Coronary Blood Flow - J.A. Spaan - 2012-12-06
by JULIEN IE HOFFMAN
One of the earliest coronary physiologists was Scaramucci who, in 1695, postulated that during systole the contracting myocardium inhibited coronary blood flow. Since then, the many contributions that have been made to our knowledge of the coronary circulation can be arbitrarily divided into three phases based on advances in technical methods. The early phase of research into the coronary circulation, done with great difficulty with crude methods, may be regarded as ending in the 1940s, and it included major discoveries made by such well known investigators as Georg
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**Recent Advances in Coronary Circulation** - Yukio Maruyama - 2012-12-06

Coronary circulation research is advancing at a rapid rate. Not only are innovative techniques for studying myocardial perfusion being
provide an in-depth analysis related to coronary blood flow control and mechanics are also being discovered. The progress in this field justifies an update in the form of this new monograph. The book is divided into the following sections: "Measurement of Coronary Blood Flow and Assessment of Myocardial Perfusion" discusses advances in perfusion measurements in humans as well as nonradioactive microsphere methods. "Coronary Flow Dynamics" elucidates the effect of heart contraction on coronary flow, perfusion, and reserve distribution as well as systolic-diastolic interaction. Models-a frequent topic of debate-are used to quantify hypotheses. "Models of Coronary Circulation" attempts to elucidate the concept of tissue pressure. "Regulatory Mechanisms of Coronary circulation and its Clinical Relevance": Numerous mechanisms affecting coronary flow have been defined and studied at the level of isolated vessels and whole organs. The chapters in this section of a selection of these mechanisms and their interactions. "Pathophysiology of Coronary Circulation in Ischemic Heart Disease" considers important aspects of factors which restrict perfusion of the myocardium in ischemic heart disease. An understanding these factors is of crucial importance in the management of patients. "Small Vessel Disorder in Coronary Circulation" describes circulatory flow and how it can be influenced by drugs.

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Regulation of Coronary Blood Flow - Michitoshi Inoue - 2013-11-09
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.

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**Cardiovascular Physiology Concepts** - Richard E. Klabunde - 2005

This uniquely readable, compact, and concise monograph lays a foundation of knowledge of the underlying concepts of normal cardiovascular function. Students welcome the book's broad overview as a practical partner or alternative to a more mechanistically oriented approach or an encyclopedic physiology text. Especially clear explanations, ample illustrations, a helpful glossary of terms, tutorials, and chapter-opening learning objectives provide superb guidance for self-directed learning and help fill the gap in many of today's abbreviated physiology established cardiovascular principles reflects recent, widely accepted cardiovascular research. The supplemental CD-ROM is an interactive, dynamically linked version of the book, which is organized by normal cardiovascular function and cardiac disease. Students may begin a path of questioning with, for example, a disease condition and then pursue background information through a series of links. Students can also link to the author's regularly updated Web site for additional clinical information.

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The Mechanical Interaction Between the Coronary Circulation and Ventricular Myocardium - Karen Diane May-Newman - 1993

Aspects of Mathematical Modelling - Roger J. Hosking - 2008-03-02
The construction of mathematical models is an essential scientific activity. Mathematics is associated with developments in science and engineering, but more recently mathematical modelling has been used to investigate complex systems that arise in other fields. This book demonstrates the application of mathematics to research topics in ecology and environmental science, health and medicine, phylogenetics and neural networks, theoretical chemistry, economics and management.

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**Coronary Circulation** - Ghassan S. Kassab - 2019-05-28

This comprehensive text examines both global and local coronary blood flow based on morphometry and mechanical properties of the coronary vasculature. Using a biomechanical approach, this book addresses coronary circulation in a quantitative manner based on models rooted in experimental data that account for the various physical determinants of coronary blood flow including myocardial-vessel interactions and various mechanisms of autoregulation. This is the first text dedicated to a distributive analysis (as opposed to lumped) and provides digital files for detailed anatomical data (e.g., diameters, lengths, node-to-node connections) of the coronary vessels. This book also provides appendices with specific mathematical formulations for the biomechanical analyses and models in the text. Written by Dr. Ghassan S. Kassab, a leader in the field of coronary biomechanics, Coronary Circulation: Anatomy, Mechanical Properties, and Biomechanics is a synthesis of seminal topics in the field and is intended for clinicians, bioengineers, and researchers as a compendium on the topic. The detailed anatomical and mechanical data provided are intended to be used as a platform to address new questions in this exciting and clinically very important research area.
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**Computational Modelling and Uncertainty Quantification of Blood Flow in the Coronary Arteries** - Justin Sheldon Tran - 2018

