

CHAPTER ONE: INTRODUCTION.....	1
STUDY GOALS AND OBJECTIVES.....	1
REASONS FOR DOING THIS STUDY.....	1
SCOPE OF REPORT.....	1
INTENDED AUDIENCE.....	2
METHODOLOGY.....	2
INFORMATION SOURCES.....	2
ANALYST CREDENTIALS.....	2
RELATED BCC REPORTS.....	3
BCC ONLINE SERVICES.....	3
DISCLAIMER.....	3
 CHAPTER TWO: SUMMARY.....	 4
SUMMARY.....	4
<i>SUMMARY TABLE GLOBAL POTENTIAL MARKET FOR</i>	
<i>MUSCULOSKELETAL DISEASE, THROUGH 2014 (\$ MILLIONS)</i> .....	5
<i>FIGURE 2 GLOBAL POTENTIAL MARKET FOR MUSCULOSKELETAL</i>	
<i>DISEASE, 2009 AND 2014 (\$ MILLIONS)</i> .....	5
SUMMARY (CONTINUED).....	6
 CHAPTER THREE: OVERVIEW.....	 7
<i>TABLE 1 PROPORTION OF U.S. POPULATION REPORTING</i>	
<i>CHRONIC MEDICAL CONDITIONS (%)</i> .....	7
<i>FIGURE 1 PROPORTION OF U.S. POPULATION REPORTING</i>	
<i>CHRONIC MEDICAL CONDITIONS (%)</i> .....	8
DEFINITION AND MARKET STRUCTURE.....	9
<i>TABLE 2 GLOBAL POTENTIAL MARKET FOR MUSCULOSKELETAL</i>	
<i>DISEASE, THROUGH 2014 (\$ MILLIONS)</i> .....	9
<i>TABLE 2 (CONTINUED)</i> .....	10
<i>FIGURE 2 GLOBAL POTENTIAL MARKET FOR MUSCULOSKELETAL</i>	
<i>DISEASE, 2009 AND 2014 (\$ MILLIONS)</i> .....	10
DISEASES OF THE BONE.....	10
OSTEOPOROSIS.....	11
PAGET’S DISEASE.....	11
OSTEOMALACIA.....	11
RICKETS.....	12
OSTEOMYELITIS.....	12
AVASCULAR NECROSIS (OSTEONECROSIS).....	12
DISEASES OF THE SKELETAL MUSCLE.....	12
MYOPATHY.....	12
CHRONIC FATIGUE SYNDROME.....	13
FIBROMYALGIA.....	13
MUSCULAR DYSTROPHY.....	13
DERMATOMYOSITIS.....	13
POLYMYOSITIS.....	13

RHABDOMYOLYSIS .....	13
COMPARTMENT SYNDROME .....	14
DISEASES OF THE JOINTS .....	14
RHEUMATOID ARTHRITIS (RA) .....	14
Epidemiology.....	14
Symptoms and Diagnosis .....	15
Symptoms and Diagnosis (Continued).....	16
Standard of Treatment.....	17
New Developments .....	18
New Treatments .....	19
Recent Clinical Trials .....	19
Outlook for Disease Area.....	19
LUPUS.....	20
Causes .....	20
Epidemiology.....	21
Symptoms and Diagnosis .....	21
Standard of Treatment.....	22
New Developments .....	22
New Treatments .....	23
Recent Clinical Trials .....	23
Outlook for Disease Area.....	24
GOUT.....	24
Epidemiology.....	24
Symptoms and Diagnosis .....	25
Standard of Treatment.....	26
New Treatments .....	26
Recent Clinical Trials .....	27
Recent Clinical Trials (Continued).....	28
Outlook for Disease Area.....	29
JUVENILE IDIOPATHIC ARTHRITIS.....	29
Epidemiology.....	29
Epidemiology (Continued) .....	30
Symptoms and Diagnosis .....	31
Standard of Treatment.....	31
New Treatments .....	32
Recent Clinical Trials .....	33
Outlook for Disease Area.....	33
OSTEOARTHRITIS .....	33
Epidemiology.....	33
Symptoms and Diagnosis .....	34
Standard of Treatment.....	34
New Treatments .....	35
Recent Clinical Trials .....	36
Outlook for Disease Area.....	36

