



**FAST Slide Reference List**

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**100 Entries**

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→ See "[Bibliography\\_long](#)" for technical and scientific details.

## Use of protein microarray technology in:

### cancer research

Scorilas et al. 2000	Grubb et al. 2003
Knezevic et al. 2001	Espina et al. 2003 (Review)
Belov et al. 2001	Nishizuka et al. 2003a
Madoz-Gurpide et al. 2001	Nishizuka et al. 2003b
Paweletz et al. 2001	Tannapfel et al. 2003
Jones et al. 2002	Simpkins et al. 2004 (Review)
Yan et al. 2003	Espina et al. 2004
Wulfkuhle et al. 2003	Qiu et al. 2004
Belov et al. 2003	Geho et al. 2005
Bouwman et al. 2003	Gulmann et al. 2005
Calvert et al. 2004	Wei et al. 2005
Christopherson. et al. 2006	(Mircean et al. 2005)
Ellmark et al. 2006	Fernández-Madrid et al. 2004
(Nishizuka et al. 2006)	Tibes et al. 2006
(Geho et al. 2007)	Becker et al. 2007
Fan et al. 2007	Rapkiewicz et al. 2007
Braunschweig et al. 2007	

### biomarker profiling

Paweletz et al. 2001	Tannapfel et al. 2003
Jones et al. 2002	Espina et al. 2004
Espina et al. 2003 (Review)	Qiu et al. 2004
Nishizuka et al. 2003a	Zhou et al. 2004
Nishizuka et al. 2003b	Ramaswamy et al. 2005
Kingsmore 2006 (Review)	Chatterjee et al. 2006a

### antibody/serum profiling

Kersten et al. 2003	Michaud et al. 2003
Nowak et al. 2006	Kersten and Feilner 2007

### autoimmune disease research

Lueking et al. 2005	Horn et al. 2006
Gutjahr et al. 2005	Li et al. 2007

### infectious disease research

Arnaud et al. 2004	Sakanyan 2004 (review)
Steller et al. 2005	Davies et al. 2005a
Wang et al. 2002	Davies et al. 2005b
Zhu et al. 2006	Davies et al. 2007
Sundaresh et al. 2007	

### chip surface comparison

Madoz-Gurpide et al. 2001	Kukar et al 2002
Angenendt et al 2003	Guillaume et al. 2005
(Suchyta 2006)	

### cytokine detection

Stillman et al. 2002	Knight et al. 2004
Tonkinson et al. 2003	Li et al. 2003a
Li et al. 2003b	Li et al. 2005
Alterovitz et al. 2006 (Review)	Averbeck et al. 2006
Lash et al. 2006	

### signal transduction research

Grubb et al. 2003	Espejo et al. 2002
Chan et al. 2004	Wulfkuhle et al. 2003
Liu et al. 2002	Kopf et al. 2005
Yamamoto et al. 2005	Rosenblatt and Kuro-o 2007
Loebke et al. 2007	Calvert et al. 2007

### kinase target identification

Feilner et al. 2005	Kramer et al. 2004
Feilner and Kersten 2007	

### apoptosis research

Narayan et al. 2006

### allergy/antigen research

Kim et al. 2002	Stadtherr et al. 2005
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### protein-protein interaction studies

Espejo et al. 2002	Kukar et al. 2002
Liu et al. 2002	Schweitzer et al. 2003 (Review)
Seitz et al. 2006	

### carbohydrate-protein interactions

Feizi et al. 2004	Wang et al. 2002
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### protein-DNA interaction studies

Kersten et al. 2004	Sakanyan 2005
Ho et al. 2006	Braun et al. 2006

### whole proteome studies

Michaud et al. 2003	Schweitzer et al. 2003 (Review)
Alterovitz et al. 2006 (Review)	(Repka 2006)
Gupta et al. 2007	(Sakanyan and Yeretssian 2007 (Review))

→ See "**Overview**" for listing according to subject.

→ See "**Bibliography\_long**" for technical and scientific details.

