**Text

Description automatically generated**

**TABLE OF CONTENTS**

[1. REPORT OVERVIEW 12](#_Toc74691090)

[1.1 Statement of the Report 12](#_Toc74691091)

[1.2 Executive Summary 15](#_Toc74691092)

[1.3 INTRODUCTION 16](#_Toc74691093)

[1.3.1 Cord Blood: An Alternative Source for HPSCs 17](#_Toc74691094)

[1.3.2 Utilization of Cord Blood Cells in Clinical Trials 17](#_Toc74691095)

[1.3.3 The Struggle of Cord Blood Banks 17](#_Toc74691096)

[1.3.4 Emerging Technologies to Influence the Financial Sustainability of Banks 18](#_Toc74691097)

[1.3.4.1 Other Opportunities to Improve Financial Stability 19](#_Toc74691098)

[1.3.4.2 Scope for Companion Products 20](#_Toc74691099)

[1.3.5 Changing Landscape of Cord Blood Cell Banking Market by Geography 20](#_Toc74691100)

[1.3.6 Extension of Services by Cord Blood Banks 21](#_Toc74691101)

[1.4 Cord Blood Industry: As of Today 22](#_Toc74691102)

[1.4.1 Diversification of Services 22](#_Toc74691103)

[1.4.2 Pairing with Genetic Testing Services 23](#_Toc74691104)

[1.4.3 Pairing with Fertility and Assisted Reproduction Services 23](#_Toc74691105)

[1.4.4 Cord Blood Industry Consolidation 24](#_Toc74691106)

[1.4.5 Cord Blood Banks as Integrated Therapeutic Companies 25](#_Toc74691107)

[2. CORD BLOOD & CORD BLOOD BANKING: AN OVERVIEW 26](#_Toc74691108)

[2.1 Cord Blood Banking (Stem Cell Banking) 27](#_Toc74691109)

[2.1.1 Public Cord Blood Banks 27](#_Toc74691110)

[2.1.1.1 Economic Model of Public Cord Blood Banks 28](#_Toc74691111)

[2.1.1.2 Cost Analysis for Public Banks 30](#_Toc74691112)

[2.1.1.3 Relationship between Costs and Release Rates 30](#_Toc74691113)

[2.1.2 Private Cord Blood Banks 31](#_Toc74691114)

[2.1.2.1 Cost Analysis for Private Cord Blood Banks 31](#_Toc74691115)

[2.1.2.2 Economic Model of Private Banks 32](#_Toc74691116)

[2.1.3 Hybrid Cord Blood Banks 33](#_Toc74691117)

[2.2 Global Private Cord Blood Banking: Market Leaders 33](#_Toc74691118)

[2.2.1 Comparing Cord Blood Banks 36](#_Toc74691119)

[2.2.2 Cord Blood Banks in the U.S. 37](#_Toc74691120)

[2.2.3 Proportion of Public, Private and Hybrid Banks in U.S. 40](#_Toc74691121)

[2.3 Percent Share of Parents of Newborns Storing Cord Blood by Country/Region 40](#_Toc74691122)

[2.4 Pricing for Processing and Storage in Commercial Banks 41](#_Toc74691123)

[2.4.1 Rate per Cord Blood Unit in the U.S. and Europe 42](#_Toc74691124)

[2.5 Cord Blood Revenues for Major Cord Blood Banks 43](#_Toc74691125)

[3. CORD BLOOD BANK ACCREDITATIONS 45](#_Toc74691126)

[3.1 American Association of Blood Banks (AABB) 45](#_Toc74691127)

[3.2 Foundation for the Accreditation of Cellular Therapy (FACT) 45](#_Toc74691128)

[3.3 FDA Registration 45](#_Toc74691129)

[3.4 FDA Biologics License Application (BLA) License 46](#_Toc74691130)

[3.5 Investigational New Drug (IND) for Cord Blood 46](#_Toc74691131)

[3.6 Human Tissue Authority (HTA) 46](#_Toc74691132)

[3.7 Therapeutic Goods Act (TGA) in Australia 46](#_Toc74691133)

[3.8 International NetCord Foundation 47](#_Toc74691134)

[3.9 AABB Accredited Cord Blood Facilities 47](#_Toc74691135)

[3.10 FACT Accreditation for Cord Blood Banks 50](#_Toc74691136)

[4. APPLICATIONS OF CORD BLOOD CELLS 51](#_Toc74691137)

[4.1 Hematopoietic Stem Cell Transplantations with Cord Blood Cells 51](#_Toc74691138)

[4.2 Umbilical Cord Cells in Regenerative Medicine 53](#_Toc74691139)

[5. CORD BLOOD PROCESSING TECHNOLOGIES 55](#_Toc74691140)

[5.1 The Process of Separation 55](#_Toc74691141)

[5.1.1 PrepaCyte-CB 56](#_Toc74691142)

[5.1.2 Advantages of PrepaCyte-CB 57](#_Toc74691143)

[5.1.3 Treatment Outcomes with PrepaCyte-CB 57](#_Toc74691144)

[5.1.4 Hetastarch (HES) 58](#_Toc74691145)

[5.1.5 AutoXpress (AXP) 58](#_Toc74691146)

[5.1.6 SEPAX 59](#_Toc74691147)

[5.1.7 Plasma Depletion Method (MaxCell Process) 60](#_Toc74691148)

[5.1.8 Density Gradient Method 60](#_Toc74691149)

[5.2 Comparative Merits of Different Processing Methods 61](#_Toc74691150)

[5.2.1 Early Stage HSC Recovery by Technologies 62](#_Toc74691151)

[5.2.2 Mid Stage HSC (CD34+/CD133+) Recovery from Cord Blood 63](#_Toc74691152)

[5.2.3 Late Stage Recovery of HSCs from Cord Blood 64](#_Toc74691153)

