

NAME OF ROTATION:

Neuroradiology/MRI

DIRECTOR OF ROTATION:

Richard J. Hicks, M.D.

Overview:

The Neuroradiology rotations are designed to provide the resident with extensive training in the interpretation of studies of the brain, spine, and head and neck. This training will be supplemented with experience in the CT rotation and Physics lecture series. The resident is expected to review the MRI teaching file and read the textbooks on the comprehensive reading list.

The resident is expected to be available in the MRI area from 7:30 a.m. until 5:00 p.m. except for conferences and other designated assignments. After the initial period of observation, the resident will be responsible for review and dictation, with staff supervision, of all MRI examinations and the reports will be approved by the resident and the staff radiologist.

GOALS AND OBJECTIVES

The overall goal of these rotations is to train the resident sufficiently to be able to function competently and independently in the performance of all MR imaging.

Neuroradiology Rotation I

During these rotations the resident will:

Patient Care

1. Review the ACR Standards and department policies and protocols pertinent to the performance and interpretation of MRI examinations.
2. State the indications and contraindications for MR imaging.
3. Discuss the pharmacology and doses of MR contrast material in both adults and pediatric patients

Medical Knowledge

1. Learn basic MRI physics, including image generation, T1 and T2 relaxation, gradient echo imaging and the interrelationships of TR, TE, number of slices, number of acquisitions, signal, resolution, imaging time and matrix size.
2. Recognize common artifacts and discuss the techniques to minimize these artifacts.
3. Identify normal anatomy and common pathologic conditions, especially for emergency cases.
4. Attend the weekly Neuroradiology conference.
5. Attend the bimonthly Neuropathology Conference.
6. Read references #1 and #2 under MRI physics, #1 under Safety and Bioeffects, and #1 under General Neuroradiology Texts.

Interpersonal Communication Skills

1. Demonstrate precise and effective communication skills during interactions with patients and technologists.
2. Communicate effectively with all members of the health care team and demonstrate competence in recognizing significant findings by directly calling referring physicians for positive urgent findings

Practice Based Learning Improvement

1. Effective utilization of electronic and text resources.
2. Utilize critical feedback and evaluations to improve resident performance.
3. Identify, learn and correct from personal mistakes and utilize resources to avoid similar circumstances in the future.

Professionalism:

1. Demonstrate appropriate decorum of a physician.
2. Demonstrate respect for patients and other members of the health care team.
3. Honor patient confidentiality.
4. Demonstrate a responsible work ethic towards daily tasks and assignments.
5. Demonstrate punctuality and follow-ups on appropriate assignments and tasks.

System Based Practice

1. Demonstrate proficiency in basic concepts of MR imaging during resident and interdepartmental conferences.
2. Demonstrate competence in ACR practice guidelines and technical standards for MRI.
3. Understand the importance of timely and appropriate MRI studies in the context of overall patient care and management.

Neuroradiology Rotation II

During this rotation the resident will continue to refine the goals and objectives of Rotation I and further his/her skills with the following:

86.

Patient Care:

1. Screen accurately the requisitions for all requested studies and determine the proper protocols to be used.
2. Perform as a consultant for the technologists
3. Perform pre-sedation screening of pediatric patients, interacting appropriately with child and parents and completing documentation
4. Function with increasing competence as a consultant to neurologists, neurosurgeons and other referring physicians

Medical Knowledge

1. Learn techniques required for performing magnetic resonance angiography
2. Contribute 4 cases to the MRI teaching file
3. Discuss fast imaging techniques, magnetization transfer contrast and fat saturation techniques
4. Demonstrate increasing proficiency in the interpretation of MRI examinations, including those involving pediatric patients.
5. Read the ACR syllabi #28, #31
6. Assist the staff neuroradiologist in the preparation of cases at the weekly Neuroradiology Conference
7. Become capable of formulating appropriate differential diagnoses

Interpersonal Communication Skills

1. Generate accurate concise reports.
2. Become capable of obtaining informed consent and addressing concerns such as risks/benefits, safety concerns and alternative methods
3. Demonstrate proficiency in communicating with other members of the health care team

Practice Based Learning Improvement

1. Continue to incorporate constructive feedback for self improvement

Professionalism

1. Demonstrate progression of skills and confidence in interpreting MRI studies

88.

