Principles Of Magnetic Resonance Imaging A Signal Processing Perspective Spie Press

Atherosclerosis represents the leading cause of mortality and morbidity in the world. Two of the most common, severe, diseases that may occur, acute myocardial infarction and stroke, have their pathogenesis in the atherosclerosis that may affect the coronary arteries as well as the carotid/intra-cranial vessels. Therefore, in the past there was an extensive research in identifying pre-clinical atherosclerotic diseases in order to plan the correct therapeutical approach before the pathological events occur. In the last 20 years imaging techniques and in particular Computed Tomography and Magnetic Resonance had a tremendous improvement in their potential. In the field of the Computed Tomography the introduction of the multi-detector-row technology and more recently the use of dual energy and multi-spectral imaging provides an exquisite level of anatomic detail. The MR thanks to the use of strength magnetic field and extremely advanced sequences can image human vessels very quickly while offering an outstanding contrast resolution.

This practical guide offers an accessible introduction to the principles of MRI physics. Each chapter explains the why and how behind MRI physics. Readers will understand how altering MRI parameters will have many different consequences for image quality and the speed in which images are generated. Practical topics, selected for their value to clinical practice, include progressive changes in key MRI parameters, imaging time, and signal to noise ratio. A wealth of high quality illustrations, complemented by concise text, enables readers to gain a thorough understanding of the subject without requiring prior in-depth knowledge.

This concise book explains the basic principles of magnetic resonance imaging.

In 1971 Dr. Paul C. Lauterbur pioneered spatial information encoding principles that made image formation possible by using magnetic resonance signals. Now Lauterbur, "father of the MRI", and Dr. Zhi-Pei Liang have co-authored the first engineering textbook on magnetic resonance imaging. This long-awaited, definitive text will help undergraduate and graduate students of biomedical engineering, biomedical imaging scientists, radiologists, and electrical engineers gain an in-depth understanding of MRI principles. The authors use a signal processing approach to describe the fundamentals of magnetic resonance imaging. You will find a clear and rigorous discussion of these carefully selected essential topics: Mathematical fundamentals Signal generation and detection principles Signal characteristics Signal localization principles Image reconstruction techniques Image contrast mechanisms Image resolution, noise, and artifacts Fast-scan imaging Constrained reconstruction Complete with a comprehensive set of examples and homework problems, Principles of Magnetic Resonance Imaging is the must-read book to improve your knowledge of this revolutionary technique.

Principles and Techniques

The Physics and Mathematics of MRI

Totally Accessible MRI

Electromagnetics in Magnetic Resonance Imaging

Magnetic Resonance Imaging of the Brain and Spine

Magnetic resonance systems are used in almost every academic and industrial chemistry, physics and biochemistry department, as well as being one of the most important imaging modalities in clinical radiology. The design of such systems has become increasingly sophisticated over the years. Static magnetic fields increase continuously, large-scale arrays of receive elements are now ubiquitous in clinical MRI, cryogenic technology has become commonplace in high resolution NMR and is expanding rapidly in preclinical MRI, specialized high strength magnetic field gradients have been designed for studying the human connectome, and the commercial advent of ultra-high field human imaging has required new types of RF coils and static shim coils together with extensive electromagnetic simulations to ensure patient safety. This book covers the hardware and engineering that constitutes a magnetic resonance system, whether that be a high-resolution liquid or solid state system for NMR spectroscopy, a preclinical system for imaging animals or a clinical system used for human imaging. Written by a team of experts in the field, this book provides a comprehensive and instructional look at all aspects of current magnetic resonance technology, as well as outlooks for future developments.

Dette er en grundlæggende lærebog om konventionel MRI samt billedteknik. Den begynder med et overblik over elektricitet og magnetisme, herefter gives en dybtgående forklaring på hvordan MRI fungerer og her diskuteres de seneste metoder i radiografisk billedtagning, patientsikkerhed m.v.

