



Cardiovascular soft tissue mechanics /

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Monografía

The seven papers of this volume present a glimpse into current research on soft tissue mechanics as well as some future directions. The seven papers concern tissues within the cardiovascular system: three focus on arteries, three on the heart, and one on biaxial testing of planar tissues such as heart valves. Given that cardiovascular disease continues to be the leading cause of death in the developed world, the importance of such research is clear. There are notable common features of the seven papers. First, most of the proposed constitutive relations are motivated directly by data on the underlying microstructure, and especially the orientations of a structurally important protein (collagen) that forms as undulated cross-linked fibers. Another feature of most of the papers is the consideration of the fact that both arteries and the heart contain muscle and that there is a need to quantify the so-called active (contractile) response in addition to the passive (non-contractile) response. Such relations must not only be structurally motivated, they must ultimately include the kinetics of calcium transport in the muscle. Constitutive relations for active behavior are discussed in the majority of the papers. The growth and remodeling of cardiovascular tissues is another common feature of the papers. Over the last twenty years, separate advances in biochemistry, cell biology, genetic engineering, and biomechanics have focused attention on the ubiquitous role of growth and remodeling of tissues

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Contenido: A New Constitutive Framework for Arterial Wall Mechanics and a Comparative Study of Material Models / Gerhard A. Holzapfel, Thomas C. Gasser and Ray W. Ogden -- Structure, Mechanical Properties, and Mechanics of Intracranial Saccular Aneurysms / J.D. Humphrey and P.B. Canham -- A Model of Arterial Adaptation to Alterations in Blood Flow / Alexander Rachev -- Computational Mechanics of the Heart. From Tissue Structure to Ventricular Function / M.P. Nash and P.J. Hunter -- Effect of Laminar Orthotropic Myofiber Architecture on Regional Stress and Strain in the Canine Left Ventricle / T.P. Usyk, R. Mazhari and A.D. McCulloch -- Modeling Heart Development / Larry A. Taber and Renato Perucchio -- Biaxial Mechanical Evaluation of Planar Biological Materials / Michael S. Sacks

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