

BIOINFORMANT

Global Cord Blood Banking Industry Report



1ST AND ONLY MARKET RESEARCH FIRM TO
SPECIALIZE IN THE STEM CELL INDUSTRY

TABLE OF CONTENTS

I. Abstract	9
A. Global Market Requires Global Understanding.....	10
B. Cord Blood Stem Cells, Compared to Other Stem Cell Alternatives.....	12
C. Awareness Levels as a Factor Impacting Market Penetration.....	13
D. Digital Competition for Cord Blood.....	13
E. Key Report Findings.....	15
II. Timeline of Key Events	16
III. Technical & Medical Characteristics of Cord Blood	20
A. Introduction to Cord Blood and Cord Tissue.....	20
B. Definitions and Nomenclature.....	22
C. Technical Advantages of Cord Blood.....	24
D. Likelihood of Needing a Stem Cell Transplant.....	26
E. Comparison of Cord Blood, Bone Marrow, & Peripheral Blood Stem Cell Transplant.....	28
F. Conditions Treatable with Cord Blood Transplant.....	30
IV. Cord Blood Market Overview	33
A. Stem Cell Storage Service Offerings.....	33
B. Public vs. Private Cord Blood Storage.....	35
V. Cord Tissue Market Overview	39
A. History of Cord Tissue Storage.....	39
B. Comparison of Cord Blood & Cord Tissue Storage.....	40
C. Clinical Trials Investigating Cord Tissue Derived Mesenchymal Stem Cells (CT-MSCs).....	41
D. Sources of Mesenchymal Stem Cells.....	45
E. Market Penetration of Cord Tissue Storage within the U.S.....	50
F. Market Penetration of Cord Tissue Storage Worldwide.....	52
G. Pricing of Cord Tissue Storage (Global Analysis).....	53
VI. Benefits of Mesenchymal Stem Cells	55
A. Key Dates in the Discovery of MSCs.....	55
B. Physical Assessment of MSCs.....	57
C. Benefits of MSCs Relative to Other Stem Cells.....	58
1. Well-Characterized.....	58
2. Non-Controversial.....	58
3. Diverse Differentiation Potential.....	58
4. Ease of Growth in Culture.....	59

5.	Flexible Propagation.....	59
6.	Clinically Relevant Volumes.....	59
7.	Role as Regulatory Cells.....	59
8.	Delivery of Gene Products.....	59
9.	Favorable Immune Status	59
10.	Commercially Available Research Tools	59
VII.	Cord Blood Industry Accreditations	60
A.	Overview of Cord Blood Industry Accreditation.....	60
B.	AABB Accreditation.....	62
VIII.	Key Processing Technologies within the Cord Blood Marketplace.....	65
A.	AutoXpress® Platform (“AXP®”) and BioArchive System (By Thermogenesis, a Division of Cesca Therapeutics in Rancho Cordova, California, USA)	67
B.	Sepax (By Biosafe, in Eysins, Switzerland)	68
C.	PrepaCyte®-CB (By BioE in St. Paul, Minnesota, USA) - Cryo-Cell Purchased Rights to it in 2015	69
D.	Cord Blood 2.0™ (By Americord, in New York, NY, USA).....	70
E.	Other Cord Blood Processing Technologies	71
IX.	Strategic Collaborations: Key Alliances within the Cord Blood Industry	72
A.	Cord Blood Registry and Women’s Health Alliance (Largest Women’s Healthcare Groups)	72
B.	ViaCord and Destination Maternity (Largest Retailer of Maternity Clothing)	73
C.	Precious Cells Miracle and the Croydon Health Services NHS Trust.....	74
D.	CarePilot and “Cord for Life” (Lifeforce Cryobank’s Cord Blood Storage Program).....	76
E.	Cesca Therapeutics and UpState Public Cord Blood Bank	78
F.	New York Blood Center and Pluristem Therapeutics Collaborate on Adjuvant Therapy for Cord Blood Transplantation.....	79
X.	Pairing Cord Blood Banking with Prenatal / Neonatal / Maternal Health Services	80
A.	Natera, a leader in genetic testing, launches EverCord™ Cord Blood and Tissue Banking Services (March 2017)	80
B.	ViaCord, owned by parent company PerkinElmer, launched Newborn Genetic Screening (August 2017)	80
C.	Human Longevity Inc. acquired LifeBankUSA (owned by Celgene); LifeBankUSA Now Passed to Celularity, Inc.....	81
D.	AMAG Pharmaceuticals acquired Cord Blood Registry to bolster its portfolio of maternal health products (June 2015).....	81
E.	Donor Egg Bank offers free processing of its clients’ newborn cord blood through its sister company, FamilyCord	81