CMR is a powerful tool in the armamentarium of pediatric cardiology and health care workers caring for patients with congenital heart disease (CHD), but a successful study still presents major technical and clinical challenges. This text was created to give trainees, practitioners, allied professionals, and researchers a repository of dependable information and images to base their use of CMR on. Because CHD presents an intricate web of connections and associations that need to be deciphered, the imager performing CMR needs to understand not only anatomy, physiology, function, and surgery for CHD, but also the technical aspects of imaging. Written by experts from the world’s leading institutions, many of whom pioneered the techniques and strategies described, the text is organized in a logical way to provide a complete understanding of the issues involved. It is divided into three main parts: The Basics of CMR - familiarizes the reader with the minimum tools needed to understand the basics, such as evaluating morphology, ventricular function, and utilizing contrast agents CMR of Congenital and Acquired Pediatric Heart Disease - discusses broad categories of CHD and the use of CMR in specific disease states Special Topics in Pediatric Cardiac MR - covers other important areas such as the complementary role of CT scanning, interventional CMR, the role of the technologist in performing a CMR exam, and more With the ever increasing sophistication of technology, more can be done with CMR in a high quality manner in a shorter period of time than had been imagined as recently as just a few years ago. Principles and Practice of Cardiac Magnetic Resonance in Congenital Heart Disease: Form, Function, and Flow makes a major contribution to applying these techniques to improved patient care. An ideal introduction for the novice or just the curious, this reference will be equally useful to the seasoned practitioner who wants to keep pace with developments in the field and would like a repository of information and images readily availalble.

Magnetic resonance imaging (MRI) is a technique used in biomedical imaging and radiology to visualize internal structures of the body. Because MRI provides excellent contrast between different soft tissues, the technique is especially useful for diagnostic imaging of the brain, muscles, and heart. In the past 20 years, MRI technology has improved significantly with the introduction of systems up to 7 Tesla (7 T) and with the development of numerous post-processing algorithms such as diffusion tensor imaging (DTI), functional MRI (fMRI), and spectroscopic imaging. From these developments, the diagnostic potentialities of MRI have improved impressively with an exceptional spatial resolution and the possibility of analyzing the morphology and function of several kinds of pathology. Given these exciting developments, the Magnetic Resonance Imaging Handbook: Image Principles, Neck, and the Brainis a timely addition to the growing body of literature in the field. Covering MRI from fundamentals to practice, this comprehensive book: Discusses the clinical benefits of diagnosing human pathologies using MRI Explains the physical principles of MRI and how to use the technique correctly Highlights each organ's anatomy and pathological processes with high-quality images Examines the protocols and potentialities of advanced MRI scanners such as 7 T systems Includes extensive references at the end of each chapter to enhance further study Thus, the Magnetic Resonance Imaging Handbook: Image Principles, Neck, and the Brainprovides radiologists and imaging specialists with a valuable, state-of-the-art reference on MRI.

Magnetic Resonance in Epilepsy

Diagnostic MRI in Dogs and Cats

The Chemistry of Contrast Agents in Medical Magnetic Resonance Imaging

Principles of Nuclear Magnetic Resonance Microscopy

This book offers a comprehensive resource for imaging the feline patient, with an emphasis on the unique considerations of imaging cats. It focuses on radiology and ultrasound, with some coverage of advanced imaging such as computed tomography and magnetic resonance imaging. Incorporating more than 1750 high-quality images, it is an invaluable reference for any veterinary practitioner with a signifi

Diagnostic Imaging begins with information on the radiographic evaluation of the thorax, abdomen, and musculoskeletal structures, including normal anatomy and pathology, followed by a review of common echocardiographic and abdominal ultrasound findings and abnormalities. Advanced imaging of the skull using computed tomography and magnetic resonance imaging cases of brain and spinal disease

Provides imaging information specifically tailored to the particular needs of cats Emphasizes the modalities most commonly used in general practice, with some discussion of advanced imaging Gives a complete overview of diagnostic imaging for the feline patients Includes tips and tricks for the unique considerations of working with cats Presents essential information for any practitioner treating feline patie

not found in other imaging books, Feline Diagnostic Imaging is an essential purchase for veterinarians wishing to improve their diagnostic imaging skills in cats. It's also an excellent guide for veterinary radiologists, and veterinary students and residents.

