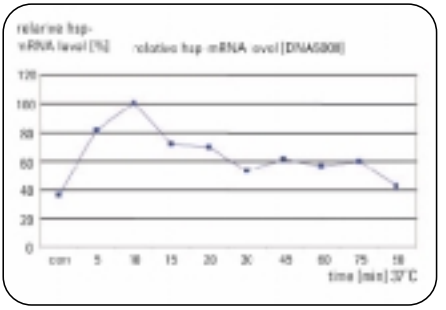
Data kindly provided by the Forschungszentrum Karlsruhe

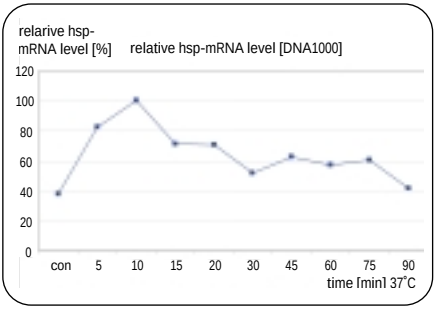
Kit: DNA 1000 LabChip kit
Assay: DNA 1000 assay
Application: Gel-like image and electropherograms showing the results of separate amplifications and co-amplifications of GAPDH and hsp72 in unstimulated HepG2 cells. Primers for GAPDH yield a PCR product of 443 bp (lane 1), primers for hsp72 yield PCR products of 384 and 650 bp (lane 2 and 3), respectively. Lane 4 and 5 show the results of the co-amplification reactions. Due to the competitiveness of the reaction, very little hsp72 products could be detected in lane 4 (insert) and no product was detected in lane 5 (lane 6 = negative control). The broad linear dynamic range of the analysis allows detection of weak bands next to strong bands and helped in the determination of gene expression in this case.
Cycling conditions were 30 s 95°C, 30 s 55°C and 30 s 72°C for 30 cycles.

Corresponding application note: 5988-4556EN

Gene expression analysis

Co-amplification of GAPDH and Hsp 72 - response curves





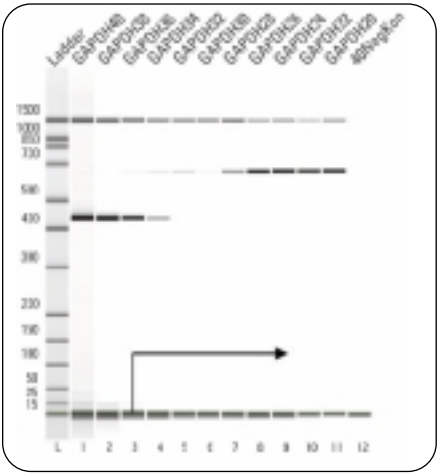
Data kindly provided by the Forschungszentrum Karlsruhe

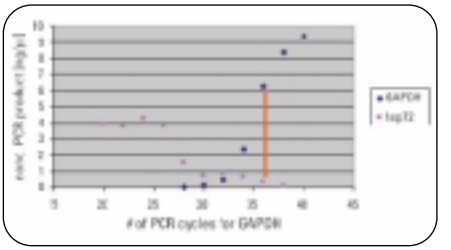
Kit: DNA 1000 LabChip kit
Assay: DNA 1000 assay
Application: The optimized PCR conditions were used to monitor the response of a stimulus to hsp. Gene expression was monitored by comparing the RT-PCR amplification of a housekeeping gene with the co-amplification of hsp. In the current case, the highest gene expression was measured after about 10 minutes. As a comparison, the same set of samples was analyzed using the DNA 500 kit. Virtually identical results are obtained with both kits, demonstrating that lab-on-a-chip technology can serve as a standardized approach to gel electrophoresis.

Corresponding application note: 5988-4556EN

Gene expression analysis

Competitive PCR





Data kindly provided by the Forschungszentrum Karlsruhe

Kit: DNA 1000 LabChip kit
Assay: DNA 1000 assay
Application: Two genes were reverse transcribed and co-amplified in one reaction tube. The PCR products were analyzed using the DNA 1000 LabChip kit. Primers for hsp72 were present from the beginning of the PCR reactions, while primers for GAPDH were added after various cycle numbers ranging from 20 to 40 cycles (primer dropping method). This allowed optimization of this competitive PCR reaction.

Corresponding application note: 5988-4556EN

GMO detection

Development of a multiplex assay for GM

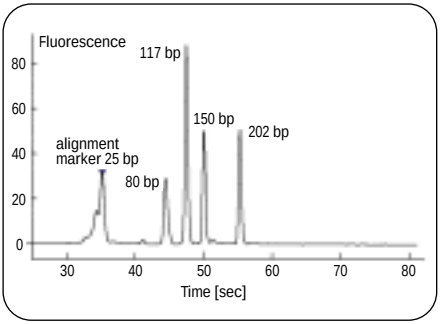


Figure A

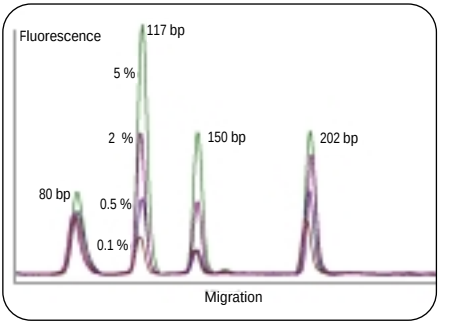


Figure B

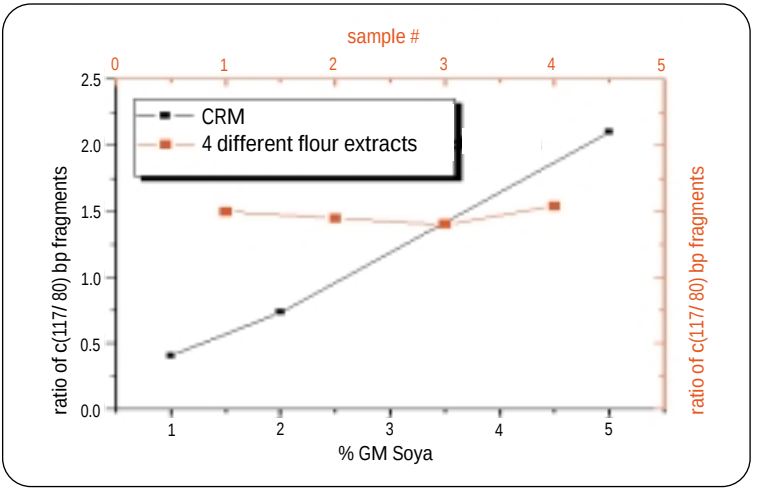
Data kindly provided by CCFRA, UK

Kit: DNA 500 LabChip kit
Assay: DNA 500 assay
Application: Multiplex assay for genetically modified (GM) soya. The aim was to develop a model assay that could be used to assess the quality of DNA extracted from heat-processed soya flour samples, in particular, to investigate differences in PCR amplification between small DNA targets. A single multiplex PCR assay was developed that enabled three GM soya targets and one control to be analyzed in a single reaction mix. Primer concentration was optimized in order to obtain four PCR products resolved by gel electrophoresis which corresponded in size to the soya lectin gene target of 80 bp, and the EPSPS (5-enolpyruvyl-shikamate- 3-phosphate synthase) gene targets of 117 bp, 150 bp and 202 bp respectively. These latter targets are only found in Roundup Ready GM soya. Figure A: Peaks produced by the four PCR products when analyzed with the Agilent 2100 bioanalyzer and DNA 500 LabChip kit. Figure B: Analysis of certified reference materials containing known amounts of GM soya.

Corresponding application note: 5988-4070EN

GMO detection

GMO quantitation based on certified reference materials



Data kindly provided by CCFRA, UK

Kit: DNA 500 LabChip kit
Assay: DNA 500 assay
Application: Analysis of flour extracts containing GM soya. By comparing the ratio of two PCR products (one specific for all types of soya and one specific for GM soya), the amount of GM soya in four samples can be determined with good accuracy. The accurate absolute quantitation of PCR products with the DNA 500 assay is crucial for obtaining reproducible results.

Corresponding application note: 5988-4070EN

GMO detection

DNA stability during food processing

Time at 100 °C and pH 3.3 (min)	Amount of PCR product*			
	80 bp	118 bp	150 bp	202 bp
0	100	100	100	100
3	74	77	73	67
6	57	58	21	6
9	36	23	24	15
12	67	33	47	21
15	48	27	16	0
18	0	0	0	0
21	0	0	0	0

* % product determined relative to the amount at 0 minutes

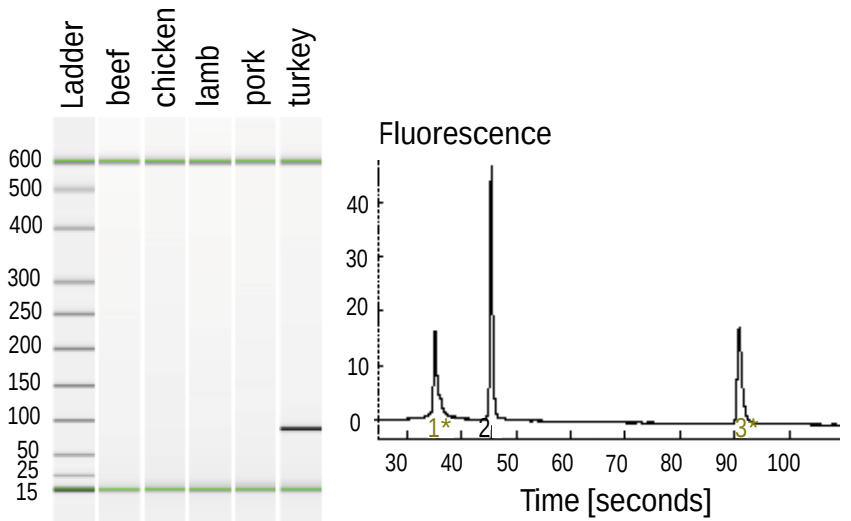
Data kindly provided by CCFRA

Kit: DNA 500 LabChip kit
Assay: DNA 500 assay
Application: The multiplex PCR assay was applied to soya flour samples containing approx. 1.3 % GM soya and boiled at either pH 3.3, 4.3 or 6.7 for up to 21 minutes. For accurate determination of the quantity of each PCR product, the samples were applied to the DNA 500 LabChip. The concentration of each PCR product was calculated using the Agilent 2100 bioanalyzer software. At pH 3.3 where an effect of heating time was observed, the amount of each PCR product at each time point was compared to the amount of each product at 0 minutes (table 2). At pH 3.3, the relative amount of the 80 bp product was reduced to 48 % after 15 minutes and no product was detected at 18 or 21 minutes. After 15 minutes, the relative amounts of products of 118 bp and 150 bp were reduced to 27 % and 16 % respectively and the 202 bp product was not detected. None of the products were detected after 18 or 21 minutes.