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BIBLIOGRAPHY		CONTENT				METHOD					Whatman's Comment	
Author	Title	Year	Publication	Application	Keywords	Summary	Printing	Scanner	Detection	Dye(s)		
<a href="#">Alterovitz, G. et al.</a>	Automation, parallelism, and robotics for proteomics	2006	Proteomics 6: 4016-4022	review	proteomics, mass spectrometry, image analysis, ZDE, FAST Quant, reverse phase arrays							
<a href="#">Angenendt, P. et al.</a>	Next generation of protein microarray support materials: Evaluation for protein and antibody microarray applications	2003	J Chromatography A 1009: 97-104	method development	protein arrays, antibody arrays, epoxy slides, silanated slides, polystyrene slides, amine slides, PEG-epoxy slides, dendrimer slides, FAST slides	7 different slide types/surface chemistries are compared	QArray (Genetix)	ScanArray 4000 (Perkin-Elmer)	fluorescence, direct and indirect	Cy3, Cy5	FAST slides show good performance in all tested parameters, are more flexible than others which may perform superior in a specific field. FAST slides are the only surface showing a linear response curve with increasing amounts of spotted AB	
<a href="#">Arnaud, M.-C. et al.</a>	Array assessment of phage-display peptide mimics of Human Immunodeficiency Virus type 1 gp41 immunodominant epitope: Binding of antibodies of infected individuals	2004	Proteomics 4: 1959-1964	virology, immunology	HIV, phage-display, near-IR fluorescence detection	printing of phage suspensions on Protran BA membrane	GMS 417 (Genetic Microsystems, Woburn, MA, USA), 0.5 - 1 nl phage suspension on Protran BA83 (not on slides!)	Odyssey Imager (LI-COR)	near-IR fluorescence indirect	IRDye 800	FAST slides were used, data not shown ("...sensitivity ... can be increased more than 2-fold ... on FAST slides...provide increased signal-to-noise ratio (compared to Protran)")	
<a href="#">Averbeck, M. et al.</a>	In situ profiling and quantification of cytokines released during ultraviolet B-induced inflammation by combining dermal microdialysis and protein microarrays	2006	Exp Dermatol 15: 447-454	cytokine research	UVB irradiation, dermatology erythema, microdialysis, photobiology	Cytokine profiles in interstitial milieu in human skin were monitored in situ with dermal microdialysis. ProVision cytokine arrays were used (predecessor to Whatman FAST Quant kit).	ready-made arrays	GenePix 4000B (Axon)	fluorescence, indirect	Cy5	ProVision Kit was predecessor of FAST Quant Kit	
<a href="#">Balboni, L. et al.</a>	Multiplexed protein array platforms for analysis of autoimmune diseases	2006	Annu Rev Immunol 24: 391-418	review (autoimmune research)	autoantibody, cytokines, immune system, proteomics, bioinformatics	Very comprehensive review covering the applications of multiplex techniques in autoimmune research and diagnostics. In addition, a general discussion of current proteomics methods and bioinformatics is included.						
<a href="#">Becker, K.-F. et al.</a>	Quantitative protein analysis from formalin-fixed tissues: implications for translational clinical research and nanoscale molecular diagnostics	2007	J. Pathol. 211(3): 370-378	cancer research	reverse phase arrays, formalin-fixed paraffin-embedded tissues, breast cancer	Reverse-phase arrays were prepared from proteins extracted from routinely prepared tissue sections. Cancer marker proteins could be reliably quantified.	MicroCAsTer (Whatman)	EagleEye (Stratagene) or Fluorchem (Alpha Innotech)	Chemilumi-nescence fluorescence	ECLPlus (Chemilumi.), SyPro Ruby (total protein)	This paper shows that routinely prepared tissue sections in hospitals all over the world are accessible to molecular diagnostics using reverse-phase protein arrays.	
<a href="#">Belov, L. et al.</a>	Immunophenotyping of leukemias using a Cluster of Differentiation antibody array	2001	Cancer Res 61: 4483-4489	cancer research (leukemia)	Leukemia types, CD protein expression	binding of lymphocytes on AB arrays; bound cells can subsequently be fixed and further analyzed with immunohistochemistry	PixSys 3200 (Cartesian Technologies, Irvine, CA)	Olympus BX60 Fluorescence Microscope	non-conventional dark-field microscopy			
<a href="#">Belov, L. et al.</a>	Identification of repertoires of surface antigens on leukemias using an antibody microarray	2003	Proteomics 3: 2147-2154	cancer research (leukemia)	Leukemia types, CD protein expression	binding of lymphocytes on AB arrays; bound cells can be quantified using non-conventional dark-field microscopy; method appears to be suited for diagnosis of common leukemias	PixSys 3200 (Cartesian Technologies, Irvine, CA)	Microscope	non-conventional dark-field microscopy			
<a href="#">Belov, L. et al.</a>	Screening microarrays of novel monoclonal antibodies for binding to T-, B-, and myeloid leukaemia cells	2005	J Immunological Methods 305: 10-19	cancer research (leukemia)	CD antibodies, leukemia leukocytes	498 monoclonal ABs against leukocyte antigens arrayed, arrays screened with leukaemia cells	Biodot AD5000 (Biodot Inc., Irvine, CA, USA)	DotScan array reader (Medasac Pty., Eveleigh, Australia)	cell binding density	formaldehyde fixed cells		
<a href="#">Bouwman, K. et al.</a>	Microarrays of tumor cell derived proteins uncover a distinct pattern of prostate cancer serum immunoreactivity	2003	Proteomics 3: 2200-2207	cancer research, method development	prostate cancer, auto-antibodies, hierarchical clustering, multivariate analysis	Proteins from cancer cell line were fractionated by IEF and RP-HPLC (20x8h=1760 fractions). These were arrayed and probed with patient sera (25 prostate cancer, 25 controls) to screen for antibodies against cancer proteins	custom-built robot, contact printing	ScanArray (Perkin-Elmer)	fluorescence, indirect	phycocerythrin (532 nm Ex)		
<a href="#">Braun, F. et al.</a>	Similarity and divergence between the RNA polymerase subunits from thermophilic <i>Thermotoga maritima</i> and mesophilic <i>Escherichia coli</i> bacteria	2006	Gene 380: 120-126	protein-DNA interaction, microbiology	hypothermophilic bacteria evolution, transcription factors, protein-DNA interaction	To study gene regulation, serial dilutions of recombinant bacterial RNA polymerase subunits were arrayed. Arrays were probed with directly fluorophore-labeled DNA probes.	GMS 417 (Affymetrix)	Odyssey Imager (LI-COR)	fluorescence, direct	IRDye 700		
<a href="#">Braunschweig, T. et al.</a>	Proteomic expression profiling of thyroid neoplasm	2007	Proteomics Clin Appl 1, 264-271	cancer research, biomarker profiling	thyroid cancer, laser capture microdissection, immunohistochemistry	LCM-samples from biopsies were biotin-tagged and analysed on AB array (330 specificities), 8 ABs shortlisted and validated by IHC. 3 potential diagnostic markers identified.	GMS 417 (Affymetrix)	standard office flatbed scanner	colorimetric	BCIP/NBT		
<a href="#">Brown Jones, M. et al.</a>	Proteomic analysis and identification of new biomarkers and therapeutic targets for invasive ovarian cancer	2002	Proteomics 2: 76-84	cancer research, reverse-phase arrays	biomarker, ovarian cancer, LCM (Laser Capture Microdissection)		GMSE 470 (Affymetrix), pin-and-ring system	not specified (office flat-bed scanner?)	colorimetric	CCLA system (Dako)	mainly ZDE, arrays only used for validation experiment	
<a href="#">Calvert, V. S. et al.</a>	Development of multiplexed protein profiling and detection using near infrared detection of reverse-phase protein microarrays	2004	Clin Proteomics 1: 81-89	cancer research, signal transduction, reverse-phase arrays	signal transduction, breast cancer, LCM (Laser Capture Microdissection)	multiplexed detection of protein phosphorylation using phospho-specific antibodies on reverse-phase arrays	GMSE 470 (Affymetrix), pin-and-ring system	Fluorchem (Alpha Innotech), Odyssey (LI-COR)	colorimetric, fluorescence, near-IR fluorescence	CSA kit (Dako), IRDye 800, Alexa Fluor 680, SyPro Ruby (for total protein)		
<a href="#">Calvert, V. S. et al.</a>	A systems biology approach to the pathogenesis of obesity-related nonalcoholic fatty liver disease using reverse phase protein microarrays for multiplexed cell signalling analysis	2007	Hepatology 46(1): 166-172	signal transduction research, hormone research	obesity, insulin resistance, adipose tissue, pathway analysis, lysate arrays, phosphorylation	Lysates of adipose tissue specimen from 99 obese patients were arrayed and probed with 54 ABs related to different signaling pathway. Molecular network comparison revealed reduction of insulin signaling in patients diagnosed to have developed nonalcoholic steatohepatitis.	2470 Arrayer (Aushon Biosystems)	Affymetrix 428 (for SyPro Ruby), UMAX Powerlook III office scanner (for CSA staining)	fluorescence, direct (total protein), colorimetric (specific proteins)	SyPro Ruby (total protein), CSA kit (Dako) for Phospho-specific ABs		
<a href="#">Chan, S.M. et al.</a>	Protein microarrays for multiplex analysis of signal transduction pathways	2004	Nature Medicine 10(12): 1390-1396	signal transduction research	kinase, phosphorylation, Jurkat T cells	measuring phosphorylation with anti-phospho/anti-non-phospho ABs against 62 different signaling components	Bio-Rad contact printer with solid pins	GenePix 4000A (Axon)	fluorescence, indirect	Cy3-SA with tyramide-amplification		
<a href="#">Chatterjee, M. et al.</a>	Diagnostic markers of ovarian cancer by high-throughput antigen cloning and detection on arrays	2006	Cancer Research 66: 1181-1190	cancer research, biomarker profiling	phage display, tumor-associated autoantibodies, ovarian cancer	T7 phage library of ovarian cancer cell line was produced; 65 clones were screened on arrays with patient sera; 48 potential biomarkers found, 11 are fragments from known cancer-related proteins.	Prosys 5510TL (Cartesian Inc., Ann Arbor, MI)	Genepix 4100A (Axon)	fluorescence, indirect	Cy3/Cy5		
<a href="#">Chatterjee, M. et al.</a>	Epitomics: global profiling of immune response to disease using protein microarrays	2006	OMICS 10(4): 499-506	biomarker profiling	phage display, tumor-associated autoantibodies, autoimmune diseases	Use of subtractive biopanning of T7 phage library to produce phage lysate arrays for biomarker screening	contact printer with 32 pins (model not specified)	not specified ("standard 2-color microarray scanner")	fluorescence, indirect	Cy3 (for normalization), Cy5 (for auto-ABs)		
<a href="#">Christopherson, R.I. et al.</a>	Classification of AML using monoclonal antibody array	2006	Myeloid Leukemia: Methods and Protocols. Methods in Molecular Medicine Vol. 125, Eds. Iland, H., Hertzberg, M., Marton, P.; Humana Press Inc., Totowa, NJ	cancer research (leukemia)	Leukemia types, CD protein expression	Use of microarrays for immunophenotyping leukemia subtypes	PixSys 3200 (Cartesian Technologies, Irvine, CA)	DotScan array reader (Medasac Pty., Eveleigh, Australia)	cell binding density	formaldehyde fixed cells	description of the Medasac DotScan system and its applications	
<a href="#">Davies, D.H. et al.</a>	Profiling the humoral immune response to infection by using proteome microarrays: High-throughput vaccine and diagnostic antigen discovery	2005	PNAS 102(3): 547-552	infectious disease research	high-throughput cloning and expression, in-vitro transcription/translation, RTS, vaccine, virus	high-throughput production of proteins to print a complete vaccinia virus proteome array, sera from vaccinia-immunized humans, monkeys, and mice analysed	OmniGrid 100 (Genomic Solutions)	ScanArray 4000 (GSI Lumonics)	fluorescence, indirect	Cy3	Products from Roche RTS in-vitro expression system were printed on FAST Slides without purification	
<a href="#">Davies, D.H. et al.</a>	Vaccinia virus H3L envelope protein is a major target of neutralizing antibodies in humans and elicits protection against lethal challenge in mice	2005	J Virology 79(18): 11724-11733	infectious disease research	vaccinia virus, vaccine, smallpox, in-vitro transcription/translation, RTS	185 recombinant vaccinia virus proteins (RTS produced) were arrayed and tested with serum samples of volunteers before and after vaccination; H3L protein was found to be immunodominant; the protective role of anti-H3L antibodies was further analysed.	OmniGrid 100 (Genomic Solutions)	ScanArray 4000 (GSI Lumonics)	fluorescence, indirect	Cy3		

