

INTRODUCTION	XIV
STUDY GOALS AND OBJECTIVES.....	XIV
REASONS FOR DOING THE STUDY	XIV
AUDIENCE FOR THE REPORT	XIV
SCOPE AND FORMAT	XV
METHODOLOGY AND INFORMATION SOURCES.....	XV
BCC INFORMATION AND RELATED BCC STUDIES.....	XV
ANALYST CREDENTIALS.....	XVI
DISCLAIMER	XVI
BCC ON-LINE SERVICES.....	XVI
EXECUTIVE SUMMARY	XVIII
<i>SUMMARY TABLE WORLDWIDE PROTEIN ARRAY TECHNOLOGY SALES BY</i> <i>MARKET SEGMENT, THROUGH 2007 (\$ MILLIONS).....</i>	<i>XVIII</i>
<i>SUMMARY FIGURE WORLDWIDE PROTEIN ARRAY TECHNOLOGY SALES BY</i> <i>MARKET SEGMENT, 2000-2007 (\$ MILLIONS).....</i>	<i>XIX</i>
OVERVIEW	1
WHICH IS THE CHICKEN, WHICH IS THE EGG: PROTEOMICS OR PROTEIN ARRAYS?	1
ARRAY-BASED PROTEOMICS GLOSSARY	1
ARRAY-BASED PROTEOMICS GLOSSARY (CONTINUED).....	2
ARRAY-BASED PROTEOMICS GLOSSARY (CONTINUED).....	3
ARRAY-BASED PROTEOMICS GLOSSARY (CONTINUED).....	4
ARRAY-BASED PROTEOMICS GLOSSARY (CONTINUED).....	5
PROTEIN ARRAY TECHNOLOGY.....	6
SURFACES	6
ATTACHMENT CHEMISTRY	6
ARRAYING DEVICES.....	6
DETECTION AND ANALYSIS ON MICROARRAYS	7
CAPTURE MOLECULES.....	7
<i>TABLE 1 PROTEIN CAPTURE MOLECULES AND TARGETS</i>	<i>7</i>
PROTEIN PRODUCTION FOR PROTEIN ARRAYS	8
PROTEIN ARRAY APPLICATIONS	8
DIAGNOSTICS	8
PROTEOME RESEARCH.....	9
DRUG DISCOVERY AND SCREENING.....	10
GOVERNMENT REGULATIONS	11
DRUG DISCOVERY PROCESS.....	11
FDA REGULATORY OVERVIEW	11
Target Discovery and Drug Identification.....	12
Preclinical Testing and Submission of an IND	13
Clinical Trials	13

Submission of an NDA	14
Post-FDA Approval.....	14
Noncompliance.....	15
OTHER AGENCY REGULATIONS.....	15
REGULATORY COSTS	15
REGULATORY BENEFITS	15
RESEARCH AND DEVELOPMENT SPENDING	16
TABLE 2 R&D SPENDING IN THE GLOBAL PHARMACEUTICAL INDUSTRY, 1980-2002 (\$ MILLIONS).....	16
Distribution of Research Costs	17
TABLE 3 DISTRIBUTION OF DRUG RESEARCH COSTS.....	17
Target Discovery Costs and Benefits.....	18
REGULATORY ENVIRONMENT AND R&D COST CUTTING.....	18
Preliminary Stage R&D Cost Reduction.....	19
NEW DRUG APPROVALS	19
TABLE 4 DRUGS APPROVED BY THE FDA, 1993-2002 (# DRUGS).....	20
CLINICAL DIAGNOSTICS.....	20
FEDERAL REGULATION OF MOLECULAR DIAGNOSTICS	21
Analyte-Specific Reagent Regulations.....	21
Analyte-Specific Reagent Regulations (Continued)	22
PROTEOME CONSORTIUMS	23
BIOPATHWAYS CONSORTIUM	23
BIOLOGICAL PATHWAY EXCHANGE.....	23
PLASMA PROTEOME INSTITUTE.....	24
HUMAN PROTEOME ORGANIZATION.....	24
THE PROTEOMICS STANDARDS INITIATIVE	25
THE PROTEOME SOCIETY	25
PROTEIN ARRAY TECHNOLOGY MARKET	26
MARKET SEGMENTS	26
TABLE 5 PROTEIN ARRAY TECHNOLOGY COMPANIES AND MARKET SHARES, BY CATEGORY, 2002.....	26
