

# **Cell Therapy**

## **Part II: Markets, Companies & Academic Institutions**

**By**

**Prof. K. K. Jain**  
MD, FRACS, FFPM  
**Jain PharmaBiotech**  
**Basel, Switzerland**

**November 2021**

**A Jain PharmaBiotech Report**

## AUTHOR'S BIOGRAPHY

Professor K. K. Jain is a neurologist/neurosurgeon with specialist qualifications including Fellowships of the Royal Colleges of Surgeons in Australia and Canada. He has trained, practiced and held academic positions in several countries including Switzerland, India, Iran, Germany Canada and USA. After retirement from neurosurgery, Prof. Jain remains a consultant in neurology. He is also working in the biotechnology/biopharmaceuticals industry and is a Fellow of the Faculty of Pharmaceutical Medicine of the Royal College of Physicians of UK. Currently, he is the CEO of Jain PharmaBiotech.

Prof. Jain's 492 publications include 35 books (6 as editor+ 29 as author) and 50 special reports, which have covered important areas in biotechnology, gene therapy and biopharmaceuticals, biomarkers: proteomics, molecular diagnostics, nanobiotechnology, and personalized medicine. Contributions to MedLink, an accredited continuing education program for neurologists, include 172 articles out of a total of 1200 articles by 450 authors. These articles are updated on a yearly basis.

Prof. Jain's earlier books were the first in the areas covered: "Handbook of Laser Neurosurgery" (Charles C. Thomas, Springfield, Ill, 1983) and "Textbook of Hyperbaric Medicine" (1st ed in 1990 and 6th ed by Springer, 2017). His "Textbook of Gene Therapy" was translated into Chinese in 2000. Recent books include "Handbook of Nanomedicine" (Springer 2008, Chinese edition by Peking University Press 2011, 3rd ed 2017), "Textbook of Personalized Medicine" (Springer 2009; Japanese ed 2012; 2nd ed Springer 2015, 3rd ed 2021), "Handbook of Biomarkers" (Springer 2010; Chinese ed, Chemical Industry Press 2016, 2nd ed 2017), "Drug-induced Neurological Disorders", 4th ed (Springer 2021), "Handbook of Neuroprotection" (Springer 2011, 2nd ed 2019), "Applications of Biotechnology in Cardiovascular Therapeutics" (Springer 2011), "Applications of Biotechnology in Neurology" (Springer 2013), and "Applications of Biotechnology in Oncology" (Springer 2014). He has also edited 3 editions of "Drug Delivery System" (Springer 2008, 20012 and 2018) and "Applied Neurogenomics" (Springer 2015). Lectures on personalized medicine given at Kazakh National Medical University, Kazakhstan were translated into Russian and published as a book "Essentials of Personalized Medicine" (LITERRA Publishing House, Moscow, 2019). Currently, he is writing the "The Handbook of Alzheimer Disease" to be published by Springer in 2022.

**November 2021 (revised and published continuously since 2001)**  
**Copyright ©2020 by**

**Jain PharmaBiotech  
Bläsiring 7  
CH-4057 Basel  
Switzerland**

**Tel & Fax: +4161-6924461**  
**Email: [info@pharmabiotech.ch](mailto:info@pharmabiotech.ch)**  
**Web site: <http://pharmabiotech.ch/>**

All rights reserved. No part of this publication may be reproduced, stored in a retrieval system, or transmitted in any form or by any means, electronic, mechanical, photocopying, or otherwise without the prior written permission of the Publisher. This report may not be lent, resold or otherwise traded in any manner without the consent of the Publisher. While all reasonable steps have been taken to ensure the accuracy of the information presented, the Publisher cannot accept responsibility for inadvertent errors or omissions.

