

questions and answers in magnetic resonance imaging

Questions and Answers in Magnetic Resonance Imaging (MRI)

Introduction:

Are you facing an upcoming MRI scan and feeling overwhelmed by the unknowns? Or perhaps you're a healthcare professional looking to brush up on common patient queries about this powerful diagnostic tool? This comprehensive guide answers your burning questions about magnetic resonance imaging (MRI), covering everything from the basics of how it works to preparing for your scan and understanding the results. We'll delve into the frequently asked questions surrounding MRI, providing clear, concise, and evidence-based information to demystify this essential medical technology. Get ready to become an MRI expert!

1. What is Magnetic Resonance Imaging (MRI)?

MRI uses a powerful magnetic field and radio waves to create detailed images of the body's internal structures. Unlike X-rays or CT scans, MRI doesn't use ionizing radiation, making it a generally safer imaging technique. The magnetic field aligns the body's hydrogen atoms, and radio waves then disrupt this alignment. The signals emitted as the atoms realign are detected and used to construct cross-sectional images. These images provide unparalleled clarity for visualizing soft tissues like the brain, spinal cord, ligaments, muscles, and internal organs, making MRI invaluable for diagnosing a wide range of conditions.

1. How Does an MRI Scan Work?

The process begins with you lying on a table that slides into a large cylindrical magnet. The magnet creates a strong magnetic field, and radiofrequency coils transmit radio waves into your body. These waves temporarily disrupt the alignment of hydrogen atoms. When the radio waves are turned off, the atoms realign, emitting signals that are detected by the coils. A computer processes these signals to create detailed images. The

entire process typically takes anywhere from 30 minutes to an hour, depending on the area being scanned and the complexity of the exam.

1. What are the Different Types of MRI Scans?

MRI scans are not one-size-fits-all. Different types of MRI exist to cater to specific diagnostic needs:

Conventional MRI: This standard MRI provides detailed anatomical images.

Functional MRI (fMRI): fMRI measures brain activity by detecting changes in blood flow. It's crucial in neurological research and diagnosing conditions like stroke.

Diffusion Tensor Imaging (DTI): DTI focuses on the movement of water molecules to visualize nerve fiber pathways in the brain and spinal cord. This is invaluable for assessing white matter integrity.

Perfusion MRI: This technique assesses blood flow and tissue perfusion, particularly useful in stroke diagnosis and monitoring.

Magnetic Resonance Angiography (MRA): MRA is specialized to visualize blood vessels without the need for contrast agents in many cases, offering detailed images of arteries and veins.

Magnetic Resonance Spectroscopy (MRS): MRS measures the chemical composition of tissues, helping detect metabolic abnormalities in diseases like cancer.

1. Preparing for an MRI Scan:

Preparation for an MRI scan usually involves:

Removing metal objects: This includes jewelry, piercings, watches, and any metallic implants that could interfere with the magnetic field. Inform your radiologist about any metallic implants beforehand.

Wearing comfortable clothing: Loose-fitting, comfortable clothing is recommended.

Potential need for contrast: In some cases, a contrast agent (gadolinium) may be injected intravenously to enhance the visibility of certain tissues. Inform your doctor about any allergies or kidney problems.

Managing claustrophobia: If you have claustrophobia, talk to your doctor about options like sedation or open MRI scanners.

Following specific instructions: Your doctor or radiology technician will provide detailed instructions on what to do before, during, and after the scan.

1. Understanding MRI Results:

MRI results are interpreted by a radiologist, a physician specializing in medical imaging. The report will describe the findings, including any abnormalities detected. Don't try to interpret the images yourself; instead, discuss the findings with your doctor who can explain the significance of the results in the context of your medical history and symptoms.

1. What are the Risks and Side Effects of MRI?

MRI is generally a safe procedure. The most common side effect is claustrophobia, which can be managed with sedation or open MRI scanners. Rarely, a contrast agent can cause allergic reactions. Individuals with certain metallic implants may not be suitable candidates for MRI.

1. What is the Cost of an MRI Scan?

The cost of an MRI scan varies depending on the location, the type of scan, and insurance coverage. It is best to contact your insurance provider or the radiology center for a cost estimate.

1. What are the Alternatives to MRI?

Alternatives to MRI include X-rays, CT scans, and ultrasound. However, MRI offers superior soft tissue detail, making it the preferred choice for many conditions.

