Evidence-Based Imaging
Evidence-Based Imaging

Optimizing Imaging in Patient Care

With 183 Illustrations, 14 in Full Color
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Foreword by Bruce J. Hillman, MD
To the many patients and researchers
who have made the evidence for this book possible.
To our families, friends, and mentors.
Despite our best intentions, most of what constitutes modern medical imaging practice is based on habit, anecdotes, and scientific writings that are too often fraught with biases. Best estimates suggest that only around 30% of what constitutes “imaging knowledge” is substantiated by reliable scientific inquiry. This poses problems for clinicians and radiologists, because inevitably, much of what we do for patients ends up being inefficient, inefficacious, or occasionally even harmful.

In recent years, recognition of how the unsubstantiated practice of medicine can result in poor-quality care and poorer health outcomes has led to a number of initiatives. Most significant in my mind is the evidence-based medicine movement that seeks to improve clinical research and research synthesis as a means of providing a more definitive knowledge basis for medical practice. Although the roots of evidence-based medicine are in fields other than radiology, in recent years, a number of radiologists have emerged to assume leadership roles. Many are represented among the authors and editors of this excellent book, the purpose of which is to enhance understanding of what constitutes the evidence basis for the practice of medical imaging and where that evidence basis is lacking.

It comes not a moment too soon, given how much is going on in the regulatory and payer worlds concerning health care quality. There is a general lack of awareness among radiologists about the insubstantiality of the foundations of our practices. Through years of teaching medical students, radiology residents and fellows, and practicing radiologists in various venues, it occurs to me that at the root of the problem is a lack of sophistication in reading the radiology literature. Many clinicians and radiologists are busy physicians, who, over time, have taken more to reading reviews and scanning abstracts than critically examining the source of practice pronouncements. Even in our most esteemed journals, literature reviews tend to be exhaustive regurgitations of everything that has been written, without providing much insight into which studies were performed more rigorously, and hence are more believable. Radiology training programs spend inordinate time cramming the best and brightest young minds with acronyms, imaging “signs,” and unsubstantiated factoids while mostly ignoring teaching future radiologists how to think rigorously about what they are reading and hearing.
As I see it, the aim of this book is nothing less than to begin to reverse these conditions. This book is not a traditional radiology text. Rather, the editors and authors have provided first a framework for how to think about many of the most important imaging issues of our day, and then fleshed out each chapter with a critical review of the information available in the literature.

There are a number of very appealing things about the approach employed here. First, the chapter authors are a veritable “who’s who” of the most thoughtful individuals in our field. Reading this book provides a window into how they think as they evaluate the literature and arrive at their conclusions, which we can use as models for our own improvement. Many of the chapters are coauthored by radiologists and practicing clinicians, allowing for more diverse perspectives. The editors have designed a uniform approach for each chapter and held the authors’ feet to the fire to adhere to it. Chapters 3 to 30 provide, up front, a summary of the key points. The literature reviews that follow are selective and critical, rating the strength of the literature to provide insight for the critical reader into the degree of confidence he or she might have in reviewing the conclusions. At the end of each chapter, the authors present the imaging approaches that are best supported by the evidence and discuss the gaps that exist in the evidence that should cause us lingering uncertainty. Figures and tables help focus the reader on the most important information, while decision trees provide the potential for more active engagement. Case studies help actualize the main points brought home in each chapter. At the end of each chapter, bullets are used to highlight areas where there are important gaps in research.

The result is a highly approachable text that suits the needs of both the busy practitioner who wants a quick consultation on a patient with whom he or she is actively engaged or the radiologist who wishes a comprehensive, in-depth view of an important topic. Most importantly, from my perspective, the book goes counter to the current trend of “dumbing down” radiology that I abhor in many modern textbooks. To the contrary, this book is an intelligent effort that respects the reader’s potential to think for him- or herself and gives substance to Plutarch’s famous admonition, “The mind is not a vessel to be filled but a fire to be kindled.”

Bruce J. Hillman, MD
Theodore E. Keats
Professor of Radiology
University of Virginia
Medical imaging has grown exponentially in the last three decades with the development of many promising and often noninvasive diagnostic studies and therapeutic modalities. The corresponding medical literature has also exploded in volume and can be overwhelming to physicians. In addition, the literature varies in scientific rigor and clinical applicability. The purpose of this book is to employ stringent evidence-based medicine criteria to systematically review the evidence defining the appropriate use of medical imaging, and to present to the reader a concise summary of the best medical imaging choices for patient care.

The 30 chapters cover the most prevalent diseases in developed countries including the four major causes of mortality and morbidity: injury, coronary artery disease, cancer, and cerebrovascular disease. Most of the chapters have been written by radiologists and imagers in close collaboration with clinical physicians and surgeons to provide a balanced and fair analysis of the different medical topics. In addition, we address in detail both the adult and pediatric sides of the issues. We cannot answer all questions—medical imaging is a delicate balance of science and art, often without data for guidance—but we can empower the reader with the current evidence behind medical imaging.