Atherosclerotic coronary artery disease continues to negatively impact the lives of millions worldwide. Computational fluid dynamics modeling of coronary blood flow has the potential to help improve clinical outcomes and aid in treatment planning. Significant advancements in coronary blood flow modeling in recent years have opened a wide range of applications such as assessing risk for disease progression or providing a platform for virtual surgery and treatment planning. To encourage the growth of this field and promote adoption of
input parameters that include clinic, it is crucial that these tools be made as automated as possible so they can be applied to large patient cohorts. In addition, the variability of computational results with respect to uncertainties in the inputs and model must be better understood and systematically quantified. Addressing these concerns is the subject of this thesis. In the first part, a framework for automatically tuning the lumped parameter boundary conditions in simulations of coronary blood flow is developed and demonstrated. Specifying boundary conditions in complex computational models is not a trivial task, especially when the dimensionality of the input space is high and multiple constraints on the outputs need to be satisfied simultaneously. Specifically in the context of patient-specific coronary simulations, clinical data such as the blood pressure, cardiac output, and coronary flow waveforms must be simultaneously satisfied with a large set of lumped resistances, capacitances, and heart model parameters. A typical user can eventually gain expertise to modify the input parameters to satisfy targets, but this manual tuning is time-consuming and not easily reproduced. We thus formulate the automated tuning process as a Bayesian inverse problem in which the model parameters are treated as random variables, and optimal parameters are determined by finding the maximum of the posterior distribution of input parameters. We also perform sensitivity analysis on the input parameters to determine a subset of thirteen parameters that most influence the clinical targets. In the second part, we perform uncertainty quantification on patient-specific simulations of coronary artery bypass graft hemodynamics. Vein graft failure in patients with coronary bypass continues to be a major clinical issue with relatively little knowledge about the mechanisms for
resolution approach. The shown that predicted quantities such as wall shear stress or wall strain can be useful in predicting vein graft failure, but adoption of such results in clinical practice is hindered due to the fact simulations can only produce deterministic results with no range of confidence. Uncertainty quantification provides a framework for quantifying the uncertainty in computational results, and we applied it to assess the variability in computed predictions of time-average wall shear stress and wall strain under uncertainty in the lumped parameter boundary conditions and vessel wall material properties. To achieve this aim efficiently, we develop a novel submodeling strategy for reducing the computational cost of the analysis. We also, for the first time, consider spatial variability in the graft wall material properties by using a random field description. We finally propagate these uncertainties forward using a newly developed multi-

results show that the time-averaged wall shear stress is relatively well estimated with confidence intervals about 35\% of the mean value, but the wall strain exhibited significantly more variability due to the large uncertainty in the material properties. In the third part, we perform a comparison of methods for modeling wall deformability in vascular blood flow simulations. Though sometimes neglected, wall deformability can have significant impacts on the computational results, affecting predictions of wall shear stress and precluding calculation of stresses and strains in the vessel wall. There are several methods proposed in the literature for modeling wall deformability, two of the most popular being the Arbitrary Lagrangian Eularian (ALE) and Couple Momentum Methods (CMM). Although both methods capture the essential characteristics of wall deformability, they can produce different results and computational performance.
This provides a rigorous comparison which will aid in the choice of deformable wall model. Additionally, we consider the concept of prestress. Because the geometry for a patient-specific simulation is extracted from medical image data of the \textit{in vivo} cardiovascular system, the vessel walls carry an internal stress which holds the geometry in equilibrium with hemodynamic pressures and viscous stresses. We implement prestress in both ALE and CMM contexts and confirm that it is necessary to avoid over-inflation of the anatomic domain. Although studied mostly within the context of coronary flow simulations, the methods and approaches outlined in this thesis are designed to be generally applicable across other domains in computational modeling, fluid dynamics, and biomechanics. Automated tuning is a general framework for assimilating multiple sources of target data to inform optimal input parameter values, and can broadly be applied in methods for uncertainty quantification can be adapted to assess variability of simulations in other computational fluid mechanics and biomechanics contexts. The results from the wall deformability comparison can also be extended to apply to other contexts including other cardiovascular diseases, respiratory flow, and medical devices. In addition to providing insights into coronary flow simulations, this thesis aims to motivate the importance of tuning, uncertainty quantification, and model comparisons for other cardiovascular simulations and multiscale biological modeling more broadly.