System Based Practice

1. Present with supervision at the weekly Neuroradiology Conference.
2. Demonstrate knowledge of ACR practice guidelines and technical standards for MRI as well as ACR appropriateness criteria
3. Understand the role of MRI imaging in the provision of diagnostic health care

Neuroradiology Rotation III

During this rotation the resident will continue to refine the goals and objectives of Rotation II and further his/her skills with the following:

Patient Care

1. Review the ACR Standards and department policies and protocols pertinent to the performance and interpretation of neuroradiologic examinations.
2. Review and discuss, with the attending neuroradiologist, then dictate, 5-10 neuroradiologic CT scans each day with special emphasis on pediatric, orbital, temporal bone and head and neck examinations.
3. Review and discuss, with the attending neuroradiologist, then dictate, 5-10 neuro MRI scans each day with special emphasis on non-routine studies and MRA examinations
4. Become comfortable with post-processing techniques for CT angiography and MR angiography
5. Assist with all myelograms referred to the neuroradiologist
6. Assist with infrequently performed procedures such as facet injections, discograms, brain biopsies, sialograms, disc aspirations, spine biopsy and, if necessary, additional cerebral angiography.

Medical Knowledge

1. Maintain a log of all interventional procedures performed during the rotation and review this list with the Director of the Neuroradiology Service at the end of the rotation.
2. Prepare and present cases for the bimonthly Neuropathology conference and the weekly Neuroradiology Conference under the direction of the neuroradiologist
3. Identify normal anatomy and pathologic conditions in the orbit, temporal bone and head and neck
4. Identify normal anatomy and pathologic conditions shown on CT and MR angiography
5. Attend the weekly Neuroradiology conference.
6. Attend the bimonthly Neuropathology Conference.
7. Function competently as a consultant to neurologists, neurosurgeons and other referring physicians.
8. Read reference #2 under General Neuroradiology Texts.
9. Read the ACR syllabi #34, #42, and #46

Interpersonal Communication Skills

1. Demonstrate precise and effective communication skills during interactions with patients and technologists.
2. Communicate effectively with all members of the health care team and demonstrate competence in recognizing significant findings by directly calling referring physicians for positive urgent findings

Practice Based Learning Improvement

1. Effective utilization of electronic and text resources.
2. Utilize critical feedback and evaluations to improve resident performance.
3. Identify, learn and correct from personal mistakes and utilize resources to avoid similar circumstances in the future.

Professionalism

1. Demonstrate appropriate decorum of a physician.
2. Demonstrate respect for patients and other members of the health care team.
3. Honor patient confidentiality.
4. Demonstrate a responsible work ethic towards daily tasks and assignments.
5. Demonstrate punctuality and follow-ups on appropriate assignments and tasks.

System Based Practice

1. Demonstrate proficiency in basic concepts of MR imaging during resident and interdepartmental conferences.
2. Demonstrate competence in ACR practice guidelines and technical standards for MRI.
3. Understand the importance of timely and appropriate MRI studies in the context of overall patient care and management.

Neuroradiology Rotation IV

During this rotation the resident will continue to refine the goals and objectives of Rotation III and further his/her skills with the following:

Patient Care:

1. Screen accurately the requisitions for all requested studies and determine the proper protocols to be used.
2. Perform as a consultant for the technologists
3. Function with increasing competence as a consultant to neurologists, neurosurgeons and other referring physicians
4. Perform successfully all myelograms referred to the neuroradiologist
5. Perform as capable infrequently performed procedures such as facet injections, discograms, brain biopsies, sialograms, disc aspirations, spine biopsy and, if necessary, additional cerebral angiography

Medical Knowledge

1. Assist the staff neuroradiologist in the preparation of cases at the weekly Neuroradiology Conference
2. Become capable of formulating appropriate differential diagnoses
3. Maintain a log of all interventional procedures performed during the rotation and review this list with the Director of the Neuroradiology Service at the end of the rotation.
4. Prepare and present cases for the bimonthly Neuropathology conference and the weekly Neuroradiology Conference under the direction of the neuroradiologist
5. Identify normal anatomy and pathologic conditions in the orbit, temporal bone and head and neck
6. Identify normal anatomy and pathologic conditions shown on CT and MR angiography
7. Function competently as a consultant to neurologists, neurosurgeons and other referring physicians.
8. Attend the weekly Neuroradiology conference.
9. Attend the bimonthly Neuropathology Conference.

Interpersonal Communication Skills

1. Generate accurate concise reports.
2. Become capable of obtaining informed consent and addressing concerns such as risks/benefits, safety concerns and alternative methods
3. Demonstrate proficiency in communicating with other members of the health care team

Practice Based Learning Improvement

1. Continue to incorporate constructive feedback for self improvement

Professionalism

1. Demonstrate progression of skills and confidence in interpreting a variety of neuroradiologic studies

System Based Practice

1. Present with supervision at the weekly Neuroradiology Conference.
2. Demonstrate knowledge of ACR practice guidelines and technical standards for MRI as well as ACR appropriateness criteria
3. Understand the role of MRI imaging in the provision of diagnostic health care.