1. The Future of MRI Technology:

MRI technology continues to evolve, with advancements leading to faster scan times, improved image quality, and more specialized techniques for diagnosing a wider range of diseases. Research is ongoing to develop even safer and more efficient MRI methods.

Article Outline: Questions and Answers in Magnetic Resonance Imaging

Name: Demystifying MRI: A Comprehensive Guide for Patients and Professionals

Introduction: Overview of MRI and the guide's purpose.

Chapter 1: What is MRI? Basic principles and applications.

Chapter 2: How an MRI Scan Works: A step-by-step explanation.

Chapter 3: Types of MRI Scans: Exploring various techniques.

Chapter 4: Preparing for an MRI: Essential steps and precautions.

Chapter 5: Understanding MRI Results: Interpretation and communication.

Chapter 6: Risks and Side Effects: Addressing potential concerns.

Chapter 7: Cost and Insurance Coverage: Practical considerations.

Chapter 8: Alternatives to MRI: Comparing imaging modalities.

Chapter 9: The Future of MRI: Emerging technologies and advancements.

Conclusion: Recap and encouragement for further learning.

(Detailed explanation of each chapter point is provided above in the main article body.)

FAQs:

1. Q: Is an MRI painful? A: No, MRI scans are generally painless. However, you may experience some discomfort from lying still for an extended period.

1. Q: Can I bring my cell phone into the MRI room? A: No, electronic devices can interfere with the MRI machine and should be left outside the room.

1. Q: How long does it take to get MRI results? A: The turnaround time for MRI results varies depending on the facility but is usually within a few days.

1. Q: Are there any weight restrictions for MRI? A: Yes, some MRI machines have weight limits; check with the facility before your scan.

1. Q: Can pregnant women have MRI scans? A: MRI is generally considered safe during pregnancy, but your doctor should be consulted.

1. Q: What is gadolinium contrast used for? A: Gadolinium enhances the visibility of certain tissues and blood vessels, making it easier to diagnose certain conditions.

1. Q: Is MRI safe for people with pacemakers? A: No, MRI is generally unsafe for people with pacemakers or certain other metallic implants.

1. Q: Can I eat before my MRI? A: Dietary restrictions vary depending on the type of MRI and whether contrast is used. Consult your doctor or the radiology center for instructions.

1. Q: What should I do if I feel claustrophobic during the MRI? A: Inform the technician immediately. They can stop the scan if needed, and options like sedation or open MRI are available.

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questions and answers in magnetic resonance imaging: *Questions & Answers in Magnetic Resonance Imaging* Allen D. Elster, Jonathan H. Burdette, 2001 The popular QUESTIONS AND ANSWERS IN MAGNETIC RESONANCE IMAGING is thoroughly revised and updated to reflect the latest advances in MRI technology. Four new chapters explain recent developments in the field in the traditional question and short answer format. This clear, concise and informative text discusses hundreds of the most common questions about MRI, as well as some challenging questions for seasoned MRI specialists. Covers the technical aspects of MRI, including physical principles, hardware, image production, artifacts, contrast agents, techniques, echo imaging, biological effects and safety, flow phenomena and angiography. Explains and reinforces the basic understanding of magnetic resonance physics. Includes material that is highly practical and immediately applicable to clinical MRI. Thoroughly revised and updated to reflect the latest advances in MRI technology. A 30 percent increase in content provides increased coverage of key topics. Includes four new chapters: MR Spectroscopy, Functional MRI, Diffusion/Perfusion Imaging, Echo-Planar Imaging, and an appendix on Sedation.

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questions and answers in magnetic resonance imaging: *Questions and Answers in Magnetic Resonance Imaging* Allen D. Elster, 1994 Approximately 100 of the most frequently-asked questions about physical principles, hardware and equipment, image production, imaging techniques, safety issues, artifacts, contrast agents, flow phenomena and MR angiography are addressed in this book, which includes answers.

questions and answers in magnetic resonance imaging: *Review Questions for MRI* Carolyn Kaut Roth, William H. Faulkner, Jr., 2013-04-29 ** New revised second edition now available, with errors corrected and content fully updated ** The second edition of the classic text has been revised and extended to meet the needs of today's practising and training MRI technologists who intend to sit for the American Registry of Magnetic Resonance Imaging Technologists (ARMRIT) examination. It provides Q&As on topics listed in the content specifications offered by the American Registry for Radiologic Technologists (AART) and offers the user with a comprehensive review of the principles and applications of MRI to prepare them for the examination.