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**Structure-Based Mechanics of Tissues and Organs** - Ghassan S. Kassab - 2016-01-28

This book portrays the commonality of tissue microstructure that dictates physiological function in various organs (microstructure-function relation). Tissue and organ models are used to illustrate physiological functions based on microstructure. Fiber scale properties such as orientation and crimp are described in detail. Structurally-based constitutive models are given throughout the book, not only to avoid ambiguities in material characterization, but also to offer insights into the function, structure, and mechanics of tissue components. A statement of future directions of the field is also given, including how advancements, such as state-of-the-art computational modeling and optical measurements of tissue/cells structures, are taking

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**Progress in quantitative coronary arteriography** - Johan H. C. Reiber - 2012-12-06

This is the fifth volume in this series on quantitative coronary arteriography (QCA) published over the last nine years. Research and applications in this exciting, field are covered in a total of 26 chapters by world renowned experts. This book is subdivided into a total of 6 latest progress in these respective fields. In Part One a comprehensive overview is given of the current knowledge and research in endothelial function, which is of eminent importance for the further understanding of the pathophysiology of coronary artery disease in patients. Fortunately, the use of QCA tools is not limited anymore to leading research institutes; over the last several years these tools have been installed in many cardiology centers world wide. To understand the current possibilites, limitations and future expectations of QCA, several relevant topics are presented in Part Two. First of all, the questions about why and how QCA systems should be validated both at the development site and at the application sites, and whether data from different vendors and core laboratories can be pooled, are discussed. As the X-ray cardiovascular world steadily moves into the digital imaging era, differences and similarities between the conventional...
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Biological Flows - Colin G. Caro - 2013-12-19
Biomechanics has a distinguished history extending at least to the 16th Century. However the later half of this century has seen an explosion of the field with it being viewed as offering exciting challenges for physical scientists and engineers interested in the life sciences, and wonderful opportunities for life scientists eager to collaborate with physical scientists and engineers and to render their scientific work more fundamental. That the field is now well established and expanding is demonstrated by the formation of a World Committee for Biomechanics and the success and large participation in the 1st and 2nd World Congresses of Biomechanics, held respectively in San Diego in 1990 and in Amsterdam in 1994. With more than 1350 scientific papers delivered at the 2nd World Congress, either within symposia or oral or poster sessions, it would have been out of the question to try to produce comprehensive edited proceedings. Moreover, we are confident that most of the papers have been or will be published in one of the excellent journals covering the field. But of effort contributed by the plenary lecturers and the tutorial we thought that the large amount and keynote speakers of various symposia deserved to be recognised in the form of a specific publication, thus also allowing those unable to attend the presentations to share in the findings. Furthermore, we feel that there is now a need to review aspects of the field.
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**Advances in Echo Imaging Using Contrast Enhancement** - N.C. Nanda - 2012-12-06

The first edition of this definitive text ran to 24 chapters. The second edition, reflecting the explosive growth of interest in echo-enhancement, contains 44. The first section deals with some of the most important emerging issues and technologies and covers harmonic imaging, the use of echo-enhancers to provide quantitative information, and the application of enhanced power Doppler to tissue imaging. The second, on contrast echocardiography, explores the use of echo-enhancement during transesophageal imaging. One chapter describes the use of contrast-enhancement transesophageal imaging to determine coronary flow reserve and another gives a detailed account of the
the development of site-specific agents and the emergence of the new acoustically active agents.

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specific agents and the ventricular function. Other authors describe the intraoperative use of contrast echocardiography and discuss the potential of myocardial contrast echocardiography to replace thallium scintigraphy. Another chapter covers the emerging technique of transient response imaging and its role in the assessment of myocardial perfusion, and two chapters are devoted to three-dimensional contrast echocardiographic assessment of myocardial perfusion. Use of echo-enhancement in the evaluation of peripheral circulation is discussed in chapters on carotid and peripheral arterial flow imaging and others that describe renal and hepatic vascular imaging. The newer applications of echo-enhancement outside the cardiovascular system are described in three chapters devoted to the visualization of tumour vasculature. The final chapters look to the future and cover the imaging of intramyocardial vasculature, the development of site-

emergence of the new acoustically active agents.

