

Goals and Objectives – MRI (First Year)

Goal:

This MRI rotation is designed to provide supervised training and clinical experiences that will prepare the resident to protocol and read MR musculoskeletal and body images. During this rotation the resident will work in the reading room independently, assisting with MRI interpretation and teaching medical students and other residents assigned to MRI.

Objectives:

By the end of this rotation, the radiology resident will:

1. Protocol cases, in consultation with the attending, to assure that the MRI examination is appropriate and of sufficient quality to address the clinical concerns of the patient and referring physician.
2. Describe basic physics concepts used in generating clinical MR images and identify pulse sequences with 80% accuracy when presenting to the attending.
3. Distinguish between normal and abnormal musculoskeletal, chest, cardiac, abdomen and pelvis anatomy, particularly as seen on MR images, with 60% accuracy when presenting to the attending.
4. Identify pathology in order to interpret routine MR musculoskeletal and body imaging studies with 60% accuracy when presenting to the attending.
5. Have been introduced to MR angiography and cardiac cases by reading at least 5 cases on the PACs system and discussing each case with the attending.
6. The resident is encouraged to spend 2 hours a week on Vitrea during each MRI rotation, Dr. Viswamitra will teach Vitrea basics during this time.
7. The resident is required to complete selected questions from ACR Body MRI book during each rotation. You will be required to complete cases 1,3,5 and during this rotation. Each case has several sub questions. The book is available in the main library. The questions must be completed prior to the resident finishing the rotation. Evaluations will be withheld till the time these are completed.

Goals and Objectives – MRI (Second Year)

Goal:

This MRI rotation is designed to provide supervised training and clinical experiences that will prepare the resident to protocol and read MR musculoskeletal and body images. During this rotation the resident will work in the reading room independently, assisting with MRI interpretation and teaching medical students and other residents assigned to MRI.

Objectives:

By the end of this rotation, the radiology resident will:

1. Protocol cases, in consultation with the attending, to assure that the MRI examination is appropriate and of sufficient quality to address the clinical concerns of the patient and referring physician.
2. Evaluate and integrate data from other studies to make recommendations to the referring physician about more appropriate or additional diagnostic studies needed for the evaluation of the patient's differential diagnosis.
3. Describe basic physics concepts used in generating clinical MR images and identify pulse sequences with 90% accuracy when presenting to the attending.
4. Distinguish between normal and abnormal musculoskeletal, chest, cardiac, abdomen and pelvis anatomy, particularly as seen on MR images, with 75% accuracy when presenting to the attending.
5. Identify pathology in order to interpret routine MR musculoskeletal and body imaging studies with 75% accuracy when presenting to the attending.
6. Demonstrate increased understanding of MR angiography and cardiac cases by reading at least 5 cases on the PACs system and discussing each case with the attending.
7. The resident is encouraged to spend 2 hours a week on Vitrea during each MRI rotation, Dr. Viswamitra will teach Vitrea basics during this time.
8. The resident is required to complete selected questions from ACR Body MRI book during each rotation. You will be required to complete cases 2,4,6 and 8 during this rotation. Each case has several sub questions. The book is available in the main library. The questions must be completed prior to the resident finishing the rotation. Evaluations will be withheld till the time these are completed.

Goals and Objectives – MRI (Third Year)

Goal:

This MRI rotation is designed to provide supervised training and clinical experiences that will prepare the resident to protocol and read MR musculoskeletal and body images. During this rotation the resident will work in the reading room independently, assisting with MRI interpretation and teaching medical students and other residents assigned to MRI.