In the past few decades, Magnetic Resonance Imaging (MRI) has become an indispensable tool in modern medicine, with MRI systems now available at every major hospital in the developed world. But for all its utility and prevalence, it is much less commonly understood and less readily explained than other common medical imaging techniques. Unlike optical, ultrasonic, X-ray (including CT), and nuclear m

does not rely primarily on simple transmission and/or reflection of energy, and the highest achievable resolution in MRI is orders of magnitude smaller that the smallest wavelength involved. In this book, MRI will be explained with emphasis on the magnetic fields required, their generation, their concomitant electric fields, the various interactions of all these fields with the subject being imaged, and the implica

to image quality and patient safety. Classical electromagnetics will be used to describe aspects from the fundamental phenomenon of nuclear precession through signal detection and MRI safety. Simple explanations and Illustrations combined with pertinent equations are designed to help the reader rapidly gain a fundamental understanding and an appreciation of this technology as it is used today, as well a

increase its value in the future. Numerous references are included to facilitate further study with an emphasis on areas most directly related to electromagnetics.

With an incredible 2400 illustrations, and written by a multitude of international experts, this book provides a comprehensive overview of both the physics and the clinical applications of MRI, including practical guidelines for imaging. The authors define the importance of MRI in the diagnosis of several disease groups in comparison or combination with other methods. Chapters dealing with basic principles of

(MRS), interventional MRI and functional MRI (fMRI) illustrate the broad range of applications for MRI. Both standard and cutting-edge applications of MRI are included. Material on molecular imaging and nanotechnology give glimpses into the future of the field.

Quantitative Magnetic Resonance Imaging is a ‘go-to’ reference for methods and applications of quantitative magnetic resonance imaging, with specific sections on Relaxometry, Perfusion, and Diffusion. Each section will start with an explanation of the basic techniques for mapping the tissue property in question, including a description of the challenges that arise when using these basic approaches. For pr

measured in multiple ways, each of these basic methods will be described in separate chapters. Following the basics, a chapter in each section presents more advanced and recently proposed techniques for quantitative tissue property mapping, with a concluding chapter on clinical applications. The reader will learn: The basic physics behind tissue property mapping How to implement basic pulse sequence

measurement of tissue properties The strengths and limitations to the basic and more rapid methods for mapping the magnetic relaxation properties T1, T2, and T2* The pros and cons for different approaches to mapping perfusion The methods of Diffusion-weighted imaging and how this approach can be used to generate diffusion tensor maps and more complex representations of diffusion How flow, ma

fraction, exchange, elastography, and temperature mapping are performed How fast imaging approaches including parallel imaging, compressed sensing, and Magnetic Resonance Fingerprinting can be used to accelerate or improve tissue property mapping schemes How tissue property mapping is used clinically in different organs Structured to cater for MRI researchers and graduate students with a wide

Explains basic methods for quantitatively measuring tissue properties with MRI - including T1, T2, perfusion, diffusion, fat and iron fraction, elastography, flow, susceptibility - enabling the implementation of pulse sequences to perform measurements Shows the limitations of the techniques and explains the challenges to the clinical adoption of these traditional methods, presenting the latest research in rapid

has the possibility to tackle these challenges Each section contains a chapter explaining the basics of novel ideas for quantitative mapping, such as compressed sensing and Magnetic Resonance Fingerprinting-based approaches