questions and answers in magnetic resonance imaging: *Lippincott's Magnetic Resonance Imaging Review* Gregory L. Wheeler, Kathryn E. Withers, 1996-01-01 Here's the perfect review tool for radiologic technologists taking the ARRT's Advanced Qualifications Examination in Magnetic Resonance Imaging. It's packed with over 700 questions and answers covering all aspects of MRI. Detailed explanations of answers and references for further study help reinforce problem areas.

questions and answers in magnetic resonance imaging: *Magnetic Resonance Imaging* Marinus T. Vlaardingerbroek, Jacques A. den Boer, 2013-04-17 This comprehensive survey of the analytical treatment of MRI physics and engineering brings the reader to a position to cope with the problems that arise when applying MRI to medical problems or when (sub)systems or sequences for new applications are designed.

questions and answers in magnetic resonance imaging: *Magnetic Resonance Imaging* Stewart C. Bushong, 2003-01-01 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.

questions and answers in magnetic resonance imaging: *MRI Made Easy* Hans H. Schild, 2012

questions and answers in magnetic resonance imaging: *Fundamentals of MRI* Elizabeth Berry, Andrew J. Bulpitt, 2008-12-22 Fundamentals of MRI: An Interactive Learning Approach explores the physical principles that underpin the technique of magnetic resonance imaging (MRI). After covering background mathematics, physics, and digital imaging, the book presents fundamental physical principles, including magnetization and rotating reference frame. It describes how relaxati

questions and answers in magnetic resonance imaging: *Magnetic Resonance Imaging* Christakis Constantinides, 2016-02-03 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

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questions and answers in magnetic resonance imaging: *Contrast-Enhanced Clinical Magnetic Resonance Imaging* Val M. Runge, 1997

questions and answers in magnetic resonance imaging: *MRI: The Basics* Ray Hashman Hashemi, William G. Bradley, Christopher J. Lisanti, 2012-03-28 Now in its updated Third Edition, MRI: The Basics is an easy-to-read, clinically relevant introduction to the physics behind MR imaging. The book features large-size, legible equations, state-of-the-art images, instructive

diagrams, and questions and answers that are ideal for board review. The American Journal of Radiology praised the previous edition as an excellent text for introducing the basic concepts to individuals interested in clinical MRI. This edition spans the gamut from basic physics to multi-use MR options to specific applications, and has dozens of new images. Coverage reflects the latest advances in MRI and includes completely new chapters on k-space, parallel imaging, cardiac MRI, and MR spectroscopy.

questions and answers in magnetic resonance imaging: Magnetic Resonance Imaging
Robert W. Brown, Y.-C. Norman Cheng, E. Mark Haacke, Michael R. Thompson, Ramesh Venkatesan, 2014-06-23 New edition explores contemporary MRI principles and practices Thoroughly revised, updated and expanded, the second edition of Magnetic Resonance Imaging: Physical Principles and Sequence Design remains the preeminent text in its field. Using consistent nomenclature and mathematical notations throughout all the chapters, this new edition carefully explains the physical principles of magnetic resonance imaging design and implementation. In addition, detailed figures and MR images enable readers to better grasp core concepts, methods, and applications. Magnetic Resonance Imaging, Second Edition begins with an introduction to fundamental principles, with coverage of magnetization, relaxation, quantum mechanics, signal detection and acquisition, Fourier imaging, image reconstruction, contrast, signal, and noise. The second part of the text explores MRI methods and applications, including fast imaging, water-fat separation, steady state gradient echo imaging, echo planar imaging, diffusion-weighted imaging, and induced magnetism. Lastly, the text discusses important hardware issues and parallel imaging. Readers familiar with the first edition will find much new material, including: New chapter dedicated to parallel imaging New sections examining off-resonance excitation principles, contrast optimization in fast steady-state incoherent imaging, and efficient lower-dimension analogues for discrete Fourier transforms in echo planar imaging applications Enhanced sections pertaining to Fourier transforms, filter effects on image resolution, and Bloch equation solutions when both rf pulse and slice select gradient fields are present Valuable improvements throughout with respect to equations, formulas, and text New and updated problems to test further the readers' grasp of core concepts Three appendices at the end of the text offer review material for basic electromagnetism and statistics as well as a list of acquisition parameters for the images in the book. Acclaimed by both students and instructors, the second edition of Magnetic Resonance Imaging offers the most comprehensive and approachable introduction to the physics and the applications of magnetic resonance imaging.