Objectives:

By the end of this rotation, the radiology resident will:

1. Protocol cases, integrating data from other studies, to assure that the MRI examination is appropriate and of sufficient quality to address the clinical concerns of the patient and referring physician.
2. Describe basic physics concepts used in generating clinical MR images and identify pulse sequences with 100% accuracy when presenting to the attending.
3. Distinguish between normal and abnormal musculoskeletal, chest, cardiac, abdomen and pelvis anatomy, particularly as seen on MR images, with 90% accuracy when presenting to the attending.
4. Identify pathology in order to interpret routine MR musculoskeletal and body imaging studies with 90% accuracy when presenting to the attending.
5. Demonstrate increased understanding of MR angiography and cardiac cases by reading at least 5 cases on the PACs system and discussing each case with the attending.
6. Demonstrate ability with MR musculoskeletal and body images at the competence level associated with a beginning practitioner in radiology and able to assist in running an MRI unit.
7. The resident is encouraged to spend 2 hours a week on Vitrea during each MRI rotation, Dr. Viswamitra will teach Vitrea basics during this time.
8. The resident is required to complete selected questions from ACR Body MRI book during each rotation. You will be required to complete cases 9,10,11,12 during this rotation. Each case has several sub questions. The book is available in the main library. The questions must be completed prior to the resident finishing the rotation. Evaluations will be withheld till the time these are completed.

Goals and Objectives – MRI (Fourth Year)

Goal:

This MRI rotation is designed to provide supervised training and clinical experiences that will prepare the resident to protocol and read MR musculoskeletal and body images. During this rotation the resident will work in the reading room independently, assisting with MRI interpretation and teaching medical students and other residents assigned to MRI.

Objectives:

By the end of this rotation, the radiology resident will:

1. Protocol cases, integrating data from other studies, to assure that the MRI examination is appropriate and of sufficient quality to address the clinical concerns of the patient and referring physician.
2. Describe basic physics concepts used in generating clinical MR images and identify pulse sequences with 100% accuracy when presenting to the attending.
3. Distinguish between normal and abnormal musculoskeletal, chest, cardiac, abdomen and pelvis anatomy, particularly as seen on MR images, with 90% accuracy when presenting to the attending.
4. Identify pathology in order to interpret routine MR musculoskeletal and body imaging studies with 90% accuracy when presenting to the attending.
5. Demonstrate increased understanding of MR angiography and cardiac cases by reading at least 5 cases on the PACs system and discussing each case with the attending.
6. Demonstrate ability with MR musculoskeletal and body images at the competence level associated with a beginning practitioner in radiology and able to assist in running an MRI unit.
7. The resident is encouraged to spend 2 hours a week on Vitrea during each MRI rotation, Dr. Viswamitra will teach Vitrea basics during this time.
8. The resident is required to complete selected questions from ACR Body MRI book during each rotation. You will be required to complete cases 13,14,15,16 during this rotation. Each case has several sub questions. The book is available in the main library. The questions must be completed prior to the resident finishing the rotation. Evaluations will be withheld till the time these are completed.

Resident's Responsibilities:

*PROTOCOL CASE: Most cases are straightforward with protocols already in place. A copy of common sequences is in the manual.

The resident (not the technologist), in consultation with the attending, has primary responsibility for making sure that the entire examination is appropriate and of sufficient quality to address the clinical concerns of the patient and referring physician. The resident should be initiated into scanning protocols and parameters what are used by the technologist. This is essential in being able to solve problems that the technologist may have from time to time.

Relevant clinical information, review of previous pertinent examinations (CT/US/MRI/PET) will help determine the protocols to be used. Write the information gained on the patient's white request sheet. Dictate this information succinctly so other residents can benefit from it. View old cases. If they are not on the Canon system disc, restore and lock them. Determine the urgency and priority of all cases. If needed, consult with body MRI attending as to which MRI protocol is most appropriate to answer the clinical questions.

It is imperative that a proactive approach be used with the technologists regarding when a case might be scanned. Be present or available for preferably ALL body examinations. Although not essential, it is helpful to review the study prior to contrast injection to avoid poor quality exams and/or asking the patient to return for additional sequences. Help localize pertinent anatomy. This is essential for MRCP. Consult with Body MRI attending about eliminating or changing sequences. Do not add additional sequences unless approved by attending. All cases should last 60 minutes or less.

MONITOR CASE: This involves checking series to determine that sufficient anatomy is covered, with sufficient spatial resolution, to match the clinical questions. Eliminate unnecessary pulse sequences, if possible, If critical pulse sequences are inadequate, determine if they should be repeated or if there is an alternative technique to obtain the information> Consult with the Body MRI attending whenever needed.