[5.3 HSC (CD45+) Recovery 64](#_Toc74691154)

[5.4 Days to Neutrophil Engraftment by Technology 65](#_Toc74691155)

[5.5 Anticoagulants used in Cord Blood Processing 66](#_Toc74691156)

[5.5.1 Type of Anticoagulant and Cell Recovery Volume 67](#_Toc74691157)

[5.5.2 Percent Cell Recovery by Sample Size 68](#_Toc74691158)

[5.5.3 TNC Viability by Time Taken for Transport and Type of Anticoagulant 69](#_Toc74691159)

[5.6 Cryopreservation of Cord Blood Cells 70](#_Toc74691160)

[5.7 Bioprocessing of Umbilical Cord Tissue (UCT) 72](#_Toc74691161)

[5.8 A Proposal to Improve the Utilization Rate of Banked Cord Blood 73](#_Toc74691162)

[6. CORD BLOOD CLINICAL TRIALS, SCIENTIFIC PUBLICATIONS & NIH FUNDING 76](#_Toc74691163)

[6.1 Cord Blood Cells for Research 76](#_Toc74691164)

[6.2 Cord Blood Cells for Clinical Trials 77](#_Toc74691165)

[6.2.1 Number of Clinical Trials involving Cord Blood Cells 78](#_Toc74691166)

[6.2.2 Number of Clinical Trials using Cord Blood Cells by Geography 79](#_Toc74691167)

[6.2.3 Number of Clinical Trials by Study Type 80](#_Toc74691168)

[6.2.4 Number of Clinical Trials by Study Phase 81](#_Toc74691169)

[6.2.5 Number of Clinical Trials by Funder Type 82](#_Toc74691170)

[6.2.6 Clinical Trials Addressing Indications in Children 83](#_Toc74691171)

[6.2.7 Select Three Clinical Trials Involving Children 84](#_Toc74691172)

[6.2.7.1 Sensorineural Hearing Loss (NCT02038972) 85](#_Toc74691173)

[6.2.7.2 Autism Spectrum (NCT02847182) 85](#_Toc74691174)

[6.2.7.3 Cerebral Palsy (NCT01147653) 85](#_Toc74691175)

[6.2.8 Clinical Trials for Neurological Diseases using Cord Blood and Cord Tissue 86](#_Toc74691176)

[6.2.9 UCB for Diabetes 87](#_Toc74691177)

[6.2.10 UCB in Cardiovascular Clinical Trials 88](#_Toc74691178)

[6.2.11 Cord Blood Cells for Auto-Immune Diseases in Clinical Trials 88](#_Toc74691179)

[6.2.12 Cord Tissue Cells for Orthopedic Disorders in Clinical Trials 89](#_Toc74691180)

[6.2.13 Cord Blood Cells for Other Indications in Clinical Trials 90](#_Toc74691181)

[6.3 Major Diseases Addressed by Cord Blood Cells in Clinical Trials 91](#_Toc74691182)

[6.4 Clinical Trials using Cord Tissue-Derived MSCs 91](#_Toc74691183)

[6.5 Ongoing Clinical Trials using Cord Tissue 93](#_Toc74691184)

[6.5.1 Cord Tissue-Based Clinical Trials by Geography 93](#_Toc74691185)

[6.5.2 Cord Tissue-Based Clinical Trials by Phase 94](#_Toc74691186)

[6.5.3 Cord Tissue-Based Clinical Trials by Sponsor Types 95](#_Toc74691187)

[6.5.4 Companies Sponsoring Trials using Cord Tissue-Derived MSCs 96](#_Toc74691188)

[6.6 Wharton’s Jelly-Derived MSCs in Clinical Trials 97](#_Toc74691189)

[6.6.1 Wharton’s Jelly-Based Clinical Trials by Phase 97](#_Toc74691190)

[6.6.2 Companies Sponsoring Wharton’s Jelly-Based Clinical Trials 98](#_Toc74691191)

[6.7 Clinical Trials Involving Cord Blood Expansion Studies 99](#_Toc74691192)

[6.7.1 Safe and Feasible Expansion Protocols 99](#_Toc74691193)

[6.7.2 List of Clinical Trials involved in the Expansion of Cord Blood HSCs 100](#_Toc74691194)

[6.7.3 Expansion Technologies 105](#_Toc74691195)

[6.8 Scientific Publications on Cord Blood 107](#_Toc74691196)

[6.9 Scientific Publications on Cord Tissue 108](#_Toc74691197)

[6.10 Scientific Publications on Wharton’s Jelly-Derived MSCs 109](#_Toc74691198)

[6.11 Published Scientific Papers on Cord Blood Cell Expansion 110](#_Toc74691199)

[6.12 NIH Funding for Cord Blood Research 111](#_Toc74691200)

[7. PARENT’S AWARENESS AND ATTITUDE TOWARDS CORD BLOOD BANKING 112](#_Toc74691201)

[7.1 Undecided Expectant Parents 112](#_Toc74691202)

[7.2 The Familiar Cord Blood Banks Known by the Expectant Parents 113](#_Toc74691203)

[7.3 Factors Influencing the Choice of a Cord Blood Bank 114](#_Toc74691204)

[8. CORD BLOOD: AS A TRANSPLANTATION MEDICINE 115](#_Toc74691205)

[8.1 Comparisons of Cord Blood to other Allograft Sources 116](#_Toc74691206)

[8.1.1 Major Indications for HCTs in the U.S. 117](#_Toc74691207)

[8.1.2 Trend in Allogeneic HCT in the U.S. by Recipient Age 118](#_Toc74691208)

[8.1.3 Trends in Autologous HCT in the U.S. by Recipient Age 119](#_Toc74691209)

[8.2 HCTs by Cell Source in Adult Patients 120](#_Toc74691210)

