

12.1 MRI Registry Review

Part I

What do the Content Specifications say about the “MRI Boards” & What are the Clinical Requirements?



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Outline

- What is on the content specifications?
 - Post primary examination
 - Primary examination
- What are the clinical requirements?
 - Post primary examination
 - Primary examination
- How do I prepare for the boards?

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Objectives

Upon completion of this course, the attendee should...

1. Know what is on the content specifications?
Post primary examination
Primary examination
2. Understand how to complete the clinical requirements for the boards?
Post primary examination
Primary examination
3. Learn how to prepare for the boards?

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MRI Boards - Pathways

- Primary **Pathway**
 - Not yet registered
 - Completed an approved course
 - Met the clinical and didactic requirements
- Post Primary **Pathway**
 - Already Registered in ...
X-ray or Radiography (R), Radiation Therapy (RT),
Nuclear Medicine (N) or Nuclear Medicine (CNMT)
 - Met the clinical experience requirements
 - Be able to pass the written portion of the examination

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Primary Pathway: Clinical & Didactic Requirements

[illegible]

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Primary Pathway: Clinical & Didactic Requirements

Magnetic Resonance Imaging Class of Commercial Computer Program				
MRI Procedures	Approved or Rejected	Approved or Rejected	Approved or Rejected	Approved or Rejected
1. MRI procedures				
2. MRI procedures				
3. MRI procedures				
4. MRI procedures				
5. MRI procedures				
6. MRI procedures				
7. MRI procedures				
8. MRI procedures				
9. MRI procedures				
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96. MRI procedures				
97. MRI procedures				
98. MRI procedures				
99. MRI procedures				
100. MRI procedures				

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Content Specifications - Then

CONTENT SPECIFICATIONS FOR THE EXAMINATION IN MAGNETIC RESONANCE IMAGING

Content Specifications for the Examination in Magnetic Resonance Imaging

Introduction

The purpose of the ARRT Examination in Magnetic Resonance Imaging is to assess the knowledge and cognitive skills underlying the intelligent performance of the tasks typically required of staff technologists practicing in this specialized area. In order to identify the knowledge and skills covered by the examination, the ARRT conducted a job analysis study involving a nationwide sample of MRIT technologists. The results of the job analysis are reflected in this document.

The table below presents the four major content categories covered on the examination, along with the number of test questions in each major category. The remaining pages of this document list the specific topics addressed within each major category. The approximate number of test questions allocated to each topic appears in parentheses.

Content Category	Number of Questions
A. Patient Care	15
B. Imaging Procedures	54
C. Data Acquisition and Processing	65
D. Physical Principles of Image Formation	43
	180*

* An additional 20% of the test may be pilot questions.



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Categories of Questions - Now

CONTENT SPECIFICATIONS FOR THE EXAMINATION IN MAGNETIC RESONANCE IMAGING

Publication Date: November 2005
Implementation Date: January 2006

Content Category	Number of Questions*
A. Patient Care	30
B. Imaging Procedures	62
C. Data Acquisition and Processing	65
D. Physical Principles of Image Formation	43
	200

Now 19
 54
 65 **Then**
 43
 180*

1. A special debt of gratitude is due to the hundreds of professionals participating in this project as committee members, survey respondents, and reviewers.

2. Each exam includes an additional 20 unscored (pilot) questions. On the pages that follow, the approximate number of test questions allocated to each content category appears in parentheses.

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CONTENT SPECIFICATIONS FOR THE EXAMINATION IN MAGNETIC RESONANCE IMAGING

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- Only 18 questions of 180 total questions on the test
- Only questions pertaining to MRI safety and patient care
- Categories
 - Screening
 - Assessment & Monitoring
 - Safety precautions
 - Biological considerations

[illegible]