questions and answers in magnetic resonance imaging: Magnetic Resonance Imaging of the Brain and Spine Scott W. Atlas, 2009 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.

questions and answers in magnetic resonance imaging: MRI from Picture to Proton
Donald W. McRobbie, Elizabeth A. Moore, Martin J. Graves, Martin R. Prince, 2017-04-13 MR is a powerful modality. At its most advanced, it can be used not just to image anatomy and pathology, but to investigate organ function, to probe in vivo chemistry, and even to visualise the brain thinking. However, clinicians, technologists and scientists struggle with the study of the subject. The result is sometimes an obscurity of understanding, or a dilution of scientific truth, resulting in misconceptions. This is why MRI from Picture to Proton has achieved its reputation for practical

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questions and answers in magnetic resonance imaging: Rad Tech's Guide to MRI William H. Faulkner, Jr., 2020-03-09 The second edition of Rad Tech's Guide to MRI provides practicing and training technologists with a succinct overview of magnetic resonance imaging (MRI). Designed for quick reference and examination preparation, this pocket-size guide covers the fundamental principles of electromagnetism, MRI equipment, data acquisition and processing, image quality and artifacts, MR Angiography, Diffusion/Perfusion, and more. Written by an expert practitioner and educator, this handy reference guide: Provides essential MRI knowledge in a single portable, easy-to-read guide Covers instrumentation and MRI hardware components, including gradient and radio-frequency subsystems Provides techniques to handle flow imaging issues and improve the quality of MRIs Explains the essential physics underpinning MRI technology Rad Tech's Guide to MRI is a must-have resource for student radiographers, especially those preparing for the American Registry of Radiation Technologist (ARRT) exams, as well as practicing radiology technologists looking for a quick reference guide.

questions and answers in magnetic resonance imaging: Introduction to Functional Magnetic Resonance Imaging Richard B. Buxton, 2009-08-27 Functional Magnetic Resonance Imaging (fMRI) has become a standard tool for mapping the working brain's activation patterns, both in health and in disease. It is an interdisciplinary field and crosses the borders of neuroscience, psychology, psychiatry, radiology, mathematics, physics and engineering. Developments in techniques, procedures and our understanding of this field are expanding rapidly. In this second edition of Introduction to Functional Magnetic Resonance Imaging, Richard Buxton – a leading authority on fMRI – provides an invaluable guide to how fMRI works, from introducing the basic ideas and principles to the underlying physics and physiology. He covers the relationship between fMRI and other imaging techniques and includes a guide to the statistical analysis of fMRI data. This book will be useful both to the experienced radiographer, and the clinician or researcher with no previous knowledge of the technology.

questions and answers in magnetic resonance imaging: Magnetic Resonance Elastography Sudhakar K. Venkatesh, Richard L. Ehman, 2014-10-01 The first book to cover the groundbreaking development and clinical applications of Magnetic Resonance Elastography, this book is essential for all practitioners interested in this revolutionary diagnostic modality. The book is divided into three sections. The first covers the history of MRE. The second covers technique and clinical applications of MRE in the liver with respect to fibrosis, liver masses, and other diseases. Case descriptions are presented to give the reader a hands-on approach. The final section presents the techniques, sequence and preliminary results of applications in other areas of the body including muscle, brain, lung, heart, and breast.

questions and answers in magnetic resonance imaging: The MRI Study Guide for Technologists Kenneth S. Meacham, 2012-12-06 Beginning in 1995, the American Association of Radiographic Technologists will offer a Registry Exam for technologists who wish to be certified in the administration of Magnetic Resonance Imaging equipment. The MRI Study Guide for Technologists offers comprehensive review questions covering the basic areas, principles, equipment, and terminology to help provide readers with the highest level of preparation for the Registry Exam. Contains over 900 multiple choice and fill-in questions. Includes a bibliography of highly recommended books for further reading.