PSORIATIC ARTHRITIS.....	36
Epidemiology.....	36
Symptoms and Diagnosis .....	37
Standard of Treatment.....	38
New Treatments .....	38
Recent Clinical Trials .....	38
Outlook for Disease Area.....	39
ANKYLOSING SPONDYLITIS.....	39
Epidemiology.....	40
Symptoms and Diagnosis .....	41
Standard of Treatment.....	42
Recent Clinical Trials .....	42
Outlook for Disease Area.....	42
OSTEOPOROSIS .....	43
Epidemiology.....	43
Symptoms and Diagnosis .....	43
Symptoms and Diagnosis (Continued).....	44
Standard of Treatment.....	45
Standard of Treatment (Continued) .....	46
Standard of Treatment (Continued) .....	47
New Treatments .....	48
Recent Clinical Trials .....	48
Outlook for Disease Area.....	49
CHAPTER FOUR: THERAPEUTICS.....	50
<i>TABLE 3 GLOBAL REVENUE OF THERAPEUTICS FOR MSD, 2009</i> <i>(%/\$ MILLIONS)</i> .....	50
<i>FIGURE 3 GLOBAL REVENUE OF THERAPEUTICS FOR MSD, 2009</i> <i>(\$ MILLIONS)</i> .....	51
DMARDS .....	51
<i>TABLE 4 GLOBAL REVENUE OF DMARDS FOR MSD, INCLUDING</i> <i>BIOLOGICAL RESPONSE MODIFIERS, BY DRUG, 2009 (\$</i> <i>MILLIONS)</i> .....	52
<i>FIGURE 4 GLOBAL REVENUE OF DMARDS FOR MSD, INCLUDING</i> <i>BIOLOGICAL RESPONSE MODIFIERS, BY DRUG, 2009 (\$</i> <i>MILLIONS</i> .....	53
BIOLOGICS .....	53
NSAIDS .....	54
NSAIDS (CONTINUED).....	54
NSAIDS (CONTINUED).....	55
NSAIDS (CONTINUED).....	55
NSAIDS (CONTINUED).....	56
<i>TABLE 5 GLOBAL REVENUE OF NSAIDS FOR MSD, 2009 (\$</i> <i>MILLIONS)</i> .....	57

