

# Diagnostic Radiology Residency Manual



msufame

# **MSU Flint Area Medical Education**

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Diagnostic Radiology Residency Manual  
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## SECTION I – Overview of Program

### 2015 – 2016 MSU Flint Area Medical Education Residency in Diagnostic Radiology

The MSU Flint Area Medical Education Diagnostic Radiology Program uniquely combines the educational and clinical resources of three major community-based teaching hospitals (Genesys Regional Medical Center, Hurley Medical Center, and McLaren Flint) with the academic resources of Michigan State University to offer a comprehensive radiology program in graduate medical education. The program is designed to provide comprehensive training in all phases of the specialty, thus providing:

- *A Unique Blend of University and Community-Based Education*
- *Multiple Distinct Learning Environments*
- *A Multitude of Specialty Procedures and Hands-On Experience*
- *Great Faculty-to-Resident Ratio*
- *Diversity and Quantity of Pathology*
- *Instructional support for written and oral board reviews*
- *Flexibility of Rotations, Work and Study Options*
- *Full ACGME Accreditation*

Rotations begin with practical experience in areas of general and subspecialty studies prior to assignment of night float responsibilities. Residents rotate through the three community hospitals with emphasis on Musculoskeletal, Chest, Gastrointestinal and Genitourinary systems, Nuclear Radiology, Ultrasound, Computerized Tomography, MRI, Mammography, Neuroradiology, Cardiac Radiology, and Interventional Angiography.

During the third year (PGY IV), residents attend a four-week course in Radiological Pathology at the American Institute for Radiologic Pathology (in Washington, D.C.) and a three-month rotation in Pediatric Radiology at Children's Hospital of Michigan in Detroit.

The last year of residency is tailored to meet the individual needs and career goals of the resident.

In addition to subspecialty lectures in the community, radiology residents from Flint and several other Michigan State University affiliated programs meet weekly for an academic day in East Lansing. Faculty members and visiting professors lecture and teach throughout the day, with a focus on physics, basic science, and radiation biology.

Our community faculty consists of Board Certified Radiologists who participate in educational and research activities in all divisions of the department. The three local affiliated hospitals conduct a combined total of over 350,000 radiological procedures on an annual basis.

## 1.1 General Guidelines

- Starting time is 7:30 a.m. at all locally affiliated institutions. It is recommended that the resident arrive 15 minutes early for their shift so they will be ready to begin work on time.
- Residents should take the workstation of the rotation to which they are assigned or any available radiologist workstation.
- When on a specific rotation, the resident is responsible for all cases performed in that modality. This includes any biopsies.
- Residents are responsible for notifying the technician of the rotation that they are on duty. Residents should be available to protocol studies, check studies, and for quality control.
- Time should be used predominantly for the specific rotation purpose. However, if those duties are complete, then the resident should spend time either observing or dictating at other workstations.
- The resident should not refuse any work (i.e., reading stat films). If the resident is unsure or unable to read the films presented to them, then the resident should seek out an attending to review the films with and provide the preliminary report.
- The residents should dictate all cases of the rotation to which they are assigned when possible.
- On the first day of an assigned rotation, the resident, in consultation with the Associate Program Director, is responsible for determining which attending they will be working with. On the first day of an assigned rotation, the resident, along with the assigned attending or the Associate Program Director, is required to review, discuss and acknowledge such review of the goals and objective of the impending rotation.
- Residents are not allowed to leave the hospital during the day without permission of the attending.
- Residents are excused at 4:00 p.m. for daily resident clinical conferences. If a conference is cancelled or not scheduled, residents should meet at MSU/FAME or one of the affiliated medical center Radiology departmental conference rooms to review the ACR teaching files.
- If dictating requires the resident to stay longer than 4:00 p.m., then they should attend conference and return from the conference to finish their dictations or refer the work to an attending. This should be avoided when possible. It may take some forethought or time management skills; however, it is not usually very difficult to be finished with work by 4:00 p.m. to attend conference.
- The residents must read from the suggested reading lists while on the various rotations.

## 1.2 Four-Year Curriculum

### Diagnostic Radiology Curriculum

#### PGY II – V

##### PGY II

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5 months	General Radiology (includes 1 month General/Chest/GI/GU/Musculoskeletal)
2 months	Ultrasound
2 months	Nuclear Medicine
2 months	Computed Tomography (CT)
<u>1 month</u>	MRI
<i>12 months total</i>	

##### PGY III

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2 months	General Radiology
1 month	Nuclear Medicine (MSU)
3 months	Vascular/Interventional
1 month	Computed Tomography (CT)
1 month	MRI (MSU)
1 month	Mammography
<u>3 months</u>	Neuroradiology
<i>12 months total</i>	

##### PGY IV

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2 months	General Radiology (includes 1 month at AIRP*)
1 month	Nuclear Medicine
1 month	Ultrasound (High Risk OB-Hurley Medical Center)
1 month	Cardiothoracic
4 months	Pediatrics (1 month-Hurley Medical Center , 3 months-Children’s Hospital of Michigan)
2 months	Mammography
<u>1 month</u>	MRI
<i>12 months total</i>	

##### PGY V

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6 months	Rotations determined by the Program faculty and approved by the Program Director to be appropriate in the Senior year of residency
<u>6 months</u>	Rotations determined by discussions between the resident and their faculty mentor in a specialty area of interest determined by the resident, with the approval of the Program Director prior to finalization of plan.
<i>12 months total</i>	

\*AIRP-American Institute for Radiologic Pathology. This is a four-week course held in Washington, D.C. The program will send a resident as positions become available.

## 1.3 Curriculum Requirements

### Diagnostic Radiology Overall Curriculum Requirements for PGY II - V

General Radiology (includes 4 weeks at AIRP)	7 months
Specified General/Chest	2 months
Specified General/GI	2 months
Specified General/GU	2 months
Specified General/MSK	2 months
Vascular/Interventional (Hurley Medical Center)	3 months
Ultrasound (Includes one month High Risk OB at Hurley Medical Center)	4 months
Nuclear Medicine (one month at MSU)	4 months
Neuroradiology	3 months
CT	4 months
Mammography	3 months
Pediatric Radiology (Hurley Medical Center-1 month) (Children’s Hospital of Michigan-3 months)	4 months
Cardiac Cath.	1 month
Magnetic Resonance Imaging (one month at MSU)	4 months minimum
Electives	<u>3 months minimum</u> 48 months
Research	3 Projects due

## 1.4 Program Contacts

MSU/FAME  
Diagnostic Radiology Residency Office  
200 East First Street  
Flint, MI 48502  
Phone: (810) 600-5600  
Fax: (810) 600-5698

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Associate Program Director  
McLaren Flint  
401 S. Ballenger Hwy  
Flint, MI 48504  
Phone: (810) 342-2209  
Fax: (810) 342-2100

### Frequently Used Phone Numbers (all are area code 810 unless indicated):

**MSU (East Lansing) Department of Radiology** (517) 884-3233  
**MSU FAX (East Lansing)** (517) 432-2849

## ***Genesys Regional Medical Center-Health Park***

Toll Free	(888) 606-6556
Main Radiology	(810) 606-6800
Main Processing Room	(810) 606-6800
<b>FAX</b> - Radiology	(810) 606-5220
All specialty areas call Main Radiology Number; calls will then be transferred.	
MRI Center/Grand Blanc	(810) 953-6100
MRI Center/Grand Blanc FAX	(810) 953-6106

## ***Hurley Medical Center***

Hospital Operator	(810) 262-9000
Front Desk Radiology #1	(810) 262-7099
Front Desk Radiology #2	(810) 262-9210
CT	(810) 262-9666
US	(810) 262-9618
Nuclear Medicine	(810) 262-9429
ER	(810) 262-9429
FAX - Radiology	(810) 262-6246
FAX - ER	(810) 262-9104

## ***McLaren Flint***

Hospital Operator:	(810) 342-2000
Front Desk Radiology #1	(810) 342-2209
Front Desk Radiology #2	(810) 342-2210
Workroom Radiology	(810) 342-2216
FAX Radiology	(810) 342-2100
CT #1	(810) 342-2755
CT #2	(810) 342-2530
Nuclear Medicine	(810) 342-4978
ER	(810) 342-2308
Workroom ER	(810) 342-4633
FAX - ER	(810) 342-2486
MRI Center/Flint	(810) 235-9311
MRI Center/Flint FAX	(810) 235-9318

## SECTION II – Administrative Procedural Processes

### 2.1 Buddy Night Float

Buddy Night Float occurs in the PGY II year; it is a mandatory requirement of the program. Buddy night float gives the new resident an opportunity to work with a higher level resident to learn the computer system, the management of incoming studies, and how to provide concise and accurate reports. Buddy night float consists of a total of at least 10 weekend night floats from 2 to 7 p.m. The resident is responsible to report for their assigned clinical duties the next day.

### 2.2 Independent Night Float

Participation in night float activities is essential for the development of radiologists, who are expected to practice independently upon completion of training, and should occur throughout the second, third and final years of radiology residency. Residents will have senior backup on their first assigned night floats. Most upper class residents in the past have teamed up with another resident on their first night floats, and are encouraged to do so in the future. This helps the PGY III residents gain confidence and feel more secure.

### 2.3 After Hours Coverage

- The Chief Resident will attempt to develop and distribute the night float schedule 6 – 12 months in advance
- Each resident will perform night float during their PGY III, IV and V years of residency, in addition to short night float weekends. Residents will also have additional night float while rotating at Children’s Hospital of Michigan; actual numbers on this rotation vary.
- Residents can request specific blocks to not be scheduled prior to the publication of the schedule.
- During the weekdays, residents cover the departments from 11:00 p.m.-7:00 a.m.
- During the weekends (Saturday and Sunday) and holidays, residents cover the departments from 2:00 p.m.-7:00 a.m.; one resident from 2:00-7:00 p.m. and the other resident from 7:00 p.m.-7:00 a.m.
- Holidays are considered weekend days. The holidays will be divided as equally as possible.
- Residents will be assigned night float in Monday-Thursday and Friday-Sunday blocks.
- Residents may switch night float blocks as long as no conflict with prior clinical responsibilities exists. If switches occur, the Program Coordinator must be notified in writing (e-mail is acceptable).
- Residents have pre- and post-night float days off for shifts greater than eight hours.
- The resident will perform the procedures (which they are capable of performing) from the institutions where they are posted for their monthly night float. The other two

institutions must make appropriate arrangements for performing procedures in their respective institutions.

- The residents will be covering the departments by electronic media. It is intended that night float coverage will rotate on a monthly basis between the three institutions.
- If there is a breakdown of electronic computer systems the resident is to first attempt to reboot the computer, which will hopefully correct the problem. If that does not rectify the situation, the resident is to contact the IS Helpdesk at the institution where the breakdown has occurred.
- The resident is to inform the department (where the breakdown has occurred) that there has been a breakdown in the system and they need to contact the attending who is on call and let them know there is a system breakdown and the attending must come in to the department to cover.
- If the above protocol does not work, the resident will move to the nearest institution provided they can retrieve images from all three institutions. At that point covering for procedures is the responsibility of the attending as mentioned in the above paragraph.
- If all three departments cannot be serviced by the resident from any institution, they will continue to stay at the assigned institution. At this point, it is the responsibility of the attending(s) to provide appropriate coverage for their institution(s) where the resident is not stationed.
- In the event of a system breakdown, the resident will also notify the MSU/FAME office, as soon as possible, informing Jarrod Miller, the Network Administrator of the problems. The Network Administrator can be reached at: [admin@msufame.msu.edu](mailto:admin@msufame.msu.edu). The MSU/FAME Network Administrator will follow up with the affected medical center on the next regular business day.
- The residents will not be traveling from one institution to another to cover night float. It is the responsibility of the attending on call at the institution where the breakdown has occurred to cover.
- All departments must provide a phone number or a pager number of the PACS Administrator or other appropriate tech person on call so that the resident can inform them of any malfunctioning of the system. It is not the responsibility of the residents to track down various individuals. This is clearly the responsibility of the departments and they must make proper arrangements to fix the system as soon as possible.
- It is the requirement of the Program that every resident reading room should have three viewing stations and a fourth station for processing. These computers must not be used for purposes other than transmitting images between the three institutions.
- If any department is providing residents with other backup systems where the quality of the images are less than the primary system, it is understood that the resident interpretation may be adversely affected and the resident cannot be held responsible for any missed findings/diagnosis.
- All departments/institutions must provide the basic necessary hardware and software as approved by the MSU/FAME GMEC as determined by the Radiology Technology Subcommittee.
- All the above criteria will apply to all three institutions by the GMEC and Program Director.

- There is no guaranteed response time for studies. There is a 30-minute response time for major trauma studies. If the resident is not able to respond to a request in a timely fashion, the resident is to call an attending for assistance. The resident cannot have conflicting duties on a night of night float (i.e., simultaneous contrast coverage). The resident on night float must be at their assigned location at the start of the night float shift.
- If at any time it becomes too busy for one resident to cover these institutions in a timely fashion, then attendings will be called on to assist. The resident will attend to the case(s) that are most critical for patient care and ask for assistance for studies that are less urgent.
- After completing night float, the resident is dismissed from duties at 7:00 a.m. until their next scheduled shift, allowing a minimum of 12 hours off. The resident who is on long night float (7:00 p.m.-7:00 a.m.) has no assigned daily responsibilities.
- If a resident has a weeknight of night float on Monday night, they are excused from East Lansing didactic sessions on Tuesday for the entire day.
- A resident report must be filled out completely for every case. This includes the indication for the study. It is very helpful for the attending/resident who is reading the case the following morning to add any additional history to this portion of the report. The time on the report should be the time the report was delivered to the emergency room/floor. The report should be sent to the emergency department. Significant findings should be called directly to the attending involved and take highest priority.
- The resident report should be legible and concise. Reports must be faxed directly to the ER, even if they are called in. The report should then be placed with the films or faxed to the respective radiology department, so appropriate feedback can be given.
- The resident should contact the attending on call before performing a fluoroscopy study on an infant/child.
- For night float trades prior to completion of the monthly night float schedule, please notify the MSU/FAME Diagnostic Radiology Chief Resident so this change can be put on the schedule.
- For night float trades after completion of the monthly schedule, the resident who initiated the trade is responsible for making sure that the appropriate changes are made at all three hospitals. Changes should be made at the front desks of all three hospitals, CT Departments at Genesys Regional Medical Center, Hurley Medical Center, and McLaren Flint, Nuclear Medicine at Hurley Medical Center, and the schedule that is posted with the MSU/FAME Radiology Residency Program Coordinator. You must also inform the Chief Resident of all night float changes. If there is any confusion, the resident who was originally scheduled will be held responsible. For emergencies, you should contact the Chief or Co-Chief Resident. Additionally, the scheduled night float resident who is taking a switched block must demonstrate professional courtesies by notifying

each institution at the beginning of the first night float block that they are the night float resident.

- Residents may, only under special circumstances, switch night float shifts without switching entire blocks. This requires approval by the Chief Resident and Program Director.
- It is important that if a night float switch is made that causes an absence at an East Lansing day, the resident is responsible for contacting the Administrative Assistant at the MSU(East Lansing) Department of Radiology, and Helena Kurowski, the MSU/FAME Radiology Residency Program Coordinator in order for the absence to be recorded and excused.
- Pediatric rotations at Children’s Hospital of Michigan in Detroit require additional night float, which is dictated by the coordinator of the rotation in Detroit.

## 2.4 Moonlighting

In accordance with the Agreement between MSU/Flint Area Medical Education (MSU/FAME) and the Diagnostic Radiology Residency Program, a Radiology Resident shall be permitted to engage in outside medical practice or other endeavors provided such activities do not interfere with the responsibilities, duties, and assignments of the Diagnostic Radiology Residency Program. Residents MUST obtain authorization to engage in outside medical activities from the Program Director PRIOR to the actual performance of such activities. Extra curricular medical practice, which requires a Diagnostic Radiology Resident to assume continuing responsibility for patients, is not permissible unless agreed to by the Program Director and the Diagnostic Radiology Residency GMEC. A Diagnostic Radiology Resident will not be allowed to assume extra curricular medical activities during regularly scheduled duty hours, including night float. The Radiology Resident is required to advise the Program Director of any extra curricular medical activities. The MSU/FAME Diagnostic Radiology Residency Program liability coverage will not be extended to cover such extra curricular medical practice.

Therefore, in order to adhere to the written contractual language between MSU/FAME and the Diagnostic Radiology Residency Program, the following criteria has been established to identify residents who qualify to participate in outside activities (Moonlighting).

### 2.4(a) All Diagnostic Radiology Residents must meet the following criteria:

- For participation in outside professional activities a Resident must have the appropriate visa status (Permanent Resident) or be an American citizen. Also, the resident must possess a valid Permanent Michigan Medical License and have successfully completed USMLE Step 3.
- The Resident must submit a written request, which includes the nature, duration, and affiliation of such outside activities in advance to the Program Director. Outside activities are to be approved by the Program Director and

the MSU/FAME Radiology GMEC prior to the Resident engaging in such activities. Only Residents in good standing with the Program will be considered for Outside Professional Activities.

- The Resident must provide the Program Director with a written statement (in a form acceptable to MSU/FAME) that the Resident shall hold harmless and fully indemnify MSU/FAME against any claim, damage, expense, or liability resulting from the Resident engaging in such activities.
- The Resident must provide written proof of liability insurance.
- The Resident must understand that their performance will be monitored for the effect of these activities upon performance and compliance to program requirements, and that adverse effects may lead to the withdrawal of permission to continue in engaging in outside professional activities.
- Residents are not required to participate in outside professional activities.

It should be further understood that when engaging in outside professional activities, the Resident will not be covered by the MSU/FAME Professional Liability Insurance, since such activities are outside of the scope of this Agreement. Permission to engage in outside professional activities is not to be construed as an acceptance of responsibility by MSU/FAME for the Resident's conduct while engaging in outside activities.

