

| | |
|---|----|
| CHAPTER ONE: INTRODUCTION..... | 1 |
| STUDY GOALS AND OBJECTIVES..... | 1 |
| REASONS FOR DOING THIS STUDY..... | 1 |
| SCOPE AND FORMAT..... | 2 |
| METHODOLOGY AND INFORMATION SOURCES..... | 2 |
| INTENDED AUDIENCE..... | 2 |
| ANALYST CREDENTIALS..... | 2 |
| RELATED BCC REPORTS..... | 3 |
| BCC ON-LINE SERVICES..... | 3 |
| DISCLAIMER..... | 3 |
| DISCLAIMER (CONTINUED)..... | 4 |
| CHAPTER TWO: SUMMARY..... | 5 |
| SUMMARY..... | 5 |
| <i>SUMMARY TABLE GLOBAL MARKET FOR TISSUE ENGINEERING AND REGENERATION PRODUCTS, THROUGH 2016 (\$ MILLIONS)</i> | 6 |
| <i>SUMMARY FIGURE GLOBAL MARKET FOR TISSUE ENGINEERING AND REGENERATION PRODUCTS, 2009-2016 (\$ MILLIONS)</i> | 6 |
| CHAPTER THREE: INTRODUCTION TO TISSUE ENGINEERING AND REGENERATION INDUSTRY..... | 7 |
| OVERVIEW..... | 7 |
| OVERVIEW OF TISSUE ENGINEERING PRODUCTS..... | 8 |
| CELLULAR PRODUCTS..... | 8 |
| SCAFFOLDS AND BIOMATERIALS..... | 9 |
| Scaffolds and Biomaterials (Continued)..... | 10 |
| Scaffolds and Biomaterials (Continued)..... | 11 |
| ASPECTS OF TISSUE CULTURES..... | 12 |
| SECTORS AND SUBMARKETS IN THE TISSUE ENGINEERING INDUSTRY..... | 12 |
| TRENDS AND MARKETS AFFECTING DEVELOPMENT OF THE TISSUE ENGINEERING INDUSTRY..... | 13 |
| Stem Cell Research..... | 13 |
| <i>TABLE 1 GLOBAL MARKET RELATED TO STEM CELL RESEARCH, THROUGH 2016 (\$ BILLIONS)</i> | 13 |
| Biomaterials Industry..... | 13 |
| <i>TABLE 2 GLOBAL MARKET FOR BIOMATERIALS, THROUGH 2016 (\$ BILLIONS)</i> | 14 |
| Cosmetics and Rejuvenating (Anti-Aging) Industry..... | 14 |
| Legislation, Research Policies, and Public Opinion..... | 14 |
| New, Breakthrough Technologies..... | 15 |
| MARKET PARTICIPANTS..... | 15 |
| Overview..... | 15 |

| | |
|--|----|
| Geographical Distribution of the Tissue Engineering Market | 15 |
| Regulatory Differences | 16 |
| <i>TABLE 3 DIFFERENCES IN REGULATORY APPROVAL: U.S. VS. EUROPE</i> | 16 |
| Impact of Healthcare System on Tissue Engineering Market Development..... | 17 |
| <i>TABLE 4 HEALTHCARE SYSTEMS OF DIFFERENT EUROPEAN AND REST OF WORLD COUNTRIES</i> | 18 |
| Patenting in Europe vs. the U.S..... | 19 |
| ROW vs. U.S. and Europe | 20 |
| CHAPTER FOUR SKIN TISSUE ENGINEERING MARKET | 21 |
| OVERVIEW | 21 |
| <i>TABLE 5 STATISTICS FOR SKIN DAMAGE MEDICAL CONDITIONS IN THE U.S. AND WORLDWIDE, 2011</i> | 22 |
| CURRENT SKIN TISSUE-ENGINEERED PRODUCTS | 22 |
| <i>TABLE 6 EXAMPLES OF ACELLULAR SKIN TISSUE-ENGINEERED PRODUCTS ON THE MARKET</i> | 23 |
| <i>TABLE 7 EXAMPLES OF CELLULAR SKIN TISSUE-ENGINEERED PRODUCTS ON THE MARKET</i> | 24 |
| MARKET VALUE OF SKIN SUBSTITUTES AND TISSUE-ENGINEERED PRODUCTS | 25 |
| Cost-Effectiveness of Skin Substitute Treatments | 25 |
| Sales of Skin Substitute Products..... | 26 |
| <i>TABLE 8 SALES OF DERMAGRAFT, THROUGH 2016 (\$ MILLIONS)</i> | 26 |
| Market Size for Skin Tissue-Engineered Products | 27 |
| <i>TABLE 9 DISTRIBUTION OF WOUND CARE MARKET ACCORDING TO DIFFERENT CATEGORIES</i> | 27 |
| <i>TABLE 10 MARKET FOR SKIN TISSUE-ENGINEERED PRODUCTS WORLDWIDE, THROUGH 2016 (\$ MILLIONS)</i> | 28 |
| <i>TABLE 11 GEOGRAPHICAL DISTRIBUTION OF SKIN TISSUE ENGINEERING MARKET (%)</i> | 29 |
| CHAPTER FIVE: TISSUE ENGINEERING FOR BONE, CARTILAGE, AND OTHER CONNECTIVE TISSUES | 30 |
| OVERVIEW OF CARTILAGE AND OTHER SOFT, MUSCULOSKELETAL CONNECTIVE TISSUES (LIGAMENTS, TENDONS) | 30 |
| <i>TABLE 12 STATISTICS FOR CARTILAGE DAMAGE WORLDWIDE</i> | 30 |
| TREATMENT FOR CARTILAGE AND CONNECTIVE TISSUE DAMAGE..... | 31 |
| <i>TABLE 13 GLOBAL MARKET FOR CARTILAGE REPAIR, THROUGH 2016 (\$ MILLIONS)</i> | 32 |