MRI

Lessons Manual

A User's Guide to Principles, Technology, and Applications

Technical Magnetic Resonance Imaging

Basic Principles and Applications

Magnetic Resonance Imaging (MRI) is one of the most important tools in clinical diagnostics and biomedical research. The number of MRI scanners operating around the world is estimated to be approximately 20,000, and the development of contrast agents, currently used in about a third of the 50 million clinical MRI examinations performed every year, has largely contributed to this significant achievement. This completely revised and extended second edition: Includes new chapters on targeted, responsive, PARACEST and nanoparticle MRI contrast agents. Covers the basic chemistries, MR physics and the most important techniques used by chemists in the characterization of MRI agents from every angle from synthesis to safety considerations. Is written for all of those involved in the development and application of contrast agents in MRI. Presented in colour, it provides readers with true representation and easy interpretation of the images. A word from the Authors: Twelve years after the first edition published, we are convinced that the chemistry of MRI agents has a bright future. By assembling all important information on the design principles and functioning of magnetic resonance imaging probes, this book intends to be a useful tool for both experts and newcomers in the field. We hope that it helps inspire further work in order to create more efficient and specific imaging probes that will allow materializing the dream of seeing even deeper and better inside the living organisms. Reviews of the First Edition: "...attempts, for the first time, to review the whole spectrum of involved chemical disciplines in this technique..."—Journal of the American Chemical Society "...well balanced in its scope and attention to detail...a valuable addition to the library of MR scientists..."—NMR in Biomedicine

This book is intended as a text/reference for students, researchers, and professors interested in physical and biomedical applications of Magnetic Resonance Imaging (MRI). Both the theoretical and practical aspects of MRI are emphasized. The book begins with a comprehensive discussion of the Nuclear Magnetic Resonance (NMR) phenomenon based on quantum mechanics and the classical theory of electromagnetism. The first three chapters of this book provide the foundation needed to understand the basic characteristics of MR images, e.g.,image contrast, spatial resolution, signal-to-noise ratio, common image artifacts. Then MRI applications are considered in the following five chapters. Both the theoretical and practical aspects of MRI are emphasized. The book ends with a discussion of instrumentation and the principles of signal detection in MRI. Clear progression from fundamental physical principles of NMR to MRI and its applications Extensive discussion of image acquisition and reconstruction of MRI Discussion of different mechanisms of MR image contrast Mathematical derivation of the signal-to-noise dependence on basic MR imaging parameters as well as field strength In-depth consideration of artifacts in MR images Comprehensive discussion of several techniques used for rapid MR imaging including rapid gradient-echo imaging, echo-planar imaging, fast spin-echo imaging and spiral imaging Qualitative discussion combined with mathematical description of MR techniques for imaging flow

Principles of Magnetic Resonance ImagingA Signal Processing PerspectiveWiley-IEEE Press

This book is a comprehensive and authoritative text on the expanding scope of CMR, dedicated to covering basic principles in detail focusing on the needs of cardiovascular imagers. The target audience for this book includes CMR specialists, trainees in CMR and cardiovascular medicine, cardiovascular physicists or clinical cardiovascular imagers. This book includes figures and CMR examples in the form of high-resolution still images and is divided in two sections: basic MRI physics, i.e. the nuts and bolts of MR imaging; and imaging techniques (pulse sequences) used in cardiovascular MR imaging. Each imaging technique is discussed in a separate chapter that includes the physics and clinical applications (with cardiovascular examples) of a particular technique. Evolving techniques or research based techniques are discussed as well. This section covers both cardiac and vascular imaging. Cardiovascular magnetic resonance (CMR) imaging is now considered a clinically important imaging modality for patients with a wide variety of cardiovascular diseases. Recent developments in scanner hardware, imaging sequences, and analysis software have led to 3-dimensional, high-resolution imaging of the cardiovascular system. These developments have also influenced a wide variety of cardiovascular imaging applications and it is now routinely used in clinical practice in CMR laboratories around the world. The non-invasiveness and lack of ionizing radiation exposure make CMR uniquely important for patients whose clinical condition requires serial imaging follow-up. This is particularly true for patients with congenital heart disease (CHD) with or without surgical corrections who require lifelong clinical and imaging follow-up.

Quantitative Magnetic Resonance Imaging

Introduction to Functional Magnetic Resonance Imaging

A Signal Processing Perspective

Physics Concepts, Pulse Sequences, and Biomedical Applications

Principles, Methods, and Techniques

Magnetic resonance imaging (MRI) is a rapidly developing field in basic applied science and clinical practice. Research efforts in this area have already been recognized with five Nobel prizes awarded to seven Nobel laureates in the past 70 years. Based on courses taught at The Johns Hopkins University, Magnetic

Resonance Imaging: The Basics provid

This is an invaluable introduction to Functional Magnetic Resonance Imaging for an interdisciplinary range of medical professionals.

