

Contents

Dedication	iii
List of Contributors	v
Foreword Joshua Jacobs, M.D. and Jack Lemons, Ph.D.	ix
Preface Cato T. Laurencin, M.D., Ph.D.	xiii
Chapter 1 —Bone Grafts and Bone Graft Substitutes: A Brief History <i>By Cato T. Laurencin, M.D., Ph.D. and Yusuf Khan, M.S.</i>	3
SECTION I: ALLOGRAFT-BASED BONE GRAFT SUBSTITUTES	
Section Leader: William W. Tomford, M.D.	
Section Overview	11
Chapter 2 —Review of the State of the Art: Allograft-Based Systems for Use as Bone Graft Substitutes <i>By Ashley R. Poynton, M.D., F.R.C.S.I., F.R.C.S. (Tr & Orth) and Joseph M. Lane, M.D.</i>	13
Chapter 3 —Musculoskeletal Allograft Tissue Banking and Safety <i>By Michael J. Joyce, M.D. and David M. Joyce, B.S.</i>	30
Chapter 4 —Clinical Perspectives on the Use of Bone Graft Based on Allografts <i>By Scott Hofer, D.O., Seth S. Leopold, M.D., and Joshua Jacobs, M.D.</i>	68
Chapter 5 —The Development of Bone Graft Materials Using Various Formulations of Demineralized Bone Matrix <i>By Mark D. Borden, Ph.D.</i>	96

Chapter 6 —Standards Development Perspectives on the Use of Bone Graft Substitutes Based Upon Allografts <i>By John S. Kirkpatrick, M.D.</i>	113
--	-----

SECTION II: CELLULAR SYSTEMS AND GROWTH FACTOR-BASED SYSTEMS FOR USE AS BONE GRAFT SUBSTITUTES

Section Leaders: Mohamed Attawia, M.B.B.Ch. and Randy Rosier, M.D., Ph.D.

Section Overview	123
Chapter 7 —Cell-Based Approaches for Bone Graft Substitutes <i>By Mohammed Attawia, M.B.B.Ch., Sudha Kadiyala, Ph.D., Kim Fitzgerald, B.S., Karl H. Kraus, D.V.M., and Scott P. Bruder, Ph.D.</i>	126
Chapter 8 —Clinical Issues in the Development of Cellular Systems for Use as Bone Graft Substitutes <i>By Peter G. Whang, M.D. and Jay R. Lieberman, M.D.</i>	142
Chapter 9 —Preclinical, Clinical, and Regulatory Issues in Cell-Based Therapies <i>By Treena Livingston Arinze, Ph.D.</i>	164
Chapter 10 —Review of the State of the Art: Growth Factor Based Systems For Use as Bone Graft Substitutes <i>By Emilie V. Cheung, M.D., Dhirendra S. Katti, Ph.D., Randy N. Rosier, M.D., Ph.D., and Cato T. Laurencin, M.D., Ph.D.</i>	174
Chapter 11 —Bone Morphogenetic Protein (BMP) Implants as Bone Graft Substitutes—Promises and Challenges <i>By T. Kuber Sampath, Ph.D. and A. Hari Reddi, Ph.D.</i>	194
Chapter 12 —Bone Graft Substitutes: A Regulatory Perspective <i>By Sergio J. Gadaleta, Ph.D.</i>	214

**SECTION III: POLYMERS, CERAMICS, AND OTHER SYNTHETIC MATERIALS
FOR
BONE GRAFT SUBSTITUTES**

Section Leaders: Mauli Agrawal, Ph.D., P.E. and Dharendra S. Katti, Ph.D.

Section Overview	229
Chapter 13 —Bone Graft Substitutes: Basic Information for Successful Clinical Use With Special Focus on Synthetic Graft Substitutes <i>By Barbara Boyan, Ph.D., Jacquelyn McMillan, M.B.Ch.B., F.R.C.S.Ed., F.R.C.S. (Tr & Orth), Christoph H. Lohmann, M.D., Don M. Ranly, D.D.S., Ph.D., and Zvi Schwartz, D.M.D., Ph.D.</i>	231
Chapter 14 —Calcium Sulfate-Based Bone Void Substitutes <i>By Warren O. Haggard, Ph.D., Kelly C. Richelsoph, M.S., and Jack E. Parr, Ph.D.</i>	260
Chapter 15 —The Development of Coralline Porous Ceramic Bone Graft Substitutes <i>By Edwin C. Shors, Ph.D.</i>	271
Chapter 16 —Clinical Issues in the Development of Bone Graft Substitutes in Orthopedic Trauma Care <i>By Robert W. Bucholz, M.D.</i>	289
Chapter 17 —Issues Involving Standards Development for Synthetic Material Bone Graft Substitutes <i>By Marc Long, Ph.D., Robert Talac, M.D., Ph.D., and Michael J. Yaszemski, M.D., Ph.D.</i>	298
Index	309