**2.4(b)** Without specific exception from the Program Director, residents who have been approved to engage in outside activities must comply with all duty hour rules established by the Accreditation Council for Graduate Medical Education (ACGME) as follows:

- Moonlighting hours at affiliated institutions, coupled with regular duty hours (including Night float) are not to exceed 80 hours per week, averaged over a four-week period.
- Approval to engage in outside activities can be revoked at any time at the discretion of the Program Director and/or the GME Council.
- Violation of the above criteria/policy could result in termination from the program.



## **2.5 Leaving the Department**

Before leaving the Radiology Department, at any hospital, for any reason (including conference or other teaching sessions) the resident must inform and receive approval from the attending that they are assigned to and/or are working with.

## **2.6 Resident Recourse**

If a resident has any issues or concerns regarding the program, they should refer to the Due Process Procedures regarding both Clinical and Administrative Matters found in the resident contract.

## **2.7 Mailing Address**

Residents are required to notify Helena Kurowski, the MSU/FAME Diagnostic Radiology Residency Program Coordinator of any changes in their current mailing address and telephone number.

## **2.8 Mailboxes**

Residents will be provided with a mailbox at each of the area hospitals and at MSU/FAME on 7W at Hurley Medical Center. It is the resident's responsibility to check their box frequently. It is a good idea to check for mail at a specific hospital during the week when conference is scheduled there.

## **2.9 Telephones**

A telephone is available for resident use at MSU/FAME, however only local calls can be made from this phone.

## **2.10 Email Address**

Residents will be provided with an MSU/FAME e-mail address and will be scheduled for computer training, which includes testing the set-up of the e-mail address. Information will be communicated via e-mail and it is the resident's responsibility to access their account.

## SECTION III – Didactics/Educational Conferences

### 3.1 Conferences & Professional Association Participation Request

Release time for attendance of conferences and/or participation in Professional Associations, must be approved at least four weeks prior to the date of the requested absence. A request for time off must be completed, signed by the attending physician who will be supervising the resident during the rotation that they are requesting the conference time off from and the Program Director. The form must be submitted to the MSU/FAME Radiology Residency Program Coordinator with conference registration confirmation information attached. **Getting approval/signatures from the appropriate person is the responsibility of the resident.** It is also the responsibility of the resident to remind the attending, and the Associate Program Director where they are rotating, a couple of days prior to leaving for the pre-approved conference or professional association participation that they will be attending and when they will return. If the resident is traveling to the conference/meeting by car, they may request the day prior and after the conference as travel days. This additional time off must be approved in advance by the Program Director. PGY II and PGY III Residents are allowed 5 conference days/professional association days per year, though additional days may be taken if approved by the Program Director. PGY IV and PGY V residents are allowed 10 such conference/professional association days per year. Additional conference days may be granted for those residents who are taking Physics or Written Review Courses during their PGY II and PGY III year. Conference days which are not utilized will be forfeited. Conference Request forms can be obtained on the MSU/FAME website.

### 3.2 MSU Didactic Days

Tuesday sessions at Michigan State University in East Lansing are **required** workdays (attendance is recorded several times during the course of the day). This includes physics lectures. If the Tuesday didactic day is not being held, you must report for work at your assigned hospital. Ten teaching file cases will be required for submission to the MSU Teaching File. The East Lansing Administrative Assistant will provide the details. The resident could utilize cases both for the AIRP and for submission to the MSU Teaching File. Brant and Helms is required reading for the first year residents; details are given to residents as reading materials are assigned. Casual dress is acceptable at the MSU Tuesday sessions; appropriate, professional attire is required when there will be a Visiting Professor present.

### 3.3 Community Afternoon Conferences

Residents will be excused from the afternoon conferences if they are: on night float, pre- or post-night float, on an out of town rotation, or other pre-approved excused absence (out of town conference, sick or on vacation).

For every academic year, residents must have at least an 80% year-to-date ongoing attendance rate at afternoon conferences. If an individual resident's attendance drops below 80%, the following action(s) will be taken.

- First offense – the Program Director (or designee) will personally talk to the resident mandating 80% attendance over the next 6 months or a plan of action approved by the Diagnostic Radiology GME Council. In addition, if offending Resident is currently approved for moonlighting activity, such approval will be suspended immediately until such time as this deficiency is resolved.
- Second offense – the Program Director (or designee) will send a written notification to the resident with disciplinary action up to and including probation.
- Third offense – the Program Director will meet with the resident to mandate 100% attendance for the next six months or 80% attendance for the remainder of the year, depending on which best applies.
- Fourth offense – the program withholds the resident's certificate of completion and/or recommends a program of remediation determined by the Council.

Also, if a resident is scheduled for night float, but another resident covers for them, for more than one consecutive night, the resident that is originally scheduled must report to the afternoon conferences.

If the conferences are canceled, the residents must meet at MSU/FAME or one of the affiliated medical center's conference rooms for ACR Teaching File case review.

### 3.4 Visiting Professor Program

The Visiting Professor Program of the Department of Radiology at Michigan State University is widely recognized among leaders in academic radiology as the most extensive and successful program of its kind. More than 150 distinguished scholars in the field of radiology from around the world have participated in the MSU community-based lectures and film reading sessions.

It is **required** that the residents attend **all** Visiting Professor Programs in East Lansing and Flint. Attendance is not mandatory at the Grand Rapids Visiting Professor sessions, although it is optional if the resident is interested. Professional attire is required when a Visiting Professor is present. There should be no one absent from the Visiting Professor sessions unless the absence has prior approval (vacation, etc.).

### 3.5 Resident Research Projects

Research is an integral component of the Residency Program. **Three projects in four years are required. Research projects are recommended to be completed during PGY II-IV years.** During their residency, each resident will be required to make two oral presentations (only one of which may be a Case Report or literature review) and one poster presentation. It is recommended that the poster be completed during the PGY IV year. While these are the

minimum requirements, residents are allowed and even encouraged to do more presentations based on their level of interest. Due to the cost of the posters, residents making more than one poster must gain prior approval from the Program Coordinator.

Once a year, topics can be presented at the MSU/FAME Community-Wide Research Forum. Residents must request an attending staff to be a mentor in any research project. Before starting this project, the resident must have the signature of the attending staff they have selected on the appropriate research papers. It is expected that annual projects/presentations will consist of research that has been accomplished during the course of the resident's training in Diagnostic Radiology. Presentation of research completed prior to acceptance to the Diagnostic Radiology residency program is not acceptable unless it has been updated or continued during the year of the presentation and approved by the Program Director. Only one case report is allowed during the course of the residency, but cannot be presented during the PGY II year. Case reports, when given, should involve a topic of sufficient distinction to warrant academic interest. It is strongly suggested that a resident work with an attending/preceptor for guidance on their research project. Presentations must abide by the time guidelines outlined on the MSU/FAME research website. Poster presentations must comply with the MSU/FAME Research Forum specified requirements which are posted on the MSU/FAME research website. Abstract submissions open on December 1 and close on March 1 every year. Specific details may be found on the FAME Research Forum site.

If resident presents a research project at a national meeting or other specialty society meeting that has been approved, in advance, by the program, funds may be made available to cover expenses incurred.

Residents must inform the Program Director and the Research Director at the institution where the project is being completed, of the topic and advisor, in accordance with the deadlines imposed by the research committee. The resident is expected to contact the research department for details related to having their poster made for submission.

## SECTION IV – Resident Employment Issues

### 4.1 Hours of Duty

The following Duty Hour standards have been mandated by the ACGME and are to be followed within the MSU/FAME program:

- Duty hours are defined as all clinical and academic activities related to the residency program, i.e., patient care (both inpatient and outpatient); administrative duties related to patient care, the provision for handover of patients, time spent in-house during night float activities, scheduled academic activities such as conferences, and moonlighting at affiliated entities. Duty hours do not include reading and preparation time spent away from the duty site.

- Duty hours must be limited to 80 hours per week, averaged over a four-week period, inclusive of all in-house night float activities and moonlighting at affiliated entities, with the provision that individual programs may apply to their sponsoring institution's Graduate Medical Education Committee (GMEC) for an increase in this limit of up to 10 percent, if they can provide a sound educational rationale.
- Residents must be provided with 1 day in 7 free from all educational and clinical responsibilities, averaged over a 4-week period, inclusive of night float. One day is defined as one continuous 24-hour period free from all clinical, educational, and administrative activities.
- In-house night float should occur no more frequently than every third night, averaged over a four-week period.
- Continuous on-site duty, including in-house night float, must not exceed 24 consecutive hours. Residents may remain on duty for up to 6 additional hours to participate in didactic activities, transfer care of patients, conduct outpatient clinics, and maintain continuity of medical and surgical care as defined in Specialty and Subspecialty Program Requirements.
- No new patients, as defined in Specialty and Subspecialty Program Requirements, may be accepted after 24 hours of continuous duty.
- A 10-hour minimum rest period must be provided between duty periods.
- Duty hours will be reported monthly by the Program Coordinator to the GMEC.

## 4.2 Educational Allowance

All residents are allocated funding each year to be used for educational activities or aids. Only those residents that are current and in full compliance with all of the program requirements for their most recently attended training program year will be eligible to receive their educational allowance.

1. All requested items must be written on an MSU/FAME Check Request form with the price quote attached.
2. The request must be approved by the Program Director and the DIO **before** purchasing.
3. Approved Items:
  - a. iPhones; one phone purchase allowed every other year
  - b. \*iPads only; no additional software, cords, carrying cases, warranties, etc.
  - c. \*Laptop computers only; no additional software, cords, carrying cases, warranties, etc.
  - d. Medical Books
  - e. Annual medical journal and database subscriptions
  - f. Educational medical conferences
  - g. Fees for USMLE Step III or Board Exams, etc.

\* If the Resident is reimbursed for an iPad or computer, there will be an IRS form 1099 issued at the end of the calendar year and the Resident may be subject to a Luxury tax;

for federal taxes it would be 25% and with state and city taxes, it may exceed 40%. If the Resident elects to receive their Educational Fund allowance as an unreimbursed stipend, this amount will also be reflected on the calendar year and IRS form 1099.

Residents should consult with their tax preparer to determine if this can be excluded from income and offset with the use of Schedule 2106 Employee Business Expense.

## 4.3 Expenses and Reimbursement

**4.3(a) Michigan State University Rotations.** The MSU/FAME Diagnostic Radiology Residency Program Coordinator will provide the resident with a MSU Travel form at the end of each rotation. The resident is required to sign and date the form and return it to the Program Coordinator. The reimbursement is intended to supplement the costs of commuting. The current reimbursement, as established by the GMEC, is \$250 per rotation.

**4.3(b) AIRP Rotation.** The program will pay the AIRP registration fee. Also, the resident will be issued a check for \$2,000 prior to their AIRP rotation to help cover costs incurred. A 1099 form may be issued and forwarded to the resident and to the Internal Revenue Service at the end of the calendar year. Residents should save all receipts and should consult with their tax preparer to determine if this can be excluded from income and offset with the use of Schedule 2106 Employee Business Expense.

**4.3(c) Children's Hospital of Michigan.** The program will either assist in costs related to the resident commuting from their home or for housing in Detroit by providing an \$1800 stipend for their pediatric rotation at Children's Hospital of Michigan.

## 4.4 Resident Staff Benefits

A detailed benefit outline is provided to each resident prior to the beginning of their residency. The following is intended to serve strictly as an overview. The resident may also refer to their Resident Agreement for more information.

- 20 Days Vacation Time
- 5 Days Sick Time
- Educational Conference/Professional Association Leave : 5 Days per year for PGY II and PGY III; 10 Days per year for PGY IV and PGY V.
- AIRP housing stipend and registration costs
- Children's Hospital of Michigan stipend
- Health Insurance (Spouse and Children)
- Dental Insurance (Spouse and Children)
- Optical Insurance (Spouse and Children)
- Life Insurance

- Professional Liability Insurance (while performing duties directly related to the residency training program; not for moonlighting activities)
- Meal Allowance at selected facilities
- Lab Coats (2 at the beginning of the residency)
- Hospital Parking

**4.4(a) Vacation Days.** The resident is allowed 20 days of vacation per program year. This time must be used during the academic year in which it is granted. Vacation time cannot be carried over. The procedure for requesting time off for vacations will be as follows:

- Residents must submit the completed Vacation/Conference Request form to the Diagnostic Radiology Residency Program Coordinator, for verification of time being requested, at least one month prior to the date of request.
- Residents will not be allowed to take more than one week of vacation during their Interventional and Neuro rotations.
- Residents will not be allowed to take more than two consecutive weeks of vacation time. If a resident is requesting more than two weeks, the GMEC must approve it. If the GMEC approves extended vacation time it cannot be taken during the same rotation. Emergency situations will be handled on an individual basis and must be approved by the Council.
- The request must be signed by the Associate Program Director from the institution that the resident is requesting vacation from and the Program Director. Getting approval/signatures from the appropriate people is the responsibility of the resident. It is also the resident's responsibility to remind the attending, and the hospital they will be rotating at, a couple of days prior to the first day away that they will be on vacation and when they will return. Vacation request forms are available on the resident website.

#### **4.4(b) Children's Hospital of Michigan Vacation Policy**

- Residents rotating through Children's Hospital of Michigan for 1 month at a time are not allowed to take vacation. Occasional days off as necessary for things such as interviews can be arranged. Emergencies are always an exception; however, Children's Hospital needs to know as far in advance as possible.
- Residents rotating for 2 or 3-month blocks are not encouraged to take time off, but are allowed to take up to two days per month off (for any reason). This must be scheduled at least 6 weeks in advance, and be pre-approved by the resident's Program Director. Advance notice is required so that the rotation schedules can be balanced to ensure good exposure to all the eight diverse areas of pediatric radiology in which instruction is offered. This may be the resident's only opportunity for exposure to Pediatric Radiology.

- If a vacation request is not submitted 6 weeks in advance Children’s Hospital will not schedule any vacation and it will not be possible to schedule vacation while rotating at Children’s Hospital of Michigan.
- All vacation requests for Children’s Hospital of Michigan must be submitted to the Executive Secretary in the Department of Pediatric Imaging 3901 Beaubien Blvd., Detroit, MI 48201-2196. Questions regarding paperwork may be directed to the Executive Secretary by phone at (313) 745-0255 or fax (313) 993-0393.
- Requests that do not meet the above requirements will be denied.

**4.4(c) Sick Time.** When a resident is not reporting to work due to illness, they must notify Helena Kurowski, the MSU/FAME Diagnostic Radiology Residency Program Coordinator via e-mail at [hkurowski@msufame.msu.edu](mailto:hkurowski@msufame.msu.edu) or by phone at (810) 600-5621. Also, the resident must personally contact the attending with whom they are scheduled to work.

## 4.5 Holidays

The following are recognized holidays for the MSU/FAME Diagnostic Radiology Residency Program:

- Independence Day
- Labor Day
- Thanksgiving Day
- Christmas Day
- New Years Day
- Memorial Day

*If the resident is scheduled for night float, they must report for their scheduled duties.*

The resident covering night float on the holiday day will be allowed to take a compensatory day at a later time. This day must have prior approval by the Program Director and must be taken within 30 days of the holiday.

## 4.6 Meal Allowance

An allowance will be included in the annual resident compensation stipend to cover the cost of meals at Genesys Regional Medical Center and Hurley Medical Center. As mandated by Administration, McLaren Flint provides an automated meal payment system for all residents.

## 4.7 Personal Appearance and Dress Policy

- All employees should look and act in a professional manner. Employees must maintain good personal hygiene at all times. Hair should be clean and controlled.
- Ties are required at Hurley Medical Center and McLaren Flint. White jackets incorporating personal identification are required at Hurley Medical Center and strongly encouraged at McLaren Flint. Although Genesys Regional Medical Center

does not require the wearing of white coats, it is a good idea to have a white coat available in case patient interaction is necessary. Scrubs should be worn only for angiography purposes and should not be worn to and from the hospital.

- Uniforms and street clothes should fit properly and be kept neat and clean. Lab coats must be clean at all times.
- Shoes should be polished and/or clean and in good repair.
- Sandals, platforms and any other similar type shoe or open-toed shoes are unsafe and inappropriate. Clogs may be worn provided they have the standard lip in the back or strap, have a smooth washable surface, and are worn with hosiery or socks. Low top, predominately white, tennis shoes are acceptable, provided they are neat and clean (laces etc.). Certain non-clinical departments may be excluded where safety is an issue. Residents can refer to individual department policies and other appropriate policies, e.g. Infection Control Policies for specifics as to appropriate footwear in nonclinical areas.
- Hose or socks are to be worn by all employees. Any stockings or socks that are inappropriate for a business setting are prohibited.
- Skirts and dresses shall be of a length and/or style that are appropriate to a hospital and business setting. Knee length skirts or dresses (no shorter than the top of kneecap) are appropriate and acceptable. Mini skirts, low-neck lines, and skintight clothing of any kind are strictly prohibited. Knee length or culottes type garments (no shorter than the top of kneecap, dressy type) are acceptable.
- Dungarees, jean-type (denim fabric) clothing/pants of any kind are prohibited, i.e., Levis, stonewashed jeans, etc., regardless of color.
- Uniform shirts (with collars) are acceptable in designated areas. T-shirts or sweatshirts of any kind are prohibited. Cut-offs of any kind are prohibited.

## 4.8 Monthly Rotation Evaluations

The Diagnostic Radiology Faculty, under the supervision of the Associate Program Director of each respective institution, will evaluate residents on a monthly basis in the hospital to which they are assigned. The Program Director reviews the evaluations and will meet with the residents no less than semi-annually. Residents will be given confidential copies of their monthly evaluations and can also request to have access to their personnel files.

## SECTION V – Resident Compliance

### 5.1 Resident Log Procedures

Residents are required to enter their log information monthly into the ACGME electronic Case Log system. Residents are required to keep a written, detailed log of all procedures performed, in the areas of Interventional, Mammography, and Nuclear. The logs should be forwarded to the Program Coordinator regularly and are a part of the evaluation process with the Program Director, which is conducted no less than two times per year.