Functional MRI: Basic Principles and Emerging Clinical Applications provides an overview of the basic principles of fMRI for clinicians with minimal knowledge of the imaging technique and its research potential and clinical applications. The text is divided into two parts, with Section I covering the primary signal

measured in fMRI (BOLD), the correlation between neuronal activity and the BOLD signal, and how the data is analyzed and interpreted in fMRI. Section II explores applications of fMRI in cognitive neuroscience and common psychiatric disorders, surgical planning in neurosurgery, anesthesia and the intensive care unit,

and more. Timely and highly accessible, this book is a valuable resource for researchers and clinicians interested in understanding what fMRI is, how it works, and its applications.

This highly successful book, details the underlying principles behind the use of magnetic field gradients to image molecular distribution and molecular motion, providing many examples by way of illustration. Following excellent reviews of the hardback edition the book is now available in paperback.

Magnetic Resonance Technology

Advanced Principles of Magnetic Resonance Imaging

Principles of Magnetic Resonance

Understanding Magnetic Resonance Imaging

Feline Diagnostic Imaging

Magnetic Resonance Imaging is a very important clinical imaging tool. It combines different fields of physics and engineering in a uniquely complex way. MRI is also surprisingly versatile, 'pulse sequences' can be designed to yield many different types of contrast. This versatility is unique to MRI. This short book gives both an in depth account of the methods used for the operation and construction of modern MRI systems and also the principles of sequence design and many examples of applications. An important additional feature of this book is the detailed discussion of the mathematical principles used in building optimal MRI systems and for sequence design. The mathematical discussion is very suitable for undergraduates attending medical physics courses. It is also more complete than usually found in alternative books for physical scientists or more clinically orientated works.

This is the second edition of a useful introductory book on a technique that has revolutionized neuroscience, specifically cognitive neuroscience. Functional magnetic resonance imaging (fMRI) has now become the standard tool for studying the brain systems involved in cognitive and emotional processing. It has also been a major factor in the consilience of the fields of neurobiology, cognitive psychology, social psychology, radiology, physics, mathematics, engineering, and even philosophy. Written and edited by a clinician-scientist in the field, this book remains an excellent user's guide to t

Established as the leading textbook on imaging diagnosis of brain and spine disorders, Magnetic Resonance Imaging of the Brain and Spine is now in its Fourth Edition. This thoroughly updated two-volume reference delivers cutting-edge information on nearly every aspect of clinical neuroradiology. Expert neuroradiologists, innovative renowned MRI physicists, and experienced leading clinical neurospecialists from all over the world show how to generate state-of-the-art images and define diagnoses from crucial clinical/pathologic MR imaging correlations for neurologic, neurosurgical, and psychiatric diseases spanning fetal CNS anomalies to disorders of the aging brain. Highlights of this edition include over 6,800 images of remarkable quality, more color images, and new information using advanced techniques, including perfusion and diffusion MRI and functional MRI. A companion Website will offer the fully searchable text and an image bank.

Principles of Magnetic Resonance Imaging provides a contemporary introduction of the fundamental concepts of MRI and connects these concepts to the latest MRI developments. Graphic illustrations are used to clarify underlying biophysical processes, simplified calculations are derived to add precision in appreciating abstract concepts, and insightful interpretations are presented for biomedical information in MRI signal. This book contains three parts. I. Section the body into voxels, which describes the Fourier encoding matrix for an imaging system, realization of Fourier encoding using the gradient field in magnetic resonance, and k-space sampling. II. What's in a voxel, which examines the effects of the biophysical processes in a voxel on MRI signal. Intuitive