[8.2.1 Transplants by Cell Source in Pediatric Patients 121](#_Toc74691211)

[8.3 Allogeneic HCTs by Cell Source 122](#_Toc74691212)

[8.3.1 Unrelated Donor Allogeneic HCTs in Patients <18 Years 123](#_Toc74691213)

[8.4 Likelihood of Finding an Unrelated Cord Blood Unit by Ethnicity 124](#_Toc74691214)

[8.4.1 Likelihood of Finding an Unrelated Cord Blood Unit for Patients <20 Years 125](#_Toc74691215)

[8.5 Odds of using a Baby’s Cord Blood 126](#_Toc74691216)

[8.6 Cord Blood Utilization Trends 127](#_Toc74691217)

[8.7 Number of Cord Blood Donors Worldwide 128](#_Toc74691218)

[8.7.1 Number of CBUs Stored Worldwide 129](#_Toc74691219)

[8.7.2 Number of CBUs, PBSCs and BMCs Shipped 131](#_Toc74691220)

[8.7.3 Cord Blood Donors by Geography 133](#_Toc74691221)

[8.7.3.1 Public Cord Blood Units Stored in Different Geographies 134](#_Toc74691222)

[8.7.3.2 Number of Donors by HLA Typing 135](#_Toc74691223)

[8.7.4 Searches Made by Transplant Patients for Donors/CBUs 136](#_Toc74691224)

[8.7.5 Types of CBU Shipments (Single/Double/Multi) 137](#_Toc74691225)

[8.7.6 TNC Count of CBUs Shipped for Children and Adult Patients 138](#_Toc74691226)

[8.7.7 Shipment of Multiple CBUs 139](#_Toc74691227)

[8.7.8 Percent Supply of CBUs for National and International Patients 140](#_Toc74691228)

[8.7.9 Decreasing Number of CBU Utilization 141](#_Toc74691229)

[8.8 Top Ten Countries in Cord Blood Donation 142](#_Toc74691230)

[8.8.1 HLA Typed CBUs by Continent 143](#_Toc74691231)

[8.8.2 Percentage TNC of Banked CBUs 144](#_Toc74691232)

[8.8.3 Total Number of CBUs, HLA-Typed Units by Country 145](#_Toc74691233)

[8.9 Cord Blood Export/Import by E.U. Member States 152](#_Toc74691234)

[8.9.1 Number of Donors and CBUs in Europe 153](#_Toc74691235)

[8.9.2 Number of Exports/Imports of CBUs in E.U. 154](#_Toc74691236)

[8.10 Global Exchange of Cord Blood Units 155](#_Toc74691237)

[9. CORD BLOOD CELLS AS THERAPEUTIC CELL PRODUCTS IN CELL THERAPY 158](#_Toc74691238)

[9.1 MSCs from Cord Blood and Cord Tissue 158](#_Toc74691239)

[9.1.1 Potential Neurological Applications of Cord Blood-Derived Cells 159](#_Toc74691240)

[9.1.2 Cord Tissue-Derived MSCs for Therapeutic use 161](#_Toc74691241)

[9.1.2.1 Indications Targeted by UCT-MSCs in Clinical Trials 162](#_Toc74691242)

[9.2 Current Consumption of Cord Blood Units by Clinical Trials 162](#_Toc74691243)

[9.3 Leading Cord Blood Stem Cell Treatments in Clinical Trials 164](#_Toc74691244)

[9.3.1 Acquired Hearing Loss (NCT02038972) 164](#_Toc74691246)

[9.3.2 Autism (NCT02847182) 165](#_Toc74691247)

[9.3.3 Cerebral Palsy (NCT03087110) 165](#_Toc74691248)

[9.3.4 Hypoplastic Left Heart Syndrome (NCT01856049) 165](#_Toc74691249)

[9.3.5 Type 1 Diabetes (NCT00989547) 166](#_Toc74691250)

[9.3.6 Psoriasis (NCT03765957) 166](#_Toc74691251)

[9.3.7 Parkinson’s Disease (NCT03550183) 166](#_Toc74691252)

[9.3.8 Signs of Aging (NCT04174898) 167](#_Toc74691253)

[9.3.9 Stroke (NCT02433509) 167](#_Toc74691254)

[9.3.10 Traumatic Brain Injury (NCT01451528) 167](#_Toc74691255)

[10. MARKET ANALYSIS 168](#_Toc74691256)

[10.1 Public vs. Private Cord Blood Banking Market 170](#_Toc74691257)

[10.2 Cord Blood Banking Market by Indication 171](#_Toc74691258)

[11. PROFILES OF SELECT CORD BLOOD BANKS 173](#_Toc74691259)

[11.1 AllCells 173](#_Toc74691260)

[11.1.1 Whole Blood 173](#_Toc74691261)

[11.1.2 Leukopak 174](#_Toc74691262)

[11.1.3 Mobilized Leukopak 174](#_Toc74691263)

[11.1.4 Bone Marrow 174](#_Toc74691264)

[11.1.5 Cord Blood 175](#_Toc74691265)

[11.2 AlphaCord LLC 175](#_Toc74691266)

[11.2.1 NextGen Collection System 175](#_Toc74691267)

[11.3 Americord Registry, Inc. 176](#_Toc74691268)

[11.3.1 Cord Blood 2.0 176](#_Toc74691269)

[11.3.2 Cord Tissue 176](#_Toc74691270)

[11.3.3 Placental Tissue 2.0 177](#_Toc74691271)

[11.4 Be The Match 178](#_Toc74691272)

[11.4.1 Hub of Transplant Network 181](#_Toc74691273)

[11.4.2 Partners of Be The Match 181](#_Toc74691274)

[11.4.3 Allogeneic Cell Sources in Be The Match Registry 182](#_Toc74691275)