| | |
|--|----|
| <i>TABLE 14 GEOGRAPHICAL DISTRIBUTION OF CARTILAGE REPLACEMENT MARKET (%)</i> | 33 |
| Tissue Engineering Products and Development for Replacement of Cartilage and Other Connective Tissues | 33 |
| <i>TABLE 15 SALES OF CARTICEL BY GENZYME CORP., 2005–2008 (\$ MILLIONS)</i> | 33 |
| Other Approaches in Tissue Engineering for Cartilage Repair | 34 |
| Autologous Mesenchymal Stem Cell Transplantation..... | 35 |
| Embryonic Stem Cells | 35 |
| Natural Scaffolds | 35 |
| Synthetic Scaffolds..... | 36 |
| Nanostructured Scaffolds | 36 |
| Scaffold-Free Methods | 36 |
| Tissue Engineering for Other Connective Tissues (Ligaments, Tendons)..... | 37 |
| OVERVIEW OF BONE REPAIR MARKET | 38 |
| <i>TABLE 16 STATISTICS FOR BONE DAMAGE AND RELATED DISEASES, 2011 (MILLION)</i> | 38 |
| <i>TABLE 17 GLOBAL MARKET FOR ORTHOBIOLOGICS AND TISSUE-ENGINEERED PRODUCTS, THROUGH 2016 (\$ MILLIONS)</i> | 39 |
| CURRENT TISSUE-ENGINEERED PRODUCTS FOR BONE DEFECTS..... | 40 |
| OVERVIEW OF BONE REPAIR ... (CONTINUED)..... | 41 |
| Additional Tissue-Engineered Products for Bone Repair | 42 |
| <i>TABLE 18 SALES OF SELECTED TISSUE-ENGINEERED PRODUCTS FOR BONE REPAIR (\$ MILLIONS)</i> | 43 |
| Geographical Distribution of Tissue Engineering Market for Bone Repair..... | 43 |
| <i>TABLE 19 GEOGRAPHICAL DISTRIBUTION OF TISSUE-ENGINEERED BONE REPAIR MARKET (%)</i> | 43 |
| SUMMARY OF MARKET VALUE FOR TISSUE-ENGINEERED PRODUCTS FOR BONE, CARTILAGE, AND OTHER CONNECTIVE TISSUE..... | 44 |
| <i>TABLE 20 GLOBAL MARKET FOR TISSUE ENGINEERING PRODUCTS FOR BONE, CARTILAGE AND OTHER CONNECTIVE TISSUES, THROUGH 2016 (\$ MILLIONS)</i> | 44 |
| CHAPTER SIX: TISSUE ENGINEERING MARKET FOR CVD..... | 45 |
| OVERVIEW..... | 45 |
| DIAGNOSTICS FOR CVD..... | 46 |
| TREATMENTS FOR CVD | 46 |
| Treatments for CVD (Continued)..... | 47 |