# TABLE OF CONTENTS

<b>10. Markets and Future Prospects for Cell Therapy .....</b>	<b>6</b>
<b>Introduction .....</b>	<b>6</b>
<b>Methods for estimation of cell therapy markets.....</b>	<b>6</b>
<b>Potential markets for cell therapy.....</b>	<b>7</b>
Markets according to technologies.....	7
<i>Stem cell transplants.....</i>	7
<i>Supporting cell technologies .....</i>	7
<i>Blood transfusion market.....</i>	8
<i>Cord blood collection and storage.....</i>	8
Cell therapy and related technologies .....	8
Cell therapy markets according to therapeutic areas .....	8
<i>Bone and joint disorders .....</i>	9
<i>Cancer.....</i>	9
<i>Cardiovascular disorders.....</i>	10
<i>Diabetes mellitus .....</i>	10
<i>Liver disorders.....</i>	11
<i>Neurological disorders .....</i>	11
<i>Retinal degenerative diseases market.....</i>	12
<i>Skin and wound care .....</i>	12
<i>Urinary incontinence.....</i>	12
<i>Reconstruction of teeth by stem cell implants.....</i>	12
<b>Market size according to geographical areas .....</b>	<b>13</b>
<b>Unmet market needs in cell therapy .....</b>	<b>13</b>
<b>Drivers of growth of cell therapy markets .....</b>	<b>14</b>
Role of stem cells in regenerative medicine .....	14
Role of cells in markets for artificial organs .....	15
Increase of R&D expense on cell therapy .....	15
Increased used of cell-based drug discovery.....	15
Impact of emerging healthcare trends on cell therapy markets .....	15
Markets for cell therapy tourism .....	15
Involvement of pharmaceutical companies in cell therapy .....	16
<b>Future prospects of cell therapy .....</b>	<b>16</b>
Challenges for cell therapy .....	16
Achievements of cell therapy.....	16
Stem cell research around the world .....	17
Stem cell research in China .....	17
Consortia for ESC research in Europe .....	18
<i>EuroStemCell .....</i>	18
<i>UK National Stem Cell Network.....</i>	18
Ethical concerns about commercialization of embryonic stem cells .....	19
Education of the physicians .....	19
Public education.....	19
NIH support of stem cell research .....	19
Funding of stem cell research from non-federal sources.....	20
Prospects of venture capital support for stem cell companies.....	21
Cell therapy in the developing countries.....	22
Guidelines for stem cell therapies.....	23
<b>Business strategies.....</b>	<b>23</b>
Formation of networks.....	24
Market potential of autologous vs allogeneic cells.....	24
Future market potential of adult vs embryonic stem cells .....	25
Transportation and handling of cell therapy products.....	25
Translating science into business .....	25
<b>11. Companies Involved in Cell Therapy .....</b>	<b>28</b>
<b>Introduction .....</b>	<b>28</b>
<b>Profiles of selected companies.....</b>	<b>30</b>
<b>Collaborations.....</b>	<b>370</b>
<b>12. Academic Institutions .....</b>	<b>380</b>
<b>Introduction .....</b>	<b>380</b>
<b>Stem cell centers .....</b>	<b>380</b>
<b>Profiles of institutions .....</b>	<b>381</b>
<b>Collaborations.....</b>	<b>471</b>
<b>13. References .....</b>	<b>474</b>

## Tables

Table 10-1: Market size according to cell therapy and related technologies 2020-2030 .....	7
Table 10-2: Market size according to therapeutic areas for cell therapy in 2020-2030 .....	9
Table 10-3: Cell therapy markets for cardiovascular disorders in 2020-2030 .....	10
Table 10-4: Values of cell therapies for neurological disorders in 2020-2030 .....	11
Table 10-5: Total cell therapy market in 2020-2030 according to geographical areas .....	13
Table 10-6: Cord blood market according to geographical areas 2020-2030 .....	13
Table 10-7: Stem cells transplant market according to geographical areas 2020-2030 .....	13
Table 10-8: SWOT Autologous cells vs allogeneic cells.....	24
Table 11-1: Publicly traded cell therapy companies .....	28
Table 11-2: Selected collaborations of cell therapy companies.....	370
Table 12-1: Therapeutic uses of stem cells .....	388
Table 12-2: Commercial collaborations of US academic institutes relevant to stem cells .....	471

## Figures

Figure 10-1: Unmet needs in cell therapy .....	14
--	----