Coronary Microvascular Dysfunction - Filippo Crea - 2013-08-15

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
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Simulation and Imaging of the Cardiac System - S. Sideman - 2012-12-06
The ultrasound velocity tomography allows measurement of cardiac geometries for various phases in the cardiac cycle. The present tomograph makes reconstructions at intervals of 20 ms. Because of a lack of clear (intramural) landmarks (except the roots of the papillary muscle), it is difficult to pinpoint spatial trajectories of particular points in the heart. Therefore, a second method was developed of injecting radiopaque markers in the heart and following their motion patterns during the cardiac cycle with help of a biplane X-ray equipment. The
The ultrasound velocity methods can be implemented in our finite element model of the heart to compute intramural stresses and strains. The results obtained so far with the extended Darcy equation to account for the interaction of blood rheology and tissue mechanics look promising. Further testing with more sophisticated subjects than mentioned in Figure 9 is required before it will be implemented in our finite element model of the heart. We conclude that analysis of regional cardiac function, including regional myocardial blood flow, requires still a major research effort but the results obtained so far justify, to our opinion, a continuation in this direction.

Acknowledgement

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**Coronary Circulation**
Johnathan D. Tune - 2014-07-01
The coronary circulation is unique in that it is responsible for maintaining adequate oxygen and substrate delivery to the organ that generates the pressure needed to drive blood throughout the entire circulatory system. In the simplest terms, coronary blood flow is directly proportional to the arterial pressure gradient across the coronary vasculature and inversely proportional to coronary vascular resistance.

Perfusion is collectively regulated by a complex variety of mechanisms which include: (1) extravascular compressive forces; (2) diastolic time fraction; (3) coronary perfusion pressure; (4) myocardial metabolism (local metabolic factors); (5) endothelial-derived substances; (6) neuro-humoral influences; and (7) arterial oxygen tension and content. This book considers each of these determinants with particular emphasis on the functional interaction between the physical and biological determinants of myocardial perfusion.

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Chapter 1 contains macroscopic and microscopic descriptions of coronary vascular anatomy, which is closely related to the functions of coronary circulation. In Chap. 2 two methods in current use to evaluate phasic coronary blood velocity waveforms are presented, i.e., the laser Doppler and ultrasound Doppler methods. Chapter 3 describes the mechanical properties of coronary circulation, a knowledge of which is indispensable for an understanding of coronary arterial and venous blood flow velocity waveforms in relation to cardiac contraction and relaxation.

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functions of coronary potential treatment alternatives, and evaluating the results of treatment. Great advances have also been made in basic research on coronary circulation and its interaction with myocardial contraction and relaxation and neural and humoral control. With respect to these developments, the papers included in the present monograph deal with important topics concerned with the basic mechanism of coronary circulation as well as ones of clinical relevance. It is directed toward physicians (cardiologists, cardiac surgeons, cardiac radiologists, anestheologists, and others) and basic scientists (e.g., physiologists, bioengineers). We would like to emphasize the importance of a multidisciplinary approach in which basic scientists and clinicians work closely together. This volume consists of nine chapters. Chapter 1 contains macroscopic and microscopic descriptions of coronary vascular anatomy, which is closely related to the circulation. In Chap. 2 two methods in current use to evaluate phasic coronary blood velocity waveforms are presented, i.e., the laser Doppler and ultrasound Doppler methods. Chapter 3 describes the mechanical properties of coronary circulation, a knowledge of which is indispensable for an understanding of coronary arterial and venous blood flow velocity waveforms in relation to cardiac contraction and relaxation.