| | |
|--|-----------|
| TISSUE ENGINEERING PRODUCTS FOR CVD | 48 |
| Heart Valves and Tissue Engineering | 48 |
| Mechanical Heart Valves..... | 48 |
| Biological Heart Valves | 49 |
| <i>TABLE 21 GLOBAL HEART VALVE MARKET, THROUGH 2016 (\$</i> <i>MILLIONS)</i> | <i>50</i> |
| <i>TABLE 22 GEOGRAPHICAL DISTRIBUTION FOR HEART VALVE</i> <i>MARKET (%)</i> | <i>50</i> |
| Blood Vessels and Tissue Engineering | 51 |
| <i>TABLE 23 GLOBAL MARKET FOR VASCULAR SYNTHETIC GRAFTS,</i> <i>THROUGH 2016 (\$ MILLIONS)</i> | <i>52</i> |
| Myocardial Infarction as a Market for Tissue Engineering Product Development (Cell Grafting/Cell Therapy Sector) | 52 |
| Myocardial Infarction (Continued)..... | 53 |
| <i>TABLE 24 EXAMPLES OF COMPANIES DEVELOPING CELL</i> <i>THERAPIES FOR CVD</i> | <i>54</i> |
| SUMMARY OF TISSUE ENGINEERING MARKET FOR CARDIOVASCULAR CONDITIONS..... | 55 |
| <i>TABLE 25 GLOBAL MARKET FOR TISSUE-ENGINEERED</i> <i>PRODUCTS FOR CVD, THROUGH 2016 (\$ MILLIONS)</i> | <i>56</i> |
| CHAPTER SEVEN: TISSUE ENGINEERING FOR CENTRAL NERVOUS SYSTEM (CNS) DISEASES..... | |
| OVERVIEW | 57 |
| TISSUE ENGINEERING MARKET FOR SCI | 58 |
| <i>TABLE 26 STATISTICS FOR SCI WORLDWIDE, 2011</i> | <i>58</i> |
| SCI Treatments | 58 |
| Tissue Engineering for SCI | 59 |
| Cell Therapy for SCI..... | 59 |
| Scaffold Approach for SCI Treatment..... | 60 |
| Scaffold ... (Continued)..... | 61 |
| Tissue Engineering Market for Peripheral Nervous System | 62 |
| <i>TABLE 27 SALES OF NEURAL GRAFT PRODUCTS FROM INTEGRA</i> <i>LIFE SCIENCES, THROUGH 2016 (\$)</i> | <i>63</i> |
| Neurodegenerative Diseases as a Market for Tissue Engineering Product Development..... | 63 |
| <i>TABLE 28 STATISTICS FOR NEURODEGENERATIVE DISEASES</i> <i>WORLDWIDE, 2011</i> | <i>64</i> |
| <i>TABLE 29 GLOBAL MARKET FOR THERAPEUTICS FOR</i> <i>NEURODEGENERATIVE DISORDERS, THROUGH 2015 (\$</i> <i>MILLIONS)</i> | <i>65</i> |
| SUMMARY AND EVALUATION OF TISSUE ENGINEERING MARKET FOR CNS DISEASES..... | 65 |

| | |
|--|----|
| <i>TABLE 30 CURRENT GLOBAL MARKET FOR TISSUE-ENGINEERED PRODUCTS FOR CNS-RELATED INJURIES AND DISEASES, THROUGH 2016 (\$ MILLIONS)</i> | 66 |
| <i>TABLE 31 GEOGRAPHICAL DISTRIBUTION OF MARKET FOR TISSUE ENGINEERING PRODUCTS FOR CNS (%)</i> | 66 |
| <i>TABLE 32 SELECTED STEM CELL THERAPIES ENTERING CLINICAL TRIALS</i> | 67 |
| CHAPTER EIGHT: TISSUE ENGINEERING FOR INTERNAL ORGANS | 68 |
| OVERVIEW | 68 |
| <i>TABLE 33 GLOBAL MARKET FOR ORGAN AND TISSUE TRANSPLANTATION PRODUCTS, THROUGH 2016 (\$ MILLIONS)</i> | 68 |
| <i>TABLE 34 STATISTICS FOR DONORS AND TRANSPLANTATION IN THE U.S., 2008–2011</i> | 69 |
| <i>TABLE 35 AVERAGE FIRST-YEAR COSTS OF TRANSPLANT PROCEDURES IN THE U.S. (\$)</i> | 69 |
| MARKET POTENTIAL FOR TISSUE ENGINEERING IN ORGAN TRANSPLANTATION | 70 |
| <i>TABLE 36 MARKET FOR TISSUE ENGINEERING IN ORGAN TRANSPLANTATION FOR, THROUGH 2016 (\$ BILLIONS)</i> | 70 |
| CURRENT ADVANCES IN TISSUE-ENGINEERED PRODUCTS FOR ORGAN TRANSPLANTATION..... | 71 |
| Kidney as Tissue-Engineered Organ | 71 |
| <i>TABLE 37 U.S. STATISTICS FOR KIDNEY DISEASES, 2010</i> | 72 |
| Liver as Tissue-Engineered Organ | 73 |
| <i>TABLE 38 STATISTICS ASSOCIATED WITH LIVER FAILURE IN U.S., 2011</i> | 73 |
| <i>TABLE 39 EXAMPLES OF ARTIFICIAL LIVER SUPPORT SYSTEMS</i> | 74 |
| Liver as Tissue-... (Continued)..... | 75 |
| Pancreas as Tissue-Engineered Organ..... | 76 |
| <i>TABLE 40 STATISTICS FOR PANCREATIC CANCER AND DIABETES IN THE U.S., 2010</i> | 77 |
| <i>TABLE 41 GLOBAL MARKET FOR DIABETES MELLITUS, THROUGH 2016 (\$ BILLIONS)</i> | 77 |
| Pancreas as Tissue- ... (Continued) | 78 |
| EXAMPLES OF NEW, BREAKTHROUGH TECHNOLOGIES AND ADVANCEMENTS IN THE INTERNAL ORGAN ENGINEERING MARKET..... | 79 |
| Examples of New, Breakthrough | 80 |
| CHAPTER NINE: EMERGING SUBMARKETS IN TISSUE ENGINEERING INDUSTRY | 81 |
| OVERVIEW | 81 |
| <i>TABLE 42 GLOBAL MARKET FOR ANTI-AGING PRODUCTS AND SERVICES, THROUGH 2016 (\$ BILLIONS)</i> | 81 |