## 5.2 State of Michigan Licensure

Residents must secure a Michigan Board of Medicine Educational Limited License or Permanent License to practice in the State of Michigan and also a Controlled Substance License. It is the resident's responsibility to obtain licensure and keep it current. It is the policy of MSU/FAME that a current Michigan Board of Medicine Educational Limited or Permanent License, and Controlled Substance License must be in the resident's permanent file or the resident may not be permitted to continue their training program. Residents will not be paid until the licenses are on file and pay will begin on the effective date on the license and not before.

## 5.3 BLS/ACLS Certification

The hospitals and the MSU/FAME Diagnostic Radiology Residency program require that all residents have current BLS and ACLS certification. Recertification is required every two years. The program may reimburse the fees for the course; however, it is the responsibility of the resident to sign up for a program before certification expires. The resident must forward a copy of their receipt for payment to Helena Kurowski, the Program Coordinator for reimbursement.

## 5.4 Film Monitoring Badges

For the protection of the residents, X-Ray Monitoring (Landauer) Badges will be issued each month at the hospital where the resident is rotating. The badges should be worn at all times, one at the waist and one at the collar, while in the hospitals. The film in the badges is changed once a month. The individual department will distribute the badges to the residents in their mailbox at the beginning of each month. Used badges should be returned based on individual hospital policy.

## 5.5 Program/Faculty Evaluations

Every year, prior to or immediately following the In-Training Exam, all residents are required to complete both a confidential evaluation of the program and a confidential evaluation of the faculty. In addition, throughout the year, at randomly selected dates, residents will be required to complete an internal resident survey covering a variety of ACGME requirement issues.

## 5.6 Radiology Board Exams

Residents entering training on July 1, 2010 or thereafter must complete all appropriate clinical rotations and formal instruction in all subspecialties of radiology and in the core subjects pertaining to radiology (e.g. medical physics, physiology on contrast media etc.) before taking the ABR Core Examination (given after 36 months of radiology training, at the end of the resident's PGY IV year).

## 5.7 Yearly Examinations

All residents are required to take the ACR In-Training Exam, which is taken early in the calendar year. The program will maintain a historical record of the resident's performance on each of these annual exams so as to monitor individual professional progression.

## SECTION VI – Resident Resources

### 6.1 Resident Resource Room

The MSU FAME Conference Room and the student computer lab, located at the MSU/FAME offices, are designed to provide a study/work area accessible 24 hours a day. Residents should keep the Conference and Computer Room clean, and remember to lock and close the door when they leave if it is after hours.

Residents will be provided with annual electronic subscription access to StatDx and RadPrimer. In addition Residents will also be given a flash drive with access to the University of California-San Francisco 551 DVDs.

### 6.2 Medical Libraries

Each of the affiliated hospitals provides extensive medical libraries to assist in gathering information for research projects and presentations. Residents should meet with the library staff when preparing a literature search to develop and focus on the information they are gathering. It is important that residents use the library located in the hospital in which they are assigned. All three hospital libraries are serious about having their books returned on time. Library books held beyond the due date will incur late fees, which the resident will be responsible for. Each affiliated institution's library has their own individual guidelines for hours of operation and check-out systems. Please refer to the individual institutions for information on their rules.

### 6.3 Computer Access

There are computers available for resident use in the MSU/FAME Medical Student Computer Lab. These computers may be accessed 24 hours a day. We encourage the use of these computers for any word processing, research, or other computing needs.

### 6.4 Electronic Mail

MSU/FAME Residents will be provided with a MSU/FAME electronic mail account. This account will allow worldwide electronic mail as well as access to the Internet. Workstations are available at the MSU/FAME offices and its affiliated hospitals.

## 6.5 Photocopying

There is a copy machine available for use at the MSU/FAME offices. Contact Helena Kurowski, the MSU/FAME Radiology Residency Program Coordinator for approval to access the MSU/FAME copy machine. Residents should keep in mind that this is primarily an office machine and that office jobs take priority.

## 6.6 Resident Night Float Rooms

Resident night float rooms are provided at Genesys Regional Medical Center, Hurley Medical Center, and McLaren Flint. Residents should be responsible when utilizing the rooms. The residents are expected to keep the rooms clean and not leave cafeteria trays or food on the tables. If the rooms need housekeeping to wash the floors or change the linen, the residents should notify the housekeeping department. The night float room door should be closed at all times in order to avoid the loss of any of the valuables and equipment.

## SECTION VII – Policies

### 7.1 Policy for Resident Impairment

If a resident shall, by virtue of their behavior, deportment, or performance, raise concern that they are suffering from an emotional disorder including, but not limited to substance abuse, they may, at the discretion of the DIO, Program Director, or Associate Program Director, be required to undergo psychiatric evaluation and drug screening. Such examination may be required periodically. Behaviors that might indicate the necessity for evaluation would include:

- Dereliction of normal duties.
- Inability to be aroused while on night float.
- Persistent tardiness.
- Disheveled appearance.
- Disorganized thinking.
- Memory impairment.
- Unprofessional or otherwise inappropriate behavior in relationship with peers, with patients and their families, with teaching faculty, or with nursing staff.
- Demonstration of a disorder of mood such as depression or anxiety of such severity that it places the patients under their care at risk.

If the psychiatric evaluation and/or substance abuse screening yielded evidence of a disorder, the resident would be required to undergo treatment in a program approved by the Program Director and the MSU/FAME Diagnostic Radiology GMEC. Depending upon the severity of the resident's impairment, and at the sole discretion of the Program Director, the following actions could be taken.

- The resident could continue to function with modification in their service load and supervision as deemed appropriate by the Program Director.
- The resident could be suspended.
- Arrangements may be made for a formal leave of absence.
- Persistent malfeasance, dereliction of duty or substandard performance could lead to dismissal from the program.

The resident may be subject to a report of their impairment to the Michigan Department of Commerce, Bureau of Occupational and Professional Regulation, pursuant to the statutory requirements.

## **7.2 Professional Behavior**

Residents are expected to exhibit professional behavior in dealing with hospital staff, faculty, patients, and peers. Sexual behavior toward or involving patients is inappropriate and will not be tolerated.

## **7.3 Sexual Harassment**

It is the policy of MSU/FAME and a requirement by the Civil Rights Act of 1964 to maintain a work place free from sexual harassment. Sexual harassment can be defined as unwelcome sexual flirtation, gestures, advances, or propositions; verbal abuse of a sexual nature; requests for sexual favors; or other conduct, either verbal or physical, of a harassing nature.

A resident who feels they have been or are being subjected to sexual harassment may wish as soon as possible to confront the individual who is engaging in sexual harassment and indicate that such attentions are not welcome and shall be reported. Any resident who has been subjected, or who feels that they have been subjected to sexual harassment, should immediately advise the Program Director and/or the Director of Residency Programs, so that the matter can be investigated and appropriate action taken.

Any MSU/FAME faculty member, administrator, or employee who is found, after appropriate investigation, to have engaged in sexual harassment of a resident shall be subject to appropriate disciplinary action depending on the circumstances. Individuals making false statements or inferences shall also be subject to corrective disciplinary action.

## **7.4 Discrimination, Harassment, and Intimidation**

MSU/FAME is committed to selecting a heterogeneous class of resident physicians. This diversity and plurality, which we have sought to achieve through the years, is a tradition of which we continue to be proud. MSU/FAME will not tolerate discriminatory behavior and remarks, whether overt or covert. Discrimination is any act or omission based on race, religious beliefs, color, gender, family status, source of income, sexual orientation or political beliefs

when that act or omission results in loss or limit on opportunities to work or fully participate in campus life or which offends the dignity of the person.

Harassment is conduct or comments that are intimidating, threatening, demeaning, or abusive and may be accompanied by direct or implied threats to grade(s), status or job. Harassment can occur between people of differing authority or between people of similar authority. Harassment may be directed at an individual or at a group. Harassment has the impact of creating a work or study environment that is hostile and limits individuals in their pursuit of education, research or work goals.

Any resident who has been subjected, or feels that they have been subjected to discriminatory, harassing, or intimidating behavior, should immediately advise the Program Director and/or the FAME Director of Residency Programs, so that the matter can be investigated and action taken to cease such behavior.

MSU/FAME prohibits any type of retaliation against a resident who lodges a complaint.

## **7.5 Mental Health Services**

Mental health services can be coordinated through the MSU/FAME office, at the resident's request, or in the event that emergency intervention is required. A resident may also seek mental health services on their own.

Providers are drawn from a pool of area mental health care providers. The cost of mental health services varies depending upon the referral. Most providers will accept insurance or will offer sliding scale payment plans.

## **7.6 Due Process**

Refer to the Resident Contract.

## **SECTION VIII – ACGME General Competencies**

All residency programs accredited by the ACGME are required to expect their residents to develop competency in the six areas below to the level expected of a new practitioner. Toward this end, programs must define the specific knowledge, skills, and attitudes required and provide educational experiences as needed in order for residents to demonstrate the competencies.

## 8.1 Patient Care

Residents must be able to provide patient care that is compassionate, appropriate, and effective for the treatment of health problems and the promotion of health. Residents are expected to:

- Communicate effectively and demonstrate caring and respectful behaviors when interacting with patients and their families.
- Gather essential and accurate information about their patients.
- Make informed decisions about diagnostic and therapeutic interventions based on patient information and preferences, up-to-date scientific evidence, and clinical judgment.
- Develop and carry out patient management plans.
- Counsel and educate patients and their families.
- Use information technology to support patient care decisions and patient education.
- Perform competently all medical and invasive procedures considered essential for the areas of practice.
- Provide health care services aimed at preventing health problems or maintaining health.
- Work with health care professionals, including those from other disciplines, to provide patient-focused care.

## 8.2 Medical Knowledge

Residents must demonstrate knowledge about established and evolving biomedical, clinical, and cognate (e.g. epidemiological and social-behavioral) sciences and the application of this knowledge to patient care. Residents are expected to:

- Demonstrate an investigatory and analytic thinking approach to clinical situations.
- Know and apply the basic and clinical supportive sciences which are appropriate to their discipline.

## 8.3 Practice-Based Learning and Improvement

Residents must be able to investigate and evaluate their patient care practices, appraise and assimilate scientific evidence, and improve their patient care practices. Residents are expected to:

- Analyze practice experience and perform practice-based improvement activities using a systematic methodology.
- Locate, appraise, and assimilate evidence from scientific studies related to their patients' health problems.
- Obtain and use information about their own population of patients and the larger population from which their patients are drawn.

- Apply knowledge of study designs and statistical methods to the appraisal of clinical studies and other information on diagnostic and therapeutic effectiveness.
- Use information technology to manage information, access on-line medical information; and support their own education.
- Facilitate the learning of students and other health care professionals.

## **8.4 Interpersonal and Communication Skills**

Residents must be able to demonstrate interpersonal and communication skills that result in effective information exchange and teaming with patients families, and professional associates. Residents are expected to:

- Create and sustain a therapeutic and ethically sound relationship with patients.
- Use effective listening skills and elicit and provide information using effective nonverbal, explanatory, questioning, and writing skills.
- Work effectively with others as a member or leader of a health care team or other professional group.

## **8.5 Professionalism**

Residents must demonstrate a commitment to carrying out professional responsibilities, adherence to ethical principles, and sensitivity to a diverse patient population. Residents are expected to:

- Demonstrate respect, compassion, and integrity; a responsiveness to the needs of patients and society that supersedes self-interest; accountability to patients, society, and the profession; and a commitment to excellence and on-going professional development.
- Demonstrate a commitment to ethical principles pertaining to provision or withholding of clinical care, confidentiality of patient information, informed consent, and business practices.
- Demonstrate sensitivity and responsiveness to patients culture, age, gender, and disabilities

## **8.6 Systems-Based Practice**

Residents must 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. Residents are expected to:

- Understand how their patient care and other professional practices affect other health care professionals, the health care organization, and the larger society and how these elements of the system affect their own practice.
- Know how types of medical practice and delivery systems differ from one another, including methods of controlling health care costs and allocating resources.
- Practice cost-effective health care and resource allocation that does not compromise quality of care.

- Advocate for quality patient care and assist patients in dealing with system complexities.
- Know how to partner with health care managers and health care providers to assess, coordinate, and improve health care and know how these activities can affect system performance.

## SECTION IX – Rotation Schedules

The Program Coordinator prepares yearly rotation schedules in association with the Chief Residents, and subject to approval by the Program Director. These schedules are subject to change.

### Rotation Guidelines

General: This includes gastrointestinal, genitourinary, chest, and musculoskeletal plain films.

#### Gastrointestinal/Genitourinary

This rotation includes all fluoroscopy, IVP's, VCUG's, etc. The resident scheduled for general rotation should check the attending schedule to identify the staff radiologist whom they will be working with. The resident should then check the fluoroscopy schedule in the morning to determine which cases would be performed that day. In general, the resident should check for any old films on the patient, review any old films, obtain a brief history, check the scout film, and perform all fluoroscopic examinations. This may differ slightly depending on the attending the resident is working with. All fluoroscopy films should be reviewed with an attending. If it is the first time the resident is performing a case, or if the resident is new to fluoroscopy, the attending may remain in the room during the case. Any emergency room reports or stat studies will require a call to the appropriate department for the purpose of giving a report. Also, whenever possible, a written report in the patient's chart is helpful. This will avoid calls later in the day asking for the results of the study. When not performing fluoroscopy, the resident on the general service should dedicate their time to reading plain films. Also, additional procedures such as myelograms can be performed on this service.

#### CT

When on the CT rotation, the resident should read all CT examinations and perform all CT-guided biopsies. If a CT-guided biopsy is performed, the resident is responsible for placing the appropriate orders and post-procedural notes in the patient's chart. The resident may also be responsible for the consultation. The resident on the CT service should protocol studies; check studies, and read all stat CT studies.

## Ultrasound

The resident on the ultrasound service should learn how to scan patients on their own. The resident should spend at least one to three hours per day (preferably down time) learning to scan or observing the technicians scanning patients. For the residents who are rotating at Hurley Medical Center, the resident will be required to spend at least one week, but preferably two weeks, under the direct supervision of Ivana Vettrano, M.D. to obtain hands-on experience in Fetal Monitoring and anomalies. The resident should perform all ultrasound-related biopsies/procedures. The resident should respond to “radiologists to ultrasound” calls. If the resident cannot answer the question of the technologist, then an attending should be sought out to join the resident in the ultrasound suite and to assist the resident with the problem. Two-three days per month should be spent devoting time to vascular ultrasound and/or prostatic ultrasounds. The resident should keep a log of all ultrasounds read and any ultrasound-related procedures.

## Nuclear Medicine

The resident should read all nuclear medicine studies. The resident should learn the appropriate quality control and nuclear pharmacy preparation. The resident should plan one-two trips to Sync or to view milking of the generator and other various procedures. The resident should keep a log of nuclear medicine studies read, and should also keep a record of any thyroid treatments or ablations performed. In order to receive certification to read cardiac nuclear studies, a resident must have 50 radionuclide cardiac studies with angiographic correlation. The same also applies to radioiodine therapy license.

## Mammography

Mammography rotations may be performed at outpatient offices. Hospital procedures or studies can be utilized to supplement the rotation. The resident should perform all localizations and biopsies. The resident should keep a log of the mammography studies read and of any procedures. The resident should be available for quality control, checking of the mammograms, and protocoling studies (asking for additional views, magnification views, etc.). The resident must have three months of training in the interpretation of mammograms, including instruction in radiation physics, radiation effects, and radiation protection. At least 60 hours of documented medical education in mammography should be on record. According to ABR and ACGME guidelines, documentation must be on file that each resident must have interpreted or multi-read at least 240 mammograms within a six-month period within the last two years of the residency program.

## Angiography

A resident rotating on the angiography service is on call for the entire rotation for any angiography study performed at any hour, unless otherwise arranged with the attending.

Vacation is limited over the three-month period. The resident should perform the history and physical on the patient, write up the consultation form, order any appropriate laboratory studies, review the appropriate laboratory studies, and present the patient to the attending before the case in an organized fashion. After performing the study, the resident is responsible for patient after-care, post-angio notes, and appropriate discharge orders. When appropriate, the resident should dictate any cases performed. The resident must keep a log of all Angio procedures.

## Neuroradiology

Residents will be assigned to the MRI Centers at each institution. The resident should read all neuroradiology cases when assigned to a Neuro rotation. The resident should do any neuroradiology-related angiographic procedures with attendings. This is a three-month rotation. Vacations should be limited during this time span. The resident should read all stat neuroradiology cases and perform myelograms and discograms if they are available. If the resident feels that they are not getting a significant amount of Neuro training, the Program Director should be contacted.

## Cardiac Catheterization

Report to the Cardiac Cath lab at McLaren Flint. Check to see when cases are scheduled and report to the lab as needed. Residents may observe the cases in the lab or behind in the monitor area.

## MRI

The residents should try to dictate as many cases as possible at the MRI Centers to which they are assigned. The residents should split their time between neuroradiology and musculoskeletal radiology.

## Pediatrics

Local Rotation at Hurley Medical Center: The resident should notify the front desk that they are on the pediatric service on the first day of the rotation. This is in order for the personnel to send all the pediatric cases to a specific workstation. The resident should read all the pediatric cases, and read the cases at the NICU workstation on the second floor. The resident is responsible for reading all the cases at the workstation where the pediatric cases are sent. The resident should perform any pediatric-related fluoroscopy cases (GI and GU).

Child ren 's Ho sp it al o f Mich igan : The resident will spend three months rotating at Children's Hospital of Michigan. The imaging department at Children's Hospital of Michigan is the only full-service imaging department in Michigan especially for children staffed by pediatric imagers. The department specializes in all forms of imaging from regular x-rays to interventional

radiography to body imaging to positron emission Tomography (PET). Children's Hospital of Michigan uses all of the imagery modalities-ultrasound, CT, nuclear medicine, angiography.

Both waiting rooms and exam rooms are designed with children in mind, and all procedures are tailored for the minimum amount of radiation necessary to complete the exam. Specifically trained pediatric radiology nurses are on-hand to help patients through the exam, which is interpreted by one of ten pediatric radiologists on-site.

