Microvascular Mechanics Hemodynamics Of Systemic And Pulmonary Microcirculation

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Microcirculation in Cardiovascular Diseases Academic Press
This book is a dedicated resource for those sitting the Part A of the MCEM (Membership of the College of Emergency Medicine) examination. It forms an essential revision guide for emergency trainees who need to acquire a broad understanding of the basic sciences, which underpin their approach to clinical problems in the emergency department. Common clinical scenarios are used to highlight the essential underlying basic science principles, providing a link between clinical management and a knowledge of the underlying anatomical, physiological, pathological and biochemical processes. Multiple choice questions with reasoned answers are used to confirm the candidates understanding and for self testing. Unlike other recent revision books which provide MCQ questions with extended answers, this book uses clinical cases linked to the most recent basic science aspects of the CEM syllabus to provide a book that not only serves as a useful revision resource for the Part A component of the MCEM examination, but also a unique way of understanding the processes underlying common clinical cases seen every day in the emergency department. This book is essential for trainees sitting the Part A of the MCEM exam and for clinicians and medical students who need to refresh their knowledge of basic sciences relevant to the management of clinical emergencies.
The Physics of Cerebrovascular Diseases Biota Publishing
Nutritional Pathophysiology of Obesity and Its Comorbidities: A Case-Study Approach challenges students and practitioners to understand the role of nutrients within the pathophysiology and development of disease, specifically those diseases which develop as a result of obesity. Through a case-based approach, the author presents complex clinical scenarios that require multiple treatment strategies, including targeted diet modification as an adjuvant to medical therapy. The book is divided into 9 modules and 5 appendices each of which covers aspects of obesity and its comorbidities. Within each module, a case is detailed with relevant history, laboratory and physical data, and follow-up information. Each case is followed by a resource section which delineates current understanding of the pathophysiology of the condition, as well as the actions of nutrients and food components shown to modify these processes. A "further readings" section cites current supporting clinical and basic literature as well as published guidelines. - Explores how obesity is a key player in the pathophysiology of many diseases, including diabetes mellitus, chronic renal failure, hypertension, and atherosclerosis - Integrates current understandings of the molecular mechanisms of nutrient action on the processes of disease development and treatment - Presents students and early practitioners with complex clinical scenarios through a practical case-based approach
Clinical Fluid Therapy in the Perioperative Setting Springer Nature
Research centering on blood flow in the heart continues to hold an important position, especially since a better understanding of the subject may help reduce the incidence of coronary arterial disease and heart attacks. This book summarizes recent advances in the field; it is the product of fruitful cooperation among international scientists who met in Japan in May, 1990 to discuss the regulation of coronary blood flow.
A Mathematical Hemodynamic Model of the Microcirculation in Skeletal Muscle, Including Passive and Active Vessel Properties, Hematocrit, and Blood