Corresponding application note: 5988-4070EN

Meat speciation

Development of meat specific assays (I)



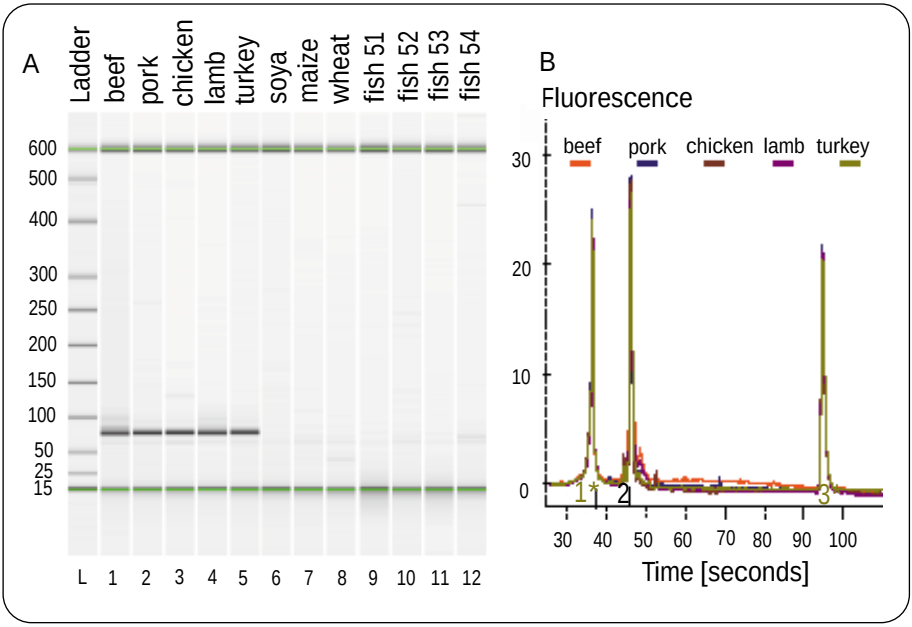
Data kindly provided by CCFRA

Kit: DNA 500 LabChip kit
Assay: DNA 500 assay
Application: For detection of individual species in processed food, PCR assays with specific sets of primers can be developed. Example: turkey specific primers do not amplify any other meat species including beef, chicken, lamb, or pork (see lane 5 and respective electropherogram).

Corresponding application note: 5988-4069EN

Meat speciation

Development of meat specific assays (II)



Data kindly provided by CCFRA

Kit: DNA 500 LabChip kit
Assay: DNA 500 assay
Application: For detection of individual component types in processed food, PCR assays with specific sets of primers can be developed. Example: Primers that amplify any type of meat but do not amplify other food constituents including soya, maize, wheat or fish.

Corresponding application note: 5988-4069EN

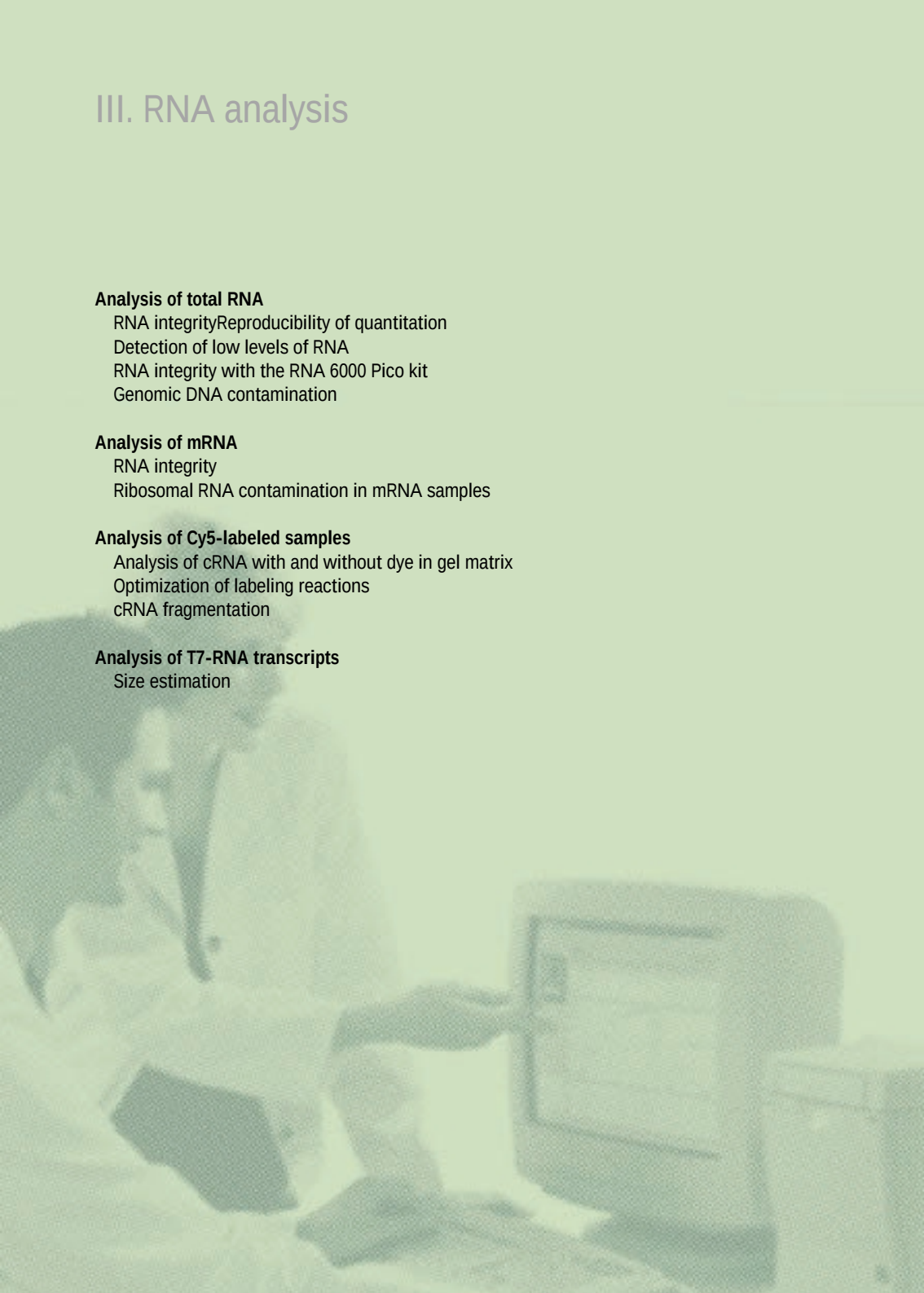
III. RNA analysis

Analysis of total RNA
- RNA integrityReproducibility of quantitation
- Detection of low levels of RNA
- RNA integrity with the RNA 6000 Pico kit
- Genomic DNA contamination

Analysis of mRNA
- RNA integrity
- Ribosomal RNA contamination in mRNA samples

Analysis of Cy5-labeled samples
- Analysis of cRNA with and without dye in gel matrix
- Optimization of labeling reactions
- cRNA fragmentation

Analysis of T7-RNA transcripts
- Size estimation



Analysis of total RNA

RNA integrity

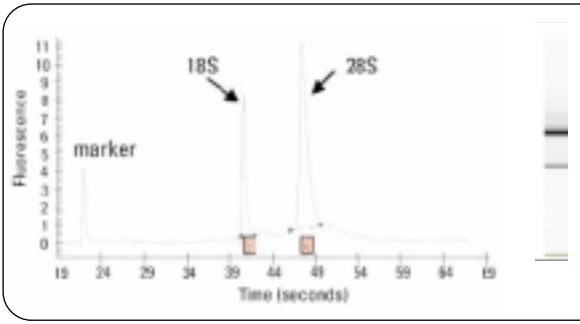


Figure A

High quality total RNA

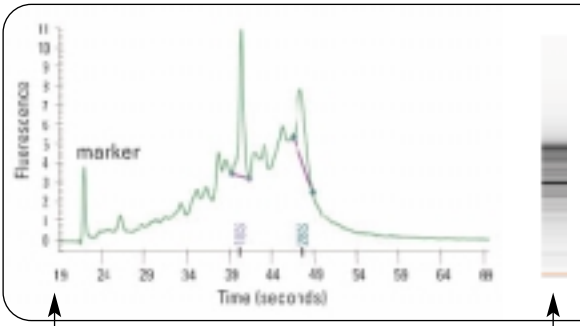


Figure B

Partially degraded total RNA

2100 bioanalyzer: electropherogram

2100 bioanalyzer: single lane gel-like image

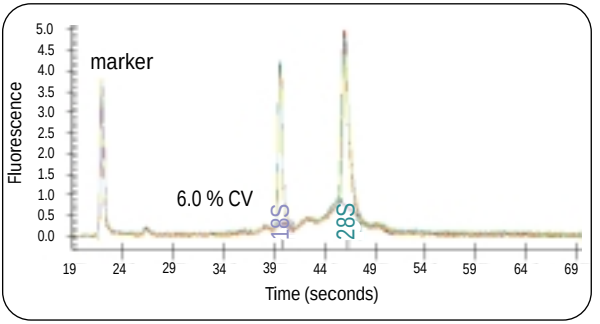
Kit: RNA 6000 Nano LabChip kit
Assay: Eukaryote total RNA Nano assay
Application: Analysis of total RNA integrity - a typical first QC step during cDNA or cRNA sample prep for microarrays. Figure A shows the upper electropherogram and gel-like image show the analysis of high quality total RNA with the 18S and 28S subunit as two distinct bands. Figure B shows the lower part of the slide shows the analysis of a partially degraded total RNA sample. Many degradation products appear between the two ribosomal bands and below the 18S band. With the help of the 2100 bioanalyzer and the RNA 6000 Nano kit the important sample QC step prior to an expensive microarray experiment can be easily and quickly achieved.