BIBLIOGRAPHY				CONTENT		METHOD				Whatman's Comment	
Author	Title	Year	Publication	Application	Keywords	Summary	Printing	Scanner	Detection		Dye(s)
<a href="#">Davies, D.H. et al.</a>	Proteome-wide analysis of the serological response to vaccinia and smallpox	2007	Proteomics 7: 1678-1686	infectious disease research	poxvirus, Dryvax, vaccine antigen array	Recombinant proteins representing the vaccinia virus proteome were arrayed. Arrays were probed with sera from Dryvax vaccinated volunteers and smallpox infected individuals. The resulting profiles were indistinguishable.	Omnigrid 100 (Genomic Solutions)	Scan Array (Perkin Elmer); office flatbed scanner (not specified)	sera: fluorescence, indirect, protein expression: colorimetric	Cy3; alk. Phosphatase with nitro-TB substrate	
<a href="#">Elmark, P. et al.</a>	Multiplex detection of surface molecules on colorectal cancer	2006	Proteomics 6: 1791-1802	cancer research	CD antibodies, immunophenotyping, DotScan	DotScan CD antibody arrays (originally designed for immunophenotyping of leukaemia cells) were used to capture colon cancer cells. The dot pattern and additional multiplex fluorophore AB staining was used for immunophenotyping.	not specified	DotScan array reader (Medasac Pty., Eveleigh, Australia); for fluorescence: Molecular Imager FX Pro (BioRad) or Typhoon 8600 (GE Healthcare)	cell binding density and fluorescence, indirect	Fluorescein, Phycocerythrin, Alexa-647 (Molecular Probes)	Antibody capturing of intact cells appears to be an interesting alternative to analysis of soluble proteins, in particular when focusing on membrane proteins
<a href="#">Espejo, A. and Bedford, M.T.</a>	Protein-domain microarrays	2004	Methods Mol Biol 264: 173-184	method development, signal transduction research	protein binding domains, PDZ, SH2, FHA, PH, WW, proline-rich motifs	recombinant protein interaction domains arrayed, probed with synthetic peptides, rec. proteins and cell lysates	FLEXYS with 48 pin head FLX12021 (Genomic Solutions)	GeneTAC LSiV (Genomic Solutions)	fluorescence, indirect	Cy3, Cy5 (peptides), FITC (ABs against Proteins)	the NOTES section is very instructive: includes good tip and the statement, that FAST slides were found to be far superior to other slides (activated glass and Hydrogel)
<a href="#">Espejo, A. et al.</a>	A protein-domain microarray identifies novel protein-protein interactions	2002	Biochem J 367: 697-702	protein interaction profiling, signal transduction research	protein binding domains, PDZ, SH2, FHA, PH, arginine methylation, proline-rich motifs	binding of peptide motifs to printed rec. protein binding domains, binding of individual proteins from total-cell lysates to protein binding domains	FLEXYS with 48 pin head FLX2021 (Genomic Solutions)	GeneTAC LSiV (Genomic Solutions)	fluorescence, direct and indirect	Cy3, Cy5, FITC	
<a href="#">Espina, V. et al.</a>	Protein microarrays: Molecular profiling technologies for clinical specimens	2003	Proteomics 3: 2091-2100	review (cancer research)	reverse phase arrays, signal transduction, cancer, LCM (Laser Capture Microdissection)	detailed description of "Reverse Phase Arrays": Analyte molecules (here: patient biopsy extracts) arrayed probed with a single detection molecule					
<a href="#">Espina, V. et al.</a>	Application of Sector Protein Microarrays to clinical samples	2004	Clin Proteomics 1: 91-99	cancer research	reverse phase arrays, signal transduction, apoptosis, cancer	a sector array is a reverse array with multiple subarrays of identical patient samples on one slide, each to be probed with a different AB	GMS 417 (Affymetrix)	not specified (office flat-bed scanner?)	colorimetric	CSA kit (Dako)	
<a href="#">Fan, Y.-H. et al.</a>	In vitro expression levels of cell-cycle checkpoint proteins are associated with cellular DNA repair capacity in peripheral blood lymphocytes: A multivariate analysis	2007	J Proteome Res 6: 1560-1567	DNA repair, cell proliferation, cancer research	DNA repair, cell proliferation, cell cycle, molecular epidemiology, reverse-phase protein array	Lymphocyte lysates from 120 healthy individuals were arrayed and analysed for expression of 8 cell cycle checkpoint proteins. Protein expression was correlated with DNA repair capacity.	SpotBot Arrayer (Telechem)	ScanArray Lite (Perkin-Elmer)	fluorescence (indirect) with tyramide-based amplification (DAKO CSA)	Cy5	
<a href="#">Feilner, T. and Kersten, B.</a>	Phosphorylation studies using plant protein microarrays	2007	Methods Mol Biol 374: 379-390	kinase target identification, kinase profiling	plant kinases, signal transduction, Arabidopsis thaliana, phosphorylation assay	Methods for purification of active plant kinases and kinase assays on antigen arrays.	QArray (Genetix)	BioImager FLA 8000 (Fuji)	isotopic (autoradiography)	<sup>32</sup> P-ATP	Phosphor Imager is superior to X-ray film due to higher sensitivity and better dynamic range. Even with high resolution Phosphor Imagers, spot pitch must be rather wide (>400µm) due to bleeding (blurred) spots.
<a href="#">Feilner, T. et al.</a>	Proteomic studies using microarrays	2004	Current Proteomics 1(4): 293-295	review	proteomics, interaction analysis: protein-protein, DNA, -small molecule, enzymes, PTMs						very comprehensive, covering many applications and new approaches
<a href="#">Feilner, T. et al.</a>	High throughput identification of potential Arabidopsis mitogen-activated protein kinases substrates	2005	Mol Cell Proteomics 4(10): 1556-1568	signal transduction research	plant protein kinases, signal transduction, mitogen, autoradiography	test of 1690 arrayed recombinant <i>A. thaliana</i> proteins as potential kinase substrates, 48 (MPK3) and 39 (MPK6) found, respectively; 88% could be confirmed with independent <i>in solution</i> assay	Q-Array (Genetix), in-house modified	Affymetrix 426 (fluorescence), Fuji FLA-8000 (IP)	fluorescence, indirect for internal control, isotopic for kinase assay	Cy3, <sup>32</sup> P	
<a href="#">Feizi, T. and Chau, W.</a>	Oligosaccharide microarrays to decipher the glyco-code	2004	Nature Reviews/Mol Cell Biol 5: 582-588	review glycosylation research	glycoprotein, blood cell antigens, aminolipid, HPTLC, Mass Spec	neoglycolipid technology, i.e. coupling of released natural or synthesized artificial oligosaccharides to aminolipids for binding to slide surfaces					
<a href="#">Fernández-Madrid, F. et al.</a>	Autoantibodies to Annexin XI-A and other autoantigens in the diagnosis of breast cancer	2004	Cancer Research 64: 5089-5096	cancer research, biomarker profiling	breast cancer, autoimmunity, T7 phage display, signal transduction	938 T7 phages encoding potential breast cancer autoantigens were arrayed; probed with sera from 90 patients with breast cancer; 51 non-cancer controls and 21 patients with systemic autoimmune diseases.	FLEXYS (Genomic Solutions)	GenePix 4000A (Axon)	fluorescence, indirect	Cy3/Cy5	