Rheology University of Adelaide Press
This book provides a balanced presentation of the fundamental principles of cardiovascular biomechanics research, as well as its valuable clinical applications. Pursuing an integrated approach at the interface of the life sciences, physics and engineering, it also includes extensive images to explain the concepts discussed. With a focus on explaining the underlying principles, this book examines the physiology and mechanics of circulation, mechanobiology and the biomechanics of different components of the cardiovascular system, in-vivo techniques, in-vitro techniques, and the medical applications of this research. Written for undergraduate and postgraduate students and including sample problems at the end of each chapter, this interdisciplinary text provides an essential introduction to the topic. It is also an ideal reference text for researchers and clinical practitioners, and will benefit a wide range of students and researchers including engineers, physicists, biologists and clinicians who are interested in the area of cardiovascular biomechanics.
Research Awards Index Academic Press
The theory of blood circulation is the oldest and most advanced branch of biomechanics, with roots extending back to Huangti and Aristotle, and with contributions from Galileo, Santori, Descartes, Borelli, Harvey, Euler, Hales, Poiseuille, Helmholtz, and many others. It represents a major part of humanity's concept of itself. This book presents selected topics of this great body of ideas from a historical perspective, binding important experiments together with mathematical threads. The objectives and scope of this book remain the same as in the first edition: to present a treatment of circulatory biomechanics from the stand points of engineering, physiology, and medical science, and to develop the subject through a sequence of problems and examples. The name is changed from Biodynamics: Circulation to Biomechanics: Circulation to unify the book with its sister volumes, Biomechanics: Mechanical Properties of Living Tissues, and Biomechanics: Motion, Flow, Stress, and Growth. The major changes made in the new edition are the following: When the first edition went to press in 1984, the question of residual stress in the heart was raised for the first time, and the lung was the only organ analyzed on the basis of solid morphologic data and constitutive equations. The detailed analysis of blood flow in the lung had been done, but the physiological validation experiments had not yet been completed.
Nutritional Pathophysiology of Obesity and its Comorbidities World Scientific Publishing Company
In the past two decades a number of studies have shown that abnormalities in the function and structure of coronary microcirculation can be detected in several cardiovascular diseases. On the basis of the clinical setting in which it occurs, coronary microvascular dysfunction (CMD) can be classified into four types: CMD in the absence of any other cardiac disease; CMD in myocardial diseases; CMD in obstructive epicardial coronary artery disease; and iatrogenic CMD. In some instances CMD represents an epiphenomenon, whereas in others it represents an important marker of risk or may contribute to the pathogenesis of myocardial ischemia, thus becoming a possible therapeutic target. This book provides an update on coronary physiology and a systematic assessment of microvascular abnormalities in cardiovascular diseases, in the hope that it will assist clinicians in prevention, detection and management of CMD in their everyday activity.
Advances in Extra-corporeal Perfusion Therapies Morgan & Claypool Publishers
This new, revised and updated edition takes into account the most recent advances in the understanding of human pathophysiology. The book presents the complex basic principles of vascular hemodynamics and its pathophysiologie in a direct and effective way, stressing the importance of the mechanical properties of large arteries in the origin of blood pressure. The readily understandable text, supported by helpful images, describes the elements that define blood pressure and explains such important concepts as pulse wave velocity, central blood pressure, reflected waves, and pulse pressure amplification. Entirely new chapters are included on the sympathetic nervous system and arterial stiffness and on the role played by arterial stiffness in influencing blood pressure variability. The book will enable the physician to answer some of the key questions encountered when addressing the problem of arterial hypertension in everyday clinical practice: How is blood pressure generated? How should blood pressure values be interpreted? Is systolic blood pressure of greater importance than diastolic blood pressure?
Mechanisms of Vascular Disease Springer
New updated edition first published with Cambridge University Press. This new edition includes 29 chapters on topics as diverse as pathophysiology of atherosclerosis, vascular haemodynamics, haemostasis, thrombophilia and post-amputation pain syndromes.
ABC of Hypertension CRC Press
Autophagy: Cancer, Other Pathologies, Inflammation, Immunity, Infection, and Aging is an eleven volume series that discusses in detail all aspects of autophagy machinery in the context of health, cancer, and other pathologies. Autophagy maintains homeostasis during starvation or stress conditions by balancing the synthesis of cellular components and their deregulation by autophagy. This series discusses the characterization of autophagosome-enriched vaccines and its efficacy in cancer immunotherapy. Autophagy serves to maintain healthy cells, tissues, and organs, but also promotes cancer survival and growth of established tumors. Impaired or deregulated autophagy can also contribute to disease pathogenesis. Understanding the importance and necessity of the role of autophagy in health and disease is vital for the studies of cancer, aging, neurodegeneration, immunology, and infectious diseases. Comprehensive and forward-thinking, these books offer a valuable guide to cellular processes while also inciting researchers to explore their potentially important connections. - Presents the most advanced information regarding the role of the autophagic system in life and death - Examines whether autophagy acts fundamentally as a cell survivor or cell death pathway or both - Introduces new, more effective therapeutic strategies in the development of targeted drugs and programmed cell death, providing information that will aid in preventing detrimental inflammation - Features recent advancements in the molecular mechanisms underlying a large number of genetic and epigenetic diseases and abnormalities, including atherosclerosis and CNS tumors, and their development and treatment - Includes chapters authored by leaders in the field around the globe—the broadest, most expert coverage available
Introduction to Bioengineering Springer Science & Business Media
This volume of the series Cardiac and Vascular Biology presents the most relevant aspects of vascular mechanobiology along with many more facets of this fascinating, timely and clinically highly relevant field. Mechanotransduction, mechanosensing, fluid shear stress, hameodynamics and cell fate, are just a few topics to name. All important aspects of vascular mechanobiology in health and disease are reviewed by some of the top experts in the field. This volume, together with a second title on cardiac mechanobiology featured in this series, will be of high relevance to scientists and clinical researchers in the area of vascular biology, cardiology and biomedical engineering.