TECHNOLOGY TRENDS	27
MARKET FORECASTS.....	27
SALES AND MARKET SHARE	27
GROWTH RATE.....	28
TABLE 6 WORLDWIDE PROTEIN ARRAY TECHNOLOGY SALES BY CATEGORY, THROUGH 2007 (\$ MILLIONS)	28
DISTRIBUTION OF COMPANIES BY SEGMENT.....	28
TABLE 7 WORLDWIDE DISTRIBUTION OF PROTEIN ARRAY TECHNOLOGY COMPANIES BY CATEGORY, 2002.....	29
COMPANY PRODUCT LAUNCHES.....	29
TABLE 8 COMPANIES WORLDWIDE THAT LAUNCHED PROTEIN ARRAY TECHNOLOGY PRODUCTS, BY CATEGORY, 1999-2002	29
TABLE 9 PROTEIN ARRAY TECHNOLOGY PRODUCT LAUNCHES, BY CATEGORY, 2002 (%)	30

ANTIBODY ARRAYS	30
TABLE 10 COMPANIES THAT LAUNCHED ANTIBODY ARRAY PRODUCTS, 1999-2002.....	30
SALES.....	30
TABLE 11 WORLDWIDE ANTIBODY ARRAY TECHNOLOGY SALES, THROUGH 2007 (\$ MILLIONS).....	31
FIGURE 1 WORLDWIDE ANTIBODY ARRAY TECHNOLOGY SALES, 2000-2007 (\$ MILLIONS)	31
ANTIBODY ARRAY PLAYERS.....	31
TABLE 12 ANTIBODY ARRAY TECHNOLOGY PRODUCT LAUNCHES, BY COMPANY, 2000-2002	32
ANTIBODY ARRAY TECHNOLOGY	32
TABLE 13 SUMMARY OF ANTIBODY ARRAY TECHNOLOGY FEATURES, BY COMPANY.....	32
TABLE 13 (CONTINUED).....	33
Surface Materials	34
TABLE 14 ANTIBODY ARRAY SURFACE MATERIAL USE, BY TYPE, 2002	34
Detection Methods.....	34
TABLE 15 ANTIBODY ARRAY DETECTION METHOD USE BY TYPE, 2002	35
ANTIBODY ARRAY MARKET SHARE.....	35
TABLE 16 ANTIBODY ARRAY TECHNOLOGY COMPANY MARKET SHARE, 2002.....	35
FIGURE 2 ANTIBODY ARRAY TECHNOLOGY COMPANY MARKET SHARE, 2002 (%).....	36
Schleicher & Schuell Bioscience, Inc.	36
RayBiotech	36
Panomics	37
Pierce Chemical Company	37
BD Clontech.....	37
Hypromatrix	37
Milagen	38
OTHER ANTIBODY ARRAY DEVELOPMENTS	38
TYPES/APPLICATIONS OF ANTIBODY ARRAYS	38
TABLE 17 APPLICATIONS/TYPES OF ANTIBODY ARRAY TECHNOLOGY, BY COMPANY.....	38
PEPTIDE BIOCHIP ARRAYS.....	39
SALES.....	39
TABLE 18 WORLDWIDE PEPTIDE BIOCHIP ARRAY TECHNOLOGY SALES, THROUGH 2007 (\$ MILLIONS).....	39
FIGURE 3 WORLDWIDE PEPTIDE BIOCHIP ARRAY TECHNOLOGY SALES, 2000-2007 (\$ MILLIONS).....	39
TABLE 19 PEPTIDE ARRAY PRODUCT LAUNCHES, 1999-2002	40
PEPTIDE CHIP TECHNOLOGY PLAYERS.....	40
TABLE 20 PEPTIDE BIOCHIP TECHNOLOGY LAUNCHES BY COMPANY, 2000-2004.....	40
PEPTIDE BIOCHIP TECHNOLOGY	40
TABLE 21 PEPTIDE BIOCHIP TECHNOLOGY FEATURES, BY COMPANY	41
Surface Materials	41
TABLE 22 PEPTIDE ARRAY SURFACE MATERIAL USE, BY COMPANY	41
Detection Methods.....	42

TABLE 23 PEPTIDE ARRAY DETECTION METHOD BY COMPANY.....	42
PROTEIN BIOCHIP ARRAYS.....	42
SALES.....	42
TABLE 24 WORLDWIDE PROTEIN BIOCHIP ARRAY TECHNOLOGY SALES, THROUGH 2007 (\$ MILLIONS).....	42
FIGURE 4 WORLDWIDE PROTEIN BIOCHIP ARRAY TECHNOLOGY SALES, 2000- 2007 (\$ MILLIONS).....	43