[11.4.4 Likelihood of a Matched Donor on Be The Match by Ethnic Background 183](#_Toc74691276)

[11.5 Biocell Center Corporation 186](#_Toc74691277)

[11.5.1 Chorionic villi after Delivery 186](#_Toc74691278)

[11.5.2 Amniotic Fluid and Chorionic Villi during Pregnancy 186](#_Toc74691279)

[11.6 BioEden Group, Inc. 187](#_Toc74691280)

[11.6.1 Differences between Tooth Cells and Umbilical Cord Cells 187](#_Toc74691281)

[11.7 Biovault Family 188](#_Toc74691282)

[11.7.1 Personalized Cord Blood Processing 188](#_Toc74691283)

[11.8 Cell Care 189](#_Toc74691284)

[11.9 Cells4Life Group, LLP 190](#_Toc74691285)

[11.9.1 Cells4Life’s pricing 190](#_Toc74691286)

[11.9.2 TotiCyte Technology 191](#_Toc74691287)

[11.9.3 Cord Blood Releases 191](#_Toc74691288)

[11.10 Cell-Save 192](#_Toc74691289)

[11.11 Center for International Blood and Marrow Transplant Research (CIBMTR) 193](#_Toc74691290)

[11.11.1 Global Collaboration 193](#_Toc74691291)

[11.11.2 Scientific Working Committees 193](#_Toc74691292)

[11.11.3 Medicare Clinical Trials and Studies 194](#_Toc74691293)

[11.11.4 Cellular Therapy 194](#_Toc74691294)

[11.12 Cord Blood Center Group 198](#_Toc74691295)

[11.12.1 Cord Blood Units Released 198](#_Toc74691296)

[11.13 Cordlife Group, Ltd. 201](#_Toc74691297)

[11.13.1 Cordlife’s Cord Blood Release Track Record 201](#_Toc74691298)

[11.14 Core23 Biobank 204](#_Toc74691299)

[11.15 Cord Blood Registry (CBR) 205](#_Toc74691300)

[11.16 Cordlife Group, Ltd. 207](#_Toc74691301)

[11.17 CordVida 208](#_Toc74691302)

[11.18 Crioestaminal 209](#_Toc74691303)

[11.18.1 Cord Blood Transplantation in Portugal 209](#_Toc74691304)

[11.19 Cryo-Cell International, Inc. 210](#_Toc74691305)

[11.19.1 Processing Method 210](#_Toc74691306)

[11.19.2 Financial Results of the Company 210](#_Toc74691307)

[11.19.3 Cryo-Cell International’s Pricing 212](#_Toc74691308)

[11.20 CryoHoldco 213](#_Toc74691309)

[11.21 Cryoviva Biotech Pvt. Ltd 214](#_Toc74691310)

[11.22 European Society for Blood and Bone Marrow Transplantation (EBMT) 214](#_Toc74691311)

[11.22.1 EBMT Transplant Activity 215](#_Toc74691312)

[11.23 FamiCord Group 216](#_Toc74691313)

[11.24 GeneCell International 217](#_Toc74691314)

[11.25 Global Cord Blood Corporation (GCBC) 218](#_Toc74691315)

[11.25.1 The Company’s Business 218](#_Toc74691316)

[11.26 HealthBaby Hong Kong 220](#_Toc74691317)

[11.26.1 BioArchive System Service Plan 220](#_Toc74691318)

[11.26.2 MVE Liquid Nitrogen System 220](#_Toc74691319)

[11.27 HEMAFUND 221](#_Toc74691320)

[11.28 Insception Lifebank 221](#_Toc74691321)

[11.29 LifebankUSA 222](#_Toc74691322)

[11.29.1 Placental Banking 222](#_Toc74691323)

[11.30 LifeCell International Pvt. Ltd. 223](#_Toc74691324)

[11.31 MiracleCord, Inc. 224](#_Toc74691325)

[11.32 Maze Cord Blood Laboratories 225](#_Toc74691326)

[11.33 New England Cord Blood Bank, Inc. 226](#_Toc74691327)

[11.34 New York Cord Blood Center (NYBC) 227](#_Toc74691328)

[11.34.1 Products 227](#_Toc74691329)

[11.34.2 Laboratory Services 227](#_Toc74691330)

[11.35 PacifiCord 229](#_Toc74691331)

[11.35.1 FDA-Approved Sterile Collection Bags 229](#_Toc74691332)

[11.35.2 AXP Processing System 229](#_Toc74691333)

[11.35.3 BioArchive System 229](#_Toc74691334)

[11.36 ReeLabs Pvt. Ltd. 230](#_Toc74691335)

[11.37 Smart Cells International, Ltd. 231](#_Toc74691336)

[11.38 Stem Cell Cryobank 232](#_Toc74691337)

[11.39 StemCyte, Inc. 233](#_Toc74691338)

[11.39.1 StemCyte Sponsored Clinical Trials 233](#_Toc74691339)

[11.39.1.1 Spinal Cord Injury Phase II 233](#_Toc74691340)

[11.39.1.2 Other Trials 233](#_Toc74691341)

[11.40 Transcell Biolife 234](#_Toc74691342)

[11.40.1 ScellCare 234](#_Toc74691343)

[11.40.2 ToothScell 234](#_Toc74691344)

[11.41 ViaCord 235](#_Toc74691345)

[11.42 Vita 34 AG 236](#_Toc74691346)

[11.43 World Marrow Donor Association (WMDA) 237](#_Toc74691347)

[11.43.1 Search & Match Service 237](#_Toc74691348)

[11.44 Worldwide Network for Blood & Marrow Transplantation (WBMT) 239](#_Toc74691349)

**INDEX OF FIGURES**

[FIGURE 2.1: Profit Margins of Select Private Cord Blood Banks, 2017-2020 32](#_Toc74691442)