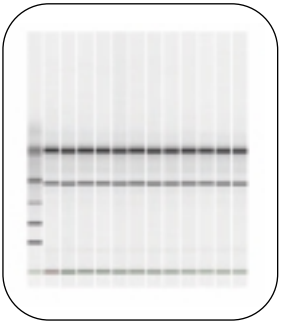
Corresponding application note: 5968-7493EN

Analysis of total RNA

Reproducibility of quantitation

Reproducibility for 12 consecutive runs



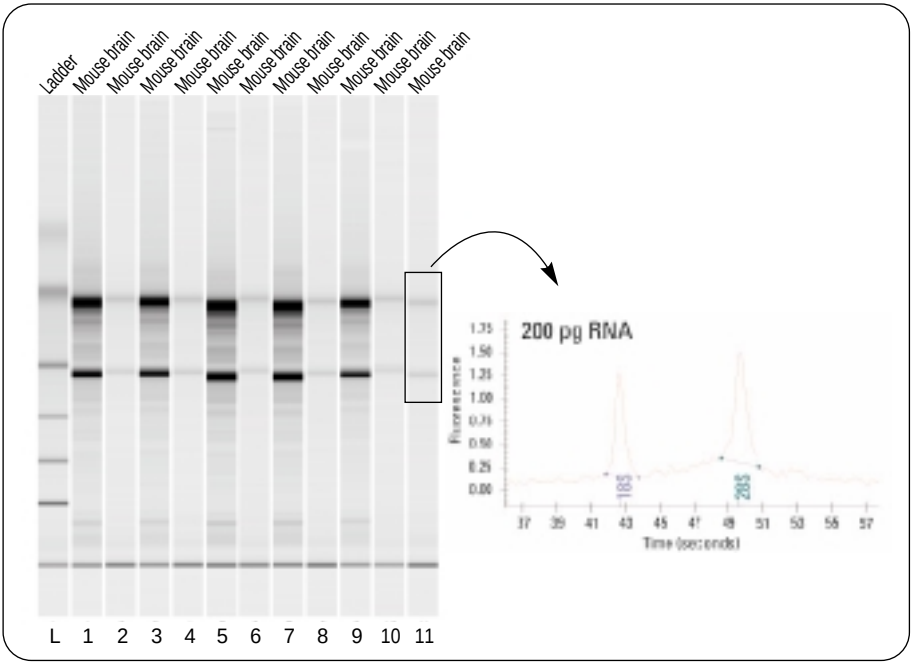


Kit: RNA 6000 Nano LabChip kit
Assay: Eukaryote total RNA Nano assay
Application: Alongside to the quality control of RNA samples, measurement of RNA concentration is important for (bio-) chemical reactions such as labeling reactions in the context of microarray experiments. With the RNA 6000 Nano kit a good reproducibility can be achieved (here 6% CV), which is little affected by sample contaminants such as phenol.

Corresponding application note: 5988-7650 EN

Analysis of total RNA

Detection of low levels of RNA



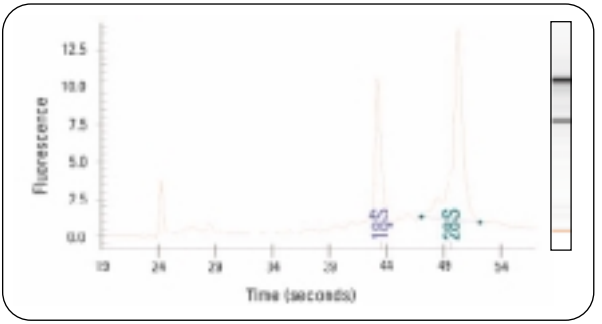
Analysis of mouse brain RNA at two different concentrations

Kit: RNA 6000 Pico LabChip kit
Assay: Eukaryote total RNA Pico assay
Application: The RNA 6000 Pico kit is complementary to the RNA 6000 Nano kit and is suitable for all applications where the amount of RNA (or cDNA) is limited, e.g. for biopsy samples, samples from microdissection experiments, QC of cDNA made from total RNA, microarray samples etc. Mouse brain RNA (Ambion) at 200 and 1000 pg/µl. Reproducibility of quality control is shown. 200 pg total RNA can be detected. Samples were obtained by dilution from stock solution.

Corresponding application note: data not published

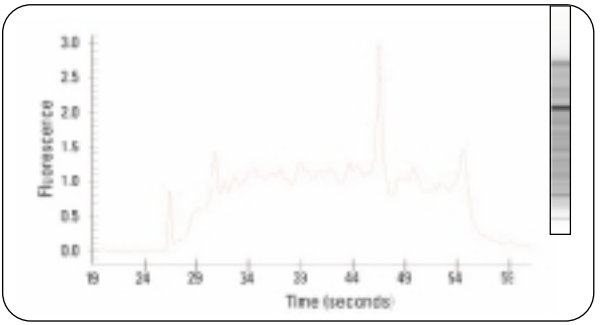
Analysis of total RNA

RNA integrity with the RNA 6000 Pico kit



Intact RNA

Figure A



Degraded RNA

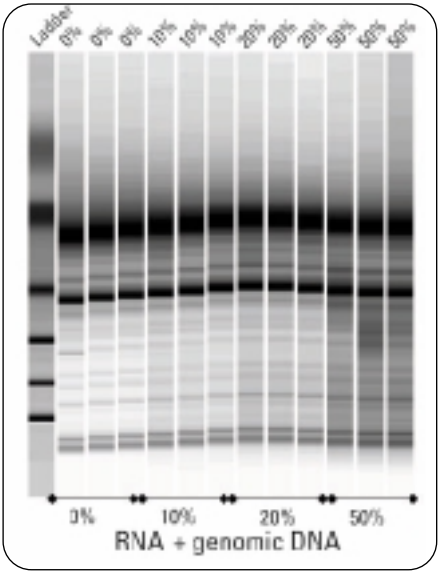
Figure B

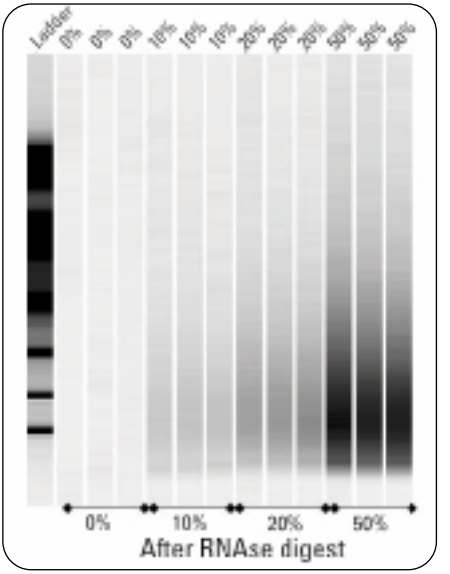
Kit: RNA 6000 Pico LabChip kit
Assay: Eukaryote total RNA Pico assay
Application: Detection of RNA degradation with the RNA 6000 Pico kit. Sample: mouse liver total RNA (Ambion) concentration: 1 ng. Degradation was accomplished by adding a low amount of RNase. *Figure A* shows the upper electropherogram and gel-like image show the analysis of high quality total RNA with the 18S and 28S subunit as two distinct bands. *Figure B* shows the analysis of a partially degraded total RNA sample. Many degradation products appear between the two ribosomal bands and below the 18S band.

Corresponding application note: data not published

Analysis of total RNA

Genomic DNA contamination



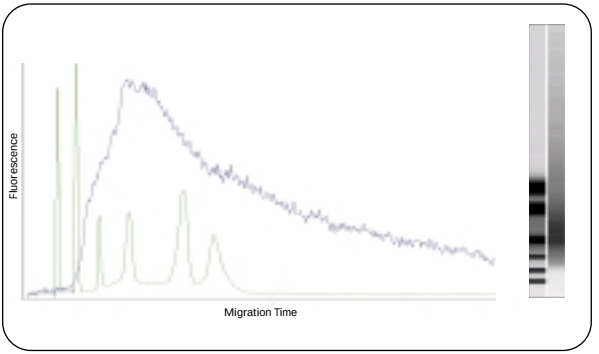


Kit: RNA 6000 Nano LabChip kit
Assay: Eukaryote total RNA Nano assay
Application: Gel representation of a chip run with total RNA samples (mouse brain) spiked with varying amounts of herring sperm genomic DNA before and after treatment with RNase. The left panel shows the intact RNA with broad bands in the low MW region stemming from the genomic DNA. After the RNase digest (right panel) only the DNA bands remain, ranging in intensity according to the amount of DNA spiked into the sample.

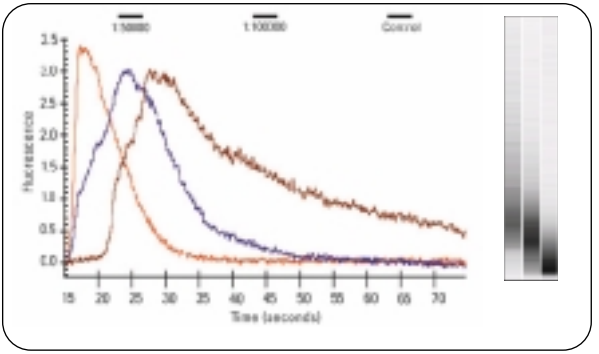
Corresponding application note: data not published

Analysis of mRNA

RNA integrity



Highly enriched Poly (A)+ RNA



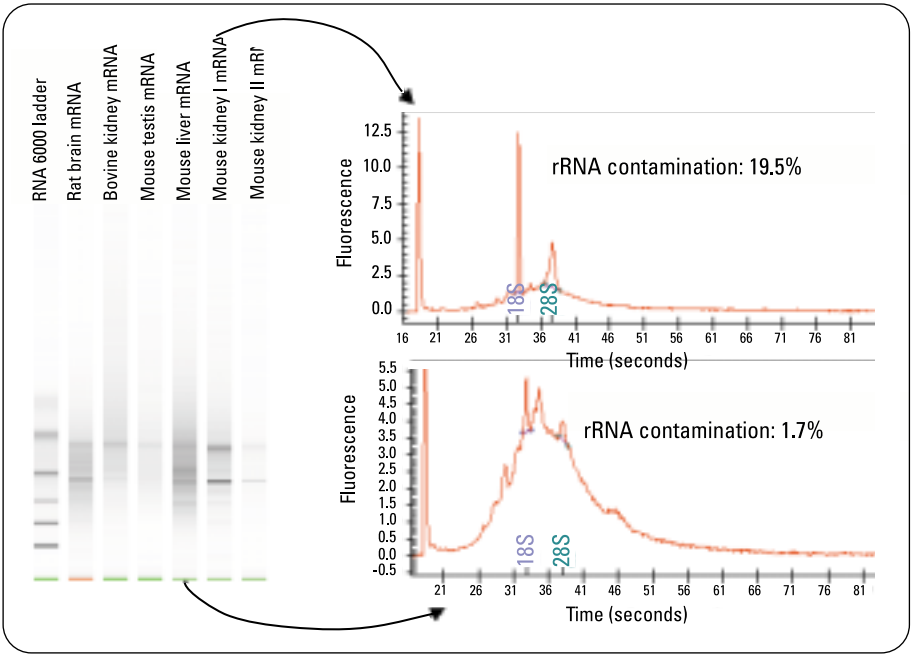
Progressive degradation of Poly (A)+ RNA

Kit: RNA 6000 Nano LabChip kit
Assay: mRNA Nano assay
Application: Progressive degradation of Poly (A)+ RNA. Poly (A)+ RNA (60 ng/µL) from cultured Jurkat cells was incubated for 15 minutes at room temperature with very dilute RNase A (1 x 10-6 and 2 x 10-6 mg/mL, respectively). A progressive shift towards shorter fragment sizes can be observed. Even with a mild degradation, the absence of very long transcripts can be noticed.