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questions and answers in magnetic resonance imaging: Electromagnetics in Magnetic Resonance Imaging Christopher M. Collins, 2016-03-01 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 medicine-based imaging, MRI does not rely primarily on simple transmission and/or reflection of energy, and the highest achievable resolution in MRI is orders of magnitude smaller than 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 implications of these interactions 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 as ongoing advances that will increase its value in the future. Numerous references are included to facilitate further study with an emphasis on areas most directly related to electromagnetics.

questions and answers in magnetic resonance imaging: Problems and Solutions in Medical Physics Kwan Hoong Ng, Jeannie Hsiu Ding Wong, Geoffrey D. Clarke, 2018-05-20 The first in a three-volume set exploring Problems and Solutions in Medical Physics, this volume explores common questions and their solutions in Diagnostic Imaging. This invaluable study guide should be used in conjunction with other key textbooks in the field to provide additional learning opportunities. It contains key imaging modalities, exploring X-ray, mammography, and fluoroscopy, in addition to computed tomography, magnetic resonance imaging, and ultrasonography. Each chapter provides examples, notes, and references for further reading to enhance understanding. Features: Consolidates concepts and assists in the understanding and applications of theoretical concepts in medical physics Assists lecturers and instructors in setting assignments and tests Suitable as a revision tool for postgraduate students sitting medical physics, oncology, and radiology sciences examinations

questions and answers in magnetic resonance imaging: Make Life Visible Yoshiaki Toyama, Atsushi Miyawaki, Masaya Nakamura, Masahiro Jinzaki, 2019-10-02 This open access book describes marked advances in imaging technology that have enabled the visualization of phenomena in ways formerly believed to be completely impossible. These technologies have made major contributions to the elucidation of the pathology of diseases as well as to their diagnosis and therapy. The volume presents various studies from molecular imaging to clinical imaging. It also focuses on innovative, creative, advanced research that gives full play to imaging technology in the broad sense, while exploring cross-disciplinary areas in which individual research fields interact and pursuing the development of new techniques where they fuse together. The book is separated into three parts, the first of which addresses the topic of visualizing and controlling molecules for life. The second part is devoted to imaging of disease mechanisms, while the final part comprises studies on the application of imaging technologies to diagnosis and therapy. The book contains the proceedings of

the 12th Uehara International Symposium 2017, "Make Life Visible" sponsored by the Uehara Memorial Foundation and held from June 12 to 14, 2017. It is written by leading scientists in the field and is an open access publication under a CC BY 4.0 license.

questions and answers in magnetic resonance imaging: *The Physics and Mathematics of MRI* Richard Ansorge, Martin Graves, 2016-11-01 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.

questions and answers in magnetic resonance imaging: Physical Aspects of Organs and Imaging Hartmut Zabel, 2017-06-12 Medical Physics covers the applied branch of physics concerned with the application of concepts and methods of physics to diagnostics and therapeutics of human diseases. The first part, Physical and Physiological Aspects of the Body, covers those body systems that have a strong physical component, such as body mechanics, energy household, action potential, signal transmission in neurons, respiratory and circulatory system as well as visual and sound perception. The second part of this volume, Imaging Modalities without Ionizing Radiation, introduces sonography, endoscopy, and magnetic resonance imaging. The second volume complements the imaging modalities with the use of ionizing radiation: x-ray radiography, scintigraphy, SPECT, and PET. This first part is followed by chapters on radiation treatment of tumors, in particular x-ray radiotherapy, proton and neutron radiation therapy, and brachytherapy. The last part treats aspects of diagnostics and therapeutics beyond radiology, including laser applications, multifunctional nanoparticles and prosthetics. This first volume - connects the basic principles of physics with the functionality of the body and with physical methods used for diagnostics and therapeutics. - covers the first part of the entire field, including the physics of the body and imaging methods without the use of ionizing radiation. - provides an introduction for Bachelor students to the main concepts of Medical Physics during their first semesters guiding them to further specialized and advanced literature. - contains many questions & answers related to the content of each chapter. - is also available as a set together with Volume 2. Contents Part A: Physical and physiological aspects of the body Brief overview of body parts and functions Body mechanics and muscles Elastomechanics: bones and fractures Energy household of the body Resting potential and action potential Signal transmission in neurons Electrophysical aspects of the heart The circulatory system The respiratory system Kidneys Basic mechanism of vision Sound and sound perception Part B: Imaging modalities without ionizing radiation Sonography Endoscopy Magnetic resonance imaging Questions & answers