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Ghassan S. Kassab - 2019-05-15

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**Physiological Assessment of Coronary Stenoses and the Microcirculation** - Javier Escaned - 2017-08-10

Since the introduction of coronary angiography, a key technique in understanding coronary artery disease, a number of paradigms regarding its study and interpretation have taken place. Following an emphasis on improved angiographic and subsequent intracoronary imaging techniques, functional assessment of coronary circulation has demonstrated to have major implications for diagnosis and treatment of coronary artery disease. Fractional flow reserve, a pressure derived index of stenosis severity, constitutes the best example physiological assessment in clinical practice. However, the acceptance of FFR by cardiologists contrasts with important voids in knowledge on the basic principles of coronary physiology and of other available techniques that, as an alternative to FFR, allow a more comprehensive assessment of coronary circulation. This is particularly noticeable in the assessment of microcirculation, an unavoidable compartment of coronary circulation that is frequently affected in acute coronary syndromes of in the presence of cardiovascular risk factors or non-coronary heart disease. A deeper understanding of the relationship between epicardial vessel and microcirculatory involvement has started with the advent of newer imaging techniques like invasive optical coherence tomography, and non-invasive CT and NMR techniques. This book aims to be an indispensable tool for clinicians and researches in the field of coronary artery
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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 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.

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Topics include basic considerations and techniques, venous drainage of the myocardium, structure and function of the cardiac lymphatic system, coronary sinus interventions in experimental research, and more.

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Heart Physiology and Pathophysiology, 4E, provides the foundation for the scientific understanding of heart function and dysfunction, and bridges the gap between basic cardiovascular science and clinical cardiology. This comprehensive text covers all the important aspects of the heart and vascular system. The most important and relevant disorders are presented, with emphasis on the mechanisms involved. The first three editions of this book developed a reputation as the leading reference in cardiovascular science for researchers and academic cardiologists. This recent edition has been updated, expanded, and includes a number of new contributors. It has also been remodeled to expand its usage as a text reference for cardiology residents, practicing cardiologists, and graduate students. Key Features * The most comprehensive book available on this topic * Clear, concise, and complete coverage of all important aspects of cardiovascular physiology/pathophysiology * Completely updated version of the foremost reference on cardiovascular science, including new information on pathophysiology and electrophysiology * Useful tool in bridging the gap between basic science, pathophysiology, and clinical cardiology.
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Basic Sciences for MCEM - Chetan Trivedy - 2016-05-15

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
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The objective of this book is to provide the researcher and clinician with the recent developments in the analysis and assessment of cardiovascular function. The chapters are organized into sections that correspond with the various anatomical levels of the cardiovascular system.
To a large extent, recent focus on the cardiovascular system function has been directed at the molecular level to the near exclusion of the tissue and organ function. While this may be useful in developing new therapeutic drugs, it does not aid the cardiologist or surgeon, who routinely deal with patient symptoms. This book integrates the micro-level and organ-level function so that new information may be assimilated into the cardiovascular system as a whole. Within each section, the chapters have been arranged to progress from recent theoretical developments, to experimental research, and finally to clinical applications. This approach facilitates the timely transfer of information from basic research to the clinic. The strength of the analytical approach will be evident to the reader. The theoretical analysis offers guidance to experimental design and, in some cases, offers solutions where measurements are as yet unattainable. In moving from newly attained knowledge to emphasizes the noninvasive methods in the future as technological advances occur. Such methods are desirable and the trend towards early preventive diagnosis is sought. What follows are highlights of new developments covered in each section of the book.

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**Coronary Pressure** - N.H. Pijls - 2013-06-29
A little bit more than two years after the first edition, we are pleased to publish the second edition of this book. More than half of the chapters have been remodeled and completed as the result of technical improvements and recently acquired clinical data. During these two years, the number of coronary pressure measurements during diagnostic and interventional procedures has increased almost exponentially. Most of the initial problems associated with this new approach have been overcome. Many colleagues have explored new research avenues and in many catheterization laboratories the method has matured from a research toy to a clinical tool. Classical indications such as the intermediate stenosis and guidance of PTCA or stent implantation, have been largely extended and coronary pressure measurement has proven to be useful in multi vessel disease, diffuse disease, long and serial stenosis, after myocardial infarction, and in many other diagnostic and interventional situations encountered in the catheterization laboratory. Quite unexpectedly, this approach has also enforced the ties with our surgical colleagues in the selection of patients suitable for minimal invasive surgery or hybride revascularization. Also in mild and intermediate left main
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Coronary Bypass Surgery in the Elderly - P.J. Walter -