[FIGURE 2.2: U.S. Cord Blood Banks by Size of Inventory 36](#_Toc74691443)

[FIGURE 2.3: Proportion of Public, Private and Hybrid Banks in U.S. 40](#_Toc74691444)

[FIGURE 2.4: Percent Share of Parents of Newborns Storing Cord Blood by Country/Region 41](#_Toc74691445)

[FIGURE 2.5: Cord Blood Revenues for Companies, 2017-2020 44](#_Toc74691446)

[FIGURE 3.1: Percent Share of AABB Accredited Cord Blood Facilities by Country 49](#_Toc74691447)

[FIGURE 5.1: Separation of Buffy Layer 55](#_Toc74691448)

[FIGURE 5.2: PrepaCyte-CB 56](#_Toc74691449)

[FIGURE 5.3: Hetastarch (HES) 58](#_Toc74691450)

[FIGURE 5.4: AutoXpress II 59](#_Toc74691451)

[FIGURE 5.5: SEPAX 2 59](#_Toc74691452)

[FIGURE 5.6: Plasma Depletion (PD) Method (MaxCell Process) 60](#_Toc74691453)

[FIGURE 5.7: Density Gradient Separation of Cord Blood 61](#_Toc74691454)

[FIGURE 5.8: Early Stage HSC Recovery from Cord Blood by Technologies 62](#_Toc74691455)

[FIGURE 5.9: Mid Stage HSC (CD34+/CD133+) Recovery from Cord Blood by Technologies 63](#_Toc74691456)

[FIGURE 5.10: Late Stage HSC Recovery from Cord Blood by Technologies 64](#_Toc74691457)

[FIGURE 5.11: HSC (CD45+) Recovery Post Process from Whole Blood by Technologies 65](#_Toc74691458)

[FIGURE 5.12: Days to Neutrophil Engraftment by Technology 66](#_Toc74691459)

[FIGURE 5.13: Difference in TNC Recovery among Anticoagulants 67](#_Toc74691460)

[FIGURE 5.14: Type of Anticoagulant and Cell Recovery Volume 68](#_Toc74691461)

[FIGURE 5.15: Percent Cell Recovery by Sample Size 69](#_Toc74691462)

[FIGURE 5.16: TNC Viability by Time Taken for Transport 70](#_Toc74691463)

[FIGURE 5.17: Difference in Recovery of Viable TNC after Thawing 71](#_Toc74691464)

[FIGURE 5.18: CD34+ Cell Count, CFU and Cell Apoptosis by Cryoprotectants 72](#_Toc74691465)

[FIGURE 5.19: The Number of Stored and Transplanted CB Units in Korea-CORD by TNC 73](#_Toc74691466)

[FIGURE 5.20: Number of Stored and Shipped CB Units and Utilization Rate by TNC Count 74](#_Toc74691467)

[FIGURE 6.1: # of Cord Blood Clinical Trials as Reported in PubMed.gov (2000 to 2020) 79](#_Toc74691468)

[FIGURE 6.2: Number of Cord Blood Clinical Trials by Geography as of June 2021 80](#_Toc74691469)

[FIGURE 6.3: Number of Cord Blood Clinical Trials by Study Type as of June 2021 81](#_Toc74691470)

[FIGURE 6.4: Number of Cord Blood Clinical Trials by Study Phase as of June 2021 82](#_Toc74691471)

[FIGURE 6.5: Number of Cord Blood Clinical Trials by Funder Type as of June 2021 83](#_Toc74691472)

[FIGURE 6.6: Percent Share of Indications in Children tested in Clinical Trials 84](#_Toc74691473)

[FIGURE 6.7: Percent Share of Diseases in Ongoing Clinical Trials using Cord Blood Cells 91](#_Toc74691474)

[FIGURE 6.8: Percent Share of Diseases in Clinical Trials using MSCs from Cord Tissue 92](#_Toc74691475)

[FIGURE 6.9: Number of Cord Tissue-Based Clinical Trials by Geography as of June 2021 94](#_Toc74691476)

[FIGURE 6.10: Cord Tissue-Based Clinical Trials by Study Phase as of June 2021 95](#_Toc74691477)

[FIGURE 6.11: Cord Tissue-Based Clinical Trials by Funder Type as of June 2021 96](#_Toc74691478)

[FIGURE 6.12: Wharton’s Jelly-Based Clinical Trials by Study Phase as of June 2021 98](#_Toc74691479)

[FIGURE 6.13: Number of Published Scientific Papers on UCB, 2000-June 2021 107](#_Toc74691480)

[FIGURE 6.14: Number of Published Scientific Papers on Cord Tissue, 2000-June 2021 108](#_Toc74691481)

[FIGURE 6.15: Number of Published Scientific Papers on Wharton’s Jelly, 2000-June 2021 109](#_Toc74691482)

[FIGURE 6.16: Number of Published Scientific Papers on CB Expansion, 2000-June 2021 110](#_Toc74691483)

[FIGURE 7.1: Percent of Expectant Parents Who Have Heard About Cord Blood Banking 112](#_Toc74691484)

[FIGURE 7.2: Undecided Expectant Parents about Cord Blood Banking 113](#_Toc74691485)

[FIGURE 7.3: Brand Name Recognition of Cord Blood Banks by Expectant Parents 113](#_Toc74691486)

[FIGURE 7.4: Factors Influencing the Choice of a Cord Blood Bank 114](#_Toc74691487)

[FIGURE 8.1: Distribution of Cell Sources in HCTs as Reported in Be The Match 115](#_Toc74691488)

[FIGURE 8.2: Comparisons of Cord Blood to other Allograft Sources 116](#_Toc74691489)

[FIGURE 8.3: Major Indications for HTC in the U.S. 118](#_Toc74691490)