Inject Gad for dynamic scanning if indicated. We currently use "Smart-Prep" for our dynamic studies. There will be a need for a "timing-bolus" on occasion. Prior to injection, check the pre-contrast images for coverage and quality. Repeat them if necessary. This is extremely important. Please read the "Technical Hints" to help you solve issues of motion or poor patient cooperation.

LOADING: Cases must be loaded by series, formatted, and print pages prepared for all. For body exams, please merge appropriate series, e.g. all T1W axial as one combined series, all T2W axial as one, and all post-contrast T1W axial as one series.

PRE-REVIEW: Make print pages to show relevant pathology. These should be made before reading with staff. The print page should be sufficient to present all key aspects of the case.

MRA RECONS: Perform 3D reconstructions, spending 10 minutes or less per case if possible. This is essential for all vascular studies and useful for some tumor work-up cases.

DOCUMENTATION: There are 3 books in which all readings are entered. These are for UAMS, outside, and Breast. Mark cases in the respective books to indicate the following:

1. TF = teaching file
2. QC = quality control of study, either POOR or EXCEPTIONAL
3. FU = follow-up for identification of pathology
4. Write-in pathology if known.

The prepared print pages should reflect any or all of the above.

DICTATION: Read the case with the staff, dictated the case, and, if appropriate, inform the referring clinicians of the results (i.e., if requested or if findings might impact on management that day. Include in the dictation a brief description of what was done. Always include the anatomic regions imaged, contrast agents used, MRA, MRCP, 3D reconstructions and/or other post-processing performed.

BREAST CASES: Review with Dr. Harms

MR ANGIOGRAPHY & CARDIAC CASES: Read at least 5 MR angiography and cardiac cases on the PACS system with the staff, usually on Thursday mornings. The resident should maintain a log of these cases.

CARDIAC MRI AND CARDIAC CTA: The aim will be for the resident to gain an understanding of Cardiac Imaging, the benefits of MRI and CT, and build his/her knowledge base with each subsequent rotation.

All residents are welcome to give me suggestions regarding this rotation or conferences. Please email them to me or, if you wish to remain anonymous, drop a letter in my mailbox.

Faculty Responsibilities:

In addition to providing direct and progressively responsible experience in pediatric imaging, the faculty will assure that the rotation provides educational experiences that allow the resident to obtain and demonstrate competency in the six areas listed below:

1. **Patient care** that is compassionate, appropriate, and effective for the treatment of health problems and the promotion of health.
2. **Medical knowledge** about established and evolving biomedical, clinical, and cognate (eg, epidemiological and social-behavioral) sciences and the application of this knowledge to patient care.
3. **Practice-based learning and improvement** that involves investigation and evaluation of their own patient care, appraisal and assimilation of scientific evidence, and improvements in patient care.
4. **Interpersonal and communication skills** that result in effective information exchange and collaboration with patients, their families, and other health professionals.
5. **Professionalism**, as manifested through a commitment to carrying out professional responsibilities, adherence to ethical principles, and sensitivity to a diverse patient population.
6. **Systems-based practice**, as manifested by actions that demonstrate an awareness of and responsiveness to the larger context and system of health care and the ability to effectively call on system resources to provide care that is of optimal value.

Readings:

MRI Principles (2nd edition) by Donald G. Mitchell
ISBN: 0721600247
November 2003
W. B. Saunders (Elsevier Science)

MRI Manual

I have compiled a series of articles from various sources that is germane to your rotation. The manual is in a binder and is updated periodically. Please take the time to peruse them before, during, and after your rotation.

Note: 2 copies of the textbook and the manual are available on loan from the chief residents.

Evaluation:

Rotation ratings by faculty (Drs. Viswamitra, Sethi, and Harms)

Submission of MRA and cardiac case log to Dr. Viswamitra

Completion of ACR open-book examination

Rotation 1: Cases 1, 3, 5, and 7

Rotation 2: Cases 2, 4, 6, and 8

Rotation 3: Cases 9, 10, 11, 12

Rotation 4: Cases 13, 14, 15, and 16