Corresponding application note: 5968-7495EN

Analysis of mRNA

Ribosomal RNA contamination in mRNA samples

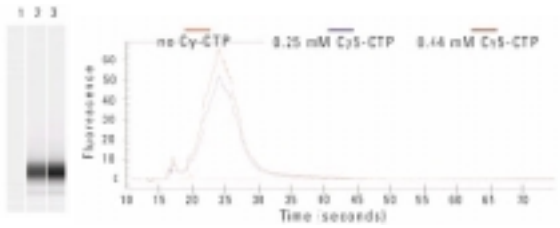


Kit: RNA 6000 Nano LabChip kit
Assay: mRNA Nano assay
Application: Ribosomal contamination in mRNA samples. During the isolation of mRNA, varying amounts of ribosomal RNA can remain in a sample. Since the purity of mRNA is of importance for a number of downstream applications, samples should be checked on the 2100 bioanalyzer. The current slide shows the analysis of 6 commercially available RNA samples from different suppliers. Analysis on the 2100 bioanalyzer reveals large differences in the purity of the mRNA samples.

Corresponding application note: 5968-7495EN

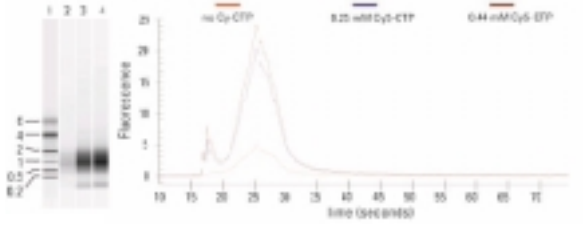
Analysis of Cy5 labeled samples

Analysis of cRNA with and without dye in gel matrix



Assay conditions:
-Cy5 labeled nucleic acids
-no intercalating dye used
-5nM Cy5 dCTP added to gel matrix and sample buffer for focusing

Lanes:
1. Unlabeled cRNA
2. Cy5 labeled cRNA
3. Cy5 labeled cRNA



Assay conditions:
as above, but intercalating dye included in gel matrix

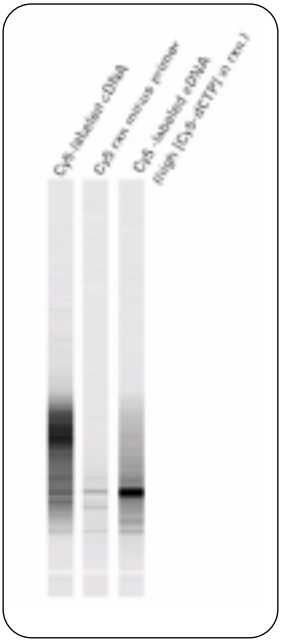
Lanes:
1. RNA transcript ladder
2. Unlabeled cRNA
3. Cy5 labeled cRNA
4. Cy5 labeled cRNA

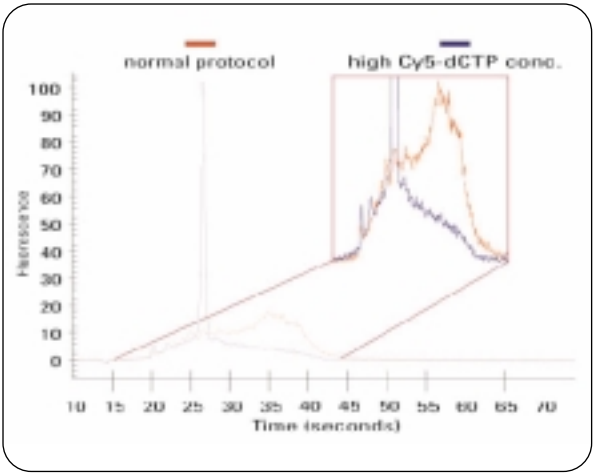
Kit: RNA 6000 Nano LabChip kit
Assay: mRNA Nano and Cy5 labeled nucleic acids Nano assay
Application: Analysis of Cy5 labeled and non-labeled cRNA samples. Cy5-labeled samples show the combined signals of the fluorescent label and the RNA signal created by the fluorescence of the RNA 6000 dye. If the RNA 6000 dye is omitted from the gel matrix, only the signal created by Cy5 is detected, allowing the determination of dye incorporation after a labeling reaction. Please note that for Cy3 labeled samples the intactness of the sample can be verified but the dye incorporation can not be checked.

Corresponding application note: 5980-0321EN

Analysis of Cy5 labeled samples

Optimization of labeling reactions



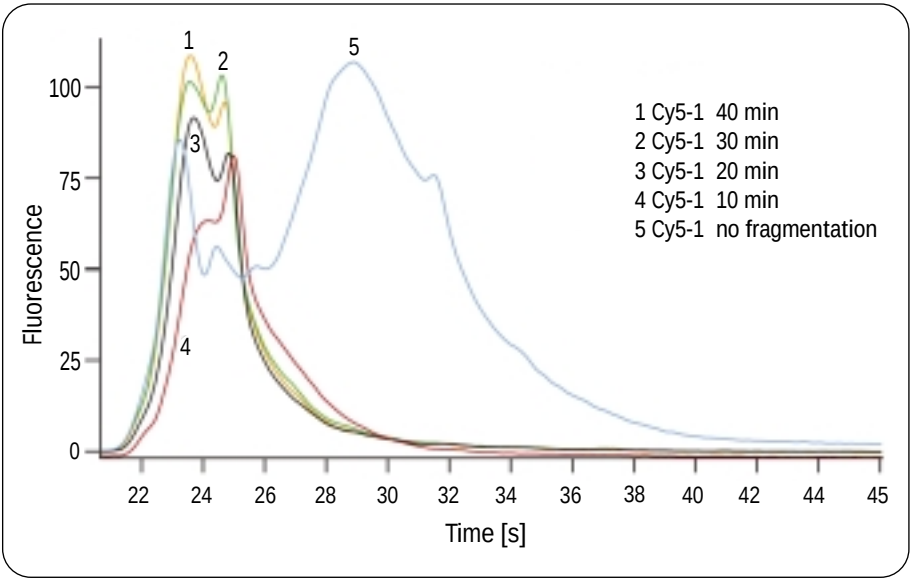


Kit: RNA 6000 Nano LabChip kit
Assay: Cy5 Labeled Nucleic Acids Nano assay
Application: An experiment was designed to check the influence of Cy5 dCTP concentration on labeling efficiency. Lane 2 represents the negative control (primer omitted from the reaction mixture), while lane 3 shows the analysis of a reaction with a 6-fold increased Cy5 dCTP concentration. A look at the electropherograms reveals that not only did the high Cy5 dCTP concentration give a high peak of unincorporated Cy5, but also the labeling efficiency for longer fragments was very low. This approach allows the optimization of labeling reactions.

Corresponding application note: 5980-0321EN

Analysis of Cy5 labeled samples

cRNA fragmentation

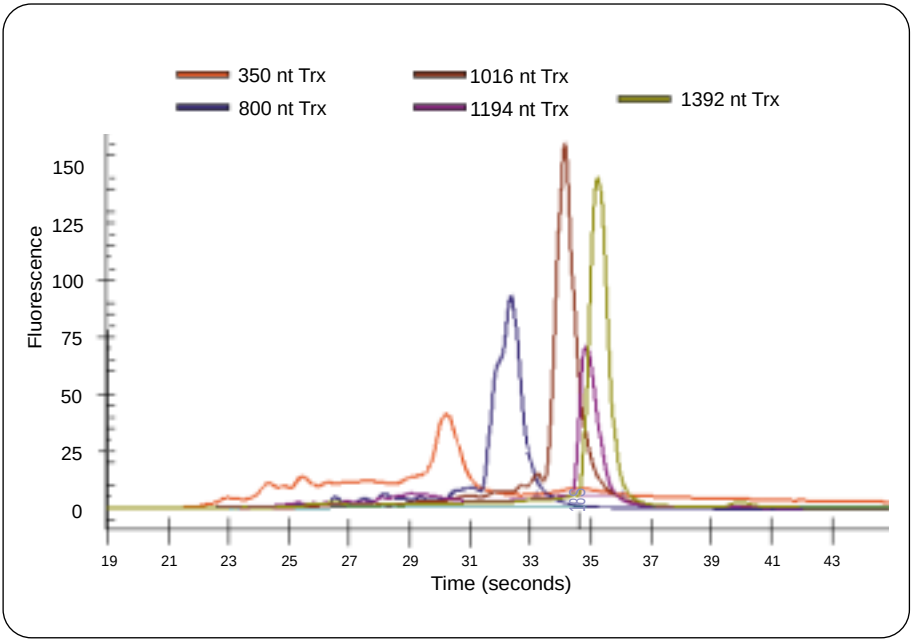


Kit: RNA 6000 Nano LabChip kit
Assay: Eukaryote total RNA Nano assay
Application: The RNA 6000 Nano LabChip kit can be used to monitor completion of an cRNA fragmentation reaction. In this example, the profile of a Cy5 labeled cRNA sample was monitored at different time points during a fragmentation reaction. It can be seen that after 10 minutes most of the fragments are in the desired size range. After 20 minutes, no further shift of fragmentation can be observed indicating completion of the fragmentation reaction.