XI. Cord Blood Industry Consolidation (Mergers and Acquisitions)	82
A. Global Analysis of Mergers & Acquisitions.....	82
B. Role of Holding Companies within the Global Cord Blood Industry	84
XII. Technologies for Cord Blood Stem Cell Expansion	87
A. Key Strategies for Cord Blood Expansion	88
1. NiCord.....	88
2. Notch-1 Ligand.....	88
3. StemRegenin-1 (SR1).....	88
4. UM171	88
5. Enforced Fucosylation	88
6. Dimethyl Prostaglandin E2 (PGE2).....	88
B. Case Study: Gamida Cell as an Industry Leader in Cord Blood Expansion Technology	89
XIII. Diversification of Stem Cell Storage Services	93
A. Dental Stem Cell Storage	95
1. Overview of Dental Stem Cell Storage.....	95
2. Leading Dental Stem Cell Companies.....	96
3. Timeline of Events for Dental Stem Cell Companies.....	97
4. Key Competitors for Dental Stem Cell Storage.....	98
5. BioEden, Leading Provider of Dental Stem Cell Storage Worldwide.....	100
B. Adipose-Derived Stem Cell Storage	101
C. Other Types of Stem Cell Storage.....	102
XIV. Comparison of U.S. Cord Blood Market Leaders	104
A. Cord Blood Registry	104
B. ViaCord	109
C. Cryo-Cell International	113
D. Comparison of Top 3 Private U.S. Cord Blood Banks.....	116
XV. Comparison of Global Cord Blood Market Leaders	119
A. Cryo-Save Group (an Esperite N.V Company).....	119
B. China Cord Blood Corporation (Owned by Sanpower Group)	122
C. LifeCell International	124
D. Comparison of International Cord Blood Banks	126
XVI. SWOT Analysis for Cord Blood Industry	127
A. Strengths.....	129
B. Weaknesses.....	131

C. Opportunities.....	133
D. Threats	135
XVII. Regulation of the Cord Blood Marketplace.....	137
A. Regulation of HCT/Ps by the U.S. FDA	137
B. 21 st Century Cures Act and REGROW Act.....	140
C. Accelerated Approval Pathways for Cell Therapies in Japan	142
D. Accelerated Approval Regulator Pathways Worldwide.....	144
XVIII. Trend Rate Analysis	147
A. Scientific Publication Rate Analysis	147
B. Grant Funding Analysis.....	151
C. Patent Analysis	155
D. Clinical Trial Analysis	163
E. Market Penetration Rate of Cord Blood Storage	167
XIX. Cord Blood Online Marketing Analysis	168
A. Cost to Win Online Traffic for the Term “Cord Blood” in Google AdWords	168
B. Cost to Win Online Traffic for the Term “Cord Tissue” in Google AdWords	171
XX. Key Cord Blood Industry Benchmarks.....	172
A. Medical Society Opinions of Cord Blood Banking	172
B. Rates of Parental Awareness	174
C. Rates of Worldwide Storage, by Year.....	175
D. Transplant Data	178
E. Impact of Haploidentical Transplant	182
XXI. Quality Guarantee Comparison	183
XXII. Market Size Analysis	185
A. Definitions.....	185
B. Methodology.....	186
1. Roll-up all competitor sales (“Gold Standard”).....	186
2. Use a weighted analysis of industry leaders (“Silver Standard”).....	186
3. Survey customers for how much they spend in the market (“Bronze Standard”)	186
C. Types of Market Participants	187
1. Largest Market Participants	187
2. Mid-Sized Market Participants	189
3. Small Sized Participants	191
4. Public Cord Blood Banking Sector.....	192

