

1. Record Nr.	UNINA9910876940403321
Autore	Laurent Cédric
Titolo	Mechanics of Living Tissues : Imaging, Characterization and Modeling Towards the Study of Soft Tissues
Pubbl/distr/stampa	Newark : , : John Wiley & Sons, Incorporated, , 2024 ©2024
ISBN	1-394-30659-8 1-394-30657-1
Edizione	[1st ed.]
Descrizione fisica	1 online resource (344 pages)
Collana	ISTE Invoiced Series
Altri autori (Persone)	VerdierClaude
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
Nota di contenuto	Cover -- Title Page -- Copyright Page -- Contents -- Preface -- Introduction: Mechanics of Living Tissues: Applications, Challenges and Methods -- Chapter 1. Biomechanics of the Liver: Characterizations, Modeling and Clinical Applications -- 1.1. Anatomy and clinical issues -- 1.1.1. Detailed anatomy -- 1.1.2. Main pathologies of the liver -- 1.1.3. Main applications of liver biomechanics -- 1.2. Experimental biomechanical characterizations -- 1.2.1. Characterizations of hepatic parenchyma -- 1.2.2. Influence of the vascular system on the mechanical response -- 1.2.3. Influence of the capsule on the mechanical response -- 1.3. Elastography for the diagnosis of fibrosis, cirrhosis, inflammation and liver tumors -- 1.3.1. Ultrasonic elastography -- 1.3.2. Magnetic resonance elastography -- 1.4. Mechanical modeling -- 1.4.1. Geometry and boundary conditions -- 1.4.2. Constitutive mechanical laws -- 1.5. Conclusion and outlook -- 1.6. Acknowledgments -- 1.7. References -- Chapter 2. Biomechanics of the Skin: Characterizations, Modeling and Scalp Applications -- 2.1. Anatomy and properties of the skin -- 2.1.1. Anatomy and microstructure -- 2.1.2. Mechanical properties -- 2.2. Characterization of the mechanical properties of the skin -- 2.2.1. Ex vivo characterization -- 2.2.2. In vivo characterization -- 2.3. Imaging of the skin -- 2.4. Modeling the mechanical behavior of the skin -- 2.5. A special case: the scalp -- 2.5.1. Anatomy and specificities of the scalp

-- 2.5.2. Towards computational simulation of scalp behavior -- 2.6. References -- Chapter 3. Biomechanics of the Cornea -- 3.1. Anatomy and clinical problems -- 3.2. Experimental characterization -- 3.2.1. Imaging -- 3.2.2. Mechanical characterization -- 3.3. Modeling mechanical behavior -- 3.4. Biomaterials -- 3.5. Acknowledgements -- 3.6. References.

Chapter 4. Biomechanical Modeling of the Human Tongue -- 4.1. Introduction -- 4.2. Anatomy of the tongue: environment, topology and partitioning -- 4.3. State of the art on biomechanical modeling of the human tongue -- 4.4. Our 3D FE model of the human tongue -- 4.4.1. Geometry and mesh -- 4.4.2. Constitutive laws -- 4.4.3. Boundary conditions -- 4.5. Numerical simulations -- 4.5.1. Transient simulations -- 4.5.2. Temporal activations of tongue muscles -- 4.5.3. Tongue displacements -- 4.5.4. Tongue trajectories -- 4.6. Discussion -- 4.7. Perspective: model order reduction for real-time simulation -- 4.8. Conclusion -- 4.9. References -- Chapter 5. Biomechanical Characterization of the Disc of the Temporomandibular Joint -- 5.1. Anatomical and geometric description of the temporomandibular joint and its discs -- 5.1.1. The temporomandibular joint -- 5.1.2. The temporomandibular joint disc -- 5.2. Biomechanics of the temporomandibular joint disc -- 5.2.1. Biomechanical tests on the temporomandibular joint disc -- 5.2.2. Simulation of the temporomandibular joint -- 5.3. Perspectives on the study of the temporomandibular joint disc -- 5.4. References -- Chapter 6. Biomechanics of the Intervertebral Disc -- 6.1. Introduction -- 6.2. Anatomy of the spine, disc and clinical issues -- 6.2.1. Anatomy of the spine -- 6.2.2. Disc anatomy and clinical issues -- 6.2.3. Discussion of some clinical issues -- 6.2.4. Structural mechanical properties of the IVD -- 6.2.5. Transport properties of the IVD -- 6.3. IVD modeling -- 6.4. IVD and therapeutic strategies -- 6.5. Conclusion and outlook -- 6.6. References -- Chapter 7. Biomechanics of the Anterior Cruciate Ligament (ACL) -- 7.1. Introduction: ACL physiology and pathologies -- 7.1.1. Anatomy and microstructure -- 7.1.2. Function of the ACL -- 7.1.3. Clinical issues -- 7.2. Mechanical characterization of the ACL. 7.2.1. Ex vivo characterization of the mechanical properties of the ACL -- 7.2.2. Definitions of physiological stresses -- 7.3. Biomechanical modeling of the ACL -- 7.3.1. Constitutive laws -- 7.3.2. Integration into computational simulations -- 7.4. Toward tissue engineering of the ACL -- 7.4.1. Specifications and challenges -- 7.4.2. State of the art -- 7.4.3. Example of a solution from a computational approach -- 7.4.4. Toward the engineering of a bone-ACL-bone complex -- 7.5. References -- Chapter 8. Mechanoregulation in Soft Biological Tissues: Application to the Development of Arterial Calcifications -- 8.1. Introduction -- 8.1.1. Abbreviations -- 8.1.2. Context -- 8.1.3. Wall structure in large elastic arteries -- 8.1.4. Wall mechanics in large elastic arteries -- 8.2. Mechanoregulation of arteries -- 8.2.1. The mechanostat -- 8.2.2. Mechanotransduction by arterial cells -- 8.2.3. Vascular mechanosome -- 8.2.4. Mechanically regulated molecules controlling vascular remodeling -- 8.3. Biochemistry of MAC -- 8.3.1. Mechanisms of MAC -- 8.3.2. MAC: a disruption of the mechanostat? -- 8.3.3. Perspectives on systems biology modeling of MAC in CKD-MBD -- 8.4. Conclusion -- 8.5. References -- Chapter 9. Biomechanics of Bone Tissue and Its Interactions with Surrounding Tissues -- 9.1. Introduction -- 9.2. Anatomy and physiology of bone from the macroscopic to the molecular scale -- 9.2.1. The human skeleton -- 9.2.2. Cortical bone and cancellous bones -- 9.2.3. Microstructure of the cortical and cancellous bones -- 9.2.4. Bone cells and their functions -- 9.2.5. Bone at the molecular level -- 9.3. Bone tissue

imaging and key morphological features -- 9.4. Mechanical behavior of bone and characterization methods -- 9.4.1. Storage, temperature, hydration: key factors for measuring the mechanical properties of biological tissues.

9.4.2. Characterization of bone structures at the macroscopic scale: accessible mechanical data and implemented methodologies -- 9.4.3. Anisotropic linear elastic behavior of bone tissue -- 9.4.4.

Viscoelasticity of bone tissue -- 9.4.5. Bone tissue damage and rupture mechanics -- 9.5. Interactions of bone tissue with surrounding tissues, and clinical implications -- 9.5.1. Bone marrow interface: involvement

in osteoporosis and bone tumors -- 9.5.2. Subchondral bone: a major player in the evolution of osteoarthritis -- 9.6. Conclusion and outlook

-- 9.7. References -- Conclusion -- List of Authors -- Index.