biophysical models are developed for MRI signal dependence on Spin fluctuation in thermal microenvironment, which leads to T1/T2 relaxation rates reflecting cellular contents in a water voxel. Micro- and macro physiological motion, which includes diffusion, perfusion, flow and biomechanical motion. Molecular electron response to the B0 field, which leads to magnetic susceptibility and chemical shift. III. How to operate MRI, which describes MRI safety issue, hardware, software, MRI scanning and routine MRI protocols. This book also uses basic concepts to demonstrate and expose students to the latest technological innovations in MRI, including: B1+ B1- mapping, Electric property tomography (EPT), Quantitative susceptibility mapping (QSM), Chemical exchange saturation transfer (CEST), Contrast agents, Molecular MRI, Spin tagging (SPAMM and DENSE), MR elastography, Parallel imaging including SENSE and GRAPPA, Compressed sensing and Bayesian approach.

Neuroimaging Techniques, Second Edition

Molecular Biomethods Handbook

Magnetic Resonance Imaging

Magnetic Resonance Tomography

Form, Function and Flow

The first edition of this book was written in 1961 when I was Morris Loeb Lecturer in Physics at Harvard. In the preface I wrote: "The problem faced by a beginner today is enormous. If he attempts to read a current article, he often finds that the first paragraph refers to an earlier paper on which the whole article is based, and with which the author naturally assumes familiarity. That reference in turn is based on another, so the hapless student finds himself in a seemingly endless retreat. I have felt that graduate students or others beginning research in magnetic resonance needed a book which really went into the details of calculations, yet was aimed at the beginner rather than the expert. " The original goal was to treat only those topics that are essential to an understanding of the literature. Thus the goal was to be selective rather than comprehensive. With the passage of time, important new concepts were becoming so all-pervasive that I felt the need to add them. That led to the second edition, which Dr. Lotsch, Physics Editor of Springer-Verlag, encouraged me to write and which helped launch the Springer Series in Solid-State Sciences. Now, ten years later, that book (and its 1980 revised printing) is no longer available. Meanwhile, workers in magnetic resonance have continued to develop startling new insights.

Recent advances in the biosciences have led to a range of powerful new technologies, particularly nucleic acid, protein and cell-based methodologies. The most recent insights have come to affect how scientists investigate and define cellular processes at the molecular level. This book expands upon the techniques included in the first edition, providing theory, outlines of practical procedures, and applications for a range of techniques. Written by a well-established panel of research scientists, the book provides an up-to-date collection of methods used regularly in the authors' own research programs.

Diagnostic MRI in Dogs and Cats makes the vast and increasingly complex topic of clinical MRI in small animals accessible to all veterinarians. With the increasing availability of MRI technology, there is also a pressing need for expertise in interpreting these images. This is the first reference textbook to provide a well-illustrated and comprehensive overview of the current knowledge, focusing on imaging appearance rather than on clinical signs or treatment. With chapters on MRI physics and technology as well as sections on specific anatomical regions, the book functions as a stand-alone reference for the reader, whether they be a radiology/neurology resident in training or a practitioner with a need to learn about veterinary clinical MRI. Includes both evidenced-based material and the authors' personal experience, providing an excellent overview of current knowledge in the field. Contributors are international leaders in the field. Bullet points format and table summaries throughout the book keep the concepts concise and organized. Richly illustrated with over 650 annotated images showcasing the main features of the disease processes. Images are obtained at all magnet field strengths, so as to reflect the current reality of veterinary MRI, which uses low-, mid- and high-field magnets. The chapters on physics and MRI technology are concise and accessible, using many visual aids and diagrams, and avoiding abstract concepts and equations whenever possible. Within each anatomical section, each chapter focuses on a disease category of that body region. When it is important to understand the imaging appearance, the pathophysiology is reviewed and imaging features of prognostic relevance are detailed. This practical yet thoroughly comprehensive book is primarily an evidence-based learning resource for trainees, but will also aid practising veterinarians who have less MRI experience.

Preceded by Magnetic resonance imaging: physical principles and sequence design / E. Mark Haacke ... [et al.]. c1999.