<a href="#">Gehro, D. et al.</a>	Pegylated, streptavidin-conjugated Quantum Dots are effective detection elements for reverse-phase protein microarrays	2005	Bioconjugate Chem 16: 559-566	method development (cancer research)	signal transduction, lysate arrays, QDots, signal amplification	Quantum Dots used as fluorescent probes in reverse-phase arrays; compared to CSA signal amplification colorimetric detection; low background, high sensitivity, good linearity and very good dynamics found	GMS 417 (Affymetrix), ring-pin system	cooled CCD camera (Alpha Innotech FluorChem) for amplified QD, hyperspectral imaging microscope for non-amplified QD	colorimetric, fluorescence (indirect)	CSA (Dako), QDot 655-PEG-SAV (Quantum Dot Corp., Hayward, CA)	very interesting new detection method!
<a href="#">Gehro, D. et al.</a>	Fluorescence-based analysis of cellular protein lysate arrays using Quantum Dots	2007	Methods Mol Biol 374: 229-237	method development (cancer research)	signal transduction, lysate arrays, QDots, signal amplification	Quantum Dots used as fluorescent probes in reverse-phase arrays; For detection with CCD camera system, a tyramide amplification was used. The PEG modified QDots, Qdot 655-PEG-Sav, were found to have less unspecific binding to the lysate spots.	GMS 417 (Affymetrix), ring-pin system	cooled CCD camera (Alpha Innotech FluorChem) for amplified Qdot, hyperspectral imaging microscope for non-amplified Qdot	colorimetric, fluorescence (indirect) with tyramide-based amplification	CSA (Dako), QDot 655-SAV or QDot 655-PEG-SAV (Quantum Dot Corp., Hayward, CA)	Detailed protocols for work with Qdots on RPPAs
<a href="#">Grubb, R.L. et al.</a>	Signal pathway profiling of prostate cancer using reverse phase protein arrays	2003	Proteomics 3: 2142-2146	cancer research	signal transduction, kinase, prostate cancer, LCM (Laser Capture Microdissection)	LCM-samples from biopsies arrayed and probed with phospho-specific ABs; P-AKT was found increased in tumor samples while P-ERK was decreased	GMS 470 (Affymetrix), pin-and-ring system	Fluorchem (Alpha Innotech), UMAX Powerlook III (office scanner)	fluorescence (total protein), colorimetric (phosphorylation)	SyPro Ruby (total protein), CSA kit (Dako) for Phospho-specific ABs	
<a href="#">Guilleaume, B. et al.</a>	Systematic comparison of surface coatings for protein microarrays	2005	Proteomics 5: 4705-4712	method development	covalent coupling, non-covalent binding, antibody	comparison of 8 different commercially available slide coatings (5x 3D-type, 3x 2D-type)	Biochip Arrayer (Perkin-Elmer), non-contact	ScanArray Express HT (Perkin-Elmer)	fluorescence, indirect	Alexa Fluor 532, Alexa Fluor 647	identical experimental conditions for all surfaces do not take into account that these may not be well suited for at least some of them; strong bias!
<a href="#">Guimann, C. et al.</a>	Proteomic analysis of apoptotic pathways reveals prognostic factors in follicular lymphoma	2005	Clin. Cancer Res 11(16): 5847-5855	apoptosis research, cancer research, biomarker profiling	reverse-phase arrays, hierarchical clustering, prognosis	Lysates from 20 FL biopsies and 15 controls were arrayed and probed with ABs against 21 proteins related to apoptosis (including some in their phosphorylated form)	GMS 417 (Affymetrix)	UMAX flatbed scanner	colorimetric, fluorescence, direct (total protein)	CSA (Dako), SyPro Ruby (for total arrayed protein)	
<a href="#">Gupta, R. et al.</a>	Ubiquitination screen using protein microarrays for comprehensive identification of Rsp5 substrates in yeast	2007	Molecular Systems Biology 3: 116	post translational modification, enzyme substrate screening, whole proteome studies	yeast, enzyme profiling, post translational modification, ubiquitin ligase, Nedd4 E3 family	Invitrogen ProtoArray Yeast was used for in-vitro ubiquitination with rec. yeast Rsp5 ubiquitin ligase. Home-made arrays of known substrates on FAST Slides were used to develop suitable conditions.	PiezoArray (Perkin-Elmer)	ProScan Array HT (Perkin Elmer)	fluorescence, direct (incorporation of FITC- Ubiquitin)	FITC, Alexa647	
<a href="#">Guljihar, C. et al.</a>	Mouse protein arrays from a Th1 cell cDNA library for antibody screening and serum profiling	2005	Genomics 85: 285-296	screening for autoantibodies in mouse model	autoantibody, SLE, mouse model	generation of expression library; profiling of commercial antibodies	Q-Array (Genetix), 16 blunt-end needles, diam. 150µm, 2nl loaded	ScanArray4000 (Perkin-Elmer)	fluorescence, indirect	Cy5	
<a href="#">Haab, B.B. et al.</a>	Immunoassay and antibody microarray analysis of the HUPO plasma proteome project reference specimens: Systematic variation between sample types and calibration of mass spectrometry data	2005	Proteomics 5: 3278-3291	whole proteome profiling	serum, plasma, cytokine, antibody arrays, Mass Spec, ELISA	Comparison of results for HUPO reference serum and plasma samples from 4 different antibody microarray methods performed in 4 different sites. Some proteins, mainly cytokines, show highly variable concentrations depending on sample preparation. In general, it appears that many cytokines are more stable in EDTA plasma.	Q-Array (Genetix), 16 blunt-end needles, diam. 150µm	ScanArray (Perkin-Elmer)	fluorescence, two-color multiplexed RCA	Cy3/Cy5	Van Andel Research Institute, Grand Rapids, MI, USA, used FAST Slides for this study.
<a href="#">Ho, S.-W. et al.</a>	Linking DNA-binding proteins to their recognition sequences by using protein microarrays	2006	PNAS 103(26): 9940-9945	protein-DNA interaction	transcription factors, yeast, DNA sequence motif, EMSA, ChIP	Array of 282 known and potential transcription factors was probed with oligonucleotides of evolutionary conserved sequences. Transcription factors that bound to specific sequences were identified. Confirmed with EMSA.	not specified	GenePix 4000 (Axon)	fluorescence, direct (labeled DNA probes)	Cy3 or Cy5	New approach to identify the binding protein(s) for a DNA motif of interest.
<a href="#">Horn, S. et al.</a>	Profiling humoral autoimmune repertoire of dilated cardiomyopathy (DCM) patients and development of a disease-associated protein chip	2006	Proteomics 6: 605-613	autoimmune research, cardiology	dilated cardiomyopathy, human fetal brain cDNA expression library, autoantibody	Plasma screening of 37200 redundant human proteins; validation on protein microarrays; 26 autoantigens bound by IgG and 6 bound by IgG3 were identified; function of these proteins in DCM currently unknown.	Q-array (Genetix), 16 or 24 blunt-end needles, diam. 150µm	ScanArray 4000 (Perkin Elmer)	fluorescence, indirect	Cy3/Cy5	