| | |
|---|----|
| <i>TABLE 43 GEOGRAPHICAL DISTRIBUTION OF ANTI-AGING MARKET (%)</i> | 82 |
| DENTAL TISSUE ENGINEERING AS EMERGING MARKET..... | 82 |
| <i>TABLE 44 GLOBAL MARKET FOR DENTAL IMPLANTS, THROUGH 2016 (\$ BILLIONS)</i> | 82 |
| Dental Tissue ... (Continued)..... | 83 |
| IMPLANTS AND BODY-SHAPING TISSUE ENGINEERING AS EMERGING MARKET | 84 |
| <i>TABLE 45 GLOBAL MARKET FOR COSMETIC PROCEDURES AND PRODUCTS, THROUGH 2016 (\$ BILLIONS)</i> | 85 |
| CHAPTER TEN: U.S. MARKET FOR TISSUE ENGINEERING AND REGENERATION | 86 |
| U.S. MARKET FOR SKIN TISSUE ENGINEERING PRODUCTS..... | 86 |
| <i>TABLE 46 CURRENT U.S. STATISTICS FOR SKIN DAMAGE CONDITIONS REQUIRING WOUND CARE, 2011</i> | 86 |
| <i>TABLE 47 MARKET FOR SKIN TISSUE-ENGINEERED PRODUCTS IN U.S., THROUGH 2016 (\$ MILLIONS)</i> | 87 |
| <i>TABLE 48 EXAMPLES OF U.S. COMPANIES SELLING OR DEVELOPING SKIN TISSUE-ENGINEERED PRODUCTS</i> | 88 |
| U.S. MARKET FOR CARTILAGE AND BONE TISSUE ENGINEERING PRODUCTS..... | 88 |
| <i>TABLE 49 STATISTICS FOR BONE DAMAGE AND RELATED DISEASES IN THE U.S. 2011</i> | 89 |
| <i>TABLE 50 U.S. MARKET FOR TISSUE-ENGINEERED PRODUCTS FOR CARTILAGE AND BONE REPAIR, THROUGH 2016 (\$ MILLIONS)</i> | 89 |
| <i>TABLE 51 EXAMPLES OF U.S. COMPANIES MARKETING OR DEVELOPING TISSUE-ENGINEERED PRODUCTS FOR CARTILAGE AND BONE REPAIR</i> | 90 |
| <i>TABLE 51 (CONTINUED)</i> | 91 |
| U.S. MARKET FOR TISSUE ENGINEERING PRODUCTS FOR CVD..... | 91 |
| <i>TABLE 52 STATISTICS FOR CVD IN U.S., 2010 AND 2011</i> | 91 |
| HEART VALVES..... | 92 |
| VASCULAR GRAFTS | 92 |
| CELL THERAPY..... | 92 |
| <i>TABLE 53 U.S. MARKET VALUE FOR TISSUE-ENGINEERED PRODUCTS FOR CVD, THROUGH 2016 (\$ MILLIONS)</i> | 93 |
| <i>TABLE 54 EXAMPLES OF U.S. COMPANIES IN TISSUE ENGINEERING MARKET FOR CVD</i> | 94 |
| U.S. MARKET FOR DEVELOPMENT OF TISSUE ENGINEERING PRODUCTS FOR CNS-RELATED INJURIES AND DISEASES..... | 94 |
| <i>TABLE 55 U.S. STATISTICS FOR DIFFERENT CNS MEDICAL CONDITIONS</i> | 95 |

