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Nota di contenuto	Mechanical and structural contributions of elastin and collagen fibers to interlamellar bonding in the arterial wall -- Tissue engineering of vascular constructs -- Engineering the multiscale complexity of vascular networks -- Epicardial layer and endocardial layer as mechanical protective interfaces for cardiac function -- Dynamic remodeling in live cardiomyocytes -- Controlling the contractile strength of engineered cardiac muscle by hierarchal tissue architecture -- Multiscale light-sheet for rapid assessing of cardiac architecture and function -- Spongiosa as an integrative interface for aortic valve trilayered structure -- Advances in experimental and computational biomechanics of the tricuspid heart valve -- Heterogeneous and multiscale mechanical behavior of aortic valve leaflets -- Multi-scale approach to investigate mechanically-induced changes in tricuspid valve anterior leaflet microstructure -- Multiscale Mechanical Considerations for Polymeric Heart Valve Development -- The stabilization of elastin network in heart valve tissue engineering --

Glutaraldehyde cross-linked mitral valves -- Contribution of glycosaminoglycans to tendon mechanical properties -- Interfibrillar shear stress as the loading mechanism of collagen fibrils in tendon -- Tendon-to-bone Interface: structural-mechanical integration of enthesis -- Hierarchical collagen fiber formation for functional tendon, ligament, and meniscus replacement -- Tissue-engineered collagen graft using a novel load-bearing suture technique -- Tendon/Ligament repair with biomimetic and smart cellular constructs -- Tendon/Ligament-Like tissue via three-dimensional cyclic mechanical stretch culture system.

Sommario/riassunto

This book covers up-to-date knowledge of how designs found in nature use tissue hierarchies to achieve optimal functions, and how these principles are applied in bioengineering. The hierarchy-based multiscale approach has the potential to drive novel biomaterial designs, advance tissue engineering and regeneration, assist in tissue-function integration, improve high-fidelity computational modeling aided by machine learning, and enhance the development of innovative characterization tools and methodologies. This book presents the latest high-impact research achievements in bioengineered and natural hierarchical systems within a clinical context. Our aim is two-fold: (i) to emphasize the importance of integrating and bridging bioengineering designs at various tissue hierarchical levels and (ii) to foster dialogue and collaboration among bioengineers, biomechanists, and clinicians. .