Patient Care Category ... New Content

I. Legal and Ethical Principles (4) A. Confirmation of Exam Request 1. verification of patient identification 2. comparison of request to clinical indications B. Legal Issues 1. common terminology (e.g., negligence, malpractice) 2. legal doctrines (e.g., respondent superior, res ipsa loquitur) C. Patient's Rights 1. informed consent (written, oral, implied) 2. confidentiality (HIPAA) 3. Patient's Bill of Rights (e.g., privacy, access to information, health care proxy, research participation) D. ARRT Standard of Ethics	III. Patient Assessment, Monitoring and Management (6) A. Routine Monitoring 1. vital signs 2. physical signs and symptoms IV. Interpersonal Communications (8) A. Modes of Communication 1. verbal, written 2. nonverbal (e.g., eye contact, touching) B. Challenges in Communication 1. patient characteristics (e.g., cultural factors, physical or emotional status) 2. strategies to improve understanding C. Patient Education 1. explanation of procedure (e.g., risks, benefits) 2. follow-up instructions 3. referral to other services D. Medical Terminology	V. Infection Control (4) A. Terminology and Basic Concepts 1. types of asepsis 2. sterile technique 3. pathogens (e.g., fungi, viruses, vectors) 4. nosocomial infections B. Cycle of Infection 1. pathogen 2. source or reservoir of infection 3. susceptible host 4. method of transmission (contact, droplet, airborne, common vehicle, vector borne) C. Standard Precautions (general patient contact) 1. handwashing 2. gloves, gowns 3. masks 4. medical asepsis / disinfection D. Additional or Transmission-Based Precautions (e.g., Hepatitis B, HIV, tuberculosis) 1. airborne (e.g., negative ventilation) 2. droplet (e.g., particulate mask) 3. contact (e.g., gloves, gown) E. Disposal of Contaminated Materials 1. linens 2. needles 3. patient supplies
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Patient Care Category, MRI Safety Issues

II. MRI Screening and Safety (11) A. Screening 1. biomedical implants (e.g., pacemakers, clips) 2. ferrous foreign bodies 3. medical conditions 4. prior diagnostic or surgical procedures B. Equipment Safety 1. placement of conductors (e.g., ECG leads, coils, cables) 2. cryogen safety 3. ancillary equipment in proximity 4. emergency procedures (e.g., quench, fire) C. Environment 1. climate control (temperature, humidity) 2. gauss lines 3. magnetic shielding 4. RF shielding D. Biological Considerations 1. RF-Field a. specific absorption rate (SAR) b. biological effects c. FDA guidelines	III. Patient Assessment, Monitoring and Management (6) A. Routine Monitoring 1. vital signs 2. physical signs and symptoms 3. claustrophobic patients 4. claustrophobic patients B. Emergency Response 1. reactions to contrast 2. other allergic reactions (e.g., latex) 3. cardiac/respiratory arrest (CPR) 4. physical injury, trauma, or RF burn 5. other medical disorders (e.g., seizures, diabetic reactions) 6. life-threatening situations (e.g., quench, projectiles) C. Patient Transfer and Body Mechanics 1. implantable devices (e.g., infusion catheters, pumps, pacemakers, others) 2. oxygen delivery systems 3. other (e.g., nasogastric tubes, urinary catheters)
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MRI Safety... What could they ask?

- Safety Questions
- What could they ask?
 - Only 30 total questions
 - Review content specs
- Study FDA regulations
 - Bo = 8.0T & 4.0T
 - B1= 4.0 watts/kg
 - Gradients - discomfort
- Review Patient Care
- Review MRI Safety
- Study guides
 - Review books
 - www.mrisafety.com
 - Look at package inserts

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Where could the questions have come from?

- Safety Questions
- Look to the experts
 - Questions came from the experts in MRI Safety
- Publications & lectures by Sherlock & Kanal
 - Look for their books
 - Or look for their web pages

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Imaging Procedures... Then

- Only 54 questions of 180 total questions on the test
- Categories
 - Head & neck
 - Spine
 - Thorax
 - Abdomen
 - Pelvis
 - Musculoskeletal
- Questions pertaining to
 - Clinical protocols
 - Anatomy
 - Contrast
 - Patient positioning

B. IMAGING PROCEDURES (54)			
TYPE OF STUDY	NUMBER OF QUESTIONS	TYPE OF STUDY	NUMBER OF QUESTIONS
1. Head & Neck (16)	16	6. Musculoskeletal (17)	17
2. Spine (16)	16	7. Thorax (16)	16
3. Thorax (16)	16	8. Abdomen (16)	16
4. Abdomen (16)	16	9. Pelvis (16)	16
5. Pelvis (16)	16		