Corresponding application note: 5988-3119EN

Analysis of T7 RNA transcripts

Size estimation



Kit: RNA 6000 Nano LabChip kit
Assay: Eukaryote total RNA Nano assay
Application: A number of RNA transcripts, ranging from 350 to 1400 nt in size, were analyzed on the RNA 6000 Nano LabChip kit. Although the assay runs under native conditions and the transcripts exhibit a certain degree of secondary structure, a good size estimation can be achieved.

Corresponding application note: Currently none available

IV. Protein analysis

Protein expression

Analysis of cell lysates - protein induction
Comparison of expression patterns in cell lysates

Protein purification

Comparison between lysate and flow through
Analysis of protein purification
GFP Streptag fusion protein purification
Analysis of column capacity
Analysis of column fractions to optimize conditions
Ni^{2+} Affinity column fractions (I)
Ni^{2+} Affinity column fractions (II)
His-tag protein purification with $ZipTips_{Ni}$

Antibody Analysis

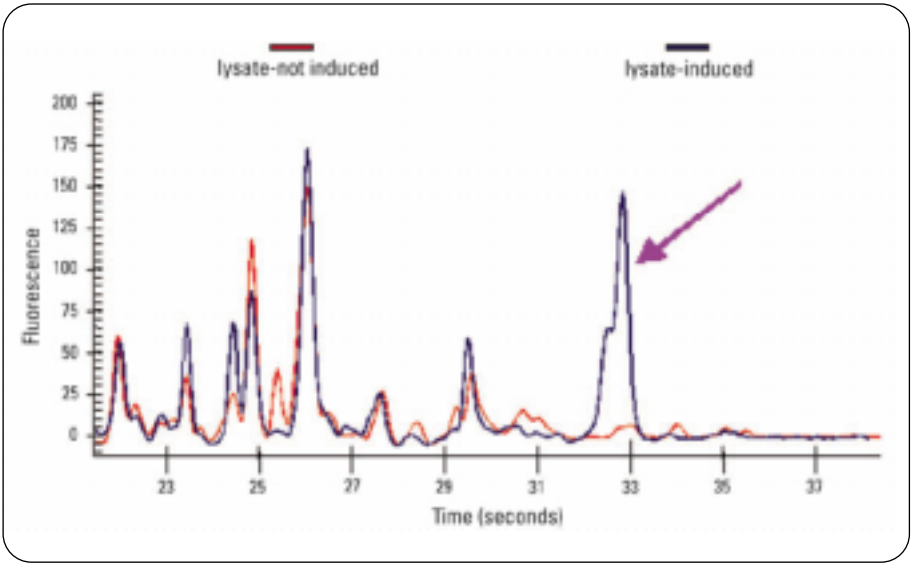
Analysis of antibodies under reducing and non-reducing conditions
Quantitation of the half-antibody content in IgG_4 preparations
Comparison of: SDS-PAGE, CGE and 2100 bioanalyzer for humanized monoclonal antibody analysis
Absolute quantitation of IgG

Others

Absolute protein quantitation
Enzymatic removal of His Tags from recombinant proteins
Bovine milk analysis

Protein expression

Analysis of cell lysates - protein induction

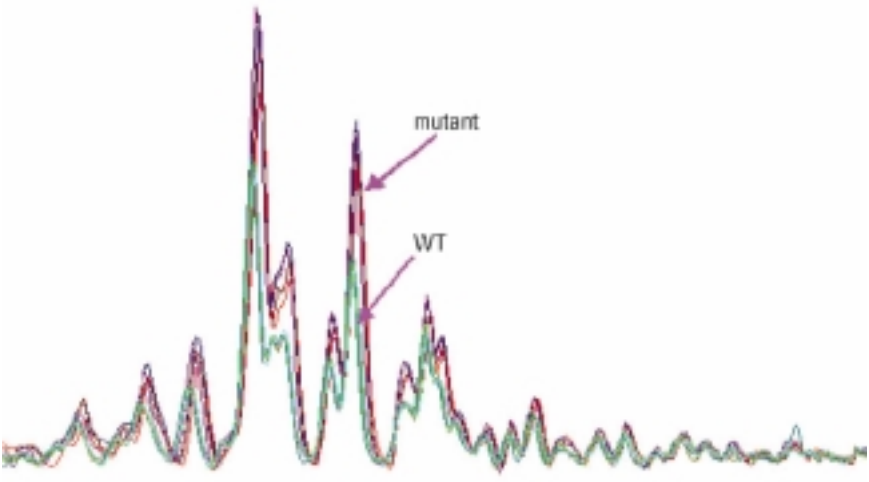


Kit: Protein 200 Plus LabChip kit
Assay: Protein 200 Plus assay
Application: Two cell lysates, induced and non-induced were compared to verify the induction of protein expression. The overlay feature of the bioanalyzer software allows a quick sample comparison. The blue electropherogram trace shows the cell lysate highly expressing β-galactosidase (128 kDa).

Corresponding application note: data not published

Protein expression

Comparison of expression patterns in cell lysates

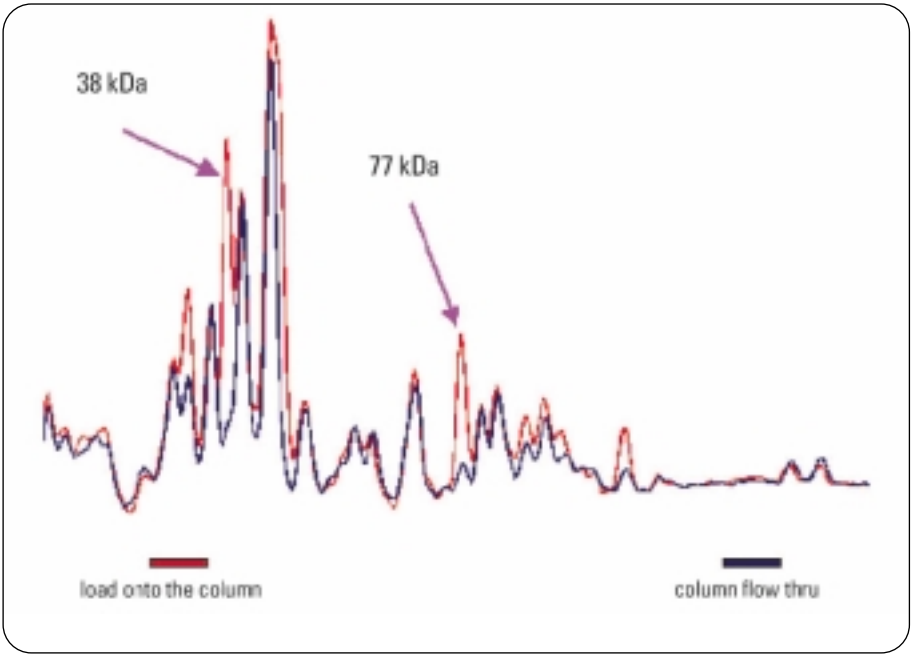


Kit: Protein 200 Plus LabChip kit
Assay: Protein 200 Plus assay
Application: Yeast cell lysates from wildtype (WT) and mutant were freshly prepared using glass beads for cell membrane disruption, both samples were analyzed with the Protein 200 Plus assay. The overlay of multiple runs is shown and demonstrates the great reproducibility. This overlay feature of the 2100 bioanalyzer software allows the direct comparison between 2 samples and the detection of small differences in the expression pattern.

Corresponding application note: data not published

Protein purification

Comparison between lysate and flow through

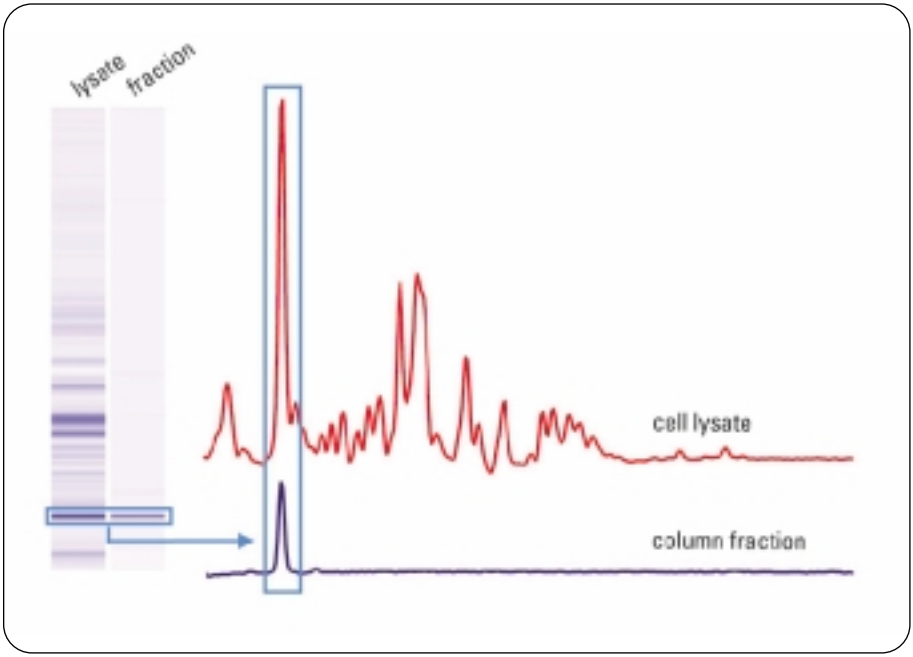


Kit: Protein 200 Plus LabChip kit
Assay: Protein 200 Plus assay
Application: Cells were lysed using the Pierce B-Per kit and than loaded onto an affinity column. The protein of interest, a 38 kDa protein, should bind to the column and not show up in the flow through. By overlaying the 2 electropherograms from both samples, the lysate and the flow through, it is visible that the protein of interest has bound to the column as expected. In addition, an 77 kDa protein has bound to the column, which could be attributed to unspecific binding or the binding of a dimer.