[FIGURE 8.4: Trend in Allogeneic HCT in the U.S. by Recipient Age, 2000 to Present 119](#_Toc74691491)

[FIGURE 8.5: Trends in Autologous HCT in the U.S. by Recipient Age, 2000 to Present 120](#_Toc74691492)

[FIGURE 8.6: Transplants by Cell Source in Adult Patients, 2010 to Present 121](#_Toc74691493)

[FIGURE 8.7: Transplants by Cell Source in Pediatric Patients <18 Years 122](#_Toc74691494)

[FIGURE 8.8: Allogeneic HCTs by Cell Source Facilitated by NMDP/Be The Match 123](#_Toc74691495)

[FIGURE 8.9: Unrelated Donor Allogeneic HCTs in Patients <18 Years/NMDP/Be The Match 124](#_Toc74691496)

[FIGURE 8.10: Likelihood of Finding an Unrelated Cord Blood Unit by Ethnicity 125](#_Toc74691497)

[FIGURE 8.11: Likelihood of Finding an Unrelated Cord Blood Unit for Patients <20 Years 126](#_Toc74691498)

[FIGURE 8.12: Cumulative Probability of having a Stem Cell Transplant by Age 127](#_Toc74691499)

[FIGURE 8.13: Cord Blood Utilization Trends 128](#_Toc74691500)

[FIGURE 8.14: Number of UCB Donors Worldwide as Reported by WMDA, 2000-2020 129](#_Toc74691501)

[FIGURE 8.15: Number of CBUs Worldwide as Reported by WMDA, 2000-2020 131](#_Toc74691502)

[FIGURE 8.16: Unrelated BM, PBPC and CB Shipped, 2000-2020 133](#_Toc74691503)

[FIGURE 8.17: Number of Umbilical Cord Blood Donors by Geography 134](#_Toc74691504)

[FIGURE 8.18: Public Cord Blood Units Stored by Geography as Reported by the WMDA 135](#_Toc74691505)

[FIGURE 8.19: Percent Shares of all Registered Donors by HLA Typing Level 136](#_Toc74691506)

[FIGURE 8.20: Number of Searches Initiated by National Patients for Donors/CBU/Both 137](#_Toc74691507)

[FIGURE 8.21: Types of CBU Shipments 138](#_Toc74691508)

[FIGURE 8.22: TNC Count of CBUs Provided for Children and Adult Patients - Single 139](#_Toc74691509)

[FIGURE 8.23: TNC Count of CBUs Provided for Children and Adult Patients - Multi 140](#_Toc74691510)

[FIGURE 8.24: Percentage of HPC Products Provided for National and International Patients 141](#_Toc74691511)

[FIGURE 8.25: Percentage of CB Units Provided for National and International Patients 142](#_Toc74691512)

[FIGURE 8.26: Top Ten Countries with Number of Donors Listed per 10,000 Inhabitants 143](#_Toc74691513)

[FIGURE 8.27: Percentage of HLA Typed CBUs Banked per Continent 144](#_Toc74691514)

[FIGURE 8.28: Percentage TNC of Banked CBUs 145](#_Toc74691515)

[FIGURE 8.29: Number of Donors per 10,000 Inhabitants by Select E.U. Countries 153](#_Toc74691516)

[FIGURE 8.30: Global Exchange of Cord Blood Units, 2020 156](#_Toc74691517)

[FIGURE 8.30: Global Shipments of CBUs by Geography in 2020 157](#_Toc74691518)

[FIGURE 9.1: Percent Shares of Indications Targeted by UCB-MSCs in Clinical Trials 160](#_Toc74691519)

[FIGURE 9.2: Percent Share of Clinical Indications using UCT-MSCs 162](#_Toc74691520)

[FIGURE 9.3: Number of UCB Units Released by Cord Blood Registry by Application 164](#_Toc74691521)

[FIGURE 10.1: Global Cord Blood Banking Market Revenue by Geography, 2020-2027 169](#_Toc74691522)

[FIGURE 10.2: Percent Share of Global Cord Blood Banking Market Revenue by Geography 170](#_Toc74691523)

[FIGURE 10.3: Percent Share of Global Cord Blood Banking Market, Public vs. Private 171](#_Toc74691524)

[FIGURE 10.4: Percent Share of Cord Blood Banking Market by Indication 172](#_Toc74691525)

[FIGURE 11.1: Growth of CBUs on the Be The Match Registry, 2001-2020 179](#_Toc74691526)

[FIGURE 11.2: Diversity of CBUs on Be The Match Registry, 2020 180](#_Toc74691527)

[FIGURE 11.3: Number of CBUs on Be The Match Registry by Race and Ethnicity, 2020 181](#_Toc74691528)

[FIGURE 11.4: Diversity of CBUs in Be The Match Registry 182](#_Toc74691529)

[FIGURE 11.5: Cell Sources for Allogeneic HCT Facilitated by Be The Match Registry 183](#_Toc74691530)

[FIGURE 11.6: Likelihood of a Matched Donor on Be The Match Registry by Ethnicity 184](#_Toc74691531)

[FIGURE 11.7: Percent Recovery of Viable Cells by TotiCyte Technology 191](#_Toc74691532)

[FIGURE 11.8: Growth in Number of New Transplant Patients Registered with the CIBMTR 194](#_Toc74691533)

[FIGURE 11.9: New Patients per Year Registered with CIBMTR 195](#_Toc74691534)

[FIGURE 11.10: Transplant Patients by Graft Source Registered with CIBMTR 196](#_Toc74691535)

[FIGURE 11.11: Number of Cord Blood Units Stored in CBR and its Competitors 206](#_Toc74691536)

[FIGURE 11.12: Key Figures of Sales Revenues and Gross Profits for Cordlife, 2014-2020 207](#_Toc74691537)