BIBLIOGRAPHY				CONTENT		METHOD				Whatman's Comment	
Author	Title	Year	Publication	Application	Keywords	Summary	Printing	Scanner	Detection		Dye(s)
<a href="#">Kersten, B. and Feilner, T.</a>	Generation of plant protein microarrays and investigation of antigen-antibody interaction	2007	Methods Mol Biol 374: 365-378	antibody profiling	<i>Arabidopsis thaliana</i> , high throughput protein expression	Methods for high-throughput expression cloning and purification of plant proteins. Production of antigen arrays for antibody profiling and serum screening.	Q-Array (Genetix)	ArraysScanner 428 (Affymetrix), ScanArray 4000 (Perkin-Elmer)	fluorescence, indirect	Cy3	
<a href="#">Kersten, B. et al.</a>	Generation of <i>Arabidopsis</i> protein chips for antibody serum screening	2003	Plant Mol Biol 52: 999-1010	antibody profiling, method development	plant proteins, antibodies, transcription factor	ABs show high selectivity	Q-Array (Genetix), contact printing	ArraysScanner 428 (Affymetrix), ScanArray 4000 (Perkin-Elmer)	fluorescence, indirect	Cy3	FAST slides show lower sensitivity than PAA, but show linearity while PAA slides do not
<a href="#">Kersten, B. et al.</a>	Protein microarray technology and ultraviolet crosslinking combined with mass spectrometry for the analysis of protein-DNA interactions	2004	Anal Biochem 331: 303-313	method development, protein-DNA interaction	DnaA, transcription factors, DNA-binding domain, Mass Spec	proof of principle: labeled dsDNA oligos bind to DNA-binding proteins arrayed on FAST slides in a specific and quantitative manner	Q-Array (Genetix), contact printing	ScanArray 4000 (Perkin-Elmer)	fluorescence, indirect (protein); fluorescence, direct (dsDNA)	Cy3 (sec. AB), Cy5 (linked to dsDNA)	
<a href="#">Kim, T.-E. et al.</a>	Quantitative measurement of serum allergen-specific IgE on protein chip	2002	Exp Mol Med 34(2): 152-158	allergy research, method development	IgE, allergen, <i>Dermatophagoides pteronyssinus</i>	arrayed allergens from different sources (mostly crude protein mixtures);	Microsys 4100 (Cartesian Technologies, Irvine, CA), nor contact	Axon (model not specified)	fluorescence, indirect	Cy3	microarrays show results comparable to UniCap® test kits (Pharmacia & Upjohn Diagnostics)
<a href="#">Kingsmore, S.F.</a>	Multiplexed protein measurement: technologies and applications of protein and antibody arrays	2006	Nature Reviews Drug Discovery 5(4): 310-320	review	proteomics, biomarker profiling, cancer, diagnostic test	general review on multiplex protein measurement technologies and applications with focus on array technologies					
<a href="#">Knezevic, V. et al.</a>	Proteomic profiling of cancer microenvironment by antibody arrays	2001	Proteomics 1: 1271-1278	cancer research	cancer microenvironment, Laser Capture Microdissection, stroma, epithelium, oral cavity cancer, disease markers	arraying of 368 ABs specific for "cancer related" proteins (i.e. signaling proteins, cell cycle related, growth factors, ECM, etc.); identified 11 proteins that consistently changed expression levels in cancer tissue environment; confirmed with other methods (i.e. W-blot, immunohistochemistry)	GMS 417 (Affymetrix)	standard office flatbed scanner	colorimetric	BCIP/NBT	
<a href="#">Knight, P. et al.</a>	Development of a sensitive microarray immunoassay and comparison with standard enzyme-linked immunoassay for cytokine analysis	2004	Shock 21(1): 26-30	cytokine analysis	cytokine, ELISA, endotoxin		GMS 417 (Genetic Microsystems, Woburn, MA, USA), 6nl	GenePix 4000 (Axon)	fluorescence, indirect	Cy5	*results are rapid, reproducible, the sensitivity is equal to traditional ELISAs and the costs is even less expensive...*
<a href="#">Koop, E. et al.</a>	Panorama™ Ab microarray cell signaling kit: A unique tool for protein expression analysis	2005	Proteomics 5(9): 2412-2416	method development (signal transduction research)	signal transduction, apoptosis, differentiation	differential protein expression in mouse tissues, differential display in cultured mouse cells after stimulation with retinoic acid	TAS (Genomic Solutions)	GSI 4000 (Lumonics, UK)	fluorescence, direct	Cy3/Cy5	
<a href="#">Kramer, A. et al.</a>	Identification of barley CK2α targets by using the protein microarray technology	2004	Phytochemistry 65: 1777-1784	signal transduction research	casein kinase 2, signal substrates, <i>Hordeum vulgare</i>	768 recombinant barley proteins arrayed and incubated with recombinant CK2α	Q-array (Genetix), 16 blunt end needles, diam. 150µm	ScanArray 4000 (Perkin-Elmer) for fluorescence, BAS Reader 5000 (Fuji) for IP (autoradiography)	fluorescence, indirect (total protein); autoradiography (phosphorylation)	Cy3, <sup>32</sup> P-ATP	
<a href="#">Kukar, T. et al.</a>	Protein microarrays to detect protein-protein interactions using Red and Green Fluorescent Proteins	2002	Anal Biochem 306: 50-54	method development	GFP, RFP, fusion proteins		GMS 417 (Affymetrix), MicroGrid II (BioRobotics, Woburn, MA, USA)	GMS 418 (Affymetrix), ScanArray5000 (Packard)	fluorescence, direct	GFP/RFP fusion proteins	aldehyde slides show approx. 20-fold signal decrease of spotted fluorescent proteins after blocking and washing while FAST slides show only very slight decrease
<a href="#">Lash, G.E. et al.</a>	Comparison of three multiplex cytokine analysis systems: Luminescence, SearchLight™ and FAST Quant®	2006	J Immunological Methods 309(2): 205-209	cytokine analysis	multiplexing, cytokine	comparison of three multiplex cytokine analysis systems	ready-made arrays	not specified	fluorescence, indirect	C5	FAST Quant has cheapest hardware cost, easiest handling, lowest sample requirement and largest dynamic range of the products compared here.
<a href="#">Li, Q.-Z. et al.</a>	Protein array autoantibody profiles for insight into systemic lupus erythematosus and incomplete lupus syndrome	2007	Clin. Exp. Immunol. 147: 60-70	autoimmune disease research	autoimmune diseases, autoantigens, skin diseases, lupus, biomarker	70 antigens related to collagenosis, rheumatoid arthritis and multiple sclerosis were arrayed. Sera from patients with Systemic Lupus, Incomplete Lupus as well as from healthy relatives were assayed. Clusters of markers were identified.	MicroGrid II (Genomic Solutions)	GenePix 4000B (Axon)	fluorescence, indirect	Cy3 (IgG), Cy5 (IgM)	