To make the book user-friendly and to enable fast access to pertinent information, we have organized all of the chapters in the same format. The chapters are framed around important and provocative clinical questions relevant to the daily physician’s practice. A short table of contents at the beginning of each chapter helps three different tiers of users: (1) the busy physician searching for quick guidance, (2) the meticulous physician seeking deeper understanding, and (3) the medical-imaging researcher requiring a comprehensive resource. Key points and summarized answers to the important clinical issues are at the beginning of the chapters, so the busy clinician can understand the most important evidence-based imaging data in seconds. This fast bottom-line information is also available in a CD-ROM format, so an expeditious search can be done at the medical office or...
hospital, or at home. Each important question and summary is followed by a detailed discussion of the supporting evidence so that the meticulous physician can have a clear understanding of the science behind the evidence.

In each chapter the evidence discussed is presented in tables and figures that provide an easy review in the form of summary tables and flow charts. The imaging case series highlights the strengths and limitations of the different imaging studies with vivid examples. Toward the end of the chapters, the best imaging protocols are described to ensure that the imaging studies are well standardized and done with the highest available quality. The final section of the chapters is Future Research, in which provocative questions are raised for physicians and nonphysicians interested in advancing medical imaging.

Not all research and not all evidence are created equal. Accordingly, throughout the book, we use a four-level classification detailing the strength of the evidence: level I (strong evidence), level II (moderate evidence), level III (limited evidence), and level IV (insufficient evidence). The strength of the evidence is presented in parenthesis throughout the chapter so the reader gets immediate feedback on the weight of the evidence behind each topic.

Finally, we had the privilege of working with a group of outstanding contributors from major medical centers and universities in North America and the United Kingdom. We believe that the authors’ expertise, breadth of knowledge, and thoroughness in writing the chapters provide a valuable source of information and can guide decision making for physicians and patients. In addition to guiding practice, the evidence summarized in the chapters may have policy-making and public health implications. Finally, we hope that the book highlights key points and generates discussion, promoting new ideas for future research.

L. Santiago Medina, MD, MPH
C. Craig Blackmore, MD, MPH
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Contributors

Nolan Altman, MD
Director and Chair, Department of Radiology, Miami Children’s Hospital,
Miami, FL 33155, USA

Yoshimi Anzai, MD, MPH
Associate Professor, Department of Radiology, University of Washington,
Seattle, WA 98195, USA

Kimberly E. Applegate, MD, MS
Associate Professor, Department of Radiology, Riley Hospital for Children,
Indianapolis, IN 46202, USA

Stephen Ashwal, MD
Chief, Division of Child Neurology, Department of Pediatrics, Loma Linda
University School of Medicine, Loma Linda, CA 92350, USA

Anil Kumar Attili, MBBS, FRCS, FRCR
Lecturer II, Department of Thoracic Radiology, University of Michigan,
Ann Arbor, MI 48109, USA

Gregory David Avey, MD
Department of Radiology, Harborview Medical Center, Seattle, WA 98115,
USA

Martha Cecilia Ballesteros, MD
Staff Radiologist, Department of Radiology, Miami Children’s Hospital,
Miami, FL 33155, USA

Alex M. Barrocas, MD, MS
Instructor, Mallinckrodt Institute of Radiology, Washington University in
St. Louis School of Medicine, St. Louis, MO 63110, USA

Wendie A. Berg, MD, PhD
Breast Imaging Consultant and Study Chair, American Radiology Services,
Johns Hopkins Greenspring, Lutherville, MD 21093, USA
Byron Bernal, MD
Neuroscientist, Department of Radiology, Miami Children’s Hospital, Miami, FL 33155, USA

Andrew J. Bierhals, MD, MPH
Mallinckrodt Institute of Radiology, Washington University in St. Louis School of Medicine. St. Louis, MO 63110, USA

C. Craig Blackmore, MD, MPH
Professor, Department of Radiology, Adjunct Professor, Health Services, University of Washington, Co-Director Radiology Health Services Research Section, Harborview Injury Prevention and Research Center, Seattle, WA 98104, USA

Ruth C. Carlos, MD, MS
Assistant Professor, Department of Radiology, University of Michigan, Ann Arbor, MI 48109, USA

Soonmee Cha, MD
Assistant Professor, Department of Radiology and Neurological Surgery, University of California San Francisco Medical Center, San Francisco, CA 94143, USA

Tina A. Chang, MD
Clinical Faculty, Department of Medicine, Harborview Medical Center, University of Washington, Seattle WA 98104, USA

Colin P. Derdeyn, MD
Associate Professor, Mallinckrodt Institute of Radiology, Departments of Neurology and Neurological Surgery, Washington University in St. Louis School of Medicine, St. Louis, MO 63110, USA

Adrian K. Dixon, MD, FRCR, FRCP, FRCS, FMEDSci
Professor, Department of Radiology, University of Cambridge, Addenbrooke’s Hospital, Cambridge CB2 2QQ, UK

John Eng, MD
Assistant Professor, Department of Radiology, The Johns Hopkins University, Baltimore, MD 21030, USA

Laurie L. Fajardo, MD, MBA, FACR
Professor and Chair, Department of Radiology, University of Iowa Hospital, Iowa City, IA 52242, USA

Julia R. Fielding, MD
Associate Professor, Department of Radiology, University of North Carolina at Chapel Hill, Chapel Hill, NC 27599, USA

Brian E. Grottkau MD
Chief, Department of Pediatric Orthopaedics, Harvard Medical School/ Massachusetts General Hospital for Children, Yawkey Center for Outpatient Care, Boston, MA 02114, USA