TABLE 25 PROTEIN BIOCHIP TECHNOLOGY COMPANIES.....	43
PROTEIN BIOCHIP ARRAY PLAYERS	43
TABLE 26 COMPANIES THAT LAUNCHED PROTEIN BIOCHIPS, 1999-2002.....	44
TABLE 27 PROTEIN BIOCHIP PRODUCT LAUNCHES BY COMPANY, 1999-2002.....	44
PROTEIN BIOCHIP ARRAY TECHNOLOGY	44
TABLE 28 PROTEIN BIOCHIP ARRAY PRODUCTS/SERVICES FEATURES BY COMPANY.....	45
TABLE 28 (CONTINUED).....	46
PROTEIN BIOCHIP ARRAY MARKET SHARE	46
TABLE 29 PROTEIN BIOCHIP ARRAY TECHNOLOGY COMPANY MARKET SHARES, 2002 (%).....	47
FIGURE 5 PROTEIN BIOCHIP ARRAY TECHNOLOGY COMPANY MARKET SHARES, 2002 (%).....	47
COMPANIES DEVELOPING PROTEIN BIOCHIP ARRAY TECHNOLOGY.....	47
TABLE 30 COMPANIES WITH PROTEIN BIOCHIP ARRAY TECHNOLOGY IN DEVELOPMENT	48
TABLE 30 (CONTINUED).....	49
TABLE 30 (CONTINUED).....	50
Molecular Staging, Inc.	50
Somalogic, Inc.	51
Zeptosens AG	51
Protein Biochip Array Surface Materials	51
TABLE 31 PROTEIN BIOCHIP ARRAY SURFACE MATERIAL USE, BY TYPE, 2002	51
TABLE 32 PROTEIN BIOCHIP ARRAY SURFACE MATERIAL DESCRIPTION, BY COMPANY.....	52
Protein Biochip Array Detection Technology	52
TABLE 33 PROTEIN BIOCHIP ARRAY DETECTION METHOD USE BY TYPE, 2002.....	53
TABLE 34 PROTEIN BIOCHIP ARRAY DETECTION METHOD DESCRIPTION, BY COMPANY.....	53
TABLE 34 (CONTINUED).....	54
Randox Laboratories, Ltd.	54
SOLUTION BEAD/PARTICLE PROTEIN ARRAYS.....	54
TABLE 35 SOLUTION BEAD/PARTICLE PROTEIN ARRAY TECHNOLOGY SALES, 2000-2007 (\$ MILLIONS).....	55
FIGURE 6 SOLUTION BEAD/PARTICLE PROTEIN ARRAY TECHNOLOGY SALES, THROUGH 2007 (\$ MILLIONS).....	55
SOLUTION BEAD/PARTICLE TECHNOLOGY PLAYERS	56
TABLE 36 SOLUTION BEAD/PARTICLE PROTEIN ARRAY TECHNOLOGY COMPANIES.....	56
SOLUTION BEAD/PARTICLE TECHNOLOGY PLAYERS	56
TABLE 37 SUMMARY OF SOLUTION BEAD/PARTICLE PROTEIN ARRAY TECHNOLOGY FEATURES BY COMPANY.....	57

Nanoplex Nanobar.....	57
Polymer Bead/Semi-Conductor Core Shell.....	57
Smartbead™.....	58
TABLE 38 SOLUTION BEAD/PARTICLE PROTEIN ARRAY MATERIAL TECHNOLOGY USE BY TYPE, 2002.....	58
TABLE 39 SOLUTION BEAD/PARTICLE PROTEIN ARRAY DETECTION TECHNOLOGY USE BY TYPE, 2002.....	58
SOLUTION BEAD/PARTICLE ARRAY MARKET SHARE	59
TABLE 40 SOLUTION BEAD/PARTICLE ARRAY COMPANY MARKET SHARE, 2002.....	59
Luminex Corp.	59
Solution Bead/Particle Collaborators.....	60
TABLE 41 LUMINEX RESEARCH/DRUG DISCOVERY PARTNERS AND APPLICATIONS	60
TABLE 42 LUMINEX DIAGNOSTIC PARTNERS AND APPLICATIONS	61
TABLE 43 SOLUTION BEAD/PARTICLE COLLABORATIONS, BY APPLICATION AREA, 2002.....	61
Biochip versus Bead/Particle Protein Array Study.....	61
Results.....	62
Luminex Venture FDA-Approved Products	62
Luminex Venture FDA-Approved Products (Continued)	63
