

INTRODUCTION	XI
REASONS FOR THIS STUDY AND OBJECTIVES	XI
AUDIENCE FOR THIS REPORT	XI
SCOPE AND CONTENT	XI
METHODOLOGY AND SOURCES	XII
ANALYST CREDENTIALS	XIII
RELATED BCC PUBLICATIONS	XIII
BCC ON-LINE SERVICES	XIV
SUMMARY	XV
<i>SUMMARY TABLE WORLDWIDE SALES OF DRUGS FOR IMMUNE DISEASES, THROUGH 2007 (\$ MILLIONS)</i>	XVI
<i>SUMMARY FIGURE WORLDWIDE MARKET FOR DRUGS TO TREAT IMMUNE DISEASE, 2001, 2002 AND 2007 (\$ MILLIONS)</i>	XVII
IMMUNE SYSTEM BACKGROUND	1
INNATE (NATURAL) IMMUNITY	1
NEUTROPHILS	2
EOSINOPHILS	2
BASOPHILS	2
MONOCYTES	2
Role of the Complement Cascade	3
ACQUIRED (ADAPTIVE) IMMUNITY	4
T-CELLS	4
Cd4+ Cells	5
<i>FIGURE 1 THE ROLE OF TH1 AND TH2 IN THE DEVELOPMENT OF IMMUNE DISEASE</i>	6
Cd 8+ cells	6
Nk-Cells (Natural Killer Cells)	7
B-CELLS	7
<i>TABLE 1 CELLS OF THE ADAPTIVE IMMUNE SYSTEM AND THEIR FUNCTION</i>	8
HOW THE BODY RECOGNIZES “SELF”	8
HOW THE BODY PREVENTS AUTOIMMUNE DISEASE	9
THE PROBLEM OF REDUNDANCY AND COMPLEXITY	10
TYPES OF IMMUNE DISEASE	11
TOO LITTLE IMMUNE RESPONSE	11
TOO MUCH IMMUNE RESPONSE	11
A MISGUIDED IMMUNE RESPONSE	12
NORMAL IMMUNE RESPONSE	12
OVERVIEW OF THE INDUSTRY	13
PRESSURES ON THE PHARMACEUTICAL INDUSTRY	13
GOVERNMENTAL REGULATION	13
<i>TABLE 2 MEDIAN FDA APPROVAL TIME FOR DRUGS, 1993-2001 (MONTHS)</i>	14
<i>FIGURE 2 MEDIAN FDA APPROVAL TIME FOR DRUGS, 1993-2001 (MONTHS)</i>	15
Drug Development Costs and Generic Competition	15

Drug Development Costs and Generic Competition (Continued)	16
PRICE LIMITATIONS AND CONTROLS	17
PHARMACEUTICAL COMPANIES	18
<i>TABLE 3 TOP TEN PHARMACEUTICAL COMPANIES BY SALES, 2001 (\$ MILLIONS)</i>	19
<i>TABLE 4 TOP COMPANIES IN SALES OF DRUGS FOR IMMUNE DISEASE, 2001 (\$ MILLIONS)</i>	19
<i>FIGURE 3 MARKET SHARE FOR THE TOP TEN COMPANIES SELLING DRUGS FOR IMMUNE DISEASE, 2001</i>	20
<i>TABLE 5 NEW DRUGS APPROVED BY THE FDA, 1990-2001</i>	21
THE ROLE OF BIOTECHNOLOGY COMPANIES.....	22
<i>TABLE 6 TOP BIOTECHNOLOGY COMPANIES BY MARKET CAPITALIZATION, 2002 (\$ BILLIONS)</i>	23
<i>TABLE 7 CLINICAL FOCUS OF BIOTECHNOLOGY COMPANIES INVOLVED IN IMMUNE DISEASE</i>	24
GENE THERAPY.....	25
INTERNATIONAL ASPECTS AND CHALLENGES	26
DEMOGRAPHICS	27
INCIDENCES OF IMMUNE DISEASE	28
<i>TABLE 8 ESTIMATED WORLDWIDE CASES (DEVELOPED COUNTRIES) OF THE MOST COMMON IMMUNE DISEASES</i>	29
IMMUNOSUPPRESSANTS.....	30
IMMUNOSUPPRESSANTS (CONTINUED)	30
<i>TABLE 9 WORLDWIDE MARKET FOR IMMUNOSUPPRESSANTS TO TREAT IMMUNE DISEASES, THROUGH 2007</i>	31