Corresponding application note: data not published

Protein purification

Analysis of protein purification



Courtesy of P. Sebastian and S.R. Schmidt GPC-Biotech AG, Martinsried, Germany

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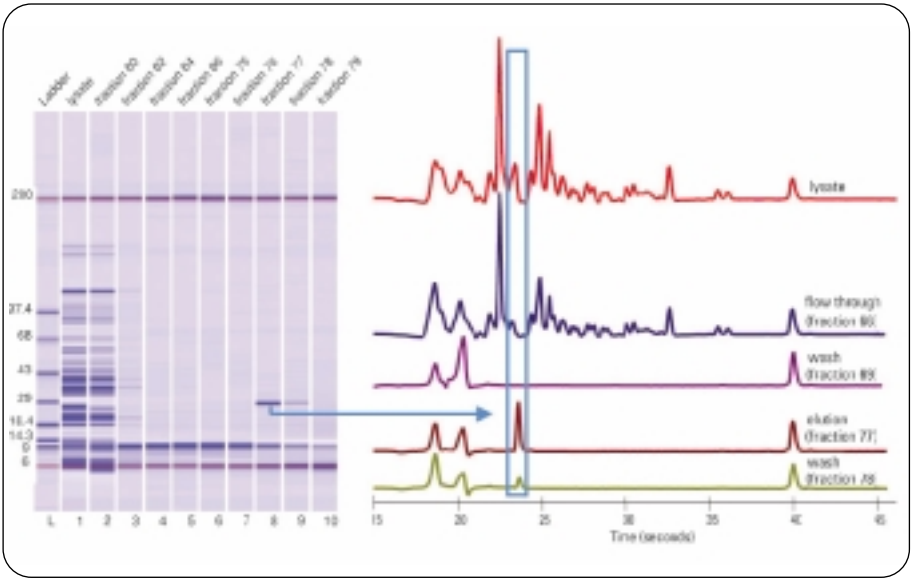
Kit: Protein 200 Plus LabChip kit
Assay: Protein 200 Plus assay
Application: A 18 kDa protein was purified using affinitiy chromatography. The starting material and the column fraction where analyzed with the protein assay. The protein of interest was determined to be 99% pure and the concentration in the column fraction was 167 ng/ul.
The protein assay allows to determine protein purity and concentration in one step, in addition it calculates protein size for reconfirmation.

Corresponding application note: data not published

Protein purification

GFP Streptag fusion protein purification



Courtesy of P. Sebastian and S.R. Schmidt GPC-Biotech AG, Martinsried, Germany

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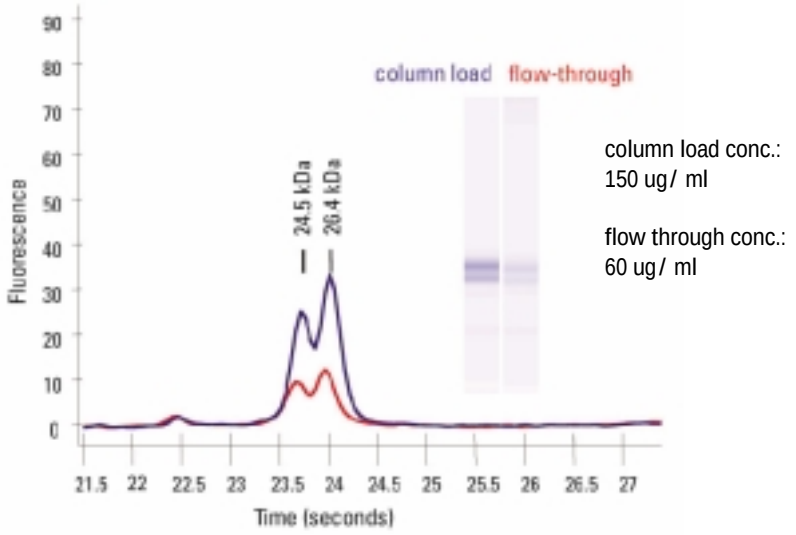
Kit: Protein 200 Plus LabChip kit
Assay: Protein 200 Plus assay
Application: This example shows the analysis of various steps during the purification workflow of a GFP Streptag fusion protein (28 kDa). The protein was expressed in *E.coli* and purified via affinity chromatography with Strep Tactin Poros as the column matrix. The protein assay allows to monitor and optimize each purification step from the cell lysis to the elution of the purified protein.

Corresponding application note: 5988-5025EN

Protein purification

Analysis of column capacity

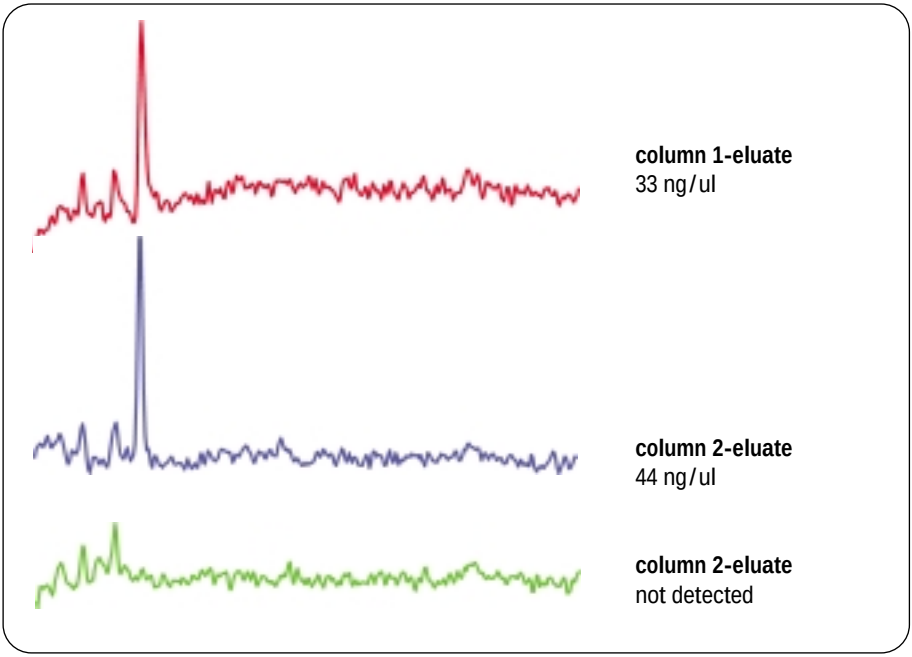


Kit: Protein 200 Plus LabChip kit
Assay: Protein 200 Plus assay
Application: The binding of a recombinant antibody Fab fragment to a Sepharose column with immobilized Protein G was analyzed to determine the column capacity and prevent column overloading. The protein assay allows to monitor and quickly optimize this purification step.

Corresponding application note: 5988-4022EN

Protein purification

Analysis of column fractions to optimize conditions



Courtesy of P. Sebastian and S.R. Schmidt GPC-Biotech AG, Martinsried, Germany

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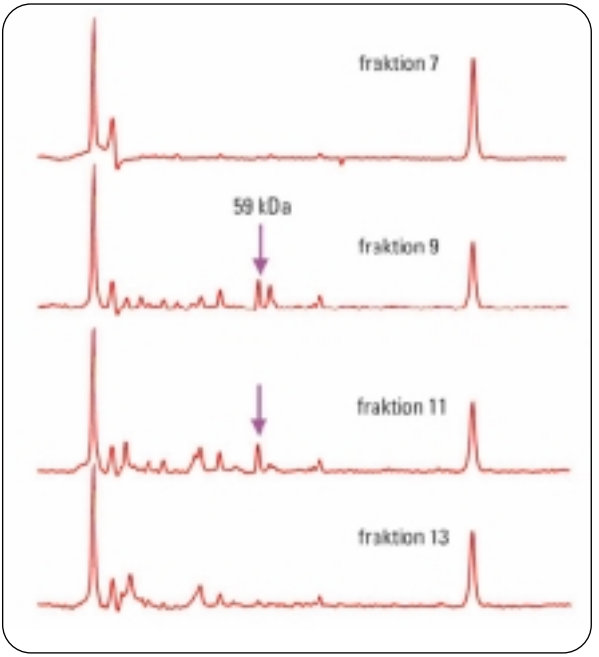
Kit: Protein 200 Plus LabChip kit
Assay: Protein 200 Plus assay
Application: Different column conditions were tested to optimize the purification conditions for a 30 kDa protein. The column fractions were analyzed for protein purity and concentration to identify the optimal conditions providing a highly purified protein in a good yield. Using the protein assay it was possible to determine the optimum purification conditions in a short time frame.

Protein purification

Ni^{2+} Affinity column fractions (I)

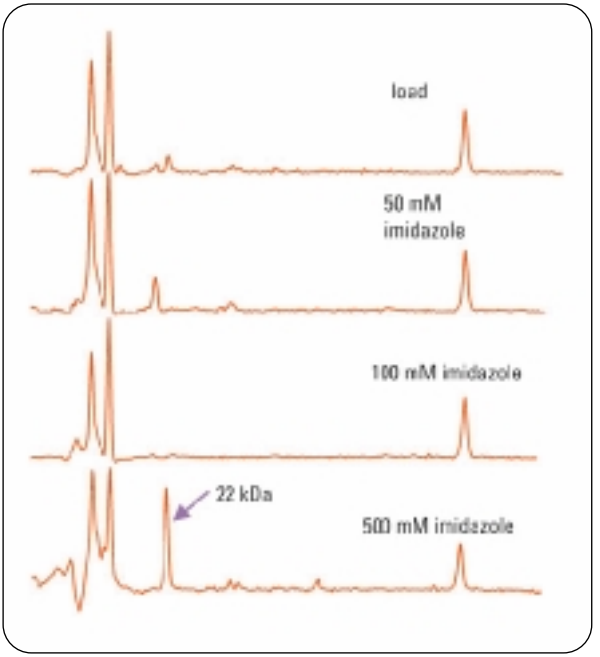


Kit: Protein 200 Plus LabChip kit
Assay: Protein 200 Plus assay
Application: The His-tag protein was purified with IMAC (immobilized metal affinity chromatography) and eluted with an imidazole gradient (0-200 mM). The UV detector showed a signal in fraction 9, to verify that, the samples were analyzed with the protein assay directly from the column. Indeed in fraction 9 various proteins are detected and the protein of interest (59 kDa) was identified according to its size. The fraction, however, still contains a considerable amount of impurities and needs further purification.