3D Imaging Technologies in Atherosclerosis

Physical Principles and Sequence Design

Physical Principles and Applications

Physics and Imaging Techniques

Principles and Practice of Cardiac Magnetic Resonance in Congenital Heart Disease

*Remarkable advances in imaging have increased the importance of MRI for diagnostic, treatment and management of epilepsy. Neuroimaging of patients with epilepsy no longer simply deals with the technology and interpretation of images but also with issues of brain metabolism, energetics, cognition and brain dysfunction. The first edition of Magnetic Resonance in Epilepsy came into clinical practice in 1995 with a revolutionary idea; that is, MR is as important as EEG in the clinical management of patients with epilepsy. The second edition of Magnetic Resonance in Epilepsy, the only comprehensive text in the field of epilepsy neuroimaging, reviews fundamental concepts and new advances in MR technology, computerized analysis, MR spectroscopy, DWI and other neuroimaging techniques such as PET, SPECT and MEG application to the study of patients with epileptic disorders. *Provides a crucial update of recent advances in imaging techniques *Timely publication as subject of neuroimaging is a very "hot" area in both clinical epilepsy and basic neuroscience research *Editors are well-respected in this field*

Magnetic resonance imaging (MRI) is a technique used in biomedical imaging and radiology to visualize internal structures of the body. Because MRI provides excellent contrast between different soft tissues, the technique is especially useful for diagnostic imaging of the brain, muscles, and heart. In the past 20 years, MRI technology has improved significantly with the introduction of systems up to 7 Tesla (7 T) and with the development of numerous post-processing algorithms such as diffusion tensor imaging (DTI), functional MRI (fMRI), and spectroscopic imaging. From these developments, the diagnostic potentialities of MRI have improved impressively with an exceptional spatial resolution and the possibility of analyzing the morphology and function of several kinds of pathology. Given these exciting developments, the Magnetic Resonance Imaging Handbook: Image Principles, Neck, and the Brain is a timely addition to the growing body of literature in the field. Covering MRI from fundamentals to practice, this comprehensive book: Discusses the clinical benefits of diagnosing human pathologies using MRI Explains the physical principles of MRI and how to use the technique correctly Highlights each organ’s anatomy and pathological processes with high-quality images Examines the protocols and potentialities of advanced MRI scanners such as 7 T systems Includes extensive references at the end of each chapter to enhance further study Thus, the Magnetic Resonance Imaging Handbook: Image Principles, Neck, and the Brain provides radiologists and imaging specialists with a valuable, state-of-the-art reference on MRI.

Magnetic resonance imaging (MRI) is the most technically dependent imaging technique in radiology. To perform and interpret MRI studies correctly, an understanding of the basic underlying principles is essential. Understanding Magnetic Resonance Imaging explains the pulse sequences, imaging options, and coils used to produce MR images, providing a strong foundation for performing and interpreting imaging studies. The text is complemented by more than 100 figures and 25 photomicrographs illustrating the techniques discussed. Radiology residents, MR technologists, and radiologists should not be without Understanding Magnetic Resonance Imaging-the only single resource that explains all technical aspects of MRI, including recent advances, and presents all imaging options.

This fifth edition of the most accessible introduction to MRI principles and applications from renowned teachers in the field provides an understandable yet comprehensive update. Accessible introductory guide from renowned teachers in the field Provides a concise yet thorough introduction for MRI focusing on fundamental physics, pulse sequences, and clinical applications without presenting advanced math Takes a practical approach, including up-to-date protocols, and supports technical concepts with thorough explanations and illustrations Highlights sections that are directly relevant to radiology board exams Presents new information on the latest scan techniques and applications including 3 Tesla whole body scanners, safety issues, and the nephrotoxic effects of gadolinium-based contrast media

Principles of Magnetic Resonance Imaging

Basic Principles of Cardiovascular MRI

Functional MRI

Basic Principles of Magnetic Resonance Imaging

Physical Principles, Related Applications, and Ongoing Developments

Preceded by MRI / Mark A. Brown, Richard C. Semelka. 4th ed. c2010.

The Basics

Basic Principles and Emerging Clinical Applications for Anesthesiology and the Neurological Sciences

Image Principles, Neck, and the Brain

Hardware and System Component Design