EVALUATION:

The Service Director will meet with the resident at the beginning of each rotation to discuss the goals and objectives of the rotation and at the end of the rotation to discuss the resident's performance relative to the stated goals and objectives. The Service Director will complete a standard written evaluation form for the resident at the end of each rotation. The written evaluation will be sent to the program director for use in compiling the resident's semi-annual overall evaluation. The evaluation will be discussed with the resident at the end of the rotation and an opportunity for resident feedback and rotation evaluation will be provided.

COMPREHENSIVE READING LIST

Introductory Reading

MRI Physics

1. Understanding MRI- Newhouse, Weiner. Chapters1-10
2. Clinical Magnetic Resonance Imaging, Volume I- Edelman, Hesselink, Zlatkin, Crues. Saunders Elsevier, 2006.
 - Chapter 2- Basic Principles pp3-22
 - Chapter 3- Practical Considerations and Image Optimization pp58-104
 - Chapter 22- Artifacts and Solutions pp577-629

Safety and Bioeffects

Clinical Magnetic Resonance Imaging, Volume I- Edelman, Hesselink, Zlatkin, Crues. Saunders Elsevier, 2006.

Chapter 24- Bioeffects, Safety and Patient Management pp647-671

ACR Standards

ACR Standard for Communication
ACR Standard for the Performance of Computed Tomography in Neuroradiologic Imaging of Adults and Children
ACR Standard for the Performance of Pediatric and Adult Neurovascular MRA
ACR Standard for the Performing and Interpreting of MRI
ACR Standard for the Performance of MRI of the Adult Spine
ACR Standard for the Performance of Myelography and Cisternography
ACR Standard for the Performance of Diagnostic Cervicocerebral Angiography in Adults
ACR Standard for the Performance of Percutaneous Vertebroplasty

Introductory Neuroradiology Texts

1. Diagnostic Imaging Brain- Osborn. Amirsys 2004

2. The Radiology of Acute Cervical Spine Trauma- Harris, Mirvis. Williams & Wilkins 1996
3. ACR Syllabus #28- Neuroradiology, Part 1 and 2
4. ACR Syllabus #31- Magnetic Resonance
5. ACR Syllabus #34- Head and Neck Disorders

Specific Topics:

Pediatric Neuroradiology

1. Pediatric Neuroimaging- Barkovich. Lippincott Williams & Wilkins 2005

Head and Neck Imaging

1. Neuroimaging Clinics of North America- Head and Neck MR Imaging, November 2004

Angiography

1. Diagnostic Cerebral Angiography-Osborn. Lippincott William & Wilkins 1999.
2. Neuroimaging Clinics of North America- Cerebral Angiography August 1996

Magnetic Resonance Angiography

1. Clinical Magnetic Resonance Imaging, Volume I- Edelman, Hesselink, Zlatkin, Crues. Saunders Elsevier, 2006.
 - a. Chapter 27 Magnetic Resonance Angiography: Basic Principles pp695-720
 - b. Chapter 51 MR Angiography of the Head and Neck pp1499-1538
2. Magnetic Resonance Imaging of the Brain and Spine- Atlas. Lippincott Williams & Wilkins 2002.
 - a. Chapter 19 MR Angiography: Techniques and Clinical Applications pp981-1058

References

1. Clinical Magnetic Resonance Imaging, Volume I, II, III- Edelman, Hesselink, Zlatkin, Crues. Saunders Elsevier, 2006.
2. Magnetic Resonance Imaging of the Brain and Spine- Atlas. Lippincott Williams & Wilkins 2002.
3. Head and Neck Imaging, Volume I and II, Som, Curtin. Mosby 2003

NEURORADIOLOGY LECTURE SERIES

1. Brain Tumors- Intraaxial
2. Brain Tumors-extraaxial
3. Temporal Lobe Lesions
4. Demyelinating Diseases
5. Hydrocephalus
6. Intracerebral Hemorrhage
7. Spine Trauma
8. Pituitary and parasellar regions
9. Stroke
10. Hypoxic ischemic encephalopathy
11. Temporal bone lesions
12. Multiple sclerosis
13. Cranial trauma
14. CNS manifestations of AIDS
15. Congenital Malformations of the brain and skull
16. Myelography- technique and interpretation
17. Degenerative Disc disease
18. Spinal cord lesions
19. Brain aneurysms and vascular malformations
20. Facial trauma
21. Orbital imaging