[FIGURE 11.13: Cryo-Cell International’s Revenues, 2016 to Present 211](#_Toc74691538)

[FIGURE 11.14: Revenue and Gross Profit for GCBC, 2015-2020 219](#_Toc74691539)

[FIGURE 11.15: Percent Share of Units Released by Indication 231](#_Toc74691540)

[FIGURE 11.16: Key Figures of Sales Revenues & Gross Profits for Vita 34, 2014 to Present 236](#_Toc74691541)

[FIGURE 11.17: Search Types in WMDA Search & Match Service, 2017-2020 238](#_Toc74691542)

**INDEX OF TABLES**

[TABLE 2.1: An Overview of Public Cord Blood Banks 27](#_Toc74691823)

[TABLE 2.2: International Prices of Cord Blood Unit 28](#_Toc74691824)

[TABLE 2.3: Prices of Cord Blood Units in NMDP Banks in the U.S. 29](#_Toc74691825)

[TABLE 2.4: An Overview of Private Cord Blood Banks 31](#_Toc74691826)

[TABLE 2.5: Profit Margins of Select Private Cord Blood Banks, 2017-2020 32](#_Toc74691827)

[TABLE 2.6: An Overview of Hybrid Cord Blood Banks 33](#_Toc74691828)

[TABLE 2.7: World’s 12 Largest Private Cord Blood Bank Operators 35](#_Toc74691829)

[TABLE 2.8: Comparison of Three Largest Private Banks in U.S. 37](#_Toc74691830)

[TABLE 2.9: List of Public, Private and Hybrid Cord Blood Banks in the U.S. 39](#_Toc74691831)

[TABLE 2.10: Pricing for Storage in Commercial Banks 41](#_Toc74691832)

[TABLE 2.11: Rate per Cord Blood Unit in the U.S. & Europe 42](#_Toc74691833)

[TABLE 2.12: Cord Blood Revenues for Major Four Companies, 2017-2020 44](#_Toc74691834)

[TABLE 3.1: AABB Accredited Cord Blood Facilities 47](#_Toc74691835)

[TABLE 3.1: (CONTINUED) 48](#_Toc74691836)

[TABLE 3.1: (CONTINUED) 49](#_Toc74691837)

[TABLE 3.2: Select FACT Accredited Cord Blood Facilities 50](#_Toc74691838)

[TABLE 4.1: Indications for the Use of UCB-Derived Stem Cells for Transplantation 51](#_Toc74691839)

[TABLE 4.1: (CONTINUED) 52](#_Toc74691840)

[TABLE 4.1: (CONTINUED) 53](#_Toc74691841)

[TABLE 4.2: Indications for the Use of UCB-Derived Stem Cells for Regenerative Medicine 54](#_Toc74691842)

[TABLE 5.1: Advantages of PrepaCyte-CB 57](#_Toc74691843)

[TABLE 5.2: Treatment Outcomes with PrepaCyte-CB 57](#_Toc74691844)

[TABLE 6.1: U.S. Cord Blood Banks Supplying Cord Blood for Research 77](#_Toc74691845)

[TABLE 6.2: Number of Cord Blood Clinical Trials by Geography as of June 2021 80](#_Toc74691846)

[TABLE 6.3: Number of Cord Blood Clinical Trials by Study Type as of June 2021 81](#_Toc74691847)

[TABLE 6.4: Number of Cord Blood Clinical Trials by Study Phase as of June 2021 82](#_Toc74691848)

[TABLE 6.5: Number of Cord Blood Clinical Trials by Funder Type as of June 2021 83](#_Toc74691849)

[TABLE 6.6: Percent Share of Indications in Children tested in Clinical Trials 84](#_Toc74691850)

[TABLE 6.7: Select Three Clinical Trials involving Children 86](#_Toc74691851)

[TABLE 6.8: Ongoing Clinical Trials using UCB for Neurological Diseases 87](#_Toc74691852)

[TABLE 6.9: Ongoing Clinical Trials using UCB for Diabetes 87](#_Toc74691853)

[TABLE 6.10: Ongoing Clinical Trials using UCB for Cardiovascular Trials 88](#_Toc74691854)

[TABLE 6.11: Ongoing Clinical Trials using UCB for Auto-Immune Diseases 89](#_Toc74691855)

[TABLE 6.12: Ongoing Clinical Trials using UCB for Orthopedic Disorders 89](#_Toc74691856)

[TABLE 6.13: Ongoing Clinical Trials using UCB for Other Indications 90](#_Toc74691857)

[TABLE 6.14: Select Clinical Trials using MSCs from Cord Tissue 92](#_Toc74691858)

[TABLE 6.15: Number of Cord Tissue-Based Clinical Trials by Geography as of June 2021 93](#_Toc74691859)

[TABLE 6.16: Number of Cord Tissue-Based Clinical Trials by Study Phase as of June 2021 94](#_Toc74691860)

[TABLE 6.17: Number of Cord Tissue-Based Clinical Trials by Funder Type as of June 2021 95](#_Toc74691861)

[TABLE 6.18: Select Cord Tissue-Based Clinical Trials by Commercial Entities, 2021 96](#_Toc74691862)

[TABLE 6.19: Wharton’s Jelly-Based Clinical Trials by Phase, June 2021 97](#_Toc74691863)

[TABLE 6.20: Wharton’s Jelly-Based Clinical Trials by Commercial Entities, June 2021 98](#_Toc74691864)

[TABLE 6.21: Clinical Trials in Cord Blood-Derived Cell Expansion by Country, 2021 99](#_Toc74691865)

[TABLE 6.22: Clinical Trials of Cell Expansion Studies by Stages in Development, 2021 100](#_Toc74691866)

[TABLE 6.23: Twenty Clinical Trials involved in the Expansion of Cord Blood HSCs 100](#_Toc74691867)