CORTICOSTEROIDS (STEROIDS).....	31
CORTICOSTEROIDS (STEROIDS) (CONTINUED)	32
<i>TABLE 10 CORTICOSTEROIDS AND SUPPLIERS</i>	33
LEUKOTRIENE ANTAGONISTS	33
TNF-ALPHA ANTAGONISTS	34
TNF-ALPHA ANTAGONISTS (CONTINUED).....	35
IMMUNOPHILIN BINDING DRUGS.....	36
INOSINE MONOPHOSPHATE DEHYDROGENASE (IMPDH) ANTAGONISTS.....	37
IL-2 ANTAGONISTS	38
ANTI-THYMOCYTE GLOBULIN.....	39
IL-1 ANTAGONISTS	39
CD2 ANTAGONISTS.....	40
CD20 ANTAGONISTS.....	41
PHOSPHODIESTERASE TYPE IV ANTAGONISTS.....	41
ALPHA 4 INTEGRIN ANTAGONISTS	42
IGE ANTAGONISTS	42
CD147 ANTAGONISTS.....	43
CD4 ANTAGONISTS.....	43
IL-5 ANTAGONISTS	44

OTHER IMMUNOSUPPRESSANTS.....	44
ADENOSINE DEAMINASE.....	44
ALKYLATING AGENTS	45
ANTI-FOLATES.....	45
ANTI-METABOLITES (VARIOUS)	46
ANTIBIOTIC IMMUNOSUPPRESSANTS.....	46
ANTIMALARIAL DRUGS	47
CASPASE-1 (INTERLEUKIN-1 BETA CONVERTING ENZYME (ICE)) ANTAGONISTS.....	47
CD3 ANTAGONISTS	47
CD54 (ICAM-1) ANTAGONISTS.....	48
CHEMOKINE ANTAGONISTS	48
COMPLEMENT ANTAGONISTS	49
GOLD COMPOUNDS	49
IL-4 ANTAGONISTS	50
P38 KINASE ANTAGONISTS.....	50
SELECTIN ANTAGONISTS	51
THALIDOMIDE	51
Thalidomide (Continued).....	52
DRUGS TO TREAT SYMPTOMS OF IMMUNE DISEASE.....	53
DRUGS TO TREAT SYMPTOMS OF IMMUNE DISEASE (CONTINUED)	53
<i>TABLE 11 WORLDWIDE SALES OF SYMPTOM-RELIEVING DRUGS FOR IMMUNE DISEASE, THROUGH 2007 (\$ MILLIONS)</i>	54
HISTAMINE ₍₁₎ ANTAGONISTS.....	54
<i>TABLE 12 H1 RECEPTOR BLOCKERS AND THEIR SUPPLIERS</i>	55
BETA AGONISTS	55
<i>TABLE 13 BETA AGONISTS AND SUPPLIERS</i>	56
NSAIDS (COX INHIBITORS)	56
NSAIDS (COX INHIBITORS) (CONTINUED).....	57
<i>TABLE 14 CYCLOOXYGENASE INHIBITORS AND SUPPLIERS</i>	58
INSULIN	58
INSULIN (CONTINUED).....	59
<i>TABLE 15 INSULIN TYPES AND SUPPLIERS</i>	60
SYNTHETIC THYROID HORMONE.....	60
AMINOSALICYLATES	60
RETINOIDS	61
THROMBOXANE A2 ANTAGONISTS.....	61
VITAMIN D DERIVATIVES	62
MUSCARINIC BLOCKERS	62
CHOLINESTERASE INHIBITORS.....	63
ANTICOAGULANTS.....	63
NEUROKININ ANTAGONISTS (NK-1 AND NK-2).....	63
NEUROKININ ANTAGONISTS (NK-1 AND NK-2) (CONTINUED).....	64

IMMUNOMODULATING AGENTS	65
<i>TABLE 16 WORLDWIDE SALES OF IMMUNOMODULATING DRUGS FOR IMMUNE DISEASE, THROUGH 2007 (\$ MILLIONS)</i>	65
<i>FIGURE 4 WORLDWIDE SALES OF IMMUNOMODULATING DRUGS FOR IMMUNE DISEASE, 2001, 2002 AND 2007 (\$ MILLIONS)</i>	66
BETA INTERFERONS	66
DOUBLE-STRANDED DNA	67
IL-10	67
IL-12 ANTAGONISTS AND AGONISTS.....	67