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Imaging Procedures... Now

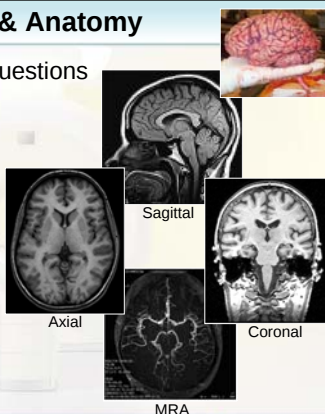
B. IMAGING PROCEDURES (180)			
TYPE OF STUDY	NUMBER OF QUESTIONS	TYPE OF STUDY	NUMBER OF QUESTIONS
1. Head & Neck (16)	16	6. Musculoskeletal (17)	17
2. Spine (16)	16	7. Thorax (16)	16
3. Thorax (16)	16	8. Abdomen (16)	16
4. Abdomen (16)	16	9. Pelvis (16)	16
5. Pelvis (16)	16		

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Imaging Procedures & Anatomy

- Imaging Procedures Questions
- What could they ask?
 - Only 62 total questions
 - Review content specs
- Study
 - Anatomy
 - General protocols
 - Planes for pathology
 - Image contrast (T1, T2)
 - Contrast media
- Study guides
 - Review books
 - www.protocols.com



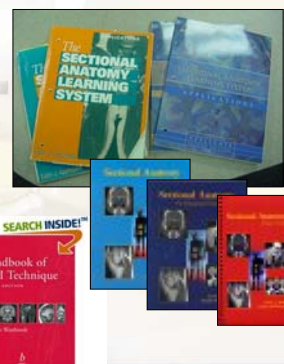
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Where did the board questions appear to come from? Anatomy

- Anatomy Questions
- Look to the experts
- Questions probably came from the experts in Anatomy
- Applegate / Peterson
- Look for their books



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Data Acquisition and Processing

- Data Acquisition & Processing Questions
- What could they ask?
 - Only 65 total questions
 - Review content specs
- Study
 - Pulse sequences
 - Data manipulation
 - Special procedures
 - Imaging parameters
 - Imaging options
 - Artifacts
 - QC
- Study guides
 - Review books



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Parameters That Influence Image Quality (SNR & CNR)

Hardware	Voxel	Sampling	Contrast	Options
Static field	Thickness	NSA	TR	SAT
RF coil	FOV	Bandwidth	TE	GMN
	Matrix	#PE's	T1	Gating
		# Slices (3D)	Flip	Resp comp
		Rectangular FOV		MT
				anti-aliasing



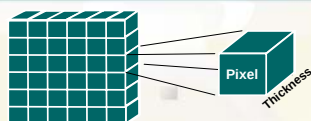
SNR ... "what we measure"
CNR ... "what we perceive"

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Pixel / Voxel



$$\text{Pixel Size} = \frac{\text{FOV}}{\text{Matrix}} \times \frac{\text{FOV}}{\text{Matrix}}$$

$$\text{Voxel Volume} = \frac{\text{FOV}}{\text{Matrix}} \times \frac{\text{FOV}}{\text{Matrix}} \times \text{Slice Thickness}$$

$$\text{Isotropic Voxel} \frac{\text{FOV}}{\text{Matrix}} = \frac{\text{FOV}}{\text{Matrix}} = \text{Slice Thickness}$$

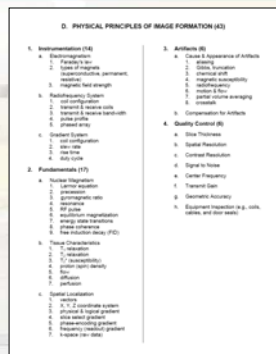
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Physical Principles of Image Formation

- Physical Principles of Image Formation Questions
- What could they ask?
 - Only 43 total questions
 - Review content specs
- Study
 - Instrumentation
 - Fundamentals
 - Artifacts
 - QC
- Study guides
 - Review books
 - Videos (on-line courses)
 - Live Courses



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Primary Programs

The ARRT Magnetic Resonance Imaging (MRI) primary pathway to certification requires candidates to complete an educational program that is accredited by a mechanism acceptable to the ARRT.

The current acceptable accreditation mechanisms for MRI are:

- The Joint Review Committee on Education in Radiologic Technology (JRCRT)
- Regional Institutional Accrediting Agency for post-secondary degree-granting institutions.

To verify the accreditation status of other programs or institutions, please consult the appropriate accrediting agency.