5. Summary of Findings	193
D. Market Size Determination for Cord Blood and Tissue Banking Market.....	194
E. Market Segmentation for All Applications of Cord Blood and Cord Tissue.....	198
1. Biobanking.....	199
2. Use in Hematopoietic Stem Cell Transplantation (HSCT)	199
3. Cellular Therapies	199
4. Genetic Manipulation	199
5. Research Tools	200
F. Market Size Determinations by Market Segment	203
XXIII. Cord Blood Industry Leadership	205
1. Dr. Elaine Gluckman	205
2. Dr. Joanne Kurtzberg.....	205
3. Dr. Pablo Rubinstein.....	206
4. Dr. Hal Broxmeyer.....	206
5. Goeffrey Crouse	207
B. Top Ten Most Influential Cord Blood Banks Worldwide.....	208
XXIV. Global Cord Blood Conferences and Events.....	213
XXV. Investors and Acquisitions Impacting the Global Cord Blood Industry	214
A. Investors Impacting the Global Cord Blood Market.....	215
B. Three Strange Similarities between Acquisition of Cord Blood Registry & ViaCord.....	218
XXV. Geographic Analysis of Evolving Cord Blood Industry Conditions	220
A. China.....	220
B. France and Italy.....	221
C. Taiwan	222
D. Ecuador.....	224
E. South Africa	224
F. Brazil.....	225
XXVI. Summary of Conclusions	226
APPENDIX A –Conditions Treatable with Hematopoietic Stem Cell Transplant (Including Cord Blood Stem Cell Transplant)	229
APPENDIX B – AABB Accredited Cord Blood Banks Worldwide.....	232
APPENDIX C – List of U.S. Cord Blood Banks by Type of Bank (Private, Hybrid, or Public)	235
APPENDIX D – Global List of Cord Blood Banks Worldwide.....	236

List of Tables and Figures

- FIGURE 1. Cord Blood Market Segmentation
- FIGURE 2. Sources of Mesenchymal Stem Cells (MSCs)
- FIGURE 3. Benefits of MSCs Relative to Other Stem Cells
- FIGURE 4. Visualization of “Cord Blood” Clinical Trials (RePORTER Tool)
- FIGURE 5. Leading Landing Page Used by CBR
- FIGURE 6. Common Cryo-Cell Landing Page
- FIGURE 7. Common ViaCord Landing Pages
- FIGURE 8. Comparison of Umbilical Cord Blood vs. Umbilical Cord Tissue
- FIGURE 9. Cord blood treatment options
- FIGURE 10. Cost to Win Online Traffic for Term “Cord Blood” in Google AdWords on a Global Basis
- FIGURE 11. Cost to Win Online Traffic for Term “Cord Blood” in Google AdWords within the U.S.
- FIGURE 12. Density of Research Grants in the U.S. Containing “Cord Blood” in Description
- FIGURE 13. Key Processing Technologies within the Cord Blood Banking Marketplace
- FIGURE 14. Gamida Cell’s Clinical Pipeline Involving Its Cord Blood Derived Products
- FIGURE 15. Geographical Breakdown of “Cord Blood” Clinical Trials Registered at ClinicalTrials.gov
- FIGURE 16. Ground-breaking Years in Transplant History
- FIGURE 17. Key Dates in the Discovery of Mesenchymal Stem Cells
- FIGURE 18. Map of Current Mesenchymal Stem Cell (MSC) Clinical Trials on ClinicalTrials.gov
- FIGURE 19. Search Terms Containing the Phrase “Cord Blood” Within Them (Geography: USA Only)
- FIGURE 20. Search Terms Containing the Phrase “Cord Blood” Within Them (Geography: Worldwide)
- FIGURE 21. Sites of Organizations that Have Received Cord Blood Grants
- FIGURE 22. Technical Advantages of Cord Blood over Bone Marrow or Peripheral Blood
- FIGURE 23. Leading Assignees for Cord Blood Patents
- FIGURE 24. Potential Strategies for Cord Blood Expansion
- GRAPH 1. Likelihood of Requiring a Stem Cell Transplant (From Cord Blood, Bone Marrow, or Peripheral Blood)
- GRAPH 2. # of "Cord Blood" Patents by Country (Title and Abstract Search)
- GRAPH 3. # of Grants Funding Projects with "Cord Blood" in Description (RePORTER Tool)
- GRAPH 4. Breakdown of Global Cord Blood and Tissue Market by Type of Participant
- GRAPH 5. Countries with AABB Accredited Cord Blood Facilities
- GRAPH 6. Market Contributions by Type of Market Participants
- GRAPH 7. Market Contributions by Type of Market Segment
- GRAPH 8. Number of Clinical Trials with "Cord Blood" in the Description
- GRAPH 9. Number of Cord Blood Units in the BMDW Cord Blood Registry, by Year
- GRAPH 10. Percentage of Cord Blood Banks Worldwide Offering Cord Tissue Storage Services
- GRAPH 11. Percentage of Global Market for Cord Blood and Cord Tissue Banking

GRAPH 12. Registry Transplants by Cell Source

GRAPH 13. Types of Transplants Used by the 70,000 Patients Requiring Hematopoietic Stem Cell Transplantation Each Year

GRAPH 14. Year-Over-Year Comparison of Stem Cell Scientific Publications, by Stem Cell Type

TABLE 1. U.S. Cord Blood Banks Offering Cord Tissue Storage in 2013 (Historical Snapshot 1)