| | |
|---|-----|
| <i>TABLE 56 U.S. MARKET FOR TISSUE-ENGINEERED PRODUCTS FOR CNS, THROUGH 2016 (\$ MILLIONS)</i> | 95 |
| <i>TABLE 57 EXAMPLES OF COMPANIES IN U.S. DEVELOPING TISSUE-ENGINEERED PRODUCTS FOR CNS DISEASES</i> | 96 |
| U.S. MARKET FOR TISSUE ENGINEERING FOR INTERNAL ORGANS | 96 |
| <i>TABLE 58 STATISTICS FOR ORGAN DONATIONS AND TRANSPLANTATIONS IN THE U.S., 2008–2011</i> | 96 |
| <i>TABLE 59 U.S. MARKET FOR TISSUE ENGINEERING IN ORGAN TRANSPLANTATION, 2009–2016 (\$ BILLIONS)</i> | 97 |
| <i>TABLE 60 NUMBER OF DIFFERENT ORGAN TRANSPLANTATIONS IN U.S., 2009</i> | 97 |
| <i>TABLE 61 STATISTICS ON MEDICAL CONDITIONS REQUIRING ORGAN TRANSPLANTATION IN THE U.S., 2010</i> | 98 |
| <i>TABLE 62 COMPANIES SELLING OR DEVELOPING PRODUCT FOR TISSUE ENGINEERING FOR INTERNAL ORGAN REPLACEMENT</i> | 99 |
| CHAPTER ELEVEN: EUROPEAN MARKET FOR TISSUE ENGINEERING AND REGENERATION | |
| EUROPEAN MARKET FOR SKIN TISSUE ENGINEERING PRODUCTS | 100 |
| <i>TABLE 63 CURRENT STATISTICS FOR SKIN DAMAGE CONDITIONS REQUIRING WOUND CARE IN EUROPE, 2011</i> | 100 |
| <i>TABLE 64 EUROPEAN MARKET FOR SKIN TISSUE-ENGINEERED PRODUCTS, THROUGH 2016 (\$ MILLIONS)</i> | 101 |
| <i>TABLE 65 EXAMPLES OF EUROPEAN COMPANIES SELLING OR DEVELOPING SKIN TISSUE-ENGINEERED PRODUCTS</i> | 102 |
| <i>TABLE 65 (CONTINUED)</i> | 103 |
| EUROPEAN MARKET FOR CARTILAGE AND BONE TISSUE ENGINEERING PRODUCTS..... | 103 |
| <i>TABLE 66 STATISTICS FOR BONE DAMAGE AND RELATED DISEASES IN DIFFERENT EUROPEAN COUNTRIES</i> | 103 |
| <i>TABLE 66 (CONTINUED)</i> | 104 |
| <i>TABLE 67 EUROPEAN MARKET FOR TISSUE ENGINEERING PRODUCTS FOR BONE AND CARTILAGE REPAIR, THROUGH 2016 (\$ MILLIONS)</i> | 104 |
| <i>TABLE 68 DISTRIBUTION OF MARKET FOR BONE AND CARTILAGE TISSUE-ENGINEERED PRODUCTS AMONG DIFFERENT COUNTRIES (%)</i> | 105 |
| <i>TABLE 69 EXAMPLES OF EUROPEAN COMPANIES MARKETING OR DEVELOPING TISSUE-ENGINEERED PRODUCTS FOR CARTILAGE AND BONE REPAIR</i> | 105 |
| <i>TABLE 69 (CONTINUED)</i> | 106 |
| EUROPEAN MARKET FOR TISSUE ENGINEERING PRODUCTS FOR CVD | 106 |

| | |
|---|---------|
| <i>TABLE 70 STATISTICS FOR CVD IN EUROPE, 2011</i> | 107 |
| <i>TABLE 71 RATE OF DEATH FROM HEART DISEASE IN DIFFERENT EUROPEAN COUNTRIES, 2011 (NO. OF DEATHS PER 100,000 CASES)</i> | 107 |
| EUROPEAN MARKET FOR...(CONTINUED) | 108 |
| <i>TABLE 72 MARKET VALUE FOR TISSUE-ENGINEERED PRODUCTS FOR CVD IN EUROPE, THROUGH 2016 (\$ MILLIONS)</i> | 109 |
| <i>TABLE 73 EXAMPLES OF COMPANIES MARKETING OR DEVELOPING TISSUE-ENGINEERED PRODUCTS FOR CVD IN EUROPE</i> | 110 |
| EUROPEAN MARKET FOR TISSUE-ENGINEERING PRODUCTS FOR CNS-RELATED INJURIES AND DISORDERS | 110 |
| <i>TABLE 74 STATISTICS FOR CNS DISORDERS AND INJURIES IN EUROPE, 2011</i> | 111 |
| <i>TABLE 75 STATISTICS FOR SCI AND PARKINSON'S DISEASE IN DIFFERENT EUROPEAN COUNTRIES, 2011</i> | 111 |
| <i>TABLE 76 CURRENT EUROPEAN MARKET FOR TISSUE-ENGINEERED PRODUCTS FOR CNS-RELATED INJURIES AND DISORDERS, THROUGH 2016 (\$ MILLIONS)</i> | 112 |
| <i>TABLE 77 EXAMPLES OF STEM CELL POLICIES IN DIFFERENT EUROPEAN COUNTRIES</i> | 112 |
| <i>TABLE 77 (CONTINUED)</i> | 113 |
| <i>TABLE 78 EXAMPLES OF COMPANIES IN EUROPE DEVELOPING PRODUCTS IN TISSUE ENGINEERING AND REGENERATION FOR CNS DISORDERS AND INJURIES</i> | 114 |
| EUROPEAN MARKET FOR TISSUE ENGINEERING FOR INTERNAL ORGANS | 114 |
| <i>TABLE 79 ORGAN DONATIONS STATISTICS FOR DIFFERENT EUROPEAN COUNTRIES, 2009</i> | 115 |
| <i>TABLE 80 ORGAN TRANSPLANTATION STATISTICS IN DIFFERENT EUROPEAN COUNTRIES, 2009</i> | 115 |
| <i>TABLE 81 EUROPEAN MARKET FOR TISSUE ENGINEERING IN ORGAN TRANSPLANTATION, THROUGH 2016 (\$ MILLIONS)</i> | 116 |
| <i>TABLE 82 PREVALENCE OF DIABETIC PATIENTS IN DIFFERENT EUROPEAN COUNTRIES, 2010</i> | 117 |
| <i>TABLE 83 EUROPEAN COMPANIES SELLING OR DEVELOPING PRODUCT FOR TISSUE ENGINEERING FOR INTERNAL ORGAN REPLACEMENT</i> | 117 |
| CHAPTER TWELVE: REST OF WORLD (ROW) MARKET FOR TISSUE ENGINEERING AND REGENERATION | 118 |
| REST OF WORLD (ROW) MARKET FOR SKIN TISSUE ENGINEERING PRODUCTS | 118 |
| <i>TABLE 84 GLOBAL STATISTICS FOR SKIN-RELATED MEDICAL CONDITIONS, 2011</i> | 119 |

