

# ADVANCES IN QUANTITATIVE CORONARY ARTERIOGRAPHY

edited by

Johan H.C. Reiber and Patrick W. Serruys



# Quantitative Coronary Arteriography

**Johan H. C. Reiber, P.W. Serruys**



## **Quantitative Coronary Arteriography:**

**Progress in quantitative coronary arteriography** Johan H. C. Reiber, P.W. Serruys, 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 parts each emphasizing the 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 possibilities 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 cinefilm and the modern digital approaches are presented Currently the widespread use of digital imaging is still hindered by the lack of proper archival and exchange media Requirements and possible solutions for this problem are handled in this section as well

**State of the Art in Quantitative Coronary Arteriography** Johan H. C. Reiber, P.W. Serruys, 2012-12-06 Over the past twenty years technical advances in coronary arteriography have contributed to our understanding of the pathophysiologic aspects and natural history of coronary artery disease Probably more than 700 000 coronary arteriograms are performed annually throughout the world Usually these arteriograms are interpreted visually to determine the morphologic extent and severity of coronary artery disease These subjective determinations which are hampered by relatively large intra and interobserver variations are used as a basis for critically important therapeutic decisions Which arteries are to be revascularized which lesions are suitable for coronary bypass surgery or for percutaneous coronary angioplasty To improve on this clinical decision making on the treatment and follow up of such patients new objective and reproducible techniques for the assessment of the extent and severity of coronary artery disease both in terms of anatomy and functional significance of the lesions must be made widely available With such new procedures and technologies the efficacy of new therapeutic procedures the effects of vasodilating and constricting drugs and the results of long term studies on the regression and progression of atherosclerotic plaque can be determined in an objective and cost effective manner

**Advances in Quantitative Coronary Arteriography** Johan H. C. Reiber, P.W. Serruys, 2012-12-06 In this fourth book in the series on quantitative coronary arteriography QCA with the earlier three volumes published in 1986 1988 and 1991 the latest developments in this exciting field are covered Both the methodological and clinical application aspects of these advances are presented in a comprehensive manner in a total of 37 chapters by world renowned experts The book is subdivided into a

total of eight parts beginning with the more methodological issues such as QCA and other modalities 3 chapters cine film versus digital arteriography 3 chapters quality control in QCA 4 chapters and coronary blood flow and flow reserve 3 chapters Since QCA has been well established as the technique for the assessment of regression and progression in atherosclerotic disease and of restenosis after recanalization procedures major clinical trials in both groups are described extensively by their principal investigators in a total of 11 chapters In addition the QCA results after the application of various recanalization techniques are presented in another eight chapters In the last part the experiences with various intracoronary prostheses with the emphasis on QCA are discussed in five chapters This large increase in application oriented chapters means that QCA is well alive and gaining momentum Although the accuracy and precision of the analytical methods steadily improve with the increasing complexity of the algorithms there is still always the human factor involved in these processes in terms of frame selection segment definition etc

**Quantitative Coronary Arteriography** Johan H C Reiber, P. W. Serruys, 1991-03-31 *Quantitative Coronary Angiography in Clinical Practice* P.W. Serruys, D.P. Foley, Pim J. de Feyter, 2013-04-17 Quantitative coronary angiography has become an invaluable tool for the interventional cardiologist providing objective and reproducible measurements of coronary artery dimensions which can be used to study progression or regression of coronary atherosclerosis as well as the immediate and long term effects of percutaneous interventions Until recently this powerful imaging technology was confined to a small number of so called high level institutions Fortunately with the development of digital cardiac imaging equipment and adaptation of cine angiographically based computer software for on line use in the catheterization room quantitative coronary angiography is now available to all interventionalists This book is a timely guide for the impending QCA user providing practical as well as theoretical and scientific information A comprehensive evaluation of the clinical usefulness of QCA is covered from the fundamental principles through experimental validation studies application to clinical trials of a wide range of pharmacological and interventional therapies in the full spectrum of clinical presentation of coronary disease syndromes evaluation of the therapeutic efficacy of various new devices for coronary intervention together with extensive presentation of its physiological functional and anatomical correlations by comparison with other intracoronary measurement and imaging techniques In addition evolving theories and concepts in the ever topical restenosis phenomenon after percutaneous intervention based on serial QCA studies are presented and discussed and a potentially unifying methodological approach to further study of this ubiquitous problem is offered This book thanks to the collaboration of many experts in the field of intracoronary imaging and measurement provides stimulating interesting and practical information both for the academic scientist and practising clinician