Coronary artery bypass surgery in the elderly: Too often or too seldom? It is a testimony to scientific advances that raising a simple inquiry today, such as whether coronary artery bypass surgery is done too often or too seldom in elderly patients, requires an exploration of what viewsonemightholdonseveral medical as well as non-medical issues. Unlike earlier years when doctors were clinically free to decide what should be done with a patient, health has become an expensive human right, decisions about which also involve the patient, the epidemiologist, the health policy administrator, politicians, the exchequer, and the philosopher. In its broadest definition health has come to mean the core of well-being and, therefore, the goal of any socio-economic system. Until only a decade ago, medical opinion regarding how often coronary artery bypass surgery (CABG) was indicated or useful was unclear. Because of multi-

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**Cardiac Positron Emission Tomography** - Ernst E. van der Wall - 2012-12-06
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cardiac PET may deepen our important issues in clinical cardiology. In particular, absence or presence of viability may be decisive in patient management, and the decision to perform angioplasty (PTCA) or bypass surgery (CABG) is frequently based on the accurate assessment of viability. Although echocardiography and conventional nuclear medicine techniques may provide valuable information on viability, positron emission tomography (PET) is currently considered to be the gold standard for the assessment of myocardial viability. The simultaneous evaluation of myocardial metabolism and perfusion allows precise delineation and accurate quantification of residual myocardial viability in affected regions. In addition, accurate quantification of myocardial perfusion alone may provide insight into the basic mechanisms of syndrome X and may assist in the appropriate clarification of this clinically complicated, but frequently occurring phenomenon. Besides that, insight into metabolism and perfusion of cardiac muscle disease, particularly in hypertrophic cardiomyopathy. Furthermore, receptor imaging studies with PET will become important as the study of cardiac neurohumoral regulation in heart failure has gained in interest. Cardiac Positron Emission Tomography: Viability, Perfusion, Receptors and Cardiomyopathy describes the most recent developments in cardiac PET as these are related to myocardial viability and myocardial perfusion studies of syndrome X. The value of PET for receptor imaging and cardiac muscle disease is also discussed. For cardiologists, nuclear medicine physicians, radiochemists, physiologists, technicians and basic researchers interested in understanding the most recent achievements in cardiovascular PET.

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Heart failure has gained in interest. Cardiac Positron Emission Tomography: Viability, Perfusion, Receptors and Cardiomyopathy describes the most recent developments in cardiac PET as these are related to myocardial viability and myocardial perfusion studies of syndrome X. The value of PET for receptor imaging and cardiac muscle disease is also discussed. For cardiologists, nuclear medicine physicians, radiochemists, physiologists, technicians and basic researchers interested in understanding the most recent achievements in cardiovascular PET.

### Myocardial Damage - Juan Carlos Kaski - 2013-03-09

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The spectrum of unstable coronary syndromes has been the object of steadily increasing research particularly in respect of novel diagnostic and treatment modalities. Although the WHO criteria for the diagnosis of acute myocardial infarction have been known for decades, there is still much debate as to the proper use of these, especially the handling of biochemical markers. Traditional enzymes have limitations in diagnostic power and new markers have unclarified applicability with regard to standardisation of assays and decision limits. Furthermore, the growing understanding of the conception of minimal myocardial damage in the borderzone between unstable angina pectoris and myocardial infarction necessitates refinement in the definitions of the various entities within the kaleidoscope of acute myocardial ischaemia. There has been a strong impetus within the European Society of Cardiology to present this subject to a broad audience of cardiologists, and as a consequence the theme of increasing research particularly in respect of novel diagnostic and treatment modalities.

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**Myocardial Viability** - A.E. Iskandrian - 2012-12-06
AMI E. ISKANDRIAN & ERNST E. VAN DER WALL
The first edition of this book was published in 1994. Since then important advances have occurred in the field of myocardial viability. This, coupled with increasing interest by the scientific community in the broader issues of its relevance to patient care, suggested to us the need to write the second edition. We are most fortunate to have the help of a distinguished group of experts who have helped shape the field; we appreciate their commitments and contributions. Almost all chapters have been radically modified. Chapter 1 deals with pathophysiology of myocardial hibernation and stunning; Chapter 2 with apoptosis; Chapter 3 with the role of positron emission tomography; Chapters 4 and 5
who have helped shape the emission computed tomography with thallium-201 and technetium agents, respectively; Chapter 6 with the role of SPECT fatty acid imaging; Chapter 7 with the role of SPECT FDG imaging; Chapter 8 with the role of cardiac catheterization angiography; Chapter 9 with the role of echocardiography; Chapter 10 with the role of magnetic resonance imaging; and Chapter 11 with clinical applications. Finally, Chapter 12 provides a short summary.