| | |
|---|------------|
| <i>TABLE 85 ROW MARKET FOR SKIN TISSUE-ENGINEERED PRODUCTS, THROUGH 2016 (\$ MILLIONS).....</i> | <i>119</i> |
| <i>REST OF WORLD (ROW) MARKET...(CONTINUED)</i> | <i>120</i> |
| <i>ROW MARKET FOR CARTILAGE AND BONE TISSUE ENGINEERING PRODUCTS</i> | <i>121</i> |
| <i>TABLE 86 STATISTICS FOR BONE DAMAGE AND RELATED DISEASES IN DIFFERENT PARTS OF THE WORLD.....</i> | <i>122</i> |
| <i>TABLE 87 ROW MARKET FOR TISSUE ENGINEERING PRODUCTS FOR BONE AND CARTILAGE REPAIR, THROUGH 2016 (\$ MILLIONS).....</i> | <i>123</i> |
| <i>TABLE 88 EXAMPLES OF COMPANIES MARKETING OR DEVELOPING TISSUE-ENGINEERED PRODUCTS FOR CARTILAGE AND BONE REPAIR IN DIFFERENT REGIONS OF THE WORLD.....</i> | <i>123</i> |
| <i>ROW MARKET FOR TISSUE ENGINEERING PRODUCTS FOR CVD</i> | <i>123</i> |
| <i>TABLE 89 STATISTICS FOR CVD IN DIFFERENT REGIONS OF THE WORLD, 2011.....</i> | <i>124</i> |
| <i>TABLE 90 ROW MARKET VALUE FOR TISSUE-ENGINEERED PRODUCTS FOR CVD, THROUGH 2016 (\$ MILLIONS).....</i> | <i>125</i> |
| <i>TABLE 91 EXAMPLES OF COMPANIES THAT MANUFACTURE/DEVELOP TISSUE-ENGINEERED PRODUCTS FOR CVD IN DIFFERENT COUNTRIES IN ROW</i> | <i>126</i> |
| <i>ROW MARKET FOR TISSUE ENGINEERING PRODUCTS FOR CNS-RELATED INJURIES AND DISEASES</i> | <i>126</i> |
| <i>TABLE 92 STATISTICS FOR CNS DISORDERS AND INJURIES WORLDWIDE, 2011.....</i> | <i>126</i> |
| <i>TABLE 93 CURRENT ROW MARKET FOR TISSUE-ENGINEERED PRODUCTS FOR CNS RELATED INJURIES AND DISEASES, THROUGH 2016 (\$U.S., MILLIONS)</i> | <i>127</i> |
| <i>TABLE 94 EXAMPLES OF STEM CELL POLICIES IN DIFFERENT COUNTIES IN ROW</i> | <i>128</i> |
| <i>TABLE 94 (CONTINUED).....</i> | <i>129</i> |
| <i>TABLE 95 EXAMPLES OF ROW COMPANIES DEVELOPING PRODUCTS IN TISSUE ENGINEERING AND REGENERATION FOR CNS DISORDERS AND INJURIES.....</i> | <i>129</i> |
| <i>ROW MARKET FOR TISSUE ENGINEERING FOR INTERNAL ORGANS</i> | <i>130</i> |
| <i>TABLE 96 ORGAN DONATIONS STATISTICS FOR DIFFERENT COUNTRIES IN ROW, 2009.....</i> | <i>130</i> |
| <i>TABLE 97 ORGAN TRANSPLANTATION STATISTICS FOR DIFFERENT COUNTRIES IN ROW, 2009.....</i> | <i>130</i> |
| <i>TABLE 98 ROW MARKET FOR TISSUE ENGINEERING BASED ON ORGAN TRANSPLANTATIONS, THROUGH 2016 (\$ BILLIONS).....</i> | <i>131</i> |

