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Simulation of Implants and Prosthetic Devices; 24 Numerical Simulation of Fracture Healing and Bone Remodelling; 5 Imaging; 25 Micro-Computed Tomography Imaging of Bone Tissue; 26 Imaging Bone; 27 Ultrasound Techniques for Imaging Bone; 28 In Vivo Scanning; 29 Imaging of Cartilage Function; 30 Histochemistry Bone and Cartilage; 31 Immunohistochemistry; 32 Molecular Imaging In Situ Hybridization; 33 Laser Scanning Confocal Microscopy and Laser Microdissection 34 Image Analysis Histomorphometry Stereology6 Cellular Studies; 35 Cell Culture Research; 36 Cartilage Explants and Organ Culture Models; 37 Fluid Flow and Strain in Bone; 38 Biomechanics of Bone Cells; 7 Molecular Techniques in Bone Repair; 39 Molecular Testing; 40 Genetically Modified Models for Bone Repair; 8 In Vivo Models; 41 General Considerations for an In Vivo Model; 42 Animal Models for Bone Healing; 43 Models for Impaired Healing; 44 In Vivo Models for Bone and Joint Infections; 45 In Vivo Models for Articular Cartilage Repair; 46 In Vivo Soft Tissue Models; 9 Tissue Engineering 47 Scaffolds for Tissue Engineering and Materials for Repair48 Use of Growth Factors in Musculoskeletal Research; 49 Stem Cells for Musculoskeletal Repair; 50 Biological Evaluation and Testing of Medical Devices; 10 Statistics for Experimental Research; 51 Study Design; 52 Power and Sample Size Calculation; 53 Nonparametric versus Parametric Tests; 54 How to Limit Bias in Experimental Research; Index

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## Sommario/riassunto

From bioinformatics to nanotechnology, advances in basic research ultimately drive advances in clinical care. This book provides a comprehensive summary of all current research methodologies for translational and pre-clinical studies in biomechanics and orthopedic trauma surgery. With this roadmap at hand, specialists and trainees will have the tools to conduct high-quality experimental research in any area of musculoskeletal science, with a solid understanding of how the findings can be applied in patient care. Special Features: Utilizes the principles and methodology of modern, evidence-bas

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