<i>FIGURE 5 GLOBAL REVENUE OF NSAIDS FOR MSD BY DRUG, 2009</i> <i>(\$ MILLIONS)</i> .....	57
CORTICOSTEROIDS .....	58
<i>TABLE 6 GLOBAL REVENUES OF CORTICOSTEROIDS FOR MSD,</i> <i>2009 (\$ MILLIONS)</i> .....	58
<i>FIGURE 6 GLOBAL REVENUES OF CORTICOSTEROIDS FOR MSD,</i> <i>2009 (\$ MILLIONS)</i> .....	58
BISPHOSPHONATES .....	59
<i>TABLE 7 GLOBAL BISPHOSPHONATES MARKET FOR MSD, 2009 (\$</i> <i>MILLIONS)</i> .....	60
<i>FIGURE 7 GLOBAL BISPHOSPHONATES MARKET FOR MSD, 2009 (\$</i> <i>MILLIONS)</i> .....	60
CALCITONINS .....	60
<i>TABLE 8 GLOBAL CALCITONINS MARKET FOR MSD, 2009 (\$</i> <i>MILLIONS)</i> .....	61
<i>FIGURE 8 GLOBAL CALCITONINS MARKET FOR MSD, 2009 (\$</i> <i>MILLIONS)</i> .....	61
ESTROGEN REPLACEMENT THERAPY.....	62
SELECTIVE ESTROGEN RECEPTOR MODULATORS .....	62
<i>TABLE 9 GLOBAL SERM MARKET FOR MSD, 2009 (\$ MILLIONS)</i> .....	63
PARATHYROID HORMONE.....	63
<i>TABLE 10 GLOBAL PTH MARKET FOR MSD (\$ MILLIONS)</i> .....	64
ORTHOBIOLOGICS.....	64
BMPS.....	65
<i>TABLE 11 GLOBAL BMP MARKET FOR MSD, 2009 (\$ MILLIONS)</i> .....	65
<i>FIGURE 9 GLOBAL BMP MARKET FOR MSD BY COMPANY, 2009 (\$</i> <i>MILLIONS)</i> .....	65
PROTEIN THERAPY .....	65
GENE THERAPY.....	66
CELLULAR THERAPY .....	66
SYNTHETIC BONE GRAFT.....	66
POLYMERS.....	67
COMPOSITE GRAFTS .....	68
DEMINERALIZED BONE MATRIX .....	68
VISCOSUPPLEMENTATION .....	68
<i>TABLE 12 VISCOSUPPLEMENTATION MARKET SHARE BY</i> <i>PRODUCT, 2009 (%)</i> .....	69
<i>FIGURE 12 VISCOSUPPLEMENTATION MARKET SHARE BY</i> <i>PRODUCT, 2009 (%)</i> .....	69
MARKET SIZE AND KEY PLAYERS .....	70
<i>TABLE 13 TOP 10 COMPANIES IN MSD MARKET, REVENUE AND</i> <i>ASSOCIATED GLOBAL MARKET SHARE, 2009 (\$ MILLIONS/%)</i> .....	70
<i>FIGURE 13 TOP 10 COMPANIES IN MSD MARKET BY GLOBAL</i> <i>MARKET SHARE, 2009 (%)</i> .....	70

MARKET SIZE.....	71
KEY PLAYERS.....	71
Pfizer .....	71
Abbott.....	71
J&J .....	71
Merck .....	71
Amgen .....	72
Roche .....	72
UCB.....	73
BMS.....	73
Medtronic .....	74
GLOBAL INDUSTRY STRUCTURE.....	74
TABLE 14 SWOT ANALYSIS OF MSD MARKET: NSAIDS.....	74
TABLE 15 SWOT ANALYSIS OF MSD MARKET: BIOLOGICALS.....	74
GROWTH DRIVERS .....	75
GROWTH OBSTACLES .....	75
APPLICATIONS .....	75
TABLE 16 GLOBAL PROJECTED MARKET FOR MSD, BY APPLICATION, THROUGH 2014 (\$ MILLIONS).....	75
FIGURE 12 GLOBAL PROJECTED MARKET FOR MSD, BY APPLICATION, 2006-2014 (\$ MILLIONS).....	76
ORTHOBIOLOGICS.....	76
TABLE 17 GLOBAL ORTHOBIOLOGICS MARKET SHARE, BY COMPANY, 2009 (%).....	77
FIGURE 15 GLOBAL ORTHOBIOLOGICS MARKET SHARE, BY COMPANY, 2009 (%).....	78
AUTOGENOUS BONE GRAFT AND THE BONE GRAFT SUBSTITUTE MARKET.....	78
FUSION RATES: ALWAYS ROOM FOR IMPROVEMENT.....	78
DRIVERS OF GROWTH IN THE MARKET .....	79
SEGMENTS IN THE BONE AND BONE SUBSTITUTE MARKET .....	79
FUTURE DISPLACEMENT IN A DYNAMIC SPINE MARKET? .....	80
TABLE 18 GLOBAL MARKET FORECAST FOR ORTHOBIOLOGICS, BY MATERIAL TYPE, THROUGH 2014 (\$ MILLIONS).....	81
FIGURE 16 GLOBAL MARKET FORECAST FOR ORTHOBIOLOGICS, BY MATERIAL TYPE, 2008-2014 (\$ MILLIONS).....	81
MARKET CHALLENGES .....	82
HIGH COST OF BMPS.....	82
PATENT PROTECTION.....	82
BIOCOMPATIBILITY ISSUES .....	82
EXISTING MARKET.....	83
MEDTRONIC INFUSE.....	83
STRYKER OP-1.....	83