| | |
|---|-----|
| <i>TABLE 99 PREVALENCE OF DIABETIC PATIENTS IN DIFFERENT COUNTRIES, 2010</i> | 131 |
| <i>TABLE 100 COMPANIES DEVELOPING TISSUE ENGINEERING PRODUCTS FOR INTERNAL ORGAN REPLACEMENT</i> | 132 |
| CHAPTER THIRTEEN: SUMMARY OF GLOBAL MARKET FOR TISSUE ENGINEERING AND REGENERATION | 133 |
| SUMMARY OF GLOBAL MARKET..... | 133 |
| <i>TABLE 101 GLOBAL MARKET FOR TISSUE ENGINEERING AND REGENERATION PRODUCTS, THROUGH 2016 (\$ MILLIONS)</i> | 134 |
| <i>FIGURE 1 GLOBAL MARKET FOR TISSUE ENGINEERING AND REGENERATION PRODUCTS, 2009–2016 (\$ MILLIONS)</i> | 134 |
| <i>TABLE 102 EXAMPLES OF MAIN MARKET PARTICIPANTS IN THE TISSUE ENGINEERING INDUSTRY</i> | 135 |
| <i>TABLE 102 (CONTINUED)</i> | 136 |
| <i>TABLE 102 (CONTINUED)</i> | 137 |
| <i>TABLE 102 (CONTINUED)</i> | 138 |
| <i>TABLE 102 (CONTINUED)</i> | 139 |
| <i>TABLE 102 (CONTINUED)</i> | 140 |
| SUMMARY OF U.S. MARKET IN TISSUE ENGINEERING AND REGENERATION | 140 |
| <i>TABLE 103 U.S. MARKET FOR TISSUE ENGINEERING AND REGENERATION PRODUCTS, THROUGH 2016 (\$ MILLIONS)</i> | 141 |
| <i>FIGURE 2 U.S. MARKET FOR TISSUE ENGINEERING AND REGENERATION PRODUCTS, 2009–2016 (\$ MILLIONS)</i> | 141 |
| SUMMARY OF EUROPEAN MARKET IN TISSUE ENGINEERING AND REGENERATION | 142 |
| <i>TABLE 104 EUROPEAN MARKET FOR TISSUE ENGINEERING AND REGENERATION PRODUCTS, THROUGH 2016 (\$ MILLIONS)</i> | 142 |
| <i>FIGURE 3 EUROPEAN MARKET FOR TISSUE ENGINEERING AND REGENERATION PRODUCTS, 2009–2016 (\$ MILLIONS)</i> | 143 |
| <i>TABLE 105 PERCENTAGE OF VENTURES IN TISSUE ENGINEERING PRODUCT DEVELOPMENT IN DIFFERENT EUROPEAN COUNTRIES</i> | 144 |
| SUMMARY OF ROW MARKET IN TISSUE ENGINEERING AND REGENERATION | 144 |
| <i>TABLE 106 ROW MARKET FOR TISSUE ENGINEERING AND REGENERATION PRODUCTS, THROUGH 2016 (\$ MILLIONS)</i> | 145 |
| <i>FIGURE 4 ROW MARKET FOR TISSUE ENGINEERING AND REGENERATION PRODUCTS, 2009–2016 (\$ MILLIONS)</i> | 146 |
| CHAPTER FOURTEEN: OVERVIEW OF SELECTED COMPANIES | 147 |
| ADVANCED BIOHEALING (A SHIRE PHARMACEUTICAL COMPANY)..... | 147 |
| CO.DON AG | 148 |

| | |
|---|-----|
| GENZYME CORP. (A SANOFI-AVENTIS COMPANY)..... | 149 |
| MEDTRONIC | 150 |
| MEDTRONIC (CONTINUED)..... | 151 |
| RENEURON GROUP | 152 |
| STRYKER CORP. | 153 |
| STRYKER CORP. (CONTINUED)..... | 154 |