Springer Science & Business Media
The partition of fluid between the vascular and interstitial compartments is regulated by forces (hydrostatic and oncotic) operating across the microvascular walls and the surface areas of permeable structures comprising the endothelial barrier to fluid and solute exchange, as well as within the extracellular matrix and lymphatics. In addition to its role in the regulation of vascular volume, transcapillary fluid filtration also allows for continuous turnover of water bathing tissue cells, providing the medium for diffusional flux of oxygen and nutrients required for cellular metabolism and removal of metabolic byproducts. Transendothelial volume flow has also been shown to influence vascular smooth muscle tone in arterioles, hydraulic conductivity in capillaries, and neutrophil transmigration across postcapillary venules, while the flow of this filtrate through the interstitial spaces functions to modify the activities of parenchymal, resident tissue, and metastasizing tumor cells. Likewise, the flow of lymph, which is driven by capillary filtration, is important for the transport of immune and tumor cells, antigen delivery to lymph nodes, and for return of filtered fluid and extravasated proteins to the blood. Given this background, the aims of this treatise are to summarize our current understanding of the factors involved in the regulation of transcapillary fluid movement, how fluid movements across the endothelial barrier and through the interstitium and lymphatic vessels influence cell function and behavior, and the pathophysiology of edema formation. Table of Contents: Fluid Movement Across the Endothelial Barrier / The Interstitium / The Lymphatic Vasculature / Pathophysiology of Edema Formation
Regulation of Tissue Oxygenation, Second Edition Cambridge University Press
Discover new concepts in cardiovascular and hemodynamic functionality in feto-maternal medicine, from leading experts in the field.
Hemodynamic Monitoring and Fluid Therapy During Surgery Springer
. . . we do not know a truth without knowing its cause. Aristotle Perhaps the greatest hope that may be entertained for a scientific work, whether experimental or theoretical, is that it leads to new thoughts and new avenues of investigation on the part of its readers. In microvascular mechanics, the interplay of rheology, anatomy, and cellular and organ function has only just begun to be addressed. To understand the operational behavior of microcirculation, there is a need to integrate studies at the cellular or molecu lar level with a quantitative, biomechanical description of the circulatory system. The symposium entitled "Frontiers in Cardiopulmonary Mechanics" held in June 1988 at the University of Virginia was intended to provide a fundamental approach to the description of the circulation from the per spective of microvascular mechanics and to examine new methodology that may advance this effort. This book arose out ofthe work presented at the symposium. Aristotle expressed well the need to pursue the causes of a phenomenon in order to achieve a truthful understanding of its nature. In this spirit has each of the quantitative sciences progressed, and in this spirit we hope that this book will provide some understanding of the microvascular events and bio mechanical mechanisms underlying the behavior of circulation in general, and of pulmonary and skeletal muscle microcirculation in particular. The integrated treatment of pulmonary and systemic microcirculation provided here is intended to encourage the cross-fertilization of these two research fields.
PanVascular Medicine John Wiley & Sons
Hemodynamics makes it possible to characterize in a quantitative way, the function of the heart and arterial system, thereby producing information about what genetic and molecular processes are of importance for cardiovascular function. Snapshots of Hemodynamics: An Aid for Clinical Research and Graduate Education by Nico Westerhof, Nikos Stergiopulos and Mark I. M. Noble is a quick reference guide designed to help basic and clinical researchers as well as graduate students to understand hemodynamics. The layout of the book provides short and independent chapters that provide teaching diagrams as well as clear descriptions of the essentials of basic and applied principles of hemodynamics. References are provided at the end of each chapter for further reading and reference.
Autophagy: Cancer, Other Pathologies, Inflammation, Immunity, Infection, and Aging Springer
A review of our current understanding of the physical phenomena associated with the flow of blood through the brain, applying these concepts to the physiological and medical aspects of cerebrovascular disease so as to be useful to both the scientist and the clinician. Specifically the book discusses the physical bases for the development of cerebrovascular disease and for its clinical consequences; specific current and possible future therapies; experimental, clinical, and computational techniques used to investigate cerebrovascular disease; blood dynamics and its role; imaging methods used in the diagnosis and management of cerebrovascular disease. Intended as a one- or two-semester course in biophysics, biomedical engineering or medical physics, this is also of interest to medical students and interns in neurology and cardiology, and provides a useful overview of current practice for researchers and clinicians.
Microvascular Mechanics Springer Science & Business Media
Bioengineering is attracting many high quality students. This invaluable book has been written for beginning students of bioengineering, and is aimed at instilling a sense of engineering in them. Engineering is invention and designing things that do not exist in nature for the benefit of humanity. Invention can be taught by making inventive thinking a conscious part of our daily life. This is the approach taken by the authors of this book. Each author discusses an ongoing project, and gives a sample of a professional publication. Students are asked to work through a sequence of assignments and write a report. Almost everybody soon realizes that more scientific knowledge is needed, and a strong motivation for the study of science is generated. The teaching of inventive thinking is a new trend in engineering education. Bioengineering is a good field with which to begin this revolution in engineering education, because it is a youthful, developing interdisciplinary field.
The Mechanics of the Circulation Morgan & Claypool Publishers
First multi-year cumulation covers six years: 1965-70.
American Journal of Physiology Cambridge University Press
Biology of the Arterial Wall is intended as a general reference text concerned with the biology of the vascular cells and the blood vessel wall under physiological and pathological conditions. One of the major functions of the arteries is to maintain a continuous blood flow to the organs whatever the pressure conditions, thanks to the vasomotor tone of the smooth muscle cells. Great advances have been made over the last decade in the