## **Educational Goals Statement**

The Department of Pediatric Imaging at Children's Hospital of Michigan strives to provide education in Pediatric Radiology appropriate for training a general diagnostic radiologist. The education emphasizes basic skills in pediatric radiology as well as recognition of the need to refer for specialized consultation.

The Department of Pediatric Imaging at CHM provides a full accredited fellowship and advanced training in pediatric radiology pursuant to subspecialty certification in this discipline.

## **Objectives for Attaining the Educational Goals Include:**

1. An extensive didactic educational experience based upon the subspecialty curriculum as endorsed by the Society for Pediatric Radiology (Pediatric Radiology; 25: 402)
2. Graded responsibility for patient care in eight specialized area under the direct supervision of staff pediatric radiologists.
3. Access to extensive library and resource materials in pediatric radiology as well as clinical interactive conferences with several pediatric subspecialty disciplines.
4. Research when appropriate is encouraged and facilitated for interested residents. Research is expected of fellows in pediatric radiology.

## **Ground Rules**

1. Starting Time: The resident workday begins at 7:30 a.m. Monday-Friday. At that hour, the resident should be at the workstation ready to begin reviewing the cases.
2. Weekday Attire: Appropriate professional clothing is acceptable attire. Scrubs are not allowed except on call. Lab coats and ties are encouraged but not mandatory.
3. Absenteeism: For an emergent absence, the resident must call the Pediatric Imaging Department (313-745-0255) and leave a message. Also, the resident must call the area where they are working and ask the tech to notify the staff physician. "Planned" absenteeism must have been cleared prior to the start of the rotation with the Administrative Assistant, Laura Gipson. For absences that were not cleared prior to the start of the rotation, the resident is responsible for finding their own coverage. Notify Laura Gipson of any absences not scheduled in advance.

4. **Parking:** Monday-Friday parking is available in the Mack Avenue structure. When on call, residents may park in the Children's Hospital parking structure 5<sup>th</sup> – 8<sup>th</sup> floors. Residents must use their ID badge for entrance.
5. **Copying Cases:** Residents may only copy cases if they bring their own equipment to do so (flash drive, CD, etc.).
6. **Teaching File Cases:** Residents should submit one teaching file case per month. The case should be interesting and/or unusual and should have clinical information and follow-up (clinical/surgical/pathology). When a case is used as a teaching file, a large "TF" should be placed on the upper corner of the jacket so that the same cases are not resubmitted. These cases can now be submitted on-line. Residents should contact Laura Gipson for complete instructions including login and password.
7. **Conference Participation:** Residents are expected to attend scheduled conferences. Participation is a crucial part of the overall experience and is reflected in the performance evaluation of the resident. Monthly exams are given, including written questions and cases by slide or CD.

## **Vacation Policy**

1. Residents rotating through Children's Hospital of Michigan for 1 month at a time are not allowed to take vacation. Occasional days off as necessary for things such as interviews can be arranged. Emergencies are always an exception; however, they need to know as far in advance as possible.
2. Residents rotating for 2 or 3-month blocks are allowed to take up to two days off per month. This must be scheduled at least 6 weeks in advance of the rotation so that the rotation schedules can be balanced to ensure good exposure to all the eight diverse areas of pediatric radiology in which instructions if offered. Remember this may be the resident's only opportunity for exposure to Pediatric Radiology.

Requests that do not meet the above requirements will be denied.

## **Housing**

MSU/FAME will provide a stipend for housing while the resident is doing their pediatric rotation at Children's Hospital of Michigan.

## AIRP (American Institute for Radiologic Pathology)

AIRP is located in Silver Spring, Maryland (Washington D.C. area) at the AFI Silver Theater, 8633 Colesville Road. The following items are now required at least 60 days prior to the start date of each course:

1. Completion of the admission application. This form is available on the AIRP website and is completed and submitted by the Residency Program Coordinator.

2. Proof of the resident's nationality. Residents who are U.S. citizens must submit a completed application form and a photocopy of either their U.S. passport or a notarized photocopy of a birth certificate verifying their status as a U.S. Citizen.
3. All applying residents will receive written notification of acceptance or denial to attend a particular course. All residents who received an acceptance letter must bring this letter with them to the AIRP in order to be admitted to the course. No letter - no admission.
4. All residents must have at least one and preferably two photographic IDs available.
5. All courses will observe a 60-day deadline for applications before the start of the course.
6. If changes are necessary in sending a particular resident to the course, the resident attending the course must have successfully completed all of the necessary security measures by the application deadline and received the acceptance letter before traveling to Washington, D.C. Any resident who does not have an acceptance letter or has not completed all required items in the admission process will be denied admission.

Given the "new uncertainty" that now seems to permeate our lives, other changes in the course may be necessary in the near future. The staff of the American College of Radiology and the American Institute for Radiologic Pathology will make every possible effort to insure the continuation of the on-site course. AIRP also continues to investigate ways that will allow all radiology residents, regardless of nationality, the opportunity to experience the benefits of the four-week course.

MSU/FAME will pay the tuition for AIRP, as well as a \$2,000 stipend for housing while at AIRP. You may receive a 1099 for this. It is best to arrange for housing 6 months to one year in advance. The senior residents can provide valuable suggestions for housing.

## Michigan State University Rotations

Rotations at Michigan State University Department of Radiology include one month Nuclear/PET and one month MRI, both to be completed in the PGY III year. The following outline includes guidelines for successful completion of the resident's MSU rotations.

### I. Objectives

#### A. Nuclear/PET

1. Provide the resident with an opportunity to develop skills in the performance and interpretation of nuclear/PET procedures including; oncologic PET, Cardiac PET, Brain PET, Bone nuclear/ PET and Bone and Thyroid nuclear imaging.
2. Develop an understanding of the principles of the department PAC system.

3. Gain an understanding of the applications of various PET isotopes to oncologic, cardiac and brain imaging.
4. Gain an understanding of the applications of various Nuclear Medicine isotopes to thyroid and cardiac applications.
5. Have an opportunity to participate in research.

## B. MR Rotation

1. To learn the basics of MR interpretation with emphasis on musculoskeletal and neurological imaging. It is suggested that the resident focus their area of study to the most common MR procedures and subsequently to the less frequently performed exams. Many choose to establish familiarity to the following exams first: brain, orbits, IACs, spine, shoulder and knee. Other MSK studies are usually studied once becoming proficient in the basic exams. Additional understanding and competence interpreting MR angiographic examinations and body MR applications should be attained at training appropriate levels.
2. To gain a better understanding of the practical physics of MRI with particular attention to the protocol choices made for given examinations and the impact on image quality.
3. To gain sufficient experience to independently interpret MR images at the conclusion of the rotation. Progress will be dependent on previous level of achievement during prior experience and training in the resident's community setting. The expectation is that residents develop incremental skills during their first month and will function more independently on subsequent MR rotations both on and off campus.
4. To have an opportunity for independent study utilizing prior patient's cases, teaching files, texts and journals.
5. To have an opportunity to participate in research.

## II. Responsibilities

### A. Rotation Schedule

1. Rotations begin on the first working day of each month.
2. Nine-hour workdays are expected with work hours from 8:00 a.m. to 5:00 p.m. Monday through Friday. The resident is expected to be available in the radiology department during the designated work hours. It is anticipated that on most days the work schedule will be completed by 5:00 p.m. However, there may be occasions when the resident may find it necessary to be in the department somewhat later to complete case dictation. A one-hour lunch period will be available.

## B. Specific Duties

### 1. Nuclear/PET Rotation

- a. The resident will be expected to prepare for review and dictation all scheduled PET/Nuclear cases on each work day. This number may vary due to the daily.
- b. To facilitate reading on the PAC system, the resident will prepare a draft report in the Power Scribe 360 dictation system.
- c. The resident will have the opportunity to participate in the general tumor board held on Monday's at noon at McLaren Mid-Michigan if MSU cases are being presented.

### 2. MR Rotation

- a. The resident must review the designated MR educational video/DVD series prior to the start of the first assigned rotation. The resident is expected to review cases prior to attending review. The resident will be expected to mark each case as "Draft" within the Power Scribe 360 dictation system. Using available resources, an effort should be made to answer questions related to the patient history and prior examinations that might arise during the staffing of each case. The resident will then discuss the case with the assigned radiologist. The report may subsequently be dictated by the attending radiologist or resident at the discretion of the attending radiologists. It is assumed that the resident's responsibilities with regard to dictation will increase during the rotation. The resident is expected to review as many cases as they can comfortably complete during the day to maximize the value of the rotation. On average, for the first MR rotation this should work out to approximately 6–8 cases each day with the number of cases increasing during the course of the month. For subsequent rotations, approximately 10-12 cases per day should be the goal.

## C. Conferences

1. Attend all Wednesday conferences from 12:00 – 1:00 p.m. in the radiology building conference room.
2. Attend all Tuesday resident conferences.
3. Attend any formal departmental educational conferences held during the rotation month.

## D. Teaching

1. Assist visiting students, residents, and faculty.

2. Participate in case review and interact with assigned clerkship students, visiting residents and faculty.
3. Assist with other department teaching responsibilities during the rotation month as a part of the fulfillment of the teaching requirements of the residency program.

### III. Time-off

- A. A maximum number of four clinical days off for each rotation may be permitted upon advance request. This includes all days missing from the rotation due to vacation, conference, post-night float days, illness, bad weather, etc. Requests for vacation or conference time during the MSU rotations are discouraged but consideration for special circumstances can be submitted 30 days in advance on the appropriate program request form. Decisions regarding the authorization of vacation will be made by the MSU Radiology Program Director in consultation with the department Administrative Assistant and the Program Director for the individual's residency. Attendance will be verified via monthly audits and credit will not be given for rotations where the maximum number of days off is exceeded.
- B. If Tuesday Didactic Day is cancelled, the resident is expected to report to their scheduled rotation; this is not considered a vacation day

### IV. Evaluation

Residents will be evaluated based on progress demonstrated during the rotation including, but not limited to the following:

#### A. Nuclear/PET Rotation

1. Ability to identify and appropriately describe findings
2. Understand the application of various isotopes and carrier molecules and their imaging/ dose characteristics.
3. Dictation skill.
4. Number of cases interpreted during the rotation.
5. Ability to complete the electronic teaching file requirement. Quality of submissions.
6. Interaction with referring physicians, technical and clerical staff and the departmental educational support staff.

#### B. MR Rotation

1. Ability to identify and appropriately describe MR findings.
2. Ability to understand factors affecting protocol choice and adjustment in MR imaging.
3. Dictation skill.
4. Number of cases interpreted during the rotation.

5. Ability to complete the electronic teaching file requirement. Quality of submissions.
6. Interaction with referring physicians, technical and clerical staff and the departmental educational support staff.

## SECTION X – Rotation Curriculum

### MSU/FAME RADIOLOGY RESIDENCY CURRICULUM

#### Rotation Goals and Objectives

#### VASCULAR/INTERVENTIONAL

The resident completes three consecutive one-month rotations in Interventional Radiology. This is both an organized and comprehensive supervised educational experience. The core competency-based goals and objectives for each rotation are outlined below.

##### ***Objectives for All Three Rotations:***

Patient Care: Prepare a case for Interventional Radiology M&M conference presenting the complication and analyzing case for quality improvement. (1 case presentation)

Practice Based Learning and Improvement: Demonstrate effective communication skills with patients and their families, technologists, nurses, physician assistants, and referring clinical services. Demonstrate skill in obtaining informed consent

Professionalism: Attend Interventional Radiology conferences, Interventional Radiology didactic lectures, Interventional radiology Journal Clubs, M&M conference. Demonstrate a responsible work ethic with regards to clinical responsibilities and patient care

Systems – Based Practice: Demonstrate ability to use hospital information system to obtain pertinent medial information, imaging procedures and respect patient confidentiality  
Prepare a case for Interventional Radiology M&M conference presenting the complication and analyzing case for quality improvement. (1 case presentation)

##### **Teaching Strategies:**

The goals and objectives will be accomplished by resident participation in the following educational activities on their Interventional Radiology rotations:

1. Rotation teaching during procedures and read-out sessions.
2. Conferences
  - a. Monthly Interventional Radiology M&M conference
  - b. Periodic Interventional Radiology Journal Club
3. Review of recommended reading materials.

## Evaluation Process:

The resident will be evaluated in the following manner on the Interventional Radiology rotations:

1. Competency-based written evaluation by Interventional Radiology facility at the completion of each rotation.
2. 360 degree evaluation completed by personnel including clerks, nurses, physician assistants and patients.
3. Review of procedure log.
4. Performance on Interventional Radiology Mock Oral exam.
5. Performance on ACR In-Training exam

## Vascular/Interventional Radiology Lecture Topics over a three year period:

1. Fundamentals of Interventional Radiology Overview
2. GU Intervention
3. Embolotherapy
4. Dialysis Interventions
5. IVC Filters
6. UFE Update
7. Vascular Interventions
8. Peripheral Arterial Disease: Diagnosis and Management
9. Biliary Interventions
10. Mesenteric
11. Interventional Oncology of Liver
12. DVT/PE
13. Venous Access
14. Varicose Vein Therapy
15. RFA Hepatic and Renal
16. Image guided Intervention of Abdomen/Pelvis
17. Imaging and Treatment of HCC

## VASCULAR/INTERVENTIONAL

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### Rotation 1

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#### Goals:

By the end of this rotation, the Resident should be able to:

1. Demonstrate the learning of competency-based objectives and mastery of technical objectives for the first rotation.
2. Demonstrate a responsible work ethic.
3. Participate in quality improvement/quality assurance activities.
4. Perform a complete and accurate clinical consult.

5. Perform basic Interventional radiology procedures.

## **Objectives:**

### Patient Care:

1. Demonstrate ability to perform Interventional radiology patient consultations.
  - a. Review previous imaging and appropriate lab work.
  - b. Review indication for procedure.
  - c. Perform targeted physical exam.
  - d. Synthesize procedure plan.
  - e. Order appropriate pre-procedure orders (antibiotics, pre-medication, lab work).
2. Perform/assist in the following Interventional procedures under staff supervision:
  - a. Venous access
  - b. Dialysis catheter placement
  - c. IVC filter
  - d. Diagnostic vascular procedures
  - e. Dialysis vascular access intervention

### Medical Knowledge:

1. Demonstrate knowledge of normal arterial anatomy.
  - a. Name vessels arising from aortic arch.
  - b. Name mesenteric arterial supply and branches.
  - c. Name upper and lower extremity arterial supply.
  - d. Name pelvic arterial supply.
2. Demonstrate knowledge of normal venous anatomy.
  - a. Name upper and lower extremity venous supply.
  - b. Name branches of mesenteric venous supply.
  - c. Name major thoracic venous structures.
3. Describe basic techniques, indications, contraindications and potential complications/management for following procedures:
  - a. Venous access (PICC, Ports)
  - b. Dialysis catheter access
  - c. IVC filters
  - d. Dialysis vascular access interventions
  - e. Diagnostic vascular procedures

## **VASCULAR/INTERVENTIONAL**

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### **Rotation 2**

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## Goals:

By the end of this rotation, the Resident should be able to:

1. Demonstrate learning of knowledge-based objectives and mastery of technical objectives for the second rotation.
2. Continue to build and improve on skills/procedures developed during the first rotation.
3. Develop skills in performing more advanced Interventional Radiology procedures.

## Objectives:

### Medical Knowledge

1. Describe basic techniques, indications, contraindications, and potential complications/management for following procedures:
  - a. Genitourinary interventional procedures (Nephrostomy, ureteral stent placement, nephrostomy exchange).
  - b. Biliary interventional procedures (PTC, PTHBD, cholecystostomy, biliary catheter exchange).
  - c. GI interventional procedures (gastrostomy/gastrojejunostomy tube placement/exchange).
2. Describe contrast agents used in Interventional Radiology including indications, contraindications, advantages, disadvantages.
  - a. Iodinated contrast
  - b. Gadolinium
  - c. CO<sub>2</sub>

### Patient Care

1. Perform/assist in the following interventional procedures under staff supervision:
  - a. Genitourinary interventional procedures
  - b. Biliary procedures
  - c. GI interventional procedures

## VASCULAR/INTERVENTIONAL

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### Rotation 3

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## Goals:

By the end of this rotation, the Resident should be able to:

1. Demonstrate learning of competency-based objectives and mastery of technical objectives for the third rotation.
2. Continue to refine skills developed during the first two rotations.
3. Participate in education of junior residents.

## Objectives:

### Medical Knowledge

1. Describe basic technique, indications, contraindications and potential complications/management for following procedures:
  - a. Vascular interventions (PTA, stent, lysis)
  - b. Embolizations (GI, GU, Trauma, UFA, etc)
  - c. Percutaneous biopsies and drainages
2. Describe agents used for embolization including indications and characteristics.

### Patient Care

1. Perform/assist in the following interventional procedures under staff supervision:
  - a. Vascular interventions
  - b. Embolizations
  - c. Interventional radiology cancer therapy
2. Perform a minimum of additional 25 Interventional radiology procedures under staff supervision.

## VASCULAR/INTERVENTIONAL

### Topical Study Aids & Learning Resources:

- Renan Uflacker, Atlas of Vascular Anatomy: An Angiographic Approach, 2<sup>nd</sup>. Ed., 2006.
- Saadoon Kadir, Atlas of Normal and Variant Angiographic Anatomy, 1991.
- Karim Valji, Vascular and Interventional Radiology, 2<sup>nd</sup> Ed., 2006
- Kaufman and Lee, Vascular and Interventional Radiology: The Requisites, 2003
- Kandarpa and Aruny, Handbook of Interventional Radiologic Procedures, 2001
- Abrams Angiography and Interventional Radiology, 3 volumes
- Editors: S. Baum and M. Pentecost
- S. Kadir: Diagnostic Angiography, W. B. Saunders 1986
- SIR: Syllabi on Interventional Radiology

## CARDIOTHORACIC RADIOLOGY

### Rotation 1

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By the end of this rotation, the Resident should be able to:

**A. Patient Care:** Recognize congestive heart failure. Recognize common congenital cardiac lesions (cyanotic, acyanotic). Assess chamber size on chest radiograph. Recognize cardiac size, pulmonary vascularity and alterations in the intersitium.