DEPUY MP52.....	84
AVERAGE SELLING PRICE.....	85
FUTURE OF THE MARKET .....	85
THERAPEUTICS.....	85
<i>TABLE 19 PROJECTED MARKET FOR KEY MSD PRODUCTS, THROUGH 2014 (\$ MILLIONS).....</i>	<i>85</i>
<i>TABLE 19 (CONTINUED).....</i>	<i>86</i>
<i>FIGURE 15 PROJECTED MARKET FOR KEY MSD PRODUCTS, 2008- 2014 (\$MILLIONS).....</i>	<i>86</i>
<i>TABLE 20 TREATMENTS AND MOA .....</i>	<i>87</i>
SUMMARY OF COMMON MEDICATIONS.....	87
<i>TABLE 21 SIDE EFFECTS.....</i>	<i>88</i>
<i>TABLE 21 (CONTINUED).....</i>	<i>89</i>
<i>TABLE 21 (CONTINUED).....</i>	<i>90</i>
<i>TABLE 21 (CONTINUED).....</i>	<i>91</i>
<i>TABLE 22 PREVALENCE OF MAJOR MSDS IN MAJOR GLOBAL MARKETS, 2009 (%).....</i>	<i>92</i>
<i>TABLE 23 GLOBAL POTENTIAL MARKET FOR TOTAL MSD, THROUGH 2014 (\$ MILLIONS).....</i>	<i>92</i>
<i>TABLE 24 KEY OTC TREATMENTS AND NATURAL PRODUCTS .....</i>	<i>93</i>
<i>TABLE 25 DRUGS USED TO TREAT MSD.....</i>	<i>93</i>
<i>TABLE 26 LEADING MSD THERAPIES AND COST PER DAY (U.S. DOLLARS) .....</i>	<i>94</i>
CHAPTER FIVE: LEGISLATION AND REGULATORY ENVIRONMENT.....	95
HEALTHCARE REFORM.....	95
COST-BENEFIT ANALYSIS.....	95
REIMBURSEMENT AND PRICING .....	95
REGULATORY CHALLENGES.....	95
BIOSIMILARS.....	96
CHAPTER SIX: RELATED DEALS AND PARTNERSHIPS.....	97
<i>TABLE 27 VENTURE INVESTMENT IN MSD COMPANIES .....</i>	<i>97</i>
<i>TABLE 27 (CONTINUED).....</i>	<i>98</i>
RELATED DEALS AND ... (CONTINUED) <b>ERROR! BOOKMARK NOT DEFINED.</b>	
<i>TABLE 28 RELATED DEALS AND PARTNERSHIPS.....</i>	<i>100</i>
CHAPTER SEVEN: PIPELINE.....	101
<i>TABLE 29 CLINICAL DEVELOPMENT PIPELINE.....</i>	<i>101</i>
<i>TABLE 29 (CONTINUED).....</i>	<i>102</i>
<i>TABLE 29 (CONTINUED).....</i>	<i>103</i>
<i>TABLE 29 (CONTINUED).....</i>	<i>104</i>
<i>TABLE 29 (CONTINUED).....</i>	<i>105</i>
<i>TABLE 29 (CONTINUED).....</i>	<i>106</i>
<i>TABLE 29 (CONTINUED).....</i>	<i>107</i>

