
Preface

The reason we are editing this book 10 years after one of us edited a similar publication is that the problem remains regarding how to integrate into optimized diagnostic protocols the vast amount of information that cardiac imaging can yield. At this time, even more so than 10 years ago, technological advances in cardiac imaging enable high-speed and high-resolution imaging of a wide spectrum of phenotypic manifestations related both to anatomy and function of the heart. However, in general, such imaging techniques involve high operational costs in terms of instrumentation/imaging agents and/or human resources/expertise. Furthermore, the process of integrating the wealth of information obtained by different 3D techniques is still far from allowing direct translation into clinical cardiology. Across countries, educational inequalities probably account for most of the difficulty in achieving meaningful merging of different approaches to cardiac imaging into diagnostic algorithms optimized in terms of clinical efficacy and cost effectiveness. In this regard, even if national rules often make imaging specialists and cardiologists equal in terms of years of training, the educational paths are frequently completely different in terms of clinical experience and crosstalk.

The solution to this problem is rather complex, and we believe that important steps forward will occur in this process thanks to growing interaction among the involved scientific medical societies. Great efforts in this direction have already been initiated—for instance, by implementing uniform processes of quality control in cardiology, radiology, and nuclear medicine and by updating guidelines. The unfavorable financial situation currently experienced worldwide will inevitably lead to strict control of the cost-benefit ratio of each technique and to definition of the more accurate, reliable, and reproducible prognostic parameters defining patient outcomes. Wise spending is already becoming a basic component of cardiac imaging, along with growing concerns regarding patient exposure to radiation.

Thus, despite towering technological progress and its growing everyday clinical use, the “circus” of cardiac imaging goes on setting new, increasingly advanced, goals and endpoints to enhance diagnostic accuracy and optimize merging of the imaging information spectrum. In order to reach these goals, we must expand our knowledge far beyond

our limited specialty areas and open our investigations to all available techniques. This is the rationale that guided us in collating this handbook. We asked a team of highly qualified experts from around the world to present and discuss the basic concepts of cardiac anatomy and pathophysiology of coronary circulation as a basis for cardiac imaging, focusing discussion on the integration of images and techniques to be used by the reader in clinical practice. Thus, each specialist contributing to this book compared data obtained within his/her subspecialty with the other contributing specialists. As a result, physicians ranging from cardiac surgeons, internal medicine specialists, and public health administrators can understand the key to hybrid cardiac imaging.

[Chapter 1](#) of the book describes the anatomy of the heart and shows the link between imaging anatomy, function, and perfusion. To attain this information, stressors are needed, taking into consideration the variable degree of coronary vasodilation induced by physical or pharmacological stimulation. [Chapter 2](#) describes all types of stressors and their contraindications and side effects. Perfusion is described in [Chapter 3](#) without referring to a single technique but, rather, with an open perspective on all of them. The message is that perfusion itself is more valuable than the investigation technique being used, and differences among 3D methods should be well known by all specialists. [Chapter 4](#) deals with myocardial innervation, an old but recently rediscovered method to assess adrenergic function, mostly relevant in heart failure. The value for clinical outcome of this evaluation is considerable, especially in high-risk populations. Beyond imaging, another important target is radiation dose reduction to patients both in multi-slice computed tomography and single photon emission computed tomographic imaging. In this regard, [Chapters 5](#) and [6](#) describe the state-of-the-art of approaches that reduce exposure; the perspective of these approaches is to achieve better reproducibility in the future of low-dose procedures, combined with better quantitative management of cardiac patients, such as, for example, absolute left ventricular volume rather than ejection fraction; mass rather than wall thickness. The main issues for specialists who wrote [Chapter 7](#) were to comment on the true role of 3D imaging in terms of standards (pathology) and available techniques or instrumentations to make image fusion applicable within imaging techniques. This chapter will probably make this book bewitching for clinicians, as with the last chapter, which compares current guidelines with evidence-based patterns of patient management. Of course, guidelines cannot be updated every month, but the common feeling is that some of them should include more cardiac imaging, particularly regarding myocardial innervation and stratification of high-risk patients, including those with diabetes.

Based on the above considerations, the best way to read this book is cover to cover, getting the best from each technique in an integrated perspective relative to the others, and attempting to avoid misadventures that frequently happen in this field.

Thank you for reading *From Basic Cardiac Imaging to Image Fusion—Core Competencies versus Technological Progress*. When you do, we will be honored to receive your comments by email:

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January 2013, Pisa, Italy

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From Basic Cardiac Imaging to Image Fusion

Core Competencies Versus Technological Progress

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2013, XVIII, 134 p. 47 illus., 36 illus. in color., Hardcover

ISBN: 978-88-470-2759-6