**B. Medical Knowledge:** Appropriately evaluate chest radiographs, cardiac nuclear medicine procedures and coronary angiograms. Understand the coronary and cardiac chamber anatomy, and recognize common abnormalities on cardiac and coronary angiography. Recognize common acquired cardiac disorders including: ischemia and rheumatic heart disease. Identify indwelling vascular lines and items of pulmonary life support, and their appropriate locations.

**C. Practice Based Learning and Improvement:** Perform all “routine” angiographic and interventional procedures independently (appropriately supervised), with a high degree of skill and success.

**D. Interpersonal & Communication Skills:** Provide consultative services to other physicians as required in the planning and interpreting of cardiac imaging studies.

**E. Professionalism:** Commit to high standards of professional conduct, demonstrating altruism, compassion, honesty and integrity. Follow principles of ethics and confidentiality and consider religious, ethnic, gender, educational and other differences in interacting with patients and other members of the health care team.

**F. Systems – Based Practice:** Understand and integrate all available imaging data on a given case, using that information to synthesize a structured recommendation to the referring physician on the case.

## CARDIOTHORACIC RADIOLOGY

### Topical Study Aids & Learning Resources:

- Plain Film Interpretation in Congenital Heart Disease, Swischuck
- Radiology Vol 2. Chapters 1 – 86, 91 -132, Tavares and Ferrucci
- Clinical Cardiac Radiology, Jefferson and Rees
- Computed Body tomography with MRI, Lee and Sagel, (Lippincott-Raven)
- Coronary Arteriography – A Practical Approach, Abrams
- CT & MR Angiography - Rubin, G and Rofsky, N, 2008
- Cardiovascular Nuclear Medicine, Lyons
- CT of the Thorax, Nardick
- Congenital Cardiac Radiology, Jefferson
- MRI and CT of the Cardiovascular System, 2<sup>nd</sup> edition, 2005. Higgins, C. and deRoos, A.
- Clinical Applications of Doppler Ultrasound, 1990. Taylor.
- Applications of Non-invasive Vascular Techniques, 1988. Gerlock, A., Giyanni, V., Krebs, C.
- Diagnostic Imaging-Chest, 1st edition, 2006. Gurnsey (Amarysis)

- Brant, W.E. Fundamentals of Diagnostic Radiology. Williams and Wilkins, Baltimore, 2006.
- Goodman, L.R. Felson's Principles of Chest Roentgenology: A Programmed Text, 3<sup>rd</sup> edition, W.B. Sanders, Philadelphia, 2006.
- Collins, J., Stern, E.; Chest Radiology: The Essentials. Lippincott, Williams and Wilkins, 1999.
- Haaga, J.R. CT and MRI of the Whole Body (Chapters 22-25). Mosby, St. Louis, 2003.

## COMPUTED TOMOGRAPHY

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### Rotation 1 & 2

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By the end of this rotation, the Resident should be able to:

**A. Patient Care:** Identify variations from normal and distinguish these from CT pathology. Identify CT pathology and recommend the correct course of imaging evaluation / intervention. Independently provide preliminary interpretations as appropriate on emergent patients. Review history of the patient for whom procedures has been ordered and determine the appropriateness of the study requested. Identify normal anatomy. Identify normal variations in anatomy. Know basic CT protocols. Know different types of contrast media. Be familiar with contrast reactions and how to manage them. Know the effects of CT contrast with renal disease and protocol for patients with renal failure. Identify CT pathology for common disease conditions. Provide independent preliminary reads by the second rotation.

**B. Medical Knowledge:** Have a thorough understanding of CT anatomy, including axial, coronal and sagittal planes. Read and dictate the studies performed, with the assistance of the faculty radiologist. Identify CT anatomy in all three plains: axial, coronal and sagittal. Read at least 15 cases per day and review with attending physician.

**C. Practice Based Learning and Improvement:** Understand the physics and mechanical principles related to the performance of CT examinations. Dictate clear concise reports based on discussion with faculty radiologists regarding cases that they have reviewed.

**D. Interpersonal & Communication Skills:** Assist faculty in the performance of interventional CT procedures, with a clear understanding of the potential patient risks and appropriate emergency intervention. Communicate with the referring physician about any recommendations for change in the type of procedure to be performed. Communicate with the technologist about any special or additional views that should be obtained to demonstrate the pathology identified.

**E. Professionalism:** Commit to high standards of professional conduct, demonstrating altruism, compassion, honesty and integrity. Follow principles of ethics and confidentiality and

consider religious, ethnic, gender, educational and other differences in interacting with patients and other members of the health care team.

**F. Systems – Based Practice:** Communicate to the referring physician on the day of the exam any significant abnormalities identifies on the examination. Understand and integrate all available imaging data on a given case, using that information to synthesize a structured recommendation to the referring physician on the case.

## COMPUTED TOMOGRAPHY

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### Rotation 3

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By the end of this rotation, the Resident should be able to:

**A. Patient Care:** Identify variations from normal and distinguish these from CT pathology. Identify CT pathology and recommend the correct course of imaging evaluation / intervention. Independently provide preliminary interpretations as appropriate on emergent patients. Review history of the patient for whom procedures has been ordered and determine the appropriateness of the study requested. Demonstrate knowledge of concepts of CT learned in prior rotations. Understand principles of multidetector CT physics.

**B. Medical Knowledge:** Have a thorough understanding of CT anatomy, including axial, coronal and sagittal planes. Read and dictate the studies performed, with the assistance of the faculty radiologist. Review at least 25 cases each day with attending physician. Understand advanced CT concepts and applications such as HRCT, CT enterography, CT Colonography and Cardiac CT and review few cases.

**C. Practice Based Learning and Improvement:** Understand the physics and mechanical principles related to the performance of CT examinations. Dictate clear concise reports based on discussion with faculty radiologists regarding cases that they have reviewed.

**D. Interpersonal & Communication Skills:** Assist faculty in the performance of interventional CT procedures, with a clear understanding of the potential patient risks and appropriate emergency intervention. Communicate with the referring physician about any recommendations for change in the type of procedure to be performed. Communicate with the technologist about any special or additional views that should be obtained to demonstrate the pathology identified.

**E. Professionalism:** Commit to high standards of professional conduct, demonstrating altruism, compassion, honesty and integrity. Follow principles of ethics and confidentiality and consider religious, ethnic, gender, educational and other differences in interacting with patients and other members of the health care team.

**F. Systems – Based Practice:** Communicate to the referring physician on the day of the exam any significant abnormalities identifies on the examination. Understand and integrate all available imaging data on a given case, using that information to synthesize a structured recommendation to the referring physician on the case.

## COMPUTED TOMOGRAPHY

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### Rotation 4

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By the end of this rotation, the Resident should have improved their ability to:

**A. Patient Care:** Continue to build on the objectives as outlined in Rotation 1 & 2. Independently perform (supervised) interventional CT procedures including; biopsies, drainages, etc.

**B. Medical Knowledge:** Discuss the various indications for CT examinations and interventional procedures. Demonstrate techniques or direct the technologist in performance of specialized CT scans including but not limited to HRCT of the lung, bone density evaluation. Demonstrate ability to perform all skills listed in previous rotation at the competence level associated with a beginning practitioner in radiology. Read 30 cases per day with attending.

**C. Practice Based Learning and Improvement:** Understand the application of 3-D imaging techniques to the day to day management of patients.

**D. Interpersonal & Communication Skills:** Read and dictate studies with minimal assistance from the faculty radiologist. Demonstrate an ability to integrate findings from all imaging modalities in developing a concise differential diagnosis.

**E. Professionalism:** Commit to high standards of professional conduct, demonstrating altruism, compassion, honesty and integrity. Follow principles of ethics and confidentiality and consider religious, ethnic, gender, educational and other differences in interacting with patients and other members of the health care team.

**F. Systems Based Practice:** Communicate to the referring physician on the day of the exam any significant abnormalities identifies on the examination. Understand and integrate all available imaging data on a given case, using that information to synthesize a structured recommendation to the referring physician on the case.

## COMPUTED TOMOGRAPHY

### Topical Study Aids & Learning Resources:

- Fundamentals of Body CT Helms, Webb, Brant ISBN: 0721668623
- CT of the Head and Neck Mancuso
- MRI and CT of the Musculoskeletal System Firooznia

- Computed Body Tomography with MRI Lee and Sagel (Lippincott-Raven)
- Diagnostic Neuroradiology Osborn (Mosby)
- PNRI and CT of the Head and Spine Grossman (Williams and Wilkins)

## GENERAL (Chest, GI, GU, Musculoskeletal)

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### Rotation 1

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By the end of this rotation, the Resident should have improved their ability to:

**A. Patient Care:** List the high risk factors for allergic reaction to intravenous contrast media (GI/GU). Recognize the normal radiographic appearance of structures of the GI/GU tract. Demonstrate knowledge of proper IV techniques, patient positioning, and type of after-films that should be taken for various procedures. Demonstrate initial development of fluoroscopic skills by identifying the more common abnormalities during the performance of GI/GU studies.

**B. Medical Knowledge:** Identify normal anatomy of the chest as it is seen on the radiograph and CT. Identify and/or describe common variants of normal (chest). State the proper assessment and treatment for allergic reactions to contrast media (GI/GU).

**C. Practice Based Learning and Improvement:** Demonstrate a basic knowledge of radiologic interpretation (chest). Given an appropriate neuroradiology plain film, make an accurate interpretation of information on the film (head/neck). Given an appropriate radiograph recognize cardiac enlargement (chest). Demonstrate basic knowledge of equipment to be used during fluoroscopy including proper IV techniques for the various procedures, radiation safety features of the machines, and proper radiation safety techniques. Demonstrate fluoroscopy techniques for performing: Barium Swallow, UGI, BE, ACBE, SBFT.

**D. Interpersonal & Communication Skills:** State the physiologic properties, proper concentrations and proper indications for the use of the following contrast material (GI/GU): barium, water soluble contrast media (oral Hypaque or Gastrografin), Ionic intravenous contrast media, non-ionic intravenous contrast media. Read and dictate the studies performed, with the assistance of the faculty radiologist. Communicate with the referring physician about any recommendations for change in the type of procedure to be performed. (GI/GU).

**E. Professionalism:** Discuss the proper clinical and radiologic indications for the following studies: (GI/GU): Barium swallow, Upper GI series, BE, ACBE, SBFT. Commit to high standards of professional conduct, demonstrating altruism, compassion, honesty and integrity. Follow principles of ethics and confidentiality and consider religious, ethnic, gender, educational and other differences in interacting with patients and other members of the health care team.

**F. Systems – Based Practice:** Recognize the following pathologic anatomy in the lungs: (chest): Air space processes; Lobular processes; Interstitial processes. Review history of the

patient for whom procedures have been ordered and determine the appropriateness of the study requested. (GI/GU)

## GENERAL (Chest, GI, GU, Musculoskeletal)

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### Rotation 2

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By the end of this rotation, the Resident should have improved their ability to:

**A. Patient Care:** Describe the stages different types of fractures go through in the process of healing (MSK). List and describe the basic principles of examination of musculoskeletal studies (MSK). Demonstrate knowledge of proper IV techniques, patient positioning, and type of after films that should be taken for various procedures.

**B. Medical Knowledge:** Discuss various common diseases that give altered patterns of lung disorders. (Chest). Describe the characteristics of common abnormal cardiac shadows (chest). Given an appropriate radiograph, demonstrate a basic knowledge of radiographic abnormalities of the GI/GU tract. (GI/GU). Discuss basic bone physiology (MSK). Identify, with a high level of accuracy, most types of bone fractures. (MSK). Identify normal musculoskeletal structure and some of the normal variants. (MSK). Recognize the commonly used radiographic projections in musculoskeletal radiology.

**C. Practice Based Learning and Improvement:** Demonstrate increasing development of fluoroscopic skills by identifying the more common abnormalities during the performance of the studies. (GI/GU). Discuss the proper clinical and radiologic indications for the following studies: Enteroclysis, ERCP, Fistulograms, IVU, Cystogram, Voiding cystourethrogram, HSG. Discuss the following information about Glucagon (GI/GU): proper indications and dosages used in GI radiology, Physiologic effects, Side effects, Contraindications.

**D. Interpersonal & Communication Skills:** Make decisions about when to alert house staff to the immediacy of a condition that is apparent on the radiograph. (chest). Determine when to request that a repeat examination is needed because of technical inadequacy. (chest). Communicate with the technologist about any special or additional views that should be obtained to demonstrate the pathology identified. (GI/GU). Communicate to the referring physician on the day of the exam any significant abnormalities identified on the examination. (All modalities).

**E. Professionalism:** Commit to high standards of professional conduct, demonstrating altruism, compassion, honesty and integrity. Follow principles of ethics and confidentiality and consider religious, ethnic, gender, educational and other differences in interacting with patients and other members of the health care team.

**F. Systems – Based Practice:** Arrange musculoskeletal radiographs in an orderly fashion for review and interpretation. (MSK). Performance and interpretation of arthrography. (MSK).

Demonstrate fluoroscopy techniques for performing the following procedures: GI/GU): Enteroclysis; ERCP ; Fistulogram; IVU; Cystogram: Voiding cystourethrogram: HSG.

## GENERAL (Chest, GI, GU, Musculoskeletal)

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### Rotation 3

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By the end of this rotation, the Resident should have improved their ability to:

**A. Patient Care:** Describe the stages different types of fractures go through in the process of healing (MSK). List and describe the basic principles of examination of musculoskeletal studies (MSK). Demonstrate knowledge of proper KV techniques, patient positioning, and type of after films that should be taken for various procedures.

**B. Medical Knowledge:** Discuss various common diseases that give altered patterns of lung disorders. (Chest). Describe the characteristics of common abnormal cardiac shadows (chest). Given an appropriate radiograph, demonstrate a basic knowledge of radiographic abnormalities of the GI/GU tract. (GI/GU). Discuss basic bone physiology (MSK). Identify, with a high level of accuracy, most types of bone fractures. (MSK). Identify normal musculoskeletal structure and some of the normal variants. (MSK). Recognize the commonly used radiographic projections in musculoskeletal radiology.

**C. Practice Based Learning and Improvement:** Demonstrate increasing development of fluoroscopic skills by identifying the more common abnormalities during the performance of the studies. (GI/GU). Discuss the proper clinical and radiologic indications for the following studies: Enteroclysis, ERCP, Fistulograms, IVU, Cystogram, Voiding cystourethrogram, HSG. Discuss the following information about Glucagon (GI/GU): proper indications and dosages used in GI radiology, Physiologic effects, Side effects, Contraindications.

**D. Interpersonal & Communication Skills:** Make decisions about when to alert house staff to the immediacy of a condition that is apparent on the radiograph. (chest). Determine when to request that a repeat examination is needed because of technical inadequacy. (chest). Communicate with the technologist about any special or additional views that should be obtained to demonstrate the pathology identified. (GI/GU). Communicate to the referring physician on the day of the exam any significant abnormalities identified on the examination. (All modalities).

**E. Professionalism:** Commit to high standards of professional conduct, demonstrating altruism, compassion, honesty and integrity. Follow principles of ethics and confidentiality and consider religious, ethnic, gender, educational and other differences in interacting with patients and other members of the health care team.

**F. Systems – Based Practice:** Arrange musculoskeletal radiographs in an orderly fashion for review and interpretation. (MSK). Performance and interpretation of arthrography. (MSK).

Demonstrate fluoroscopy techniques for performing the following procedures: GI/GU): Enteroclysis; ERCP; Fistulogram; IVU; Cystogram: Voiding cystourethrogram: HSG.

## GENERAL (Chest, GI, GU, Musculoskeletal)

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### Rotation 4

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By the end of this rotation, the Resident should have improved their ability to:

**A. Patient Care:** State the indications for computed tomography, plain tomography, MRI and bone scans (MSK). Demonstrate review and/or retention of knowledge requirements set forth for the prior rotations (All modalities). Given a fluoroscopic examination, demonstrate the ability to identify the abnormality at fluoroscopy and modify the technique or change the patient's position to take more diagnostic fluoroscopic spot films. (GI/GU). Demonstrate the ability to perform efficiently through decreasing fluoroscopic time needed to perform a study without compromising diagnostic acumen. (GI/GU).

**B. Medical Knowledge:** Describe and/or discuss GI/GU tract pathology in specific detail (GI/GU). Demonstrate further development of technical skills of performing the GI/GU studies listed in the first rotation. (GI/GU). Demonstrate improved skill for tube placement, technical performance and interpretation of enteroclysis procedures. (GI/GU).

**C. Practice Based Learning and Improvement:** Evaluate and integrate data from other studies (CT, MRI, sonography and nuclear medicine) of the GI/GU tract to make recommendations to the referring physician about more appropriate or additional diagnostic studies needed for evaluation of the patient's abnormality. (GI/GU). Given radiograph of a healing bone fracture, determine the stage of bone healing. (MSK).

**D. Interpersonal & Communication Skills:** Read and dictate studies with less assistance from the faculty radiologist. (GI/GU). Given musculoskeletal radiographs that are not diagnostic without further study, state whether the patient should have additional exams in CT, MR, plain tomography or nuclear imaging. (MSK).

**E. Professionalism:** Assist with preparation and presentation of GI/GU conferences. (GI/GU). Demonstrate review and/or retention of knowledge requirements set forth for the prior rotations (All modalities). Commit to high standards of professional conduct, demonstrating altruism, compassion, honesty and integrity. Follow principles of ethics and confidentiality and consider religious, ethnic, gender, educational and other differences in interacting with patients and other members of the health care team.

**F. Systems – Based Practice:** Arrange musculoskeletal radiographs in an orderly fashion for review and interpretation. (MSK). Demonstrate review and/or retention of knowledge requirements set forth for the prior rotations (All modalities). Performance and interpretation of arthrography. (MSK). Demonstrate fluoroscopy techniques for performing the following

procedures: GI/GU): Enteroclysis; ERCP; Fistulogram; IVU; Cystogram: Voiding cystourethrogram: HSG.