<a href="#">Li, Y. and Reichert, W.M.</a>	Adapting cDNA microarray format to cytokine detection protein arrays	2003	Langmuir 19: 1557-1566	method development, cytokine detection	cytokine, sandwich immuno assay, optimization	development of assay for quantitative determination of 5 cytokines; optimization for slide surface, printing, blocking, dye, AB concentration; FAST slides perform better than covalently protein binding glass slides.	Microsys 5100 (Cartesian Technologies, Irvine, CA) with Chipmaker pins CMP4 (Telechem, Sunnyvale, CA)	GenePix 4000B (Axon)	fluorescence, indirect	Cy5 (Cy3, phycoerythrin-cyanine, phycoerythrin, FITC)	
<a href="#">Li, Y. et al.</a>	Parallel comparison of sandwich and direct label assay protocols on cytokine detection protein arrays	2003	Anal Chem 75:5274-5281	cytokine analysis, method development	IL-1β, TNF-α, VEGF, MIP-1β, TGF-β1		Microsys 5100 (Cartesian Technologies, Irvine, CA)	GenePix 4000B (Axon)	fluorescence, direct and indirect	Cy3	sandwich assays clearly outperform direct label assays. FAST slides show better absorbency of capture ABs and greater consistency of results than other slides
<a href="#">Li, Y. et al.</a>	Protein array method for assessing in vitro biomaterial-induced cytokine expression	2005	Biomaterials 26: 1081-1085	method development, cytokine detection	biomaterial implants, inflammation, in vitro assay, cytokines	utilizing home-made cytokine microarray for an in vitro test for biocompatible materials	Microsys 5100 (Cartesian Technologies, Irvine, CA) with Chipmaker pins CMP4 (Telechem, Sunnyvale, CA)	GenePix 4000B (Axon)	fluorescence, indirect	Cy5	
<a href="#">Liu, M.Y. et al.</a>	14-3-3 interacts with the tumor suppressor tuberin at Akt phosphorylation site(s)	2002	Cancer Res 62: 6475-6480	cancer research, signal transduction	protein binding domains, PH domain, Ser-phosphorylation, kinase	binding of peptide motifs to printed rec. protein binding domains	FLEXYS (Genomic Solutions)	GeneTAC LSVI (Genomic Solutions)	fluorescence, direct	Cy5	
<a href="#">Loebke, C. et al.</a>	Infrared-based protein detection arrays for quantitative proteomics	2007	Proteomics 7: 558-564	signal transduction, method development	reverse-phase arrays, EGF signalling, phosphorylation	Protein quantification utilizing recombinant protein standard and near-IR dyes yields very low LODs (<16 fg/spot) with very good reproducibility (CV < 3% interslide, < 1% intraslide)	Biochip Arrayer (Perkin-Elmer), non-contact	Odyssey Imager (LI-COR)	fluorescence, indirect	Fast Green FCF (total protein), IRDye 700DX	
<a href="#">Lueking, A. et al.</a>	Profiling of Alopecia areata autoantigen based on protein microarray technology	2005	Mol Cell Proteomics 4(9): 1382-1390	autoimmune research	autoimmune diseases, autoantigens, skin diseases	screening of 37200 rec. proteins from cDNA expression library; 8 autoantigens identified	Q-Array (Genetix), contact printing	ScanArray 4000 (Perkin-Elmer)	fluorescence, indirect	Cy3	
<a href="#">Madzo-Gjurdje, J. et al.</a>	Protein based microarrays: a tool for probing the proteome of cancer cells and tissues	2001	Proteomics 1: 1279-1287	method development, cancer research	lung adenocarcinoma cell lysate, IEF, fractionation, lysate arrays	Cancer cell line lysate fractionated by IEF, fractions arrayed on different surfaces	FLEXYS with 32 pin head (Genomic Solutions)	GeneTAC LSVI (Genomic Solutions)	fluorescence, indirect	R-phycoerythrin	FAST slides performed superior, amine slides and aldehyde slides gave very poor results. "...white membranes on top of the glass slides greatly improved the scanning of reflected light towards the sensor... further contributing to enhanced signal to noise ratio and greater sensitivity."
<a href="#">Michaud, G.A. et al.</a>	Analyzing antibody specificity with whole proteome microarrays	2003	Nature Biotechnology 21: 1509-1512	antibody profiling	yeast, crossreactivity, sequence homology	monoclonal and polyclonal ABs profiled on Yeast Whole Proteome Array; crossreactivity cannot generally be deduced from sequence homologies	Omnigrd (Genomic Solutions)	GenePix 4000B (Axon)	fluorescence, indirect	Cy5	
<a href="#">Mircean, C. et al.</a>	Robust estimation of protein expression ratios with lysate microarray technology	2005	Bioinformatics 21(9): 1935-1942	method development	lysate array, cancer, quantification, regression analysis	comparison of 2 regression models for applicability to quantify protein expression ratios on reverse-phase lysate arrays	G3 (Genomic Solutions)	Office scanner at 1200 dpi	colorimetric	CSA kit (Dako)	
<a href="#">Miyaili, T. et al.</a>	Frozen protein arrays: A new method for arraying and detecting recombinant and native tissue proteins	2002	Proteomics 2: 1489-1493	method development	lysate array, cancer, cryosectioning	Fabrication of arrays without printer: samples were frozen in a mold of CryoGel OCT, cryosectioned and transferred to FAST slides via Scotch Tape; results appear to be comparable to printed arrays	ifreezing and cryosectioning	cooled CCD camera (Alpha Innotech)	colorimetric	CSA (Dako)	
<a href="#">Nam, M.J. et al.</a>	Molecular profiling of the immune response in colon cancer using protein microarrays: Occurrence of autoantibodies to ubiquitin C-terminal hydrolase L3	2003	Proteomics 3: 2108-2115	cancer research	colon cancer, lung cancer, auto antibodies, DE, western blot	Proteins from cancer cell line were fractionated by IEF and RP-HPLC (20x88=1760 fractions). These were arrayed and probed with patient sera (15 colon cancer, 15 lung cancer, 15 controls) to screen for antibodies against cancer proteins; UCH-L3 protein identified in 9/15 colon cancer samples, confirmed with 2-DE W-blot	FLEXYS (Genomic Solutions)	GeneTAC LSVI (Genomic Solutions)	fluorescence, indirect	R-phycoerythrin	
<a href="#">Narayan, S. et al.</a>	Over-expression of CLN3P, the Batten disease protein, inhibits PANDER-induced apoptosis in neuroblastoma cells: further evidence that CLN3P has anti-apoptotic properties	2006	Mol Genetics Metabol 88: 178-183	apoptosis research, signal transduction research	pro-apoptotic proteins, anti-apoptotic proteins, Batten disease, pancreatic-derived factor, cytokine	RPPAs were used to measure expression of pro-apoptotic and anti-apoptotic proteins in cells expressing CLN3P and PANDER, respectively.	SpotArray 24 (Perkin-Elmer) with SMP3 Stealth pins (Telechem)	FluorChem (Alpha Innotech)	fluorescence (indirect) with tyramide-based amplification	CSA (Dako), QDot 655-SAV (Quantum Dot Corp., Hayward, CA)	