Corresponding application note: data not published

Protein purification

Ni^{2+} Affinity column fractions (II)

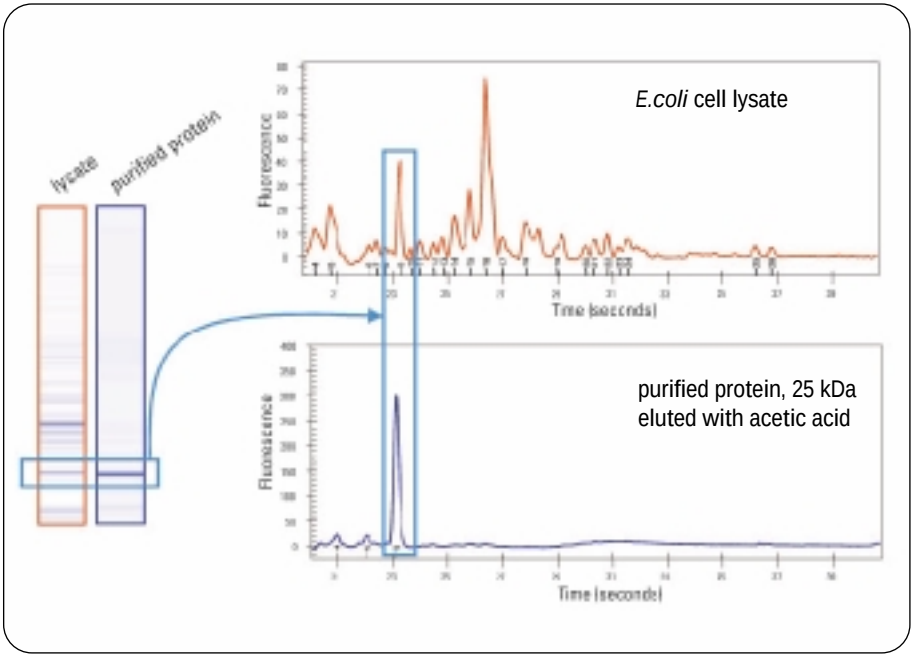


Kit: Protein 200 Plus LabChip kit
Assay: Protein 200 Plus assay
Application: IMAC column fractions were analyzed with the protein assay. The protein was expected to elute in the 500 mM imidazole fraction (50 mM Tris pH 7.5 and 500 mM NaCl), and indeed the protein of interest (22 kDa) was detected in that fraction and is 95% pure as automatically determined by the software.

Corresponding application note: data not published

Protein purification

His-tag protein purification using Ni++ZipTips®

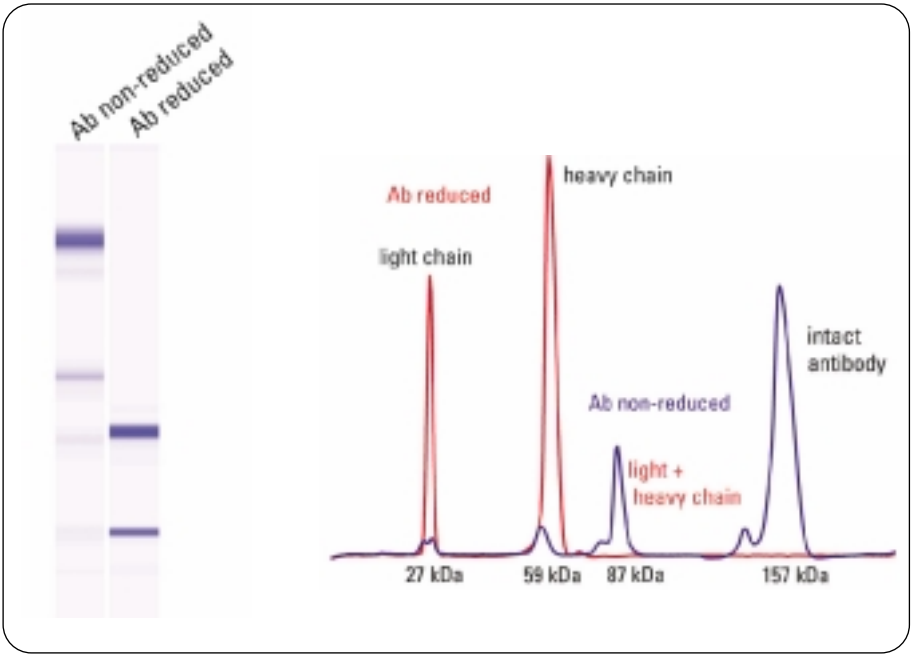


Kit: Protein 200 Plus LabChip kit
Assay: Protein 200 Plus assay
Application: ZipTips loaded with a Ni^{2+}-resin (in development by Millipore) were used to purify a His-tagged protein expressed in *E.coli.* Both the cell lysate and the purified protein were analyzed with the 2100 bioanalyzer to demonstrate the performance of the tips. The purification with the tips takes approximately 5 minutes, followed by the analysis of the samples with slab gel electrophoresis, this takes a further 2 hrs. This analysis could be achieved much faster using the protein assay and the 2100 bioanalyzer.

Corresponding application note: data not published

Antibody analysis

Analysis of antibodies under reducing and non-reducing conditions

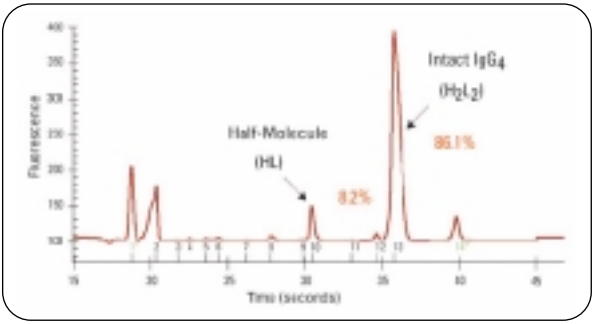


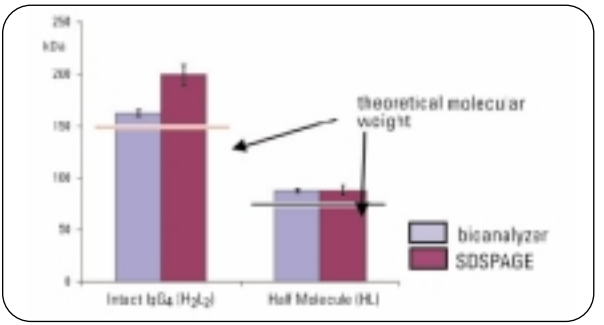
Kit: Protein 200 Plus LabChip kit
Assay: Protein 200 Plus assay
Application: The protein kit allows analysis of both reduced and non-reduced antibodies on the same chip. This is not possible using SDS-PAGE, as the reducing agent will diffuse within the gel and will also reduce other samples. Under non-reducing conditions, it is expected to detect the intact antibody around 160 kDa. Here the single light and heavy chains and half-antibodies are also visible. Under reducing conditions this is all completely reverted to single light and heavy chains, due to the reduction of the disulfide bonds.

Corresponding application note: data not published

Antibody analysis

Quantitation of the half-antibody content in IgG_4 preparations





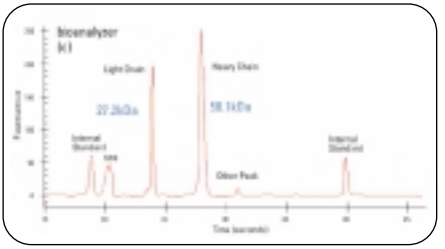
Kit: Protein 200 Plus LabChip kit
Assay: Protein 200 Plus assay
Application: Usually up to 30 % of IgG_4 is secreted as half-molecule (half-antibody) depending on the host cell line. The half-molecule has only a single disulfide bond between the heavy and light chains, the inter-heavy chain disulfide bonds are absent. The protein assay allows to automatically determine the half-antibody content in IgG_4 preparations. In addition, the sizing provided compares very well in terms of accuracy and reproducibility to SDS-PAGE and the theoretical size.

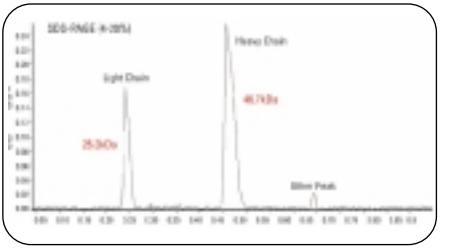
Poster presented at WCBP Conference, January 27-30, 2002 by E.Vasilyeva, H.Fajardo, P.Bove, F.Brown and M.Kretschmer. BIOGEN, Cambridge, MA , USA

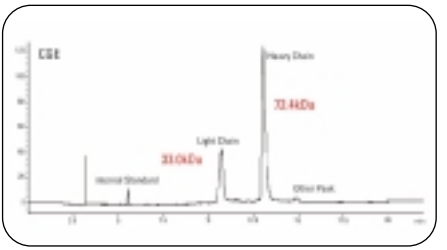
Corresponding application note: data not published

Antibody analysis

Comparison of SDS-PAGE, CGE and 2100 bioanalyzer for humanized monoclonal antibody analysis







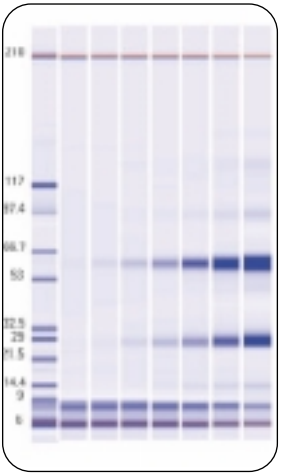
Kit: Protein 200 Plus LabChip kit
Assay: Protein 200 Plus assay
Application: The analysis of a humanized monoclonal antibody under reducing condition was compared using 3 different techniques, the 2100 bioanalyzer , 4-20% SDS-PAGE, stained with Coomassie, and capillary gel electrophoresis. All 3 techniques result in a similar separation pattern showing the light and the heavy chain of the antibody. In addition, the determined sizes of the light and heavy chain were comparable for all 3 techniques and compared well to the molecular weights determined by MALDI-TOF (ligh chain: 23762 Da, heavy chain: 51003 Da). However, the 2100 bioanalyzer provides a significant time saving compared to the other techniques.