New Developments in Quantitative Coronary Arteriography Johan H. C. Reiber, P.W. Serruys, 2012-12-06 There are few techniques that have influenced therapeutic strategies in modern cardiology to a similar extent as coronary arteriography Bypass surgery as well as transluminal coronary angioplasty would not have been possible without coronary angiography serving as a midwife in

their evolution Despite the widespread and long standing use in clinical practice however the interpretation of coronary angiograms has not changed very much since the early days Most angiograms are still reviewed in a visual and semi quantitative and thus often very subjective way In the face of an almost exploding field for interventional catheterization including thrombolysis balloon dilatation and other rapidly evolving techniques for transluminal revascularization or recanalization a more detailed and quantitative analysis of coronary arteriograms is urgently required In addition to the delineation of coronary morphology we need dynamic and functional information about flow and perfusion to understand the physiological significance of anatomic abnormalities Coronary arteriography contains and can provide most of this information With the application of appropriate techniques it can be made available in the catheterization laboratory even during the patient's investigation thus facilitating and improving clinical decision making Objective and reproducible analysis will furthermore enhance our understanding about the pathophysiology of coronary disease **Quantitative**

**Coronary and Left Ventricular Cineangiography** Johan H. C. Reiber, P.W. Serruys, C.J. Slager, 2012-12-06 In recent years there has been an increasing interest in quantitative analysis of coronary cineangiograms and already for a longer time of left ventricular cineangiograms The need for quantitation of coronary arterial dimensions has been stimulated by the introduction of new therapeutic procedures in the catheterization laboratory such as the balloon dilatation technique PTCA and thrombolytic therapy by the need to study the vasoactive responses of pharmaceutical agents and also by the desire to study the progressive nature of coronary artery disease with the ultimate goal to find ways to bring a halt to the progression of coronary atherosclerosis or even achieve regression of the disease Parallel with these clinical developments rapid technical developments in computer architectures and semiconductor memories have made it possible to digitize and store cineframes or selected portions thereof in image processors and to analyze these pictorial data quantitatively at affordable prices More than 15 years of research have been directed by various groups towards the semi or fully automated delineation of the left ventricular boundaries on a frame to frame basis Yet not a single system with fully automated capability is commercially available In the mean time many different left ventricular wall motion models have been developed again with little consensus on which model is to be preferred as no golden standard exists Coronary CT Angiography In The

Quantitative Analysis Of Coronary Plaques Zhong-hua Sun, 2018-02-26 This book provides a comprehensive overview of the author's work which includes significant developments of coronary CT angiography in the diagnosis of coronary plaques The main contributions of the book lie in the following areas both 2D and 3D analysis of coronary plaques with coronary CT angiography diagnostic value of coronary CT angiography with use of different multislice CT scanners quantitative analysis of coronary plaques in terms of lumen assessment and bifurcation angle analysis in particular the diagnostic performance of coronary CT angiography in calcified plaques and finally hemodynamic analysis of plaques with regard to the effects of plaques on coronary blood flow and CT derived fractional flow reserve FFRCT **Coronary Artery Disease** James T.

Willerson, David R. Holmes, Jr., 2015-03-11 Cardiovascular Medicine Coronary Artery Disease will offer today's most up to date user friendly guidance on the evaluation diagnosis and medical and surgical treatment of this most important aspect of cardiovascular disease and will be on the wish list for every trainee and practising cardiologist cardiac surgeon vascular surgeon diabetologist cardiac radiologist and any physician who manages cardiac patients The book is dedicated to providing comprehensive coverage of every aspect of coronary arterial medicine from cardiac signs and symptoms through imaging and the genetic basis for coronary disease to surgery interventions treatment and also to preventive cardiology The Editor and a group of contributing world authorities offer their decades of scientific and clinical experience A major selling point is the consistent chapter organization clear design and engaging text that includes user friendly features such as tables lists and treatment boxes The reader will have all the guidance to diagnose and manage a full range of conditions in a series of textbook resources while also having access to additional video material from the integral website **Coronary Radiology**

Matthijs Oudkerk, 2013-06-29 Due to the enormous progress in multidetector CT technology as well as in magnetic resonance angiography non invasive coronary imaging has matured to become a clinical tool in daily radiologic practice Therefore this book is a timely addition to the series Medical Radiology Diagnostic Imaging This is the most comprehensive and up to date work on all aspects of non invasive visualization of the coronary arteries that is currently available The very latest developments in the field are all described in this superbly illustrated volume I am very much indebted to the editor of this volume Professor M Oudkerk a well known international expert in cardiac radiology for his immense dedication and his tireless efforts to prepare and edit this outstanding volume in such a short time I would like to congratulate him and the contributing authors all selected for their exceptional expertise on the superb quality of the different chapters and the wide range of topics covered This work will be a daily source of reference for all radiologists and cardiologists involved in non invasive coronary imaging and will provide a solid base of information for those taking their first steps in this fascinating field I am confident that this outstanding volume will meet considerable success with the readership of our series