PROTEIN ARRAY APPLICATION MARKETS.....	64
TABLE 44 PROTEIN ARRAY APPLICATION SECTOR SALES, THROUGH 2007 (\$ MILLIONS)	64
RESEARCH PROTEIN ARRAY TECHNOLOGY SECTOR.....	64
TABLE 45 RESEARCH PROTEIN ARRAY TECHNOLOGY SALES BY CATEGORY, THROUGH 2007 (\$ MILLIONS)	65
Antibody Array Technology Research Market Players.....	65
TABLE 46 ANTIBODY PROTEIN ARRAY TECHNOLOGY RESEARCH MARKET SHARE BY COMPANY, 2002	65
FIGURE 7 ANTIBODY PROTEIN ARRAY TECHNOLOGY RESEARCH MARKET SHARE BY COMPANY, 2002 (%).....	66
Peptide Biochip Protein Array Technology Research Market Players.....	66
TABLE 47 PEPTIDE BIOCHIP TECHNOLOGY RESEARCH MARKET SHARE BY COMPANY, 2002 (%)	66
Protein Biochip Array Technology Research Market Players	67
TABLE 48 PROTEIN BIOCHIP ARRAY TECHNOLOGY RESEARCH MARKET SHARE BY COMPANY, 2002 (%).....	67
FIGURE 8 PROTEIN BIOCHIP ARRAY TECHNOLOGY RESEARCH MARKET SHARE BY COMPANY, 2002 (%).....	67
Solution Bead/Particle Protein Array Technology Research Market Players.....	68
TABLE 49 SOLUTION BEAD/PARTICLE PROTEIN ARRAY TECHNOLOGY RESEARCH MARKET SHARE BY COMPANY, 2002.....	68
Content Specific Research Protein Array Market Players	68

Cytokines.....	68
Kinases	69
CLINICAL PROTEIN ARRAY TECHNOLOGY.....	69
TABLE 50 PROTEIN ARRAY TECHNOLOGY CLINICAL MARKET SALES, THROUGH 2007 (\$ MILLIONS)	69
PROTEIN ARRAY CONTENT DEVELOPMENT.....	70
TABLE 51 SELECTED AVAILABLE PROTEIN ARRAY TARGET MARKET DATA (\$ MILLIONS).....	71
CONTENT-SPECIFIC PROTEIN ARRAY TECHNOLOGY PLAYERS.....	71
TABLE 52 CONTENT-SPECIFIC PROTEIN ARRAY TECHNOLOGY PLAYERS, BY APPLICATION.....	71
TABLE 52 (CONTINUED).....	72
CONTENT-SPECIFIC PROTEIN ARRAY TECHNOLOGY MARKETS.....	72
Allergy	72
Alzheimer's Disease.....	73
Angiogenesis	73
TABLE 53 ANGIOGENESIS-DEPENDENT DISEASES.....	73
TABLE 53 (CONTINUED).....	74
Cancer	75
Drugs of Abuse.....	75
Fertility	75
Immune/Autoimmune Diseases	75
Obesity	76
Pathogens.....	76
Therapeutic Drugs.....	76
Tissue Typing/Cardiac Marker	77
Thyroid.....	77
CONTENT-SPECIFIC PROTEIN ARRAY TECHNOLOGY DEVELOPERS.....	77
TABLE 54 CONTENT-SPECIFIC PROTEIN ARRAY TECHNOLOGY DEVELOPERS, BY APPLICATION.....	77
TABLE 54 (CONTINUED).....	78
SPOTTING ARRAYERS.....	78
NEW DEVELOPMENTS	79
PROTEIN BIOCHIP ENHANCERS	80
BIOINFORMATICS.....	80
TECHNOLOGY	80
DEVELOPMENT	81
CLINICAL DIAGNOSTIC APPLICATIONS	81
BIOINFORMATIC DATA STANDARDS	81
PATENTS.....	82
TABLE 55 PROTEIN ARRAY TECHNOLOGY PATENT FILINGS, 1989-2002.....	82
ANTIBODY ARRAY PATENTS	82
TABLE 56 ANTIBODY ARRAY PATENTS.....	82

TABLE 57 ANTIBODY ARRAY PATENTS BY ASSIGNEE, 2000-2002	83
PEPTIDE BIOCHIP ARRAY PATENTS	83