PEPTIDE FRAGMENTS	68
PEPTIDE FRAGMENTS (CONTINUED).....	69
DISEASES	70
<i>TABLE 17 WORLDWIDE MARKET FOR DRUGS TO TREAT IMMUNE DISEASES BY DISEASE TYPE, THROUGH 2007 (\$ MILLIONS)</i>	70
ASTHMA	70
ASTHMA (CONTINUED).....	71
ASTHMA (CONTINUED).....	72
<i>TABLE 18 WORLDWIDE SALES OF DRUGS FOR THE TREATMENT OF ASTHMA, THROUGH 2007 (\$ MILLIONS)</i>	73
<i>FIGURE 5 WORLDWIDE SALES OF DRUGS FOR THE TREATMENT OF ASTHMA, 2001, 2002 AND 2007 (\$ MILLIONS)</i>	73
ALLERGIC RHINITIS.....	74
<i>TABLE 19 WORLDWIDE SALES OF DRUGS FOR ALLERGY, THROUGH 2007 (\$ MILLIONS)</i>	75
<i>FIGURE 6 WORLDWIDE SALES OF DRUGS FOR ALLERGY, 2001, 2002 AND 2007 (\$ MILLIONS)</i>	75
RHEUMATOID ARTHRITIS	76
DRUGS CURRENTLY ON THE MARKET	76
Drugs Currently on the Market (Continued)	77
CORTICOSTEROIDS, METHOTREXATE, AND OTHER TREATMENTS.....	78
DRUGS IN CLINICAL DEVELOPMENT	79
Drugs in Clinical Development (Continued)	80
<i>TABLE 20 WORLDWIDE SALES OF DRUGS FOR THE TREATMENT OF RHEUMATOID ARTHRITIS, THROUGH 2007 (\$ MILLIONS)</i>	81
MULTIPLE SCLEROSIS	82
DRUGS CURRENTLY ON THE MARKET	83
Drugs Currently on the Market (Continued)	84
DRUGS IN DEVELOPMENT.....	85
<i>TABLE 21 WORLDWIDE SALES OF DRUGS FOR THE TREATMENT OF MULTIPLE SCLEROSIS, THROUGH 2007 (\$ MILLIONS)</i>	86
<i>FIGURE 7 WORLDWIDE SALES OF DRUGS FOR THE TREATMENT OF MULTIPLE SCLEROSIS, 2001, 2002 AND 2007 (\$ MILLIONS)</i>	86
TRANSPLANT REJECTION AND GRAFT VS. HOST DISEASE.....	86
<i>TABLE 22 NUMBER OF TRANSPLANTS PERFORMED BY TYPE, 2001</i>	87
TRANSPLANT REJECTION AND GRAFT VS. HOST DISEASE (CONTINUED).....	88

TABLE 23 WORLDWIDE SALES OF DRUGS TO PREVENT TRANSPLANTATION REJECTION, THROUGH 2007 (\$ MILLIONS).....	89
FIGURE 8 WORLDWIDE SALES OF DRUGS TO PREVENT TRANSPLANTATION REJECTION, 2001, 2002 AND 2007 (\$ MILLIONS).....	89
TYPE ONE DIABETES MELLITUS (JUVENILE DIABETES)	90
CURRENT DRUGS.....	90
DRUGS IN CLINICAL TRIALS	91
TABLE 24 WORLDWIDE SALES OF INSULIN FOR TYPE ONE DIABETES, THROUGH 2007 (\$ MILLIONS).....	92
FIGURE 9 WORLDWIDE SALES OF INSULIN FOR TYPE ONE DIABETES, 2001, 2002 AND 2007 (\$ MILLIONS)	93
TABLE 25 WORLDWIDE MARKET FOR OTHER DRUGS FOR TYPE ONE DIABETES, THROUGH 2007 (\$ MILLIONS).....	93
PANCREAS TRANSPLANTATION.....	93
CROHN'S DISEASE AND ULCERATIVE COLITIS (INFLAMMATORY BOWEL DISEASE)	94
DRUGS CURRENTLY ON THE MARKET	95
DRUGS IN DEVELOPMENT.....	96
