

Contents

List of Contributors xiii

Section 1: Stem Cells

Chapter 1

"Stem Cells into Liver" — Basic Research and Potential
Clinical Applications..... 3
*Agnieszka Banas, Gary Quinn, Yusuke Yamamoto,
Takumi Teratani, and Takahiro Ochiya*

Chapter 2

Mesenchymal Stem Cells Increase Self-Renewal of Small
Intestinal Epithelium and Accelerate Structural Recovery
after Radiation Injury 19
*Alexandra Sémont, Sabine François, Moubarak Mouseddine,
Agnès François, Amandine Saché, Johanna Frick,
Dominique Thierry, and Alain Chapel*

Chapter 3

Optimizing Viral and Non-Viral Gene Transfer Methods
for Genetic Modification of Porcine Mesenchymal Stem Cells..... 31
*Maik Stiehler, Mogens Duch, Tina Mygind, Haisheng Li,
Michael Ulrich-Vinther, Charlotte Modin, Anette Baatrup,
Martin Lind, Finn S. Pedersen, and Cody E. Bünger*

Chapter 4

Transplantation of Bone Marrow Stromal Cells for Treatment
of Central Nervous System Diseases..... 49
Michael Chopp and Yi Li

Section 2: Soluble and Insoluble Signals

Chapter 5

- Chondrocyte Signaling and Artificial Matrices for Articular Cartilage Engineering**..... 67
Diana M. Yoon and John P. Fisher

Chapter 6

- Osteoinduction with COLLOSS[®], COLLOSS[®] E, and GFm**..... 87
W.E. Huffer, J.J. Benedict, R. Rettenmaier, and A. Briest

Chapter 7

- Biglycan Is a Positive Modulator of BMP-2-Induced Osteoblast Differentiation**..... 101
Yoshiyuki Mochida, Duenpim Parisuthiman, and Mitsuo Yamauchi

Chapter 8

- Use of Neopterin as a Bone Marrow Hematopoietic and Stromal Cell Growth Factor in Tissue-Engineered Devices**..... 115
E. Zvetkova, Y. Gluhcheva, and D. Fuchs

Section 3: Scaffolds and Matrix Design

Chapter 9

- Injectable Synthetic Extracellular Matrices for Tissue Engineering and Repair**..... 125
Glenn D. Prestwich, Xiao Zheng Shu, Yanchun Liu, Shenshen Cai, Jennifer F. Walsh, Casey W. Hughes, Shama Ahmad, Kelly R. Kirker, Bolan Yu, Richard R. Orlandi, Albert H. Park, Susan L. Thibeault, Suzy Duflo, and Marshall E. Smith

Chapter 10

- Temporal Changes in PEG Hydrogel Structure Influence Human Mesenchymal Stem Cell Proliferation and Matrix Mineralization**..... 135
Charles R. Nuttelman, April M. Kloxin, and Kristi S. Anseth

Chapter 11

- Novel Biophysical Techniques for Investigating Long-Term Cell Adhesion Dynamics on Biomaterial Surfaces.....** 151

Z. Feng, N. Cai, V. Chan, P.S. Mhaisalka, K.S. Chian, B.D. Ratner, and K. Liao

Chapter 12

- Evaluation of Various Types of Scaffold for Tissue-Engineered Intervertebral Disc.....** 167

Soon Hee Kim, Sun Jung Yoon, Bangsil Choi, Hyun Jung Ha, John M. Rhee, Moon Suk Kim, Yoon Sun Yang, Hai Bang Lee, and Gilson Khang

Chapter 13

- Physicochemical Characterization of Photopolymerizable PLGA Blends.....** 183

Biancamaria Baroli

Chapter 14

- Porous Tantalum Trabecular Metal Scaffolds in Combination with a Novel Marrow Processing Technique to Replace Autograft.....** 197

Xuenong Zou, Haisheng Li, Lijin Zou, Tina Mygind, Martin Lind, and Cody Bünger

Chapter 15

- Preparation of Sponge Using Porcine Small Intestinal Submucosa and Their Applications as a Scaffold and a Wound Dressing.....** 209

Moon Suk Kim, Min Suk Lee, In Bum Song, Sang Jin Lee, Hai Bang Lee, Gilson Khang, and Il Woo Lee

Section 4: Bioreactor and Assessment Technologies

Chapter 16

- Modulation of Cell Differentiation in Bone Tissue Engineering Constructs Cultured in a Bioreactor.....** 225

Heidi L. Holtorf, John A. Jansen, and Antonios G. Mikos

Chapter 17

- Bioreactors for Tissues of the Musculoskeletal System** 243
Rita I. Abousleiman and Vassilios I. Sikavitsas

Chapter 18

- Non-Invasive Monitoring of Tissue-Engineered Pancreatic
 Constructs by NMR Techniques**..... 261
*Ioannis Constantinidis, Nicholas E. Simpson,
 Samuel C. Grant, Stephen J. Blackband, Robert
 C. Long Jr., and Athanassios Sambanis*

Section 5: Animal Models and Clinical Strategies

Chapter 19

- From Molecules to Matrix: Construction and Evaluation of
 Molecularly Defined Bioscaffolds**..... 279
*Paul J. Geutjes, Willeke F. Daamen, Pieter Buma,
 Wout F. Feitz, Kaeuis A. Faraj, and Toin H. van Kuppevelt*

Chapter 20

- Age-Related Differences in Articular Cartilage Wound
 Healing: A Potential Role for Transforming Growth
 Factor β 1 in Adult Cartilage Repair** 297
P.K. Bos, J.A.N. Verhaar, and G.J.V.M. van Osch

Chapter 21

- Intrinsic versus Extrinsic Vascularization in Tissue Engineering**..... 311
*Elias Polykandriotis, Raymund E. Horch, Andreas Arkudas,
 Apostolos Labanaris, Kay Brune, Peter Greil, Alexander D.
 Bach, Jürgen Kopp, Andreas Hess, and Ulrich Kneser*

Chapter 22

- Predictive Value of *in Vitro* and *in Vivo* Assays in Bone
 and Cartilage Repair — What Do They Really Tell Us
 about the Clinical Performance?** 327
*Pamela Habibovic, Tim Woodfield, Klaas de Groot,
 and Clemens van Blitterswijk*

Section 6: Science, Regulation, and the Public

Chapter 23

Engineered Tissues: The Regulatory Path from Concept to Market 363
Kiki B. Hellman

Section 7: Tissue Engineering Strategies

Chapter 24

Fibrin in Tissue Engineering..... 379
Daniela Eyrich, Achim Göpferich, and Torsten Blunk

Chapter 25

Ectopic Bone Induction by Equine Bone Protein Extract..... 393
Haisheng Li, Marco Springer, Xuenong Zou, Arne Briest, and Cody Bünger

Chapter 26

Adipose Tissue Induction *in Vivo* 403
Filip B.J.L. Stillaert, Phillip N. Blondeel, Keren Abberton, Erik Thompson, and Wayne A. Morrison

Chapter 27

Ocular Tissue Engineering..... 413
Florian Sommer, Ferdinand Brandl, and Achim Göpferich

Chapter 28

Molecular Mechanism of Osteochondroprogenitor Fate
Determination during Bone Formation 431
Lijin Zou, Xuenong Zou, Haisheng Li, Tina Mygind, Yuanlin Zeng, Nonghua Lü, and Cody Bünger

Author Index..... 443

Subject Index 445