

# Contents

## Part I Basics in Tribology

|                                                                                                                       |           |
|-----------------------------------------------------------------------------------------------------------------------|-----------|
| <b>1 Tribology of Hip Prostheses .....</b>                                                                            | <b>3</b>  |
| John Fisher                                                                                                           |           |
| <b>2 Biomechanics of Hip Arthroplasty .....</b>                                                                       | <b>11</b> |
| Michael M. Morlock, Nick Bishop, and Gerd Huber                                                                       |           |
| <b>3 Ceramic Hip Replacements: Wear Behavior Affects<br/>the Outcome – A Tribological and Clinical Approach .....</b> | <b>25</b> |
| Meinhard Kuntz, Sylvia Usbeck, Thomas Pandorf, and Ricardo Heros                                                      |           |
| <b>4 Tribology of Metal-on-Metal Bearings .....</b>                                                                   | <b>41</b> |
| Jasper Daniel and Amir Kamali                                                                                         |           |
| <b>5 Highly Cross-Linked Polyethylenes .....</b>                                                                      | <b>61</b> |
| Robert M. Streicher                                                                                                   |           |

## Part II Ceramic Articulations

|                                                                                                                                                                      |           |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|
| <b>6 Are Noisy Ceramic-on-Ceramic Hips Linked to Periprosthetic Bone? .....</b>                                                                                      | <b>73</b> |
| Bernd Grimm, Alphons Tonino, and Ide Christiaan Heyligers                                                                                                            |           |
| <b>7 Noise Emissions in Total Hip Replacements, with an Emphasis<br/>on Ceramic-on-Ceramic and Ceramic-on-Metal Bearings<br/>and Different Articular Sizes .....</b> | <b>85</b> |
| Dick Ronald van der Jagt, Lipalo Mokete, Bradley Rael Gelbart,<br>Kingsley Nwokeyi, and Anton Schepers                                                               |           |
| <b>8 Head Size in Relation to Noise Occurrence in Ceramic-on-Ceramic<br/>Bearings .....</b>                                                                          | <b>91</b> |
| Frank Hoffmann, Milan Jovanovic, and Michael Muschik                                                                                                                 |           |
| <b>9 The Squeaking Phenomenon in Ceramic-on-Ceramic Bearings .....</b>                                                                                               | <b>99</b> |
| Alexandra Pokorny and Karl Knahr                                                                                                                                     |           |

### Part III Metal Articulations

- 10 Ceramic Surface Engineering of the Articulating Surfaces Effectively Minimizes Wear and Corrosion of Metal-on-Metal Hip Prostheses** ..... 113  
Karel J. Hamelnyck, David J. Woodnutt, Robin Rice, and Genio Bongaerts
- 11 Retrieval Wear Analysis of Metal-on-Metal Hip Resurfacing Implants Revised Due to Pseudotumours** ..... 121  
Young-Min Kwon, Harinderjit S. Gill, David W. Murray, and Amir Kamali

### Part IV Polyethylene Articulations

- 12 Polyethylene Wear in Total Hip Arthroplasty for Suboptimal Acetabular Cup Positions and for Different Polyethylene Types: Experimental Evaluation of Wear Simulation by Finite Element Analysis Using Clinical Radiostereometric Measurements** ..... 135  
Christian Wong and Maiken Stilling
- 13 Wear Analysis of Highly Cross-Linked Polyethylene in Total Hip Arthroplasty** ..... 159  
Charles R. Bragdon, Michael Doerner, and Henrik Malchau
- 14 Rates of Osteolysis in Well-Functioning Alumina-on-Highly Cross-Linked Polyethylene Bearing Cementless THA in Patients Younger than Fifty with Femoral Head Osteonecrosis**..... 169  
Young-Hoo Kim, Yoowang Choi, and Jun-Shik Kim
- 15 Osteolysis and Aseptic Loosening: Cellular Events Near the Implant** ..... 181  
Gema Vallés, Eduardo García-Cimbrelo, and Nuria Vilaboa

### Part V Miscellaneous

- 16 Cushion Form Bearings in Total Hip Arthroplasty: Nature's Approach to the Synovial Joint Problem** ..... 195  
Antonio Moroni, Martha Hoque, Giovanni Micera, Riccardo Orsini, Emanuele Nocco, and Sandro Giannini
- 17 A Novel Model to Predict Wear in an Uncemented Hip Replacement with a Ceramic on Polyethylene Bearing**..... 207  
Simon Boyle, Peter Loughenbury, Phil Deacon, and Richard M. Hall
- 18 Comparative In Vivo Wear Measurement of Conventional and Modern Bearing Surfaces in Total Hip Replacements by the Use of POLYWARE® Computerized System** ..... 217  
Georgios Karydakis and Theofilos Karachalios

- Index** ..... 229

Tribology in Total Hip Arthroplasty

Knahr, K. (Ed.)

2011, VIII, 233 p. 90 illus., 70 illus. in color., Softcover

ISBN: 978-3-642-19428-3