**Angiocardiography** H. Just, P.H. Heintzen, 2012-12-06 With contributions by numerous experts Cumulated Index Medicus, 1977 **Interventional Cardiology** Carlo Di Mario, George D. Dangas, Peter Barlis, 2011-08-02 This new volume

offers a balanced and current presentation of the key topics that form the cornerstone of an Interventional Cardiology training program Globally recognized editors and contributors draw on their years of experience to provide practical information emphasizing the basics of material selection and optimal angiographic setup for purposes of the interventional procedure Comprehensive chapters address the different techniques of approaching complex coronary lesions such as chronic occlusions bifurcations and unprotected left main lesions Textbook of Interventional Cardiology E-Book Eric J. Topol, Paul S. Teirstein, 2015-08-21 Ideal for cardiologists surgeons and referring physicians who need a clinical guide to interventional procedures Textbook of Interventional Cardiology focuses on the latest treatment protocols for managing heart

disorders at every level of complexity In this updated edition Dr Topol continues to bring together experts in the field who present the current state of knowledge and clinical practice in interventional cardiology including cutting edge theories trends and applications of diagnostic and interventional cardiology as well as peripheral vascular techniques and practices Offers an in depth understanding of cardiology making it well suited for cardiology and interventional cardiology exam preparation Expert guidance from leading authorities ensures a fresh and balanced perspective on every aspect of interventional cardiology Presents the most recent genetic information and clinical trials related to interventional cardiology Highlights the latest treatment advances procedures devices and techniques including transcatheter aortic valve implantation TAVI Brand new chapters include Radiation Safety Renal Denervation for Resistant Hypertension Post PCI Hospitalization Length of Stay and Discharge Planning and Interventional Heart Failure Offers balanced coverage of the entire scope of technologies available without favoring one particular device over another Integrates the latest trial data into discussions on clinical practice and recommendations Multiple images of devices and intra procedural imaging enhance your visual understanding of the material Key Points boxes at the beginning of each chapter summarize the most important facts

*Chronic Coronary Artery Disease: A Companion to Braunwald's Heart Disease E-Book* James de Lemos,Torbjørn Omland,2017-01-03 Featuring expert guidance from Drs James de Lemos and Torbjørn Omland as well as other globally known leaders in cardiology Chronic Coronary Artery Disease covers every aspect of managing and treating patients suffering from chronic coronary syndromes This brand new companion to Braunwald's Heart Disease was designed as a stand alone reference for physicians treating patients who present with complex unique challenges offering the latest information on the use of imaging modalities in diagnosis and treatment advances in interventional and surgical approaches to revascularization new medications to improve symptoms and outcomes in chronic CAD and much more Covers every aspect of evaluation and treatment of patients who suffer from chronic coronary syndromes Provides both evidenced based recommendations from the most recent guidelines from the major cardiology societies AHA ACC and ESC as well as practical management tips from leading experts with extensive clinical experience Highlights new developments concerning epidemiology and prevention pathophysiology and clinical findings as well as laboratory testing invasive and non invasive testing risk stratification clinical decision making and prognosis and management of chronic coronary syndromes Features information on today's hot topics including the use of novel imaging modalities in diagnosis and treatment and emerging therapies to improve outcomes in chronic CAD

**Regression of Atherosclerotic Lesions** M. Rene Malinow,2013-06-29 The Advanced Study Institute on Regression of Atherosclerotic Lesions sponsored by the North Atlantic Treaty Organization was held in Maratea Italy September 11-13 1983 The institute was designed to foster discussion of experimental data on the regression of atherosclerosis in animals and evidence of a similar phenomenon in humans The participating scientists showed with anatomical and biochemical data that atherosclerosis regresses in cholesterol fed animals after withdrawal of

atherogenic stimuli The existence of regression in humans was inferred from sequential angiographic visualization of arteries but anatomical and biochemical characteristics of the process have not been defined Two mechanisms are probably involved in such an angiographic regression The first which may occur when hyperlipidemia is partly or fully corrected or during undernutrition or other metabolic abnormalities may be related to atherosclerosis changes noted in animals undergoing regression The second type seems independent of changes in plasma lipid levels and may involve resolution of thrombi or other underlying arterial wall factors The relative frequencies of the two mechanisms are unknown whether they can occur simultaneously also warrants consideration It is likely that an exciting milestone will be forthcoming when regression of atherosclerosis is unequivocally demonstrated in humans Publication of these institute proceedings constitutes a valuable background for future developments

