Cardiovascular MRI

Contemporary Cardiology

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150 Multiple Choice Questions and Answers

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Foreword by Warren J. Manning, MD

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To my parents, brother, and teachers who made me who I am and helped me get this far.

To my beloved wife Mary, our lovely daughter Katerina, and our unborn son, who are the light in my life and keep me going.

Foreword

It has now been 20 years since I was a cardiology fellow and viewed my first cardiovascular magnetic resonance (CMR) image. This seminal event in my career occurred during an otherwise unremarkable Wednesday morning cardiac catheterization conference. Dr. Sven Paulin, Chief of Radiology at the former Beth Israel Hospital, Boston, showed us a cine ECG-triggered gradient-echo CMR study in a patient with severe aortic regurgitation. Although crude by today's standards, this cine image with obvious valvular dysfunction "took my breath away" and led me on my noninvasive imaging career.

Since then, CMR has evolved from a somewhat laborious research tool with "great potential" to a widely used and multifaceted clinical tool with a multitude of rapid imaging sequences used by clinicians around the globe to advance our understanding of cardiovascular disease and the care of our patients. We have witnessed the development of CMR-focused societies composed of clinicians and scientists, such as the Society for Cardiovascular Magnetic Resonance and European Cardiac MR Working Group, as well as the publication of guidelines by the American College of Cardiology, European Society of Cardiology, and Society for Cardiovascular Magnetic Resonance for the clinical use of CMR. With this growth has come the important issue of CMR training for our cardiovascular fellows and radiology residents/fellows as well as the education and training of the much larger number of cardiovascular imaging practitioners who have completed their formal training.

The versatility of CMR for assessment of cardiac anatomy, function, viability, perfusion, blood flow, ischemia, and vasculature has always been both its great strength and great weakness. Strength for the ability of CMR to provide a comprehensive assessment of cardiovascular physiology and pathology; weakness because of the inherent complexity of CMR—tissues may be black, gray, or white depending on the sequence and underlying pathology and the use of an exogenous contrast agent. "It is so complex" are the words often expressed by those new to the field. Indeed, guidelines for fellowship training and postgraduate training for the clinical practice of CMR include substantial didactic efforts to fully appreciate and harness the power of CMR.

Although formal CMR textbooks are widely available, Dr. Danias has provided us with a unique, thematically organized, multiple choice question and answer

format text to learn and to test our knowledge of CMR. CMR practitioners at all levels will find this text useful because of its clarity in presentation and wide breadth of coverage, with the added value of references for those who wish to pursue more in-depth discussions.

The question is no longer "when" will CMR have a clinical role, but rather "which patient" and using what sequence/application. Dr. Danias has provided us with a valuable learning tool that will benefit both the new and the seasoned CMR practitioner. As the field continues to advance, I look forward to the next 150 questions!

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Preface

The recent rapid growth of cardiovascular magnetic resonance imaging (CMR) has reflected the trend of modern Medicine towards increasing development and utilization of noninvasive diagnostic approaches. CMR is particularly appealing because it can assess every aspect of cardiovascular anatomy, physiology, and pathology with exquisite accuracy, precision, and most importantly, with minimal associated biologic risks.

This textbook aims to provide a comprehensive educational tool for physicians who start getting involved with CMR and for the cardiology and radiology trainees who study for Board certification. The book includes 150 multiple choice questions and answers with concise explanation on each question and pertinent up-to-date bibliography.

The textbook includes chapters on physics and safety, general CMR, valvular heart disease, diseases of the myocardium and pericardium, ischemic heart disease, congenital heart disease, and diseases of the great vessels. The questions, many of which are based on clinical cases, are constructed so as to bring up teaching points. Each of the chapters is a separate entity, although the first two chapters provide the necessary background knowledge to build on for the subsequent ones.

All 135 images included in this textbook were obtained from patient studies performed at the CMR Center of Hygeia Hospital, a tertiary referral center in Athens, Greece, and a Harvard Medical International Affiliate. Sincere thanks to all our patients and to all the staff of the CT and MRI department for their support of this effort. And last but not least, many thanks to all my teachers and colleagues at the Beth Israel Deaconess Medical Center in Boston who helped me start my career in CMR.

Peter G. Danias, MD, PHD

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