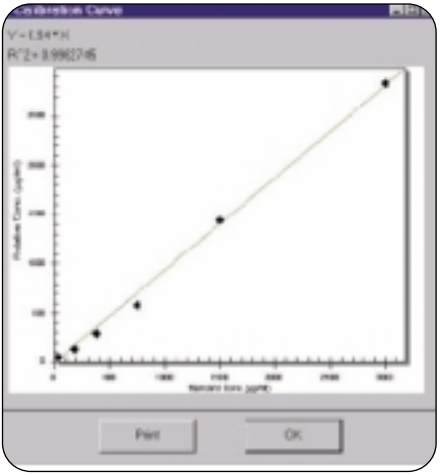
Poster presented at WCBP Conference, January 2002 by
S.H. Bowen, M. Chan, P.McGeehan, J.Smith, L. Inderdass, R. Strouse, M. Schenerman
MedImmune Inc., Gaithersburg, MD, USA

Corresponding application note: data not published

Antibody analysis

Absolute quantitation of IgG



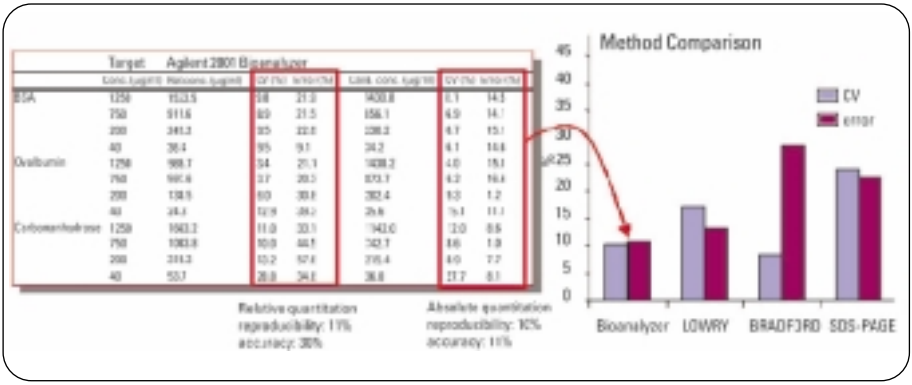


Kit: Protein 200 Plus LabChip kit
Assay: Protein 200 Plus assay
Application: The calibration feature within the software allows to determine the absolute antibody concentration in comparison to user defined standards with known concentration, to accuratly determine IgG concentrations and to do a batch comparison during antibody QA/QC.

Corresponding application notes: 5988-4021EN and 5988-6576EN

Protein - others

Absolute protein quantitation

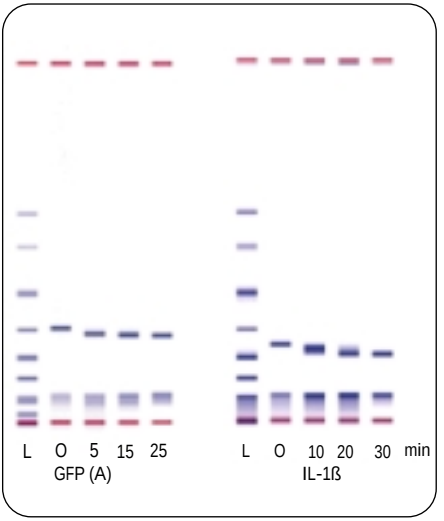


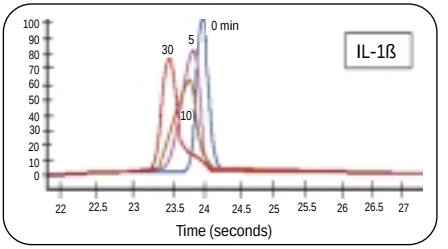
Kit: Protein 200 Plus LabChip kit
Assay: Protein 200 Plus assay
Application: A comparative analysis of different techniques used for absolute protein quantitation was performed analyzing 3 different proteins (CA, BSA, OV) in 4 different concentration (40 - 1250 ug/ml). The same samples were quantitated using the 2100 bioanalyzer, two commonly used total protein quantitation assays, Lowry and Bradford, and SDS-PAGE, stained with Coomassie. The relative standard deviation (CV) and the error compared to the target concentration were determined. This data demonstrates that the 2100 bioanalyzer is a viable alternative for protein quantitation. It allows the quantitation of individual proteins and simultanous determination of protein purity and size.

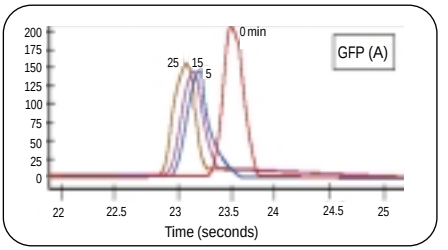
Corresponding application notes: 5988-4021EN and 5988-6576EN

Protein - others

Enzymatic removal of His Tags from recombinant proteins







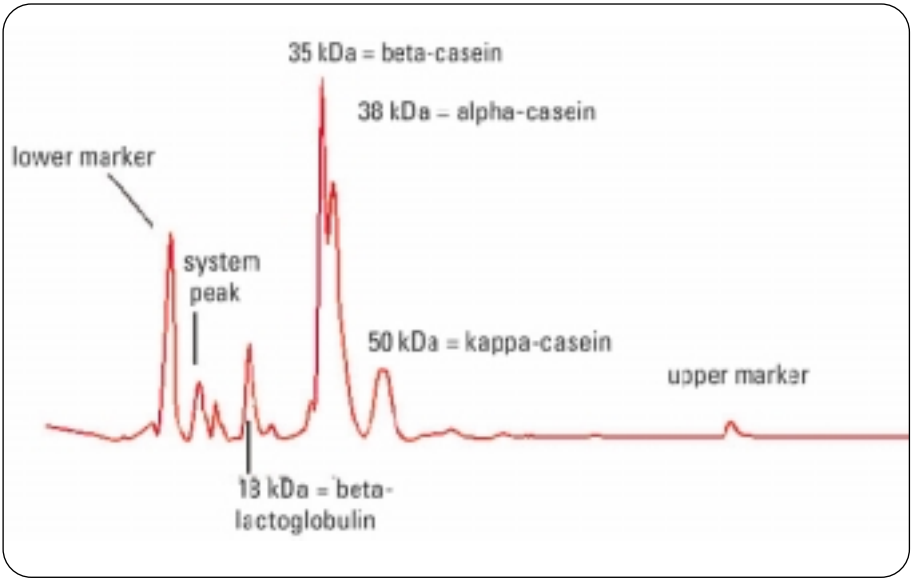
Kit: Protein 200 Plus LabChip kit
Assay: Protein 200 Plus assay
Application: For some applications, it might be required to remove the His-tag after the protein purification, because of its effects on enzymatic activity or protein structure. Here the TAGZyme system (Qiagen) was used, to remove the N-terminal His-tag from two different proteins, a GFP variant and a recombinant Interleukin 1β. Samples were taken at different time points to study the kinetics of the enzymatic cleavage. The dipeptide cleavage can be detected by a size shift on the gel-like images and the electropherograms.
The fast analysis with the bioanalyzer allows to do multiple kinetic studies in one day instead of waiting until the next day for the results from SDS-PAGE analysis.

Poster presented at ABRF Conference, March 2002 by
F. Schäfer, K. Steinert, C. Feckler, J.Drees, and J.Ribbe, QIAGEN GmbH, Hilden, Germany

Corresponding application note: data not published

Protein - others

Bovine milk analysis



Kit: Protein 200 Plus LabChip kit
Assay: Protein 200 Plus assay
Application: The main protein compenents of bovine milk were analyzed and identified using the 2100 bioanalyzer and the Protein 200 Plus assay. Prior to analysis, the milk was diluted 1:10 in water.

Corresponding application note: data not published

Literature

Agilent application notes

Description	Publication number
DNA	
Quantitative analysis of PCR fragments with DNA 7500 LabChip kit	5968-7496EN
High precision restriction fragment sizing with DNA 12000 LabChip kit	5968-7501EN
Comparing the Agilent 2100 bioanalyzer performance to traditional DNA analysis	5980-0549EN
Agilent 2100 Bioanalyzer replaces gel electrophoresis in prostate cancer research	5988-1086EN
High resolution DNA analysis with the DNA 500 and DNA 1000 LabChip kits	5988-3041EN
Quantitative end-point RT-PCR gene expression using DNA 7500 LabChip kit	5988-3674EN
Development of meat speciation assays using the Agilent 2100 bioanalyzer	5988-4069EN
Analysis of genetically modified soya using the Agilent 2100 bioanalyzer	5988-4070EN
Detecting genetically modified organisms with the Agilent 2100 bioanalyzer	5988-4847EN
RNA	
Analysis of total RNA using the RNA 6000 LabChip kit	5968-7493EN
Analysis of messenger RNA using the RNA 6000 LabChip kit	5968-7495EN
Analysis of Cy5-labeled cRNAs and cDNAa using the RNA 6000 LabChip kit	5980-0321EN
Quantitation comparison of total RNA using the 2100 bioanalyzer, ribogreen analysis and UV spectrometry	5988-7650EN
Characterization of RNA quality using the RNA 6000 LabChip kit	5980-0472EN
Comparing performance of the Agilent 2100 bioanalyzer to traditional RNA analysis	5980-2206EN
The total RNA story	5988-2281EN
Interpreting mRNA electropherograms	5988-3001EN
Optimizing cRNA fragmentation for microarray experiments using 2100 bioanalyzer	5988-3119EN
Proteins	
Protein sizing and analysis using the Protein 200 LabChip kit	5988-0975EN
Differences and similarities between Protein 200 Assay and SDS-PAGE (tech note)	5988-3160EN
Comparison of different protein quantitation methods	5988-6576EN
Using the Agilent 2100 bioanalyzer for analysis of His-tag removal from recombinant proteins	5988-8144EN
Absolute quantitation with the Protein 200 LabChip kit	5988-4021EN
Optimization of protein purification using the Agilent 2100 bioanalyzer	5988-4022EN
Comparison of different methods for purification analysis of a green fluorescent strep-tag fusion protein	5988-5025EN
Fast analysis of proteins between 5-50 kDA using the Agilent 2100 bioanalyzer and Protein 50 assay	5988-8322EN
Using the Agilent 2100 bioanalyzer for analysis of His-tag removal from recombinant proteins	5988-8144EN
Cells	
Apoptosis detection by annexin V and active caspase-3 with the 2100 bioanalyzer	5988-4319EN
Detection of cell surface proteins with the Agilent 2100 bioanalyzer by on-chip antibody staining	5988-7111EN
Monitoring transfection efficiency in cells using an on-chip staining protocol	5988-7296EN
A fast protocol for apoptosis detection by Annexin V with the Agilent 2100 bioanalyzer	5988-7297EN
Cell fluorescence assays on the Agilent 2100 bioanalyzer - general use	5988-4323EN
Monitoring transfection efficienency by green fluorescence protein (GFP) detection	5988-4320EN
Detection of antibody-stained intracellular protein targets with the 2100 bioanalyzer	5988-4322EN
Measuring multiple apoptosis parameters with the Agilent 2100 bioanalyzer	5988-8028EN
Flow cytometric analysis of human primary cells using the Agilent 2100 bioanalyzer and on-chip staining	5988-8154EN

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Research papers

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Notes

Notes

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