CHAPTER FIFTEEN: LIST OF THE COMPANIES MENTIONED IN

| | |
|---|-----|
| REPORT | 155 |
| 3DM | 155 |
| AAP IMPLANTANTE AG..... | 155 |
| AASTROM BIOSCIENCES, INC..... | 155 |
| ACORDA THERAPEUTICS, INC..... | 156 |
| ADVANCED CELL TECHNOLOGY, INC..... | 156 |
| ADVANCED MEDICAL SOLUTIONS GROUP, PLC | 157 |
| ALDAGEN, INC..... | 157 |
| ALLERGAN, INC..... | 158 |
| APERION BIOLOGICS | 158 |
| ARTHRO-KINETICS..... | 159 |
| ARTERIOCYTE | 159 |
| AVITA MEDICAL | 160 |
| BAXTER HEALTHCARE CORP..... | 160 |
| BEFUTUR BIOTECHNOLOGIES | 161 |
| BETA-CELL NV..... | 161 |
| BETA-O2 TECHNOLOGIES LTD | 162 |
| BIO NOVA INTERNATIONAL PTY., LTD..... | 162 |
| BIOCOMPOSITES, LTD. | 163 |
| BIOCORAL, INC..... | 163 |
| BIOFISICA, INC..... | 163 |
| BIOHEART, INC..... | 164 |
| BIOMET, INC. | 164 |
| BIOTIME, INC..... | 164 |
| BIOTISSUE TECHNOLOGIES GMBH..... | 165 |
| BONALIVE BIOMATERIALS, LTD. | 165 |
| BOSTON SCIENTIFIC CORP. | 166 |
| B. BRAUN MEDICAL, INC..... | 166 |
| BREONICS, INC..... | 166 |
| CAPRICOR, INC..... | 167 |
| CARDIUM THERAPEUTICS, INC..... | 167 |
| CELLERIX SA..... | 168 |
| CELLSEED, INC. | 168 |
| CELLULAR DYNAMICS INTERNATIONAL..... | 169 |
| CERAPEDICS, INC. | 169 |
| CERCO MEDICAL, LLC | 169 |
| COOK GROUP, INC..... | 170 |

| | |
|--|-----|
| C.R. BARD, INC..... | 170 |
| CRYOLIFE, INC. | 170 |
| CYTOGRAFT TISSUE ENGINEERING, INC. | 171 |
| CYTONET GMBH & CO. KG..... | 171 |
| CYTORI THERAPEUTICS, INC..... | 172 |
| CURASAN AG..... | 172 |
| DEGRADABLE SOLUTIONS AG..... | 173 |
| DEVELOGEN AG | 173 |
| EXACTECH, INC..... | 173 |
| EXCORP MEDICAL | 174 |
| FIBROGEN, INC. | 174 |
| FIDIA ADVANCED BIOPOLYMERS/FIDIA FARMACEUTICI SPA | 175 |
| FORTICELL BIOSCIENCE, INC. | 175 |
| GAMIDA CELL, LTD. | 176 |
| GERON CORP. | 176 |
| GLYCOTEX, INC..... | 177 |
| HEPALIFE TECHNOLOGIES/AQUAMED TECHNOLOGIES, INC./ALLIQUA, INC. | 177 |
| HISTOCELL TISSUE ENGINEERING | 178 |
| HUMACYTE, INC..... | 178 |
| HYBRID ORGAN GMBH | 179 |
| INCYTU, INC..... | 179 |
| INION OY..... | 180 |
| INNOVACELL BIOTECHNOLOGIE AG..... | 180 |
| INTEGRA LIFE SCIENCES | 181 |
| INTERCYTEX..... | 181 |
| KENSEY NASH CORP..... | 182 |
| KERECIS..... | 182 |
| KINETIC CONCEPTS, INC..... | 183 |
| KUROS BIOSURGERY AG..... | 183 |
| LABORATORIES GENEVRIER | 184 |
| LIFECELL CORP. | 184 |
| MAXCYTE INC..... | 184 |
| MESOBLAST LTD..... | 185 |
| NELLONE THERAPEUTICS, INC. | 185 |
| NEURALSTEM..... | 186 |
| NEUROGENERATION | 186 |
| ORGANOGENESIS, INC. | 187 |
| ORGANOVO, INC..... | 187 |
| OSIRIS THERAPEUTICS, INC. | 188 |
| PIONEER SURGICAL TECHNOLOGY..... | 188 |
| PLURISTEM THERAPEUTICS, INC..... | 189 |
| POLYGANICS..... | 189 |
| PRONEURON BIOTECHNOLOGIES, INC..... | 190 |

| | |
|---|-----|
| Q-MED..... | 190 |
| REINNERVATE..... | 191 |
| RENOVO | 191 |
| REVIVICOR, INC. | 192 |
| RTI BIOLOGICS..... | 192 |
| SERNOVA CORP..... | 193 |
| SKINETHIC LABORATORIES..... | 194 |
| SMITH & NEPHEW | 194 |
| STRAUMANN HOLDINGS/INSTITUT STRAUMANN AG..... | 195 |
| SYNOVIS LIFE TECHNOLOGIES, INC. | 195 |
| TEI BIOSCIENCES, INC. | 195 |
| TENGION, INC..... | 196 |
| TEPHA, INC..... | 196 |
| TETEC TISSUE ENGINEERING TECHNOLOGIES AG..... | 197 |
| TIGENIX NV | 197 |
| TISSUEMED..... | 198 |
| VIACYTE..... | 198 |
| VITAL THERAPIES, INC. | 199 |
| VITROLIFE..... | 199 |
| ZIMMER, INC..... | 200 |