[TABLE 6.23: (CONTINUED) 101](#_Toc74691868)

[TABLE 6.23: (CONTINUED) 102](#_Toc74691869)

[TABLE 6.23: (CONTINUED) 103](#_Toc74691870)

[TABLE 6.23: (CONTINUED) 105](#_Toc74691871)

[TABLE 6.24: Cord Blood Expansion Approaches 106](#_Toc74691872)

[TABLE 6.25: Select NIH Funding for Umbilical Cord Blood Research, 2019-2020 111](#_Toc74691873)

[TABLE 8.1: Comparisons of Cord Blood to other Allograft Sources in Transplantation 116](#_Toc74691874)

[TABLE 8.2: Number of HCTs Performed in the U.S. as reported to CIBMTR by Disease 117](#_Toc74691875)

[TABLE 8.3: No. of Cord Blood Units Available Worldwide According to WMDA, 1997-2020 130](#_Toc74691876)

[TABLE 8.4: Unrelated BM, PBPC and CB Shipped, 1997-2020 132](#_Toc74691877)

[TABLE 8.5: Total Number of Cord Blood Donors and Cord Blood Units by Country 146](#_Toc74691878)

[TABLE 8.5: (CONTINUED) 147](#_Toc74691879)

[TABLE 8.5: (CONTINUED) 148](#_Toc74691880)

[TABLE 8.5: (CONTINUED) 149](#_Toc74691881)

[TABLE 8.5: (CONTINUED) 150](#_Toc74691882)

[TABLE 8.5: (CONTINUED) 151](#_Toc74691883)

[TABLE 8.5: (CONTINUED) 152](#_Toc74691884)

[TABLE 8.6: Number of Donors and CBUs by E.U. Country as of December 31, 2018 154](#_Toc74691885)

[TABLE 8.7: Number of Exports/Imports of CBUs in E.U. in 2018 155](#_Toc74691886)

[TABLE 9.1: Select 15 Clinical Trials Using Cord Blood-Derived MSCs as Interventions 159](#_Toc74691887)

[TABLE 9.2: Select Clinical Trials using UCT-MSCs as Interventions 161](#_Toc74691888)

[TABLE 10.1: Global Cord Blood Banking Market Revenue by Geography, 2020-2027 169](#_Toc74691889)

[TABLE 11.1: AlphaCord’s pricing 175](#_Toc74691890)

[TABLE 11.2: Growth of Cord Blood Units in Be The Match Registry, 2001-2020 178](#_Toc74691891)

[TABLE 11.3: Diversity of CBUs on Be The Match Registry, 2020 179](#_Toc74691892)

[TABLE 11.4: Number of CBUs on Be The Match Registry by Race and Ethnicity, 2020 180](#_Toc74691893)

[TABLE 11.5: Cell Care’s pricing for Processing and Storage 189](#_Toc74691894)

[TABLE 11.6: Cells4Life’s pricing for Cord Blood, Cord Tissue, Amnion and Placental Cells 190](#_Toc74691895)

[TABLE 11.7: Cord Blood and Cord Tissue Products Released from Cells4Life 192](#_Toc74691896)

[TABLE 11.8: Distribution of Transplant Patients by Graft Source Registered with CIBMTR 196](#_Toc74691897)

[TABLE 11.9: Distribution of Transplant Patients by Indication Registered with CIBMTR 197](#_Toc74691898)

[TABLE 11.10: Cord Blood Units Released from Cord Blood Center Group 198](#_Toc74691899)

[TABLE 11.10: (CONTINUED) 199](#_Toc74691900)

[TABLE 11.10: (CONTINUED) 200](#_Toc74691901)

[TABLE 11.11: Cordlife’s Cord Blood Release Track Record 201](#_Toc74691902)

[TABLE 11.11: (CONTINUED) 202](#_Toc74691903)

[TABLE 11.11: (CONTINUED) 203](#_Toc74691904)

[TABLE 11.12: Core23 Biobank’s Processing and Storage Fees 204](#_Toc74691905)

[TABLE 11.13: Cryo-Cell International’s Revenues, 2016-2020 211](#_Toc74691906)

[TABLE 11.14: Cryo-Cell International’s Pricing for Processing and Storage 212](#_Toc74691907)

[TABLE 11.15: Allogeneic and Autologous Infusions by Indication Reported in EBMT 215](#_Toc74691908)

[TABLE 11.16: GeneCell Internationals Prepaid Storage Plans 217](#_Toc74691909)

[TABLE 11.17: Selected Financial Data for GCBC, 2015-2019 218](#_Toc74691910)

[TABLE 11.18: Insception Lifebank’s Pricing 221](#_Toc74691911)

[TABLE 11.19: LifeCell International’s pricing 223](#_Toc74691912)

[TABLE 11.20: MiracleCord’s Cost Comparison with Competitors 224](#_Toc74691913)

[TABLE 11.21: Maze Cord Blood Laboratory’s Payment Plans 225](#_Toc74691914)

[TABLE 11.22: Comparison of Pricing of NECBB with others 226](#_Toc74691915)

[TABLE 11.23: Stem Cell Cryobank’s pricing for Processing and Storage 232](#_Toc74691916)

[TABLE 11.24: Search Types in WMDA Search & Match Service, 2017-2020 238](#_Toc74691917)

About BioInformant:

As the first and only market research firm to specialize in the stem cell industry, BioInformant research is cited by the Wall Street Journal, Nature Biotechnology, Xconomy, and Vogue Magazine.

Serving market leaders that include Pfizer, Goldman Sachs, Beckton Dickinson, and Thermo Fisher Scientific, BioInformant is your global leader in stem cell industry data.

Learn more at [www.BioInformant.com](http://www.BioInformant.com).

**BioInformant Worldwide, LLC**

**www.BioInformant.com**