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Author	Title	Year	Publication	Application	Keywords	Summary	Printing	Scanner	Detection		Dye(s)
<a href="#">Nishizuka, S. et al.</a>	Diagnostic markers that distinguish colon and ovarian adenocarcinomas: identification by genomic, proteomic, and tissue array profiling	2003	Cancer Research 63: 5243-5250	cancer research	colon cancer, ovarian cancer, cDNA array, oligo array, tissue array, villin, moesin	screening RP arrays from a bank of 60 cancer cell lines (NCI-60) to validate transcriptomics data	GMS 417 (Affymetrix), ring-pin system	not specified (office flat-bed scanner?)	colorimetric	CSA (Dako) with HRP and DAB	
<a href="#">Nishizuka, S. et al.</a>	Proteomic profiling of the NCI-60 cancer cell lines using new high-density reverse-phase lysate microarrays	2003	PNAS 100(24): 14229-14234	cancer research	expression profiling, cancer cell lines, reverse-phase arrays, hierarchical clustering	screening RP arrays from a bank of 60 cell lines with 52 cancer related ABs, surprising finding: mRNA expression data and protein data are in good correlation for structural proteins, but not for non-cell-structure-related proteins	GMS 417 (Affymetrix), ring-pin system	Epson Perfection 1200S (office scanner), Fluorimager Si (Amersham)	colorimetric, fluorescence (total arrayed protein)	CSA (Dako), SyPro Ruby (for total arrayed protein)	
<a href="#">Nishizuka, S. et al.</a>	Evaluation method of ordinary flatbed scanners for qualitative density analysis	2006	BioTechniques 40(4): 442-448	method development, cancer research	reverse-phase arrays, colorimetric detection, flatbed scanner	Test of 2 standard flatbed scanners for their usability for scanning protein microarrays. Calibration with a wedge density strip.	GMS417 (Genetic Microsystems/Affymetrix)	Epson Perfection 1250 and Epson Perfection 4870	colorimetric	CSA (Dako) Cytomation	Valuable information for scientists who want to do quantitative colorimetric analysis with a flatbed scanner
<a href="#">Nowak, J.F. et al.</a>	Direct production and purification of T7 phage display proteins selected and analyzed on microarrays	2006	BioTechniques 40(2): 220-227	method development, antibody profiling	phage display, SEREX, high throughput protein purification	Development of a method for purification of proteins cloned by T7 phage display using an in-vitro transcription/translation	Arrayit SpotBot (Telechem, Sunnyvale, CA, USA)	GenePix 4100A (Axon)	fluorescence, indirect	Cy3/Cy5	
<a href="#">Panveltz, C.P. et al.</a>	Reverse phase protein microarrays which capture disease progression show activation of pro-survival pathway at the cancer invasion front	2001	Oncogene 20: 1981-1989	cancer research	signal transduction, prostate cancer, LCM (Laser Capture Microdissection), kinase	RP arrays of LCM material from cancer patients; analysis of disease signal pathway involved proteins, phosphorylation	GMSE 470 (Affymetrix), pin-and-ring system	UMAX PowerLook III (office scanner)	colorimetric	CSA (Dako) with HRP and DAB	lowest detection limit reported so far for protein arrays: <5000 molecules recombinant PSA!
<a href="#">Qiu, J. et al.</a>	Development of natural protein microarrays for diagnosing cancer based on an antibody response to tumor antigens	2004	J Proteome Res 3: 261-267	cancer research	lung cancer, auto antibodies, hierarchical clustering, multivariate analysis	Proteins from cancer cell line were fractionated by IEF and RP-HPLC (20492-1840 fractions). These were arrayed and probed with patient sera (18 lung cancer, 13 controls) to screen for antibodies against cancer proteins	16 pin custom-built contact printer	GenePix (Axon)	fluorescence, indirect	R-phycoerythrin	
<a href="#">Ramaswamy, A. et al.</a>	Application of protein lysate microarrays to molecular marker verification and quantification	2005	Proteome Science 3:9	atherosclerosis research, biomarker profiling	reverse-phase arrays, atherosclerosis	Lysates from endarterectomy samples were arrayed. Analysed quantitatively for lipoprotein [a] and apolipoprotein B100; data compared to ELISA: correlation found to be highly significant	FLEXYS (Genomic Solutions)	GenePix 4000 (Axon)	fluorescence, direct and indirect	Cy3/Cy5	very careful control experiments incl. study of linearity of all binding steps, first reverse-phase study comparing quantitative data with ELISA
<a href="#">Rapkiewicz, A. et al.</a>	The needle in the haystack: application of breast fine-needle aspirate samples to quantitative protein microarray technology	2007	Cancer 111: 173-184	cancer research, signal transduction research	breast cancer, fine-needle aspiration, biopsy, reverse phase arrays, apoptosis	Lysates from fine-needle aspiration specimen were analysed by RPPA. 17 ABs representing proteins of apoptotic and prosurvival pathways were used for probing, many of them being phosphorylation-specific.	GMS 417 (Affymetrix)	Alpha Innotech (total protein) Epson flatbed scanner CSA staining	fluorescence, direct (total protein), colorimetric (specific proteins)	SyPro Ruby (total protein), CSA kit (Dako) for Phospho-specific ABs	
Repka, V.	Early defence response induced by two distinct elicitors derived from a Botrytis cinerea in grapevine leaves and cell suspensions	2006	Biol Plantarum 50: 94-106	plant pathogen-host interaction, signal transduction	plant pathogen, elicitor, cell death, transcriptional activation	Arrays of 97 specific antibodies were used to study regulation of gene expression in elicitor-treated cells of grapevine.	MicroCASTer (Whatman/Schleicher & Schuell)	not specified	chemilumi-nescence	SuperSignal West Pico (Pierce)	
<a href="#">Rosenblatt, K. and</a>	Klotho, an aging-suppressor gene	2007	Horm Res 67(suppl.1):191-203	signal transduction research, hormone research	aging, Klotho protein, hormone, insulin signaling, FGF signaling, oxidative stress, lysate arrays	Overview of putative actions of Klotho. RPPAs used to measure ERK-phosphorylation in FGF receptor knockdown mutants of 293K cells.	not specified	not specified	not specified	not specified	Very much review-like overview of Klotho protein properties and actions. Very limited information on experimental details.
<a href="#">Sakanyan, V.</a>	Puces à protéines: nouvelle approche du diagnostic des maladies infectieuses	2004	Antibiotiques 6: 185-192	review							
<a href="#">Sakanyan, V.</a>	High-throughput and multiplexed protein array technology, protein-DNA and protein-protein interactions	2005	J Chromatography B 815(1-2): 77-95	review	transcription factors, signal transduction, antibody profiling, protein domain array	review on protein-DNA and protein-protein studies utilizing arrays incl. general consideration on high-throughput protein production, array surfaces, and detection methods					
<a href="#">Sakanyan, V. and Yeretsian, G.</a>	Near-infrared fluorescence detection of antigen-antibody interactions on microarrays	2007	In: Spectral techniques in proteomics. Ed. Sem, D.S.; CRC Press, Boca Raton, FL	review	proteomics, sandwich immuno assays, reverse-phase arrays, amplification	Review showing different examples of array formats (including self-assembling protein arrays) with focus on fluorescence detection utilizing near-IR dyes.				Alexa Fluor 680, IRDye700, IRDye800, IRDye38, Cy5.5	FAST Slides in combination with NIR dyes provide a method for protein microarrays which is exceptionally sensitive yet robust and simple.
<a href="#">Sanchez-Carbayo, M. et al.</a>	Profiling bladder cancer using targeted antibody arrays	2006	Am J Pathology 168(1): 93-103	cancer research, biomarker profiling	bladder cancer, cancer-related antibodies, disease-targeted antibodies, RCA	254 antibodies against 183 target proteins arrayed	custom-built robot	ScanArray (Perkin-Elmer)	fluorescence, two-color multiplexed RCA	Cy3/Cy5	
<a href="#">Schweitzer, B. et al.</a>	Microarrays to characterize protein interactions on a whole-proteome scale	2003	Proteomics 3: 2190-2199	review	immune profiling, protein-small molecule interactions						
<a href="#">Scorilas, A. et al.</a>	Streptavidin-polyvinylamine conjugates labeled with a europium chelate: applications in immunosay, immunohistochemistry, and microarrays	2000	Clin Chemistry 46(9): 1450-1455	fluorescent dye testing	Eu <sup>3+</sup> chelator, time-resolved fluorescence	lanthanide chelates can provide very high fluorescence signals, mainly because of efficient background fluorescence rejection (time-resolved fluorescence)	not specified	Signifer 1432 Microimager (Perkin-Elmer), epi-fluorescence microscope equipped for time-resolved fluorescence	time-resolved fluorescence	macromolecular complex of Eu <sup>3+</sup> chelator	
<a href="#">Seitz, H. et al.</a>	Differential binding studies applying functional protein microarrays and surface plasmon resonance	2006	Proteomics 6: 5132-5139	protein-protein interaction	surface plasmon resonance (SPR), S100 proteins, Ca-dependant protein interaction	80 recombinant human proteins ("prey") analysed for binding to 2 S100 proteins ("bait") by microarray and by SPR. Overlap between both methods was found to be higher than between 2 different immobilization strategies for SPR.	QArray (Genetix), modified, with X2777 solid pins (150µm)	Affimetrix 428	fluorescence, indirect	Cy5, Cy3	"At present, for protein microarrays, nitrocellulose-coated slides are the most reliable surfaces for measuring protein-protein interactions as the 3-D structure of the layer offers a high protein binding capacity."
<a href="#">Simpkins, F. et al.</a>	Beyond genomics to functional proteomics	2004	Mol Diagnostics and Biomarkers 1: S7-S14	review (cancer research)							
<a href="#">Stadtherr, K. et al.</a>	An aptamer-based protein biochip	2005	Anal Chem 77:3437-3443	(allergy research)	aptamers, IgE	aptamer-based arrays compared to antibody-based arrays	MicroCASTer (Whatman/Schleicher & Schuell)	LS200 (Tecan)	fluorescence, direct	Texas Red	aptamers appear to perform very good
<a href="#">Steller, S. et al.</a>	Bacterial protein microarrays for identification of new diagnostic markers for <i>Neisseria meningitidis</i> infections	2005	Proteomics 5: 2048-2055	infectious disease research	meningitis, infection, phase-variable genes, immune response	screening of patient sera for ABs against phase-variable <i>Neisseria</i> proteins; the immune response to infection was found to be very variable; AB to 1 protein (OpaV) was found in most patient sera	Q-array (Genetix), 16 blunt-ended needles, diam. 150µm	ScanArray 4000 (Perkin-Elmer)	fluorescence, indirect	Cy5	
<a href="#">Stillman, B. et al.</a>	Development of a multi-cytokine assay panel in a protein microarray format on nitrocellulose surface - comparison to traditional ELISA assays	2002	Oak Ridge Conference	cytokine analysis							
<a href="#">Stillman, B. et al.</a>	Applying multiplexed microspot immunoassays	2004	Genetic Engineering News 24(6)	cytokine analysis	cytokine quantification, FAST Quant				fluorescence, indirect	Cy5	FAST Quant kit
<a href="#">Suchyta, S.</a>	Assay: Protein Microarrays on Nitrocellulose Slides. Processes Involved in Using DNA Microarray Instrumentation in Protein Microarray Workflow	2006	Genetic Engineering News 26(2)	method development	optimization of parameters, printing, scanning	All steps of the protein microarray workflow (printing, processing, scanning) performed with instrumentation from Genomic Solutions.	MicroGrid and OmniGrid (Genomic Solutions)	UC4 (Genomic Solutions)	fluorescence, indirect	Cy3	Valuable information to optimize parameters, especially (but not only) for scientists working with Genomic Solutions systems
<a href="#">Sundares, S. et al.</a>	From protein microarrays to diagnostic antigen discovery: a study of the pathogen <i>Francisella tularensis</i>	2007	Bioinformatics 23(13): i508-i518	infectious disease research	tularemia, immune response, immunodominant antigen, diagnostic marker	the entire proteome of <i>tularensis</i> was expressed in a cell-free system and arrayed. 244 immunodominant antigens were selected for 2nd stage arrays and probed with 100 sera from tularemia infected patients and controls.	OmniGrid 100 (Genomic Solutions)	ScanArray Express HT (Perkin-Elmer)	fluorescence, indirect	PBXL-3 (Martek)	
<a href="#">Tannapfel, A. et al.</a>	Identification of novel proteins associated with hepatocellular carcinomas using protein microarrays	2003	J Pathol 201: 238-249	biomarker profiling, cancer research	cancer, hepatoma, LCM, NHS-ester direct labeling	direct fluo labeling (NHS-chemistry) of proteins from laser capture microdissected samples	MicroCASTer (Whatman/Schleicher & Schuell)	GenePix 4000B (Axon)	fluorescence, direct	Cy3/Cy5	

