

# Contents

Preface	v
<i>Roger Bertolotti &amp; Keiya Ozawa</i>	

List of Contributors	xi
----------------------	----

## Introduction

Toward a Universal Platform for Autologous Stem Cell Gene Therapy	xxi
<i>Roger Bertolotti</i>	

### **Long-term Stem Cell Gene Therapy: From Current Clinical Random-Integration Achievements to Stem Cell Gene Targeting/Cybridization**

<b>I. From pioneering clinical retroviral gene therapy to experimental site-specific integrative gene therapy</b>	
1 Stem Cell Gene Therapy for ADA-Deficiency without Myeloablative Conditioning	1
<i>Makoto Otsu and Tadashi Ariga</i>	
2 Targeted Insertion of Transgene into a Specific Site on Chromosome 19 by Using Adeno-Associated Virus Integration Machinery	19
<i>Masashi Urabe, Yoko Obara, Takayuki Ito, Hiroaki Mizukami, Akihiro Kume and Keiya Ozawa</i>	
3 Herpes Simplex Virus Type 1/Adeno-Associated Virus Hybrids as Site-Specific Integrating Vectors	47
<i>Cornel Fraefel, Daniel L. Glauser, Thomas Heister and Mathias Ackermann</i>	

- II. Stem cell gene targeting/cybridization: toward endonuclease-boosted gene repair/alteration, custom site-specific integrative gene therapy and transmitochondrial therapy/rejuvenation**
- 4 Endonuclease-Boosted Gene Targeting and Cybridization for Long-Term Stem Cell Gene Therapy 81  
*Roger Bertolotti*
- 5 Cell-Free Protein-Evolution Systems for Engineering of Novel Sequence-Specific DNA-Binding and -Modifying Activities 115  
*Armin Sepp, Farid Ghadessy and Yen Choo*
- 6 Advances in Engineering Homing Endonucleases for Gene Targeting: Ten Years After Structures 135  
*Barry L. Stoddard, Andrew M. Scharenberg and Raymond J. Monnat, Jr*
- 7 Gene Targeting Mediated by Helper-dependent Adenoviral Vectors 169  
*Kohnosuke Mitani*

**Adult Pluripotent Stem Cells: Emerging Stem Cell/Gene Therapy Breakthrough**

- 8 Multipotent Progenitor Cells: A New Era in Stem Cell-Mediated Gene Therapy? 187  
*Marta Serafini and Catherine M. Verfaillie*

**Cancer Stem Cell Gene Therapy**

- I. Cancer stem cells as breakthrough targets of cancer gene therapy**
- 9 Leukemia Stem Cells, A Pioneering Paradigmatic Model 203  
*Daniel J. Pearce and Dominique Bonnet*
- 10 Mammary Stem Cells 261  
*Mark Shackleton, Marie-Liesse Asselin-Labat, François Vaillant, Geoffrey J. Lindeman and Jane E. Visvader*

---

11	Human Brain Tumor Stem Cells <i>Sara G. M. Piccirillo and Angelo L. Vescovi</i>	299
12	CD44 as a Functional Cancer Stem Cell Marker and a Potential Therapeutic Target <i>Lubna Patrawala and Dean G. Tang</i>	317
<b>II. Armed stem cells as tumor-homing vectors for cancer gene therapy</b>		
13	Neural Stem Cell-mediated Therapy of Primary and Metastatic Solid Tumors <i>Joseph Najbauer, Mary K. Danks, Nils-Ole Schmidt, Seung U. Kim and Karen S. Aboody</i>	335
14	Antitumor Activity of Adenovirally Transduced CD34 <sup>+</sup> Cells Expressing Membrane-bound TRAIL <i>Carmelo Carlo-Stella, Cristiana Lavazza, Antonino Carbone and Alessandro M. Gianni</i>	373
15	Mesenchymal Stem Cells as Vehicles for Delivering Therapeutics and Oncolytic Viruses <i>Larisa Pereboeva and Justin Roth</i>	393
	Index	445