MAGNETIC RESONANCE IMAGING PROGRAM
NORTHERN ALBERTA INST OF TECH
11762 106TH ST NW
EDMONTON, AB T6C 1J1, CANADA, AB
Program Director: CRAIG BRIGGS Telephone: 780-378-5269

MAGNETIC RESONANCE IMAGING PROGRAM
BRITISH COLUMBIA INST OF TECH
3700 WILLINGDON AVE
BURNABY BC V5C 3K4 CANADA, BC
Program Director: EUCLID SEERAM Telephone: 604-432-8231

MAGNETIC RESONANCE IMAGING PROGRAM
MA COLLEGE OF PHAM & HEALTH SCI
179 LONGWOOD AVE
BOSTON, MA 02115-5896
Program Director: MARYANN BLAINE Telephone: 617-732-1318

MAGNETIC RESONANCE IMAGING PROGRAM
MICHENER INSTITUTE
222 SAINT PATRICK ST
TORONTO, ON M5T 1A4 CANADA, ON
Program Director: LORRAINE RAMSAY Telephone: 416-596-3101

MAGNETIC RESONANCE IMAGING PROGRAM
RED RIVER COLLEGE
2055 NOT DAME AVE
WINNIPEG, MB R3H 0J9 CANADA, MB
Program Director: LARRY KUSTOJA Telephone: 204-632-2241

MRI PROGRAM/DPT OF RADIOLOGIC SCIENCES
THOMAS JEFFERSON UNIVERSITY
130 S 9TH ST SUITE 1005 EDISON
PHILADELPHIA, PA 19107-0000
Program Director: RICHARD H WEEKING Telephone: 215-503-0059

Magnetic Resonance Imaging Schools

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Primary Program Clinical Requirements

Magnetic Resonance Imaging Clinical Competency Requirements				
MRI Procedures	Competency as Director	Sign Completed	Practice or Simulated	Competency Verified By
Head and Neck				
brain with contrast	12			
brain without contrast	12			
central auditory canal	12			
orbit	12			
pituitary	12			
MRSA brain	12			
soft brain scans including functional, vascular, and perfusion (fMRI, MRA, MRS)	12			
MRSA (nasal)	12			
Spine				
lumbar	12			
neck	12			
thoracic	12			
whole spine	12			
Thorax				
breast (gross)	12			
breast (small)	12			
chest	12			
heart	12			
lung	12			
Abdomen and Pelvis				
adrenal	12			
bladder	12			
abdominal MR angiography	12			
rectal pelvis	12			
renal pelvis	12			
Specialized Studies				
diffusion	12			
vascular	12			
whole body	12			

MRI Procedures	Maintenance or Director	Date Completed	Practice or Simulated	Competency Verified By
hip bony pelvis	12			
shoulder	12			
tail	12			
foot	12			
hand bones	12			
hand	12			
myocardial perfusion	12			
MR angiography	12			
Special Imaging Procedures				
MRV	12			
single pass perfusion	12			
extended MR angiography	12			
perfusion	12			
SWI	12			

3. Quality Control Procedures:
Responsibility: Candidates must demonstrate competence in all six quality control activities listed below.

Quality Control Procedures	Date Completed	Competency Verified By
signal to noise		
contrast frequency		
film quality control		
visualization (patient information)		
geometric accuracy		
equipment inspection (e.g., coils, cables, RF shield)		

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- How do I prepare for the boards?

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What's the best Study Material?

- Books
 - Text Books
 - Study guides
 - Flash cards
 - Q & A
- Video Tapes
- CD's
- Mock Tests
- Lectures



Yes, this was my office!

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Are there any Short-Cuts?

Yes
&
NO



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What About Videos?

- Principles
- Pulse Sequences
- Parameters
- Safety
- etc...



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What About Courses?

- Face time
- Ask questions
- See where you are weak
- Good for auditory learners
- Get from the lecture what you didn't get from reading
- Learn the tricks
- Bond with other techs
- Learn from their mistakes



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Tips for taking the exam...D-Day

- Don't tell anyone!
- Get rest
- Carefully read question
 - ONLY the question
 - Don't add anything
 - It's not about YOU, or your site
- Carefully read all of the answers (distracters)
- Don't change your answers
 - Always go with your 1st guess
 - Your 1st answer is generally right
- Upon completion count your guesses
- Find a Happy Place!



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Do it today! The longer you wait...

- The more they stuff put on it
- The more information you forget
- The more it costs
 - It will become mandatory
 - They will make you do it
 - This will add stress
- The more the requirements
 - Now clinical (documented cases)
 - Maybe classes (JRCERT approved)



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12.1 MRI Registry Review

Part I - What do the Content Specifications say about the "MRI Boards"
&
What are the Clinical Requirements?



Thank you for your attention!

Click to take your post test and get your credits

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