BIBLIOGRAPHY				CONTENT			METHOD				Whatman's Comment
Author	Title	Year	Publication	Application	Keywords	Summary	Printing	Scanner	Detection	Dye(s)	
<a href="#">Tibes, R. et al.</a>	Reverse phase protein microarray: validation of a novel proteomic technology and utility for analysis of primary leukemia specimens and hematopoietic stem cells	2006	Mol Cancer Ther 5(10): 2512-2521	cancer research, signal transduction research (method development)	signal transduction, lysate arrays, validation, leukemia, hematopoietic stem cells	RPPAs from leukemia cell or stem cell lysates were analysed for effects of different buffers, freeze-thaw cycles, storage, inter-experiment, inter-slide, spot-to-spot variations. Reproducibility was found to be very high and the method proved to be robust.	GeneTac Arrayer (Genomic Solutions)	not specified	colorimetric	CSA (DAKO Cytomation)	Very comprehensive work on robustness and reproducibility of RPPA.
Tonkinson, J.L. et al.	Smaller is better. Developing microscale immunoassays for parallel analysis of multiple analytes	2003	IVD-Technology 9(2): 29-34	method development, cytokine detection	microspot ELISA, cytokine quantification				fluorescence, indirect	Cy5	validation of FAST Quant, general considerations on microspot ELISA
<a href="#">Wang, D. et al.</a>	Carbohydrate microarrays for the recognition of cross-reactive molecular markers of microbes and host cells	2002	Nature Biotechnology 20: 275-281	method development, glycosylation research	dextrans, glycans, microbes, infectious diseases, cell markers	48 carbohydrate-containing macromolecules of different origin (microbial, cell surface, synthetic) arrayed, probed with human sera	GMS 417 (Genetic Microsystems, Woburn, MA, USA)	ScanArray 5000 (Packard BioChip Technologies)	fluorescence, indirect	FITC, Texas Red, Cy3	
<a href="#">Wei, Q. et al.</a>	Expression of nucleotide excision repair proteins in lymphocytes as marker of susceptibility to squamous cell carcinomas of the head and neck	2005	Cancer Epidemiol Biomarkers Prev 14(8): 1961-1966	cancer research, biomarker profiling	reverse-phase arrays, DNA repair, nucleotide excision repair	Lymphocyte lysates from 57 squamous cell carcinoma patients and 63 controls were arrayed and probed with ABs against 6 of the core factors in nucleotide excision repair. One (XPF) was identified as potential risk factor by multivariate regression.	SpotBot Arrayer (Telechem)	ScanArray Lite (Perkin-Elmer)	fluorescence (indirect) with tyramide-based amplification (DAKO CSA)	Cy5	
<a href="#">Wingren, C. et al.</a>	Microarrays based on affinity-tagged single-chain Fv antibodies: sensitive detection of analyte in complex proteomes	2005	Proteomics 5:1281-1291	method development (immunology)	scFv antibody fragments, complement factors, non-purified affinity tagged probes	comparison of different substrates/coupling methods, probe and analyte deposition strategies	Biochip Arrayer (Perkin-Elmer), non-contact	ScanArray (Perkin-Elmer)	fluorescence, direct	Cy5	Limits of detection were found to be up to 1000 times (1 lower on FAST Slides compared to silane coated slides)
<a href="#">Wulfschue, J. D. et al.</a>	Signal pathway profiling of ovarian cancer from human tissue specimen using reverse-phase protein microarrays	2003	Proteomics 3: 2085-2090	cancer research, signal transduction, reverse-phase arrays	signal transduction, ovarian cancer, LCM (Laser Capture Microdissection)		GMSE 470 (Affymetrix), pin-and-ring system	UMAX PowerLook III (office scanner)	colorimetric	CSA kit (Dako), with DAB substrate	
<a href="#">Yamamoto, M. et al.</a>	Regulation of oxidative stress by the aging hormone Klotho	2005	J Biol Chem 280(45):38029-38034	signal transduction research, hormone research	aging, Klotho protein, hormone, kinase, oxidative stress, reverse-phase arrays, lysate arrays	RPPAs from HeLa, COS, and CHO cells were used to measure Klotho-induced changes in SOD2 protein level and to assess Akt and FOXO1 phosphorylation status.	SpotArray (Perkin-Elmer)	Alpha Innotech 9900	fluorescence (indirect) with tyramide-based amplification	CSA (Dako), QDot 655-PEG-SAV (Quantum Dot Corp., Hayward, CA)	
<a href="#">Yan, F. et al.</a>	Protein microarrays using liquid phase fractionation of cell lysates	2003	Proteomics 3: 1228-1235	cancer research	liquid chromatography, Mass Spec, prostate cancer, fractionation, autoantibodies	15 fractions from LNCaP cell lysates won by chromatofocusing further separated by RP-HPLC. Fraction spotted on arrays and probed with patient sera and control sera.	GMS 417 (Genetic Microsystems) or Magna Spotter (Bioautomation)	Axon (model not specified)	fluorescence, indirect	Cy5	
<a href="#">Yeretssian, G. et al.</a>	Competition on nitrocellulose-immobilized antibody arrays. From bacterial protein binding assay to protein profiling in breast cancer cells.	2005	Mol Cell Proteomics 4: 605-617	method development, cancer research	protein interaction, competition assay, one-color displacement, competitive displacement		MicroCASTer (Whatman/Schleicher & Schuell)	Odyssey Imager (LI-COR)	near-IR fluorescence direct	IRDye 800, Alexa Fluor 680	two-color labeling found to be superior to one-color in competition assays
<a href="#">Zha, H. et al.</a>	Similarities of pro-survival signals in Bcl-2 positive and Bcl-2-negative follicular lymphomas identified by reverse-phase protein microarrays	2004	Laboratory Investigation 84: 236-244	cancer research	cancer, lymphoma	reverse-phase array analysis	GMS 417 (Affymetrix), ring-pin system	not specified (office flat-bed scanner?)	colorimetric	CSA (Dako) with HRP and DAB	
<a href="#">Zhong, L. et al.</a>	Using protein microarray as a diagnostic assay non-small cell lung cancer	2005	Am J Resp Crit Care Med 172: 1308-1314	cancer research, biomarker profiling	phage display, tumor-associated autoantibodies, non-small cell lung cancer	212 immunogenic proteins from 77 phage libraries were arrayed and tested with serum samples from cancer patients. The 5 most predictive phage proteins were combined in a model that achieved 90% sensitivity and 95% specificity in prediction of patient samples for non-small cell lung cancer.	GMS 417 (Affymetrix)	Affymetrix 428	fluorescence, indirect	Cy3/Cy5	An approach with similar rationale as the lysate-fraction array screening for autoantibodies in tumor patients.
<a href="#">Zhou, H. et al.</a>	Two-color, rolling-circle amplification on antibody microarrays for sensitive, multiplexed serum-profile measurements	2004	Genome Biology 5(4): R28	biomarker profiling, cancer research	rolling-circle amplification, liver cancer, NHS-ester direct labeling	comparison of different staining/detection methods, rolling-circle amplification (RCA)	Biochip Arrayer (Perkin-Elmer), non-contact	ScanArray (Perkin-Elmer)	fluorescence, direct and indirect, two-color multiplexed RCA	Cy3/Cy5	
<a href="#">Zhu, H. et al.</a>	Severe acute respiratory syndrome diagnostics using a coronavirus protein array	2006	PNAS 103(11): 4011-4016	infectious disease research	SARS, coronavirus, diagnostics, epidemiology	A protein array containing 82 recombinant coronavirus antigens (about 1/3 from SARS-CoV) was tested and found to be at least as sensitive and more specific than the best current immunodiagnostic tests.	Bio-Rad microarrayer	not specified	fluorescence, indirect	Cy3 or Cy5	