TABLE 2. U.S. Cord Blood Banks Offering Cord Tissue Storage in 2015 (Historical Snapshot 2)

TABLE 3. Adulthood Probability of Requiring a Stem Cell Transplant

TABLE 4. Breakdown of Global Market by Type of Participant

TABLE 5. Childhood Probability of Requiring a Stem Cell Transplant

TABLE 6. Clinical Trials Investigating the Use of Cord Tissue Derived Mesenchymal Stem Cells (CT-MSCs)

TABLE 7. Clinical Trials Underway Involving Use of Wharton's Jelly, a Rich Source of Cord Tissue MSCs

TABLE 8. Companies Offering Adipose-Derived Stem Cell Storage (Both Cord Blood Banks and Specialty Companies)

TABLE 9. Companies Offering Dental Stem Cell Storage, Including Cord Blood Banks and Specialty Companies

TABLE 20. Comparative Analysis of Pricing Among Leading U.S. Private Cord Blood Banks

TABLE 21. Comparison of Acquisition of Cord Blood Registry by AMAG Pharmaceuticals and ViaCord by PerkinElmer

TABLE 22. Comparison of Quality Guarantees Among Private U.S. Cord Blood Banks (Ranked by Value of the Guarantee)

TABLE 23. Comparison of Services and Features Among Leading Private Cord Blood Banks Worldwide

TABLE 24. Comparison of Services and Features Among Leading U.S. Private Cord Blood Banks

TABLE 25. Comparison of Stem Cell Publication Rates by Stem Cell Type

TABLE 26. Cord Blood Banking Opinions Issued by Medical Societies

TABLE 27. Cord Blood Clinical Trials Registered at ClinicalTrials.gov

TABLE 28. Cord Blood Units in the Bone Marrow Donors Worldwide Database

TABLE 29. Countries Containing AABB Accredited Cord Blood Banks

TABLE 30. Disease Categories That May Be Treatable with HSCT in the Future

TABLE 31. Disease Categories Treatable with Hematopoietic Stem Cell Transplantation (HSCT)

TABLE 32. Esperite N.V. Subsidiaries Operating Worldwide

TABLE 33. Free Cord Blood Programs for Families in Need in the U.S.

TABLE 34. Geographic Breakdown of "Cord Blood" Clinical Trials Registered at ClinicalTrials.gov

TABLE 35. Global Cord Blood Conference and Events

TABLE 36. Global Private Cord Blood and Tissue Banking Market, by Type of Market Participant

TABLE 37. Google AdWords Pay-Per-Click Prices for Cord Blood Related Search Terms

TABLE 38. Industry Investors within the Cord Blood Market

TABLE 39. Major Acquisitions within the Global Cord Blood Market

TABLE 40. Market Contribution in USD (\$) by Market Segment

TABLE 41. Market Contribution in USD (\$) by Type of Market Participant

TABLE 42. Market Size Determinations by Market Segment

TABLE 43. Number of Cord Blood and Tissue Units Stored by Mid-Sized Private Cord Blood Banks

TABLE 44. Number of Cord Blood and Tissue Units Stored in Largest Private Cord Blood Banks

TABLE 45. Opportunities within the Global Cord Blood Banking Market

TABLE 46. Patents Containing “Cord Blood” in the Title or Abstract (Google Patent Search)

TABLE 47. Percent of Cord Blood Banks Worldwide Offering Cord Tissue Storage Services

TABLE 48. Percent of Total Global Market by Type of Cord Blood Bank

TABLE 49. Pricing Structures for Umbilical Cord Tissue

TABLE 50. Strengths of the Global Cord Blood Banking Market

TABLE 51. Threats to the Global Cord Blood Banking Market

TABLE 52. Timeline of Key Events within the Cord Blood Industry

TABLE 53. Transplants by Cell Source

TABLE 54. Trend Rate Analysis of Cord Blood and Cord Tissue Scientific Publications

TABLE 55. Trend Rate Analysis of Cord Blood Grants (RePORTER Tool)

TABLE 56. Trends in Cord Blood Industry Growth by Geography and Sector

TABLE 57. Types of Stem Cell Banking

TABLE 58. Unique Differentiators for CBR, ViaCord, and Cryo-Cell

TABLE 59. Weaknesses of the Global Cord Blood Banking Market

TABLE 60: Fetal Sources for Mesenchymal Stem Cell (MSC) Isolation

TABLE 61: Adult Sources for Mesenchymal Stem Cell (MSC) Isolation

TABLE 62: Cord Blood Banks Securing Cord Blood Patents as the Assignee