**Cardiovascular Imaging** Johan H. C. Reiber, Ernst E. van der Wall, 2012-12-06 In the past coronary arteriography was the only modality available to provide high quality images of the coronary anatomy Quantitative coronary arteriography QCA was developed implemented validated and extensively applied to obtain accurate and reproducible data about coronary morphology and the functional significance of coronary obstructions Over the last few years extensive basic technological research supported by clinical investigations has created competing modalities to visualize coronary morphology and the associated perfusion of the myocardial muscle Currently the following modalities are available X ray coronary arteriography intracoronary ultrasound contrast and stress echocardiography angiography nuclear cardiology magnetic resonance imaging and cine and spiral CT imaging For all these imaging modalities the application of dedicated quantitative analytical software packages enables the evaluation of the imaging studies in a more accurate reliable and reproducible manner These extensions and achievements have resulted in improved diagnostics and subsequently in improved patient care Particularly in patients with ischaemic heart disease major progress has been made to detect coronary artery disease in an early phase of the disease process to follow the atherosclerotic changes in the coronary arteries to establish the functional and metabolic consequences of the luminal obstructions and accurately to assess the results of interventional therapy Aside from all these high tech developments in cardiac imaging techniques the transition from the analogue to the digital world has been going on for some time now For the future it has been predicted that the CD R will be the exchange medium for cardiac images and DICOM 3 the standard file format This has been a major achievement in the field of standardization activities Since these developments will have a major impact on the way images will be stored reviewed and exchanged in the near future an important part of this book has been dedicated to DICOM and the filmless catheterization laboratory Cardiovascular Imaging will assist cardiologists radiologists nuclear medicine physicians image processing specialists physicists basic scientists and fellows in training for these specialties to understand the most recent achievements in cardiac imaging techniques and their impact on cardiovascular medicine

**New Developments in Myocardial Imaging** Simon Braat, Marie-Paul Larock, Michael Maisey, Pierre Rigo, Heinz Sochor, 1993-01-01 Examines the



advantages of technetium 99mTc sestamibi and its uses in diagnosis management and prognosis of coronary artery disease Each chapter covers a particular set of clinical problems using case studies with correlation of sestamibi studies with ECG scintigraphy and angiography Computational Modeling for Assessing Coronary Artery Pathophysiology Christos Bourantas,Rob Krams,Yoshinobu Onuma,Patrick W. Serruys,Peter Stone,Ryo Torii,2022-09-27 *CARS 2002 Computer Assisted Radiology and Surgery* H.U. Lemke,M.W. Vannier,K. Inamura,A.G. Farman,K. Doi,J.H.C. Reiber,2012-12-06 Progress in specific computer assisted techniques digital imaging computer aided diagnosis image guided surgery MEMS etc combined with computer assisted integration tools offers a valuable complement to or replacement for existing procedures in healthcare Physicians are now employing PACS and telemedicine systems as enabling infrastructures to improve quality of and access to healthcare Tools based on CAD and CAS facilitate completely new paths in patient care To ensure that CARS tools benefit the patient collaboration between various disciplines specifically radiology surgery engineering informatics and healthcare management is a critical factor A multidisciplinary congress like CARS is a step in the desired direction of knowledge sharing and crossover education It provides the necessary cooperative framework for advancing the development and application of modern computer assisted technologies in healthcare

## Whispering the Techniques of Language: An Psychological Journey through **Quantitative Coronary Arteriography**

In a digitally-driven earth wherever screens reign great and quick transmission drowns out the subtleties of language, the profound techniques and psychological nuances hidden within words often go unheard. Yet, nestled within the pages of **Quantitative Coronary Arteriography** a captivating literary value blinking with organic thoughts, lies an extraordinary journey waiting to be undertaken. Penned by a talented wordsmith, that charming opus attracts visitors on an introspective journey, delicately unraveling the veiled truths and profound affect resonating within the very fabric of each and every word. Within the mental depths with this touching review, we can embark upon a genuine exploration of the book is core themes, dissect its charming publishing fashion, and yield to the strong resonance it evokes strong within the recesses of readers hearts.

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## **Quantitative Coronary Arteriography Introduction**

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