CHAPTER EIGHT: PATENT ANALYSIS.....	108
PATENT EXPIRATIONS .....	108
ACTEMRA .....	108
SIMPONI .....	108
KINERET .....	108
CIMZIA .....	109
NEW PATENTS FILED.....	109
TABLE 30 PATENT ANALYSIS .....	109
TABLE 30 (CONTINUED).....	110
TABLE 30 (CONTINUED).....	111
TABLE 30 (CONTINUED).....	112
TABLE 30 (CONTINUED).....	113
TABLE 30 (CONTINUED).....	114
TABLE 30 (CONTINUED).....	115
TABLE 30 (CONTINUED).....	116
TABLE 30 (CONTINUED).....	117
TABLE 30 (CONTINUED).....	118
TABLE 30 (CONTINUED).....	119
TABLE 30 (CONTINUED).....	120
TABLE 30 (CONTINUED).....	121
TABLE 30 (CONTINUED).....	122
TABLE 30 (CONTINUED).....	123
TABLE 30 (CONTINUED).....	124
TABLE 30 (CONTINUED).....	125
TABLE 30 (CONTINUED).....	126
TABLE 30 (CONTINUED).....	127
TABLE 30 (CONTINUED).....	128
TABLE 30 (CONTINUED).....	129
TABLE 30 (CONTINUED).....	130
TABLE 30 (CONTINUED).....	131
TABLE 30 (CONTINUED).....	132
TABLE 30 (CONTINUED).....	133
TABLE 30 (CONTINUED).....	134
TABLE 30 (CONTINUED).....	135
TABLE 31 KEY PATENT HOLDERS IN BONE/JOINT DISEASE AREA (NUMBER/%).....	135
FIGURE 19 KEY PATENT HOLDERS IN BONE/JOINT DISEASE MARKET (%).....	136
CHAPTER NINE: COMPANY PROFILES .....	137
AB SCIENCE .....	137
ABBOTT .....	137
ABLYNX, NV .....	137
ACCELERON PHARMA .....	138
ACTIVE BIOTECH RESEARCH AB.....	138

ALDER BIOPHARMACEUTICALS, INC.....	138
ALETHIA BIOTHERAPEUTICS, INC. ....	139
AMGEN .....	140
ARANA THERAPEUTICS.....	140
ARRAY BIOPHARMA .....	141
ASTELLAS.....	141
ASTION PHARMA A/S.....	142
ASTRAZENECA.....	142
BAYER SCHERING PHARMA AG.....	142
BIOGENIDEC .....	143
BIOIBERICA.....	143
BIOMET .....	144
BIOTIE THERAPIES .....	144
BMS .....	145
BOEHRINGER INGELHEIM .....	146
BONE MEDICAL, LTD. ....	146
CAPSITONIN ORAL CALCITONIN.....	146
ORAL PARATHYROID HORMONE BN003 .....	146
TNF REGULATORS BN006.....	147
BONE CELL REGULATOR: BN005 AND BN008 .....	147
BTG INTERNATIONAL LTD. ....	147
CAN-FITE BIOPHARMA .....	148
CARTICEPT MEDICAL, INC. ....	148
CELGENE CORPORATION .....	149
CENTOCOR ORTHO BIOTECH .....	150
CEPHALON, INC. ....	150
CHELSEA THERAPEUTICS, INC.....	151
CHEMOCENTRYX, INC. ....	151
CHUGAI .....	152
<i>TABLE 32 CHUGAI H'S PROGRAMS IN DEVELOPMENT FOR BONE</i>	
<i>AND JOINT DISEASES .....</i>	<i>153</i>
COMBINATORX, INC.....	153
CRYSTAL GENOMICS .....	154
CYTOKINETICS.....	154
DELENEX THERAPEUTICS AG .....	155
ELAN.....	155
ELI LILLY.....	156
ESBATECH.....	156
EUROFARMA LABS .....	156
FERRING PHARMA.....	157
FOREST LABS.....	157
GENELABS TECHNOLOGIES (GSK) .....	157
GENENTECH, INC. ....	158
GENMAB A/S.....	158