TABLE 58 PEPTIDE BIOCHIP ARRAY PATENTS.....	83
TABLE 59 PEPTIDE PATENT ARRAYS BY ASSIGNEE, 1999-2002.....	84
PROTEIN BIOCHIP ARRAY PATENTS	84
TABLE 60 NUMBER OF NEW PROTEIN BIOCHIP ARRAY PATENTS.....	84
TABLE 61 PROTEIN BIOCHIP ARRAY PATENTS, 1989-2002.....	84
TABLE 61 (CONTINUED).....	85
TABLE 61 (CONTINUED).....	86
TABLE 61 (CONTINUED).....	87
TABLE 62 PROTEIN BIOCHIP ARRAY PATENTS BY ASSIGNEE, 1989-2002.....	87
TABLE 62 (CONTINUED).....	88
CIPHERGEN, LUMICYTE, MAS PATENT DISPUTE.....	88
PROTEIN SOLUTION BEAD/PARTICLE ARRAY PATENTS.....	88
TABLE 63 NUMBER OF NEW PROTEIN BIOCHIP ARRAY PATENTS, 1998-2002	89
TABLE 64 PROTEIN SOLUTION BEAD/PARTICLE ARRAY PATENTS	89
TABLE 64 (CONTINUED).....	90
TABLE 65 PROTEIN SOLUTION BEAD/PARTICLE ARRAY PATENTS BY ASSIGNEE, 1998-2002.....	90
APPENDIX I - PROTEIN ARRAY COMPANY PROFILES	91
ANTIBODY ARRAY COMPANIES.....	91
BD BIOSCIENCES CLONTECH	91
DOMANTIS LTD.....	91
HYPROMATRIX, INC.....	92
MILAGEN, INC.....	93
PERKIN-ELMER LIFE SCIENCES/PACKARD BIOSCIENCE	94
PANOMICS, INC.	94
PIERCE BIOTECHNOLOGY, INC.	95
RAYBIOTECH, INC.....	95
SCHLEICHER & SCHUELL BIOSCIENCE, INC.	96
PROTEIN BIOCHIP ARRAY COMPANIES	97
ADVANCED ARRAY TECHNOLOGY S.A.	97
AFFIBODY AB.....	97
ASPIRA BIOSYSTEMS, INC.....	98
AXCELL BIOSCIENCES CORP.	99
BIACORE, INC.....	99
BIOCEPT, INC	100
BIOFORCE NANOSCIENCES, INC.....	101
CIPHERGEN BIOSYSTEMS, INC.....	101
GENOMIC SOLUTIONS, INC.	102
HTS BIOSYSTEMS.....	102
HYBRIGENICS SA	103
LUMICYTE, INC.....	104
MESO SCALE DISCOVERY	104
METRIGENIX, INC.	105
MIRAGENE, INC.....	106

MOLECULAR STAGING, INC.	106
MOREWOOD MOLECULAR, INC.	107
NEXTGEN SCIENCES LTD.	107
PERKIN-ELMER LIFE SCIENCES/PACKARD BIOSCIENCE	108
PROLINX, INC.....	109
PROTOMETRIX.....	109
PROTIVERIS INC.....	110
RANDOX LABORATORIES LTD.....	111
SOMALOGIC, INC.....	111
SURFACE LOGIX, INC.....	112
TELECHEM INTERNATIONAL, INC.	112
ZEPTOSENS AG	113
ZYOMYX, INC.....	114
PROTEIN BIOCHIP ARRAY ENHANCER COMPANIES.....	114
ADVALYTIX.....	114
GENICON SCIENCES CORP.	115
PEPTIDE ARRAY COMPANIES	116
JERINI AG	116
PEPSCAN	117
XEOTRON CORP.....	117
SOLUTION BEAD ARRAY COMPANIES	118
BIOPLEX CORP. (CRYSTALPLEX CORP.).....	118
LUMINEX CORP.	119
NANOPLEX TECHNOLOGIES, INC.	119
QUANTUMDOT CORP.....	120
SMARTBEAD TECHNOLOGIES LTD.	121
VERITY BIOSYSTEMS	121
PROTEIN ARRAY SPOTTING INSTRUMENT COMPANIES.....	122
DIGITALGENE BIOSCIENCES, LTD.....	122
TELECHEM INTERNATIONAL	122
Telechem International (Continued)	123
APPENDIX II - ASSOCIATIONS	124
HUMAN PROTEOME ORGANIZATION (HUPO)	124
BIOPAX	124
BIOLOGICAL PATHWAYS	124
PLASMA PROTEOME INSTITUTE (PPI)	125
PROTEOME SOCIETY	125