## GENERAL (Chest, GI, GU, Musculoskeletal)

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### Rotation 5

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By the end of this rotation, the Resident should have improved their ability to:

**A. Patient Care:** State the indications for computed tomography, plain tomography, MRI and bone scans (MSK). Given a fluoroscopic examination, demonstrate the ability to identify the abnormality at fluoroscopy and modify the technique or change the patient's position to take more diagnostic fluoroscopic spot films (GI/GU). Demonstrate the ability to perform efficiently through decreasing fluoroscopic time needed to perform a study without compromising diagnostic acumen (GI/GU).

**B. Medical Knowledge:** Describe and/or discuss GI/GU tract pathology in specific detail Demonstrate review and/or retention of knowledge requirements set forth for the prior rotation. (All Modalities). Demonstrate further development of technical skills of performing the GI/GU studies listed in the first rotation. Demonstrate improved skill for tube placement, technical performance and interpretation of enteroclysis procedures (GI/GU).

**C. Practice Based Learning and Improvement:** Evaluate and integrate data from other studies (CT, MRI, sonography and nuclear medicine) of the GI/GU tract to make recommendations to the referring physician about more appropriate or additional diagnostic studies needed for evaluation of the patient's abnormality. (GI/GU). Given radiograph of a healing bone fracture, determine the stage of bone healing. (MSK).

**D. Interpersonal & Communication Skills:** Read and dictate studies with less assistance from the faculty radiologist. (GI/GU). Given musculoskeletal radiographs that are not diagnostic without further study, state whether the patient should have additional exams in CT, MR, plain tomography or nuclear imaging. (MSK).

**E. Professionalism:** Assist with preparation and presentation of GI/GU conferences. (GI/GU). Demonstrate review and/or retention of knowledge requirements set forth for the prior rotations (All modalities). Commit to high standards of professional conduct, demonstrating altruism, compassion, honesty and integrity. Follow principles of ethics and confidentiality and consider religious, ethnic, gender, educational and other differences in interacting with patients and other members of the health care team.

**F. Systems – Based Practice:** Arrange musculoskeletal radiographs in an orderly fashion for review and interpretation. (MSK). Demonstrate review and/or retention of knowledge requirements set forth for the prior rotations (All modalities). Performance and interpretation of arthrography. (MSK). Demonstrate fluoroscopy techniques for performing the following

procedures: GI/GU): Enteroclysis; ERCP; Fistulogram; IVU; Cystogram: Voiding cystourethrogram: HSG.

## GENERAL (Chest, GI, GU, Musculoskeletal)

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### Rotation 6

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By the end of this rotation, the Resident should have improved their ability to:

**A. Patient Care:** Read routine chest films with a high level of accuracy and efficiency. (Chest) Given an appropriate radiograph, identify the following categories of bone pathology (MSK): Inflammatory processes; bone tumors; Congenital and acquired diseases; Metabolic diseases. Given a radiograph demonstrating bone pathology listed, and pertinent clinical/pathological information, identify common pathologies in each category. (MSK).

**B. Medical Knowledge:** Name and describe the various common types of bone and joint trauma, other than fractures. (MSK). Name and differentiate between various forms of arthritis, including laboratory and clinical findings of each type. (MSK). State the radiographic features that differentiate benign and malignant bone tumors. (MSK) Name and describe clinical/pathological/radiological features of metabolic bone diseases. (MSK). Name and describe clinical/pathological/radiological features of congenital and acquired bone pathologies. (MSK) Describe the radiographic features of inflammatory bone/joint diseases. (MSK)

**C. Practice Based Learning and Improvement:** Prepare and present the radiographic components of the radiology/pathology and chest conferences. (Chest)

**D. Interpersonal & Communication Skills:** Demonstrate increasing skill in quality and quantity of dictation of musculoskeletal images. (MSK)

**E. Professionalism:** Assist with preparation and presentation of GI/GU conferences. (GI/GU). Demonstrate review and/or retention of knowledge requirements set forth for the prior rotations (All modalities). Commit to high standards of professional conduct, demonstrating altruism, compassion, honesty and integrity. Follow principles of ethics and confidentiality and consider religious, ethnic, gender, educational and other differences in interacting with patients and other members of the health care team.

**F. Systems – Based Practice:** Given a patient with a musculoskeletal pathology, review radiographs and clinical history, then make decision about the appropriateness of nuclear, CT, and/or MR imaging. (MSK)

## GENERAL (Chest, GI, GU, Musculoskeletal)

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### Rotation 7

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By the end of this rotation, the Resident should have improved their ability to:

**A. Patient Care:** Show improvement in performance of the skills listed in the previous rotations. (GI/GU). Demonstrate improvement of decision-making skills listed in previous rotation. (All modalities) Integrate knowledge of all radiologic imaging modalities for evaluation of GI/GU pathology so that the most appropriate study will be done and studies will be done in the proper sequence. (GI/GU).

**B. Medical Knowledge:** Name and describe characteristics of chest pathologies that are seen infrequently in routine work but have distinctive radiographic and/or clinical pathological signs. (chest) Correlate pathological and clinical data with radiographic findings on the chest file. (Chest)

**C. Practice Based Learning and Improvement:** Demonstrate the technical skills and interpret the results of a defacography study. (GI/GU).

**D. Interpersonal & Communication Skills:** Discuss, with increased understanding, GI/GU tract pathology. (GI/GU)

**E. Professionalism:** Read and dictate studies with minimal assistance from the faculty radiologist. (All modalities)

**F. Systems – Based Practice:** Determine which cases can be interpreted and dictated independently and which cases require the assistance of a faculty radiologist. (Chest)

## GENERAL (Chest, GI, GU, Musculoskeletal)

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### Rotation 8

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By the end of this rotation, the Resident should have improved their ability to:

**A. Patient Care:** Demonstrate continued increase in knowledge in the areas listed in the previous rotations. (All modalities)

**B. Medical Knowledge:** Demonstrate ability to perform all skills listed in previous rotations at the competence level associated with a beginning practitioner in radiology. (All modalities).

**C. Practice Based Learning and Improvement:** Demonstrate ability to perform all skills listed in previous rotations at the competence level associated with a beginning practitioner in radiology. (All modalities).

**D. Interpersonal & Communication Skills:** Discuss, with increased understanding, GI/GU tract pathology. (GI/GU)

**E. Professionalism:** Read and dictate studies with minimal assistance from the faculty radiologist. (All modalities)

## GENERAL (Chest, GI, GU, Musculoskeletal)

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### Rotation 9

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By the end of this rotation, the Resident should have improved their ability to:

**A. Patient Care:** Consult, with confidence, with the primary care physicians and surgeons in regard to most imaging procedures. (All modalities) Serve as a consultant to attending staff, discussing their patient's cases and offering recommendations for additional imaging studies as necessary.

**B. Medical Knowledge:** Render preliminary readings with a high degree of skill and accuracy.

**C. Practice Based Learning and Improvement:** Demonstrate a high degree of accuracy in interpreting and dictating cases, identifying consistently those cases with which assistance is needed. (All modalities)

**D. Interpersonal & Communication Skills:** Dictate reviewed cases in an expedited fashion with quality concise reports.

**E. Professionalism:** Independently prepare and discuss cases with the faculty.

**F. Systems – Based Practice:** Be comfortable with presenting cases both in small groups as well as in conference settings.

## GENERAL (Chest, GI, GU, Musculoskeletal)

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### Rotation 10

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By the end of this rotation, the Resident should have improved their ability to:

**A. Patient Care:** Consult, with confidence, with the primary care physicians and surgeons in regard to most imaging procedures. (All modalities) Serve as a consultant to attending staff, discussing their patient's cases and offering recommendations for additional imaging studies as necessary.

**B. Medical Knowledge:** Render preliminary readings with a high degree of skill and accuracy.

**C. Practice Based Learning and Improvement:** Demonstrate a high degree of accuracy in interpreting and dictating cases, identifying consistently those cases with which assistance is needed. (All modalities)

**D. Interpersonal & Communication Skills:** Dictate reviewed cases in an expedited fashion with quality concise reports.

**E. Professionalism:** Independently prepare and discuss cases with the faculty.

**F. Systems – Based Practice:** Be comfortable with presenting cases both in small groups as well as in conference settings.

## GENERAL (Chest, GI, GU, Musculoskeletal)

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### Rotation 11

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By the end of this rotation, the Resident should be able to:

**A. Medical Knowledge:** Understand the pathologic basis of diseases by employing radiologic-pathologic correlation in their identification.

**B. Patient Care:** Apply the principals of radiologic-pathologic correlation to the interpretation of radiologic studies. Apply an understanding of the clinical and pathologic implications of the radiological appearances of image interpretation. Refine differential diagnoses in various organ systems based on specific imaging features.

**C. Systems Based Practice:** Experience the day to day operation of an Armed Forces Medical Post with it's variety of equipment, staff and opportunities for increasing knowledge not only in radiology but other areas.

**D. Practice Based Learning & Improvement:** Endeavor to achieve excellence in the technologically advancing specialty of radiology by employing radiologic pathologic correlation in the identification of disease.

**E. Professionalism:** Follow principles of ethics and confidentiality and consider religious, ethnic, gender, educational and other differences in interacting with patients and other members of the team.

**F. Interpersonal & Communication Skills:** Interact with members of other diagnostic radiology programs, including those from other countries, in an environment

## GENERAL (Chest, GI, GU, Musculoskeletal)

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### Rotation 12

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By the end of this rotation, the Resident should have improved their ability to:

**A. Patient Care:** Consult, with confidence, with the primary care physicians and surgeons in regard to most imaging procedures. (All modalities) Serve as a consultant to attending staff, discussing their patient's cases and offering recommendations for additional imaging studies as necessary.

**B. Medical Knowledge:** Render preliminary readings with a high degree of skill and accuracy.

**C. Practice Based Learning and Improvement:** Demonstrate a high degree of accuracy in interpreting and dictating cases, identifying consistently those cases with which assistance is needed. (All modalities)

**D. Interpersonal & Communication Skills:** Dictate reviewed cases in an expedited fashion with quality concise reports.

**E. Professionalism:** Independently prepare and discuss cases with the faculty.

**F. Systems – Based Practice:** Be comfortable with presenting cases both in small groups as well as in conference settings.

## GENERAL (Chest, GI, GU, Musculoskeletal)

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### Rotation 13

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By the end of this rotation, the Resident should have improved their ability to:

**A. Patient Care:** Consult, with confidence, with the primary care physicians and surgeons in regard to most imaging procedures. (All modalities) Serve as a consultant to attending staff, discussing their patient's cases and offering recommendations for additional imaging studies as necessary.

**B. Medical Knowledge:** Render preliminary readings with a high degree of skill and accuracy.

**C. Practice Based Learning and Improvement:** Demonstrate a high degree of accuracy in interpreting and dictating cases, identifying consistently those cases with which assistance is needed. (All modalities)

**D. Interpersonal & Communication Skills:** Dictate reviewed cases in an expedited fashion with quality concise reports.

**E. Professionalism:** Independently prepare and discuss cases with the faculty.

**F. Systems – Based Practice:** Be comfortable with presenting cases both in small groups as well as in conference settings.

## GENERAL (Chest, GI, GU, Musculoskeletal)

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### Rotation 14

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By the end of this rotation, the Resident should have improved their ability to:

**A. Patient Care:** Consult, with confidence, with the primary care physicians and surgeons in regard to most imaging procedures. (All modalities) Serve as a consultant to attending staff, discussing their patient's cases and offering recommendations for additional imaging studies as necessary.

**B. Medical Knowledge:** Render preliminary readings with a high degree of skill and accuracy.

**C. Practice Based Learning and Improvement:** Demonstrate a high degree of accuracy in interpreting and dictating cases, identifying consistently those cases with which assistance is needed. (All modalities)

**D. Interpersonal & Communication Skills:** Dictate reviewed cases in an expedited fashion with quality concise reports.

**E. Professionalism:** Independently prepare and discuss cases with the faculty.

**F. Systems – Based Practice:** Be comfortable with presenting cases both in small groups as well as in conference settings.

## GENERAL (Chest, GI, GU, Musculoskeletal)

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### Rotation 15

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By the end of this rotation, the Resident should have improved their ability to:

**A. Patient Care:** Consult, with confidence, with the primary care physicians and surgeons in regard to most imaging procedures. (All modalities) Serve as a consultant to attending staff, discussing their patient's cases and offering recommendations for additional imaging studies as necessary.

**B. Medical Knowledge:** Render preliminary readings with a high degree of skill and accuracy.

**C. Practice Based Learning and Improvement:** Demonstrate a high degree of accuracy in interpreting and dictating cases, identifying consistently those cases with which assistance is needed. (All modalities)

**D. Interpersonal & Communication Skills:** Dictate reviewed cases in an expedited fashion with quality concise reports.

**E. Professionalism:** Independently prepare and discuss cases with the faculty.

**F. Systems – Based Practice:** Be comfortable with presenting cases both in small groups as well as in conference settings.

## GENERAL (Chest, GI, GU, Musculoskeletal)

### Topical Study Aids & Learning Resources:

#### **Chest:**

- Synopsis of Diseases of the Chest, 3<sup>rd</sup> edition (Saunders), 2005 Fraser, Pare
- Thoracic Radiology, The Requisites (Mosby), 1999. McCloud
- Chest Roentgenology (Saunders), 1973 Felson, B.
- Chest Radiology, Plain Film Patterns and Differential Diagnoses Reed

#### **Bone:**

- The Radiology of Acute Cervical Spine Trauma Harris, Williams & Wilkins
- Bone and Joint Imaging, 3<sup>rd</sup> edition (Saunders), 2005 Resnick
- Arthritis in Black and White, 2<sup>nd</sup> edition, 1997 Brower & Saunders
- Imaging of Orthopedic Trauma Berquist. Raven
- Differential Diagnosis of Tumors and Tumor-Like Lesions of Bones and Joints Adam MD. Greenspan, Wolfgang, MD Remagen
- Musculoskeletal Radiology, The Requisites Odeda. Debra NA
- Bone Tumor book Edeikin

#### **GI:**

- Gastrointestinal Radiology, The Requisites, 3<sup>rd</sup> edition, 2006. Halpert (Mosby)
- Gastrointestinal Radiology, 2<sup>nd</sup> edition, 1990. Eisenberg (Lippincott)
- Dynamic Radiology of the Abdomen Meyers. Springer-Verlag
- Textbook of Gastrointestinal Radiology, 3<sup>rd</sup> edition, 2008. Gore, Levine, Laufer
- Double Contrast GI Radiology Laufer

#### **GU:**

- Radiology of the Kidney Davidson. Saunders
- The Tailored Urogram Lalli
- Requisites in Radiology: Genitourinary Radiology, 2<sup>nd</sup> edition, 2004. Ronald J. Zagoria (Mosby)

- Textbook of Uroradiology, 4<sup>th</sup> edition, 2009. Dunnick, N.R. (Lippincott)

**General:**

- The Radiology of Emergency Medicine, 4<sup>th</sup> edition, 1999. Harris, Williams & Wilkins (Lippincott)
- ACR Syllabi
- Essentials of Radiology Paul & Juhl
- Textbook of Diagnostic Imaging Sutton
- Fundamentals of Diagnostic Radiology, 3<sup>rd</sup> edition, 2008 William E. Brant, Clyde A. Helms (Lippincott)
- Diagnostic Imaging Series (All textbooks). AMIR'S YS

## MAMMOGRAPHY

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### Rotation 1

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By the end of this rotation, the Resident should have improved their ability to:

**A. Patient Care:** Make a preliminary review of mammogram films and advise the technologist on the need for additional films. Select cases for appropriate ultrasound examination. Assist with and perform needle localization of breast masses and calcifications. Select lesions appropriate for stereotactic and ultrasound-guided core biopsy. Perform same with supervision. Learn the proper indication for Breast MRI, the basic principles for the basis of MRI interpretation and biopsies.

**B. Medical Knowledge:** Given a mammogram, identify normal vs. abnormal anatomic structures. Be able to establish a plan for follow-up protocol for probably benign lesions. Interpret breast ultrasound examinations. Know the etiology of breast cancer and assessment of risk. Know the anatomy, physiology and histology of the breast. Perform directed breast ultrasound and ultrasound biopsy procedures with technologist's assistance.

**C. Practice Based Learning and Improvement:** Be aware of federal and state laws regarding MQSA, certification, etc. Efficacy of screening. Breast Cancer staging. Natural history of Breast cancer including DCIS. Have acquired sufficient reviewed cases to meet MQSA and State requirements for an interpreting Physician.

**D. Interpersonal & Communication Skills:** Discuss technical and physical factors unique to the production of a mammogram. Knowledge of routine and additional supplementary views for Mammography. Recognize indications for, and interpretation of, ductograms.

**E. Professionalism:** Utilize and analyze mammographic, sonographic, and MRI imaging to detect and characterize lesions and appropriately recommend continued imaging surveillance vs. biopsy or other intervention. Recommend appropriate image guided biopsy vs. surgical biopsy for suspicious lesions.

**F. Systems – Based Practice:** ACR-BIRADS Lexicon for terminology and coding used in mammography reports. Conducting a mammography practice audit. Read and dictate mammograms after review by the attending radiologist.

## MAMMOGRAPHY

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### Rotations 2 & 3

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By the end of this rotation, the Resident should have improved their ability to:

**A. Patient Care:** Make a preliminary review of mammogram films and advise the technologist on the need for additional films. Select cases for appropriate ultrasound examination. Assist with and perform needle localization of breast masses and calcifications. Select lesions appropriate for stereotactic and ultrasound-guided core biopsy. Perform same with supervision.

**B. Medical Knowledge:** Given a mammogram, identify normal vs. abnormal anatomic structures. Able to establish a plan for follow-up protocol for probably benign lesions. Interpret breast ultrasound examinations. Etiology of Breast Cancer and assessment of risk. Anatomy, physiology and histology of the breast. Perform directed breast ultrasound and ultrasound biopsy procedures with technologist's assistance.