GENZYME .....	159
GLAXO WELLCOME U.K., LTD. (GSK) .....	159
HALOZYME THERAPEUTICS .....	159
HARBOR BIOSCIENCES, INC. (FORMERLY HOLLIS-EDEN).....	160
HORIZON THERAPEUTICS .....	161
HUMAN GENOME SCIENCES .....	162
HUMANIS KLINIKUM.....	162
IDERA PHARMACEUTICALS .....	163
IMMUNOMEDICS, INC.....	164
IMMUPHARMA, PLC .....	165
INCYTE.....	166
IPSEN.....	166
ISOTIS ORTHOBIOLOGICS (ACQUIRED BY INTEGRA	
LIFESCIENCES).....	167
SPINAL FUSION .....	167
TRAUMA .....	167
JOINT REVISION.....	168
BONE VOID FILLING .....	168
CRANIOMAXILLOFACIAL SURGERY .....	168
ORAL AND PERIODONTAL REPAIR .....	168
ITALFARMACO S.P.A.....	168
JOHNSON & JOHNSON .....	169
KENSEY NASH .....	169
LEXICON PHARMACEUTICALS .....	170
MEDAREX .....	171
MEDIGENE AG.....	171
MEDIMMUNE, LLC.....	172
MEDIPOST CO., LTD.....	173
MEDIVIR AB .....	173
MIV 710/711 (CATH-K) .....	174
MEDTRONIC SOFAMOR DANEK.....	174
MERCK .....	175
MERRIMACK PHARMACEUTICALS .....	175
MERRION PHARMACEUTICALS, LTD. ....	175
MITSUBISHI TANABE.....	176
MORPHOSYS AG .....	177
NEOVACS SA .....	178
NICOX SA .....	179
NIPPON KAYAKU .....	180
NORDIC BIOSCIENCE A/S.....	180
NOVARTIS.....	181
NOVO NORDISK A/S.....	182
NOXXON PHARMA AG .....	182
NPS PHARMACEUTICALS.....	183

NUON THERAPEUTICS, INC. ....	184
NUVO RESEARCH, INC.....	185
NYCOMED.....	185
ONO PHARMA .....	186
ORTHOVITA.....	186
OSTEOLOGIX, INC.....	187
OSTEOTECH .....	188
PALAU PHARMA.....	188
PALAU PHARMA (CONTINUED).....	189
PANGENETICS BV.....	190
PG102-PROTOTYPE.....	190
PG102.....	191
PASCOE PHARMA.....	191
PDL BIOPHARMA, INC.....	191
PFIZER.....	192
PHYTOHEALTH CORPORATION.....	193
PHN031(PH3).....	193
Description.....	193
Development Status .....	194
POZEN, INC.....	194
RADIUS HEALTH .....	195
REGENERON .....	196
RIGEL PHARMA, INC. ....	196
RIVEX PHARMA, INC. ....	197
ROCHE.....	198
SANOFI-AVENTIS .....	199
SERVIER.....	199
SMITH & NEPHEW PLC.....	200
SPINAL RESTORATION, INC. ....	200
STRYKER BIOTECH .....	201
SUCAMPO PHARMACEUTICALS, INC. ....	202
SYNTHES, INC.....	202
TAKEDA.....	203
TEVA .....	203
TRUBION PHARMACEUTICALS INC.....	203
TRUBION PHARMACEUTICALS INC. (CONTINUED) .....	204
UCB .....	205
UNIGENE LABS .....	205
VERTO MEDICAL, LTD. ....	205
WRIGHT MEDICAL TECHNOLOGY INC. ....	206
XOMA .....	206
ZELOS THERAPEUTICS, INC.....	207
ZELOS THERAPEUTICS, INC. (CONTINUED) .....	208
ZIMMER.....	209

ZOSANO PHARMA .....	210
ZYMOGENETICS, INC. ....	211
ATACICEPT (FORMERLY TACI-IG) .....	211
AUGMENT BONE GRAFT (FORMERLY GEM- OS1™)/AUGMENT INJECTABLE BONE GRAFT (FORMERLY GEM-OS2™) .....	212
CHAPTER TEN: OUTLOOK—TRENDS AND CHALLENGES .....	213
MSDS ARE A LARGE BURDEN ON THE HEALTHCARE SYSTEM .....	213
OUTLOOK FOR ORTHOBIOLOGICS IS BRIGHT .....	213
OSTEOPOROSIS: PAYER ACCEPTANCE IS KEY ISSUE .....	213
COMPETITION FOR THE RA PATIENT POPULATION FAILING ANTI-TNF THERAPIES .....	213
LUPUS IS A CHALLENGING INDICATION .....	213
DIAGNOSIS RATES FOR PSORIATIC ARTHRITIS AND AS .....	214