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questions and answers in magnetic resonance imaging: Pediatric MRI Rosalind B. Dietrich, 1991

questions and answers in magnetic resonance imaging: MRI Brian M. Dale, Mark A. Brown, Richard C. Semelka, 2015-08-06 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

questions and answers in magnetic resonance imaging: Handbook of functional connectivity Magnetic Resonance Imaging methods in CONN Alfonso Nieto-Castanon, 2020-01-31 This handbook describes methods for processing and analyzing functional connectivity Magnetic Resonance Imaging (fMRI) data using the CONN toolbox, a popular freely-available functional connectivity analysis software. Content description [excerpt from introduction] The first section (fMRI minimal preprocessing pipeline) describes standard and advanced preprocessing steps in fMRI. These steps are aimed at correcting or minimizing the influence of well-known factors affecting the quality of functional and anatomical MRI data, including effects arising from subject motion within the scanner, temporal and spatial image distortions due to the sequential nature of the scanning acquisition protocol, and inhomogeneities in the scanner magnetic field, as well as anatomical differences among subjects. Even after these conventional preprocessing steps, the measured blood-oxygen-level-dependent (BOLD) signal often still contains a considerable amount of noise from a combination of physiological effects, outliers, and residual subject-motion factors. If unaccounted for, these factors would introduce very strong and noticeable biases in all functional connectivity measures. The second section (fMRI denoising pipeline) describes standard and advanced denoising procedures in CONN that are used to characterize and remove the effect of these residual non-neural noise sources. Functional connectivity Magnetic Resonance Imaging studies attempt to quantify the level of functional integration across different brain areas. The third section (functional connectivity measures) describes a representative set of functional connectivity measures available in CONN, each focusing on different indicators of functional integration, including seed-based connectivity measures, ROI-to-ROI measures, graph theoretical approaches, network-based measures, and dynamic connectivity measures. Second-level analyses allow researchers to make inferences about properties of groups or populations, by generalizing from the observations of only a subset of subjects in a study. The fourth section (General Linear Model) describes the mathematics behind the General Linear Model (GLM), the approach used in CONN for all second-level analyses of functional connectivity measures. The description includes GLM model definition, parameter estimation, and hypothesis testing framework, as well as several practical examples and general guidelines aimed at helping researchers use this method to answer their specific research questions. The last section (cluster-level inferences) details several approaches implemented in CONN that allow researchers to make meaningful inferences from their second-level analysis results while providing appropriate family-wise error control (FWEC), whether in the context of voxel-based measures, such as when studying properties of seed-based maps across multiple subjects, or in the context of ROI-to-ROI measures, such as when studying properties of ROI-to-ROI connectivity matrices across multiple subjects.

questions and answers in magnetic resonance imaging: Handbook of MRI Pulse Sequences Matt A. Bernstein, Kevin F. King, Xiaohong Joe Zhou, 2004-09-21 Magnetic Resonance Imaging (MRI) is among the most important medical imaging techniques available today. There is an installed base of approximately 15,000 MRI scanners worldwide. Each of these scanners is capable of running many different pulse sequences, which are governed by physics and engineering principles, and implemented by software programs that control the MRI hardware. To utilize an MRI scanner to the fullest extent, a conceptual understanding of its pulse sequences is crucial. Handbook of MRI Pulse Sequences offers a complete guide that can help the scientists, engineers, clinicians, and technologists in the field of MRI understand and better employ their scanner. - Explains pulse sequences, their components, and the associated image reconstruction methods commonly used in MRI - Provides self-contained sections for individual techniques - Can be used as a quick reference guide or as a resource for deeper study - Includes both non-mathematical and mathematical descriptions - Contains numerous figures, tables, references, and worked example problems

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and is now increasingly utilized in patient care. Its advantages are noninvasiveness, superb image resolutions, and body tissue characterization. CMR is now an essential part of both cardiology and radiology training and has become part of the examination for Board certification. This book provides a condensed but comprehensive and reader friendly educational tool for cardiology fellows and radiology residents. It contains multiple choice questions similar to board examinations with concise comment and explanation about the correct answer.

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Perry Sprawls, 2000

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insertion of foreign bodies.

questions and answers in magnetic resonance imaging: Principles of Magnetic Resonance Imaging Zhi-Pei Liang, Paul C. Lauterbur, IEEE Engineering in Medicine and Biology Society, 2000 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.

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