TABLE 26 WORLWIDE SALES OF DRUGS FOR THE TREATMENT OF CROHN'S AND ULCERATIVE COLITIS, THROUGH 2007 (\$ MILLIONS).....	97
FIGURE 10 WORLDWIDE SALES OF DRUGS FOR THE TREATMENT OF CROHN'S AND ULCERATIVE COLITIS, 2001, 2002 AND 2007 (\$ MILLIONS)	97
HASHIMOTO'S THYROIDITIS.....	97
TABLE 27 WORLWIDE SALES OF DRUGS FOR THE TREATMENT OF HASHIMOTO'S DISEASE, THROUGH 2007 (\$ MILLIONS).....	98
PSORIASIS	98
DRUGS ON THE MARKET	99
DRUGS IN DEVELOPMENT.....	100
TABLE 28 BIOLOGIC DRUGS FOR PSORIASIS ON THE MARKET AND IN DEVELOPMENT, 2002-2007+	101
TABLE 29 WORLDWIDE SALES OF DRUGS FOR PSORIASIS, THROUGH 2007 (\$ MILLIONS).....	101
FIGURE 11 WORLDWIDE SALES OF DRUGS FOR PSORIASIS, 2001, 2002 AND 2007 (\$ MILLIONS).....	102
PSORIATIC ARTHRITIS	102
TABLE 30 WORLDWIDE SALES OF DRUGS FOR THE TREATMENT OF PSORIATIC ARTHRITIS, THROUGH 2007 (\$ MILLIONS).....	103
FIGURE 12 WORLDWIDE SALES OF DRUGS FOR THE TREATMENT OF PSORIATIC ARTHRITIS, 2001, 2002 AND 2007 (\$ MILLIONS).....	103
SYSTEMIC LUPUS ERYTHEMATOSUS	104
DRUGS CURRENTLY ON THE MARKET	105
DRUGS UNDER DEVELOPMENT	106
Drugs Under Development (Continued).....	107
TABLE 31 WORLDWIDE SALES OF DRUGS FOR THE TREATMENT OF LUPUS, THROUGH 2007 (\$ MILLIONS).....	108
FIGURE 13 WORLDWIDE SALES OF DRUGS FOR THE TREATMENT OF LUPUS, 2001, 2002 AND 2007 (\$ MILLIONS)	108
MYASTHENIA GRAVIS.....	109
TABLE 32 WORLDWIDE SALES OF DRUGS FOR MYASTHENIA GRAVIS, THROUGH 2007 (\$ MILLIONS).....	110

SCLERODERMA	110
DRUGS IN USE	111
DRUGS UNDER DEVELOPMENT	111
<i>TABLE 33 WORLDWIDE SALES OF DRUGS FOR THE TREATMENT OF</i> <i>SCLERODERMA, THROUGH 2007 (\$ MILLIONS)</i>	<i>112</i>
<i>FIGURE 14 WORLDWIDE SALES OF DRUGS FOR THE TREATMENT OF</i> <i>SCLERODERMA, 2001, 2002 AND 2007 (\$ MILLIONS).....</i>	<i>112</i>
COMPANIES	113
ABBOTT LABORATORIES.....	113
ABGENIX.....	113
AMGEN	114
ASTRAZENECA.....	114
AVENTIS.....	115
BIOGEN	116
BIOTRANSPLANT	116
BOEHRINGER INGELHEIM GMBH	117
BRISTOL-MYERS SQUIBB.....	117
CELLTECH	118
CELGENE.....	119
ELI LILLY AND CO.	119
GENENTECH	120
GLAXOSMITHKLINE.....	120
ICOS	121
IDEC PHARMACEUTICALS.....	121
ISIS PHARMACEUTICALS.....	122
LA JOLLA PHARMACEUTICAL	122
MEDIMMUNE	123
MERCK	123
NEUROCRINE BIOSCIENCES.....	124
NOVARTIS.....	124
NOVO-NORDISK.....	125
PFIZER.....	125
PHARMACIA	126
PROTEIN DESIGN LABS.....	126
ROCHE.....	127
SANGSTAT	127
SCHERING-PLOUGH.....	128
SERONO	129
TANOX	129
VERTEX	129
WYETH (FORMERLY AMERICAN HOME PRODUCTS).....	130
XOMA	131