**C. Practice Based Learning and Improvement:** Be aware of federal and state laws regarding MQSA, certification, etc. Efficacy of screening. Breast Cancer staging. Natural history of Breast cancer including DCIS. Have acquired sufficient reviewed cases to meet MQSA and State requirements for an interpreting Physician.

**D. Interpersonal & Communication Skills:** Discuss technical and physical factors unique to the production of a mammogram. Knowledge of routine and additional supplementary views for Mammography. Recognize indications for, and interpretation of, ductograms.

**E. Professionalism:** Utilize and analyze mammographic and sonographic imaging to detect and characterize lesions and appropriately recommend continued imaging surveillance vs. biopsy or other intervention. Recommend appropriate image guided biopsy vs. surgical biopsy for suspicious lesions.

**F. Systems – Based Practice:** ACR-BIRADS Lexicon for terminology and coding used in mammography reports. Conduct a mammography practice audit. Read and dictate mammograms after review by the attending radiologist.

## MAMMOGRAPHY

### Topical Study Aids & Learning Resources:

- Mammography: The Requisites ISBN: 0323019692, Mosby, 2005.  
Ikeda, Debra NA Professor of Radiology, Stanford University, School of Medicine
- Breast Imaging Reporting and Data System, 4<sup>th</sup> edition, 2003. ACR
- Diagnosis of Diseases of the Breast, 2<sup>nd</sup> edition, 2005. Bassett, Saunders
- Screening Mammography, 1993. Potchen, et.al (Mosby)
- Breast Imaging, 3<sup>rd</sup> edition, 2006. Kopans (Lippincott)
- Mammographic Interpretation, 2<sup>nd</sup> edition, 1996. Homer (McGraw-Hill)
- Breast Imaging Atlas Laxlo Tabar
- Atlas Film-Screen Mammography DeParedes
- ACR Syllabi
- Diseases of the Breast. Harris, Lippman, Morrow, Osborne
- Breast MRI: Diagnosis and Intervention, 1<sup>st</sup> edition, April 26, 2005. Morris (Springer)
- Practical MR Mammography. Fisher
- Breast Imaging Companion. Cardenosa

## MRI

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### Rotation 1

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By the end of this rotation, the Resident should have improved their ability to:

**A. Patient Care:** Develop independently an appropriate imaging plan when presented with a patient's symptoms and preexisting clinical / laboratory information. Know MR physics. Have the ability to protocol a study based on clinical indications and patient symptoms. Know about MR safety issues. Know the biochemistry indications and contraindications of gadolinium based contrast agents. Learn contrast reactions and how to manage them. Know normal MR anatomy of brain, abdomen, and pelvis. Know normal variations. Be knowledgeable in MR pathology of common diseases.

**B. Medical Knowledge:** Direct MRI technologists in the appropriate sequences for most routine MRI imaging requests.

**C. Practice Based Learning and Improvement:** Understand the physical principles governing the performance of MRI examinations. Understand basic MRI sequences and their application to: Neuroimaging, Musculoskeletal and Body Imaging.

**D. Interpersonal & Communication Skills:** Dictate a concise accurate report of the imaging findings in all types of MRI examinations. Consult with attending / referral physicians regarding the cases that the resident has been involved with in a professional and collegial fashion.

**E. Professionalism:** Participate in and contribute to research projects and understand their impact on patient care and patient imaging. By working with the faculty during the

development of various MARI applications, understand the ramifications of new technologies on existing understanding of disease and the impact of these technologies on the ultimate costs of health care.

**F. Systems – Based Practice:** Independently evaluate MRI exams for all body areas, being able to present those exams to the assigned faculty member for discussion.

## MRI

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### Rotation 2

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By the end of this rotation, the Resident should have improved their ability to:

**A. Patient Care:** Improve on their differential diagnosis knowledge and skills. Independently review screening mammographic exams with the ability to point out to faculty areas of concern with logical diagnostic plan to present. Demonstrate a clear understanding of the process necessary to appropriately triage fluoroscopy patients for the appropriate examination. Develop appropriate differential diagnoses for the individual patient without generation of long lists of unlikely but possible differentials. Learn MR artifacts. Understand the value and limitations of MR examination.

**B. Medical Knowledge:** Advise the technologist about special views or specific parameters of the study that require special attention.

**C. Practice Based Learning and Improvement:** Apply basic science considerations in relation to the radiologic manifestations of disease. Review at least 7-10 cases per day with attending physician.

**D. Interpersonal & Communication Skills:** Discuss thoroughly the ultrasound procedures and findings in the array of cases presented for daily review, including abdomen, pelvis, and obstetrical ultrasound. Consult with attending/ referral physicians regarding the cases that the resident has been involved with in a professional and collegial fashion.

**E. Professionalism:** Independently review general radiographic studies, knowing when to consult with faculty members regarding the findings of the examination. Provide preliminary reports where appropriate, developing confidence in their decision making skills. Understand the value of review of current literature, and its application to the day to day practice of radiology in the community.

**F. Systems – Based Practice:** Direct a mammography technologist in the correct positioning of diagnostic images for the diagnostic work-up of a given finding.

## MRI

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### Rotation 3

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By the end of this rotation, the Resident should have improved their ability to:

**A. Patient Care:** Develop independently an appropriate imaging plan when presented with a patient's symptoms and preexisting clinical / laboratory information.

**B. Medical Knowledge:** Direct MRI technologists in the appropriate sequences for most routine MRI imaging requests.

**C. Practice Based Learning and Improvement:** Understand the physical principles governing the performance of MRI examinations. Understand basic MRI sequences and their application to: Neuroimaging, Musculoskeletal, and Body Imaging. Review 15 cases per day with an attending physician.

**D. Interpersonal & Communication Skills:** Dictate a concise accurate report of the imaging findings in all types of MRI examinations. Consult with attending / referral physicians regarding the cases that the resident has been involved with in a professional and collegial fashion.

**E. Professionalism:** Participate in and contribute to research projects and understand their impact on patient care and patient imaging. By working with the faculty during the development of various MRI applications, understand the ramifications of new technologies on existing understanding of disease and the impact of these technologies on the ultimate costs of health care.

**F. Systems – Based Practice:** Independently evaluate MRI exams for all body areas, being able to present those exams to the assigned faculty member for discussion.

## MRI

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### Rotation 4

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By the end of this rotation, the Resident should have improved their ability to:

**A. Patient Care:** Develop independently an appropriate imaging plan when presented with a patient's symptoms and preexisting clinical / laboratory information.

**B. Medical Knowledge:** Direct MRI technologists in the appropriate sequences for most routine MRI imaging requests.

**C. Practice Based Learning and Improvement:** Understand the physical principles governing the performance of MRI examinations. Understand basic MRI sequences and their application to: Neuroimaging, Musculoskeletal and Body Imaging. Review 20 cases per day with an attending physician.

**D. Interpersonal & Communication Skills:** Dictate a concise accurate report of the imaging findings in all types of MRI examinations. Consult with attending / referral physicians regarding the cases that the resident has been involved with in a professional and collegial fashion.

**E. Professionalism:** Participate in and contribute to research projects and understand their impact on patient care and patient imaging. By working with the faculty during the development of various MARI applications, understand the ramifications of new technologies on existing understanding of disease and the impact of these technologies on the ultimate costs of health care.

**F. Systems – Based Practice:** Independently evaluate MRI exams for all body areas, being able to present those exams to the assigned faculty member for discussion.

## MRI

### Topical Study Aids & Learning Resources:

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|--|---------------------------------|
| • Fundamentals of Diagnostic Radiology             | Brant and Helms ISBN:0683300938 |
| • Magnetic Resonance Imaging                       | Stark and Bradley               |
| • Computed Body tomography with MRI                | Lee & Sagel                     |
| • MRI of the Spine                                 | Modic                           |
| • Craniospinal MRI                                 | Pomeranz                        |
| • MRI Joints                                       | Pomeranz                        |
| • MRI Knee   | Mink                            |
| • MRI of Brain and Spine                           | Atlas                           |
| • Video Tape collection in MSU Learning Laboratory |                                 |
| • MRI and CT of the Musculoskeletal System         | Firooznia                       |
| • Neuroradiology                                   | Osborn                          |
| • Diagnostic Neuroradiology                        | Traverras                       |
| • Textbook of Radiology                            | Brant and Helms                 |
| • Diagnosis of Diseases of the Chest               | Fraser and Pare                 |
| • Radiology of Bone Disease                        | Greenfield                      |
| • Clinical Urology                                 | Pollak                          |
| • Radiology of the Newborn and Young Infant        | Swischuk                        |
| • Esophagus  | Levine                          |
| • Diagnosis of Bone and Joint Disorders            | Resnick                         |
| • Radiology of Upper GI, Small Bowel and Colon     | Marshak                         |
| • Double Contrast GI Radiology                     | Laufer                          |
| • GI Radiology                                     | Eisenberg                       |
| • Orthopedic Radiology                             | Greenspan                       |
| • Textbook of Diagnostic Imaging                   | Sutton                          |

- Musculoskeletal MRI, 2<sup>nd</sup> edition, Nov. 4, 2008. Helms (Saunders)
- Breast MRI: Diagnosis and Intervention, 1<sup>st</sup> edition, April 26, 2005. Morris (Springer)
- Diagnostic Imaging Series (All textbooks) Amirsys
- STATdx (Internet based system available through FAME Radiology website and at MR Centers)

## NEURORADIOLOGY

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### Rotation 1

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By the end of this rotation, the Resident should have improved their ability to:

**A. Patient Care:** Given an appropriate abnormal image, recognize basic neuropathology and give a differential diagnosis. Given an appropriate neuroradiology plain film make an accurate interpretation of the information on the film. Screen, prescribe, and supervise routine neuroimaging procedures.

**B. Medical Knowledge:** Given normal neuron images, demonstrate a proficient knowledge of the anatomy of the head and neck, spine and central nervous system. Given appropriate films, demonstrate a thorough knowledge of the vascular anatomy of the central nervous system.

**C. Practice Based Learning and Improvement:** Demonstrate proficiency in performance and interpretation of lumbar, dorsal and cervical myelograms. Demonstrate proficiency as an assistant angiographer for routine neuroangiography.

**D. Interpersonal & Communication Skills:** Interact with primary care physicians and neurologists in consultation when more common pathologies are at question.

**E. Professionalism:** Discuss the basic principles of CT and MRI physics. Describe, in considerable detail, CT and MR imaging protocols. Perform, in a responsible manner, pre-angiography patient consultations and post procedure patient follow-ups, identifying patient conditions that require specific action on the part of the angiography team.

**F. Systems – Based Practice:** Supervise and screen imaging patient sedation.

## NEURORADIOLOGY

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### Rotation 2

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By the end of this rotation, the Resident should have improved their ability to:

**A. Patient Care:** Make decisions based on patient conditions when consulting with the patient pre or post procedure. Conduct, with guidance from the attending radiologist, pre-angiographic patient consultation and post-procedure patient follow up.

**B. Medical Knowledge:** Make decisions to modify a neuroangiographic procedure when unexpected pathology or angiographic abnormalities occur, then follow through with the performance and supervision of the procedure. Demonstrate increased ability to recognize pathology and discuss a differential diagnosis.

**C. Practice Based Learning and Improvement:** Perform with increasing levels of skill in myelography and angiography.

**D. Interpersonal & Communication Skills:** Dictate neuroimaging studies after review with the attending neuroradiologist. Consult, with increasing confidence, with primary care physicians and neurologists in regard to most neuroimaging procedures.

**E. Professionalism:** Discuss criteria for modifying studies, depending on the expected pathology or angiographic abnormalities. Screen, prescribe, and supervise, with an increasing level of responsibility, most neuroimaging procedures.

**F. Systems – Based Practice:** Demonstrate increasing ability to accept responsibility for performance and supervision of neuroradiologic procedures.

## NEURORADIOLOGY

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### Rotation 3

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By the end of this rotation, the Resident should have improved their ability to:

**A. Patient Care:** Make decisions based on patient conditions when consulting with the patient pre or post procedure.

**B. Medical Knowledge:** Make decisions to modify a neuroangiographic procedure when unexpected pathology or angiographic abnormalities occur, then follow through with the performance and supervision of the procedure. Demonstrate increased ability to recognize pathology and discuss a differential diagnosis.

**C. Practice Based Learning and Improvement:** Perform with increasing levels of skill in myelography and angiography.

**D. Interpersonal & Communication Skills:** Dictate neuroimaging studies after review with the attending neuroradiologist. Consult, with increasing confidence, with primary care physicians and neurologists in regard to most neuroimaging procedures.

**E. Professionalism:** Discuss criteria for modifying studies, depending on the expected pathology or angiographic abnormalities. Screen, prescribe, and supervise, with an increasing level of responsibility, most neuroimaging procedures.

**F. Systems – Based Practice:** Demonstrate increasing ability to accept responsibility for performance and supervision of neuroradiologic procedures.

## NEURORADIOLOGY

### Topical Study Aids & Learning Resources

- Neuroradiology: The Requisites (Requisites in Radiology), 2<sup>nd</sup> edition, 2003 ISBN: 032300508X Robert I. Grossman, David M. Yousem (Mosby)
- Introduction to Cerebral Angiography, 2<sup>nd</sup> edition, 1998. Osborn (Lippincott)
- Head and Neck Imaging, 3<sup>rd</sup> edition, 2003. Som, Peter (Mosby)
- Neuroradiology, 1<sup>st</sup> edition, January 15, 1994. Osborn (Mosby)
- MRI of Brain and Spine, 4<sup>th</sup> edition, 2008. Atlas, S.C. (Lippincott)
- Diagnostic Imaging: Brain, 1<sup>st</sup> edition, 2004. Osborn (AMIRSYS)
- Diagnostic Imaging: Head and Neck, 1<sup>st</sup> edition, 2004. Harnsberger (AMIRSYS)
- Diagnostic Imaging: Spine, 1<sup>st</sup> edition, 2004. Ross (AMIRSYS)

## NUCLEAR MEDICINE

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### Rotation 1

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By the end of this rotation, the Resident should have improved their ability to:

**A. Patient Care:** Review histories of patients to be imaged each day to: determine the relevance of the study to clinical symptoms, evaluate for contraindications to the study, and advise technologists about special views or specific parameters of the study that require special attention. Assist technologists in the determination of the radiopharmaceutical dosage when patient conditions do not fit the criteria of the standard dose.

**B. Medical Knowledge:** Demonstrate a thorough knowledge of the clinical indications, general procedures, including radiopharmaceutical and dose, and scintigraphic findings in: Pulmonary (emboli) ventilation and perfusion imaging; Hepatobiliary imaging and functional studies; GI blood loss imaging; Bone imaging; Testicular torsion. Be familiar with V/Q Scans, Hepatorbiliary imaging including pharmacological interventions, GI Blood loss studies, bone imaging including three-phase bone imaging. Be familiar with nuclear myocardial perfusion studies, including anatomy, myocardial perfusion, and systolic components. Be aware of nuclear thyroid imaging and uptake protocols, indications and findings.

**C. Practice Based Learning and Improvement:** Identify the isotopes, including physical and chemical properties that are used routinely in the compounding of radiopharmaceuticals

for nuclear radiology procedures. Master elution and quality control of the generator, gamma camera setup and quality control, radiation safety principles, NRC regulations pertaining to use of reactor-produced radiopharmaceuticals, state regulations regarding the use of non-reactor produced radiopharmaceuticals, the use of uptake probae systems, wellcounter, survey meter, GM counter and other equipment in nuclear medicine, maintain a log of all activities including type and quantity of different radiopharmaceutical uses observed and participated in, visit a commercial nuclear pharmacy, visit and observe DEXA studies, observe PET/CT studies.

**D. Interpersonal & Communication Skills:** Discuss the basic physical principles of nuclear medicine imaging and instrumentation. Make a preliminary review of the images and advise technologists when additional views, repeat views or correlative radiographs are needed.

**E. Professionalism:** Have a basic understanding of all imaging performed in the Nuclear Medicine department. Collect and maintain a log of all interesting cases observed and show them at conferences.

**F. Systems – Based Practice:** Observe at least one of each of the different scans routinely performed, as well as all the infrequently ordered studies.

## NUCLEAR MEDICINE

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### Rotation 2

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By the end of this rotation, the Resident should have improved their ability to:

**A. Patient Care:** Discuss criteria for allowing patients who receive > 33mCi to be sent home immediately.

**B. Medical Knowledge:** Demonstrate a thorough knowledge of the clinical indications, general procedures, including radiopharmaceutical and dose, and scintigraphic findings in: Renal and urinary tract studies; Liver/spleen imaging; GI tract imaging and functional studies; Brain imaging and functional studies; tumor and abscess imaging. Identify and discuss indications for isotopes used for therapeutic purposes. Demonstrate a thorough knowledge of clinical indications protocols, anatomy, nuclear myocardial perfusion, systolic function, and clinical relevance of interpretations for nuclear myocardial perfusion studies. Demonstrate a thorough knowledge of nuclear thyroid imaging and uptake studies including indications, protocols, findings and clinical relevance. Gain exposure to PET CT.

**C. Practice Based Learning and Improvement:** Assist with radioactive therapy treatments, making sure the consent form is completed properly and that the appropriate dose is administered, giving particular attention to radiation safety practices during the procedure.

**D. Interpersonal & Communication Skills:** Read and / or dictate films with the assistance and review of the faculty radiologist. Review all scans as they are performed for significant findings that require prompt attention, and make decisions in regard to notification of the referring physician if the faculty radiologist is not available for consultation.

**E. Professionalism:** Recognize limitations in personal skill and knowledge, always making sure dictations and consultations are checked by the faculty radiologist. Assist with preparation and presentation of cases for resident film review.

**F. Systems – Based Practice:** Describe the protocol for using I-131 for treatment of hyperthyroidism and thyroid malignancies, including protocol for release or hospitalization and monitoring of patients who receive over 33 mCi of activity.

