Contents

Contributors, viii
Preface to the first edition, x
Preface to the second edition, xi

Part 1: Evolution of biological concepts
1 Biological basis of orthodontic tooth movement: An historical perspective, 3
Zeev Davidovitch and Vinod Krishnan
2 Biology of orthodontic tooth movement: The evolution of hypotheses and concepts, 15
Vinod Krishnan and Zeev Davidovitch
3 Cellular and molecular biology behind orthodontic tooth movement, 30
Vinod Krishnan, Rodrigo F. Viecilli, and Zeev Davidovitch

Part 2: Mechanics meets biology
4 The effects of mechanical loading on hard and soft tissues and cells, 53
Itzhak Binderman, Lital Young, Hila Bahar, Nasser Gadban, and Avinoam Yaffe
5 Biological aspects of bone growth and metabolism in orthodontics, 62
Song Chen, James K. Hartsfield, Jr., and W. Eugene Roberts
6 Mechanical load, sex hormones, and bone modeling, 82
Sara H. Windahl and Ulf H. Lerner
7 Biological reactions to temporary anchorage devices, 97
Gang Wu, Jing Guo, Haikun Hu, and Vincent Everts

Part 3: Inflammation and tooth-moving orthodontic forces
8 Oral and periodontal microbiology and orthodontic treatment: Changes, effects, and alterations, 111
Ellen Ghijselings, Carine Carels, and Jan van Gastel
9 The role of inflammation in defining the type and pattern of tissue response in orthodontic tooth movement, 121
Masaru Yamaguchi and Gustavo Pompermaier Garlet
10 Markers of paradental tissue remodeling in the gingival crevicular fluid and saliva of orthodontic patients, 138
Laura R. Iwasaki

Part 4: Personalized diagnosis and treatment based upon genomic criteria
11 Genetic influences on orthodontic tooth movement, 147
Maggie Zeichner-David
12 Personalized orthodontics: Limitations and possibilities in orthodontic practice, 164
James K. Hartsfield, Jr.
13 The effect of drugs and diet on orthodontic tooth movement, 173
Vinod Krishnan, James J. Zahrowski, and Zeev Davidovitch

Part 5: Rapid orthodontics
14 Biologic orthodontics: Methods to accelerate or decelerate orthodontic tooth movement, 191
Vinod Krishnan and Zeev Davidovitch
15 Corticotomy and postmodern incarnations of surgically facilitated orthodontic therapy (SFOT), 210
Neal C. Murphy, William M. Wilcko, and Nabil F. Bissada

Part 6: Long-term effects of tooth-moving forces
16 Mechanical and biological determinants of iatrogenic injuries in orthodontics, 231
Vinod Krishnan and Zeev Davidovitch
17 The biological background of relapse of orthodontic tooth movement, 248
Jaap C. Maltha, Vaska Vandevska-Radunovic, and Anne Marie Kuijpers-Jagtman

Part 7: Tooth-movement research
18 Controversies in tooth-movement research, 263
Vinod Krishnan and Zeev Davidovitch
19 Planning and executing tooth-movement research, 279
Zeev Davidovitch, Rajesh Ramachandran, and Vinod Krishnan

Index, 295