understanding of the endothelial cells as integrators and transducers of signals originating from the blood stream. The pluripotent control functions of the endothelial cells in the vessel wall are now well recognized. A review of endothelial functions and dysfunctions is presented. Cell biology and molecular genetic studies have now identified an array of molecules elaborated by endothelial cells and vascular smooth muscle cells and by the blood-borne elements which interact with artery cells, defending the artery against injury and modulating evolving abnormal processes. Molecules which induce or inhibit endothelial and/or smooth muscle cells are currently under great scrutiny. Angiogenesis, which plays a major role in tumor growth, but may also be beneficial as a healing process in muscle ischemia, is discussed. Apoptosis, or programmed cell death, has only recently been recognized as an essential process in blood vessel modeling and remodeling. An overview of apoptosis in the vascular system is presented. It is increasingly evident that the adjustments of the blood vessel wall are made in the presence of deforming disease processes such as hypertension and atherosclerosis. The second part of the book is concerned with the blood vessel wall in disease conditions. Several chapters review the role of the vessel and vascular cells in inflammation, and vascular remodeling during arterial hypertension and aging. One chapter is devoted to atherogenesis, atheroma and plaque instability, followed by the pathophysiology of post-angioplasty restenosis, which is a crucial issue in modern interventional cardiology.

Pulse Waves Cambridge University Press

This reference is a volume in the Handbook of Physiology, co-published with The American Physiological Society. Growth in knowledge about the microcirculation has been explosive with the field becoming fragmented into numerous subdisciplines and subspecialties. This volume pulls all of the critical information into one volume. - Meticulously edited and reviewed. Benefit: Provides investigators a unique tool to explore the significance of their findings in the context of other aspects of the microcirculation. In this way, the updated edition has a direct role in helping to develop new pathways of research and scholarship - Highlights the explosive growth in knowledge about the microcirculation including the biology of nitric oxide synthase (NOS), endothelial cell signaling, angiogenesis, cell adhesion molecules, lymphocyte trafficking, ion channels and receptors, and propagated vasomotor responses. Benefit: Microcirculatory biology has become fragmented into numerous sub-disciplines and subspecialties, and these reference reintegrates the information in one volume

Introduction to Bioengineering Springer Science & Business Media

Combining two successful texts, Clinical Fluid Therapy in the Perioperative Setting, 2nd edition and Perioperative Hemodynamic Monitoring and Goal Directed Therapy, this revised volume provides a guide to fluid management and hemodynamic therapy for the perioperative practitioner. The book begins with an up-to-date overview of the basics before then exploring most of the current and controversial topics within hemodynamic monitoring and fluid therapy. This is followed by a section on practical use which explores hemodynamic and fluid therapy in various types of surgery and patient conditions. The book closes with a discussion of the future concepts in fluid and hemodynamic therapy ranging from microcirculation, to closed-loop and mobiles technologies. With contributions from the world's leading experts, chapters guide the reader in the application of fluid and hemodynamic therapy in all aspects of perioperative patient care. A valuable resource for those involved in perioperative patient management, including anaesthesiologists, intensivists, and surgeons.