## NUCLEAR MEDICINE

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### Rotation 3

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By the end of this rotation, the Resident should have improved their ability to:

**A. Patient Care:** Make preliminary decisions on all matters of film interpretation and consultation. Perform radiopharmaceutical therapy including management and evaluation of patients with hyperthyroidism, thyroid cancer, radioimmunotherapy of indolent lymphomas and use of unsealed radiopharmaceuticals for management of bone pain from metastatic disease, metastatic liver disease, brain tumors, arthritis and other emerging indications.

**B. Medical Knowledge:** Comment on anatomical findings, scanning technique, and reasons for doing the study to medical students in such a way that the students will be able to develop an appreciation for the value of nuclear radiology procedures in patient management. Understand clinical indications and basics of FDG metabolism.

**C. Practice Based Learning and Improvement:** Assist with radioactive therapy treatments, making sure the consent form is completed properly and that the appropriate dose is administered, giving particular attention to radiation safety practices during the procedure.

**D. Interpersonal & Communication Skills:** Review and dictate with the faculty radiologist all scans performed.

**E. Professionalism:** Identify normal and abnormal findings on all imaging and functional studies, other than nuclear cardiology studies.

**F. Systems – Based Practice:** Discuss all aspects of nuclear studies, including indications, pathologies, protocols, correlative studies, radiopharmaceuticals used for each study, and various parameters that might interfere with the results of the procedure.

## NUCLEAR MEDICINE

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### Rotation 4

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By the end of this rotation, the Resident should have improved their ability to:

**A. Patient Care:** Discuss patient conditions and patient monitoring requirements, particularly in relation to exercise and drug stress studies. Calculate patient doses, using information related to decay factors, volume concentration, and patient parameters.

**B. Medical Knowledge:** Demonstrate a thorough knowledge of the clinical indications, general procedures, and findings in: all requirements from previous rotations plus knowledge of multi-gated acquisition imaging and function studies, myocardial infarct imaging, and lymphoscintigraphy. Demonstrate knowledge of myocardial perfusion studies (rest and stress); Inject, monitor, and mark nodes for lymphoscintigraphy. Discuss the following information regarding all radiopharmaceuticals used in nuclear radiology studies: production and physical properties of isotopes; Generation elution and quality control; compounding of radiopharmaceuticals; Radiochemical quality control; Biodistribution and mechanisms of localization. Demonstrate thorough knowledge of PET CT protocols, clinical indications, findings, and clinical impact.

**C. Practice Based Learning and Improvement:** Demonstrate an in-depth understanding of the physics of nuclear radiology. Assist with radioactive therapy treatments, making sure the consent form is completed properly and that the appropriate dose is administered, giving particular attention to radiation safety practices during the procedure.

**D. Interpersonal & Communication Skills:** Describe the procedures and rationale for instrument quality control in nuclear medicine. Describe the radiopharmaceuticals used in cardiac nuclear studies, including the methods of red cell labeling, patient dosages, and physical properties of the isotopes discuss the range of invasive and noninvasive tests, test characteristics, and the prognostic value of tests used to evaluate cardiac disease.

**E. Professionalism:** Compound radiopharmaceuticals from kits and do appropriate quality control procedures. Elute a generator and do appropriate quality control procedures. Calculate and draw up patient doses. Demonstrate appropriate use of a survey meter to monitor radioactivity spills or other sources. Perform a wipe test. Perform quality control procedures on cameras, well/uptake probes, and dose calibrators. Handle radioactive sources according to the established guidelines. Select tests for evaluation for evaluation of cardiac disease on the basis of patient condition and clinical symptoms. Correlate the results from various tests with interpretation of nuclear cardiology exams.

**F. Systems – Based Practice:** Process computer data obtained in each of the different cardiac studies. Discuss rules and regulations that apply to the practice of nuclear radiology as outlined in 10CFR20 and other appropriate sources. Describe the types of records that must be

maintained in order to comply with federal and state guidelines for radiation safety and radioisotope receipt, use and disposal. Carry out the practice of nuclear radiology with due regard to quality control, quality assurance and radiation safety for patient and personnel.

## NUCLEAR MEDICINE

### *Required Reading, Topical Study Aids & Learning Resources*

- Essentials of Nuclear Medicine Imaging, 5<sup>th</sup> Edition 2006. Milton J. Guiberteau, Fred A. Mettler ISBN: 0721651216
- Nuclear Medicine: The Requisites, 3<sup>rd</sup> edition, 2006. James H. Thrall, Harvey A. Ziessman (Mosby) ISBN: 032300537
- Braunwald's Textbook of Cardiac, Nuclear Cardiology, Chapter 14.
- Diagnostic Imaging: Nuclear Medicine, 2007. Morton (AMIRSYS).
- ACR Syllabi

## PEDIATRIC RADIOLOGY

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### Rotation 1

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By the end of this rotation, the Resident should have improved their ability to:

**A. Patient Care:** Make preliminary review of outpatient and pediatric ICU films and discuss findings with the radiologist, then dictate as directed. Assist the technologist in preparation of the patient for fluoroscopic examination (e.g., enemas, etc).

**B. Medical Knowledge:** Identify normal and abnormal airways on chest x-ray of the infant or older child. Identify abnormalities associated with neonatal chest, including congenital heart. Identify normal variants on skeletal radiographs. Establish bone age on the basis of radiographic findings.

**C. Practice Based Learning and Improvement:** Identify normal vs. abnormal skeletal structures (esp. extremities on a bone survey). Describe the proper procedure for fluoroscopy of an infant / older child.

**D. Interpersonal & Communication Skills:** Assist with preparation and presentation of cases for conferences.

**E. Professionalism:** Recognize limitations in personal knowledge and skills, being careful to not make decisions beyond the level of personal competence.

**F. Systems – Based Practice:** Sit in on all reading sessions with the attending radiologist, including pediatric ICU and occasionally neonatal ICU.

## PEDIATRIC RADIOLOGY

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### Rotation 2

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By the end of this rotation, the Resident should have improved their ability to:

**A. Patient Care:** Describe positioning techniques and technical factors leading to optimum chest, abdomen, GI and GU radiographs of the infant and older child. Perform fluoroscopic procedures with the assistance of the radiologist.

**B. Medical Knowledge:** Understand normal anatomy of infants and children on cross-sectional images including CT and ultrasound. Add to knowledge base in chest radiology and congenital diseases of the heart through continued reading of films and case reviews. Increase the knowledge base of pathological processes based on cross-sectional imaging.

**C. Practice Based Learning and Improvement:** Review PICU and NICU films as they are done for completeness of study and for significant findings that require prompt attention and make decision in regard to notification of the referring physician if the radiologist is not immediately available for consultation.

**D. Interpersonal & Communication Skills:** Determine bone ages and dictate findings. Dictate films (esp. chest, abdomen, GI, GU) with assistance of the radiologist.

**E. Professionalism:** Assist with preparation and present cases at weekly pediatric conferences. Recognize limitations in personal knowledge and skills, being careful to not make decisions beyond the level of personal competence.

**F. Systems – Based Practice:** Sit in on all reading sessions with the attending radiologist, including pediatric ICU and occasionally neonatal ICU.

## PEDIATRIC RADIOLOGY

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### Rotation 3

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By the end of this rotation, the Resident should have improved their ability to:

**A. Patient Care:** Perform fluoroscopic exams unless complications are anticipated.

**B. Medical Knowledge:** Become proficient in plain radiographs of the chest, musculoskeletal system, and cross-sectional imaging of chest/abdomen/pelvis. Should have thorough understanding of various manifestations of intentional trauma. Should be well-versed with various pediatric malignancies. Should be able to identify congenital neurological anomalies, as well as manifestations of acute trauma.

**C. Practice Based Learning and Improvement:** Add to knowledge base in all areas of pediatric radiology through continued study, review of ACR cases and film reading.

**D. Interpersonal & Communication Skills:** Review and dictate, either alone or with the radiologist, pediatric outpatient and inpatient films and PICU and NICU films, making sure all work is checked by the radiologist prior to final reporting.

**E. Professionalism:** Make preliminary decisions on all matters of film interpretation and consultation, recognizing and obtaining assistance with situations that require the expertise of the radiologist.

**F. Systems – Based Practice:** Sit in on all reading sessions with the attending radiologist, including pediatric ICU and occasionally neonatal ICU.

## PEDIATRIC RADIOLOGY

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### Rotation 4

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By the end of this rotation, the Resident should have improved their ability to:

**A. Patient Care:** Perform fluoroscopic exams except when complications are anticipated.

**B. Medical Knowledge:** Should become familiar with pediatric Neuroradiology, pediatric malignancies, traumatic sequelae, and congenital gastrointestinal and genitourinary.

**C. Practice Based Learning and Improvement:** Add to knowledge base in all areas of pediatric radiology and mammography through continued study, review of ACR cases and film reading.

**D. Interpersonal & Communication Skills:** Review and dictate, either alone or with the radiologist, pediatric outpatient and inpatient films and PICU and NICU films, making sure all work is checked by the radiologist prior to final reporting.

**E. Professionalism:** Make preliminary decisions on all matters of film interpretation and consultation, recognizing and obtaining assistance with situations that require the expertise of the radiologist.

**F. Systems – Based Practice:** Sit in on all reading sessions with the attending radiologist, including pediatric ICU and occasionally neonatal ICU.

## PEDIATRIC RADIOLOGY

**Topical Study Aids & Learning Resources:**

- Pediatric Diagnostic Imaging, 11<sup>th</sup> edition. Caffey
- Radiology of the Newborn and Young Infant Swischuk
- Practical Pediatric Imaging Kirks
- Pediatric Neuro Imaging Barkovich

## ULTRASOUND

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### Rotation 1

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By the end of this rotation, the Resident should have improved their ability to:

**A. Patient Care:** Describe, from observation, the technique used to perform each of the routinely performed procedures.

**B. Medical Knowledge:** Discuss thoroughly the ultrasound procedures and findings in: Gallbladder / biliary tree ultrasound (cholelithiasis / cholecystitis); Genito-urinary ultrasound (obstruction / renal failure); Pelvic ultrasound (ectopic pregnancy); Cranial ultrasound (intracranial hemorrhage); Duplex Doppler (venous thrombosis of extremities); Right Lower Quadrant for Appendicitis; Trauma assessment for hemoperitoneum; Testicular torsion; Placental abruption; Embryonic demise; Incompetent cervix. Advise the technologist about special views or specific parameters of the study that required special attention. Develop scanning skills for each of the areas delineated above.

**C. Practice Based Learning and Improvement:** Record a pertinent history of the patient on the ultrasound worksheet. Discuss the basic ultrasound physics and instrumentation, especially related to equipment operation and the specifications for various probes.

**D. Interpersonal & Communication Skills:** Assist with the preparation and presentation of the noon ultrasound conference.

**E. Professionalism:** Give an ultrasound case, make a preliminary review of the images and advise the technologists when additional views or repeat views are needed.

**F. Systems – Based Practice:** Review histories of patients to be examined each day to determine the relevance of the study to clinical symptoms.

## ULTRASOUND

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### Rotation 2

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By the end of this rotation, the Resident should have improved their ability to:

**A. Patient Care:** Review all scans as they are performed for significant findings that require prompt attention.

**B. Medical Knowledge:** Demonstrate thorough knowledge of the ultrasound procedure through performing or assisting the sonographer with performance of the following studies: Liver / biliary tree (biliary obstruction / tumors); Pancreas (acute and chronic inflammatory process / tumors); Renal (transplant rejection / Doppler, tumors and inflammatory processes); Pelvis (uterine leiomyoma / ovarian neoplastic and non-neoplastic diseases); Cranial ultrasound (hydrocephalus / cerebral ischemia and infarction); Duplex and Color Flow Doppler (duplex sonography of carotids and abdominal structures).

**C. Practice Based Learning and Improvement:** Assist with preparation and presentation of cases for the ultrasound imaging conference. Make decisions in regard to notification for the referring physician if the faculty radiologist is not available for consultation.

**D. Interpersonal & Communication Skills:** Develop interpretive and reporting skills at the view box.

**E. Professionalism:** Given an ultrasound case, make a preliminary review of the images and advise the technologists when additional views or repeat views are needed.

**F. Systems – Based Practice:** Read and or dictate films with the assistance and review of the faculty radiologist.

## ULTRASOUND

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### Rotation 3

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By the end of this rotation, the Resident should have improved their ability to:

**A. Patient Care:** Make preliminary decisions on all matters of film interpretation and consultation and recognize the need to obtain assistance in situations that require the expertise of the faculty radiologist.

**B. Medical Knowledge:** Perform ultrasound guided procedures including : biopsy, drainage procedures, paracentesis, thoracentesis and amniocentesis.

**C. Practice Based Learning and Improvement:** Assist with preparation and presentation of cases for the ultrasound imaging conference. Make decisions in regard to notification for the referring physician if the faculty radiologist is not available for consultation.

**D. Interpersonal & Communication Skills:** Discuss all aspects of ultrasound imaging, including indications, pathology and correlative studies used for each examination.

**E. Professionalism:** Given an ultrasound case, make a preliminary review of the images and advise the technologists when additional views or repeat views are needed.

**F. Systems-Based Practice:** Review and dictate with the faculty radiologist all scans performed.

## ULTRASOUND

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### Rotation 4

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By the end of this rotation, the Resident should have improved their ability to:

**A. Patient Care:** Make preliminary decisions on all matters of film interpretation and consultation and recognize the need to obtain assistance in situations that require the expertise of the faculty radiologist.

**B. Medical Knowledge:** Perform ultrasound guided procedures including: biopsy, drainage procedures, paracentesis, thoracentesis and amniocentesis.

**C. Practice Based Learning and Improvement:** Assist with preparation and presentation of cases for the ultrasound imaging conference. Make decisions in regard to notification for the referring physician if the faculty radiologist is not available for consultation.

**D. Interpersonal & Communication Skills:** Discuss all aspects of ultrasound imaging, including indications, pathology and correlative studies used for each examination.

**E. Professionalism:** Given an ultrasound case, make a preliminary review of the images and advise the technologists when additional views or repeat views are needed.

**F. Systems – Based Practice:** Review and dictate with the faculty radiologist all scans performed.

## ULTRASOUND

### Topical Study Aids & Learning Resources:

- Ultrasound: Radiology Requisites Series  
William D. Middleton, Barbara S. Hertzbert, Alfred B. Kurtz.  
ISBN: 0323017029
- Diagnostic Ultrasound, 2 volume set, 3<sup>rd</sup> edition, 2005. Rumack, Carol; Wilson, S.; Charboneau, J. W.; Johnson, J. ISBN: 978-0-323-02023-7
- Ultrasonography in Obstetrics and Gynecology. Callen (Saunders)
- Clinical Applications of Doppler Ultrasound. Taylor
- Textbook of Diagnostic Ultrasonography. Hagen and Ansert
- ACR Syllabi

## SECTION XI – Recommended Reading

### General

Fundamentals of Diagnostic Radiology – William E. Brant, Clyde A. Helms

### Emergency Radiology / Call

(These books should be reviewed prior to or while taking night float duty)

Radiology of Emergency Medicine – William H. Harris, John H. Harris

Practical Nuclear Medicine - Palmer

Radiology of Acute Cervical Spine Trauma - Harris

Diagnostic Neuroradiology - Osborn

Radiology Review Manual - Dahnert

### Core Radiology Textbooks by Subspecialty:

#### Neuroradiology

Neuroradiology: The Requisites – Robert Grossman, David Yousem

Diagnostic Neuroradiology - Osborn

Cranial MRI and CT - Lee and Rao

#### Ultrasound

Ultrasound - The Requisites – Middleton, Hertzberg, Kurtz

Ultrasonography in Obstetrics and Gynecology - Callen

Female Pelvis - TA, TV

Female Pelvis, Obstetric - TA, TV

Scrotum / Testicles

RLQ

Abdomen

Head (Pediatric)

#### Gastrointestinal

Gastrointestinal - The Requisites - Halpert

Gastrointestinal Radiology: A Pattern Approach - Eisenberg

Double Contrast Gastrointestinal Radiology - Laufer and Levine

#### Genitourinary

Requisites in Radiology:

Genitourinary Radiology: Radiology Requisites Series - Ronald J. Zagoria

Essentials of Uroradiology - Amis

#### Musculoskeletal

Musculoskeletal Imaging: The Requisites – David May, David Disler, David Sartoris,  
B.J. Manaster

Fundamentals of Skeletal Radiology - Helms

Orthopedic Radiology: A Practical Approach - Greenspan

## **Night float Topics by Subspecialty:**

Fundamentals of Fluoroscopy – Michael Davis, Jeffrey D. Houston

UGI, BE, IVP - Adult

UGI, BE, IVP - Pediatric

Esophogram

Tube Check

Urethrogram

## **Computed Tomography:**

Fundamentals of Body CT – Clyde A. Helms, W. Richard Webb, William E. Brant

Head

Cervical/Thoracic/Lumbar Spine

Neck

Chest, Abdomen, Pelvis

## **Mammography**

Mammography: The Requisites – Debra Ikeda

## **Nuclear Medicine:**

Essentials of Nuclear Medicine Imaging – Milton J. Guiberteau, Fred A. Mettler

Practical Nuclear Medicine - Palmer

Nuclear Medicine: The Requisites – James H. Thrall, Harvey A. Ziessman

Lung Scans

G.I. Bleed Scans / Meckel's Scan

HIDA Scan

Testicular Scan

Renal Transplant Scan (rare)

Brain Death Scan (rare)

## **Chest**

Thoracic Radiology: The Requisites – Theresa McCloud

Chest Radiology: Plain Film Patterns and Differential Diagnoses – James Reed

## **Vascular**

Vascular and Interventional Radiology: The Requisites – Lee, Michael Lee, Kaufman

Vascular and Interventional Radiology – Karim Valji

## **Dictations**

Normal CT/MRI Finding – Torsten Moller, Emil Reif

Normal Finding In Radiology – Torsten Moller

**Miscellaneous**

Venograms - How to Perform and Read

Contrast Reaction Protocol

Contraindications to IV Contrast; Dosage in Pediatric Population

**Plain Films:**

Cervical Spine Including Conventional Tomography