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It is the mark of an instructed mind to rest satisfied with the degree of precision which the
principles supported the and not to seek exactness where only an approximation of the truth is possible. Aristotle With the development of imaging techniques, the in vivo study of human anatomy and physiology has become possible with increasing “approximation of the truth.” Advances have been made not only in data acquisition, but also in processing as well as visualization of functional and morphological data. Following the successful application of planar two-dimensional imaging approaches, more recently three-dimensional data acquisition and corresponding tomographic image reconstruction has become possible. With the rapid growth of computer support, advanced processing allows for user-friendly interaction with complex data sets. Classical x-ray imaging techniques have matured to excellent spatial resolution and contrast, which provide specific delineation of anatomical changes occurring in cardiovascular disease. In parallel, the use of tracer successful introduction of nuclear medicine procedures for the functional characterization of physiology and pathophysiology. The application of such techniques were initially limited by relatively poor spatial resolution, but excelled in high sensitivity 30 years, scintigraphic imaging emerged from and specificity. In the last rectilinear scanning to planar gamma camera imaging and single-photon xvi Preface emission tomography (SPECT). Based on these advances and the experimental success of autoradiography, the potential of scintigraphy as a clinical and research tool has been well appreciated.

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In the past few years it has become clear that left ventricular dysfunction, even of severe degree, may be reversible after coronary revascularization in some patients. As a result, myocardial viability has captured the imagination of researchers and clinicians seeking to unravel the cellular and subcellular mechanisms and define appropriate diagnostic modalities. These
patients. As a result, cardiac catheterization, positron-emission tomography, magnetic resonance imaging, two-dimensional echocardiography and single-photon imaging. This book, for the first time, brings together a diverse array of information in a comprehensive and concise fashion using a template of ten chapters written by experts in the field. It will be required reading for cardiologists, radiologists, nuclear medicine specialists, cardiac surgeons, anesthesiologists, internists and basic researchers and their trainees who are involved in the management of patients with coronary artery disease in whom myocardial viability is a clinically relevant issue.

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Purines and Myocardial Protection - Anwar-Saad A. Abd-Elfattah - 2012-12-06
A critical review of the most up-to-date research on purines and myocardial protection. The role of purines in reversible `myocardial stunning' and irreversible (myocardial infarction) ischemic injury, ventricular arrhythmias, and ischemic preconditioning is discussed in detail, by experts. All reviews address recent and rather controversial issues on purines and myocardial protection. Mechanisms of cardioprotection of exogenous versus endogenous purines are discussed in detail. The contribution of internationally recognized experts in the field of purines and cardiovascular physiology and in myocardial protection makes this a unique and interesting book for clinicians, basic scientists and students.

Myocardial Protection and the KATP Channel - Derek Yellon - 1995-12-31
The ATP-sensitive potassium channel (KATP) was discovered in 1983. Since then, an enormous amount of research has been undertaken to characterize it in detail. This volume consolidates both the current knowledge and most recent advances on the
nature and its use in the myocardial protection. To this end, the editors have assembled investigators at the forefront of ongoing basic and clinical research to provide scholarly and candid comments concerning each of the pertinent issues, including: a comprehensive review of the biology of the channel with respect to the structure-activity relationship as well as overall chemistry of the channel; the role of opening this channel and its effect on smooth muscle (covering both the effects on myocardial stunning and its ability to protect against myocardial infarction); the relationship of KATP channel opening and the protection to the myocardium afforded by the phenomenon of ischemic preconditioning; the relationship between the KATP channel and electrophysiological consequences with specific reference to arrhythmogenicity; and the clinical implications of the use of agents that mimic the opening of this channel, with reference to its protective treatment of angina.

Audience: Clinicians and basic scientists who have a direct interest in the KATP channel as well as those groups who are interested in the entire concept of myocardial protection and its relationship to academic and clinical medicine.

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